Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Volume 3: Appendices

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Appendix 1.1: EIAR Team Competencies

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A1 EIAR Team Competencies

Role	Name	Company	Experience	Professional Qualifications	Professional Affiliations	Overview
Ch 1 Introduction Need for Scheme Ch 3 Description Ch 18 Population & Human Health Ch 19 Material Assets Ch 20 Major Accidents Ch 21 Cumulative and Interactive Effects Ch 22 Summary	Clodagh O'Donovan	Arup	25 years	BE, University College Cork MEngSc, University College Dublin	CEng, FIEI, FConsEI, MCIWEM, C.WEM	Clodagh is the Planning Service Team Lead for Arup Ireland. Clodagh has significant experience in the management and delivery of complex multidisciplinary projects, with particular experience in the EIA, AA and statutory consent process.
	Ailsa Doyle	Arup	4 years	BSc. Environmental Planning and Management	PIEMA	Ailsa has a BSc in Environmental Planning and Management and has been working in the capacity of Environmental Consultant for four years. Ailsa has assisted in the coordination of a number of Environmental Impact Assessments in this time, and has developed a speciality in Strategic Environmental Assessment.
Ch 2 Alternatives	Rob Keane	Reddy A+U	25 years	B Arch UCD 1994 PSDP RIAI Accredited 2012	Chartered Member of the Institution of Structural Engineers and Engineers Ireland	Rob Keane is a registered Architect B. Arch MRIAI RIBA Managing Director of Reddy Architecture and Urbanism with 25 years' experience in practice.

Role	Name	Company	Experience	Professional Qualifications	Professional Affiliations	Overview
						In this period Rob has contributed to and provided reports for EIAR/EIA's including the State's first successful Strategic Housing Development (SHD) application and over 12 large scale mixed use projects – including Heuston South Quarter, Dublin 8 (110,000m^2 mixed use development), Connolly Station Quarter, Dublin 1 (65,000m^2 mixed use development), Herberton Dublin 8, (60,000m^2 mixed use development), UCD Student Residences – (65,000m^2) which are relevant to this project.
Ch 4 Construction	Sean Barret	Arup	21 years	BE (Civil) MIStructE MIEI CEng	Chartered Member of the Institution of Structural Engineers and Engineers Ireland	Sean is a Chartered Structural Engineer with over 20 years' experience in the design of civil structures and buildings. Seán has been involved in a wide range of Structural and Civil Engineering work, including University buildings, Deep Basement Construction, Concert Halls, Residential and Office developments.

Role	Name	Company	Experience	Professional Qualifications	Professional Affiliations	Overview
						He has extensive experience in delivery of Public and Private projects through traditional and Design & Build Contracts.
Ch 5 Planning and Policy	Stephen Little	Stephen Little and Associates, Chartered Town Planners and Development Consultants	27 years	Dip Env. Mgmnt, Dublin Institute of Technology BA(Hons) T.P., Oxford Brookes University Dip T.P., Oxford Brookes University Dip EIA. Mgmnt, University College Dublin	MRTPI MIPI	Stephen is the Managing Director of Stephen Little and Associates. Stephen has significant experience in the management and delivery of complex multidisciplinary projects, with particular experience in Town Planning and EIA.
Ch 6 Traffic	Tiago Oliveira	Arup	21 years	Licenciatura (5-year degree) in Geography and Urban Planning	CMILT, Member of Academy of Urbanism, MTPS	Tiago is an Arup Project Manager on various transportation projects, and provides traffic and transportation advice for a number of projects in which Arup is involved in Ireland and elsewhere in the world.

Role	Name	Company	Experience	Professional Qualifications	Professional Affiliations	Overview
						Throughout his career, Tiago has gathered relevant experience in different areas of Transport Planning, including Traffic and Transportation Assessments, Masterplanning, Streetscape Design, Sustainable Transport and Transport Strategies.
Ch 7 Air Quality Ch 8 Climate	Sinéad Whyte	Arup	23 years	BSc, MSc – Experimental Physics, 1996 Diploma Acoustics and Noise Control, 2009	MCIWEM, IOA	Sinéad Whyte is an Environmental Scientist and an Associate and Senior Environmental Consultant with Arup in Dublin. Since joining Arup in 2000, Sinéad has taken on the role of Project Manager for a wide variety of environmental assessments of plans and projects.
	Cormac McKenna	Arup	6 years	BSc Civil Engineering MSc Environmental Engineering	MIEI	Cormac holds an M. Sc in Environmental Engineering and has over 6 years' experience working in the Environmental Consulting group in Arup. Cormac has specialist expertise in noise modelling, air dispersion modelling and has contributed to a range of Environmental Impact Assessments and Industrial Emissions licence applications for major projects.

Role	Name	Company	Experience	Professional Qualifications	Professional Affiliations	Overview
						He has experience in room and building acoustics modelling and assessment.
	Stephen Smyth	AWN Consulting	16	BAI, PhD Mechanical & Manufacturing Engineering - Trinity College Dublin	Member - Institute of Acoustics Member – Engineers Ireland	Stephen has extensive experience in prediction and assessment of environmental noise from transport (road, rail & air) industrial, commercial, and residential developments. Other projects include inward noise impacts of road and rail schemes on proposed developments, planning applications and architectural acoustic projects.
Ch 10 Biodiversity	Ger O’Donoghue	Moore Group	25 years	B.Sc. – Applied Freshwater & Marine Biology M.Sc. – Environmental Science		Ger has over 25 years’ experience as an environmental consultant with particular experience in the planning and management of EIARs. His primary role in Moore Group is as Principal Ecologist in the management and compilation of EIARs and undertaking Ecological Impact Assessments of the terrestrial and aquatic environments of any particular development.

Role	Name	Company	Experience	Professional Qualifications	Professional Affiliations	Overview
Ch 11 Archaeology & Cultural Heritage	Dr Clare Crowley	Courtney Deery	20 years	B.A. (Hons) – Archaeology & Geography PhD - Archaeology		Dr Crowley has 20 years' experience in the fields of archaeology, built heritage and cultural heritage. Dr Crowley has considerable experience in the management of the cultural heritage component of EIAs for road schemes and motorway service areas.
Ch 12 Architectural Heritage Ch 13 Landscape and Visual	Bill Hastings	ARC Consultants	49 years	B.Arch UCD 1970, 1st Honours Fellow of the RIAI RIAI accredited Grade 1 Conservation Architect Former Lecturer in Architecture, University College Dublin	Member of ICOMOS Ireland Member of the ICOMOS National Scientific Committee on Cultural Tourism	Bill is an Architect, Fellow of the Royal Institute of the Architects of Ireland and RIAI Grade 1 accredited Conservation Architect, with almost fifty years' experience working in architecture and architectural services in Ireland, the UK and overseas. He has particular experience in conservation, measured survey and recording, digital modelling & photomontage and environmental impact assessment.
Ch 14 Water	Kevin Barry	Arup	15 years	BE Civil & Environmental Engineering MEngSc Civil & Environmental Engineering Chartered Engineer	CEng MIEI	Kevin Barry is a Senior Chartered Engineer working in the Dublin office as a senior member of the water team.

Role	Name	Company	Experience	Professional Qualifications	Professional Affiliations	Overview
						Kevin has significant experience of flood risk management in Ireland, and has undertaken a significant number of flood risk assessment studies to support the planning applications of various developments for a range of clients across both the public and private sector.
Ch 15 Land Soils Ch 16 Hydrogeology	Eoin Wyse	Arup	14 years	BSc (Hons)	EurGeol, PGeo	Eoin is a Senior Engineer in the Applied Geology sub-group of the Ground Engineering group in the Irish practice. Eoin has experience in a number of contaminated land projects and has particular skills in ground investigation, risk assessment, waste categorisation and Environmental Risk Assessment.
Ch 17 Resource Waste	Chonaill Bradley	AWN Consulting	5 Years	BEnvSc	GradMCIWM	BSc (Environmental Science) and is a Graduate Member of the Institute of Waste Management (GradCIWM).

Role	Name	Company	Experience	Professional Qualifications	Professional Affiliations	Overview
						He is a Senior Environmental Consultant in AWN and has over 5 years' experience in environmental consultancy experience with 3+ years in waste management. He has helped coordinate and prepare multiple specialist inputs and EIAR chapters including the Waste Management Chapters, Operational and C&D Waste Management Plans for numerous EIS/EIA/EIAR's.
	Elaine Neary	AWN Consulting	16 Years	BA (Natural Sciences), MApplSc. (Environmental Science)	MCIWM	Elaine Neary, BA (Natural Sciences), MApplSc. (Environmental Science) and is a Chartered Member of the Institute of Waste Management (MCWIM). She is an Associate in AWN and has over 16 years' experience in environmental consultancy with extensive experience in Waste Management and Environmental Impact Assessment. She has project managed, coordinated and prepared specialist inputs including the Waste Management Chapters,

Role	Name	Company	Experience	Professional Qualifications	Professional Affiliations	Overview
						Operational and C&D Waste Management Plans for numerous EIS/EIA's.

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Appendix 2.1: Alternative Site Layouts

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ALTERNATIVE SITE LAYOUTS - MASSING

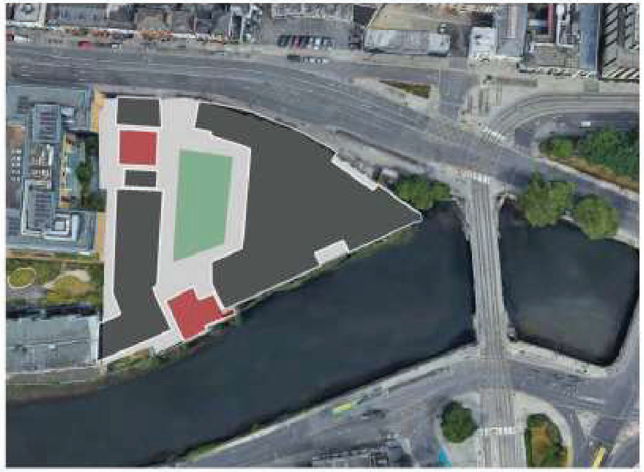
Site Layout

The subject site has some clear constraints, such as views to the Wellington Monument, the various protected structures, and the requirement to provide a significant area of public realm. From the outset, these constraints have determined the zones within the site that are considered suitable for development, and the zones that are considered suitable for public open space.

The following pages will demonstrate the various options that have been considered within the site constraints, including location of uses, massing, height, and retention/ demolition of protected structures.

Massing Option 1

- Creates a central open space
- Seeks to retain all existing structures including Parkgate House
- Provides permeability to river edge
- Long linear elevation to Parkgate Street



Massing Option 2

- Maximises the retail footprint at ground floor
- Places significance to the stone warehouses
- Modulates the streetscape to Parkgate Street

Massing Option 3

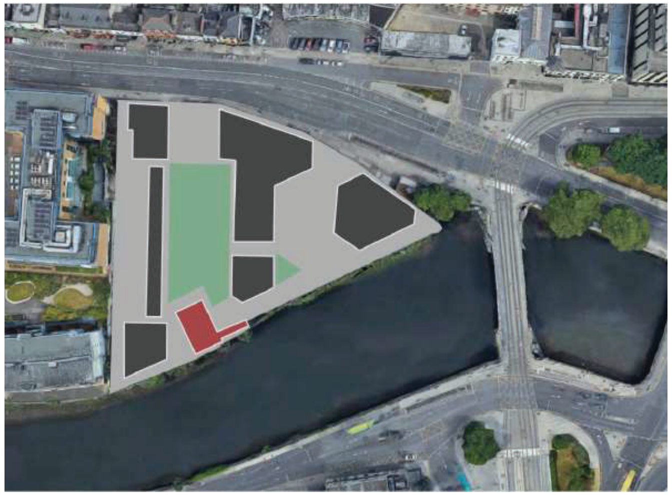
- Building form is three independent linear finger blocks
- A more permeable and legible footprint
- Daylight penetration and sunlight is significant to open spaces

ALTERNATIVE SITE LAYOUTS - MASSING

Site Layout

As the scheme developed with each iteration, there were significant improvements in the key design drivers:

- To create a visual and physical connection between Parkgate Street and the River Liffey through the lands by integrating significant heritage elements such as the river boundary wall, the stone arch and the stone warehouse structures.
- To identify this signature location with a landmark building to the East of the site at the confluence of the river and the Bridge whilst respecting the views to the Wellington Monument.
- To harness the potential of this city centre location with a high-density residential scheme with significant public realm and appropriate employment uses
- To maximise the public facing uses at lower levels to activate the street scape onto Parkgate Street



Massing Option 4

- Defines the footprint of a vertical element to the eastern apex
- Building form and massing adopting a more organic footprint
- Provides increased permeability to river edge
- Much more broken down edge to Parkgate Street

Massing Option 5

- Develops the permeability between the "fingers"
- Improves the legibility of the public realm and the street
- Better urban form to existing Parkgate Apartments and Offices to the west

Plan Form

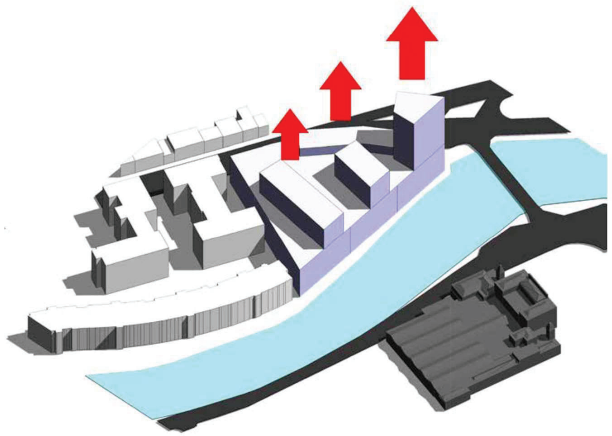
- Retains Parkgate House
- Shared living to Parkgate street in a linear block
- Three fingers of development to the central plan form
- Low level building form to River Liffey edge

ALTERNATIVE SITE LAYOUTS - FORM

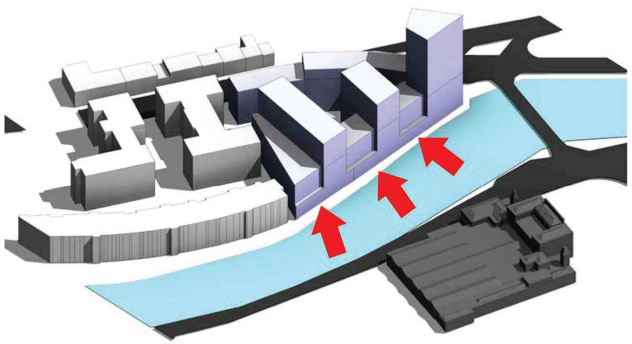
Site Layout

The subject site has some clear constraints, such as views to the Wellington Monument, the various protected structures, and the requirement to provide a significant area of public realm. From the outset, these constraints have determined the zones within the site that are considered suitable for development, and the zones that are considered suitable for public open space.

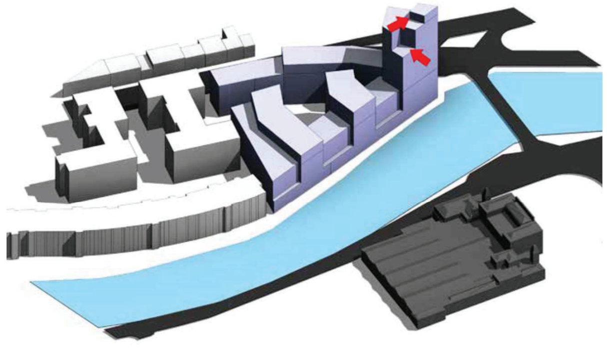
The following pages will demonstrate the various options that have been considered within the site constraints, including location of uses, massing, height, and retention/ demolition of protected structures.



• Creation of three linear blocks rising from a plinth to the river



• Creation of edge to Parkgate Street and courtyard internally to urban block



•Modulation of vertical elements to create visual interest

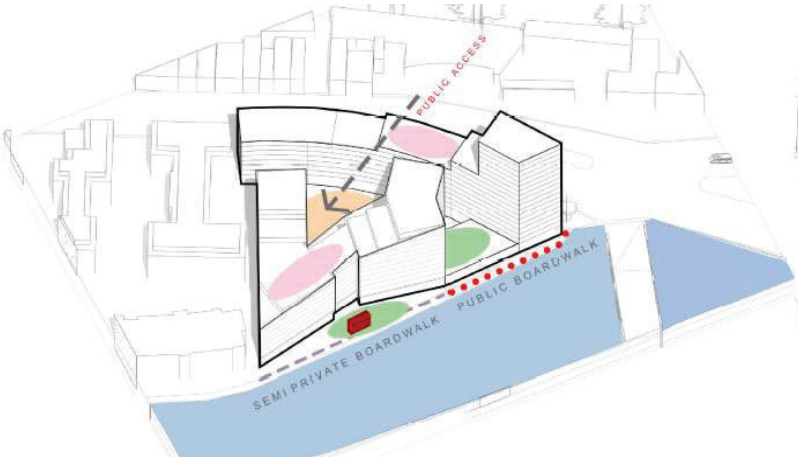
Plan Form

- Retains Parkgate House
- Ground Floor Uses onto Parkgate Street are developed
- Building form onto River is fractured for visual and physical connection

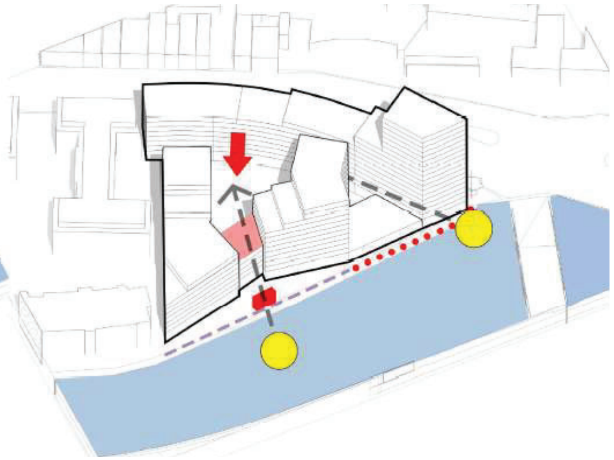
ALTERNATIVE SITE LAYOUTS - FORM
Plan Form

Modulating the site arrangement arising from interactions with DCC and the day-light sunlight studies resulted in a fractured edge to the River Liffey to open up the internal areas to the south light.

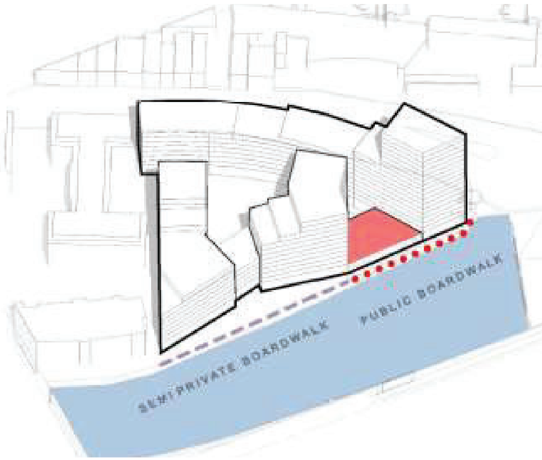
Significance of public realm became a driving elements and a desire to separate the private courtyard spaces and the accessible new public realm areas.



• Separation of private and public open space



• Fracturing the block to facilitate better sunlight and daylight penetration to the courtyard spaces

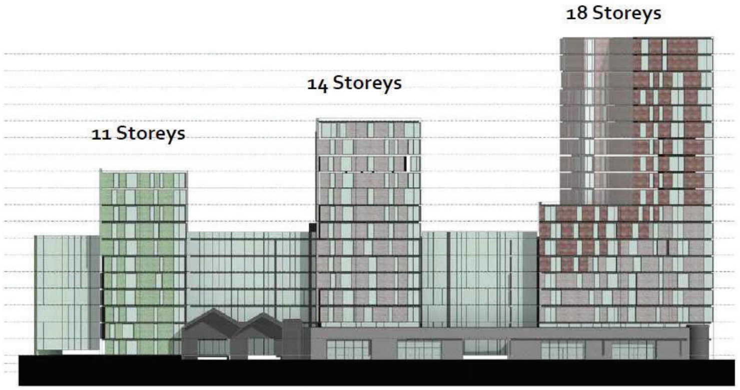


•Modulation of vertical elements to create visual interest

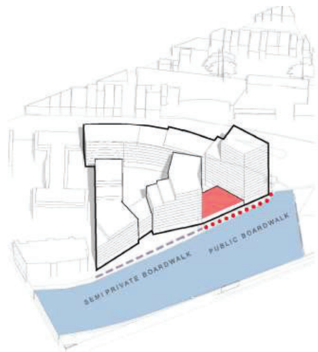
ALTERNATIVE SITE LAYOUTS
Height Studies

Developing the scheme in height across the site from west to east was one of the earliest studies. A series of drawings to aid the visual and physical appearance of future development from the southern edge were prepared.

The natural barrier of the river provides a set back and context of the River Boundary Wall to any development option and it was noted that perception of the scheme from this area would be critical to any successful design iteration.



Elevation facing the Liffey



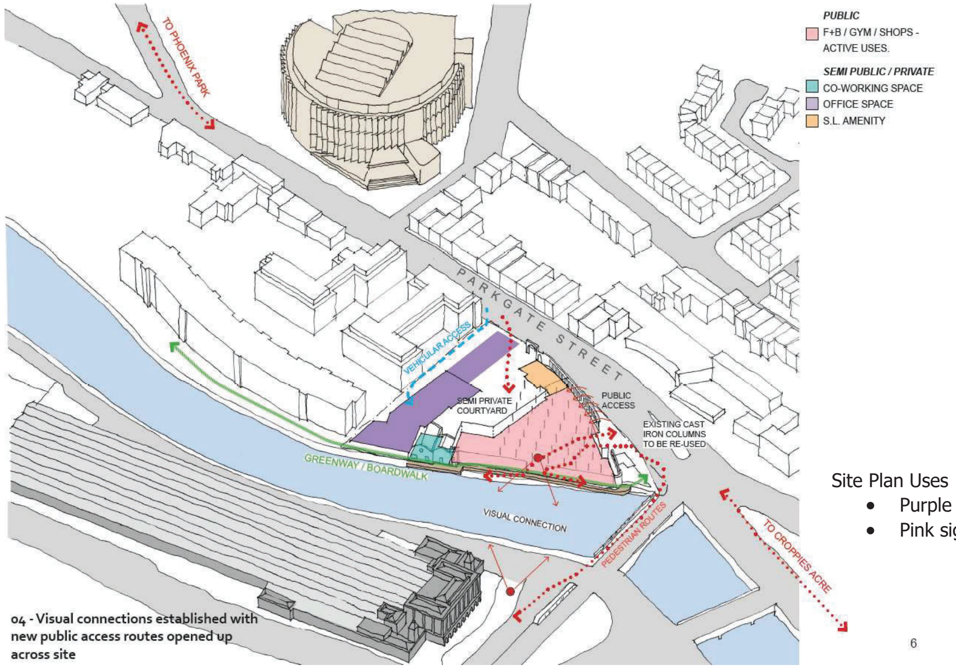
Public Plaza [First Floor]

- South Facing
- Overlooking River
- Landscaped / seated area
- Possible location for Coffee / Kiosk

ALTERNATIVE SITE LAYOUTS
Site Uses

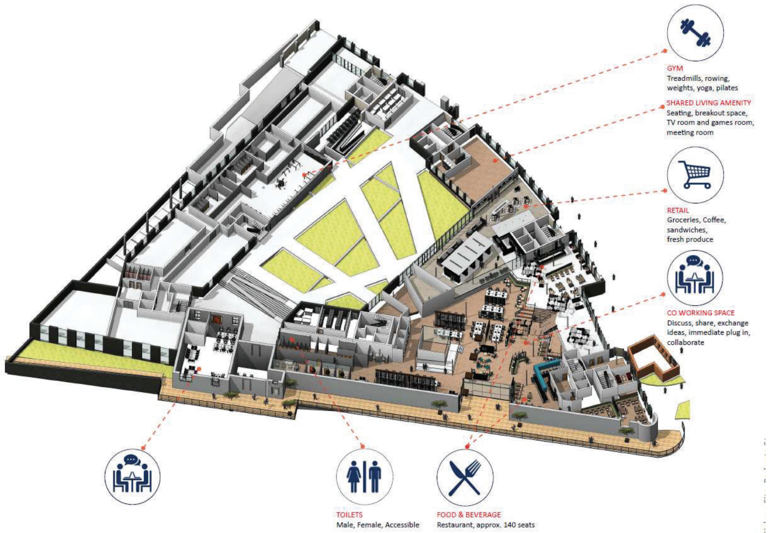
Early schemes south to create a significant ground floor use – market or similar with a raised podium for public access.

This had inherent issues with access due to the change in level and also created a dense ground floor instead of external public realm. This lead to an emergence of a conflict between private and public space and a disconnect between the two.

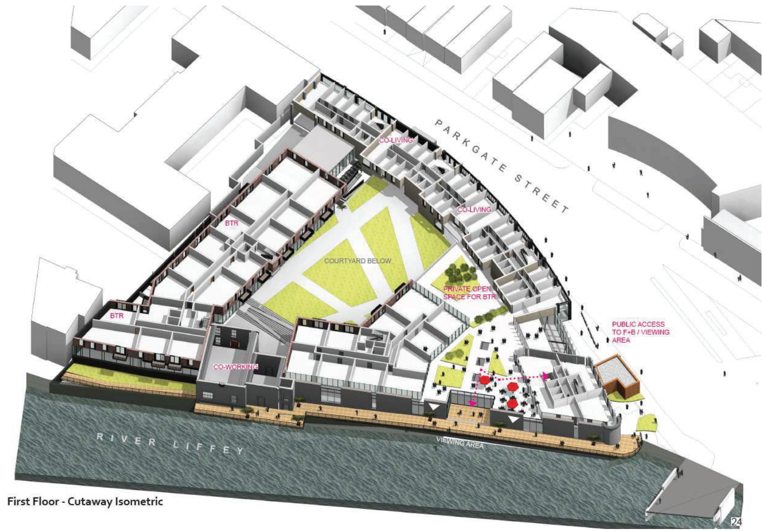


Site Plan Uses

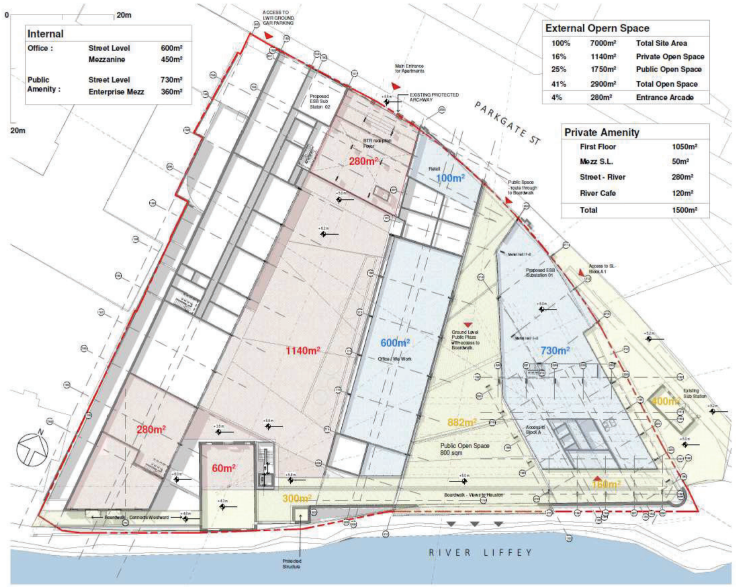
- Purple signifies commercial uses
- Pink signifies large open plan market/co working space



Ground Floor uses define a significant private realm for the development



Public realm is located at a podium deck accessed through the market building or from Parkgate Street.



ALTERNATIVE SITE LAYOUTS
Site Layout

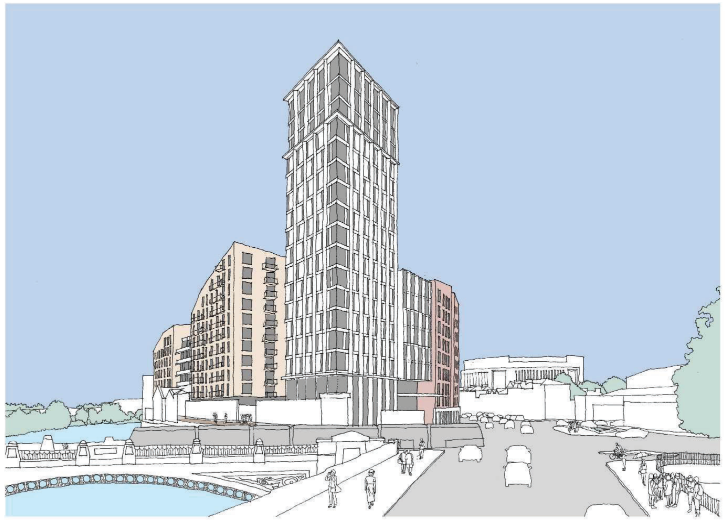
The developing design and workshops with DCC Planning Department lead to a more defined "finger" arrangement which divided spaces into public and private realm.

The stone archway onto Parkgate Street becomes a central feature of the scheme and frames the entrance and views to the stone warehouses onto the river edge.

Site Plan

- Does not retain Parkgate House
- 2 major spaces created – one public one private
- Building form onto River is now much more permeable

• Height Study onto Parkgate Street



• Height study of vertical elements to the apex of the site

Landmark Tower Building - Options Considered

1.

2.

3.

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Appendix 4.1: Construction Environmental Management Plan

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1 Introduction

Ruirside Developments Ltd. intend to apply for permission to develop apartments, commercial office, retail and café/restaurant floorspace at the Hickey's site, 42A Parkgate Street, Dublin 8.

The proposed development is a mixed-use residential and commercial scheme comprising 'Build to Rent' residential units with associated residential amenities and facilities, commercial office and café/ restaurant floor space. The proposed development involves demolition and retention of a number of existing structures at the site, and construction of the mixed use residential and commercial scheme, which will include a 29-storey tower on the eastern corner of the site.

Arup has prepared this Construction Environmental Management Plan (CEMP) for the proposed development at the Hickey's site. The purpose of this CEMP is to provide a framework that outlines how Ruirside and any contractor appointed will manage and, where practicable, minimise negative environmental effects during the construction of the proposed development. Construction is considered to include all site preparation, enabling works, materials delivery, materials and waste removal, construction activities and associated engineering works.

This CEMP identifies the minimum requirements with regard to the appropriate mitigation, monitoring, inspection and reporting mechanisms that need to be implemented throughout construction. Compliance with this CEMP does not absolve the contractor or its sub-contractors from compliance with all legislation and bylaws relating to their construction activities.

This CEMP has been produced as part of the Environmental Impact Assessment Report (EIAR).

2 Overview

This CEMP provides a framework to:

- Provide an overview description of the construction strategy (Section 3)
- Outline an indicative programme for construction (Section 4);
- Describe the land-use requirements of the construction phase (Section 5);
- Outline the employment requirements, roles and responsibilities associated with the construction phase of the proposed development (Section 6 and Section 7);

- Outline all the measures which shall be implemented by the appointed contractor to ensure that no significant effects on the environment occur during the construction phase of the proposed development (Section 8 and Section 9).

It is intended that this CEMP would be expanded and updated by the contractor prior to the commencement of any construction activities on site.

Following appointment, the contractor will be required to develop more specific Method Statements and submit a more detailed (bespoke, contract-specific) CEMP that is cognisant of the proposed construction activities, equipment and plant usage and environmental monitoring plan for the proposed development. This CEMP should not be considered a detailed Construction Method Statement as it would be the responsibility of the contractor, appointed to undertake the individual works, in association with Ruirside Developments Ltd., to implement the mitigation measures described in the CEMP in more detail, by adopting appropriate procedures and in progressing this documentation prior to commencement of construction.

This CEMP outlines the range of potential types of construction methods, plant and equipment which may be used by any contractor appointed in order to enable their impacts to be assessed by the competent authority for the purposes of the environmental impact assessment and appropriate assessment prior to determining whether to grant planning permission.

3 Construction Strategy

As described in **Section 1**, the proposed development involves demolition of a number of existing structures at the site, and construction of the mixed-use scheme, which will include a 29-storey tower on the eastern corner of the site.

This section describes the key elements of the construction phase of the proposed development.

3.1 Phase 1- Enabling Works and Demolition

3.1.1 Preparation Works

A survey of the buildings and local surroundings will be carried out. This will identify the detail of the buildings' construction and all services on the site. Site investigation pits and boreholes will be excavated to establish the soil condition.

Movement, vibration, and dust monitors will be put in place.

Refer to **Section 4.1** below for further information on site preparation works.

3.1.2 Service Disconnections and Diversions

Utilities such as ESB, Gas, IT, and water will be disconnected, and the services terminated from entering the site. Disconnections will be phased corresponding to the proposed progress of demolition and construction works on site.

The existing sprinkler system within the Hickey's warehouse will be emptied with the water contained therein discharged to sewer at a controlled rate in agreement with Irish Water.

There are a number of above and under-ground fuel tanks located around the site. The tanks will be disconnected, and all associated pipework made defunct and stripped out during the demolition phase. Any fuel contained within the tanks and associated pipework will be emptied and disposed of appropriately.

The site is relatively free of services, with the services encountered within the site curtilage serving the buildings to be demolished. These services will be made defunct and stripped out during the demolition phase. Primary services and utilities are beneath the adjoining road network and not in direct proximity to the site.

Where the excavation strategy or temporary works require any temporary diversion of local services or utilities on the site perimeter, this would be undertaken with prior agreement of the relevant service provider.

The Contractor may seek agreement with Irish Water for a foul connection on Parkgate Street for the site compounds and welfare facilities. Alternatively, foul waste may be removed by tanker and disposed of off-site at an appropriately licensed facility.

3.1.3 Asbestos removal

An asbestos audit will be carried out on the buildings scheduled for demolition prior to demolition works. Any asbestos discovered will be removed by a Specialist Contractor in accordance with *Safety, Health, and Welfare at Work (Exposure to Asbestos) Regulations 2006/2013*[1], and disposed of by specialist contractors to an appropriately licensed facility. Traceable records of this activity, including the disposal licence, will be kept. Following the asbestos removal, a soft strip of the building will be carried out to remove wiring, ceiling tiles, electrical fittings, mechanical plant, fixtures, etc.

3.1.4 Erection of scaffolding along demolition perimeter

Scaffolding will be erected around each building to be demolished. This scaffolding will be clad in Monarflex to control dust, light debris, and light from the site.

[1] Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013). Available: https://www.hsa.ie/eng/Legislation/New_Legislation/SI_291_2013.pdf Accessed: 29/10/19.

There will be consultation with neighbouring stakeholders to agree measures along the western boundary and near the eastern boundary, where there may be certain requirements, e.g. type of netting to be used in lieu of Monarflex for visual impact.

3.1.5 Demolition of the existing structures

A detailed demolition plan will be developed in due course by the appointed specialist demolition contractor which will take account of any particular requirements of the planning permission. Detailed proposals will depend on the expertise and plant available to the demolition specialists selected to undertake the demolition and will be set out in the Demolition Specification during the project delivery phase. It is envisaged that existing structures will be demolished in the reverse order from how they were constructed.

Following a soft strip of the building comprising removal of finishes, electrical fittings, wiring, mechanical plant, fixtures, fittings, etc., the structural frame will be demolished. All substructures and foundations will be grubbed up to an approximate depth of 1.8m below existing ground level. Underground tanks and other buried structures shall be removed in advance of piling mat construction.

3.1.6 Demolition waste generation

Demolition waste is expected to comprise of concrete, masonry, stone, metals and glass. These wastes will be segregated where possible for reuse or recycling in accordance with the relevant legislation and guidelines. In addition, it is likely that some plastics, cabling, and mixed non-hazardous demolition waste will also be generated.

3.1 Phase 2- Piling and Groundworks

3.1.1 Piling Mat

The piling mat will be formed at existing site levels and will comprise of a combination of imported granular material and site-won crushed concrete and rock material. The piling specialist shall clearly delineate the areas of pile mat constructed in the different sourced materials to enable appropriate removal in future.

Prior to construction of the pile mat, the formation shall be prepared, and a separation geotextile membrane installed. The pile mat material shall be appropriately compacted in layers in accordance with the Piling Specialist requirements.

3.1.2 Piling

The foundations are envisaged to be continuous flight auger (CFA) piles to Buildings B and C, and bored rock socketed piles to Building A. The piles shall support reinforced concrete pile caps and piled rafts under the stability cores.

It is anticipated that the respective piling rig shall install piles from a pile mat datum close to existing ground level. Arisings from the pile installation shall be appropriately disposed off-site to a licensed facility.

A temporary retention structure is required in the vicinity of the existing Protected Arch to facilitate the bulk excavation of the basement. This will comprise of either sheet piles or king-post construction and will be monitored for movement throughout the substructure works. The retention structure shall be removed upon achievement of the appropriate concrete strength in the ground floor slab construction.

Subsequent to the bulk excavation of the basement, the constructed piles in this area will be broken down to proposed foundation datum level using an excavator with hydraulic breaker attachment.

3.1.3 Groundworks

The outline Construction Waste Management Plan (CWMP) contains more detailed information regarding the minimising of stockpiling of excavated material on site. Excavated material generated by the construction works shall be appropriately assessed for possible re-use on site, where possible, through various accommodation works. Surplus material will be immediately removed from site. The groundworks external to the buildings will comprise installation of precast retaining walls along the existing River Liffey boundary to facilitate build-up of ground to proposed finished levels.

Refer to **Sections 6 and 7** for information on vehicle movements during the bulk excavation.

Refer to **Section 6** for information on stockpiling of site-won material.

3.1.4 Dewatering

Dewatering may be required for local excavations, such as pile cap or lift pit locations. Any local dewatering is to be discharged to the River Liffey by agreement with the Local Authority and will include necessary treatment as required, such as silt traps and settlement tanks. Alternatively, dewatering may be reinjected to the subsurface through a number of wells or injection points across the site. Similar treatment measures will be adopted prior to reinjection. Local dewatering is likely to be necessary for only a portion of the construction programme, approximately 20 weeks.

3.1.5 Surface Water Run-Off

Existing surface water drainage on the site discharges to the River Liffey. It is envisaged that one of the existing surface water discharge points shall be maintained for the duration of the works, subject to Local Authority agreement. All other existing surface water discharge points to the River Liffey shall be decommissioned.

Appropriate settlement tanks and silt traps shall be incorporated to capture any excess silt in the run-off. Refer to **Section 10.1.9** for further detail on surface water management measures.

The Contractor shall employ measures to ensure surface water run-off from Parkgate Street does not enter the site.

3.2 Phase 3- Main Construction Works

3.2.1 Substructure

The substructure generally consists of a reinforced concrete slab supported on reinforced concrete pile-caps. The stability core walls are supported on reinforced concrete piled raft foundations. The pile-caps and piled rafts for works at grade will be shuttered with formwork and the concrete cast. Upon removal of the formwork, the areas between the foundations will be built-up with site-won material.

In the basement area, the bulk dig datum will be the formation level of the foundations. This will mean the method of constructing the pile-caps and piled rafts in the basement will be similar to that at grade.

There will be an open dig to the basement area, with localised retention works at existing structures. The rising perimeter walls will be constructed with two-sided shutters, propped in position, and supported off the basement slab.

3.2.2 Superstructure

The superstructure of Building A is cast in-situ concrete. The stability core walls will be constructed by jump-formwork technique. Columns and slabs will be conventional reinforced concrete flat slab construction. The proposed external envelope comprises either prefabricated or precast panels, hence most of the fabrication will occur off-site at supplier premises.

The superstructures of Buildings B and C are in-situ concrete up to and including Level 1. Thereafter, the superstructure is precast concrete. The proposed façade comprises lightweight cold form steel sections to the inner leaf façade, with the external leaf constructed in masonry and supported from relieving angles and lintels. Scaffolding around the building exterior shall be necessary for construction of the masonry outer leaf and will remain in place until completion of the façade. Prefabricated balcony structures shall be lifted into position and fixed into cast-in connection points.

The precast elements are large components and require substantial vehicle movement on site for deliveries. Vehicles will be standard multi-axle flat back trucks delivering less than 40 tonnes each trip and typical for a building of this scale. There will be in-situ concrete work requiring regular deliveries of premixed concrete and formwork materials.

The construction works will require the use of tower cranes on site. The cranes will be required for the moving of building materials on site, such as formwork for concrete, reinforcement, precast concrete, steelwork, façade, plant, and general building materials. The use of mobile cranes may be adopted to assist in the installation of the façade and plant.

3.2.3 Existing Structures

The following structures are included in the Record of Protected Structures (RPS 6320) and are to be retained as part of the new development: riverside stone wall; turret at eastern end of site; square tower on the riverfront; and entrance stone arch on the Parkgate Street frontage. The River Liffey Building to the west of the River Liffey wall (not a protected structure) is also to be retained and adapted for re-use within the scheme.

The majority of the works to the River Liffey wall will be land based. However, some works from the River Liffey may be necessary, such as vegetation removal and pointing repair of mortar. The Contractor will obtain a Foreshore Licence for temporary scaffolding erection in the River Liffey to facilitate the works, should this be necessary, and the associated Stakeholder engagement shall include liaison with Inland Fisheries Ireland (IFI). The Foreshore Application will involve submission of a Method Statement for the works, which will be prepared with input from a suitably qualified Ecologist.

Entrance Stone Arch

The existing arch is a stonework arch structure. Refurbishment works will comprise stonework repair and pointing repair of mortar. In some instances, the stonework is delaminating at the surface and localised replacement will be necessary. All superfluous embedded metal work shall be removed, and the substrate made good with matching stonework and mortar.

Scaffolding shall be erected to all sides of the arch to facilitate refurbishment works.

Turret

The existing turret is a stonework structure. All vegetation growth will be removed. Refurbishment works will comprise local stonework repair and pointing repair of mortar. In some instances, the stonework will require local stitching with helical ties. All superfluous embedded metal work shall be removed, and the substrate made good with matching stonework and mortar. Some of the capping at parapet level may need replacement.

Square Tower

The existing tower structure comprises stonework construction at lower level and brickwork at upper level. All vegetation growth will be removed. Refurbishment works will comprise local structural fabric repair and pointing repair of mortar. In some instances, the structural fabric is delaminating at the surface and localised replacement will be necessary. All superfluous embedded metal work shall be removed, and the substrate made good with matching stonework and mortar.

The internal metal work to be retained shall be shot blasted in situ and a new protective paint finish applied. The existing timber roof structure shall be retained, subject to condition assessment, but new roof finishes shall be installed.

Riverside Stone Wall

The existing riverside stone wall comprises stonework above high-tide level, and colloidal concrete below. The foundations of the river wall are also comprised of stonework. There is a separate internal brick wall that constitutes part of the adjacent Warehouse structure to the north of the riverside stone wall; this separate wall being shorter than the riverside stone wall and stopping short of its eastern end.

The quay wall supports timber rafters from the edge of the roof of the adjacent warehouse building, which span from the adjacent internal Warehouse brick wall described above.

The existing riverside stone wall will be fully propped by temporary works, which will be removed upon installation of the permanent lateral restraint (after the Level 1 slab construction has been cast). The build-up in ground levels will result in new retaining structures installed at the north side of the riverside stone wall.

The proposed elevation of the wall comprises new opening modifications, which will be either broken-out or saw-cut. Some re-building of the openings will be necessary, and the openings will be redressed and strengthened as required with new structural framing to align with the final design features described in the Alternative Chapter of the EIAR which accompanies this planning application.

All vegetation growth on the River Liffey side will be removed. In some instances, the stonework will require local stitching with helical ties. All superfluous embedded metal work shall be removed, and the substrate made good with matching stonework and mortar. Some of the capping at parapet level may need replacement.

A new surface water discharge point for the development will be constructed in the wall. The proposed surface water management measures have been agreed with Dublin City Council (DCC) Drainage Division, with various SuDS measures incorporated to satisfy their drainage requirements for a minimum two-stage treatment train approach. The majority of the works to the wall will be land based.

Gabled Industrial Buildings on the River Front

The existing gabled industrial buildings on the River front are double height structure comprising a combination of stonework and brickwork walls. It is intended to retain the larger of the two gabled buildings and the River façade of the smaller gabled building In the larger gabled building there is a mezzanine floor at differing levels. The original mezzanine structure over part of the building consists of concrete floors supported by steel and cast iron beams. It appears that the remaining mezzanine was infilled with timber construction at a later date. The roof finishes are supported on timber sarking boards, which are supported by ironwork trusses. Window and door heads are generally supported by concrete lintels, but some comprise of steel or cast-iron beams.

Modifications to the existing structural fabric for larger openings have been formed by a combination of wrought iron and steelwork members, depending on the time of interventions.

The works to the larger gabled building will comprise the removal of the existing roof finishes, demolition of mezzanine structures, removal of most internal walls and removal of the existing ground bearing concrete floor slab. Any made ground below the slab will be removed and new fill material placed and compacted for supporting a new ground bearing concrete slab. New lightweight mezzanine structures comprising timber floor construction supported on steelwork will be installed. The existing ironwork roof trusses will be refurbished in-situ (shot blast and new paint protection applied), with new roof finishes also installed. There will be minor modifications to the structural fabric to form new openings and widen existing openings. Temporary pinning of the walls will be necessary for the installation of new supporting beams and padstones.

All vegetation growth to the exterior walls will be removed, in particular the gable wall facing the River Liffey. In some instances, the walls will require local stitching with helical ties. All superfluous embedded metal work shall be removed, and the substrate made good with matching stonework and mortar. Some of the capping at parapet level may need replacement.

The works to the gabled industrial buildings on the River front will provide an improved setting that opens the building up to both the river walk and the residential courtyard. The design will remove previous unsympathetic work to open the ground floor level to the residential community behind. These works are intended to provide an increase in natural light levels, to give a better connection to the River walk as a though route.

The Large Main Warehouse at the east of the Site

Most of the eastern half of the site is occupied by a large single storey warehouse. It is proposed to demolish this large warehouse including its curving north wall, which runs along Parkgate Street. However, the large cast-iron elements within the warehouse, including columns and beams, are to be removed for re-use as advised by the Conservative Specialist.

3.2.4 Parkgate Street Interfaces

Works along the south footpath on Parkgate Street will be carried out in phases. Refer to **Section 4.3.2.3** for proposed activities. The Contractor will obtain road closure licences on at least two occasions for the Works. The first will be at the start of Phase 3 to facilitate construction arrangements, and later licences will be necessary for minor reconfigurations of the south footpath on Parkgate Street.

Works associated with the surface water improvement works will take place on public property, including public roads and footpaths. The scheme will be installed by trench excavations. Approximately 20m of trenching will be open at any one time. Installation of pipework shall be carried out under traffic management at night, with all traffic lanes returned to traffic each morning. Manholes shall be constructed under traffic management at weekends.

Gullies and local pavement resurfacing works may be completed under lane restriction during daytime hours.

The duration of the proposed works will be approximately five weeks and will commence in Q4 2020. Excavated material will be removed off site to a registered waste facility. There will be no storage of chemicals on lands outside of the ownership boundary, and refuelling will take place at the Contractor's base compound.

4 Duration and Sequencing

It is envisaged that construction of the proposed development will take approximately 34 months. Phase 1 and phase 2 will run concurrently and are expected to take approximately 4 months. Phase 3 as the main construction works will take approximately 30 months. All construction works will be carried out during day time hours (Refer to **Section 6.6**).

The Main Contractor(s), once appointed, will ultimately be responsible for the sequencing and implementation of the works in a safe and secure manner, and in accordance with all statutory requirements and the mitigation measures proposed in the EIAR.

An indicative construction methodology is described in **Section 3**.

The main stages of construction will proceed in a general sequence as follows:

- Phase 1: Enabling Works and Demolition
- Phase 2: Piling and Groundworks
- Phase 3: Main Construction Works

There will be some overlap in phasing activities, as outlined in the sections below.

4.1 Phase 1: Enabling Works and Demolition

Phase 1 will take approximately 4 months. The following is a list of the main activities that are planned to be undertaken in the first phase.

4.1.1 Enabling Works Site Set Up

- Site set up for the enabling works contract, including construction compound and erection of secure site hoarding and fencing along Parkgate Street and the neighbouring premises;
- Implementation of Contractor's Health & Safety Plan for the enabling works and demolition contract;
- Identification and cut-off, as required, to existing services;

- Protection of existing site features to be retained (See Section 6.10 for further information); and
- Removal and disposal of asbestos, based on survey and site investigations, and in accordance with statutory requirements (See Chapter 17, Resource and Waste Management, for greater detail on construction and demolition waste).

4.1.2 Demolitions and Site Preparation

- Undertaking of condition surveys of existing buildings/structures that will be retained (see structures highlighted in blue in Figure 1);
- Erection of temporary structures for retention of existing structures around protected archway and quay wall;
- Erection of permanent works for retention of proposed fill to back of existing quay wall and to interface with existing River Building;
- Demolition of existing structures (see structures highlighted in red in Figure 1), with the exception of those to be incorporated in the development;
- Excavation and removal of all substructures and foundations to an approximate depth of 1.8m below existing ground level;
- Removal of all underground tanks and other buried structures in advance of piling mat construction;
- Maintenance of protection measures to existing site features to be retained;
- Removal of waste materials off-site in accordance with statutory permitting requirements and retention of selected material for re-use on site as fill; and
- Possible re-use of some demolition waste material (subject to suitability testing) to be crushed and graded on site for re-use in building sub-bases and landscaping.

The Contractor shall coordinate the Works with the Archaeologist.

4.2 Phase 2: Piling and Groundworks

The piling works undertaken in Phase 2 consist of the installation of all piles across the site. The works may also include the installation of temporary retention structures to facilitate bulk excavation. The works will run concurrently with Phase 1 and are expected to last 4 months.

4.2.1 Piling

The Piling Specialist will liaise with the separate Phase 1 and Phase 3 Contractors to:

- Develop the preferred sequencing of the works;
- Conduct condition surveys of sensitive boundary structures and existing buildings that will be retained;

- Co-ordinate the design and installation of the temporary works required to implement the Main Contractor’s preferred sequence of works;
- Relocate construction compound and welfare facilities within the site boundary; and
- Agree on the optimum location for stockpiling of material for re-use on site.

The Piling Specialist will also undertake the following list of activities:

- Installation, and later removal, of pile working platform (possible re-use of site won material);
- Construction of permanent piles across the site;
- Conduction of working load pile tests on a number of production piles;
- Conduction of integrity testing of all piles;
- Installation and removal of temporary piles; and
- Breaking down of piles within basement area.

4.2.2 Groundworks

The following is a list of the main groundworks activities that are planned to be undertaken in this phase:

- Bulk excavation for basement;
- Removal of surplus excavated material for off-site disposal;
- Stockpiling of site-won material (to be stockpiled for a maximum of 6 months) and appropriate temporary covering (refer to Section 6.11 for further information); and
- Placement of site-won material in areas at grade for build-up in site levels and as backfill to basement substructure, if appropriate for re-use.

4.3 Phase 3: Main Construction Works

The Phase 3 construction works include the construction of the new buildings, the refurbishment of the existing structures, and the external site works. The works will take approximately 30 months. The footpath will remain open throughout the construction phase, with the exception of short road closure licences necessary to complete service tie-ins.

4.3.1 Site Set Up and Preparation

- Mobilisation and site set up for the main contract works, including the erection of the construction compound and secure site hoarding and fencing (note: possible retention and re-configuration of hoarding erected as part of Phase 1);
- Closure of the existing vehicular entrance and construction of a new site entrance between Building A and B for construction movements;

- Conduction of minor works along the south footpath on Parkgate Street, including:
    - Creation of a dished kerb at proposed vehicular entrance;
    - Relocation of the westbound bus stop and shelter;
    - Regrading of the bus stop kerb;
    - Relocation of recycling bins;
    - Creation of loading bay;
    - Relocation of Dublin Bikes Station No. 92; and
    - Creation of dropped kerbs for emergency access to the development, all subject to relevant permits and agreements.
- Improvement works for surface water along the south kerb on Parkgate Street, subject to Local Authority agreement, comprising:
    - Installation of new manholes constructed in Parkgate Street pavement;
    - Installation of new sections of surface water concrete pipework to connect new manholes and gullies;
    - Connection into existing surface water outfall;
    - Diversion of existing road gullies into new surface water sewer; and
    - Construction of new trapped blockwork road gullies and connection into new surface water sewer.
- Protection of existing site features to be retained, including Protected Structures (See **Section 6.10** for details);
- Condition surveys of existing buildings and boundary structures that will be retained; and
- Preparation of site area for the construction of the new buildings.

4.3.2 Construction of New Development

It is envisaged that a number of construction activities will progress concurrently at the start of Phase 3 works, including:

- Installation of temporary structures, including tower cranes, needling, and stability measures to existing structures;
- Construction of pile-caps and piled raft foundations in areas at grade;
- Installation of radon barrier/damp proof membrane/waterproof membrane, where appropriate;
- Construction of basement substructure, including retaining walls;
- Construction of all new site services;
- Connection to new foul drainage infrastructure;
- Connection to surface water drainage for discharge to River Liffey;

- Connection to new site services, including Gas, Electricity Supply Board, and Telecoms; and
- Construction of reinforced concrete ground floor slabs.

The rising superstructure is likely to be concrete frame but will comprise different construction methods across the different buildings, as explained below. The various buildings shall be constructed at a similar rate, apart from the Building A main stability core. The following is a list of the main activities that are planned to be undertaken in this phase.

- Building A main stability core to be slip-form or jump-form construction, meaning the core will be constructed for the full building height in advance of the rest of the superstructure;
- Building A superstructure to be cast-in situ reinforced concrete columns up to first floor. There shall be a thickened slab structure at Level 1 where columns shall change in profile and comprise either precast concrete or in situ reinforced concrete structural form for the remaining building height. The floor slabs shall be flat slab construction, which requires formwork and temporary propping, to roof level;
- Buildings B and C superstructure to be cast-in situ reinforced concrete columns and flat slab construction up to Level 2, which requires formwork and temporary propping;
- Buildings B and C superstructure to be precast concrete from Level 2 to roof, consisting of precast load-bearing stability and non-stability walls supporting precast floor panels with in situ concrete topping. Associated temporary propping to be provided as necessary;
- Installation of temporary works in area between Building A and Building B to maintain construction traffic movements during construction of superstructure overhead;
- Installation of precast construction stair flights and landings, with associated temporary propping as necessary;
- Installation of prefabricated bathroom ensuite pod units;
- Completion of external envelope to Buildings B and C once the concrete frame is near completion and the groundworks is clear. The façade comprises masonry construction with associated relieving angle and lintel supports to the external leaf. Scaffolding around the building exterior to be provided and to remain in place until completion of the façade;
- Completion of external envelope to Building A. The façade comprises either stone faced precast concrete panels or individual fixed stone, and erection will start once groundworks is clear;
- Installation of prefabricated balconies to fixing points cast into the concrete frame to Buildings B and C;
- Completion of reinforced concrete balconies to Building A, which shall comprise Special Finish to the soffit and include a drip check;

- External envelope insulation and detail to ensure air tightness in accordance with the Building Regulations;
- Installation of building services;
- Internal fit out, including partition walls, doors, joinery, and fire rated enclosures as required;
- Toilet and sanitary facilities installation, including disabled/accessible provision in accordance with the Building Regulations;
- Internal finishes (floors, walls, and ceilings) to various areas; and
- Fitted furniture installation.

Other site related works not listed above include:

- Provision of permanent lateral restraint to existing stonework wall along River Liffey upon completion of Level 1 of Building A, and removal of temporary retention structure;
- Construction of appropriate sub-base to non-trafficable and trafficable areas;
- Refurbishment and strengthening to existing structures retained on site;
- New substructure and internal superstructure to existing River Building at west end of river wall;
- Removal of vegetation, pointing repair to localised sections of stonework, and construction of a surface water outfall point to the existing quay wall; and
- Landscaping works, beginning at Building A and progressing westward.

Figure 1: Overall sequencing of Works (1 of 6)

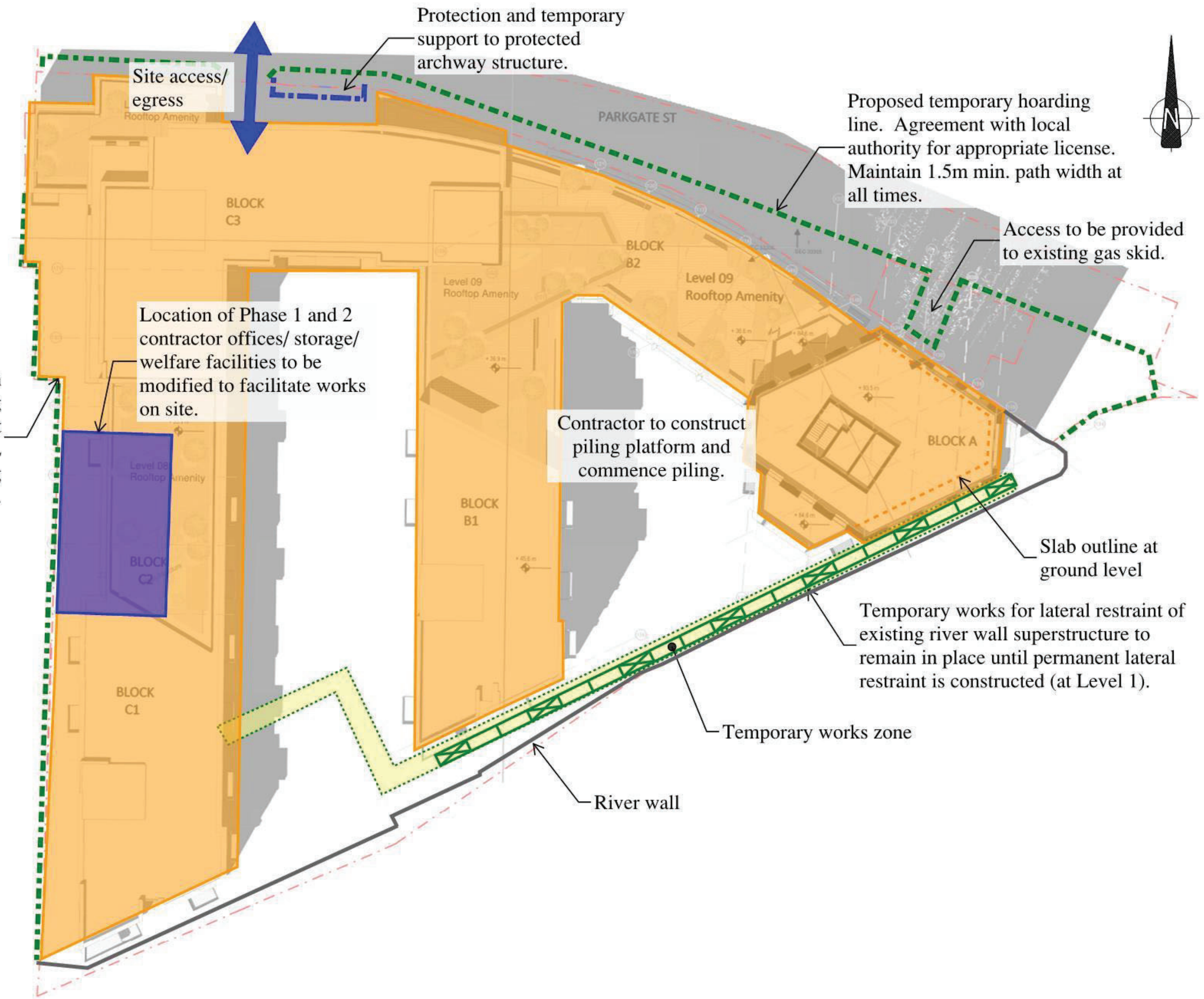

Figure 2: Overall sequencing of Works (2 of 6)

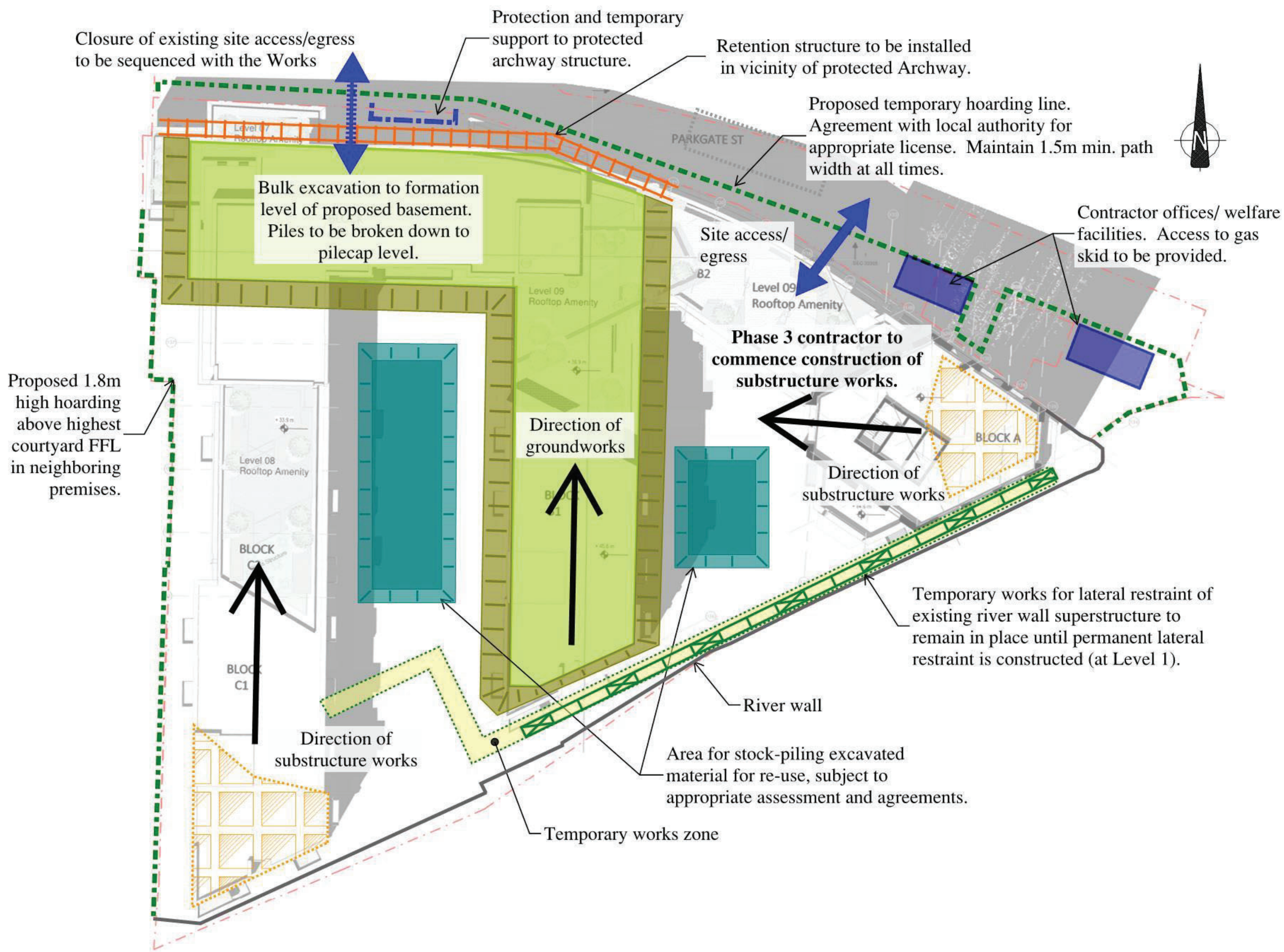

Figure 3 Overall sequencing of Works (3 of 6)

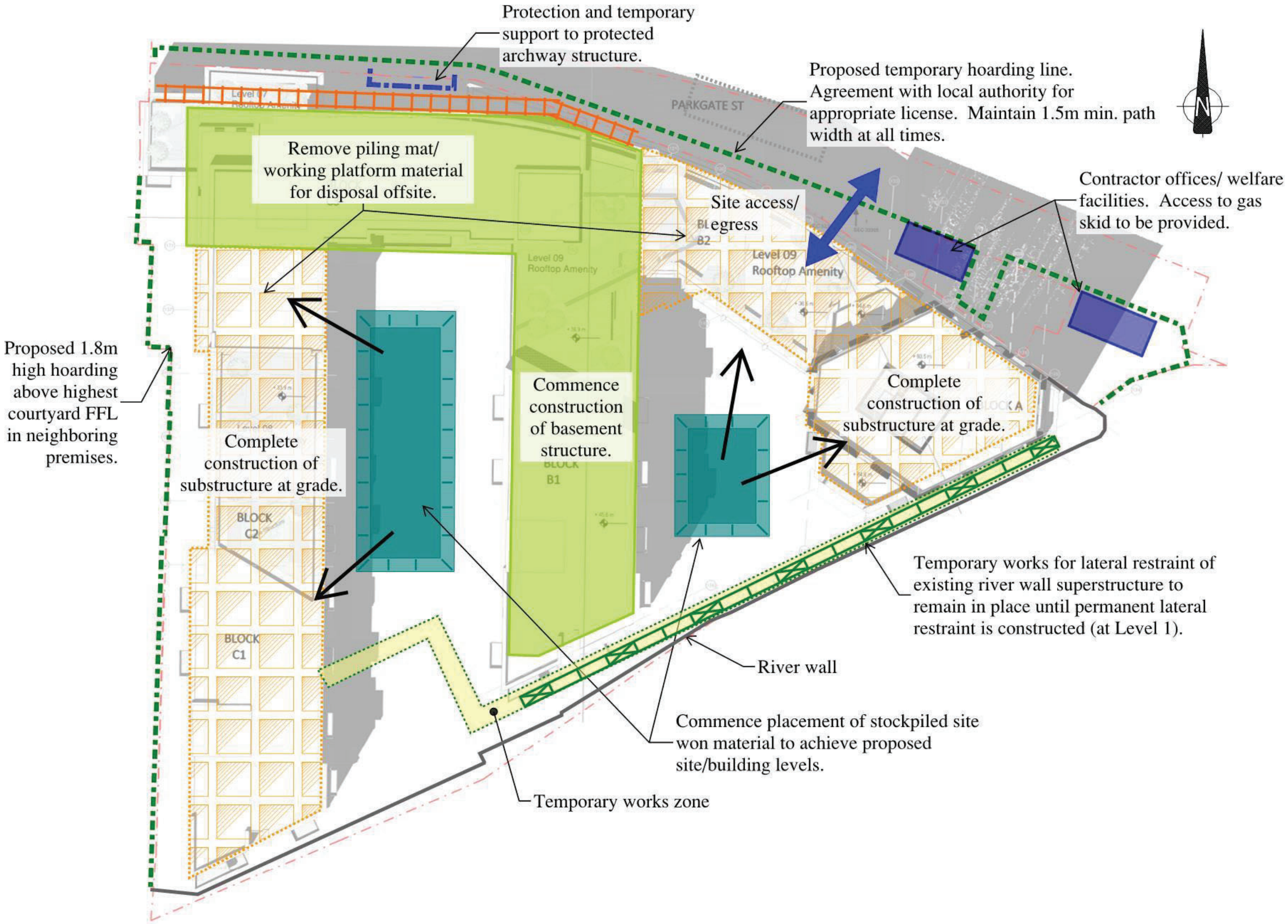

Figure 4 Overall sequencing of Works (4 of 6)

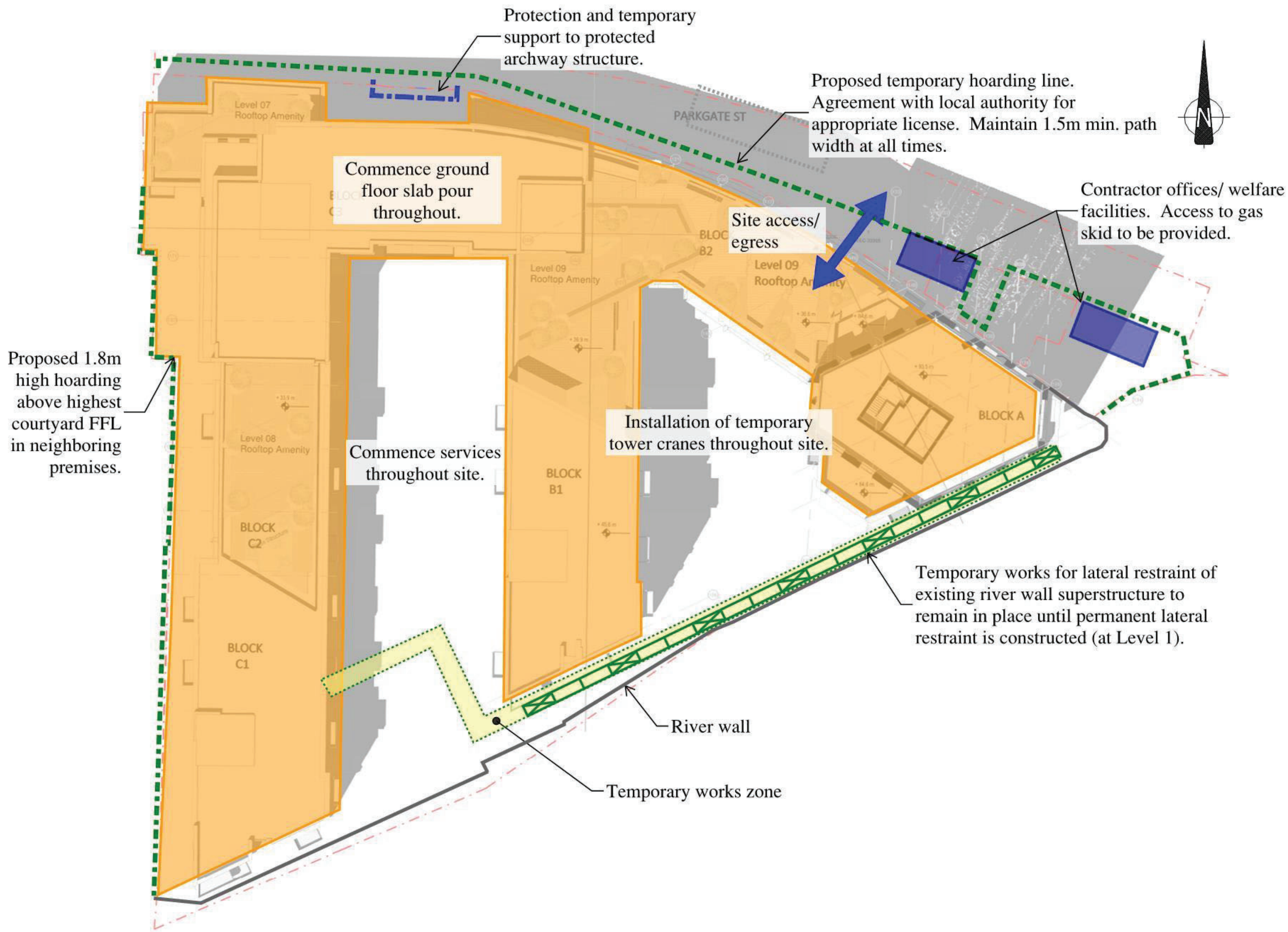

Figure 5 Overall sequencing of Works (5 of 6)

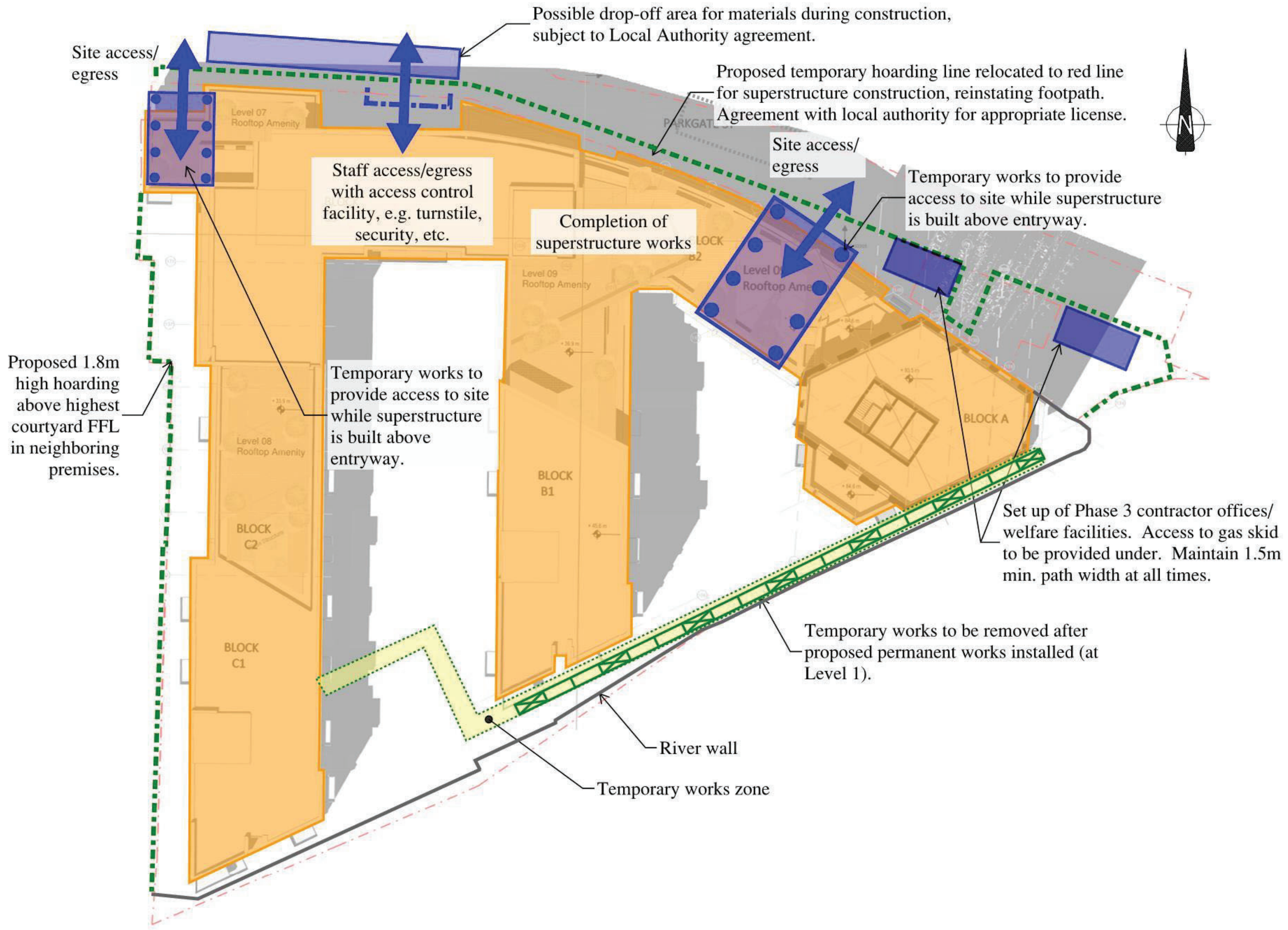

Figure 6 Overall sequencing of Works (6 of 6)

5 Land-Use Requirements

The site of the proposed development is owned by the developer, Ruirside Developments Limited. No acquisition of land will be required during the construction phase of the proposed development. The development area will also include the portion of landscaped area east of the existing ESB substation on Parkgate Street, and an area of footpath and pavement along Parkgate Street. All areas outside the site ownership boundary but within the red line boundary are owned or controlled by Dublin City Council.

The site is currently occupied by Hickeys fabric company and has been since the 1970s. As part of a leasing agreement, Hickeys will vacate the site in December 2019. These lands are in the ownership of Ruirside Developments Limited, so no change in land ownership is required.

The works to take place outside the site boundary (but within the red line planning boundary), for which the necessary licences and consents shall be obtained, include:

- Minor works along the south footpath on Parkgate Street;
- Surface water improvement works along the south kerb on Parkgate Street;
- Foul drainage connection on Parkgate Street;
- Vegetation removal, pointing repair of existing stonework, and the construction of a surface water discharge point to the River Wall; and
- Set up of site offices on the south footway on Parkgate Street, adjacent to the existing ESB Substation.

5.1 Construction Compound

The construction compound will be located on site within the planning boundary for the duration of the project. On-site accommodation will consist of:

- Adequate materials drop-off and storage area;
- Set down areas for trucks;
- Site offices; and
- Staff welfare facilities (i.e. toilets etc.).

As construction progresses, it will be necessary to move the location of the construction compound within the site. **Error! Reference source not found.**Figures 1 to 6 indicate the location of the construction compound in the context of the proposed development site.

The construction compound will be engineered with appropriate services and will be hoarded or fenced off for security purposes. The compound will be used as the primary location for the storage of materials, plant, and equipment, site offices (which may be two to three stories in height), and worker welfare facilities.

An access control facility will be provided to restrict compound access to site personnel and authorised visitors only.

Materials to be stored on site will be stored in a safe manner and will minimise the risk of any negative environmental effects and will be managed on a 'just-in-time' basis. All fuel storage areas will be bunded in the compound and will be clearly marked. Fuel will be transported from the offsite compound to the plant and equipment, on the Parkgate Street worksite, in mobile units based on need. A dedicated fuel filling point will be set up on site with all plant brought to this point for filling.

Temporary toilets and wash facilities will be provided for construction workers. These facilities may require periodic waste pumping and waste offsite haulage, which will be carried out by an authorised sanitary waste contractor. Alternatively, the Contractor may utilise an existing foul drainage connection for site welfare facilities, subject to license agreement with Irish Water.

Appropriate lighting will be provided as necessary at the construction compound. All lighting will be installed to minimise light spillage from the site and will be temporary, i.e. confined to use during construction only. The Contractor may utilise existing electrical ducting at the boundary, with connection to be agreed with ESB Networks.

No car parking is envisaged to be provided within the site. Staff and visitors to the site will be encouraged to utilise non-vehicular means. Otherwise, there is on-street Pay & Display public parking in the environs of the site.

6 Site Management

6.1 Good Housekeeping

The Contractor will employ a "good housekeeping" policy at all times. This will include, but not necessarily be limited to, the following requirements:

- General maintenance of working areas and cleanliness of welfare facilities and storage areas;
- Provision of site layout map showing key areas such as first aid posts, material storage, spill kits, material and waste storage, welfare facilities etc;
- Maintain all plant, material and equipment required to complete the construction work in good order, clean, and tidy;
- Keep construction compounds, access routes and designated parking areas free and clear of excess dirt, rubbish piles, scrap wood, etc. at all times;
- Details of site managers, contact numbers (including out of hours) and public information signs (including warning signs) will be provided at the boundaries of the working areas;

- Provision of adequate welfare facilities for site personnel;
- Installation of appropriate security, lighting, fencing and hoarding at each working area;
- Effective prevention of oil, grease or other objectionable matter being discharged from any working area;
- Provision of appropriate waste management at each working area and regular collections to be arranged;
- Excavated material generated during construction will be reused on site as far as practicable and surplus materials/soil shall be recovered or disposed of to a suitably authorised waste facility site;
- Effective prevention of infestation from pests or vermin including arrangements for regular disposal of food and material attractive to pests will be implemented. If infestation occurs the contractor will take appropriate action to eliminate and prevent further occurrence;
- Maintenance of wheel washing facilities and other contaminant measures as required in each working area;
- No discharge of site runoff or water discharge without agreement of the relevant authorities;
- Open fires will be prohibited at all times;
- The use of less intrusive noise alarms which meet the safety requirements, such as broadband reversing warnings, or proximity sensors to reduce the requirement for traditional reversing alarms;
- Maintenance of public rights of way, diversions and entry/ exit areas around working areas for pedestrians and cyclists where practicable and to achieve inclusive access;
- All loading and unloading of vehicles will take place off the public highway wherever this is practicable; and
- Material handling and/or stockpiling of materials, where permitted, will be appropriately located to minimise exposure to wind. Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods.

6.2 Site Management and Security

A construction management team will be established for the duration of the construction phase. The team will manage the construction of the works including monitoring the contractor’s performance to ensure that the proposed construction phase mitigation measures are implemented, and that construction effects and nuisance are minimised.

The primary function of site security will be to ensure that no unauthorised entry to site occurs. There will be hoarding around the construction areas to minimise the risk of vandalism and unauthorised access.

6.3 Site Hoarding

The Demolition and Enabling Works Contractor will establish a site boundary with the provision of appropriate signage, construction of hoarding, and welfare facilities, site office, and establishment of appropriate access and egress.

The site hoarding (or fencing where appropriate) will be established around the work area before any significant construction activity commences and will be 1.8m in height.

Construction site hoarding is used to provide a secure site boundary to what can be a dangerous environment for people who have not received the proper training and are unfamiliar with construction operations. Site hoarding also performs an important function in relation to minimising some of the potential environmental impacts associated with construction, namely:

- Noise;
- Visual impact; and
- Dust.

The Contractor will be required to ensure at all times a clear demarcation with a safe and secure enclosure between areas in use as public facilities and areas of the construction site. Where possible, hoarding and fencing will be retained and re-configured from the Phase 1 works, and re-used for subsequent work phases.

The extent of compound and facilities required by the Contractor will vary throughout the duration of the works. The Contractor will likely require a small-scale compound and facilities located within the site compound. It is proposed that the hoarding line will incorporate part of the footpath during the works along Parkgate Street, where the appropriate licences will be obtained from the Local Authority in advance of the works.

The footpath will be closed for short periods to facilitate service connections, where minor diversion for pedestrians shall be provided along the carriageway of the road immediately adjacent to the footpath, closing off one lane of traffic to westbound vehicles.

Controlled access points to the site, in the form of gates or doors, will be kept locked for any time that these areas are not monitored (e.g. outside working hours).

The hoarding will be well maintained and painted and may contain graphics portraying project information.

6.4 Lighting

- Site lighting would typically be provided by tower mounted 1000W metal halide floodlights. The floodlights would be cowled and angled downwards to minimise spillage to surrounding properties. The following measures will be applied in relation to site lighting:

- Lighting will be provided with the minimum luminosity sufficient for safety and security purposes. Where practicable, precautions will be taken to avoid shadows cast by the site hoarding on surrounding footpaths, roads and amenity areas;
- Motion sensor lighting and low energy consumption fittings will be installed to reduce usage and energy consumption; and
- Lighting will be positioned and directed so as not to unnecessarily intrude on adjacent buildings and land uses, ecological receptors and structures used by protected species, nor to cause distraction or confusion to passing motorists, river users or navigation lights for air or water traffic.

6.5 Hours of Working

Normal working hours during the construction phase will typically be as follows:

Start	Finish	
0700	1800	Monday to Friday
0800	1400	Saturday

However, it may be necessary, in exceptional circumstances, to work outside of these hours at night and at weekends during certain activities and stages of the development. These will be agreed in advance with DCC and advertised in advance to relevant stakeholders.

6.6 Employment

The construction workforce numbers will vary depending on the construction stage of the project. However, it is anticipated that at the peak of construction there will be an average construction workforce of approximately 600-700 people employed on site.

6.7 Construction Health and Safety

The appointed Contractor will be required to ensure all Health & Safety requirements are agreed with Ruirside.

All construction staff and operatives will be inducted into the security, health and safety and logistic requirements on site prior to commencing work.

All contractors will be required to progress their works with reasonable skill, care and diligence and to proactively manage the works in a manner most likely to ensure the safety, health and welfare of those carrying out construction works, all other persons accessing the subject site and interacting stakeholders.

Contractors will have to implement all mitigation measures relevant to construction activity described in the EIAR. Contractors will also have to ensure that, as a minimum, all aspects of their works and project facilities comply with legislation, good industry practice and all necessary consents.

Particular cognisance will be taken by the contractor to managing the use of machinery in a public environment.

The requirements of the Safety, Health and Welfare at Work Act 2005, the Safety, Health and Welfare at Work (Construction) Regulations, 2006 and other relevant Irish and EU safety legislation will be complied with at all times.

As required by the Regulations, a Health and Safety Plan will be formulated which will address health and safety issues from the design stages through to completion of the construction and maintenance phases. This plan will be reviewed and updated as required, as the development progresses.

In accordance with the Regulations, a "Project Supervisor Construction Stage" will be appointed as appropriate. The Project Supervisor Construction Stage will assemble the Safety File as the project progresses.

Further, any requirements of the Irish Aviation Authority (IAA) with regards to lighting, crane operation etc. will be fully complied with.

6.8 Emergency Response Provision

The Contractor will maintain an emergency response action plan which will cover all foreseeable risks, i.e. fire, spill, flood, etc. The response plan will be developed in accordance with the site emergency plan. Appropriate site personnel will be trained as first aiders and fire marshals. In addition, appropriate staff will be trained in environmental issues and spill response procedures.

Equipment and vehicles will be locked, have keys removed and be stored securely in the works area.

6.9 Protection of Sensitive Structures

The Contractor will carry out condition surveys of all neighbouring structures and Protected Structures on the site and will erect protective hoarding to the existing Arch on Parkgate Street and the Turret at the eastern corner of the site. Temporary works will be put in place to protect sensitive structures, and a cordoned off zone of influence will be maintained at all times, in particular to the River Wall, Arch, Turret, and Tower. The Contractor(s) of subsequent construction phases will keep all protection measures in good order for the duration of the works.

The Contractor's Demolition and Construction Management Plan shall include a section on the Luas interface, dealing with and mitigating the specific risks to Luas infrastructure and operational services. All works shall be carried out in strict accordance with *Code of Practice for Works on, Near or Adjacent to the Luas Light Rail System* which is available to download from https://luas.ie/work-safety-permits.html. The Demolition and Construction Management Plan shall demonstrate compliance with the code of engineering practice, and particularly:

- Working safely in the vicinity of the Overhead Conducting System danger zone and the general Luas corridor;

- Demonstrating settlement and vibration remains within the limits set in the code of practice;
- Ensuring the Demolition and Construction Traffic Management Plan does not impact Luas operations, and;
- Compliance with the requirements of the Transdev (Luas operators) permit system for works in the area.

6.10 Waste Management

The handling and storage of construction wastes arising will be conducted in full compliance with the recommended guidelines.

6.10.1 Excavated Materials

Excavated materials as part of the construction works will generally consist of:

- Service yard and ground floor slab (i.e. asphalt and concrete);
- Topsoil and soil;
- Made ground; and
- Underground structures of various materials.

It is estimated that c. 14,400 m^3 of bulk excavation will result from the works, including c. 220 m^3 of excavation outside the ownership boundary for the proposed surface water improvement works. It is estimated that c. 6,100 m^3 of fill material will be required, assuming some re-use of excavated materials will be allowed.

6.10.2 Demolition Materials

Materials will arise from the demolition and refurbishment of structures on the site. These will include concrete, steel, timber, and other materials that typically arise from the demolition of structures.

Any stockpiles of demolition material shall be temporarily stored on impermeable surfaces and covered using tarpaulin to avoid any contaminated run off entering the surface water system. Any stockpiles of excavated material will be covered using tarpaulin. Silt traps shall be placed in gullies to capture any excess silt in the run-off. All silos shall be bunded appropriately. Construction activities will have regard to CIRIA Good Practice Guidelines (C543 – Control of Water Pollution from Construction Sites).

The Main Contractor(s) will be required to establish and implement a detailed Construction and Demolition Waste Management Plan as part of their Quality Assurance System.

6.10.3 Construction Materials Requirements

The proposed development will have a requirement for imported materials, primarily concrete, and steel for the new proposed construction.

It is estimated that the following approximate quantities of the main construction materials will be imported during the construction works:

- Concrete In-Situ (superstructure only)– 15,100 m^3;
- Concrete Precast (superstructure and landscape paving)- 51,700m^3
- Concrete (Substructure only)- 5,100m^3
- Reinforcing Steel – 4,700 tonnes;
- Façade Glazing – 11,500 m^2;
- Solid Façade – 13,100 m^2; and
- Brickwork – 6,200 m^2.

6.10.4 Construction and Demolition Waste Management Plan

Resource and waste generation during construction will be mitigated and managed where possible. In this regard, Contractors will be required to produce a Construction and Demolition Waste Management Plan (CDWMP) for DCC approval prior to commencing any works on site. The CDWMP will address waste generation and arrangements made for prevention, reuse, recycling disposal and collection of recyclables and wastes.

The CDWMP which accompanies this planning application was prepared in line with the DoEHLG Best Practice Guidelines on the Preparation of Waste Management Plans for Construction & Demolition Projects.

The following is an indicative list of the contents of a CDWMP:

- Description of the Project;
- Wastes Arising Including Proposals for Minimisation/Reuse/Recycling;
- Procedures for prevention, reuse and recycling of wastes
- Estimated Cost of Waste Management;
- Roles including Training and Responsibilities for C&D Waste;
- Procedures for education of workforce and plan dissemination programme
- Record Keeping Procedures;
- Waste Collectors, Recycling and Disposal Sites Including Copies of Relevant Permits or Licences; and
- Waste auditing protocols.

Using the information identified in this section the Contractor will be required to develop, implement and maintain the CDWMP for the construction phase of the proposed development. The Construction and Demolition Waste Management Plan can be found in **Appendix 17.1** of the EIAR which accompanies this planning application.

6.11 Water Management

Site drainage will be provided to collect surface runoff prior to discharge to the local drainage network – all in accordance with the necessary Dublin City Council approval.

7 Construction Traffic Management Plan

7.1 Site Access

It is anticipated that, subject to the grant of planning permission, construction will commence in Q4 2020.

The site is currently accessed from Parkgate Street via an existing vehicular entrance. For the duration of the Phase 1 and 2 works, all construction traffic will enter and leave the site using this existing entrance. A temporary lay-by may be required for truck set down for management of deliveries to site.

Phase 3 will require closure of the existing vehicular entrance and construction of a new site entrance between Building A and B for access and egress construction movements. This will require the relocation of the Dublin Bike Station No. 92.

Pedestrian Access

During certain stages of construction, it may be necessary to close part of the footpath along Parkgate Street. If this were to occur, a minor diversion for pedestrians would be provided along the carriageway of the road immediately adjacent to the footpath, closing off one lane of traffic to westbound vehicles. There are two vehicle lanes in the westbound direction, so no detours would be required for vehicles. All details of this Construction Traffic Management Plan will be agreed with Dublin City Council and An Garda Síochána in advance of the works.

Cycle Facilities

Cycle parking spaces will be provided on site for construction staff and in addition lockers will be provided to provide necessary storage for cyclist's personal belongings. There are also several Dublin Bikes stations in the vicinity of the site near Heuston Station.

As part of the proposed development it will be necessary to permanently re-locate Dublin Bikes Station No. 92 on Parkgate due to the provision of a loading bay in the current location of the station. It is likely that the relocation will occur early in the construction phase. The new location for the Dublin Bikes Station will be confirmed by DCC.

Public Transport

It is not envisaged that there will be any impact on public transport infrastructure or services during the construction of this development.

Car parking

No car parking is being provided on site for staff as the location of the proposed development is in the centre of Dublin and can be easily accessed by public transport, walking and cycling. If staff drive, they will have to park in the wider area such as Phoenix Park, Royal Hospital Kilmainham, or the various city centre car parks. However, the majority of these trips will likely occur before 7:00 and thus will not impact the network during the peak period of traffic volume.

7.1.1 Removal of Materials from Site

Demolition of existing buildings and bulk excavation arisings will be the most intensive period for removal of materials off site. Removal of materials off site will be managed effectively to ensure that there will be no queuing of trucks on the public roadways around the site. All trucks will have a built-in tarpaulin that will cover the excavated material as it is being hauled off site, and wheel wash facilities will be provided at all site egress points.

7.1.2 Deliveries to Site

Deliveries of materials will be planned and programmed to ensure that the materials are delivered only as they are required on site. Works requiring multiple vehicle deliveries to site, such as concrete pours, will be planned to ensure there will be no queuing on the public roadways around the site.

7.2 Construction Traffic Trip Generation

The level of construction traffic directly associated with the construction of the proposed development will vary over the course of the construction project. The construction works will generate traffic during the following phases:

- Phase 1 – Enabling Works and Demolition;
- Phase 2 – Piling and Groundworks; and
- Phase 3 – Main Construction Works

The following section presents the projected volume of traffic generated during the peak period of construction activity.

It is expected that the most onerous phase of construction activity is during Phases 1 and 2 which may potentially run concurrently over a period of 4 months. For the purposes of this assessment and its robustness, it has been assumed that the entirety of the construction works for these phases will occur over a period of 2 months. This means an assumption of the same volume of trips but distributed by a shorter time period, thus resulting in more trips per day or hour.

Removal of Excavated and Demolished Material: The largest number of HGV movements will be associated with the excavation and demolition stage. It has been robustly assumed that approximately 14,500m^3 of bulk excavation material and approximately 2,250m^3 of demolition waste (based on estimate of 2,695 tonnes, at 1.2T/m^3) will require removal from the site, and this is assumed to occur over a 2-month period. It is unlikely that demolition and excavation will happen at the same time. However, for robustness, this assessment assumes that they will occur at the same time.

On the basis of a 10m^3 truck capacity, approximately 28 trucks per day are needed over the 2-month period. This equates to less than 2.5 trucks per hour on average. During peak construction periods this number could potentially double to 5 trucks per hour.

Imported Fill Material: It has been robustly assumed that 6,500m^3 of fill material will be imported to the site, and again, it is assumed that this will occur over a 2-month period.

On the basis of a 10m^3 truck capacity, approximately 11 trucks per day are needed over the 2-month period. This equates to less than one truck per hour on average. During peak construction periods this number could double to 2 trucks per hour.

Total Construction Traffic Generation: The total traffic generation for construction activities based on the assumptions set out above is presented in Table 1 below. Note these are 2-way movements (i.e. one truck = two movements).

Table 1: Traffic Generated During the Construction Period

Construction Aspect	2-Way Trips in Peak Hour
Removal of Excavated Material	10
Imported Fill Material	4
Total	14

A total of 14 two-way trips in a peak construction hour will not have any significant impact on the local traffic network.

7.3 Construction Traffic Distribution

It is anticipated that all construction vehicles accessing and egressing the site will do so from a construction access point on Parkgate Street. Construction traffic travelling to and from the site will do so via the Conyngham Road, South Circular Road, and Con Colbert Road/Chapelizod Bypass from where they will access the M50 and the national road network. This will keep trucks to an established HGV route, minimising their impact on residential areas.. The CTMP will be agreed with Dublin City council and An Garda Síochána in advance of the works.

Figure 7 shows the designated construction traffic route to/from the site.

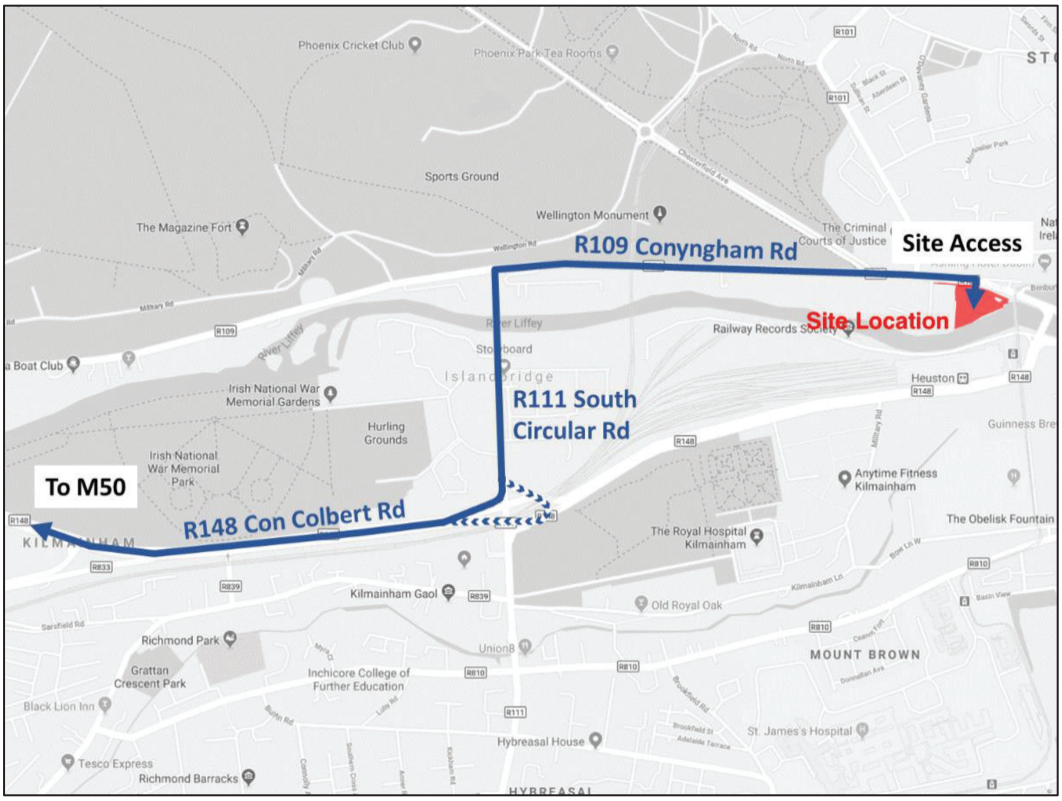

Figure 7 Designated Construction Traffic Route

7.4 Construction Stage Traffic Impact Mitigation

7.4.1 Construction Vehicle Movements

Construction vehicle movements will be minimised through:

- Consolidation of delivery loads to/from the site and management of large deliveries on site to occur outside of peak periods;
- Use of precast/prefabricated materials where possible;
- Assessment of 'cut' material generated by the construction works for possible re-use on site through various accommodation works. This will reduce the amount of material for removal offsite.
- Provision of adequate storage space on site;
- Development of a strategy to minimise construction material quantities as much as possible; and
- Minimisation of construction staff vehicle movements by offering Travel to Work Scheme benefits to encourage car sharing and public transport use.

7.4.2 Mobility Management Measures

A framework Mobility Management Plan (MMP) has been included with the planning application documentation, as part of the Transport Statement.

The Contractor will be required to introduce a MMP for its workforce to encourage access to the site by means other than private car.

The following section identifies some of the measures the Contractor will provide as part of the MMP. The MMP will be agreed with Dublin City Council prior to works beginning on site.

There is good connectivity between the site and public transport links.

There are buses within walking distance including Parkgate Street, Heuston Station, and St. John's Road West. The Luas Red-Line stop at Heuston Station is also within walking distance. The Contractor will issue an information leaflet to all staff as part of their induction on site highlighting the location of the various public transport services in the vicinity of the construction site.

Cycle parking spaces will be provided on the site for construction staff. In addition, lockers will be provided to allow cyclists store their cycling clothes. There are several Dublin Bike stations in the vicinity, on Parkgate Street and near Heuston Station.

Car sharing among the construction staff should be encouraged, especially from areas where construction staff may be clustered. The Contractor will aim to organise shifts in accordance with staff origins, thereby enabling higher levels of car sharing. Such a measure offers a significant opportunity to reduce the proportion of construction staff driving to the wider site area and will minimise the potential traffic impact on the road network surrounding this facility.

To oversee and implement the Mobility Management Plan for the construction works, the following mechanisms will be put in place:

- The appointment of a Mobility Manager to implement the Plan; and
- The establishment of a group to oversee the implementation and ongoing implementation of the Plan.

7.4.3 Temporary Traffic Management

Despite the limited impact on traffic capacity, the construction activities may require temporary modifications to the existing road network, particularly on Parkgate Street adjacent to the site.

The exact nature of the modifications and the time periods over which they will be in place will be a matter for the Construction Management Plan to be submitted by the appointed Contractor to Dublin City Council for agreement prior to commencement of works.

As part of the temporary traffic management, it may be necessary to interrupt the pedestrian footpath on the southern side of Parkgate Street to facilitate construction activities such as piling works along the northern boundary of the site. If this were to occur, a minor diversion for pedestrians would be provided along the carriageway of the road immediately adjacent to the footpath, closing off one lane of traffic to westbound vehicles. There are two vehicle lanes in the westbound direction, so no detours would be required for vehicles.

The Contractor will liaise with DCC and Dublin Bus to ensure the impact is adequately mitigated during construction.

8 Environmental Management Framework

8.1 Overview

The contract(s) awarded for the proposed development will include a requirement for the contractor to comply with relevant documentation including the EIAR, planning (and other statutory consent) conditions received, this CEMP and subsequent further development of this CEMP.

As part of the environmental management framework contractors will need to comply with all relevant environmental legislation and take account of published standards, accepted industry practice, national guidelines and codes of practice appropriate to the proposed development. Due regard should be given to the guidance and advice given by ISO14001 standard[2] and Construction Industry Research and Information Association (CIRIA) guidance[3,4,5].

The contractor will be required to develop and implement an Environmental Management System (EMS) that follows the principles of ISO14001. Further, the contractor's EMS should include an environmental policy, operational, monitoring and auditing procedures to ensure compliance with all environmental requirements and to monitor compliance with environmental legislation and the environmental management provisions outlined in the relevant documentation.

8.2 Roles and Responsibilities

8.2.1 Employer

Ruirside Developments Limited ('Ruirside') will be the employer responsible for ensuring that competent parties are appointed to undertake construction and that sufficient resources are made available to facilitate the appropriate management of risks to the environment.

8.2.2 Employers Representative

Ruirside and/or the Employers Representative (ER) appointed by Ruirside will be responsible for monitoring compliance with the CEMP. The ER may be required to appoint temporary or permanent specialists with appropriate skills and experience as required to implement on site procedures and monitor construction on behalf of Ruirside, i.e. competent experts in noise, vibration, dust, waste etc.

[2] ISO (2015) ISO 14001:2015 Environmental management systems -- Requirements with guidance for use
[3] CIRIA (2015) Environmental Good Practice on Site C692 (fourth edition) (C762)
[4] CIRIA (2015) Coastal and marine environmental site guide (second edition) (C744)
[5] CIRIA (2002) Brownfield development sites: ground-related risks for buildings (X263)

8.2.3 The Contractor

The contractor(s) appointed will be responsible for the organisation, direction and execution of environmental related activities during the detailed design and construction of the proposed development. The contractor is required to undertake all activities in accordance with the relevant environmental requirements including the consent documentation and other regulatory and contractual requirements.

8.2.4 Site Manager

A Site Manager will be appointed by the contractor to oversee the day-to-day management of working areas within the site and ensure that effective, safe, planned construction activities are delivered on an ongoing basis to the highest standards. The Site Manager will be a suitably qualified, competent and experienced professional that will oversee site logistics, communicate regularly with construction staff, accommodate project-specific inductions for staff on site and ensure that all work is compliant with the relevant design standards and health and safety legislation.

9 Environmental Management Procedures

9.1 Monitoring, Inspections and Audits

For the duration of the contract(s), the environmental performance of the contractor will be monitored through site inspections and audits. The programme for monitoring, inspections and audits shall be specified in the contract and it is likely to be a combination of internal inspections and independent external audits that may be either random or routine.

Records of all inspections carried out should be recorded on standard forms and all actions should be closed out in a reasonable time. The CEMP will be developed further by the appointed Contractor(s) to include further details of inspection procedures.

10 Environmental Management

The contractor will be required to comply with any conditions imposed as part of the granted planning approval including any environmental commitments i.e. mitigation and monitoring measures set out in the EIAR.

A summary of the mitigation and monitoring measures for each aspect of the proposed development are set out in Chapter 22 of the EIAR which accompanies this planning application.

As stated previously, the CEMP will be developed by the appointed contractor and updated with regard to the environmental commitments including all mitigation as set out in the EIAR which accompanies this planning application. These mitigation measures are also included in this CEMP for each environmental factor. See below for a list of the environmental factors considered in this CEMP and the corresponding EIAR chapter.

- Traffic and Transport – EIAR Ch 6
- Air Quality – EIAR Ch 7
- Climate – EIAR Ch 8
- Noise and Vibration – EIAR Ch 9
- Biodiversity – EIAR Ch 10
- Archaeology – EIAR Ch 11
- Architectural Heritage – EIAR Ch 12
- Landscape and Visual – EIAR Ch 13
- Water – EIAR Ch 14
- Land and Soils – EIAR Ch 15
- Hydrogeology – EIAR Ch 16
- Resource and Waste Management – EIAR Ch 17
- Population & Human Health – EIAR Ch 18
- Material Assets – EIAR Ch 19
- Major Accidents and Disasters – EIAR Ch 20

Potential environmental effects during construction will be mitigated or reduced where possible. This section summarises all those construction related mitigation and monitoring measures that must be implemented by the appointed contractor during the construction phase of the proposed development, in accordance with the EIAR for the proposed development.

10.1 Mitigation Measures

10.1.1 Traffic & Transport

A Construction Traffic Management Plan has been included as Section 7 of this CEMP. The contractor will develop this CEMP and Construction Traffic Management Plan (CTMP) in order to implement the requirements of the CEMP prepared as part of this application. This will be developed by the appointed contractor in advance of the works and will be agreed with Dublin City Council and An Garda Síochána.

10.1.2 Air Quality

The assessment of likely significant effects during construction includes for the implementation of 'standard mitigation', as stated in the TII guidance[6]. The measures which are appropriate to the proposed development and which will be implemented include:

- Spraying of exposed earthwork activities and site haul roads during dry weather;
- Provision of wheel washes at exit points;
- Covering of stockpiles;
- Control of vehicle speeds, speed restrictions and vehicle access; and
- Sweeping of hard surface roads.

In addition, the following measures will be implemented for during the construction phase of the proposed development:

- Facades of buildings will be covered and sprayed with water while being demolished;
- A c. 1.8m hoarding will be provided around the site works to minimise the dispersion of dust from the working areas;
- Any generators will be located away from sensitive receptors in so far as practicable; and
- Stockpiles will be located as far as possible from sensitive receptors and covered and/or dampened during dry weather.

Employee awareness is also an important way that dust may be controlled on any site. Staff training and the management of operations will ensure that all dust suppression methods are implemented and continuously inspected.

During the construction phase of the proposed development it is possible that disturbance of ACMs on site could cause asbestos fibres to be released into the ambient environment. An asbestos audit will be carried out on the buildings scheduled for demolition prior to demolition works. Any asbestos discovered will be removed by a Specialist Contractor in accordance with Safety, Health, and Welfare at Work (exposure to Asbestos) Regulations 2006/2013[7], and disposed of by specialist contractors to an appropriately licensed facility. Traceable records of this activity, including the disposal licence, will be kept.

[6] TII, 2011. Guideline for the Treatment of Air Quality During the Planning and Construction of National Road Schemes. Available at: *https://www.tii.ie/technical-services/environment/planning/Guidelines-for-the-Treatment-of-Air-Quality-during-the-Planning-and-Construction-of-National-Road-Schemes.pdf*

[7] Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013). Available at: *https://www.hsa.ie/eng/Legislation/New_Legislation/SI_291_2013.pdf*

10.1.3 Climate

Carbon emissions

Due to the nature of effects predicted, no mitigation measures are proposed during the construction phase of the proposed development.

Wind

As no significant impacts are predicted during the construction phase, no mitigation measures are proposed.

Daylight and Sunlight

As no significant impacts are predicted during the construction phase, no mitigation measures are proposed.

10.1.4 Noise & Vibration

Noise

The impact assessment conducted for the construction activity during the construction phase has highlighted that the predicted construction noise levels are above the adopted criteria at distances of 20m or less, and that a negative impact on nearby receivers will occur.

The following mitigation measures will be implemented during construction activities in order to reduce the noise and vibration impact to nearby noise sensitive areas. The contractor will provide proactive community relations and will notify the public and vibration sensitive premises before the commencement of any works forecast to generate appreciable levels of noise or vibration, explaining the nature and duration of the works. The contractor will distribute information circulars informing people of the progress of works and any likely periods of significant noise and vibration.

With regard to potential mitigation measures during construction activities, the standard planning condition typically issued by Dublin City Council states:

"*During the construction and demolition phases, the proposal development shall comply with British Standard 5228 "Noise Control on Construction and open sites Part 1. Code of practice for basic information and procedures for noise control*."

BS5228 includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- selection of quiet plant;
- control of noise sources;
- screening;
- hours of work, and;
- liaison with the public.

Thus, the following noise mitigation will be adhered to during construction:

Selection of Quiet Plant

The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

Referring to the potential noise generating sources for the works under consideration, the following best practice migration measures should be considered:

- Site compounds will be located away from noise sensitive receptors within the site constraints. The use lifting bulky items, dropping and loading of materials within these areas will be restricted to normal working hours.
- Mobile plant should be switched off when not in use and not left idling.
- For piling plant, noise reduction can be achieved by enclosing the driving system in an acoustic shroud. For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system or utilising an acoustic canopy to replace the normal engine cover.
- For concrete mixers, control measures will be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.
- For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- Demountable enclosures can also be used to screen operatives using hand tools and will be moved around site as necessary.
- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Piling

Piling is the construction activity which is most likely to cause disturbance. Mitigation in relation to piling is outlined in the following paragraphs.

Piling programmes will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. If piling works are in progress on a site at the same time as other works of construction or demolition that themselves may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any time.

During consultation the planner, developer, architect and engineer, as well as the local authority, should be made aware of the proposed method of working of the piling contractor. The piling contractor will in turn have evaluated any practicable and more acceptable alternatives that would economically achieve, in the given ground conditions, equivalent structural results.

Noise reduction will be achieved by enclosing the driving system in an acoustic shroud.

Screening by barriers and hoardings is less effective than total enclosure but can be a useful adjunct to other noise control measures. For maximum benefit, screens should be close either to the source of noise (as with stationary plant) or to the listener. Removal of a direct line of sight between source and listener can be advantageous both physically and psychologically. In certain types of piling works there will be ancillary mechanical plant and equipment that may be stationary, in which case, care should be taken in location, having due regard also for access routes. When appropriate, screens or enclosures will be provided for such equipment.

Contributions to the total site noise can also be anticipated from mobile ancillary equipment, such as handling cranes, dumpers, front end loaders etc. These machines may only have to work intermittently, and when safety permits, their engines will be switched off (or during short breaks from duty reduced to idling speed) when not in use.

Screening

Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. Construction site hoarding will be constructed around the site boundaries as standard. The hoarding will be constructed of a material with a mass per unit of surface area greater than 7 kg/m2 to provide adequate sound insulation.

In addition, careful planning of the site layout will also be considered. The placement of site buildings such as offices and stores will be used, where feasible, to provide noise screening when placed between the source and the receiver.

Liaison with the Public

A designated environmental liaison officer will be appointed to site during construction works. Any noise complaints should be logged and followed up in a prompt fashion by the liaison officer. In addition, where a particularly noisy construction activity is planned or other works with the potential to generate high levels of noise, or where noisy works are expected to operate outside of normal working hours etc., the liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

Monitoring

Construction noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the development works to check compliance with the construction noise criterion.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise*.

Project Programme

The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. During excavation/ piling or other high noise generating works are in progress on a site at the same time as other works of construction that themselves may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any time.

Vibration

Any construction activities undertaken on the site will be required to operate below the recommended vibration criteria set out in *BS 7385-2 (1993).* [8]

10.1.5 Biodiversity

Terrestrial Environment

Mammals

The buildings on site present roosting potential to bats. However, none were recorded in two separate surveys at the appropriate time of the year. There are no proposed mitigation measures for bats with regard to the demolition of buildings.

There will be no direct lighting of the river during the construction period. All arc or flood lighting will be directed into the site and away from the river to reduce potential effects on commuting otters and bats during night time hours.

Birds

There are no specific measures required for birds during construction.

Aquatic Environment

Surface Water

Surface water from the proposed development will discharge to the River Liffey. A foreshore consent will be sought for this discharge. Mitigation measures relating to the protection of surface water quality and status are described in **Chapter 14**, Water and Hydrology and are summarised below.

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[8] BS 7385-2:1993 *Evaluation and measurement for vibration in buildings. Guide to damage levels from ground borne vibration.*

"The employment of good construction management practices will minimise the risk of pollution of soil, surface water and groundwater. The following site-specific measures will be implemented for the proposed development which will include:

- *Earthworks operations shall be carried out such that surfaces shall be designed with adequate falls, profiling and drainage to promote safe run-off and prevent ponding and flooding;*
- *Run-off will be controlled to minimise the water effects in outfall areas;*
- *All concrete mixing and batching activities will be located in areas away from watercourses and drains; and*
- *Good housekeeping (site clean-ups, use of disposal bins, etc.) will be implemented on the site.*

In order to prevent the accidental release of hazardous materials (fuels, cleaning agents, etc.) during construction site activity, all hazardous materials will be stored within secondary containment designed to retain at least 110% of the storage contents. Temporary bunds for oil/diesel storage tanks will be used on the site during the construction phase of the project. Safe materials handling of all potentially hazardous materials will be emphasised to all construction personnel employed during this phase of the proposed development. The contractor's sanitary facilities will discharge into the existing combined sewer on Parkgate Street or as otherwise agreed with Dublin City Council."

Construction management measures including specific measures to prevent pollution of the River Liffey have also been incorporated into the CEMP, see **Appendix 4.1,** which will ensure that there are no likely effects on the River Liffey from surface water runoff.

The CEMP has been formulated in consideration of standard best practice and, as expanded on by the contractor, will align with the guidance set out in the following documents:

- CIRIA – Guideline Document C532 Control of Water Pollution from Construction Sites (CIRIA, 2001)[9]; and
- CIRIA – Guideline Document C624 Development and Flood Risk - guidance for the construction industry (CIRIA, 2004)[10]; and
- CIRIA (2015) Environmental Good Practice on Site C692 (4th Edition) (C762)[11].

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[9] CIRIA, 2001. Guidance Document C532 Control of Water Pollution from Construction Site: https://www.ciria.org [Accessed October 2018]
[10] CIRIA, 2004. Guidance Document C624 Development and Floor Risk – guidance for the construction industry: https://www.ciria.org [Accessed October 2018
[11] CIRIA, 2015. Environmental Good Practice on Site C692 (4th Edition): https://www.ciria.org [Accessed October 2018]

10.1.6 Archaeology

All archaeological and cultural heritage issues will be resolved during the pre-construction phase, or in advance of the main construction stage, during the site clearance / ground reduction / demolition stage.

10.1.7 Architectural Heritage

As is detailed above, repair and refurbishment works are proposed in the case of all the protected structures on the site and the retained historic structures. No other mitigation measures have been proposed with respect to effects from the construction of the proposed development.

10.1.8 Landscape & Visual

The subject application proposes the development of site designated as a Strategic Development and Regeneration Area under the *Dublin City Development Plan 2016-2022*, which was the subject of major re-development in order to accommodate medium and high density residential development in recent years. In these circumstances, during the construction or operational phases scope for mitigation measures, which would preserve a sustainable level of density, is limited.

10.1.9 Water

The employment of good construction management practices will minimise the risk of pollution of soil, surface water and groundwater. The following site-specific measures will be implemented for the proposed development which will include:

- Earthworks operations shall be carried out such that surfaces shall be designed with adequate falls, profiling and drainage to promote safe run-off and prevent ponding and flooding; and
- Run-off will be controlled to minimise the water effects in outfall areas; and
- All concrete mixing and batching activities will be located in areas away from watercourses and drains; and
- Good housekeeping (site clean-ups, use of disposal bins, etc.) will be implemented on the site.

In order to prevent the accidental release of hazardous materials (fuels, cleaning agents, etc.) during construction site activity, all hazardous materials will be stored within secondary containment designed to retain at least 110% of the storage contents. Temporary bunds for oil/diesel storage tanks will be used on the site during the construction phase of the project. Safe materials handling of all potentially hazardous materials will be emphasised to all construction personnel employed during this phase of the proposed development. The contractor's sanitary facilities will discharge into the existing combined sewer on Parkgate Street or as otherwise agreed with Dublin City Council.

These mitigation measures will be in accordance with:

- *ICE (2015) Earthworks, A Guide (2nd Edition)*[13]*; and*
- *TII (2013) Specification for Road Works Series 600 - Earthworks.*[14]

This CEMP will be developed and implemented by the Contractor for the duration of the construction phase, in accordance with the guidance set out in the following documents:

- CIRIA – Guideline Document C532 Control of Water Pollution from Construction Sites (CIRIA, 2001)[15]; and
- CIRIA – Guideline Document C624 Development and Flood Risk - guidance for the construction industry (CIRIA, 2004)[16]; and
- CIRIA (2015. All personnel working on the site will be trained in the implementation of the procedures.
- Environmental Good Practice on Site C692 (4th Edition) (C762)[17].

10.1.10 Land & Soils

General

Precautionary measures will be taken to contain any areas within the planning boundary at risk of contaminated run-off.

- Potential pollutants shall be adequately secured against vandalism and will be provided with proper containment according to the relevant codes of practice. Any spillages will be immediately contained, and contaminated soil shall be removed from the proposed development and properly disposed of in an appropriately licensed facility;
- Dust generation shall be kept to a minimum through the wetting down of haul roads as required and other dust suppression measures;
- Any stockpiles of earthworks and site clearance material shall be stored on impermeable surfaces and covered with appropriate materials;
- Silt traps shall be placed in gullies to capture any excess silt in the run-off from working areas;

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[13] Institute of Civil Engineers ICE, 2015. Earthworks, A Guide (2nd Edition) https://www.icevirtuallibrary.com/isbn/9780727741851 [Accessed October 2018]

[14] Transport Infrastructure Ireland, 2013. Specification for Road Works Series 600 – Earthworks (including Erratum No. 1, dated June 2013) http://www.tiipublications.ie/library/CC-SPW-00600-03.pdf [Accessed October 2018]

[15] CIRIA, 2001. Guidance Document C532 Control of Water Pollution from Construction Site: https://www.ciria.org [Accessed October 2018]

[16] CIRIA, 2004. Guidance Document C624 Development and Floor Risk – guidance for the construction industry: https://www.ciria.org [Accessed October 2018

[17] CIRIA, 2015. Environmental Good Practice on Site C692 (4th Edition): https://www.ciria.org [Accessed October 2018]

- Soil and water pollution will be minimised by the implementation of good housekeeping (daily site clean-ups, use of disposal bins, etc.) and the proper use, storage and disposal of these substances and their containers as well as good construction practices; and

This CEMP includes good housekeeping and emergency response measures to be implemented during the construction phase of the project, including actions for dealing with any potential pollution incidents, in accordance with the following measures which are detailed in CIRIA Guidance 37:

- Containment measures;
- Emergency discharge routes;
- List of appropriate equipment and clean-up materials;
- Maintenance schedule for equipment;
- Details of trained staff, location and provision for 24-hour cover;
- Details of staff responsibilities;
- Notification procedures to inform the EPA or Environmental Department of the Dublin City Council;
- Audit and review schedule;
- Telephone numbers of statutory water consultees; and
- List of specialist pollution clean-up companies and their telephone numbers.

Compression of Substrata

- Excavations shall be kept to a minimum, using shoring or trench boxes where appropriate. For more extensive excavations, a temporary works designer shall be appointed to design excavation support measures in accordance with all relevant guidelines and standards.

Loss of Overburden

- All excavated material will, where possible, be reused as construction fill. The appointed contractor will ensure acceptability of the material for reuse for the proposed development with appropriate handling, processing and segregation of the material. This material would have to be shown to be suitable for such use and subject to appropriate control and testing according to the Earthworks Specification(s);
- These excavated soil materials will be stockpiled using an appropriate method to minimise the impacts of weathering. Care will be taken in reworking this material to minimise dust generation, groundwater infiltration and generation of runoff; and
- Any surplus suitable material excavated that is not required elsewhere for the proposed development, shall be used for other projects where possible, subject to appropriate approvals/notifications.

Earthworks Haulage

- Earthworks haulage will be along agreed predetermined routes along existing national, regional and local routes. Where compaction occurs due to truck movements and other construction activities on unfinished surfaces, remediation works will be undertaken to reinstate the ground to an acceptable condition. Where practicable, compaction of any soil or subsoil which is to remain in situ will be avoided; and
- Earthworks operations shall be carried out such that surfaces shall be designed with adequate falls, profiling and drainage to promote safe runoff and prevent ponding and flooding. Runoff will be controlled through erosion and sediment control structures appropriate to minimise the possible impacts.

Impact on surrounding ground:

- Ground settlement, horizontal movement and vibration monitoring will be implemented during construction activities to ensure that the construction does not exceed the design limitations; and
- Ground settlements will be controlled through the selection of a foundation type and construction methods which are suitable for the particular ground conditions.

10.1.11 Hydrogeology

Pollution from Construction Activities

The employment of good construction management practices will minimise the risk of pollution of soil, storm water run-off, adjacent watercourses and groundwater. The construction management of the site will take account of the recommendations of the CIRIA guidance Control of Water Pollution from Construction Sites – Guidance for consultants and contractors (Masters-Williams et al., 2001) to minimise as far as possible the risk of soil, groundwater and surface water contamination.

Measures that will be implemented to minimise the risk of spills and contamination of soils and waters, will include:

- Where feasible all excavated spoil will be treated to remove excess fluid prior to stockpiling and transportation;
- Where feasible transfer of excess soil materials from stockpile areas off-site will be undertaken during dry periods;
- Stockpile and transfer of excess soil material will be restricted to specified and impermeable areas that are isolated from the surrounding environment;
- Wheel washes will be provided at site entrances to clean vehicles prior to exiting the work site;
- All staff will be trained and follow vehicle cleaning procedures. Details of these procedures will be posted in all work sites for easy reference; and

- The implementation of the above measures will ensure that the risk of pollution of groundwater and nearby water bodies resulting from the construction activities will be minimised.
- Training of site managers, foremen and workforce, including all subcontractors, in pollution risks and preventative measures;
- Careful consideration will be given to the location of any fuel storage facilities. These will be designed in accordance with guidelines produced by CIRIA, and will be fully bunded;
- All vehicles and plant will be regularly inspected for fuel, oil and hydraulic fluid leaks. Suitable equipment to deal with spills will be maintained on site;
- Ensure that all areas where liquids are stored, or cleaning is carried out are in designated impermeable areas that are isolated from the surrounding area e.g. by a roll-over bund, raised kerb, ramps or stepped access;
- Minimise the use of cleaning chemicals; and
- Use trigger-operated spray guns, with automatic water-supply cut-off.

10.1.12 Resource & Waste Management

As previously stated, a project specific C&D WMP has been prepared in line with the requirements of the guidance document issued by the DoEHLG and is included as **Appendix 17.1** to the EIAR which accompanies this application. Adherence to the high-level strategy presented in this C&D WMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the demolition, excavation and construction phases of the proposed development. Prior to commencement, the contractor(s) will be required to refine/update the C&D WMP or submit an addendum to the C&D WMP to DCC to detail specific measures to minimise waste generation and resource consumption and provide details of the proposed waste contractors and destinations of each waste stream.

Correct classification and segregation of the excavated material is required to ensure that any potentially contaminated materials are identified and handled in a way that will not impact negatively on workers as well as on water and soil environments, both on and off-site.

In addition, the following mitigation measures will be implemented:

- Building materials will be chosen with an aim to ‘design out waste’;
- On-site segregation of waste materials will be carried out where practical to increase opportunities for off-site reuse, recycling and recovery – the following waste types, at a minimum, will be segregated:
  - Concrete rubble (including ceramics, tiles and bricks);
  - Plasterboard;
  - Metals;
  - Glass; and

  - Timber.
- Left over materials (e.g. timber off-cuts, broken concrete blocks/bricks) and any suitable construction materials will be re-used on-site, where possible;
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
- A waste manager will be appointed by the main contractor(s) to ensure effective management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered where possible to avoid material designated for disposal;
- All waste leaving the site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licenced facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.

Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with *Article 27 of the EC (Waste Directive) Regulations (2011)* [18]. EPA approval will be obtained prior to moving material as a by-product.

These mitigation measures will ensure that the waste arising from the construction phase of the development is dealt with in compliance with the provisions of the *Waste Management Act 1996, as amended*, associated Regulations, the *Litter Pollution Act 1997* [19] and the *EMR Waste Management Plan (2015-2021)*. It will also ensure optimum levels of waste reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources.

10.1.13 Population & Human Health

A Site Manager will be appointed to ensure the proper running of the site, and the minimisation of community disturbance and the implementation of “good housekeeping” policy at all times. Potential effects on air quality, and consequently human health, will be mitigated during the construction phase and full account will be taken of the Transport Infrastructure Ireland (TII) guidance and the development of employee awareness. Measures that will be implemented for the proposed development will include:

[18] EC (2011) Article 27 of the EC (Waste Directive) Regulations
[19] Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended

- A c. 1.8m hoarding will be provided around the site works to minimise the dispersion of dust from the working areas;
- Any generators will be located away from sensitive receptors in so far as practicable;
- Stockpiles will be located as far as possible from sensitive receptors and covered and/or dampened during dry weather.

Where asbestos is uncovered on site during construction, the ACM will be double-bagged and removed from the site by a competent contractor and disposed of in accordance with the relevant procedures and legislation.

The use of best practice noise control measures, hours of operation, scheduling of works within appropriate time periods, strict construction noise limits and noise monitoring during the construction phase will ensure any potential human health effects from noise are controlled to within the adopted criteria.

In order to offset any potential effects on water, and consequently human health, earthworks operations shall be carried out such that surfaces shall be designed with adequate falls, profiling and drainage to promote safe run-off and prevent ponding and flooding. Good housekeeping (site clean-ups, use of disposal bins, etc.) will be enforced by the contractor on the site to mitigate against the risk of spillages.

The potential risk of river wall collapse during construction will be mitigated by standard best practice construction measures, and lateral steel restraints will be provided to the existing stonework along the river, throughout construction.

Should any utility/service diversions or disturbances be required, these will only be carried out in agreement with the relevant service providers, and with notice to the affected public.

10.1.14 Material Assets

The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services and that all services and utilities are maintained, unless this has been agreed in advance with the relevant service provider and local authority.

All works in the vicinity of utilities apparatus will be carried out in ongoing consultation with the relevant utility company and/or local authority and will be in compliance with any requirements or guidelines they may have.

Where new services are required, the Contractor will apply to the relevant utility company for a connection permit where appropriate and will adhere to their requirements.

The proposed development is likely to give rise to a minor adverse effect on transmission links, once developed.

During the construction phase of the proposed development, Vodafone and Three will re-align the identified microwave links to new hop sites.

In the unlikely event that the proposed development continues to impact on existing or new microwave channels, Ruirside Developments Ltd. is committed to assisting in mitigating the issues as illustrated in Figure 8 below.

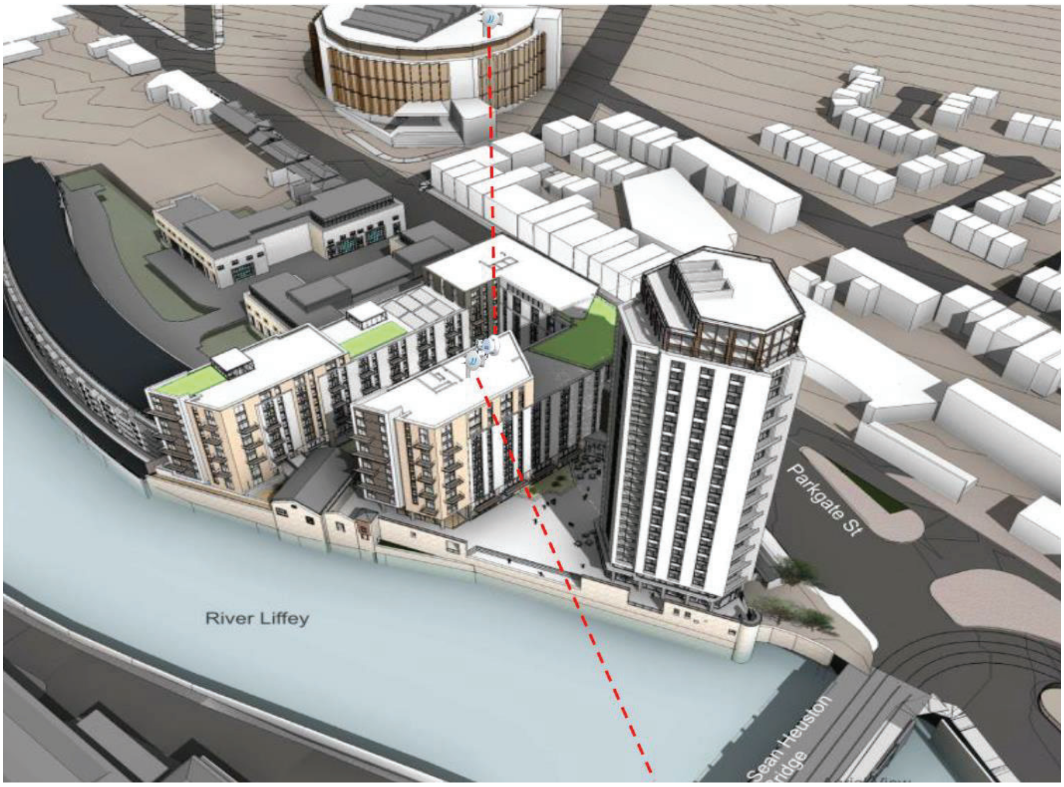

Figure 8 Potential Mitigation

10.1.15 Major Accidents & Disasters

As previously discussed, the construction phase of the proposed development will be carried out in compliance with best practice construction measures.

Lateral steel restraints will be provided to the existing stonework along the river, throughout construction, to avoid risk of collapse. Asbestos will be removed from site and disposed of prior to construction/ demolition in accordance with statutory requirements.

10.2 Monitoring Measures

10.2.1 Traffic & Transportation

No monitoring has been proposed with respect to effects from construction traffic associated with the proposed development.

10.2.2 Air Quality

Dust monitoring will be undertaken at a range of nearest sensitive receptors during the demolition and construction phases. The TA Luft dust deposition limit values of 350 $mg/m^2/day$ (averaged over one year) will be applied as a 30-day average

10.2.3 Climate

As no significant impact is predicted to occur during the construction phase of the proposed development, no monitoring measures are required.

10.2.4 Noise & Vibration

Where required, construction noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the development works to check compliance with the construction noise criteria. Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.

Vibration monitoring will be implemented during construction activities to ensure that vibration levels are in accordance with criteria set out in Section 9.2.7.2. Monitoring will be more rigorous in the proximity of any protected structures; including more frequent monitoring and additional monitoring points. Monitoring points will be located on the face of the structures and centred every 1m.

10.2.5 Biodiversity

During the construction phase when and if dewatering of excavations is required, the Contractor will be responsible for monitoring the suspended solids content of the adjacent River Liffey water. The discharge of treated surface water from construction activities will be monitored to ensure that the discharged treated water will be in accordance to the Dublin City Council Discharge Licence if required.

The settlement tank and silt bag will be monitored by a Site Environmental Manager who will direct the control of settlement and whether a silt bag needs to be changed.

10.2.6 Archaeology

No construction phase monitoring measures are proposed with respect to archaeology.

10.2.7 Architectural Heritage

No monitoring has been proposed with respect to effects from construction of the proposed development.

10.2.8 Landscape & Visual

No monitoring has been proposed with respect to visual effects from of the proposed development.

10.2.9 Water

Hydrology, Water Quality and Drainage

Visual monitoring will be undertaken as part of the regular site audits during the construction of the proposed development to ensure existing surface water runoff is draining from the site and is not exposed to any contaminants.

Wastewater

The contractor will be required to ensure that the sanitary facilities for the site personnel are maintained and effluent storage is regularly emptied and disposed of.

Water Supply

The contractor will be required to ensure that the water supply to the site is maintained and free of contaminants.

Flood Risk

The contractor is required to monitor the weather forecasts to inform the programming of earthworks and stockpiling of materials.

10.2.10 Land & Soils

Excavations in made ground will be monitored by an appropriately qualified person to ensure that any contaminated material is identified, segregated and disposed of appropriately. Any identified hotspots shall be segregated and stored in an area where there is no possibility of runoff generation or infiltration to ground or surface water drainage. Care will be taken to ensure that the hotspot does not cross-contaminate clean soils elsewhere.

Any excavation shall be monitored during earthworks to ensure the stability of side slopes and to ensure that the soils excavated for disposal are consistent with the descriptions and classifications according to the waste acceptance criteria testing carried out as part of the site investigations.

Ground settlement, horizontal movement and vibration monitoring will be implemented during construction activities to ensure that the construction does not exceed the design limitations. Monitoring will be more rigorous in the proximity of any protected structures. This will include more frequent monitoring and additional monitoring points. Monitoring points will be located on the face of the structures and centred every 1m. Horizontal, vertical and rotational displacement in all directions will be monitored.

Movement monitoring shall be carried out during any activities which may result in ground movements or movements of any nearby structures.

10.2.11 Hydrogeology

In relation to soils contamination a suitably experienced environmental consultant will be required to oversee the excavation works for the proposed development so that potential contamination can be segregated, classified and suitably disposed.

The works will be monitored by a Resident Engineer.

Visual monitoring will be undertaken as part of the regular site audits during the construction of the proposed development to ensure the groundwater resource is not impacted by the proposed development.

10.2.12 Resource & Waste Management

The management of waste during the construction phase will be monitored by the site manager to ensure compliance with relevant local authority requirements and effective implementation of the C&D WMP including maintenance of waste documentation.

The objective of setting targets for waste management is only achieved if the actual waste generation volumes are calculated and compared. The C&D WMP specifies the need for a waste manager to appointed who will have responsibility to monitor the actual waste volumes being generated and to ensure that contractors and sub-contractors are segregating waste as required. Where targets are not being met, the waste manager should identify the reasons for targets not being achieved and work to resolve any issues. Recording of waste generation during the project will enable better management of waste contractor requirements and the identification of trends. The data will be maintained to advise on future projects.

10.2.13 Population & Human Health

Dust monitoring will be undertaken at a range of nearest sensitive receptors during the demolition and construction phases. The TA Luft dust deposition limit values of 350 $mg/m^2/day$ (averaged over one year) will be applied as a 30-day average.

Where required, construction noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the development works to check compliance with the construction noise criteria. Noise monitoring will be conducted in accordance with the International Standard ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.

Visual monitoring will be undertaken as part of the regular site audits during the construction of the proposed development to ensure existing surface water runoff is draining from the site and is not exposed to any contaminants. The contractor will be required to ensure that the sanitary facilities for the site personnel are maintained and effluent storage is regularly emptied and disposed of. The contractor will be required to ensure that the water supply to the site is maintained and free of contaminants.

The contractor is required to monitor the weather forecasts to inform the programming of earthworks and stockpiling of materials.

The management of waste during the construction phase will be monitored by the site manager to ensure compliance with relevant local authority requirements and effective implementation of the Construction & Demolition Waste Management Plan including maintenance of waste documentation.

10.2.14 Material Assets

Construction phase mitigation measures have been proposed to ensure that significant negative effects on material assets will be avoided, prevented or reduced during the construction of the proposed development. As such, no monitoring measures are proposed during the construction phase.

10.2.15 Major Accidents & Disasters

No monitoring is proposed specific to reducing the risk of major accidents/disasters during construction.

Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Appendix 8.1: Site Wind Analysis

265381-00

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Site Wind Analysis

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CONTENTS

1.0 EXECUTIVE SUMMARY

The predicted effects of wind were determined for the proposed development and surrounding site in order to assess Pedestrian Comfort and duly inform design for amenity spaces and balconies. Analysis was based on drawing and 3D information as received from Reddy Architecture + Urbanism.

Site Wind Analysis was undertaken utilising Computational Fluid Dynamics (CFD) software (Phoenics/ Flair). CFD originated in the aeronautics industry but can be applied to the built environment in order to enable assessment of wind effects on buildings in a “virtual wind tunnel”.

The CFD analysis involved creating a 3D representational model of the proposed Parkgate Street buildings in the context of their surrounding urban environment and adjacent buildings. Wind profile boundary layers were applied, applicable to urban terrain, for varying wind speeds and directions.

Predicted pressures and velocity vectors in the vicinity of the buildings were calculated for varying wind speeds and directions, accounting for turbulence effect, with derived parameters determined for Pedestrian Comfort (Lawson Criteria).

The Parkgate Street analysis was carried out for three amenity types, namely: ground level, roof top amenity and tower balconies.

The results of the ground level assessment indicate no areas of excessive predicted wind speeds identified as “Not Suitable for Pedestrian Comfort” under the Lawson Criteria. The ground level results of the analysis were used to inform the landscaping strategy and the positioning of seating to the amenity areas.

The rooftop amenity spaces were each assessed to determine suitability for intended use. The results indicated that no areas “not suitable for pedestrian comfort would be present”.

An analysis of average wind velocities for Dublin were utilised to determine optimum locations for the balconies on the tower. Analysis determined that by siting balconies only on the East aspect of the tower, balconies remained in a sheltered environment for the entire height of the tower. Conversely, balconies sited on the south west façade, were found to experience greater than average wind speeds. These areas were not counted as amenity space.

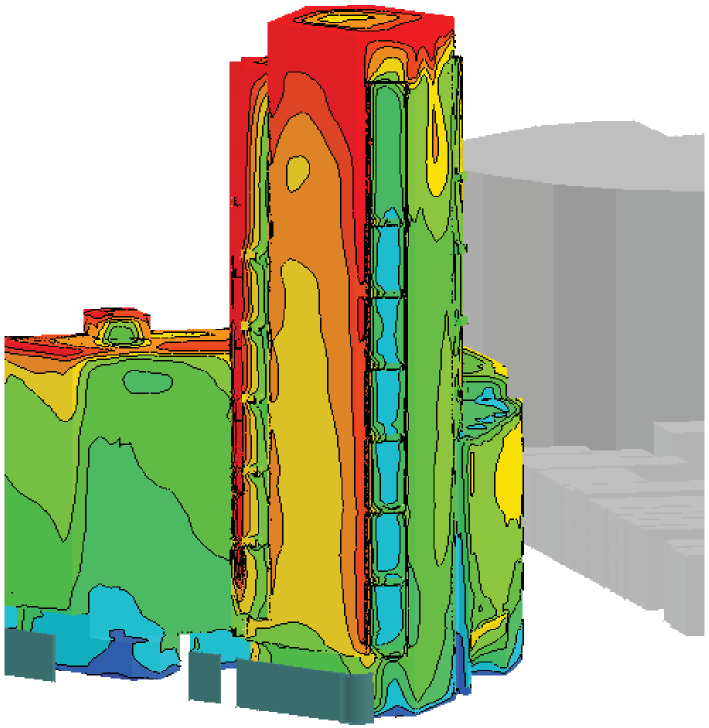

Figure 1.1 - Averaged Dublin Wind Velocities to Tower

2.0 WIND ANALYSIS

2.1 Methodology

In order to determine the predicted wind patterns around the proposed development, airflow simulations were undertaken using Computational Fluid Dynamics (CFD) software (Phoenics / Flair).

This enabled an assessment of the site wind conditions, calculating zones of high pressure, negative pressure, and predicted air velocities/directions for varying wind conditions.

An initial 3D representational model of the proposed buildings and their immediate surroundings was created (Figure 2.1.1), representing the proposed development and existing neighbouring buildings.

The CFD simulations utilised wind profiles accounting for terrain effects. Allowing for the urban nature of the site, a boundary layer profile representative of suburban terrain was utilised.

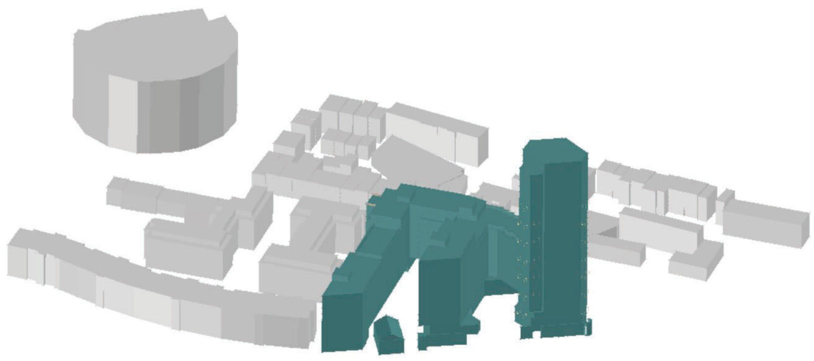

Fig 2.1.1 - 3D Model of Proposed Parkgate Street Development & Neighbouring Environment

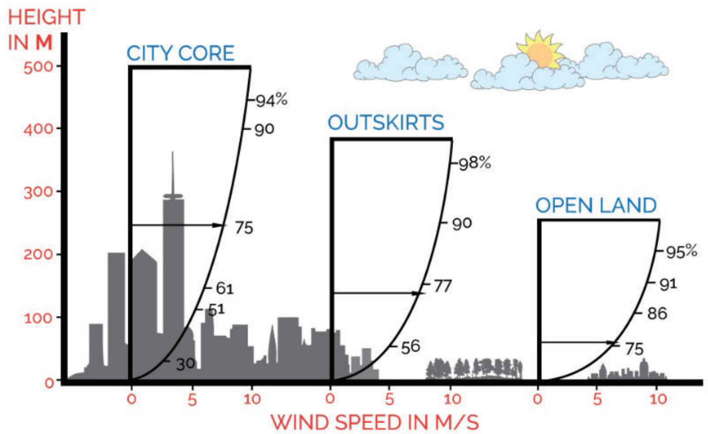

Fig 2.1.2 - Wind Profiles Accounting for Terrain Effects

2.0 PEDESTRIAN WIND COMFORT

2.1 Methodology

Pedestrian Wind Comfort was assessed utilising the “Lawson Criteria” scale, which has been developed as a means of assessing the long term suitability of urban areas for walking or sitting, accounting for both microclimatic wind effects (i.e. site location and prevailing winds) and microclimatic air movement associated with wind forces influenced by the localised built environment form. Figure 2.1.1 illustrates the Lawson Criteria scale; which ranges from areas deemed suitable for long term sitting through to regions not suitable for pedestrian comfort, as wind effects and associated air velocities would be too excessive for significant periods of the year.

Lawson Criteria	Colour
Suitable for long term Sitting	
Suitable for Standing or short term Sitting	
Suitable for Walking and Strolling	
Suitable for Business Walking	
Not Suitable for Pedestrian Comfort	

Figure 2.1.1 - Lawson Criteria Scale

The methodology calculates predicted airflow patterns around buildings for all wind orientations and calculates average velocity applying weighting based on probability of occurrence throughout the year. Therefore, wind effects around buildings for prevailing wind conditions are deemed to have more of a potential impact to pedestrian discomfort, as these will occur on a more regular occurrence.

However, it may be noted that in terms of pedestrian comfort, the Lawson Criteria assesses solely for wind/associated air velocity effects. Therefore, other environmental aspects that may influence a space’s microclimate, such as exposure to sunlight and envisaged temperature variation throughout the year are not accounted for.

In terms of microclimate assessment, wind data for the nearest available meteorological station at Dublin Airport was utilised. Analysis is based on frequency of hourly wind speeds and direction data included in European Wind Atlas for Dublin Airport. It may be noted that wind data and subsequent analysis is therefore based on hourly averages and does not include for example, intermittent gusting effects.

Figure 2.1.2 indicates the long-term annual “Wind Rose” for Dublin Airport. The rose diagram illustrates the frequency that wind will be from a certain direction and at what speed. It can be seen how the prevailing South Westerly winds entirely predominate for Dublin due to Atlantic gulf stream, with only lower occurrence from other directions- notably South East, which tend to occur during warm summer weather due to offshore breeze effects.

Furthermore, higher wind speeds (which accentuate pedestrian discomfort) occur almost entirely for prevailing South Westerly conditions and therefore will predominate in terms of the potential impact on pedestrian comfort as analysed below.

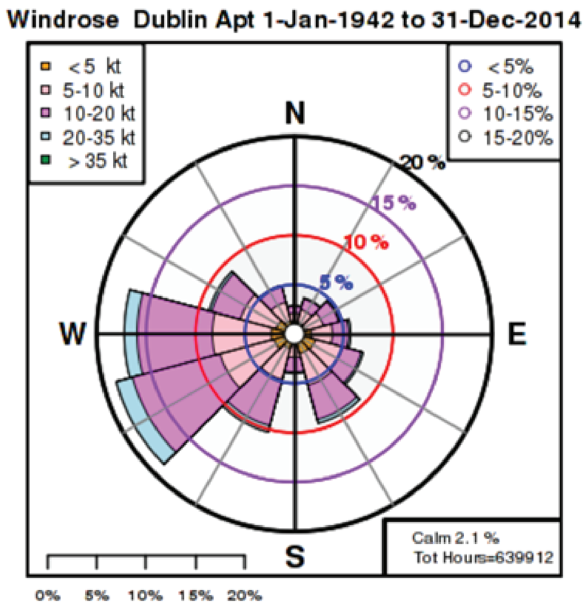

Figure 2.1.2 - Windrose (Dublin Airport)

2.0 PEDESTRIAN WIND COMFORT

2.2 Ground Level

CFD simulations were undertaken for the proposed building configurations as illustrated in fig 2.2.1 & 2.2.2.

Pedestrian comfort at ground level was assessed by predicting Lawson Criteria values at 1m above ground level (indicative of average height sitting/ standing).

Grey/ cyan contours illustrate areas deemed “suitable for long term sitting” and “suitable for standing or short term sitting” respectively as well as standing. Green contours indicate areas “suitable for walking and strolling”, with yellow illustrative of being “suitable for business walking”. Red areas highlight zones as “not suitable for pedestrian comfort”.

Figure 2.2.1 indicates predicted Lawson Criteria at Ground Level for the building configuration does not identify any areas of red (which would indicate excessive pedestrian wind speeds).

An area of yellow contours (suitable for brisk business walking) is only in evidence in part in the throughway into the amenity space beside the tower.

The analysis determined the optimum location for siting suitable amenity spaces such as outdoor seating areas located in the grey zones.

Figure 2.2.1 - Plan Layout

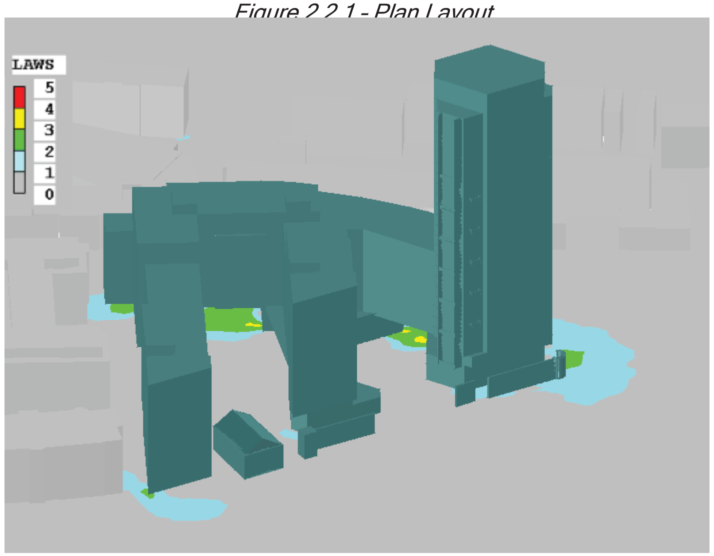

Figure 2.2.2 - 3D Model

2.0 PEDESTRIAN WIND COMFORT

2.3 Rooftop Amenity

The rooftop amenities were assessed for the three various levels at 1m above floor level incorporating a 1.5m high balustrade. The analysis allowed identification of potential use for each amenity space from more sheltered spaces suitable for long term sitting to more active spaces for social gatherings, season use etc..

As above, the grey/ cyan contours illustrate areas deemed “suitable for long term sitting” and “suitable for standing or short term sitting” respectively as well as standing. Green contours indicate areas “suitable for walking and strolling”, with yellow illustrative of being “suitable for business walking”. Red areas highlight zones as “not suitable for pedestrian comfort”.

Figures 2.3.1, 2.3.2 and 2.3.3 illustrate the results as assessed for the Lawson Criteria for each amenity space. With the exception of a small area on the amenity space on the 9th floor, no other areas of “not suitable for pedestrian comfort” were identified. This minor area identified could be mitigated through the use of localised planting.

The amenity space located on the 8th floor was determined to have the majority of its areas as “suitable for long term sitting” (grey). This is due to this space being sheltered from the prevailing winds from the south west. No areas designated as “not suitable for pedestrian comfort” were determined for the amenity space on the 8th floor.

The amenity space located on the 9th floor was determined to predominantly be “suitable for standing or short term sitting” with a mix of “suitable for long term sitting” and “suitable for walking and strolling” lending the intended use as a more social space. The minor areas of “suitable for business walking” would be mitigated through the use of localised planting and a canopy located at the base of the tower to prevent downdraft.

Due to the negative pressures as a result of the shape and orientation of the tower against the prevailing winds, the amenity space of the 25th floor was found to be “suitable for long term sitting”.

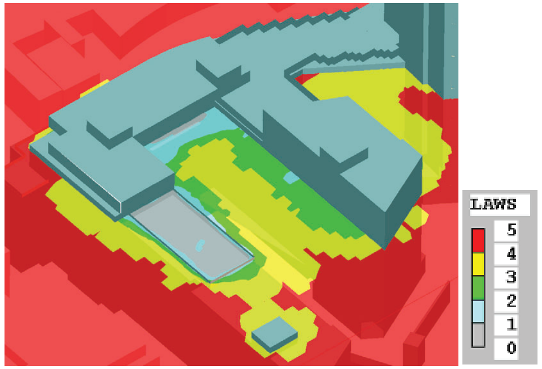

Figure 2.3.1 - Amenity Space 8th floor

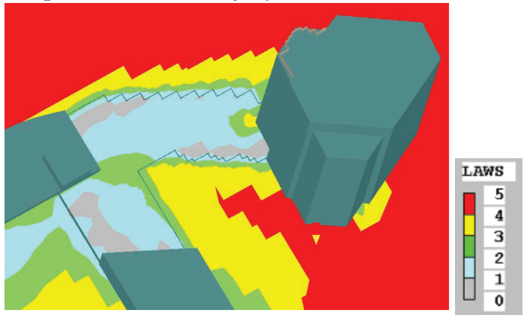

Figure 2.3.2 - amenity Space 9th Floor

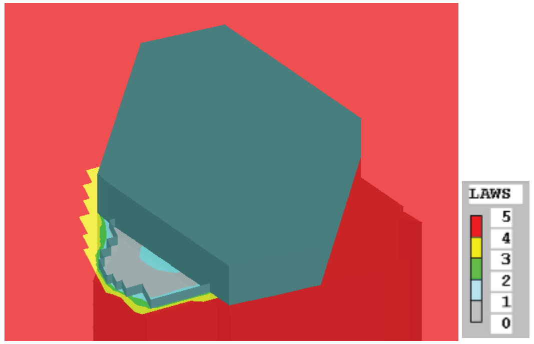

Figure 2.3.3 - Amenity Space 25th Floor

2.0 PEDESTRIAN WIND COMFORT

2.4 Tower Balconies

The balconies on the tower were assessed to determine if there would be any risk to habitual excessive wind speeds as a result of the building's height.

The tower was assessed for the annual predicted average wind velocities and directions for Dublin (VAV). Figure 2.4.1 illustrates the tower as seen from north west, south and east showing where average velocities would be low to medium low (blue to green) and medium to high (yellow to red) onto the building. It can be seen from these images that careful placement of the balconies on the east aspect of the tower places them in a low to medium average wind velocity zone. Conversely, balconies sited on either of the other two triangle points would be in positions of medium to high average wind velocities and therefore potentially unsuitable for habitual use.

As assessed under the Lawson Criteria, the analysis determined, fig 2.4.2 & table over, that all balconies on this façade all contain some element of grey contours signifying that they would be "suitable for long term" sitting based on the probability of wind direction and wind speeds for Dublin.

As a result of this analysis, any balcony deemed to be not suitable for sitting were removed from the overall quantum of amenity spaces.

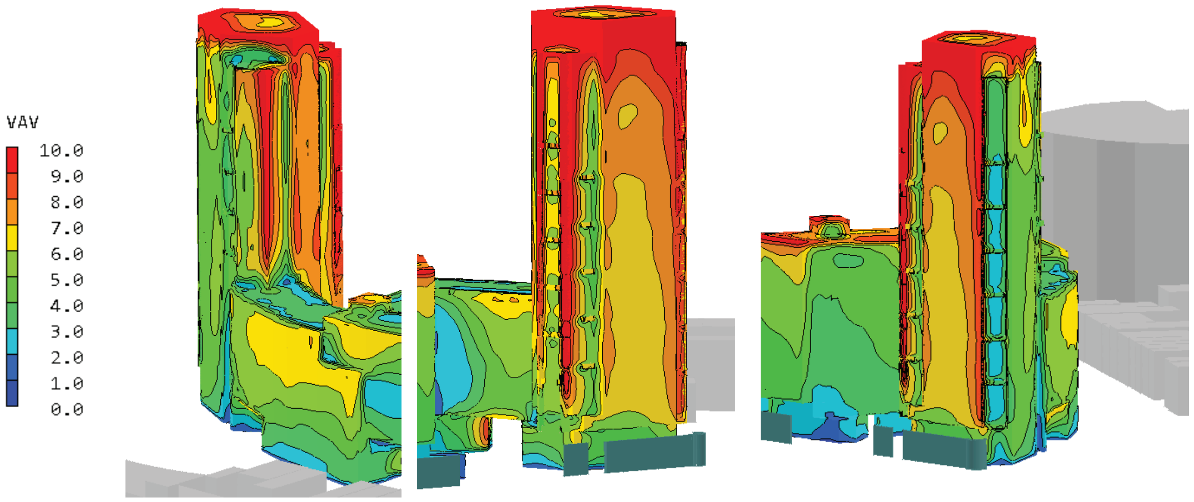

Figure 2.4.1 - Average Dublin Wind Velocities on North West, South and East Aspects of Tower

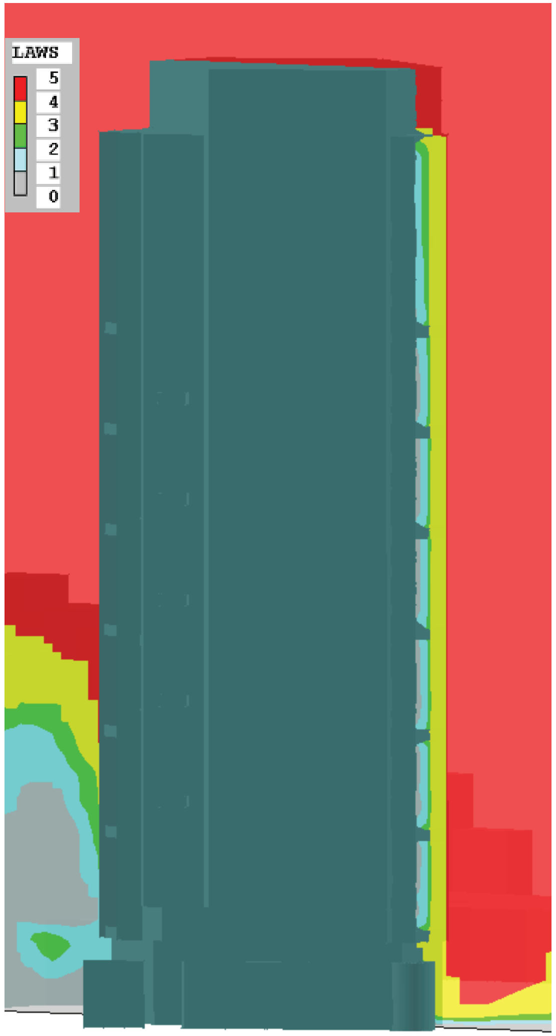

Figure 2.4.2 - Balcony Comfort - Section Through Tower Balconies from South East

2.0 PEDESTRIAN WIND COMFORT

Figure 2.4.3 - Balcony Comfort - Section Through Tower Balconies from South

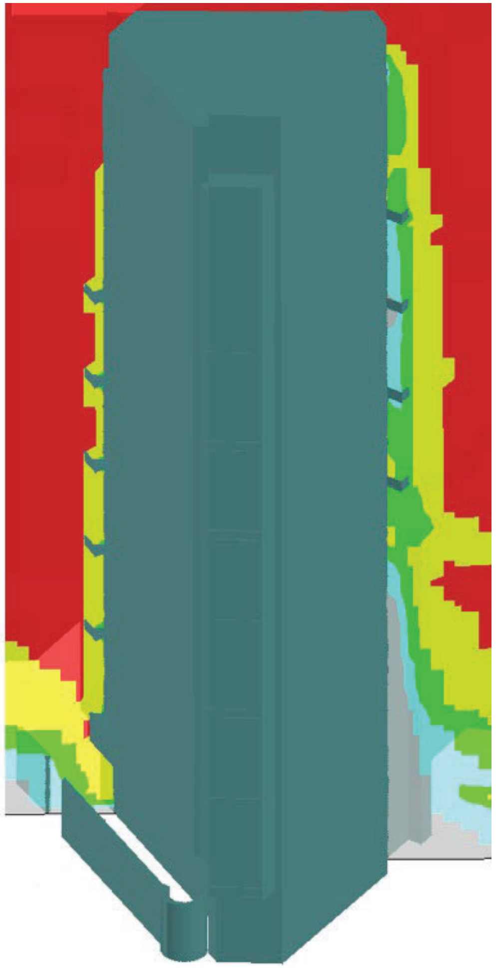

Figure 2.4.4- Balcony Comfort - Section Through Tower Balconies from East

Dublin
Unit B Mount Pleasant Business Centre
Upper Mount Pleasant Avenue
Ranelagh, Dublin 6
t: +353 (0)1 496 0900
e: info@in2.ie

London
Unit 31 Waterside
44-48 Wharf Road
London N1 7UX
t: +44 (0)20 3582 8852
e: info@in2engineering.com

Athlone
14 O'Connell Street
Athlone
County Westmeath
t: +353 (0)90 640 9090
e: info@in2.ie

Belfast
52 Elmwood Avenue
Belfast
BT9 6AZ
t: +44 (0)28 9022 1110
e: info@in2engineering.com

Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Appendix 8.2: Daylight & Sunlight Analysis

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D1861
42A Parkgate Street
Dublin 8

Daylight & Sunlight Analysis

18th December 2019

Rev08

INDEX

1.0 EXECUTIVE SUMMARY

This report summarises the results of Sunlight, Shadow Daylight assessments completed for the proposed Parkgate Street development based on drawing and 3D information as received from Reddy Architecture + Urbanism.

Sunlight Analysis

Sunlight availability to the Amenity spaces was assessed against the BRE guideline criteria target of 50% achieving 2-hours sunlight on March 21st, detailed in Section 2.0. Due to the orientation of the blocks and the openness to the south, the Parkgate Street development has 2,100m² of compliant amenity space at ground level. An assessment of the potential loss of sunlight to the neighbouring building's amenity space was also carried out. This assessment determined that the neighbouring amenity space would not be negatively impacted due to the development.

Shadow Analysis

The Shadow cast of the building was analysed through the day for the Spring Equinox and the Summer Solstice against the existing site. The analysis, detailed in Section 3.0, illustrates minimum adverse impact to the surrounding developments from the proposed building massing. Although the height of the tower cast a long shadow, the slenderness of same results in the shadow moving quickly across neighbouring buildings, and therefore having minimum impact.

Daylight Analysis

The internal Average Daylight Factors (ADF) for each of the Living areas and Bedrooms were assessed against BRE guideline targets. The assessment determined that 96% of habitable rooms exceed these minimum requirements with just 4% below target. An additional assessment was carried out to determine the impact on this development if the existing neighbouring building was to increase in height. This assessment determined that whilst there would be some reduction in daylight, the overall quantum of rooms passing for the site does not drop below 95%.

2.0 AMENITY SUNLIGHT

2.1 Methodology

The BRE *Site Layout Planning for Daylight and Sunlight* Design Guide provides guidance with regards to sunlighting and shading to external Amenity spaces for new developments.

The guidance recommends "*that for it to appear adequately sunlit throughout the year, at least half* ***(50%)*** *of a garden or amenity area should receive at least two hours of sunlight on 21st March*". The analysis illustrates any areas that do not achieve this requirement as dark green (see sample image in Fig 3.1.1).

Additionally, the guidance notes "If as result of new development an existing garden or amenity area does not meet the above, **and** the area which can receive two hours of sun on 21st March is less than 0.8 times its former value, then the loss of sunlight is likely to be noticeable".

2.2 Proposed Amenity Space: PASS

The amenity spaces to Parkgate Street achieve excellent Sunlight availability. The amenity areas achieve 87% sunlight availability for at least two hours on 21st March. The area of complaint amenity space is 2,100m² on the ground floor.

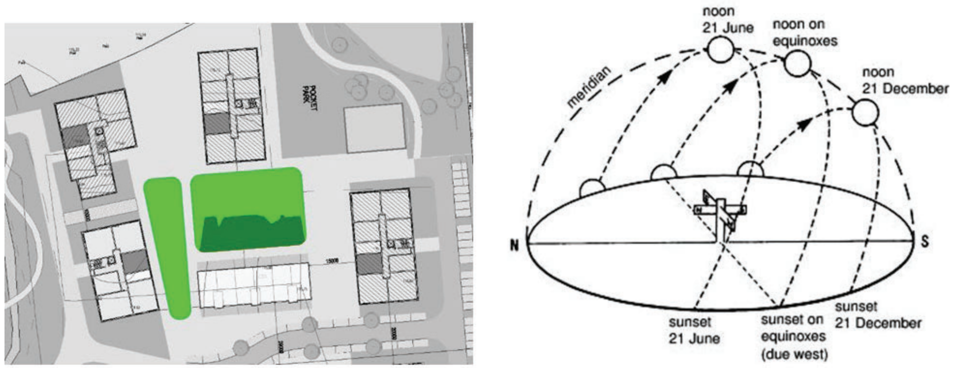


Fig 2.1.1 -Sample Sunlight Image & Sun Path Diagram

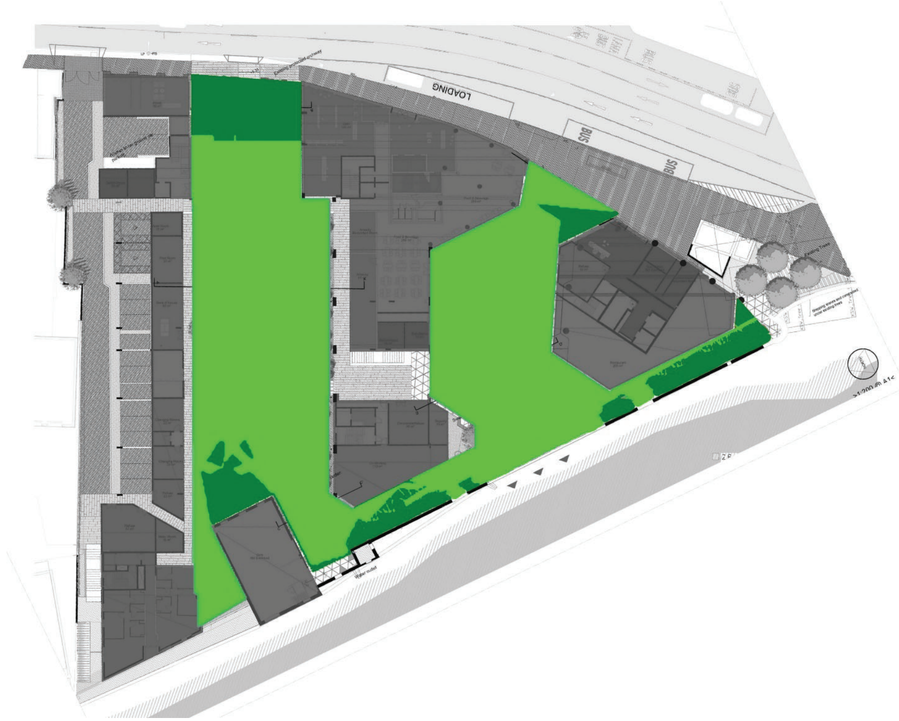


Fig 2.1.2 -Amenity Sunlight Results

2.0 AMENITY SUNLIGHT (Cont'd)

2.3 Neighbouring Amenity Space: PASS

A 3D model was utilised to determine the extent of overshadowing on to the amenity space. The OSI land registry compliant map was used to define the location of the amenity space in conjunction with Google Maps aerial view.

The results, fig 2.2.1-2.2.2 illustrate that the amenity spaces adjacent to the proposed Parkgate Street development will, as result of the new proposed development, still achieve in excess of 50% of the space sun lit for at least two hours on 21st March. The proposed development will therefore not have a negative effect on the existing amenity space.

2.4 Neighbouring Daylight Availability: PASS

The daylight availability to the neighbouring building was assessed including for proposed development, in particular the single bedroom as identified in Fig 2.2.1 below.

The results determined that an Average Daylight Factor of 1.1% would be achieved in the bedroom. As this is above the minimum standards as assessed in section 4.0 below, it was determined that the proposed development would not have an undue negative impact on the neighbours daylight availability.

Fig 2.3.1 -Daylight Availability to Neighbouring Building

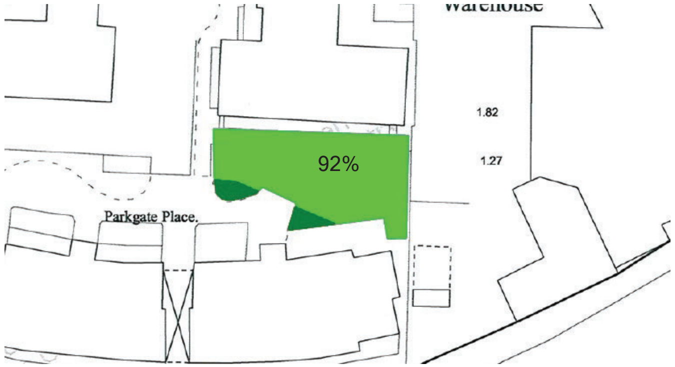


Fig 2.2.1 -Current Sunlight Results for Neighbouring Amenity Space

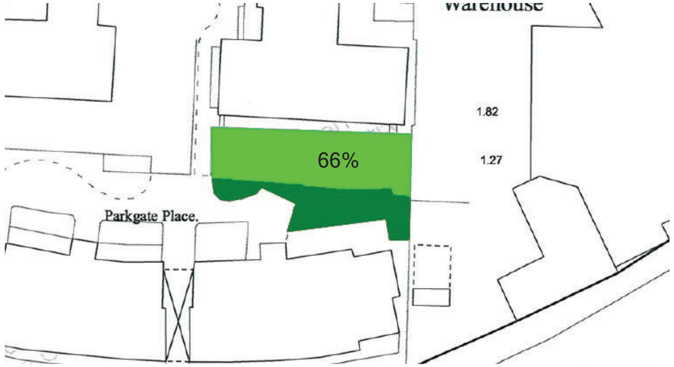


Fig 2.2.2 - Proposed Sunlight Results for Neighbouring Amenity Space

Fig 2.2.3 -Amenity Space as viewed from Google Maps

3.0 SHADOW ANALYSIS

3.1 Methodology

The shadowing effects of the proposed development were asssessed against the current pre-development condition to determine the exent of the shadowing from the proposed buidling massing throughout the day on the Spring Equinox and Summer Solstice.

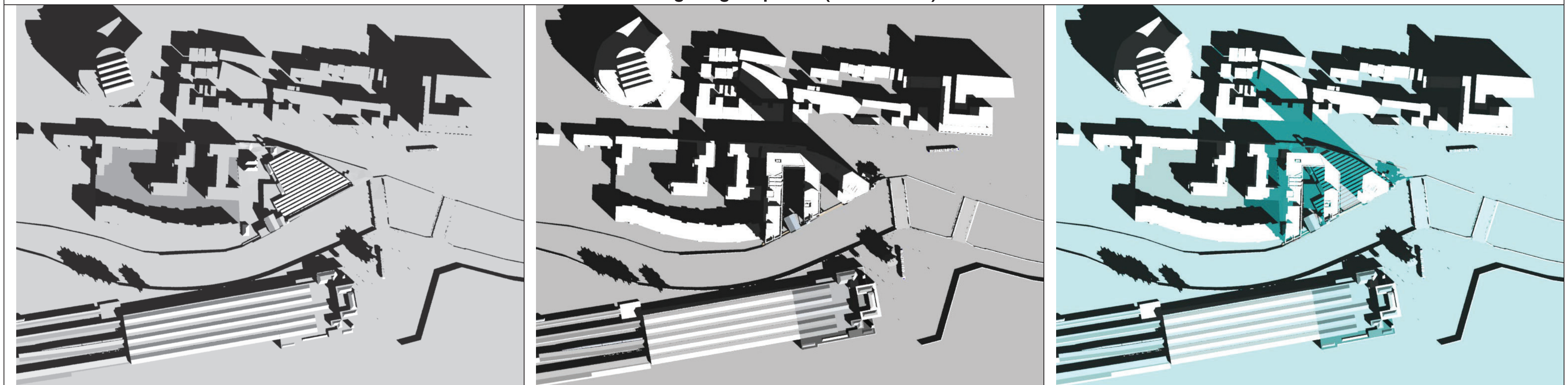
3.2 Results

The results indicate no significant shadowing of surrounding buildings. Building to west would only be effected for a couple of hours in the morning time, with the rest of the day as previous. The tower, whilst it’s shadow does cross neighbouring buildings, the duration of this shadowing would on be for part of one hour.

3.3 Site Shading Spring Equinox

March 21st – 9am

Site Sunlighting: Equinox (March 21st) 09:00



Plan View - Existing Building | Plan View - Proposed Building | Existing and Additional Shadow Cast

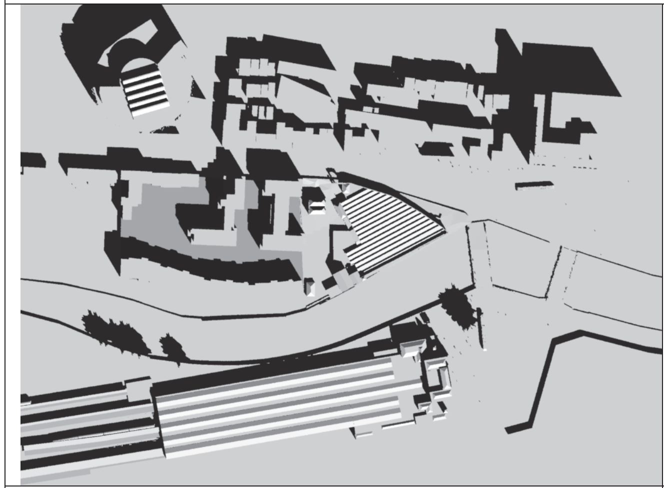
Extent of Additional Shadow	
Extent of Existing Shadow	

3.0 SHADOW ANALYSIS

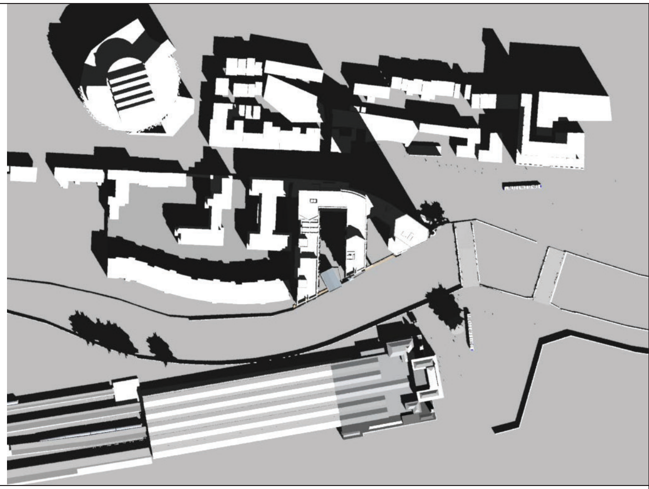
3.3 Site Shading Spring Equinox

March 21st - 10 am

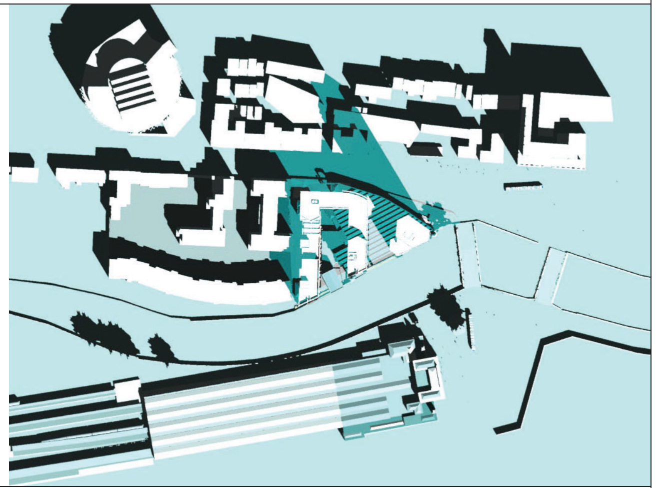
Site Sunlighting: Equinox (March 21st) 10:00



Plan View - Existing Building



Plan View - Proposed Building



Existing and Additional Shadow Cast

Extent of Additional Shadow	
Extent of Existing Shadow	

3.0 SHADOW ANALYSIS

3.3 Site Shading Spring Equinox

March 21st - 11 am

Site Sunlighting: Equinox (March 21st) 11:00

Plan View - Existing Building	Plan View - Proposed Building	Existing and Additional Shadow Cast

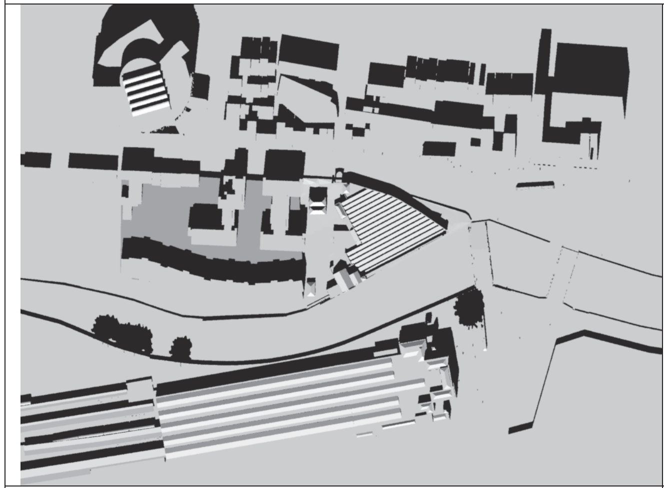
Extent of Additional Shadow	
Extent of Existing Shadow	

3.0 SHADOW ANALYSIS

3.3 Site Shading Spring Equinox

March 21st - 12 Noon

Site Sunlighting: Equinox (March 21st) 12:00



Plan View - Existing Building

Plan View - Proposed Building

Existing and Additional Shadow Cast

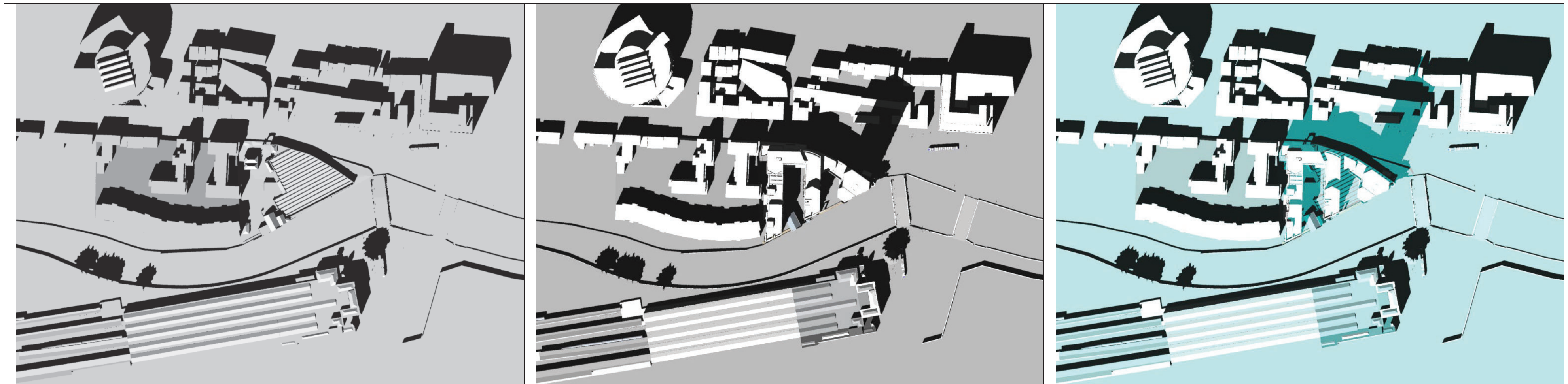
Extent of Additional Shadow	
Extent of Existing Shadow	

3.0 SHADOW ANALYSIS

3.3 Site Shading Spring Equinox

March 21st - 1 pm

Site Sunlighting: Equinox (March 21st) 13:00



Plan View – Existing Building | Plan View – Proposed Building | Existing and Additional Shadow Cast

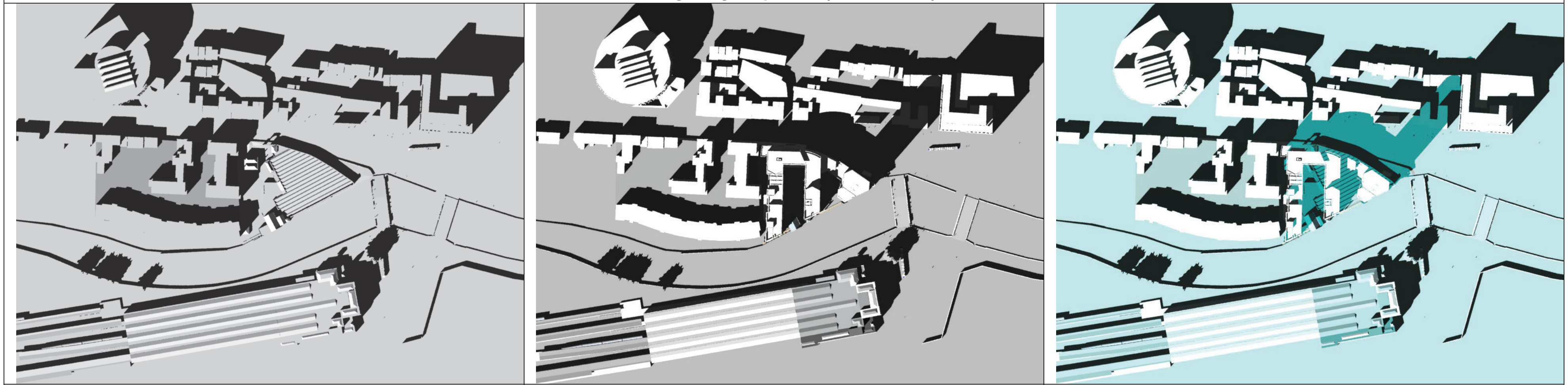
Extent of Additional Shadow	
Extent of Existing Shadow	

3.0 SHADOW ANALYSIS

3.3 Site Shading Spring Equinox

March 21st - 2pm

Site Sunlighting: Equinox (March 21st) 14:00



Plan View - Existing Building	Plan View - Proposed Building	Existing and Additional Shadow Cast

Extent of Additional Shadow	
Extent of Existing Shadow	

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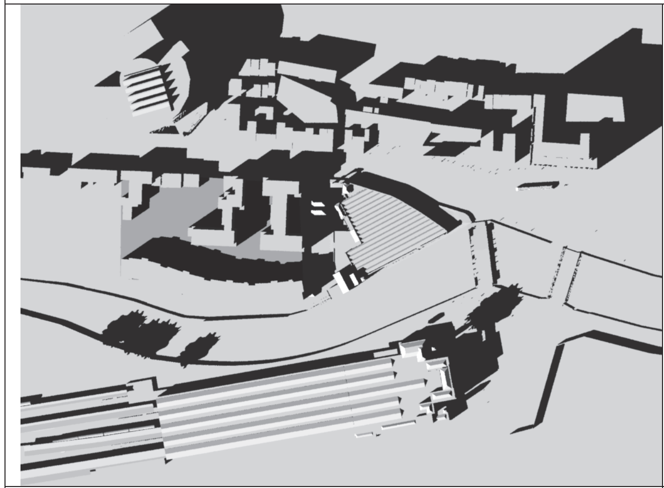
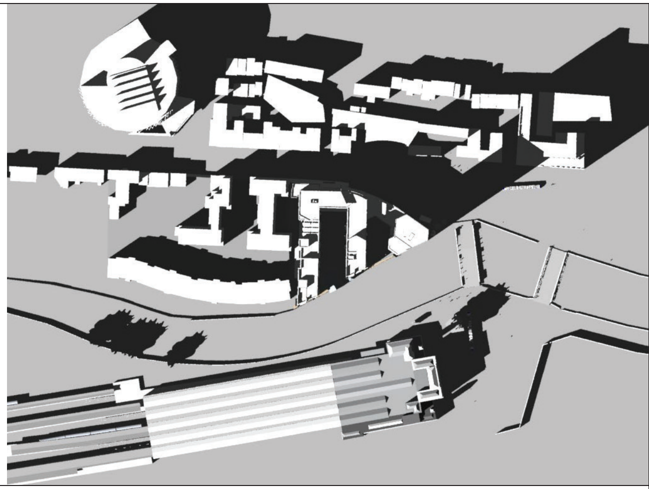
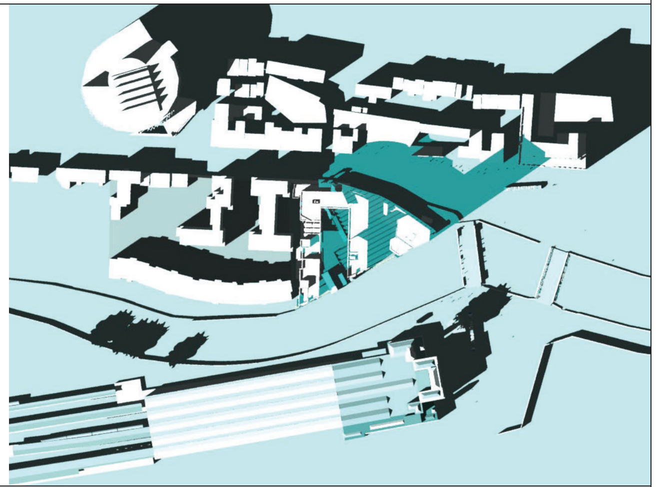
3.0 SHADOW ANALYSIS

3.3 Site Shading Spring Equinox

March 21st - 3 pm

Site Sunlighting: Equinox (March 21st) 15:00		
		
Plan View - Existing Building	Plan View - Proposed Building	Existing and Additional Shadow Cast

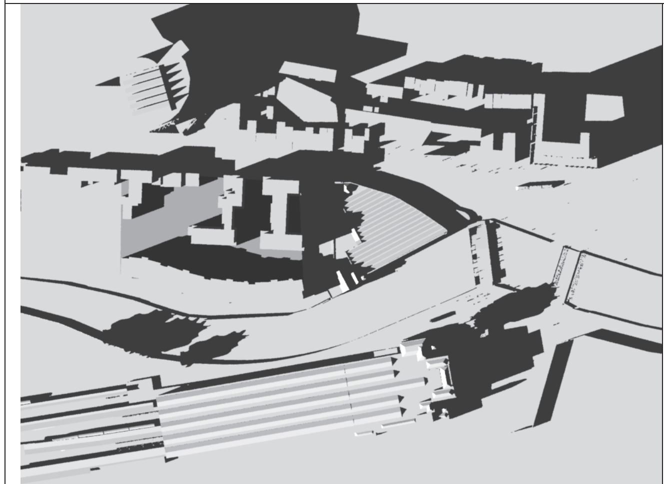
Extent of Additional Shadow	
Extent of Existing Shadow	

3.0 SHADOW ANALYSIS

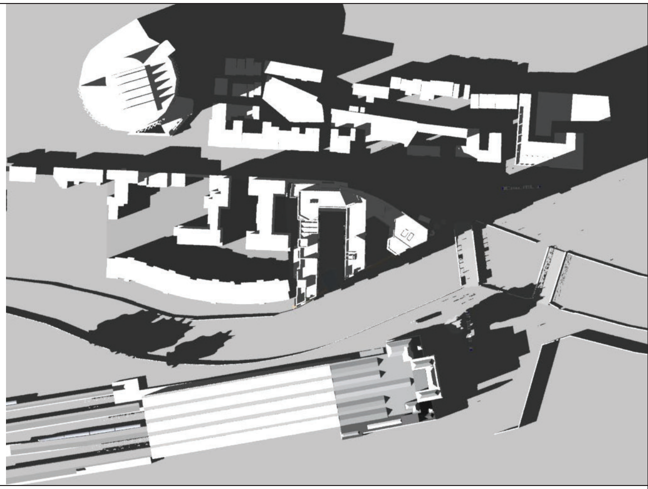
3.3 Site Shading Spring Equinox

March 21st - 4pm

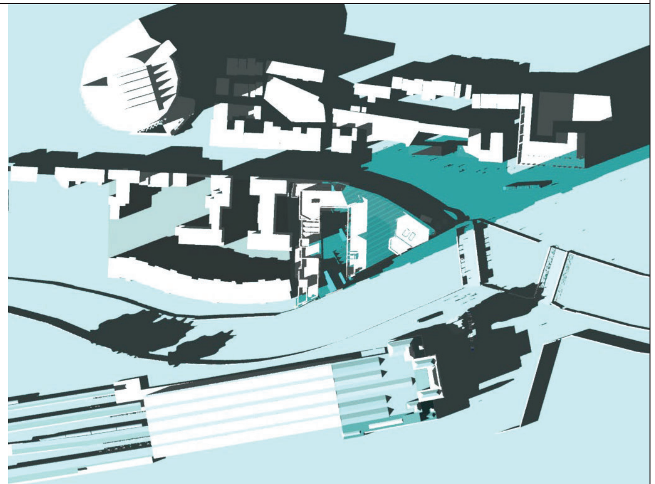
Site Sunlighting: Equinox (March 21st) 16:00



Plan View – Existing Building



Plan View – Proposed Building



Existing and Additional Shadow Cast

Extent of Additional Shadow	
Extent of Existing Shadow	

4.0 INTERNAL DAYLIGHT FACTORS

4.1 Methodology

The internal Average Daylight Factors were analysed using a dynamic simulation model (TAS Software). The daylight analysis accounts for building form, orientation, adjoining buildings along with detailed framing, cill depth and glazing properties in accordance with the architectural design drawings. Simulation results are displayed overleaf as colour contour plots showing the achieved values for Average Daylight Factors (ADF) to each apartment Living area and Bedroom.

Internal Lighting levels were determined for a CIE Overcast Sky of 10,000 Lux. This CIE sky is uni-directional, so façade orientation does not affect daylight factors.

Each habitable space was assessed against the BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition), as relevant, for Daylighting which state;

"Daylight provision in new rooms may be checked using the average daylight factor (ADF). The ADF is a measure of the overall amount of daylight in a space. BS 8206-2 Code of practice for daylighting recommends an ADF of 5% for a well daylit space and 2% for a partly daylit space. Below 2% the room will look dull and electric lighting is likely to be turned on. In housing BS 8206-2 also gives minimum values of ADF of 2% for kitchen, 1.5% for living rooms and 1% for bedroom."

Spaces were therefore assessed for the following daylight factors:

- > 1.5% for Living Areas
- >1% for Bedrooms

The daylighting models were calculated based on the following assumptions:

- Glazing Transmission = 70% (low-e double glazing)
- Ceilings: 82% reflectance (BS 00E55 White)
- Walls: 62% reflectance (BS 10C31 Ivory)
- Floors: 36% reflectance (BS 00A05 Platinum Grey)

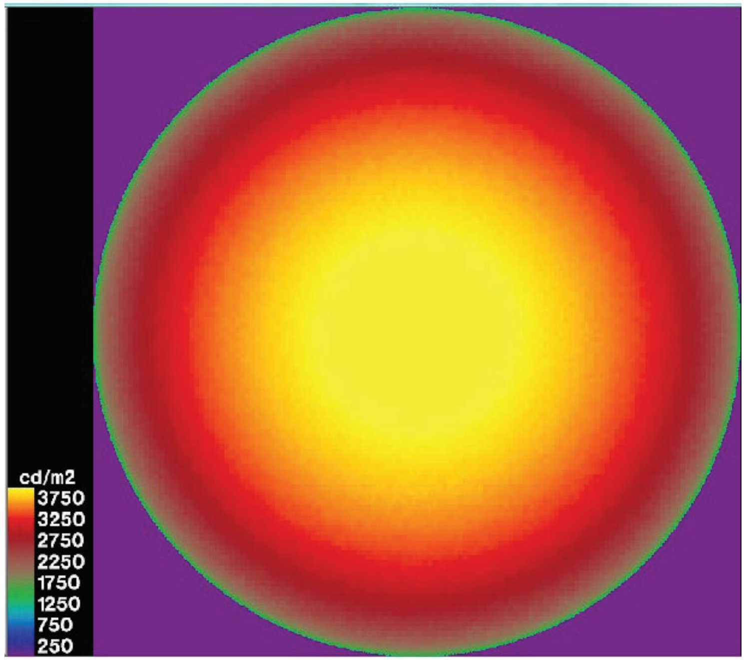


Fig 4.1 – CIE Overcast Sky

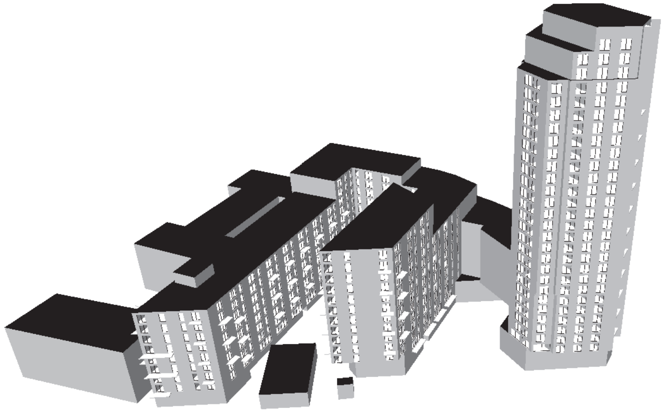


Fig 4.1 – Dynamic Simulation Model

4.0 INTERNAL DAYLIGHT FACTORS

4.2 Results

The Average Daylight Factors (ADF) results were determined for the development as detailed below.

These results determined that 96% of the residential rooms will achieve compliance with the BRE minimum recommendations. Of the remaining 4%, the design has ensured that no sub quality spaces, i.e. less than 0.4%, are proposed. The results determined that an average ADF of 3% for all living / dining space across the development with 50% of the spaces achieving 2.5% as illustrated in Figure 4.2. Results below illustrate achieved results for all floors with achieved values identified for lower floors and representative upper floor.

Due to the massing and height of this development, an element of self-shading was inevitable. This has been recognised within the scheme by providing excellent amenity space (in terms of daylight availability as detailed in section 2.0).

We note the BRE guide should be seen as advisory only as the guide was developed for low density urban housing and was developed to inform design rather than to constrain it. Although the guide provides numerical guidelines, these should be interpreted flexibly since natural lighting is only one of many factors in site layout design.

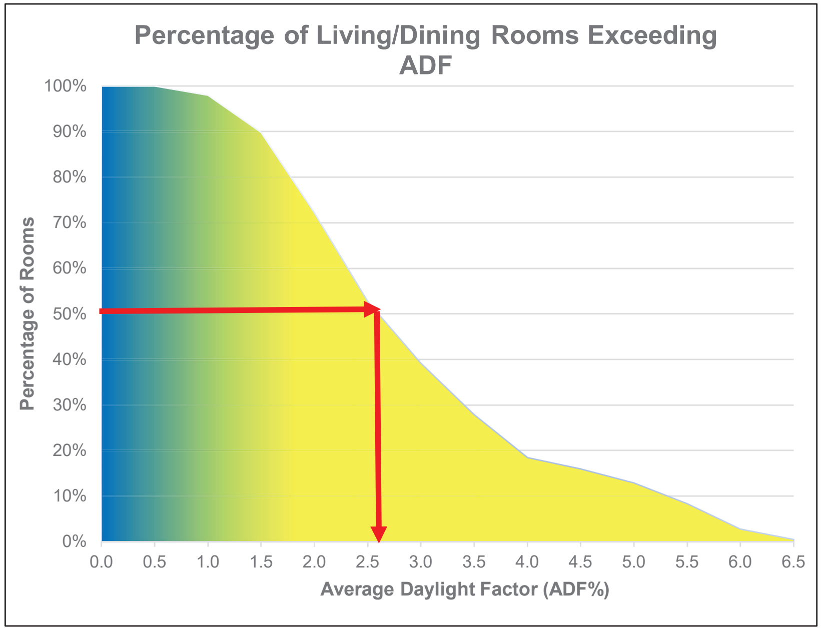


Fig 4.2 - Percentage of Living / Dining Rooms Exceeding ADF%

Entire Scheme Total Room Breakdown		
Above Target	908	96%
Below Target	38	4%

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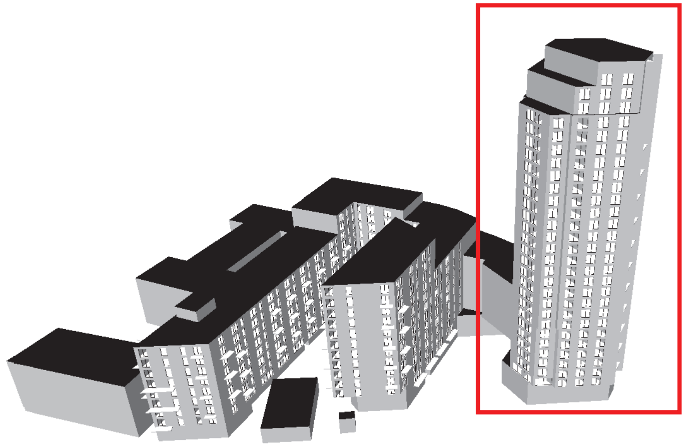
4.0 INTERNAL DAYLIGHT FACTORS

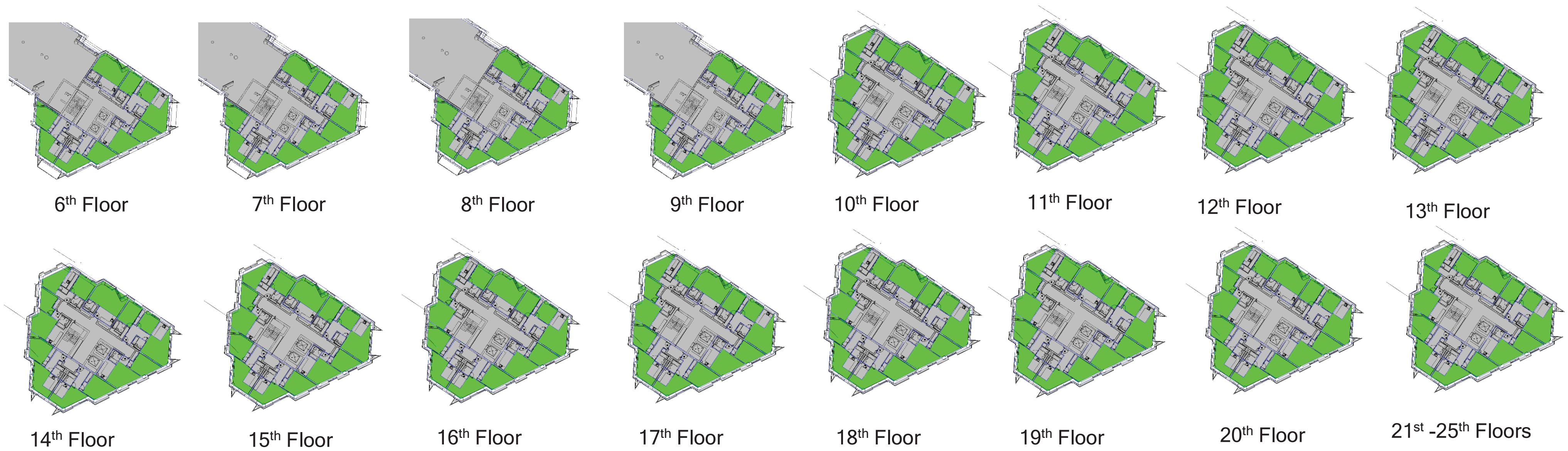
Block A Results

Block A Room Breakdown		
Above Target	327	>99%
Below Target	1	<1%

Daylight Target Bedroom	
>1%	(green)
< 1%	(pink)

Daylight Target Living	
>1.5%	(green)
< 1.5%	(pink)





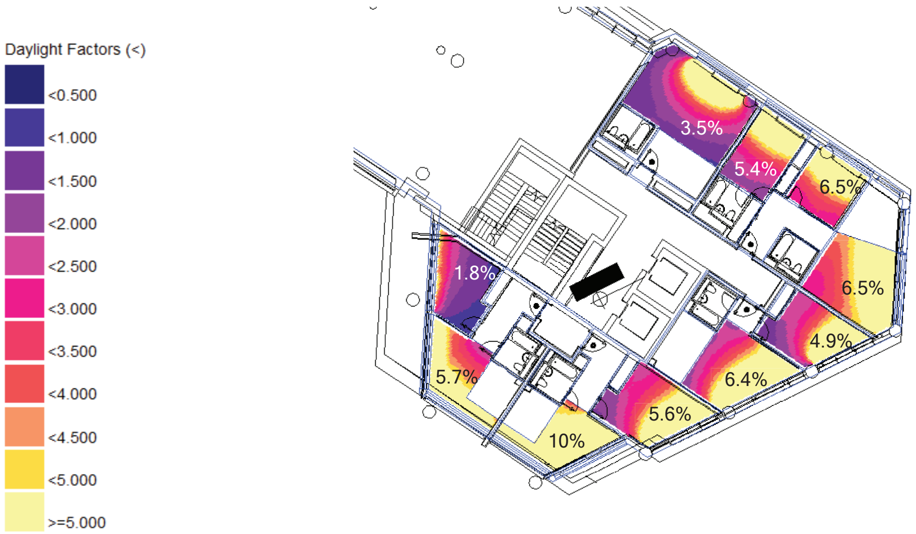
4.0 INTERNAL DAYLIGHT FACTORS

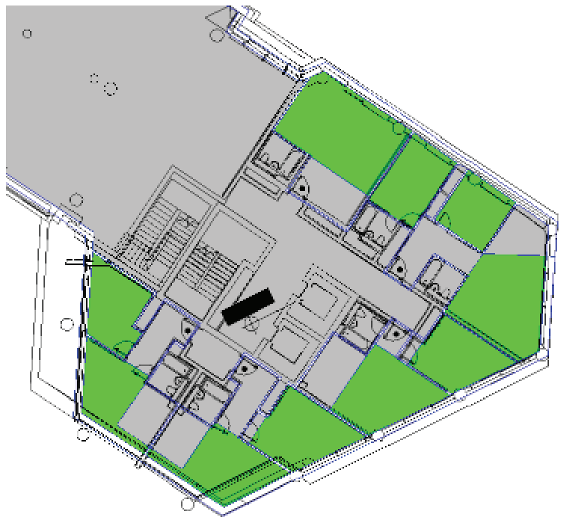
Block A Results

First Floor

Daylight Target Bedroom	
>1%	
< 1%	

Daylight Target Living	
>1.5%	
< 1.5%	





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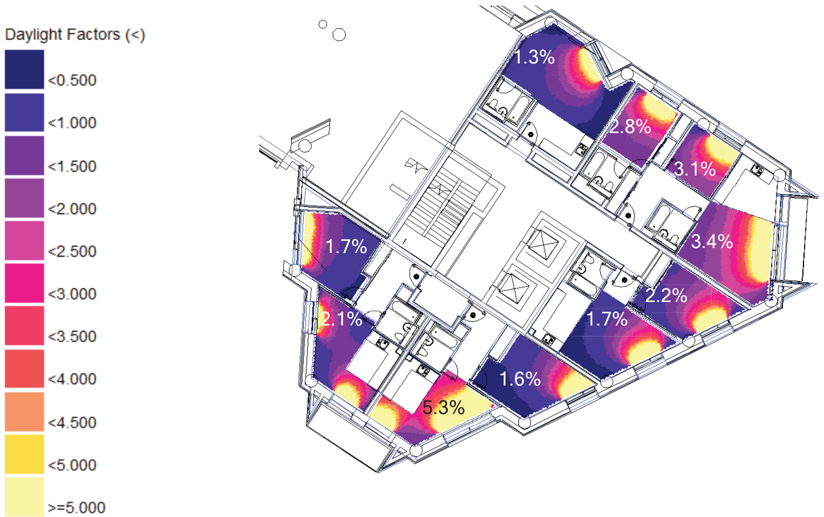
4.0 INTERNAL DAYLIGHT FACTORS

Block A Results

Second Floor

Daylight Target Bedroom	
>1%	
< 1%	

Daylight Target Living	
>1.5%	
< 1.5%	



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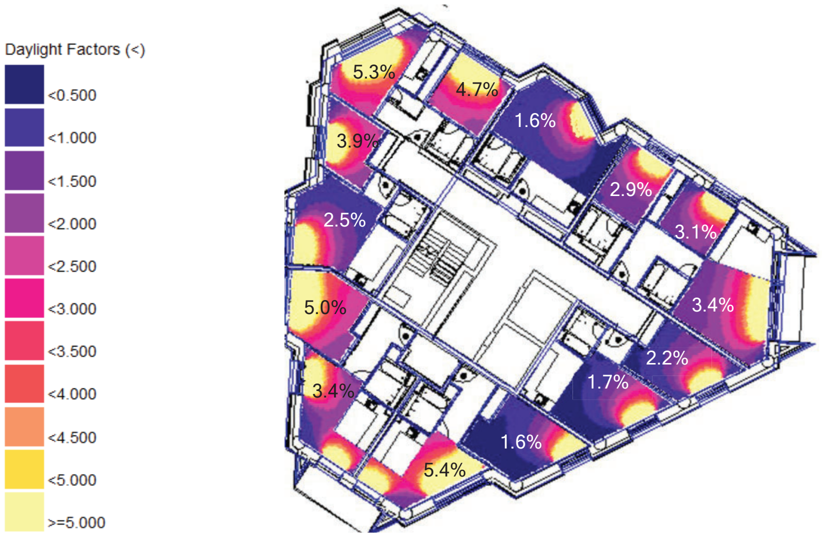
4.0 INTERNAL DAYLIGHT FACTORS

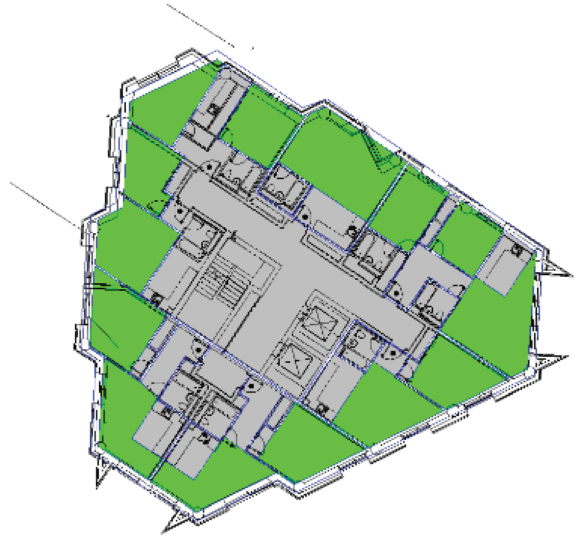
Block A Results

Twelfth Floor

Daylight Target Bedroom	
>1%	
< 1%	

Daylight Target Living	
>1.5%	
< 1.5%	

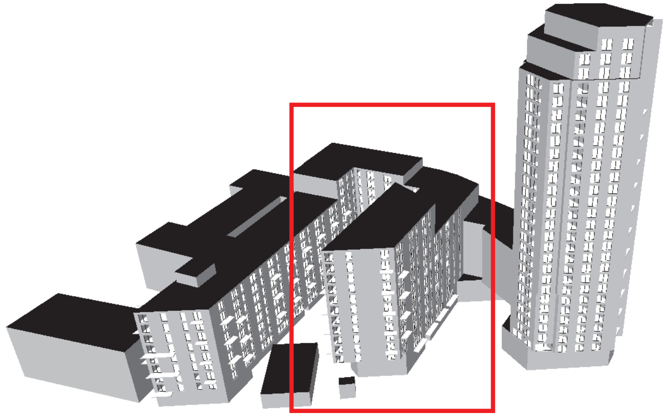




4.0 INTERNAL DAYLIGHT FACTORS

Block B Results

Block B Room Breakdown		
Above Target	276	94%
Below Target	17	6%



Daylight Target Bedroom	
>1%	
< 1%	

Daylight Target Living	
>1.5%	
< 1.5%	

Mezzanine | 1st Floor | 2nd Floor | 3rd Floor | 4th Floor | 5th Floor | 6th - 8th Floor | 9th - 11th Floor

4.0 INTERNAL DAYLIGHT FACTORS

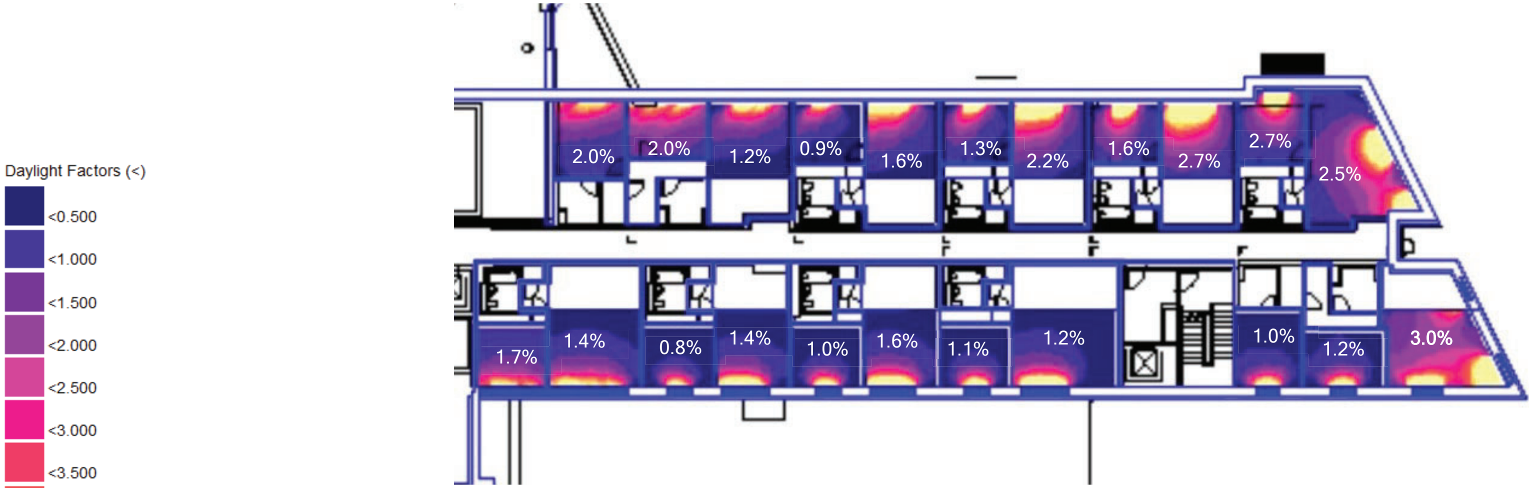
Block B Results

Mezzanine Floor

4.0 INTERNAL DAYLIGHT FACTORS

Block B Results

First Floor



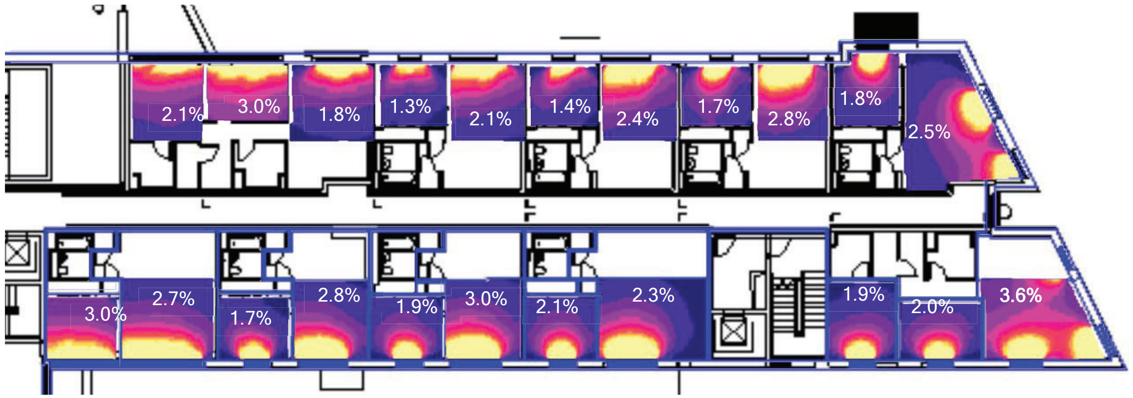
4.0 INTERNAL DAYLIGHT FACTORS

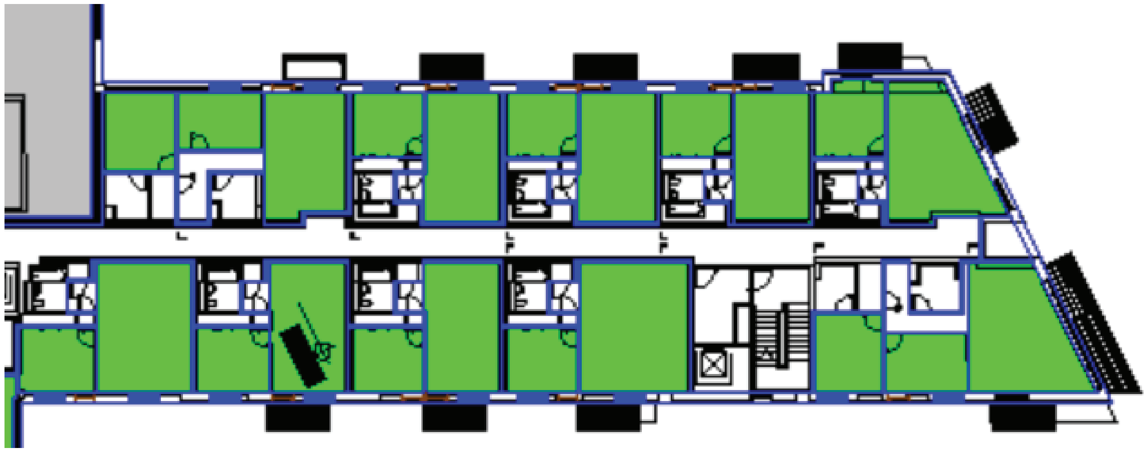
Block B Results

Sixth Floor

Daylight Factors (<)

- <0.500
- <1.000
- <1.500
- <2.000
- <2.500
- <3.000
- <3.500
- <4.000
- <4.500
- <5.000
- >=5.000

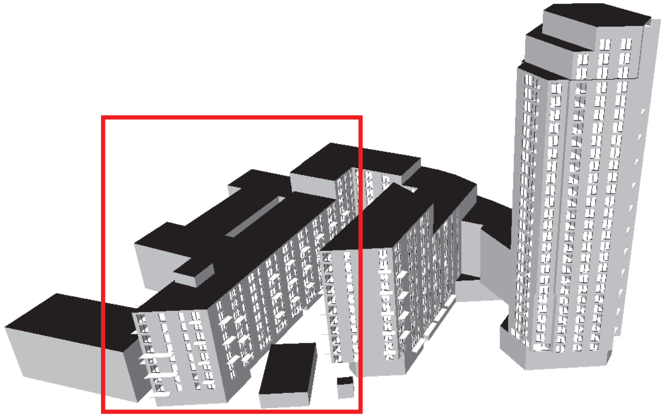


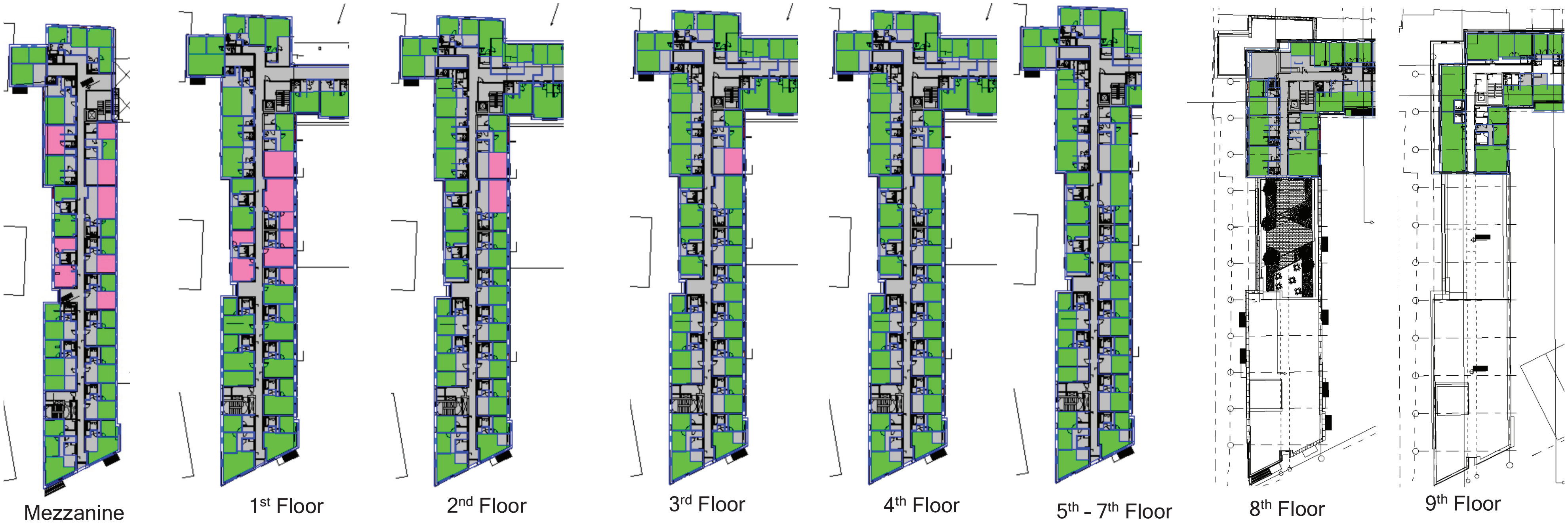


4.0 INTERNAL DAYLIGHT FACTORS

Block C Results

Block C Room Breakdown		
Above Target	305	94%
Below Target	20	6%

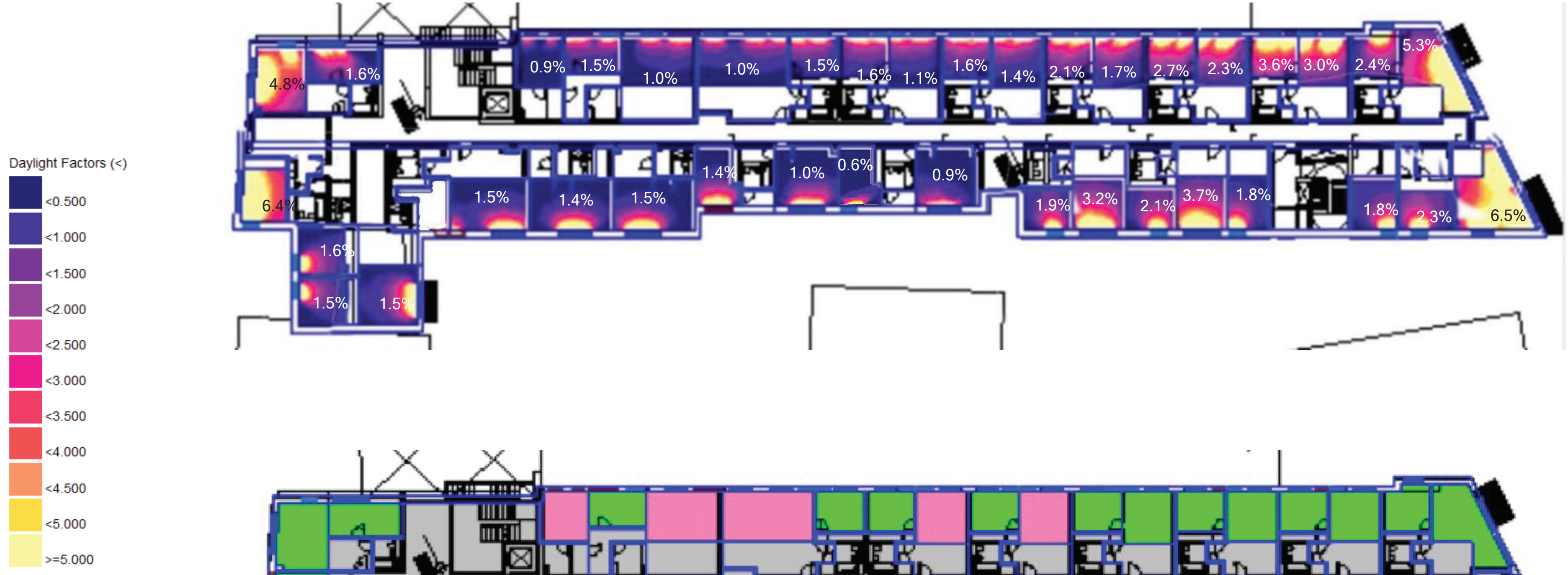




4.0 INTERNAL DAYLIGHT FACTORS

Block C Results

Mezzanine Floor



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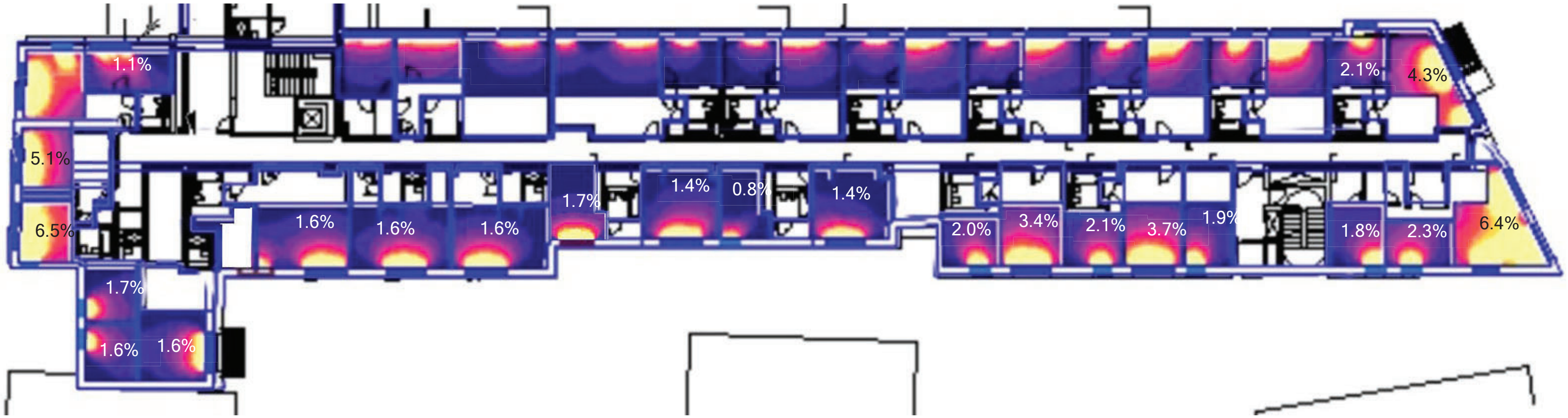
4.0 INTERNAL DAYLIGHT FACTORS

Block C Results

First Floor

Daylight Factors (<)

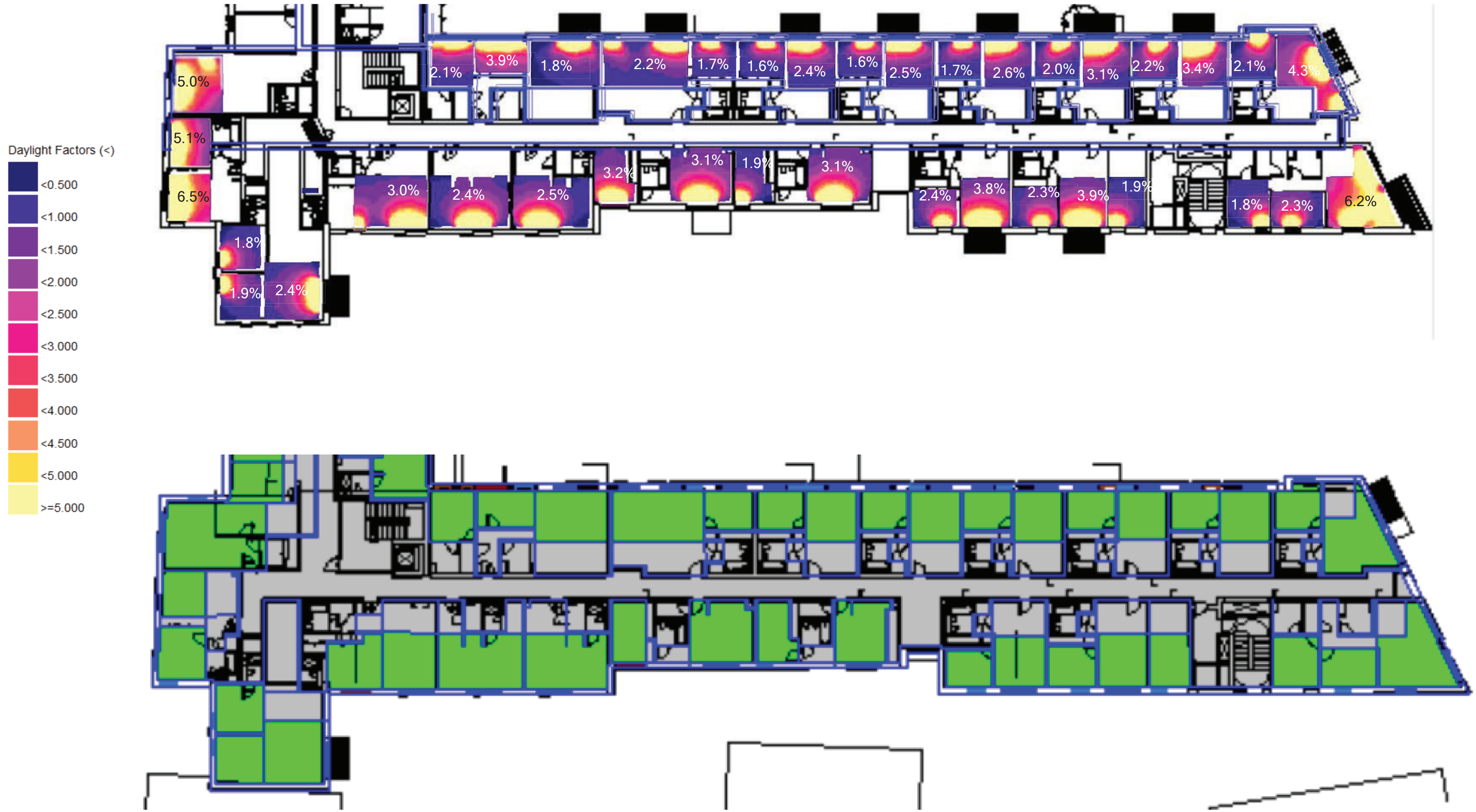
- <0.500
- <1.000
- <1.500
- <2.000
- <2.500
- <3.000
- <3.500
- <4.000
- <4.500
- <5.000
- >=5.000



4.0 INTERNAL DAYLIGHT FACTORS

Block C Results

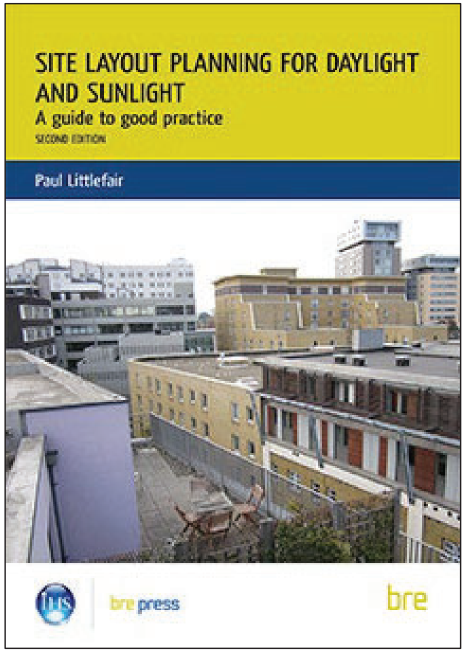
Sixth Floor



APPENDIX - DAYLIGHT STANDARDS

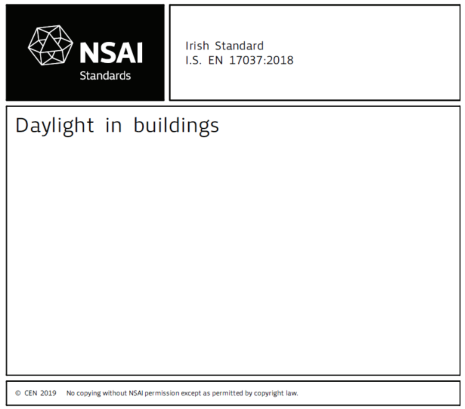
The Daylight Analysis section of the report assesses the Average Daylight Factors in accordance with the BRE 209 guide ‘Site Layout Planning for Daylight and Sunlight’ (2nd edition). This guide is specifically referenced within Section 6.6 of The Department of Housing, Planning and Local Government document - Design Standards for New Apartments which advises that:

Planning authorities should have regard to quantitative performance approaches to daylight provision outlined in guides like the BRE guide ‘Site Layout Planning for Daylight and Sunlight’ (2nd edition) or BS 8206-2: 2008 - ‘Lighting for Buildings - Part 2: Code of Practice for Daylighting’ when undertaken by development proposers which offer the capability to satisfy minimum standards of daylight provision.



Subsequent to this guidance, a new European Standard for Daylight in Buildings (EN 17037) was released in 2018 and adopted as IS EN 17037 in January 2019. This standard does not fall under any directive of the EU or any Irish Statutory Instrument and therefore remains advisory.

On release of the EN standard the BRE confirmed their intention to provide a National Annex, which would subsequently inform an updated and revised BRE 209 document. The rational for this Annex is that the Median Daylight Factors methodology applied within EN 17037 do not differentiate between residential and non-residential applications, with the standard stipulating a minimum target illuminance of 300 lux in all cases. This minimum target is deemed excessive for Dwellings, which have lower natural light requirements compared to non-domestic buildings (i.e. BS. 8602-2 has Average Daylight Factors of 1.0-2.0% for dwellings, as opposed to Average Daylight Factors of 2.0-5.0% for non-residential). Providing higher daylight level in residential applications may indeed be counter productive in that it may promote overheating.



This Annex, which was included in the British Standard version of EN 17037 identifies the target illuminances for dwellings that should be exceeded for over at least 50% of the points on a reference plane 0.85m above the floor, for at least half of the daylight hours (i.e. median). Utilising the Median External Illuminance of 14,900 Lux for Dublin (Table A.3) the following Median Daylight Factors may be applied, adopting the methodology used in BS.EN 17037 Annex NA.

Room type	Target illuminance E_T (lx)	Median Daylight Factors
Bedroom	100	0.7%
Living room	150	1.0%
Kitchen	200	1.3%

APPENDIX - DAYLIGHT STANDARDS (Cont'd)

The scatter graph (Fig A.1) compare the ADF as per BER 209 (vertical axis) against the EN 17037 Annex target illuminance levels (horizontal axis) for the sample spaces assessed throughout the Parkgate development, as contained within the body of the report.

The analysis determined that 82% Living / Dining spaces are compliant with the requirements of both methodologies, as evident from their location in the north east quadrant, green area, of the graph.

The graph illustrate the results are aligned under both methodologies, the BRE 209 and the BS EN 17037 Annex NA. As BRE 209 is specifically referenced with the Design Standards for New Apartments guidance, coupled with this being the industry standard, and thereby more recognisable and more widely understood, the approach adopted within this report has been to follow this guidance.

Each habitable space was therefore assessed against the BRE guide 'Site Layout Planning for Daylight and Sunlight' (2nd edition), as relevant, for Daylighting which state;

- Kitchens 2%
- Living Rooms 1.5%
- Bedrooms 1%

Regarding the target kitchen Average Daylight Factor of 2%, we note the BRE 209 guide was developed for residential housing where the kitchen is an identifiable separate room with seating where residents would be expected to eat and spend time as well as being generally present throughout the day. Apartments do not include a kitchen of this type; they instead include a kitchenette which would be expected to be used solely to prepare food with the residents spending most of their time in the living area. We therefore do not asses to the kitchen figure of 2% ADF, instead referencing the 1.5% ADF for living/dining rooms and 1% ADF for bedrooms.

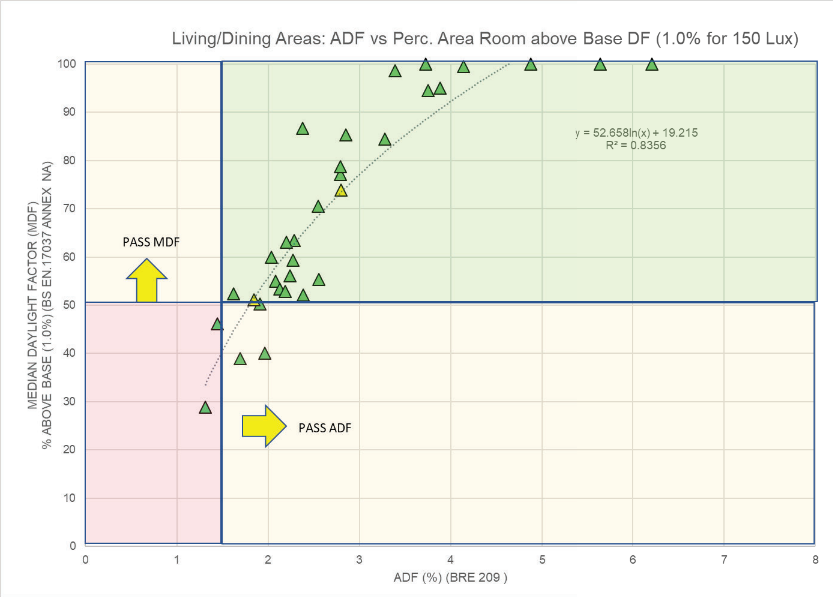


Fig A.1 Living / Dining Results for Parkgate Residential
(4th Floor Sample Shown)

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42A Parkgate Street, Dublin 8

Appendix 9.1: Construction Mitigation Measures

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ARUP

Appendix 9.1 - Construction Mitigation Measures

1.1 Construction Phase - Noise

With regard to construction activities, best practice control measures for noise and vibration from construction sites are found within BS 5228 (2009 +A1 2014) *Code of Practice for Noise and Vibration Control on Construction and Open Sites* Parts 1 and 2. Whist construction noise and vibration impacts are expected to vary during the construction phase depending on the distance between the activities and noise sensitive buildings, the contractor will ensure that all best practice noise and vibration control methods will be used, as necessary in order to ensure impacts at off-site noise sensitive locations are minimised.

The best practice measures set out in BS 5228 (2009) Parts 1 and 2 includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- selection of quiet plant;
- noise control at source;
- screening;
- liaison with the public, and;
- monitoring.

Detailed comment is offered on these items in the following paragraphs. Noise control measures that will be considered include the selection of quiet plant, enclosures and screens around noise sources, limiting the hours of work and noise and vibration monitoring, where required.

1.1.1 Selection of Quiet Plant

The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.

1.1.2 Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control “at source”. This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates can be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

Referring to the potential noise generating sources for the works under consideration, the following best practice migration measures should be considered:

- Site compounds will be located away from noise sensitive receptors within the site constraints. The use lifting bulky items, dropping and loading of materials within these areas will be restricted to normal working hours.
- Mobile plant should be switched off when not in use and not left idling.
- For piling plant, noise reduction can be achieved by enclosing the driving system in an acoustic shroud.
- For concrete mixers, control measures will be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.
- For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.

- Demountable enclosures can also be used to screen operatives using hand tools and will be moved around site as necessary.

- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

1.1.3 Piling

Piling is the construction activity which is most likely to cause disturbance. Mitigation in relation to piling is outlined in the following paragraphs.

Piling programmes will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. If piling works are in progress on a site at the same time as other works of construction or demolition that themselves may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any time.

During consultation the planner, developer, architect and engineer, as well as the local authority, should be made aware of the proposed method of working of the piling contractor. The piling contractor will in turn have evaluated any practicable and more acceptable alternatives that would economically achieve, in the given ground conditions, equivalent structural results.

Noise reduction will be achieved by enclosing the driving system in an acoustic shroud.

Screening by barriers and hoardings is less effective than total enclosure but can be a useful adjunct to other noise control measures. For maximum benefit, screens should be close either to the source of noise (as with stationary plant) or to the listener. Removal of a direct line of sight between source and listener can be advantageous both physically and psychologically. In certain types of piling works there will be ancillary mechanical plant and equipment that may be stationary, in which case, care should be taken in location, having due regard also for access routes. When appropriate, screens or enclosures will be provided for such equipment.

Contributions to the total site noise can also be anticipated from mobile ancillary equipment, such as handling cranes, dumpers, front end loaders etc. These machines may only have to work intermittently, and when safety permits, their engines will be switched off (or during short breaks from duty reduced to idling speed) when not in use.

1.1.4 Screening

Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. Construction site hoarding will be constructed around the site boundaries as standard. The hoarding will be constructed of a material with a mass per unit of surface area greater than 7 kg/m^2 to provide adequate sound insulation.

In addition, careful planning of the site layout will also be considered. The placement of site buildings such as offices and stores will be used, where feasible, to provide noise screening when placed between the source and the receiver.

1.1.5 Liaison with the Public

A designated environmental liaison officer will be appointed to site during construction works. Any noise complaints should be logged and followed up in a prompt fashion by the liaison officer. In addition, where a particularly noisy construction activity is planned or other works with the potential to generate high levels of noise, or where noisy works are expected to operate outside of normal working hours etc., the liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

1.1.6 Monitoring

Construction noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the development works to check compliance with the construction noise criterion.

Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: *Acoustics – Description, measurement and assessment of environmental noise*.

1.1.7 Project Programme

The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. During excavation/ piling or other high noise generating works are in progress on a site at the same time as other works of construction that themselves may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any time.

Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Appendix 9.2: Inward Noise Impact Assessment Report

265381-00

ARUP

PROPOSED MIXED RESIDENTIAL DEVELOPMENT, PARKGATE STREET, DUBLIN 8

NOISE ASSESSMENT OF PROPOSED DEVELOPMENT SITE

The Tecpro Building,
Clonshaugh Business & Technology Park,
Dublin 17, Ireland.

T: + 353 1 847 4220
F: + 353 1 847 4257
E: info@awnconsulting.com
W: www.awnconsulting.com

Technical Report Prepared For

Ruirside Developments Limited

Technical Report Prepared By

Leo Williams, BAI MAI PgDip AMIOA

Our Reference

LW/19/10606NR01b

Date of Issue

17 December 2019

Cork Office
Unit 5, ATS Building,
Carrigaline Industrial Estate,
Carrigaline, Co. Cork.
T: + 353 21 438 7400
F: + 353 21 483 4606

AWN Consulting Limited
Registered in Ireland No. 319812
Directors: F Callaghan, C Dilworth,
T Donnelly, T Hayes, D Kelly, E Porter

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Revision Level	Revision Date	Description	Sections Affected
LW/19/10606NR01a	27 June 2019	Amended details	Section 4.2
LW/19/10606NR01b	17 December 2019	Red line boundary updated	Various

Record of Approval

Details	Written by	Approved by
Signature		
Name	Leo Williams	Stephen Smyth
Title	Acoustic Consultant	Associate (Acoustics)
Date	17 December 2019	17 December 2019

EXECUTIVE SUMMARY

AWN Consulting has been commissioned to carry out a study in relation to the potential noise impacts incident to the proposed mixed development at the former Hickey & Company site on Parkgate Street, Dublin 8. This document presents the noise review of the proposed development site with respect to the inward impact of road and tram noise.

A baseline noise survey has been undertaken to determine the existing environment at the development site. Based on the survey results and a noise model developed for the site, the assessment has classified the development site as having a range of noise risks associated with a ‘medium to high’ risk.

Further discussion is presented in terms of the likely noise impact of both the external and internal areas of the proposed development. It has been found that the majority of the inhabitants will have access to a quiet external area that is screened by the development itself from road traffic noise and tram noise.

In addition, it is expected that the majority of habitable rooms will achieve a good internal noise environment while also allowing natural ventilation via an open window. However, for those rooms overlooking the local road and tram network, it will be necessary to provide enhanced acoustic glazing to ensure that when windows are closed that the internal noise environment is good. In these rooms the noise level internally with the windows open will be higher than ideal, however, inhabitants will have the option to close the window to reduce the noise level internally, while still maintaining adequate ventilation in accordance with Part F.

CONTENTS

1.0 INTRODUCTION

AWN Consulting has been commissioned to carry out a study in relation to the potential noise impacts incident to the proposed residential development at the former Hickey & Company site on Parkgate Street, Dublin 8. The focus of this report is to provide input into the acoustic design of the proposed development, identify any potential noise impacts and provide measures to minimise or mitigate those impacts.

Figure 1 presents the proposed development site and context.

Figure 1 Location of proposed development – Ground Floor Layout

Appendix A presents a glossary of acoustic terminology that is used throughout this report.

2.0 DESIGN GUIDANCE

2.1 Dublin Agglomeration Noise Action Plan

Here, consideration has been given to the content of the Dublin Agglomeration Noise Action Plan 2018 – 2023 (NAP). The document states that its 'key objective' is:

> *"as with the previous two Action Plans is to avoid, prevent and reduce, where necessary, on a prioritised basis the harmful effects, including annoyance, due to long term exposure to environmental noise from road traffic and rail sources. This will be achieved by taking a strategic approach to managing environmental noise and undertaking a 'balanced approach' within the context of sustainable development."*

It is important to state the following extract from the document:

> *"The Noise Action Plan is aimed at managing Environmental Noise and excludes, for the most part, noise from domestic activities, noise created by neighbours, noise at work places or construction noise as these can be dealt with under existing legislation such as the Environmental Protection Agency Act 1992 and Health & Safety legislation. However, Dublin City Council in Volume 1 of the plan, which relates only to the Dublin City Council Area, has outlined policies and procedures related to managing noise nuisances as they wish to provide all relevant information on how it intends to manage all matters in relation to the management of environmental and nuisance noise."*

This content will be reviewed and commented upon as appropriate in this and following sections.

In relation to noise limits the NAP sates:

> *"No national limit values exist in relation to environmental noise control. This Action Plan sets out certain criteria in relation to environmental sound levels which will be applied in identification of Quiet Areas and areas that have 'Undesirable' high sound levels or 'Desirable' low sound levels. These are set out below are and are fully described in each of the individual local authority volumes. These criteria are the same as those contained in the previous two action plans."*

The NAP states the following in relation to what it considers to be "'Undesirable' high sound levels or 'Desirable' low sound levels":

Desirable Low Sound Levels	Undesirable High Sound Levels
< 50 dB(A) L_{night}	>55 dB(A) L_{night}
< 55 dB(A) L_{day}	>70 dB(A) L_{day}

Table 1 Review of Undesirable Hight and Desirable Low Sound Levels

2.2 ProPG: Planning & Noise

The *Professional Guidance on Planning & Noise* (ProPG) document was published in May 2017. The document was prepared by a working group comprising members of the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH). Although not a government document, since it's adoption it has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance.

The ProPG outlines a systematic risk based 2 stage approach for evaluating noise exposure on prospective sites for residential development. The two primary stages of the approach can be summarised as follows:

- Stage 1 - Comprises a high level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels; and,
- Stage 2 – Involves a full detailed appraisal of the proposed development covering four "key elements" that include:
    - Element 1 - Good Acoustic Design Process;
    - Element 2 - Noise Level Guidelines;
    - Element 3 - External Amenity Area Noise Assessment
    - Element 4 - Other Relevant Issues

A key component of the evaluation process is the preparation and delivery of an Acoustic Design Statement (ADS) which is intended for submission to the planning authority. This document is intended to clearly outline the methodology and findings of the Stage 1 and Stage 2 assessments, so as the planning authority can make an informed decision on the permission. ProPG outlines the following possible recommendations in relation to the findings of the ADS:

A. Planning consent may be granted without any need for noise conditions;
B. Planning consent may be granted subject to the inclusion of suitable noise conditions;
C. Planning consent should be refused on noise grounds in order to avoid significant adverse effects ("avoid"); or,
D. Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects ("prevent").

Section 3.0 of the ProPG provides a more detailed guide on decision making to aid local authority planners on how to interpret the findings of an accompanying Acoustic Design Statement (ADS).

A summary of the ProPG approach is illustrated in Figure 2.

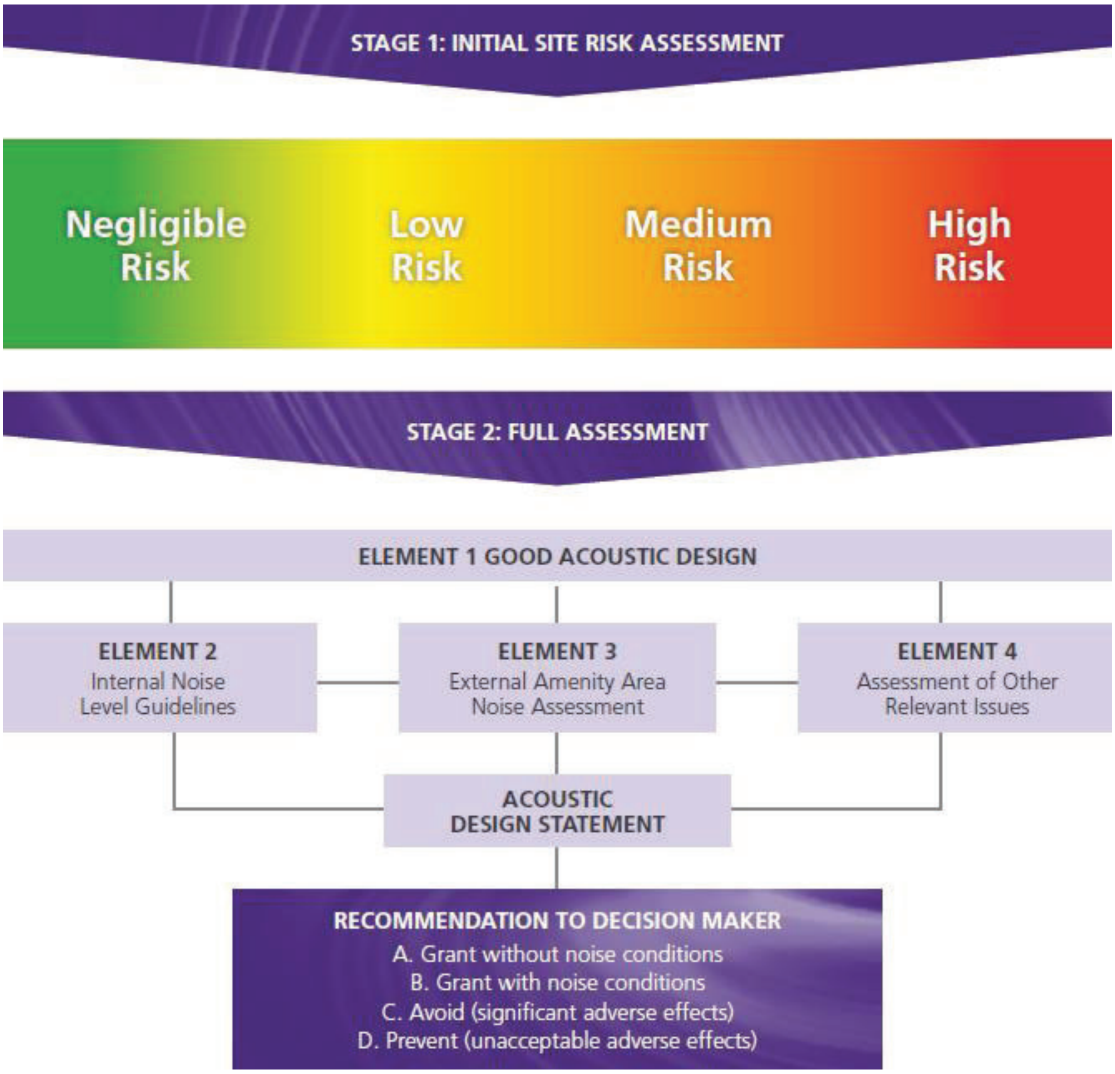


Figure 2 ProPG Approach (Source: ProPG)

2.3 British Standard BS 8233:2014

2.3.1 Internal Noise

There are no statutory guidelines or specific local guidelines relating to appropriate internal noise levels in dwellings. In this instance, reference is made to BS 8233: 2014: *Guidance on sound insulation and noise reduction for buildings.*

BS 8233 sets out recommended internal noise levels for several different building types from external noise sources such as traffic. The guidance is primarily for use by designers and hence BS 8233 may be used as the basis for an appropriate schedule of noise control measures. The recommended indoor ambient noise levels for residential dwellings are set out in Table 2 overleaf.

Activity	Location	Day (07:00 to 23:00hrs) dB $L_{Aeq,16hr}$	Night (23:00 to 07:00hrs) dB $L_{Aeq,8hr}$
Resting	Living room	35	-
Dining	Dining room/area	40	-
Sleeping (daytime resting)	Bedroom	35	30
Commercial	Open plan office	40	-

Table 2 Indoor Ambient Noise Levels for Dwellings from BS8233: 2014

BS 8233 also provides some guidance on individual noise events, it states:

> *"Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or L_{AFmax}, depending on the character and number of events per night. Sporadic noise events could require separate values."*

Typically, a 45 dB L_{AFmax} criterion is applied to individual noise events within bedrooms at night. This criterion is generally considered a noise level that should not typically be exceeded.

2.3.2 External Noise

BS 8233 also provides desirable noise levels for external amenity areas such as gardens, patios and balconies. It states:

> *"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."*

3.0 STAGE 1 – NOISE RISK ASSESSMENT

3.1 Methodology

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the site as a negligible, low, medium or high risk based on the pre-existing noise environment. Figure 3 presents the basis of the initial noise risk assessment, it provides appropriate risk categories for a range of continuous noise levels either measured and/or predicted on site.

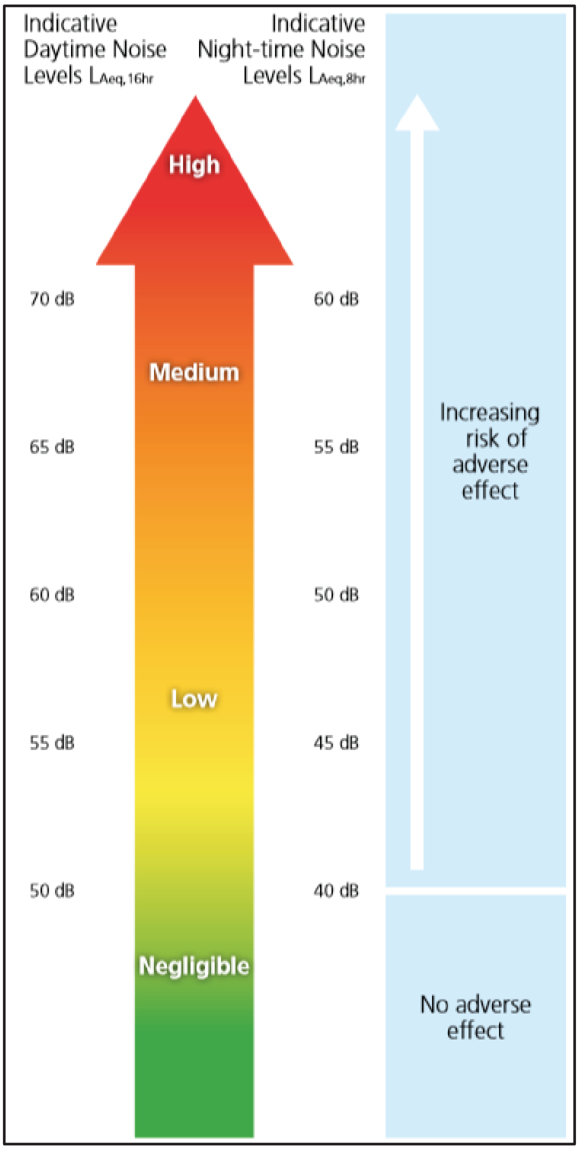


Figure 3 ProPG Stage 1 - Initial Noise Risk Assessment

It should be noted that a site should not be considered a negligible risk if more than 10 no. L_{AFmax} events exceed 60dB during the night period and the site should be considered a high risk if the L_{AFmax} events exceed 80dB more than 20 times a night.

Paragraph 2.9 of ProPG states that,

> *"The noise risk assessment may be based on measurements or prediction (or a combination of both) as appropriate and should aim to describe noise levels over a "typical worst case" 24 hour day either now or in the foreseeable future."*

In this instance it is proposed to develop a 3D computer noise model of the development site and predict the noise levels across the entire site in order to investigate the initial noise risk. The noise model will use the measured noise levels during the survey, discussed in Section 3.2, to validate the model. Furthermore, the model allows the site to be assessed taking into account the changes in topography that are required to allow development. This is to comply with the requirements of paragraph 2.8 of ProPG which states,

> *"The risk assessment should not include the impact of any new or additional mitigation measures that may subsequently be included in development proposals for the site and proposed as part of a subsequent planning application. In other words, the risk assessment should include the acoustic effect of any existing site features that will remain (e.g. retained buildings, changes in ground level) and exclude the acoustic effect of any site features that will not remain (e.g. buildings to be demolished, fences and barriers to be removed) if development proceeds."*

3.2 Baseline Noise Survey

Environmental noise surveys have been conducted in order to quantify noise emissions across the existing site. The external survey was conducted in general accordance with ISO1996-2:2017 *Acoustics - Description, Measurement and Assessment of Environmental Noise -- Determination of Environmental Noise Levels*. Specific details are set out in the following sections.

3.2.1 Methodology

The attended noise survey was conducted at three locations over the following period:

- 13:00hrs to 16:00hrs on 2 February 2019;
- 14:30hrs to 16:00hrs on 25 March 2019; and,
- 23:00hrs on 26 March to 00:10hrs on 27 March 2019.

An unattended logging meter was installed over the period 6th to 11th February 2019.

For the purpose of this assessment, daytime is taken to be between 07:00hrs and 23:00hrs, whilst night-time is between 23:00hrs and 07:00hrs. The weather during the daytime survey period was dry and calm with wind speeds of less than 5m/s. Temperatures were in the range of 9 to 11°C. The weather during the night-time survey period was dry and calm and wind speeds less than 3m/s. Temperatures were in the range of 4 to 5°C.

3.2.2 Measurement Parameters

The noise survey results are presented in terms of the following parameters:

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

L_{AFMax} is the maximum sound pressure level recorded during the sample period.

L_{Amin} is the instantaneous minimum sound level measured during the sample period.

L_{A10} is the sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

SEL Sound exposure level – a measure of the A-weighted sound energy used to describe noise events such as the passing of a train or aircraft; it is the A-weighted sound pressure level if occurring over a period of 1 second, would contain the same amount of A-weighted sound energy as the event.

The “A” suffix denotes the fact that the sound levels have been “A-weighted” in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

3.2.3 Measurement Locations

The four measurement locations, three attended (NM2, NM3 and NM4) and one unattended (NM1), were selected as shown in Figure 4.

NM1 This monitoring location was situated on north site boundary. The position was chosen to represent baseline noise levels associated with proposed facades exposed to traffic noise on Parkgate Street.

NM2 This monitoring position was located at the southern boundary of the proposed development.

NM3 This location was chosen in order to obtain representative noise levels in the vicinity of noise sensitive buildings adjacent to the western boundary of the proposed development

NM4 This monitoring position was located at a position representative of the proposed residential dwellings in the north east of the site across from the Luas tram line.

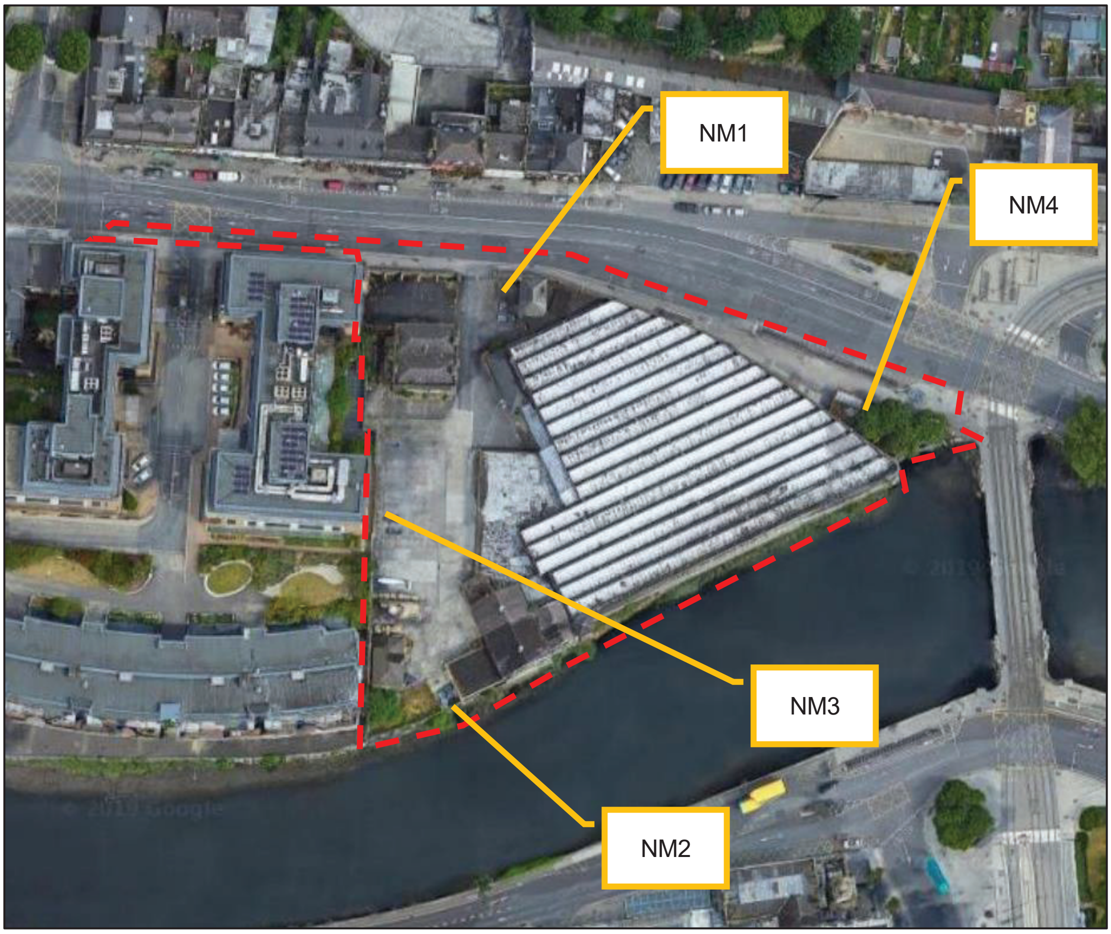


Figure 4 Noise Monitoring Locations and Site Boundary

3.2.4 <u>Survey Results – Location NM1</u>

Table 3 presents a summary of noise levels measured during the noise survey at Location 1.

Attended Measurements

Date	Period	Time	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)				
			L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
6th February	Day	15:15	69	85	50	73	54
25th March		14:23	71	88	51	75	57
		15:42	72	87	52	76	56
26th March	Night	23:19	69	83	46	74	52
		26:53	69	83	44	73	47

Table 3 Review of Attended Measured Noise Levels – NM1

The noise environment at the measurement location was dominated by traffic noise on Parkgate Street. The noise environment also comprised pedestrian activity, car horns and Luas movements. Daytime noise levels were in the range from 69 to 72dB $L_{Aeq,15min}$ and 54 to 57dB $L_{A90,15min}$. Night time noise levels were of the order of 69dB $L_{Aeq,15min}$ and 47 to 52dB $L_{A90,15min}$.

Unattended Measurements

Date	Period	Measured Noise Levels (dB re. $2x10^{-5}$ Pa)		
		L_{Aeq}	L_{Amax}	L_{A90}
6th February 2019	Day	75	84	55
7th February 2019	Night	72	82	48
	Day	76	84	55
8th February 2019	Night	72	82	50
	Day	76	83	57
9h February 2019	Night	72	81	53
	Day	75	81	54
10th February 2019	Night	73	82	47
	Day	78	82	53
11th February 2019	Night	71	82	46
	Day	74	82	56
Average	Day	76	83	55
	Night	72	82	49

Table 4 Review of Unattended Measured Noise Levels – NM1

In addition, the night-time L_{AFmax} levels have been reviewed. Figure 5 presents a histogram of the measured levels indicating that the L_{AFmax} levels are typically in the range of 78 to 83dB $L_{AFmax,}$ with a handful of single instances of higher maximum noise levels.

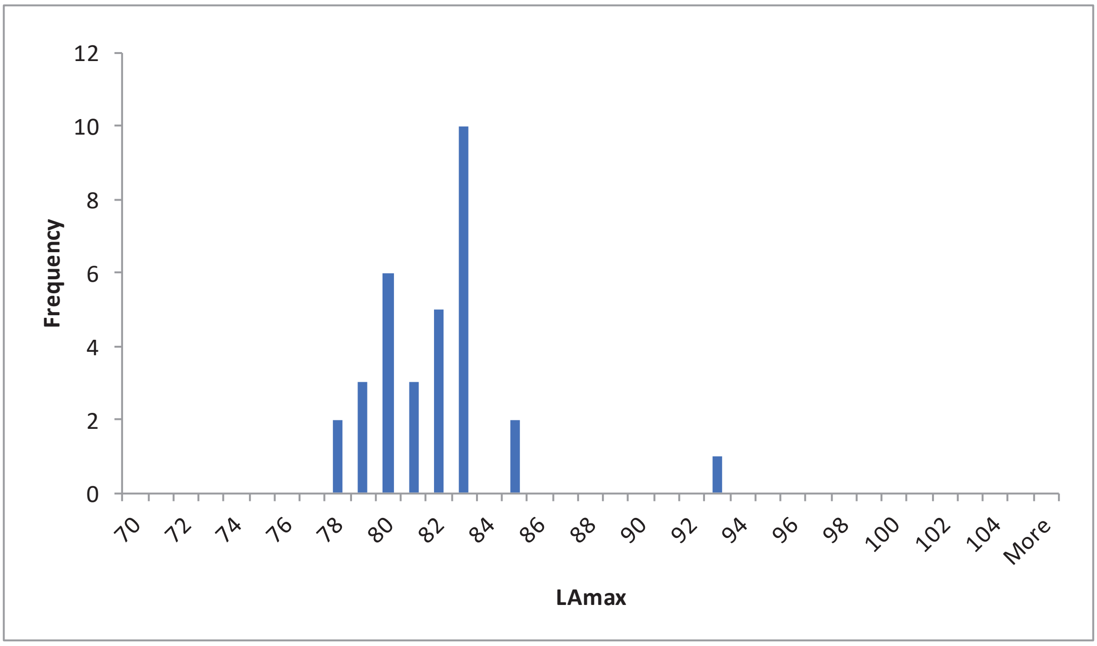


Figure 5 Summary of Night Time L_{AFmax} Levels

3.2.4 Survey Results – Location NM2

Table 5 presents a summary of noise levels measured during the noise survey at Location NM2.

Date	Period	Time	Measured Noise Levels (dB re. 2x10^{-5} Pa)				
			L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
2nd February	Day	14:41	57	67	50	59	54
25th March		14:49	55	80	50	58	52
		16:00	56	81	50	58	51

Table 5 Review of Attended Measured Noise Levels – NM2

The noise environment at the measurement location comprised distant traffic noise on Parkgate Street, occasional distant train movements. It was observed that announcements on Heuston Station PA system were audible intermittently. Daytime noise levels were in the range from 55 to 57dB $L_{Aeq,15min}$ and 51 to 54dB $L_{A90,15min}$.

3.2.4 Survey Results – Location NM3

Table 6 presents a summary of noise levels measured during the noise survey at Location NM3.

Date	Period	Time	Measured Noise Levels (dB re. 2x10^{-5} Pa)				
			L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
2nd February	Day	15:34	54	75	47	57	49
25th March		15:07	54	71	45	57	48
		16:18	50	64	44	52	46

Table 6 Review of Attended Measured Noise Levels – NM3

The noise environment at the measurement location comprised distant traffic noise on Parkgate Street and occasional faint distant train movements. Delivery vans were observed accessing and exiting the car park. Daytime noise levels were in the range from 50 to 54dB $L_{Aeq,15min}$ and 46 to 49dB $L_{A90,15min}$.

3.2.6 Survey Results – Location NM4

Table 7 presents a summary of noise levels measured during the noise survey at Location NM4.

Date	Period	Time	Measured Noise Levels (dB re. 2x10^{-5} Pa)				
			L_{Aeq}	L_{Amax}	L_{Amin}	L_{A10}	L_{A90}
2nd February	Day	14:59	68	87	54	72	59
25th March		15:25	66	80	53	71	57
		16:37	68	86	53	71	57
26th March	Night	23:02	66	80	48	71	51
		23:36	64	77	46	69	51

Table 7 Review of Attended Measured Noise Levels – NM4

The noise environment at the measurement location was dominated by traffic noise on Parkgate Street. Other sources included pedestrian activity and Luas movements. Daytime noise levels were in the range from 66 to 68dB $L_{Aeq,15min}$ and 57 to

59dB $L_{A90,15min}$. Night time noise levels were in the range of 64 to 66dB $L_{Aeq,15min}$ and of the order of 51 dB $L_{A90,15min}$.

3.2.5 Baseline Noise Review Conclusions

With reference to the Noise Risk Assessment outlined in ProPG the noise levels for relevant periods have been derived in order to classify the proposed development site. Table 8 summarises the measured noise levels at the measurement location situated approximately at the proposed building facades as per the preliminary site layout.

Period	Measured Noise Level (dB, $L_{Aeq,T}$)	"Risk Category"
Daytime	62 – 69	Medium – High
Night time	52 – 62	High

Table 8 Categorising Proposed Site

3.3 Noise Model of Site – Traffic Noise

A 3D noise model has been prepared in order to predict the impact of traffic noise across the proposed site. The following section outlines the proposed methodology for predicting incident noise levels on the most exposed facades in the proposed development.

3.3.1 Methodology

Proprietary noise calculation software will be used for the purposes of establishing the prevailing noise levels on the proposed site. The selected software, Brüel & Kjær Type 7810 *Predictor*, calculates noise levels in accordance with the *Calculation of Road Traffic Noise (CRTN - ISBN 0 11 550847 3)* issued by the UK Department of Transport in 1988. This the standard recognised for the prediction of road traffic noise by Transport Infrastructure Ireland (TII).

The following information will be included in the model:

- Site layout drawings of proposed development, and;
- OS mapping of surrounding environment.

3.3.2 Model Validation

Noise levels recorded during the baseline noise survey were used to calibrate the traffic noise model to within 1 dB of the measured values. This is regarded as very strong correlation in respect of predicted noise levels.

3.3.3 Noise Model Output

To assess the initial noise risk assessment across the development site the noise model has been used to prepare noise contour maps for both daytime and night-time periods at a height representative of first floor residential levels of the proposed development (4m above ground). The model has been prepared presuming existing walls and buildings are cleared. These maps are presented in Figures 6 and 7.

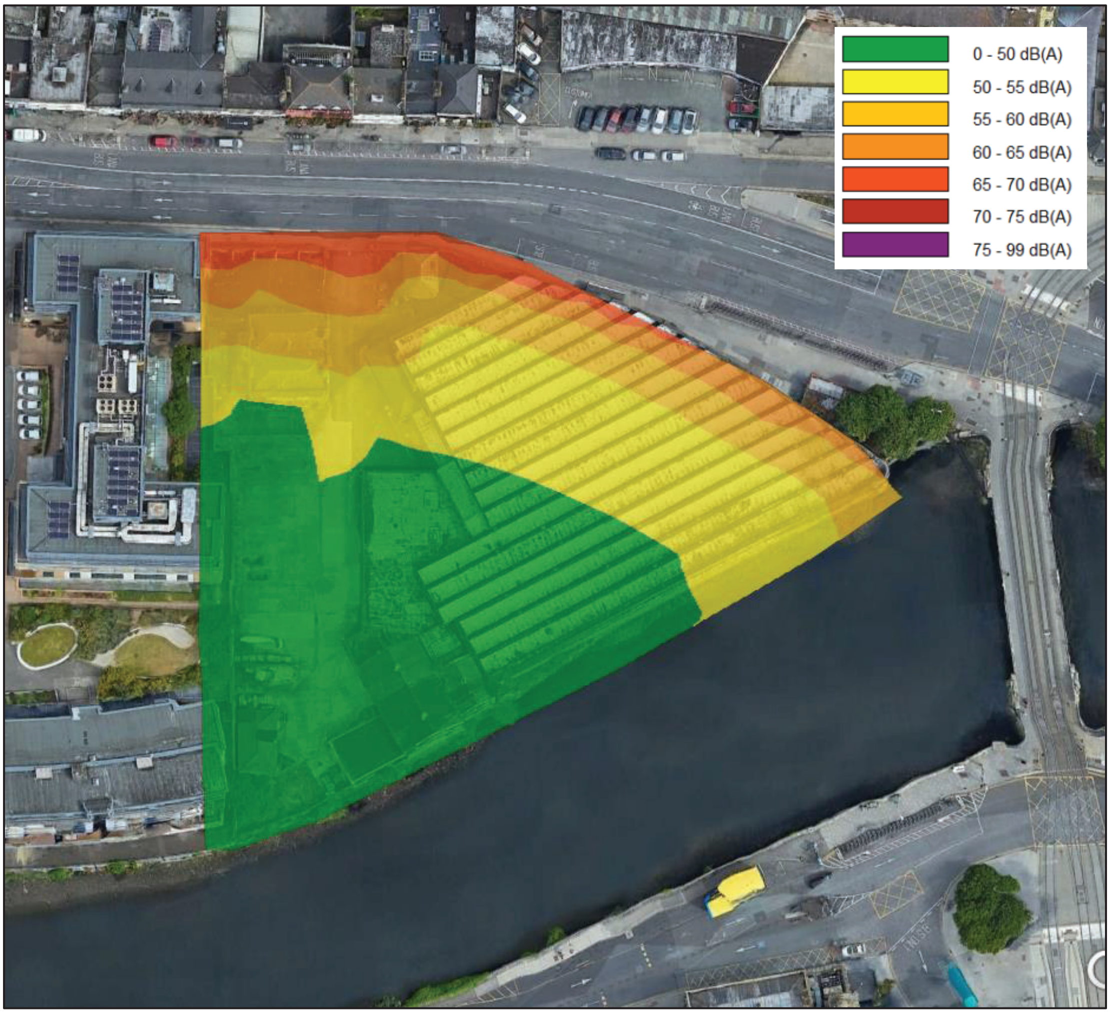


Figure 6 Daytime Noise Levels at 4m Above Ground

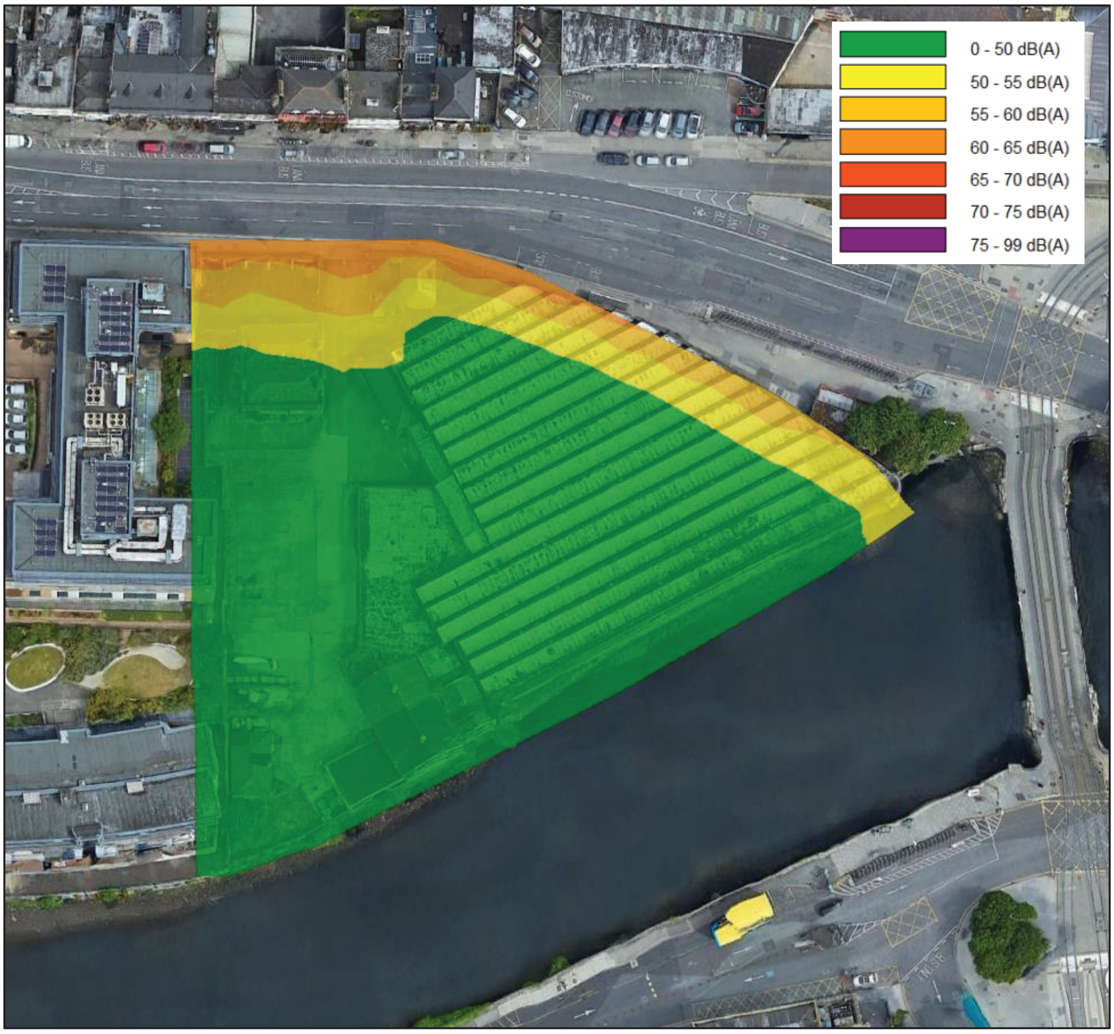


Figure 7 Night Noise Levels at 4m Above Ground

3.4 Tram Traffic

With the calculated SEL of a train movement and the knowledge of the number of movements on the line during a day and night time period the expected levels of tram noise at the facades of the proposed buildings have been predicted. The expected level has been predicted to the closest façade on the proposed site. The review of this analysis is presented in Table 9.

Activity	Location	Period	No. Of Movements	Predicted Noise Level at Closest Façade
Luas Movements	Block A1 (eastern façade)	Day	456	52 dB $L_{Aeq,1hr}$
		Night	24	40 dB $L_{Aeq,8hr}$

Table 9 Predicted Train Noise Levels

The above calculation assumes screening is afforded to the first floor only of the buildings from tram movements. Therefore, the approach adopted here is considered to be representative of the worst-case scenario.

3.5 Noise Risk Assessment Conclusion

Giving consideration to the measured and predicted noise levels presented in the previous sections the initial site noise risk assessment has concluded that the level of risk across the site varies from medium to high noise risk.

Additionally, the Stage 1 Noise Risk Assessment requires analyses of the L_{AFmax} noise levels. In the case of this survey the L_{AFmax} noise levels were typically in the range of 78 to 83dB L_{AFMax} during the night, with occasional instances of higher levels. The number of L_{AFMax} events above 80dB is greater than 20, indicating that the site can be considered High Risk in terms of L_{AFmax} events.

ProPG states the following with respect to medium and high risks:

Medium Risk	*As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.*
High Risk	*High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.*

Given the above it can be concluded that the development site may be categorised as *Medium to High Risk* and as such an Acoustic Design Strategy will be required to demonstrate that suitable care and attention has been applied in mitigating and minimising noise impact to such an extent that an adverse noise impact will be avoided in the final development.

It should be noted that ProPG states the following with regard to how the initial site noise risk is to be used,

> *"2.12 It is important that **the assessment of noise risk at a proposed residential development site is not the basis for the eventual recommendation to the decision maker**. The recommended approach is intended to give the developer, the noise practitioner, and the decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perspective and the extent of the acoustic issues that would be faced. Thus, a site considered to be high risk will be recognised as presenting more acoustic challenges than a site considered as low risk. A site considered as negligible risk is likely to be acceptable from a noise perspective and need not normally be delayed on noise grounds. A potentially problematical site will be flagged at the earliest possible stage, with an increasing risk indicating the increasing importance of good acoustic design."*

Therefore, following the guidance contained in ProPG does not preclude residential development on sites that are identified as having medium or high-risk noise levels. It merely identifies the fact that a more considered approach will be required to ensure the developments on the higher risk sites are suitable designed to mitigate the noise levels. The primary goal of the approach outlined in ProPG is to ensure that the best possible acoustic outcome is achieved for a particular site.

3.6 Proposed Development

The traffic noise model was updated to incorporate the proposed buildings in order to determine noise levels across the site taking into account the screening effect of the new buildings and to determine specific noise levels at the most exposed residential facades Figures 8 and 9 display the calculated noise contours across the site at a height of 4m for day and night-time periods respectively.

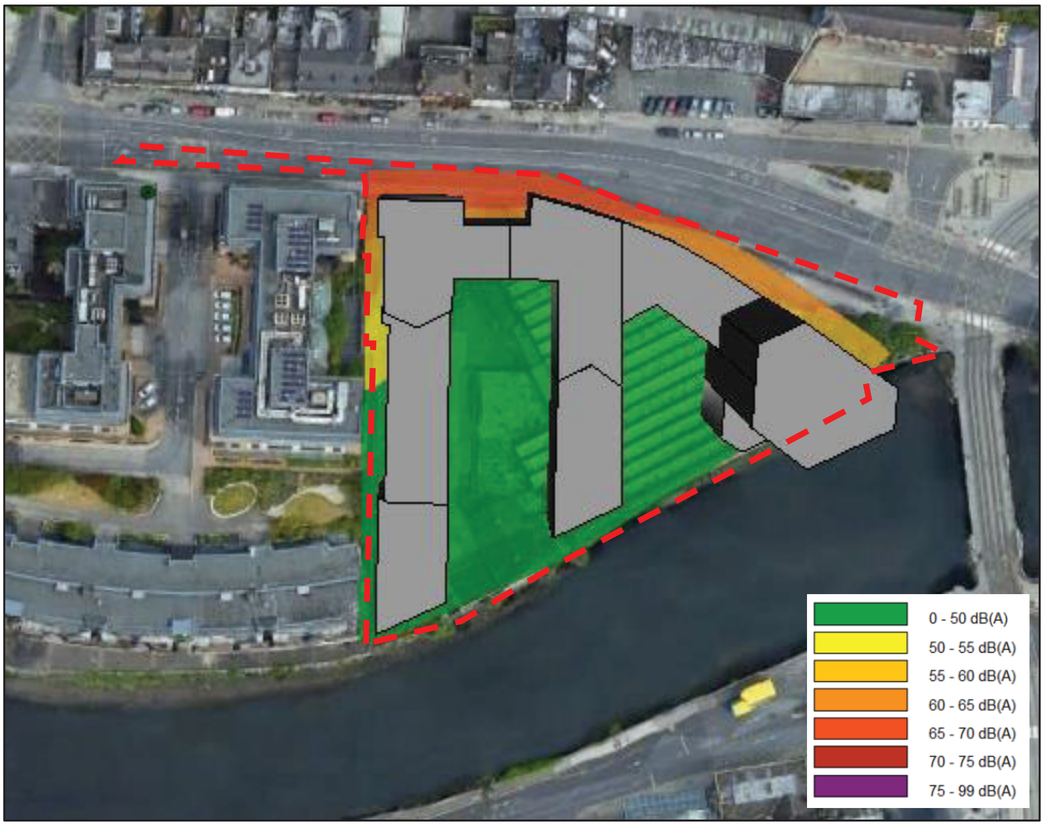


Figure 8 Predicted Traffic Noise Contour Across the Developed Site – Daytime

The results of the assessment indicate that during daytime periods, noise levels are highest along the northern boundary of the site at the units / apartments facing Parkgate Street. The predicted noise levels at the most exposed facades are between 60 and 70dB $L_{Aeq,16hr}$ along this section of the development.

Along the eastern boundary levels at the façades overlooking the tram line predicted noise levels of 54 to 58dB $L_{Aeq,16hr}$ depending on the façade orientation.

For the majority of the site the predicted noise levels range from 27[1] to 44dB $L_{Aeq,16hr}$ depending on the proximity and orientation of the section of the façade to Parkgate Street and screening provided by proposed buildings.

1 Lower predicted noise levels refer to traffic noise contribution. Actual noise levels may be higher due to contribution from surrounding noise sources.

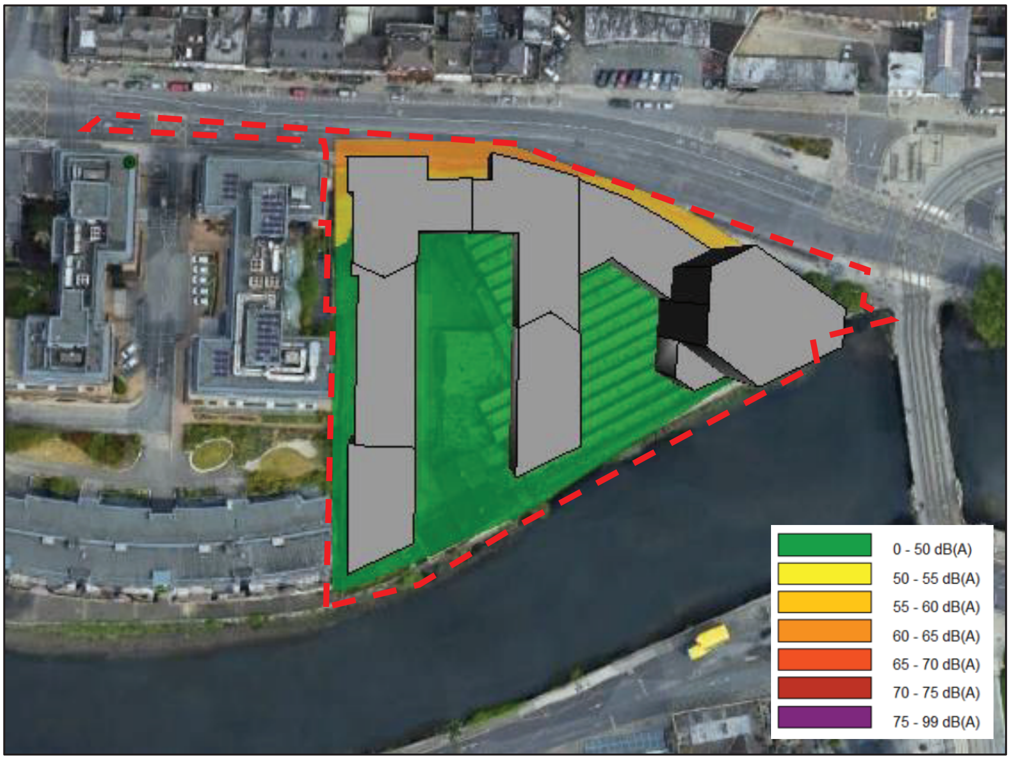


Figure 9 Predicted Traffic Noise Contour Across the Developed Site – Night

The results of the assessment indicate that during night time periods, noise levels are highest along the northern boundary of the site at the units / apartments facing Parkgate Street. The predicted noise levels at the most exposed facades are between 56 and 63dB $L_{Aeq,8hr}$ along this section of the development.

Along the southern boundary levels at the façades overlooking the tram line predicted noise levels of 44 to 53dB $L_{Aeq,16hr}$ depending on the façade orientation.

For the majority of the site the predicted noise levels range from 22 to 42dB $L_{Aeq,16hr}$ depending on the proximity of the section of the façade to Parkgate Street and screening provided by proposed buildings.

3.7 Cumulative Noise Levels

To assess the predicted impact along the eastern boundary a cumulative level has been calculated to account for traffic noise and tram noise. The table below presents the predicted cumulative noise levels at the most exposed facades of Block A1.

Location	Period	Traffic Noise (dB $L_{Aeq,T}$)	Tram Noise (dB $L_{Aeq,T}$)	Predicted Noise Level at Closest Façade
Block A1	Day	58	52	59 dB $L_{Aeq,16hr}$
	Night	53	40	53 dB $L_{Aeq,8hr}$

Table 10 Predicted Cumulative Noise Levels

4.0 STAGE 2 – FULL ACOUSTIC ASSESSMENT

4.1 Element 1 – Good Acoustic Design (GAD) Process

4.1.1 ProPG Guidance

In practice, good acoustic design should deliver the optimum acoustic design for a particular site without adversely affecting residential amenity or the quality of life of occupants or compromising other sustainable design objectives. It is important to note that ProPG specifically states that good acoustic design is not equivalent to overdesign or "*gold plating"* of all new development but that it seeks to deliver the optimum acoustic environment for a given site.

Section 2.23 of the ProPG outlines the following checklist for Good Acoustic Design:

- Check the feasibility of relocating, or reducing noise levels from relevant sources;
- Consider options for planning the site or building layout;
- Consider the orientation of proposed building(s);
- Select construction types and methods for meeting building performance requirements;
- Examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design and management) etc;
- Assess the viability of alternative solutions; and,
- Assess external amenity area noise.

In the context of the proposed development, each of the considerations listed above have been addressed in the following subsections.

4.1.2 Application of GAD Process to Proposed Application

Relocation or Reduction of Noise from Source

The surrounding road network is located outside the redline boundary of the site and therefore it is beyond the scope of this development to introduce any noise mitigation at source.

Planning, Layout and Orientation

Review of the site layout shows that the blocks are positioned parallel to Parkgate Street, therefore the façades facing the road (north, north-west) are exposed to noise from the road.

On the other hand, the facades and amenity spaces to the rear of the blocks are screened from the road by the buildings themselves. At a further distance, gardens and community spaces are located further from the influence of road traffic noise.

Select Construction Types for meeting Building Regulations

Masonry constructions will be used in constructing the external walls of the development. The masonry construction type offers high levels of sound insulation performance. However, as is typically the case the glazed elements and any required ventilation paths to achieve compliance with Part F of the Building Regulations will be the weakest elements in the façade in terms of sound insulation performance.

Consideration will therefore be given to the provision of upgraded glazing and acoustic ventilators. Note that it will not be possible to achieve the desirable internal acoustic environments with windows open. Instead the proposal here will be to provide dwelling units with glazed elements and ventilators that have good acoustic insulation properties so that when the windows are closed the noise levels internally are good. Inhabitants will be able to open the windows if they wish, however, doing so will increase the internal noise level. This approach to mitigation is supported in ProPG where it states the following (note my emphasis has been added in bold),

"2.22 *Using fixed unopenable glazing for sound insulation purposes is generally unsatisfactory and should be avoided;* ***occupants generally prefer the ability to have control over the internal environment using openable windows, even if the acoustic conditions would be considered unsatisfactory when open****. Solely relying on sound insulation of the building envelope to achieve acceptable acoustic conditions in new residential development, when other methods could reduce the need for this approach, is not regarded as good acoustic design. Any reliance upon building envelope insulation with closed windows should be justified in supporting documents* "

Note 5 Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} *target levels should not normally be exceeded*

2.34 *Where the LPA accepts that there is a justification that the internal target noise levels can only be practically achieved with windows closed,* ***which may be the case in urban areas and at sites adjacent to transportation noise sources****, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment. In such circumstances, internal noise levels can be assessed with windows closed but with any façade openings used to provide "whole dwelling ventilation" in accordance with Building Regulations Approved Document F (e.g. trickle ventilators) in the open position (see Supplementary Document 2). Furthermore, in this scenario the internal* L_{Aeq} *target noise levels should not generally be exceeded*."

It is very important to note that it is impractical to achieve the good internal noise levels with windows open across the vast majority of development sites in urban or suburban locations. Such sites would need to be classified as having a negligible risk in accordance with the ProPG noise risk assessment approach. For this reason, there are no guidance documents either at a local level or an international level that AWN is aware of which would support the approach of achieving the ideal internal noise levels only in the open window scenario. It is therefore considered entirely correct and justifiable to provide building facades with a moderate degree of sound insulation such that with windows closed but vents opened a good internal acoustic environment is achieved.

Impact of noise control measures on fire, health and safety etc

The good acoustic design measures that have been implemented on site, e.g. locating properties away from the road, placing outdoor space on the quiet side of buildings, are considered to be cost neutral and do not have any significant impact on other issues.

Assess Viability of Alternative Solutions

This will be explored as the project progresses and the noise model will be used to assess the acoustic benefit of any alternative solutions.

Assess External Amenity Area Noise

ProPG provides the following advice with regards to external noise levels for amenity areas in the development:

> *"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$."*

Noise levels across amenity areas is addressed in Section 4.3 below.

4.2 Element 2 – Internal Noise Levels

Internal Noise Criteria

Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233 (2014). The recommended indoor ambient noise levels are set out in Table 8.2 and are based on annual average data.

In addition to these absolute internal noise levels ProPG provides guidance on flexibility of these internal noise level targets. For instance, in cases where the development is considered necessary or desirable, and noise levels exceed the external WHO guidelines, then a relaxation of the internal L_{Aeq} values by up to 5dB can still provide reasonable internal conditions.

Façade Noise Levels

Noise levels have been predicted across the development site during day and night-time periods. Table 11 presents the predicted noise levels for the various facades of the buildings on site that have been assumed for this assessment.

Ref	Period	$L_{Aeq,\,T}$ dB
RED	Day	60 - 70
	Night	55 - 65
ORANGE	Day	55 - 60
	Night	50 - 55
GREEN	Day	≤45
	Night	≤40

Table 11 Summary of Predicted Façade Noise Levels

Figure 10 Predicted Cumulative Façade Levels

Taking into account the height of Block A1, a check of incident noise levels as the building increases with height has been done. At a height of approx. 32m incident noise levels decrease to a level where standard glazing is sufficient to ensure the required internal noise levels. Therefore glazing to facades of Block A1 from 8th Floor upwards are designated under the 'orange' and 'green' categories described above, i.e. these facades do not require upgraded glazing[2].

Discussion on Open/Closed Windows

The level of sound reduction offered by a partially open window is typically applied as 15dB[3] to 18dB.

Considering the design goals outlined in Table 2 and sound reduction across an open window of 15dB, the free-field noise levels that would be required to ensure that internal noise levels do not exceed 'good' or 'reasonable' internal noise levels have been summarised in Table 12.

Level Desired	Day 07:00 to 23:00hrs	Night 23:00 to 07:00hrs
Good (i.e. at or below the internal noise levels)	50 – 55dB $L_{Aeq,16hr}$	45dB $L_{Aeq,8hr}$
Reasonable (i.e. 5 dB above the internal noise levels)	55 – 60dB $L_{Aeq,16hr}$	50dB $L_{Aeq,8hr}$

Table 12 External Noise Levels Required to Achieve Internal Noise Levels

2 Based on Reddy Architecture drawings revision P03, issued 14/6/2019.
3 Section 2.33 of ProPG, additional information can be found in the DEFRA NANR116: *'Open/Closed Window Research' Sound Insulation Through Ventilated Domestic Windows'*

For sensitive rooms that face on to Parkgate Street a reasonable internal noise level will not be achieved with windows open (red highlighted facades). Facades of buildings along the southern boundary should achieve reasonable internal levels for the majority of the time since the ‘red’ categorisation is dictated by plant noise and tram noise which is more intrusive at night time only. For those on green highlight facades reasonable levels will be achieved with windows open.

Mechanical ventilation is proposed for the development therefore there is no requirement to have windows open to achieve background ventilation requirements. An appropriate acoustic specification for windows shall be provided in this instance to ensure the rooms achieve good internal noise levels.

Recommend Façade Treatment

The British Standard BS EN 12354-3: 2000: *Building acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 3: Airborne sound insulation against outdoor sound* provides a calculation methodology for determining the sound insulation performance of the external envelope of a building. The method is based on an elemental analysis of the building envelope and can take into account both the direct and flanking transmission paths.

The Standard allows the acoustic performance of the building to be assessed taking into account the following:

- Construction type of each element (i.e. windows, walls, etc.);
- Area of each element;
- Shape of the façade, and;
- Characteristics of the receiving room.

The principles outlined in BS EN 12354-3 are also referred to in BS8233 and Annex G of BS8233 provide a calculation method to determine the internal noise level within a building using the composite sound insulation performance calculated using the methods outlined in BS EN 12354-3. The methodology outlined in Annex G of BS8233 has been adopted here to determine the required performance of the building facades. This approach corrects the noise levels to account for the frequency content of the source in question. In this instance, tram and road traffic noise, depending on the buildings in question.

Glazing

As is the case in most buildings, the glazed elements of the building envelope are typically the weakest element from a sound insulation perspective. In this instance the facades will be provided with glazing that achieves the minimum sound insulation performance as set out in Table 13.

Glazing Specification	Octave Band Centre Frequency (Hz)						R_w
	125	250	500	1k	2k	4k	
Red	27	24	34	39	42	49	37
Orange/Green	17	21	30	38	36	35	33

Table 13 Sound Insulation Performance Requirements for Glazing, SRI (dB)

The glazing performance requirement for the various facades can be confirmed by reviewing the mark up presented in Figure 10 above.

The overall R_w outlined above are provided for information purposes only. The over-riding requirement is the Octave Band sound insulation performance values which may also be achieved using alternative glazing configurations. Any selected system will be required to provide the same level of sound insulation performance set out in Table 13 or greater.

It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing system. In the context of the acoustic performance specification the ‘glazing system’ is understood to include any and all of the component parts that form part of the glazing element of the façade, i.e. glass, frames, seals, openable elements etc.

It is advised that the window supplier provides laboratory tests confirming the sound insulation performance. It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing system when installed on site.

Wall Construction

In general, all wall constructions (i.e. block work or concrete and spandrel elements) offer a high degree of sound insulation, much greater than that offered by the glazing systems. Therefore, noise intrusion via the wall construction will be minimal. The calculated internal noise levels across the building façade have assumed a minimum sound reduction index of 50 dB R_w for this construction.

Internal Noise Levels

Taking into account the external façade levels and the specified acoustic performance to the building envelope, the internal noise levels have been calculated.

All locations are predicted to achieve good internal noise levels with windows closed. For locations highlighted orange and green in Figure 10, the good to reasonable internal noise levels are achieved with both windows open and closed.

Summary

Considering the constraints of the site, in so far as possible and without limiting the extent of the development area, the principles of Good Acoustic Design have been applied to the development.

In terms of viable alternatives to acoustic treatment of façade elements, currently it is not considered likely that there will be further options for mitigation outside of proprietary acoustic glazing. This will be developed further as the design progresses.

4.3 Element 3 – External Amenity Areas

For this development the good acoustic design principles employed have ensured that the private external spaces are positioned to benefit from the screening effect of the development buildings. Figure 11 illustrates that for the current layout the vast majority of the outdoor amenity area achieves a noise level ≤55dB $L_{Aeq,16hr}$.

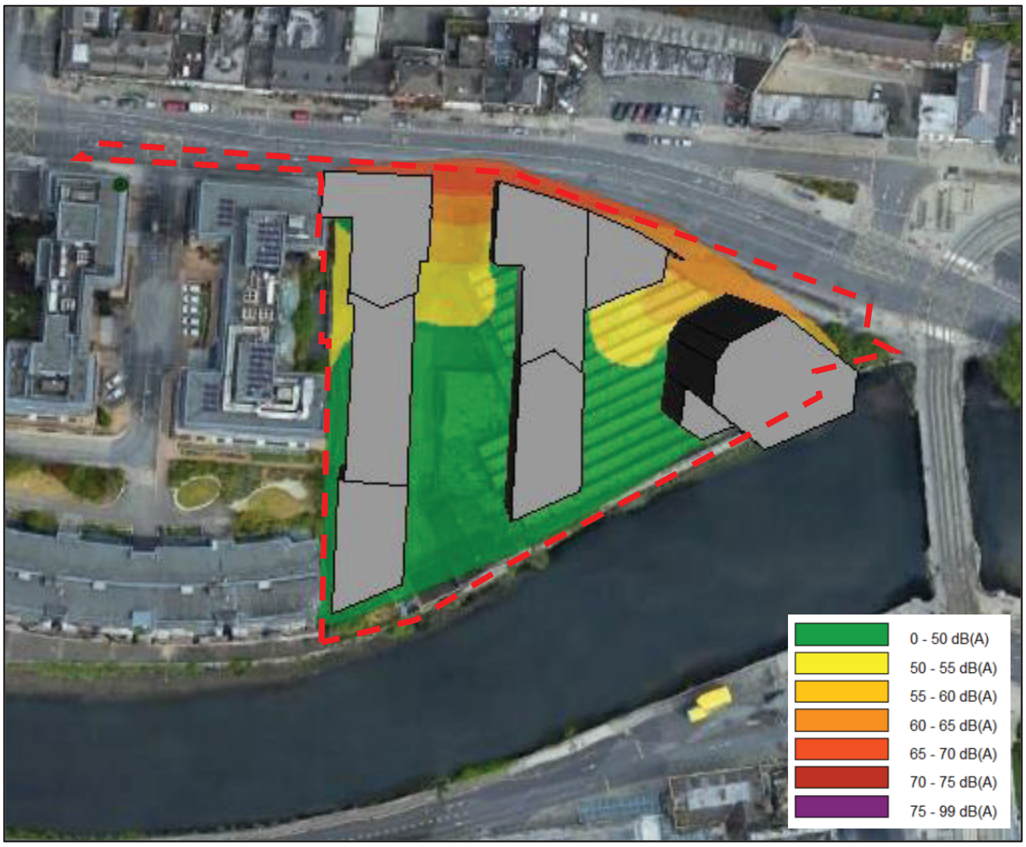


Figure 11 Noise Levels Across External Amenity Areas – Ground Level

Balconies overlooking Parkgate Street and the tram line will experience elevated noise levels. In an urban setting elevated noise levels on balconies is compensated for by provision of dedicated sheltered community amenity space as is the case in this instance.

5.0 CONCLUSION

A site noise risk assessment has been carried out on the proposed residential development at former Hickey & Company site on Parkgate Street, Dublin 8. The assessment has classified the development site as having a range of noise risks associated ranging from medium to high risk. This was determined through a combination of measurements of noise levels on site and through the development of a 3D noise model of the site and surrounds.

Further discussion is presented in terms of the likely noise impact of both the external and internal areas of the proposed development. It has been found that the majority of the inhabitants will have access to a quiet external area that is screened by the development itself from road traffic noise and other noise sources.

In addition, it is expected that most habitable rooms will achieve a good internal noise environment while also allowing natural ventilation via an open window. However, for those rooms overlooking the local road network and tram line, it will be necessary to provide enhanced acoustic glazing to ensure that when windows are closed that the internal noise environment is good. In these rooms the noise level internally with the windows open will be higher than ideal, however, inhabitants will have the option to close the window to reduce the noise level internally, while also achieving adequate ventilation in accordance with Part F.

Further specific mitigation measures will be developed as the design progresses.

APPENDIX A
GLOSSARY OF ACOUSTIC TERMINOLOGY

Ambient noise — The totally encompassing sound in a given situation at a given time, usually composed of sound from many sources, near and far.

Background noise — The steady existing noise level present without contribution from any intermittent sources. The A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 per cent of a given time interval, T ($L_{AF90,T}$).

dB — Decibel - The scale in which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the RMS pressure of the sound field and the reference pressure of 20 micro-pascals (20 μPa).

dB(A) — An 'A-weighted decibel' - a measure of the overall noise level of sound across the audible frequency range (20 Hz – 20 kHz) with A-frequency weighting (i.e. 'A'–weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.

$D_{n,e,w}$ — Weighted element-normalized level difference. This is the value of sound insulation performance of a ventilator measured under laboratory conditions. It is a weighted single figure index that is derived from values of sound insulation across a defined frequency spectrum. Technical literature for acoustic ventilators typically presents sound insulation data in terms of the $D_{n,e,w}$ parameter.

Hertz (Hz) — The unit of sound frequency in cycles per second.

$L_{Aeq,T}$ — This is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period (T).The closer the L_{Aeq} value is to either the L_{AF10} or L_{AF90} value indicates the relative impact of the intermittent sources and their contribution. The relative spread between the values determines the impact of intermittent sources such as traffic on the background.

L_{AFN} — The A-weighted noise level exceeded for N% of the sampling interval. Measured using the "Fast" time weighting.

L_{AF90} — Refers to those A-weighted noise levels in the lower 90 percentile of the sampling interval; it is the level which is exceeded for 90% of the measurement period. It will therefore exclude the intermittent features of traffic and is used to estimate a background level. Measured using the "Fast" time weighting.

L_{AF10} — Refers to those A-weighted noise levels in the upper 10 percentile of the sampling interval; it is the level which is exceeded for 10% of the measurement period. It is typically representative of traffic noise levels. Measured using the "Fast" time weighting.

L_{AFmax} is the instantaneous fast time weighted maximum sound level measured during the sample period.

Octave band A frequency interval, the upper limit of which is twice that of the lower limit. For example, the 1,000Hz octave band contains acoustical energy between 707Hz and 1,414Hz. The centre frequencies used for the designation of octave bands are defined in ISO and ANSI standards.

42A Parkgate Street, Dublin 8

Appendix 10: TBC

ARUP

42A Parkgate Street, Dublin 8

Appendix 11.1: Glossary of Impact Assessment

ARUP

CHAPTER 11 - APPENDICES

APPENDIX 11.1 – GLOSSARY OF IMPACT ASSESSMENT

Significance Criteria (NRA Guidelines 2006)

The significance criteria can be used to evaluate the significance of an archaeological site, monument or complex. It should not, however, be regarded as definitive, rather it is an indicator which contributes to a wider judgment based on the individual circumstances of a feature. Different monument types lend themselves more easily to assessment and it should be borne in mind that this can create a bias in the record, for example an upstanding stone monument such as a fortified house is easier to examine with a view to significance than a degraded enclosure site.

Table 1 Significance Criteria

Criteria	Explanation
Existing Status	The level of protection associated with a monument or complex is an important consideration.
Condition /Preservation	The survival of a monument's archaeological potential both above and below ground is an important consideration and should be assessed in relation to its present condition and surviving features. Well-preserved sites should be highighted, this assessment can only be based on a field inspection.
Documentation /Historical Significance	The significance of a monument may be enhanced by the existence of records of previous investigations or contemporary documentation supported by written evidence or historic maps. Sites with a definite historical association or an example of a notable event or person should be highlighted.
Group Value	The value of a single monument may be greatly enhanced by its association with related contemporary monuments or with monuments from different periods indicating an extended time presence in any specific area. In some cases it may be preferable to protect the complete group, including associated and adjacent land, rather than to protect isolated monuments within that group.
Rarity	The rarity of some monument types can be a central factor affecting response strategies for development, whatever the condition of the individual feature. It is important to recognise sites that have a limited distribution.
Visibility in the landscape	Monuments that are highly visible in the landscape have a heightened physical presence. The inter-visibility between monuments may also be explored in this category.
Fragility/ Vulnerability	It is important to assess the level of threat to archaeological monuments from erosion, natural degradation, agricultural activity, land clearance, neglect, careless treatment or development. The nature of the archaeological evidence cannot always be specified precisely but it may still be possible to document reasons to justify the significance of the feature. This category relates to the probability of monuments producing material of archaeological significance as a result of future investigative work.
Amenity Value	Regard should be taken of the existing and potential amenity value of a monument.

Assessment of material assets, as defined by the EPA

Context	Describe the location and extent of the asset. Does it extend beyond the site boundary?
Character	Describe the nature and use of the asset. It is exploited, used or accessible? Is it renewable or non-renewable and if so over what period?
Significance	Describe the significance of the asset. Is the material asset unique, scarce or common in the region? Is its use controlled by known plans, priorities or policies? What trends are evident or may reasonably be inferred?
Sensitivity	Describe the changes in the existing environment which could limit the access to, or the use of, the material asset.

Glossary of Impacts as defined by the EPA and the NRA Guidelines 2006

Impacts are generally categorised as either being a direct impact, an indirect impact or as having no predicted impact. A glossary of impacts as defined by the EPA are as follows:

- A **direct impact** occurs when an item of archaeological heritage is located within the proposed development area and entails the removal of part, or all of the monument.
- **Indirect impacts** may be caused due to the close proximity of a development to an archaeological feature. Mitigation strategies can often ameliorate any adverse indirect impact.
- **No predicted** impact occurs when the proposed development does not adversely or positively affect an archaeological site.

The Draft EPA Revised Guidelines on Information to be contained within an EIS (September 2015) have also described two additional types of impact/effects:

- *Indirect Impacts* – Effects that arise off-site or are caused by other parties that are not under the control of the developer. Effects which are caused by the interaction of effects, or by associated or off-site projects (this is different to the explanation stated in the NRA guidelines 2006 see above).
- *Secondary Impacts* – Effects that arise as a consequence of a project.

The impacts of the proposed development on the archaeological environment are first assessed in terms of their quality i.e. positive, negative, neutral (or direct and indirect):

- **Negative Impact** — A change that will detract from or permanently remove an archaeological monument from the landscape.
- **Neutral Impact** — A change that does not affect the archaeological heritage.
- **Positive Impact** — A change that improves or enhances the setting of an archaeological monument.

Duration of Impacts

- *Temporary Impact* — Impact lasting for one year or less.
- *Short-term Impacts* — Impact lasting one to seven years.
- *Medium-term Impact* — Impact lasting seven to fifteen years.
- *Long-term Impact* — Impact lasting fifteen to sixty years.
- *Permanent Impact* — Impact lasting over sixty years.

Types of Impacts

- *Cumulative Impact* – The addition of many small impacts to create one larger, more significant, impact.
- *Do Nothing Impact* – The environment as it would be in the future should no development of any kind be carried out.
- *Indeterminable Impact* – When the full consequences of a change in the environment cannot be described.
- *Irreversible Impact* – When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
- *Residual Impact* – The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
- '*Worst case' Impact* – The impacts arising from a development in the case where mitigation measures substantially fail.

Magnitude of Impact Criteria

- *Extent* – size, scale and spatial distributions of the effect
- *Duration* – period of time over which the effect will occur
- *Frequency* – how often the effect will occur
- *Context* – how will the extent, duration and frequency contrast with the accepted baseline conditions.

A significance rating for the magnitude of impacts is given:

- **Very High (Profound)** – Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. These effects arise where an archaeological / cultural heritage site is completely and irreversibly destroyed by a proposed development.
- **High (Significant) –** An impact which, by its magnitude, duration or intensity alters an important aspect of the environment. An impact like this would be where the part of a site would be permanently impacted upon leading to a loss of character, integrity and data about the archaeological / cultural heritage feature/site.
- **Medium (Moderate) –**A moderate direct impact arises where a change to the site is proposed which though noticeable is not such that the archaeological / cultural heritage integrity of the site is compromised and which is reversible. This arises where an archaeological / cultural heritage feature can be incorporated into a modern day development without damage and that all procedures used to facilitate this are reversible.
- **Low (Slight) –** An impact which causes changes in the character of the environment which are not significant or profound and do not directly impact or affect an archaeological / cultural heritage feature, site or monument.
- **Very Low (Imperceptible) –** An impact capable of measurement but without noticeable consequences.
- **Neutral -** A change that does not affect the cultural heritage asset.

4.14.2.5 Sensitivity Criteria

An evaluation of the value/ significance of sites and features is based on the extent to which assets contribute to the archaeological or built heritage character, though their individual or group qualities, either directly or potentially and guided by legislation, national policies, acknowledged standards, designations and criteria. The table below presents the scale of values/ sensitivity together with criteria. It has been compiled by Courtney Deery Heritage Consultancy Ltd based on standard authorities and guidelines.

Table 2 Sensitivity Criteria

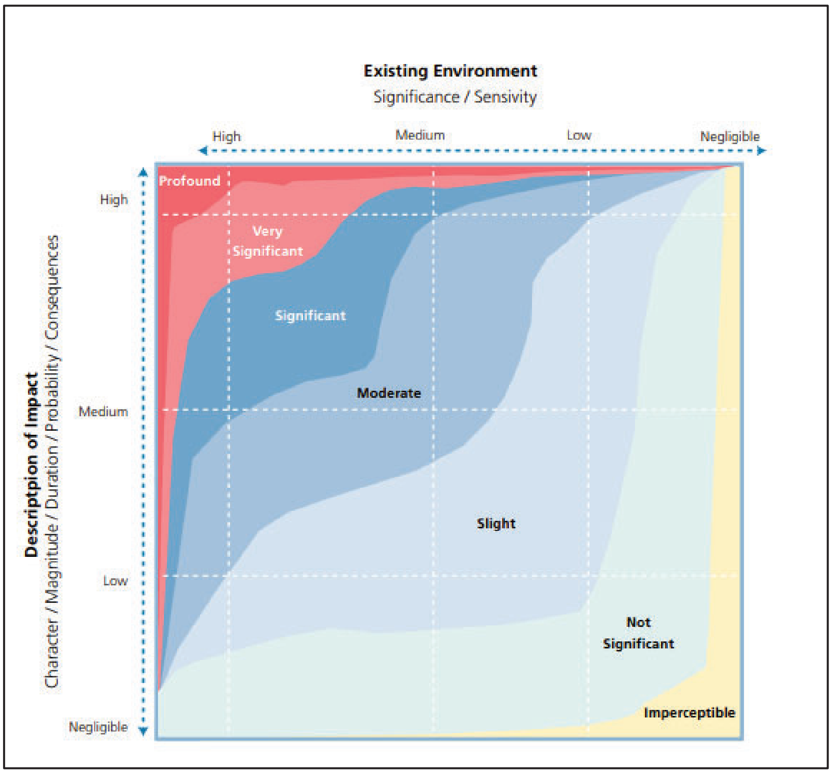
Sensitivity / Value	Criteria
Very High	Sites of international significance: World Heritage Sites National Monuments Protected Structures of international and national importance Designed landscapes and gardens of national importance Assets of acknowledged international importance or that can contribute significantly to international research objectives
High	Recorded Monuments and complexes of regional importance Designated assets that contribute to regional research objectives Protected Structures of regional importance Architectural Conservation Areas that contain very significant buildings/structures Architectural Conservation Areas containing structures that contribute significantly to its historic character
Medium	Recently identified archaeological sites / potential sites Greenfield areas with archaeological potential due research and stray finds Designated or undesignated assets that contribute to regional research objectives Sites listed in the NIAH Building and Garden surveys for which there are no upstanding remains
Low	Undesignated Sites of local importance (e.g. townland / field boundaries) Assets compromised by poor preservation and/or poor survival of contextual associations Assets of limited value but with the potential to contribute to local research objectives Historic townscapes or built up areas of limited historic integrity in their building or their settings
Negligible	Assets with very little or no surviving archaeological interest. Buildings of no architectural or historic note
Unknown	The importance of the resource has yet to be fully ascertained Structures with potential historic significance (possibly hidden or inaccessible)

Criteria for assessment of impact significance

The Draft EPA Revised Guidelines on Information to be contained within an EIS (September 2015) has also added the following levels of significance of effect (as per figure below):

Table 3 Significance of Effects (EPA draft 2015)

Significance of Effect	Description
Very Significant	An impact which by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment, for example in this case a monument
Not Significant	An effect which causes noticeable changes in the character of the environment but without noticeable consequences.



Source: Draft EPA Revised Guidelines on Information to be contained within an EIS (September 2015), p.43

Using both the sensitivity of the heritage asset and the magnitude of impact the impact significance is established. The table below has been compiled by Courtney Deery Heritage Consultancy Ltd based on standard authorities and guidelines.

Table 4 Criteria for assessment of impact significance

Impact Significance					
Magnitude Impact (+/-)	**Sensitivity/ Value of Archaeological/ Cultural Heritage asset**				
Neutral	Very Low	Low	Medium	High	Very High
Very Low	Imperceptible	Not Significant	Slight	Slight	Slight

Low	Imperceptible	Slight	Moderate	Moderate	Moderate
Medium	Slight	Moderate	Moderate	Significant	Significant
High	Slight	Moderate	Significant	Significant	Profound
Very High	Slight	Moderate	Significant	Very Significant	Profound

Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Appendix 11.2: Archaeological Assessment—Monitoring of Ground Investigation Works

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ARUP

COURTNEY • DEERY

ARCHAEOLOGY & CULTURAL HERITAGE

Archaeological Assessment

Monitoring of Ground Investigation Works

Licence No. 19E0179

Hickey's Factory

Parkgate Street

Dublin 8

By

Padraig Clancy and Lisa Courtney

for

Courtney Deery Heritage Consultancy Ltd

On behalf of

Lafferty

24 June 2019





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EXECUTIVE SUMMARY

This report describes the results of the archaeological monitoring of ground investigation works undertaken at the site of Hickeys (No. 43) Parkgate Street, Dublin 8. Archaeological monitoring was undertaken by Padraig Clancy under Licence No. 19E0179 between March and May 2019.

The ground investigation works comprised of 18 no. window sample holes to a depth of 4m BGL, 7 bore holes and 2 no. cable percussive boreholes with rotary core follow on (scheduled depth 15m BGL). Five slit trenches were excavated, one along the footpath to the northeast of the site on Parkgate Street, and two in the southwest corner of the site. The pits were excavated by hand and a mechanical auger and also by mini-digger fitted with a drill and grading bucket that alternated between toothed and toothless as appropriate.

Buried beneath a meter of made ground consisting of gravel and red brick rubble which is sealed by a modern concrete slab, archaeological monitoring of the ground investigation works showed three main phases of deposition. The original river and meadow level as represented in the early cartographic sources appears to be represented at 4 – 5m below the current ground levels. Prior to the construction of the Iron works, land reclamation or land improvements is evident with c. 2m of made up ground of brown clays being imported on to the site.

Cartographic sources from the 19th century onwards, indicate a sequence of industrial installations on the site, commencing with the Royal Phoenix Iron Works. A spread of black, rubble rich, material which varies in depth across the site, appears to be associated with the final phase/ shut down of the Iron Works (1880s) and represents the demolition material associated with the foundry. It is possible that demolition materials were spread across the site to infill structures and to level the site in preparation for the next face of construction. A possible ground surface is evident at 1.5m below the current ground level. Possible walls and sub-surface structures were visible within WS116.

The results of monitoring the ground investigation works appear to indicate foundations, possible wall and floor levels associated with the iron working phase and later phases on site (early 1800's onwards). In order to understand and ascertain the extent and nature of these industrial archaeological remains and potentially earlier deposits it will be necessary to archaeologically investigate.

The presence of industrial archaeological features and potentially earlier archaeological horizons will have to be taken into account and archaeological investigation including excavation will have to be considered in the overall timeframe and delivery of the project.

Consultation has taken place with the City Archaeologist on the 21st May 2019 where it was indicated that archaeological test excavation would inform the archaeological strategy on site.

Once the site is vacated it is recommended that archaeological test excavation takes place. Test excavation may also require the demolition of the existing warehouse on site in order to provide access for machinery to remove the ground slab and overburden.

Once the site is cleared test excavation can proceed, it is envisaged that this could take place on a phased basis, utilising the ground slab as a working platform to investigate adjacent areas.

Where possible large testing blocks could be cut through the concrete slab to expose voids or structures beneath the concrete. Once structural elements were identified and recorded, a series of archaeological trial pits could be excavated within each of the blocks to confirm that depth of reclamation soils. This is to establish the original pre- 19^{th} century ground levels and to ascertain the archaeological potential of these soils. It will also inform the subsequent piling programme.

If structural remains of the nineteenth century iron works are discovered, they will be recorded to the specification of the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht and the City Archaeologist. Preservation in situ by design will also be explored in relation to the piling layout in order to avoid or minimise an impact on the industrial heritage remains.

Archaeological excavation in an urban environment where there are existing buildings on site and underpinning of boundary and quay walls etc may be necessary, is challenging especially when deposits have been identified up to 2m deep –as this creates a lot of spoil within a confined space. A build-up of post medieval horizons takes time to excavate and depending on the findings can introduce redesign issues, additional costs and delays to the overall programme.

Therefore, it is critical that a phased approach to the archaeological investigation and mitigation takes place in consultation with the City Archaeologist and the statutory authorities and is placed within the demolition and construction programme for the site. Subject to approval with the authorities and the City Archaeologist, this approach will inform the extent and the timing of the archaeological investigation required on site.

1. INTRODUCTION

1.1. General

This report describes the results of the archaeological monitoring of ground investigation works undertaken at the site of Hickeys (No. 43) Parkgate Street, Dublin 8. Archaeological monitoring was undertaken by Padraig Clancy under Licence No. 19E0179 between March and May 2019.

Features relating to the former industrial activity on the site during the 19th century were exposing during the monitoring works.

The information gained from the site investigations will be used to inform the archaeological chapter of the EIAR currently being prepared as part of the planning application for the proposed development.

As part of this process and in order to agree an archaeological strategy for the site, a meeting has been sought the National Monuments Service through the Development Application Unit (DAU, 7th May). A meeting has taken place with the City Archaeologist (21st May 2019) in order to advise the authorities of the archaeological findings to date from the baseline report issued in 2018 and the monitoring results (2019).

1.2. Site Location

The site is located on Parkgate Street, on the northern bank of the River Liffey, opposite the point of discharge for the River Camac and immediately west of Sean Heuston Bridge (Figure 1). It lies south of the Phoenix Park and within Arran Quay Ward, with the River Liffey acting as the boundary between Arran Quay Ward and Usher Quay Ward. Parkgate Street itself marks a Municipal Boundary, with the southern wall of the Phoenix Park acting as a 'County of the City' and Parliamentary Boundary.

The proposed development site lies within the statutory zone of archaeological potential for the Historic City of Dublin (RMP No. DU018-020). There are no specific RMP sites recorded within the subject site, however its location on the south-facing bank of the River Liffey offers a vantage point of many of the monuments in this region of the city.

Cartographic analysis indicates that the usage of the site evolved from open meadow in the eighteenth century to the use of the site for industrial purposes from the early nineteenth century onwards (e.g. the Phoenix Iron Works in the early 1800s, followed by Kingsbridge Woollen Factory and the Parkgate Printing Works).

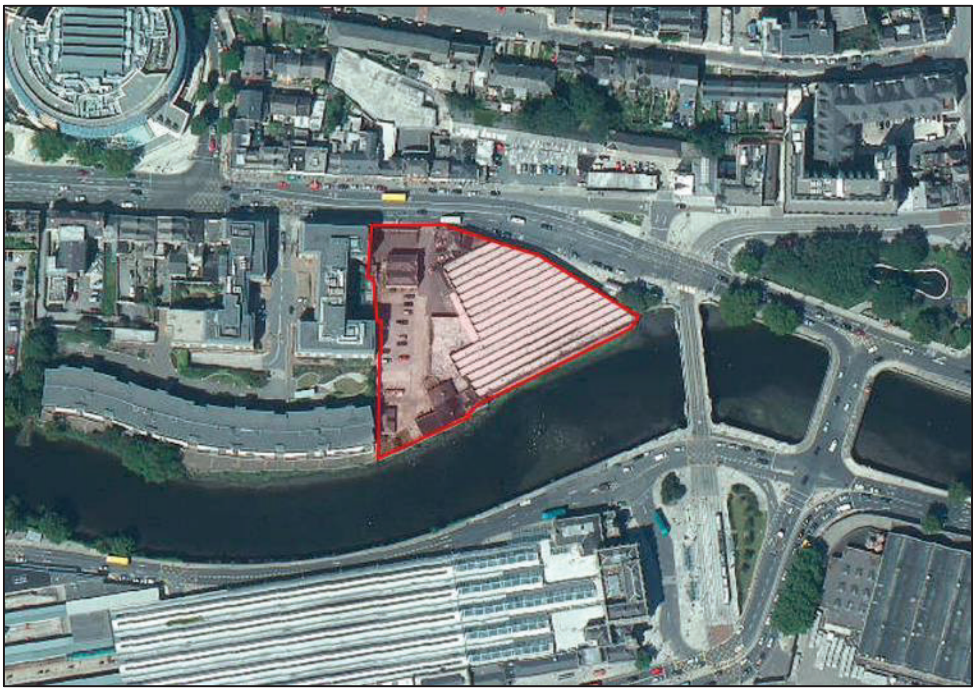

Figure 1 Site location

1.3. Description of Ground Investigation Works and Methodology

The ground investigation (GI) works comprised of 18 no. window sample holes to a depth of 4m BGL, 7 bore holes and 2 no. cable percussive boreholes with rotary core follow on (scheduled depth 15m BGL). Three slit trenches were excavated, one along the footpath to the northeast of the site on Parkgate Street, and two in the southwest corner of the site. The location of the GI works are indicated on Figure 2 below.

The aim of the archaeological monitoring was to establish the archaeological potential of the lands are and to highlight if there are any archaeological considerations for the development of the site. The baseline information used in the report draws on archaeology and cultural heritage reports for the site prepared by Courtney Deery Heritage Consultancy in 2018 and 2019.

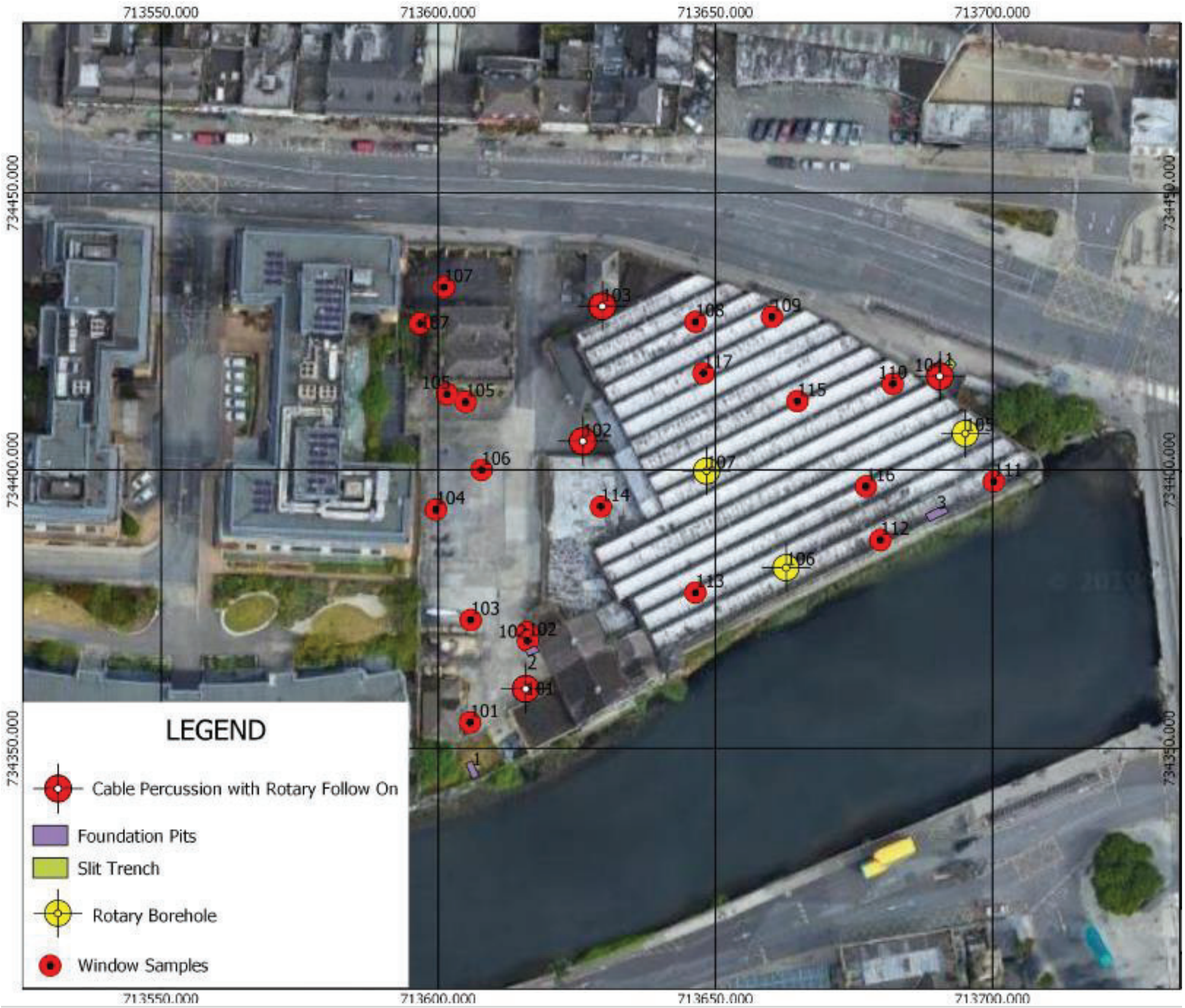

Figure 2 Locations of Ground Investigation Works

2. ARCHAEOLOGICAL AND HISTORICAL BACKGROUND

2.1. Introduction

The topography of the site has been altered in relatively modern times with the construction of industrial units overlooking the River Liffey. Elements of building within the boundary of the site are listed as protected structures; these have previously been assessed in a separate conservation report by David Slattery and are undergoing additional assessment by ARC as part of the EIAR process for the proposed development. Cartographic evidence indicates that the usage of the site changed from open meadow to industrial use in the early-mid-19th century, when the site was occupied by the Phoenix Iron Works, followed by Kingsbridge Woollen Factory and then the Parkgate Printing Works.

2.2. Prehistoric Period (c.9000BC-c.500AD)

The earliest archaeological site in the wider landscape is a megalithic structure that now stands within the Zoological Gardens in the Phoenix Park, c. 955m north-west (DU018-007009). This is the closest known prehistoric site. It was originally uncovered in a sandpit close to Chapelizod not far from Knockmary in the Phoenix Park. A human skeleton was found within the tomb (Borlase 1897, 381, 2; Poe 1904, 5-6, cited in SMR file).

There is also a Linkardstown-type burial of late Neolithic date at Knockmaree, in the Phoenix Park (DU018-00711). The site was excavated in the early 19th century and comprised a mound overlying a central cist that contained two crouched skeletons. These were accompanied by a shell necklace, flint knife and bone toggle. Four small cists were also discovered dating from the Early Bronze Age, containing cremated bones and food vessels, two of which were bowls (Wood-Martin 1895, 281, Fig.74; Waddell 1970, 115; Waddell 1990, 81, cited in SMR file). Although this site lies over 3km west of the subject site, this evidence suggests continuity of occupation in the prehistoric period, in the general Phoenix Park area.

Further evidence of continued occupation in the area, north of the river, during the prehistoric period can be found in the topographical files of the National Museum of Ireland, which record two Bronze Age axes and a bronze pin dated to the Iron Age, all found in the Phoenix Park. South of the river, there is additional Bronze Age activity. A pit burial is recorded within the grounds of the former Infirmary of the Royal Hospital (DU018-112). It was uncovered during archaeological testing and was found to contain a tripartite Food Vessel cremation (Licence No. 02E0067; Excavations Bulletin Ref. 2002:0610).

2.3. Early Medieval activity (c.500AD-c.1100AD)

One of the earliest references to this area of the city is the establishment of the ecclesiastical foundation at Kilmainham. The placename Kilmainham is derived from the Gaelic *Cill Maignenn* or *Cill Mhaighneann*, which refers to an early seventh century Irish saint known as Maignenn, who is thought to have founded a monastery at this location. The most likely location for this monastery is on a high ridge of land on the south side of the river, possibly at Bully's Acre cemetery, c. 975m southwest of the proposed development site. This ridge ran for two kilometres along the southern bank of the Liffey, from the confluence of the rivers Liffey and Camac westward to the War Memorial Park in Islandbridge.

The monastery was ideally located, and the elevated ridge on which it stood was recognised for its considerable strategic importance throughout the area's subsequent history. It held a prime position above the mouth of the river (Kenny 1995). It also benefitted from proximity to the ford of *Kylmehanok* (possibly a later corruption of *Cill Mhaighneann*), which is believed to have been located upstream of where Island Bridge now spans the Liffey (formerly Sarah Bridge, c. 980m to the west of the proposed development). The better known 'ford of the hurdles', which gives its name to the city of Dublin (*Áth Cliath*), was situated approximately one kilometre downstream at the later, permanent Viking settlement.

In 919 Niall Glundubh, or 'Black-knee', reportedly led a combined force of Irish against the Vikings at Kilmainham and subsequently lost his life (Kenny 1995). A century later, in 1013–14, Brian Bóruma (Brian Boru) set up his headquarters at the monastery, and it was from here that he launched his successful military offences against the Norse settlers of Dublin. This legendary Irish king is believed to have burned down whatever remained of the *Cill Mhaighneann* monastery before his final battle at Clontarf in 1014.

An early medieval bronze bell, found during the 19th century in the Kilmainham area and now housed in the National Museum, has been dated to the period AD 700–900 (NMI Ref: 1917:2). It is possible that this bell is a surviving relic of the monastic settlement of St Maignenn, or perhaps of another monastic centre in the Kilmainham area. Given the existence of the ecclesiastical foundation and the known fording points the vicinity of Parkgate Street, it is likely that there was also activity on the north side of the River Liffey during this period.

2.4. Viking Settlement

It is probable that the location of the Early Christian monastery of *Cill Mhaighneann* was adapted in the ninth century by Vikings and used as a longphort. The term longphort was first coined in 840 and it described the defended Viking ship encampments that were generally defined by an earthwork. The longphort also doubled as the place where trading and campaigning took place. O'Brien (1998) points to the concentration of the recorded Viking activity west of the River Camac. She suggests the possibility of a ninth-century Viking settlement, in the land between the Camac and the Liffey rivers, located on the same ridge as St. Maighnenn's original monastery. Briggs (1985) and Graham-Campbell (1976) have also identified the monastic site as the possible focus of early Norse settlement. This area lies on the south bank of the River Liffey, to the southwest of the proposed development site.

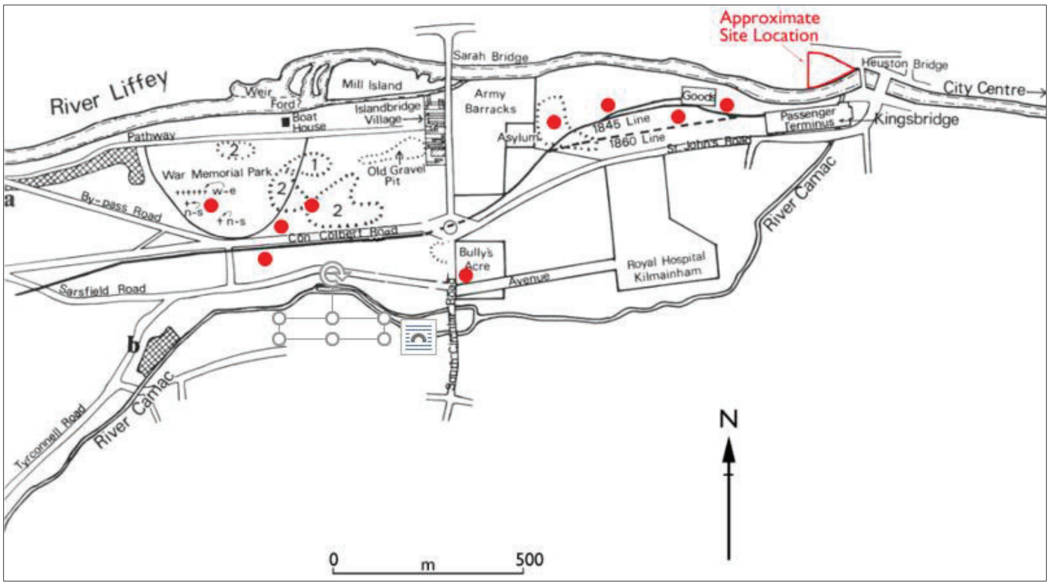

Figure 3 Map showing the locations (in red) of Viking material recovered in the 19th century (after O'Brien 1998)

An examination of the location and context of all Viking material recovered since the 19th century has demonstrated the presence of two Viking cemeteries, one near the early monastic foundation in Kilmainham, the second further west in the vicinity of the War Memorial Park at Islandbridge (O'Brien 1998; Figure 3). Simpson (2004) has suggested that the spread of Viking burials was extensive, stretching at least from Memorial Park/Islandbridge in the west to Heuston Station to the east, a distance of 1.5km but confined to the natural gravel ridge, bordered by the Liffey on the north and the Camac River to the south. Two Viking brooches have also been discovered within Phoenix Park, which indicate that there is a possibility of recovering such isolated remains within the proposed development area. These burial sites and stray finds illustrate the extent of Viking activity along both the south and north banks of the Liffey, which also points to an interaction between both banks during the Viking settlement of the area.

2.5. Islandbridge

Activity spanning both sides of the Liffey becomes more tangible with the arrival of the Anglo-Normans in 1169 and a number of new religious orders from the continent. One such order was the Knights Hospitallers of Saint John of Jerusalem, a military and religious organisation founded in the wake of the crusades. Granted land in Kilmainham by Richard de Clare (Strongbow), the knights founded a new priory in c.1174 (RMP DU018-020286), close to the site of the old monastic buildings associated with *Cill Mhaighneann*. The priory was given lands from the Tyrrells of Castleknock, leaving it with landed possessions of over five hundred acres. Its possessions included a moiety (portion) of the River Liffey that reached as far as Conyngham Road and the entrance to the Phoenix Park in Parkgate Street, this became the source of numerous disputes between the local inhabitants and the priory (Kenny 1995).

The knights, during their occupation at Kilmainham, are reputed to have erected a six-arch bridge to connect their land on both sides of the river, near the ford of '*Kilmehanoc*'. A reference to 'the bridge of Kylmaynan' in 1261 in the White Book of the City of Dublin offers evidence that the bridge was in existence from at least that time. The bridge is mentioned again during the reign of Henry VIII, so it appears to have continued in use until the sixteenth century. This same bridge is also believed to have given Islandbridge its name. In 1577, Lord Deputy Sidney erected a new stone bridge at Islandbridge to replace the original six-arched bridge.

2.6. Phoenix Park

During the Suppression of the Monasteries in the mid-sixteenth century, the Crown acquired the lands owned by the Knights Hospitallers of St John of Jerusalem, which had formerly belonged to the Templars. These lands were in turn ceded to Sir Richard Sutton in 1611, who proceeded to sell them to Sir Edward Fisher. The name 'Phoenix' is first documented in 1619 and originally referred to a spring located within the grounds of the park called *Fionn-Uisge* meaning 'clear water' (rendered phonetically, the Irish words became 'feenisk', which was anglicised to 'phoenix'). It was initially applied by Sir Edward Fisher to his residence on Thomas Hill (Joyce 1995). In 1618 the Phoenix house and surrounding grounds were once more purchased by the Crown as a residence for the Irish Viceroy.

The Duke of Ormond instigated plans to enclose the lands of Inchicore, Island Bridge and Kilmainham as part of the Phoenix Park. It was hoped that the establishment of such a park would demonstrate how fashionable Dublin was becoming and encourage the English nobility to come to live in Dublin. But his decision was reversed when he established the Royal Hospital near the ruinous priory in Kilmainham, and the Park was reduced to its present limits. Islandbridge at this time became the scene of a considerable amount of development and was renowned for its market gardens and nurseries. Once plans for the Phoenix Park were finalised, Sir John Temple conducted the construction of the perimeter wall along the line of the road to Chapelizod in 1680. He did so in exchange for the lands between Conyngham Road and the River Liffey (Ball 1906).

By 1734 the park residence had fallen out of use and was replaced by the Magazine Fort, which was constructed to secure the munitions necessary for the defence of the city. In the middle of the 18th century, the Park had become popular as a recreation ground for the citizens of Dublin, and shrubs and trees were planted and formal gravel walks were laid down. As such a public amenity it became the location for a series of commemoratory monuments the most visible of which is the Wellington Monument. The Wellington Monument dominates much of this area of the city. Built to commemorate the military successes of the Iron Duke, Arthur Wellesley, it remains a popular landmark. Although the foundation stone was laid in June 1817, the monument was not completed until June 1861, nine years after the duke's death (Jordan 2005).

2.7. Parkgate Street

Further development of the area surrounding Parkgate Street occurred with the advent of railway industry in the 19th century and the subsequent growth of residential development. To the west of the site lies the Liffey Viaduct, a section of the railway system that centres on Heuston Station. This railway bridge was constructed in 1877 and was linked to the longest railway tunnel in the city at the time, being half-mile in length. The tunnel ran in a north-south direction under the Phoenix Park and its location is marked by a stone arch in the wall of the park itself (Conlin and De Courcy 1988), c. 700m to the west of the proposed site.

In 1786 the Wide Streets Commissioners were given the power "*to alter and widen the road westward from Barrack Street (now Benburb Street) to Island Bridge*". The western part of the improved road was named Conyngham Road, while the eastern part – from the Phoenix Park gate to Temple Street West – is first named as Park Gate Street on a map produced by Sherrard for the commissioners of the Royal Barracks in 1790 (WSC 15). It is also so-named on Wilson's Directory, Plan of Dublin in 1804.

Sean Heuston Bridge had replaced the ferry crossing from Steevens Hospital to the north side of the River Liffey in 1828; the commemorative plaque marks the date of the royal visit in 1821, when funds were made available to design and build the bridge. The structure is a single-span seven-ribbed cast iron arched bridge designed by George Papworth. The bridge was initially named as Kings Bridge, but was also known as Sarsfield Bridge, and now as Sean Heuston Bridge.

The River Camac discharges into the River Liffey directly opposite the proposed development site. Prior to the building of Heuston railway station, the confluence of the River Camac and Liffey was, at high tide, a broad expanse of water, as shown on many views drawn by 18th century artists of the Liffey from Phoenix Park. The terminus building for Heuston Station was built over the channel of the River Camac, burying it in the culvert through which it now flows, beneath the station and into the Liffey.

2.8. No. 43 Parkgate Street – Hickey's Fabric Site

The history of the subject site at No. 43 Parkgate Street was compiled from various documentary sources, including Thom's Dublin Street Directory, Ordnance Survey and historical maps.

The proposed development site was occupied by the Royal Phoenix Iron Works, also known as Robinson's Iron Works from the early 1800's (Figure 4). The Iron works was located over a large area (Figures 8, 9 and 10) which extended westwards outside the proposed development area and included a dwelling house, pleasure gardens, foundry workshops, a forge, outhouses and workers cottages. The owner, Richard Robinson, a native of Hull, had settled in Dublin in 1800. His Phoenix foundry was responsible for casting King's Bridge, designed by George Papworth to commemorate the visit of George IV to Dublin in 1823. The foundry acquired the designation 'Royal' in this year. Robinson died in 1848 and is buried in St Michan's Church of Ireland church. By 1844 he had been succeeded in the business by William Robinson who carried on until 1858 or later. By 1863 the foundry had been taken over by Edward Toomey. (https://www.dia.ie/architects/view/4625/ROBINSON-RICHARD%5B1%5D%2A). The metalwork for Sean Heuston Bridge was cast here and the strongly walled site was used as a location for a bomb-making factory during the First World War. The munitions were carried down the river in barges that were loaded at a jetty beside the factory (De Courcy 1996).

Figure 4 William Sadler (1782-1839) c.1861 A View of the Royal Hospital at Kilmainham and the Wellington Monument in Phoenix Park (Iron Works in foreground)

The demise of the site as an iron works was first noted from an advertisement in the Freeman's Journal on the 20 July 1878 when there was a sale of machinery, bricks, granite quoins.

> *'To iron founders and others. To be disposed of, at the Royal Phoenix Ironworks, several engines and boilers to match, lathes, planning and drilling machines, punching presses and iron rollers, putty mill, scrab (crab?) winches, single and double purchase, shafting, pulleys and wheels, patterns of all descriptions, bellows, hearths, anvils and all tools necessary for smithy purposes. Foundry fixtures of all kinds, tools for boiler shop, viz:- furnace, templates and force pump, steam valves, mill machinery, leather belting and buckets, two sets of three through (throw) pumps, columns and pipes, beams, scales and weights; oil cisterns, tanks, timber, granite, quoins and bricks, with numberless other items. The above will be sold privately in convenient lots to suit purchasers.'*

A further advertisement on the 24 of January 1880 in the Freeman's Journal, cited the sale of extensive premises, plant and stock etc at a site known as the Royal Phoenix Iron Works. The site was described as follows:

> '*together with the superior dwellinghouse, out-houses, pleasure grounds, gardens &c., the entire containing 3a6r38p statute measure, with a handsome entrance from Parkgate Street, the river Anna Liffey being its boundary in the south.*
>
> *There are also eight two-storied cottages for workmen, with foundry workshops, forge, &c. where a considerable trade was successfully carried on for many years, there being also a great facility of water carriage up and down the river Liffey for the export and import of heavy articles connected with the trade. The above premises are held under lease for ever at the extremely low rent of £84 per annum, the cottages along producing a rental of £150.*
>
> *The plant and stock consists of the usual machinery adapted to the trade, comprising steam engines, from 1 to 16 horse power, and several large steam boilers, lathes, planning, drilling, punching and rolling machines, steam hammer anvils, and smiths' tools in general, also a quantity of boilermaker's tools, furnace for bending plates, levelling blocks, bellows, hearths and troughs, cranes, core boxes, beam ladles, moulding boxes, core barrels, brass furnace, &c for foundry uses; also wheel pattern and models of all descriptions, crab, winches, double and single purchase pulley, blocks and chains, wrought iron shafting pulleys and wheels, steam gauges and boiler mountings, &c.*
>
> *Sale to commence at 11 o'clock with the machinery; interest of premises at 2 o'clock pm*.'

These advertisements would appear to indicate that the site, its machinery and buildings were stripped clean prior to its sale. The Iron works was in operation from the early 1800s to approximately 1880, after which the site was occupied for a decade by The Kingsbridge Mills, a woollen worsted manufacturer. Another manufacturer, Phoenix Park Works, was in operation on the site from approximately 1900 to 1910, though the specific type of manufacture is unknown. While in the possession of the Phoenix Park Works, the site then lay vacant until about 1920, when it was taken over for use as Government Stores. A printing works was set up on site around ten years later, by which time the original site had been subdivided, with the Lucan Dairy Depot occupying the western half (i.e. the area now outside of and separate from the proposed development site; see Figure 12 below). The printing works remained in operation until the mid-1970s when the current owners, Hickey's Fabrics, took up residence.

3. CARTOGRAPHIC SOURCES

3.1. Earliest available sources

The 1656 Down Survey Parish Map of Kilmainham is the earliest cartographic source for the study area (Figure 5). It is possible to identify the approximate location of the proposed development site on this early map source using the course of the Liffey and the outlet for the Camac river as topographical pointers. Other features depicted on the map include a bridge crossing upstream on the Liffey (Sarah Bridge, now Island Bridge), which is flanked by two mills. At this time there was no bridge crossing the river at the site of the present Sean Heuston Bridge. The road to '*Maynoth from Dublin*' appears to terminate at the bridge, though a route of some sort continuing along the north bank is likely. The bridge itself provided access to the network of principal roads on the south side of the river. A large house is shown on the map and represents the substantial residence built by Sir Edward Fisher in the former lands of Kilmainham Priory (now the Phoenix Park) is depicted on the map and named 'Phoenix' (this is the site of the present Magazine fort, DU018-007012).

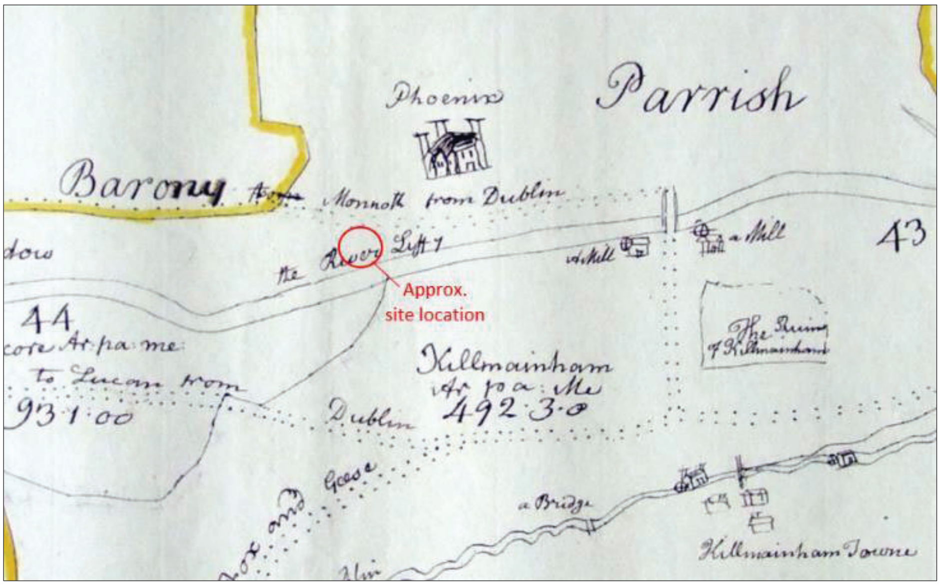

Figure 5 Down Survey map of the parish of Kilmainham, c. 1656

A slightly later seventeenth century map of the region is that of Thomas Taylor, dating to 1671 (not shown). It demonstrates that part of the present Parkgate Street was encased within the large expanse of the Phoenix Park, which at that time stretched across the River Liffey. The scale of the park was reduced in 1680 and its southern boundary was defined by a wall (along the northern edge of the present Conyngham Road), leaving a strip of land between the road and the River Liffey. This can be seen on two 18th century maps of Dublin, Brooking's 1728 map (not shown) and John Rocque's 1756 map (Figure 6). Both maps show the area to the south of the Phoenix Park as an open meadow, which is named on Rocque's map as 'Long Meadows'.

Rocque's map also shows a small channel leading from the bend of the River Liffey towards the 'road from Chapel Izzod'. It appears to be culverted beneath the road and presumably represents the tail end of a stream that flows down from the park and feeds a pond on the other side of the road.

One of the first instances of the road being named Parkgate Street is on Wilson's 1804 map (not shown), on which 'Park Gate Street' and 'Conyngham Road' follow the line of the old Chapelizod / Islandbridge thoroughfare. On Campbell's map of 1811 (Figure 7), a ferry crossing is shown linking Steeven's Lane on the south side of the Liffey to the north bank of the river, immediately to the east of the proposed development site. The latter is defined as a triangular property plot, similar to its present form. A range of buildings occupies the northeastern side of the site (only the western end of the range is aligned with Park Gate Street), with one square structure extending southwards from it. The Camac river, culverted beneath Military Road, is shown entering the River Liffey on the south bank, opposite the proposed development site.

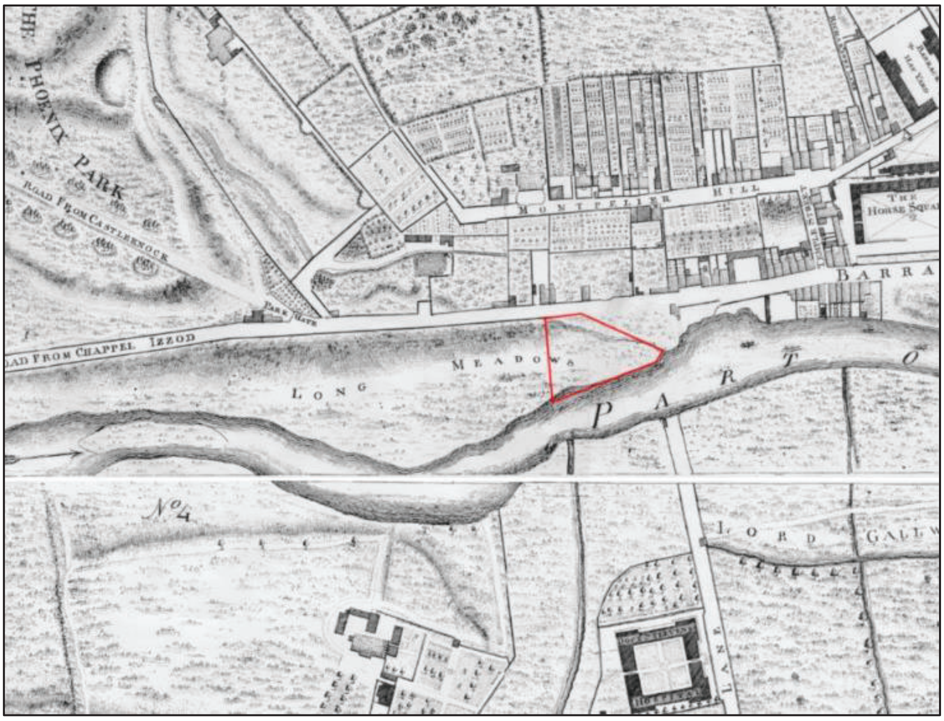

Figure 6 Rocque's County Map of Dublin, 1760, with approximate site location in red

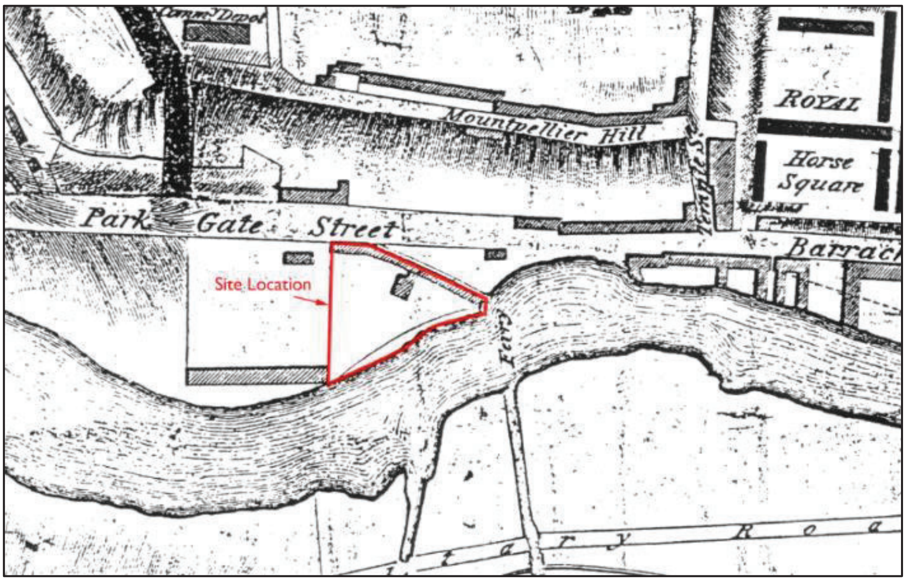

Figure 7 Thomas Campbell map of 1811 of the City of Dublin, 1811, with approximate site location in red

3.2. Ordnance Survey maps

By the time of the first edition Ordnance Survey (OS) 1843 six-inch map (Figure 8), the Royal Phoenix Iron Works occupy a large plot on the north river bank, accessed via an entrance onto Parkgate Street (the proposed development site forms the eastern half of the original iron works site). A significant development in the vicinity is King's Bridge, which was erected in 1828.

The works can be seen in greater detail on the 1847 and 1864 OS five-foot plans (Figures 9 and 10). The eastern half of the plot appears to house the majority of the iron works buildings, with gardens and open space dominating the western half (becoming more elaborate by 1864).

The Kingsbridge Woollen Factory replaces the irons works on the 1889 OS map (Figure 11) and in later editions the site was in use as a printing works. The 1889 map also shows the tram lines running along Parkgate Street and across King's Bridge.

The 1943 revised OS map (Figure 12) shows that the original iron works site was now in use for two separate industries, with the printing works in the eastern half (within the proposed development site) and the Lucan Dairy Depot in the western half (outside the proposed development site).

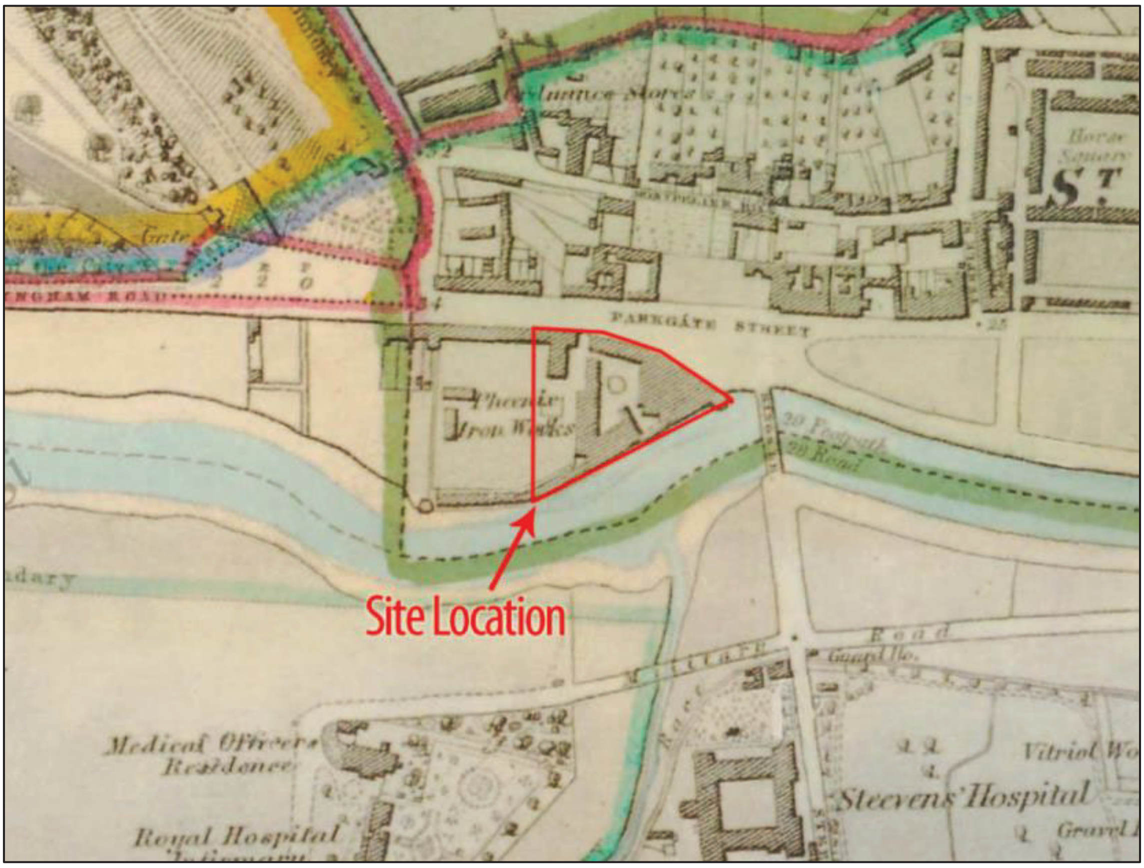

Figure 8 First edition OS map, 1843 (scale 1:10,560), showing approximate site location

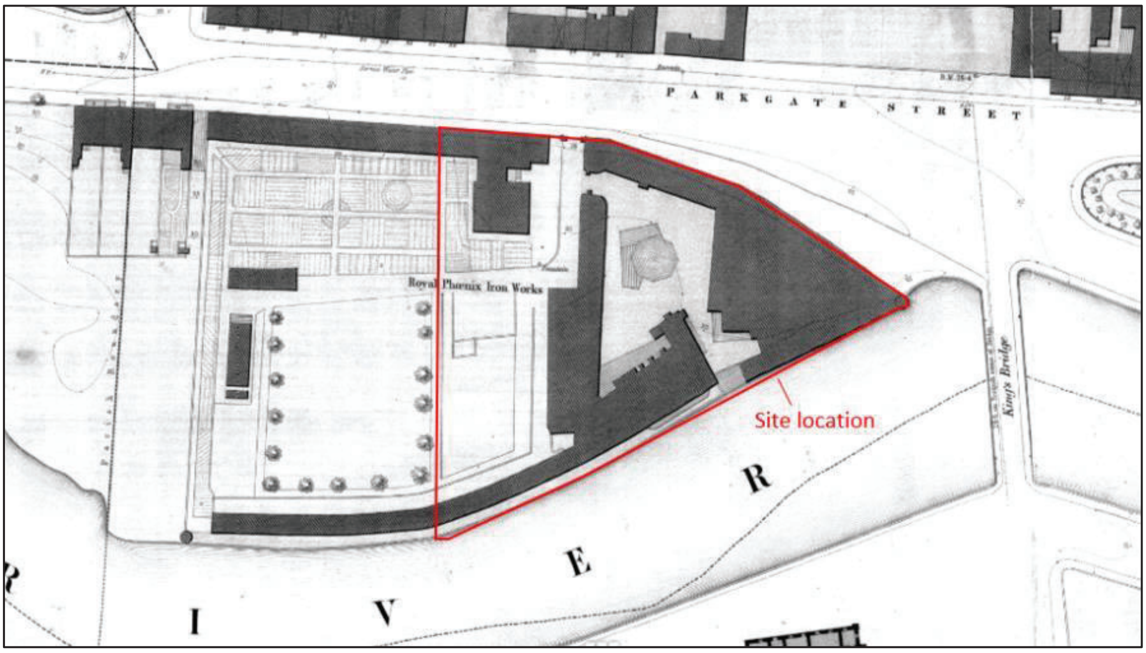

Figure 9 First edition 1:1056 OS Map 1847, (scale 1:1056), showing approximate site location

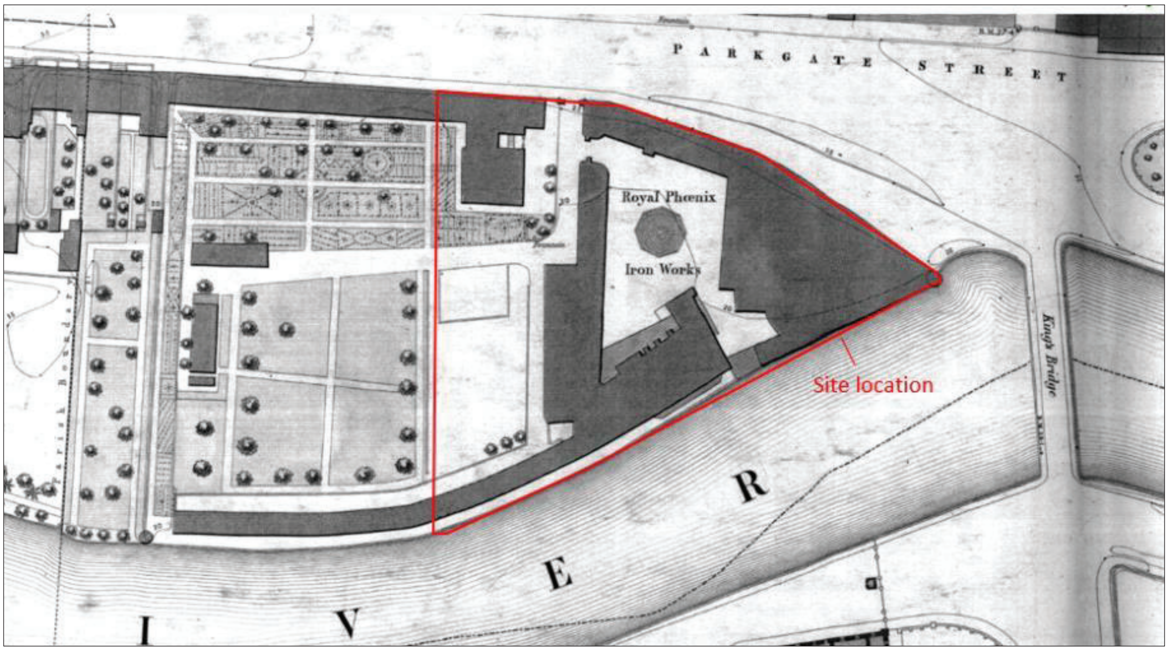

Figure 10 Revised edition OS map, 1864 (scale 1:1056), showing approximate site location

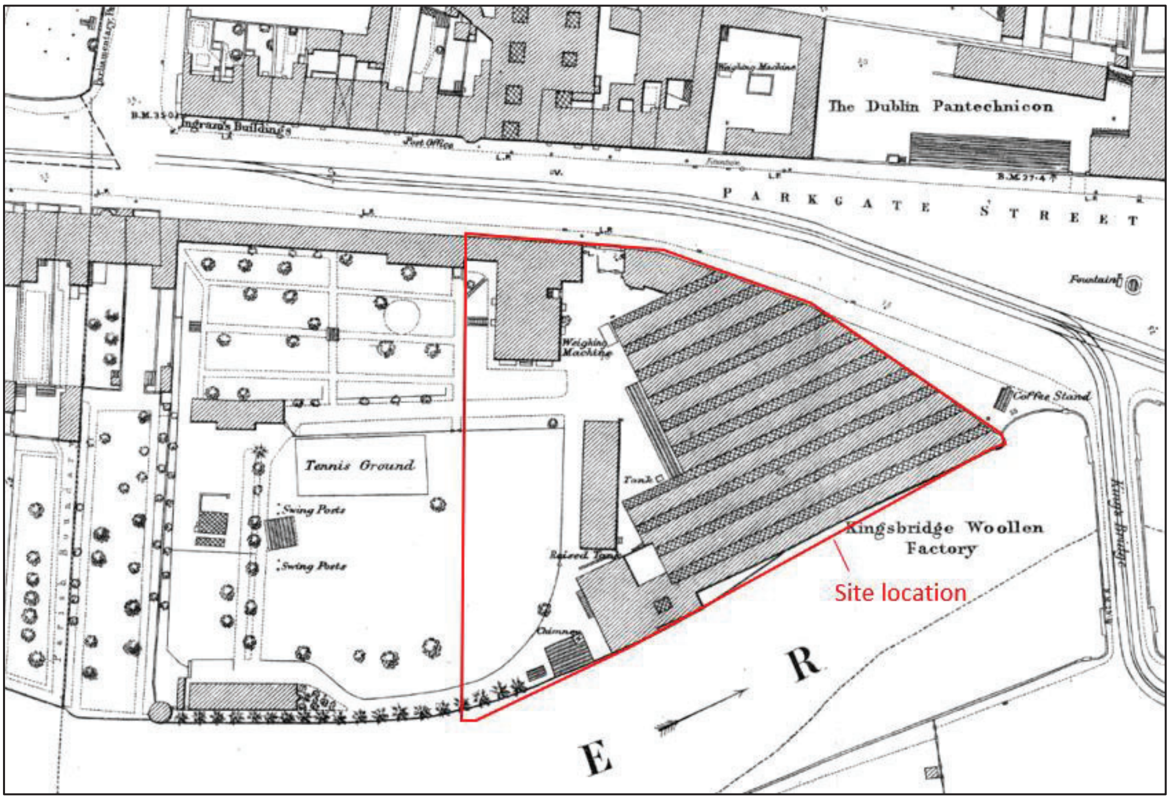

Figure 11 Revised edition OS map, 1889 (scale 1:1056), showing approximate site location

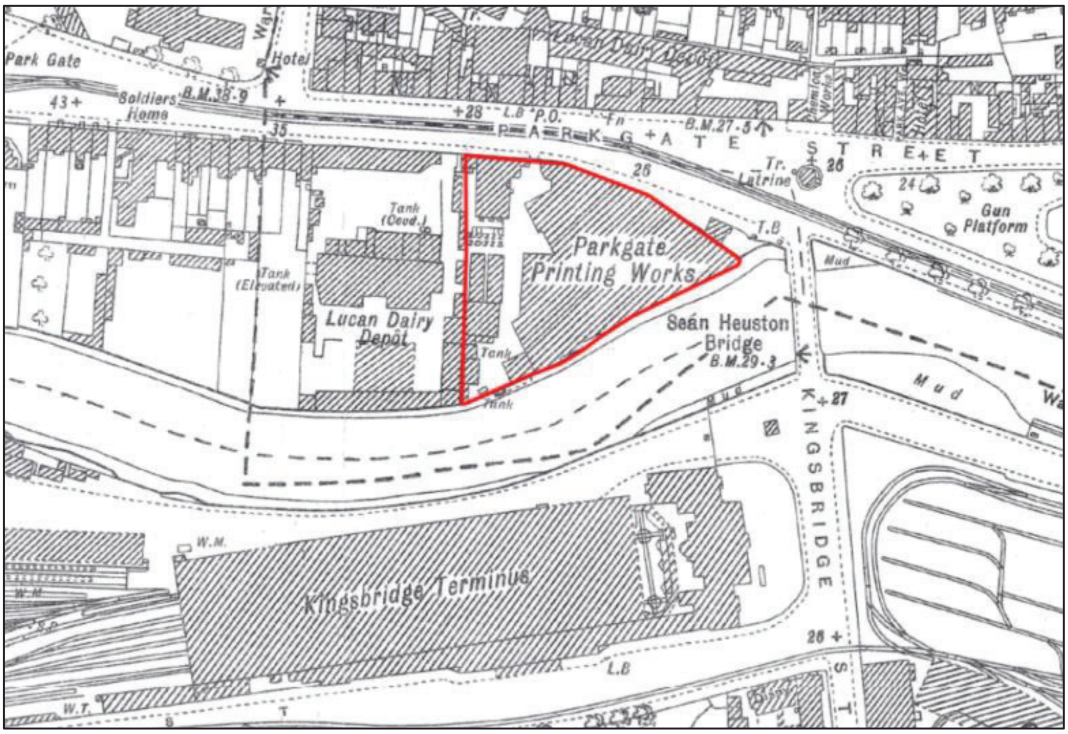

Figure 12 Revised edition OS map, 1943 (scale 1:1,560), showing approximate site location

4. RECORDED MONUMENTS AND PREVIOUS EXCAVATIONS

4.1. Record of Monuments and Places Sites (RMP sites)

The proposed development site is situated within the statutory zone of archaeological potential 'Historic City of Dublin', RMP No. DU018-020. There are no specific Record of Monuments and Places (RMP) sites recorded within the subject site, however its location on the south-facing bank of the River Liffey and offers a vantage point of many of the monuments in this region of the city (Figure 13).

The nearest recorded archaeological feature is the site of a dwelling (DU018-020-532) located on Montpelier Hill 100m to the north.

The Phoenix Park archaeological complex (DU018-007) is located c. 105m northwest of the development site (Figure 13). The complex is composed of a number of different sites, including the deer park (DU018-007001), a tower house (DU018-007002), a mound (DU018-007003), a house site of indeterminate date (DU018-007004), a possible well (DU018-007005), a possible enclosure (DU018-007007), a well (DU018-007008), a megalithic structure (DU018-007009), a road (DU018-007010), a cemetery mound (DU018-007011) and the star-shaped fort (DU018-007012).

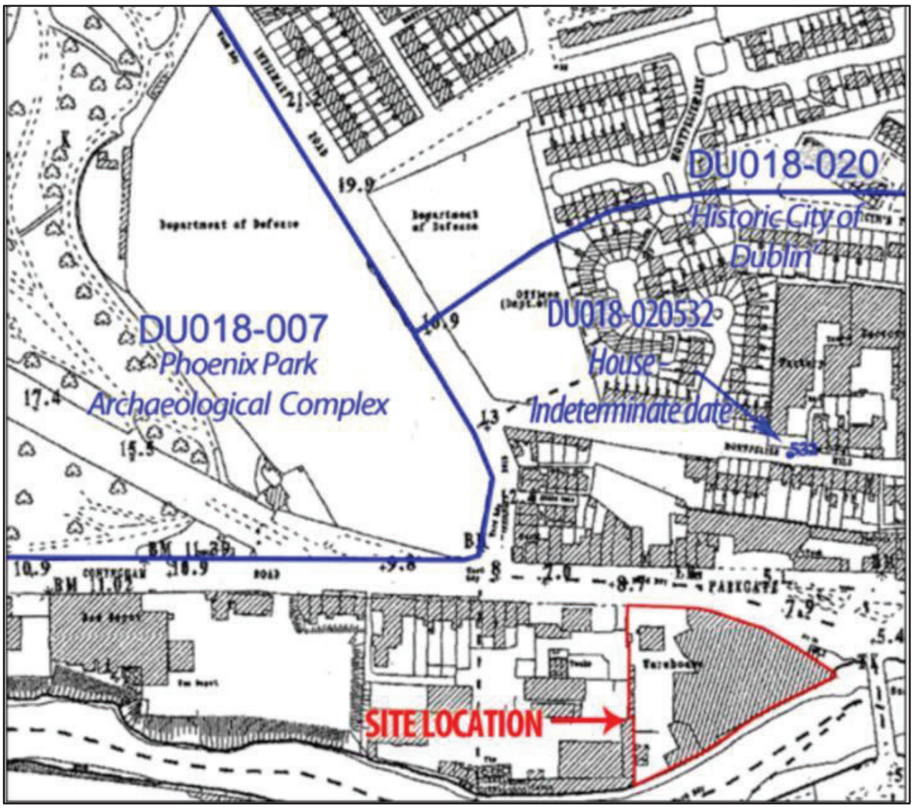

Figure 13 Published RMP map showing site location

The Royal Hospital Kilmainham (DU018-020-285) and associated gardens (DU018-020-528) are located directly south of Conyngham Road and south west of the site. Collin's Barracks (DU018-020-306) and the burial ground at the military recreation ground (DU018-020-447) located to the south of the barracks are situated 200m east of the proposed development.

Prominent landmark features in the surrounding urban landscape include the Royal Hospital, c. 600m to the southwest and the Wellington Monument, c. 600m to the northwest within the Phoenix Park and Sean Heuston Station, c. 100m south of the proposed development and south of the River Liffey.

4.2. Industrial Heritage Sites

The site as a whole is listed in the Dublin City Industrial Heritage Record (DCIHR) and is recorded as forming an important component within the city's industrial heritage. This record is extracted as follows.

Reference	DCIHR 18 10021
Site function	Iron Works
Location	Parkgate Street
Name	Parkgate Printing works {Royal Phoenix Iron Works}
Description	
Former Royal Phoenix Ironworks originally built c.1800, rebuilt c.1880 and converted to printing works c.1920. Site now functioning as commercial premises. Site comprises variety of single-storey double-	

height brick buildings to southwest corner having differing roof profiles with some lit by rooflights and having brick corbelled chimneystacks and Flemish bonded brick walls. Two-storey smooth-rendered building adjoining to northwest with hipped slate roof and curved southwest corner containing large opening now functioning as window. Square-headed window openings with painted stone sills and replacement timber windows; tripartite window to ground floor west elevation; flat-roofed extension links buildings to main structures. Two-storey random coursed stone structures to southwest of site having pitched slate roofs, cast-iron rainwater goods and roof vents, dressed limestone quoins and segmental-headed window openings with brick block-and-start surrounds and replacement windows. Site bounded to north by painted Flemish bond brick wall with denticulated recessed panels and stone quoins; bounded to riverside (south) by random rubble stone wall having ashlar limestone turret with cornice to east and square tower with cut limestone quoins, pyramidal slate roof and segmental-headed openings with brick surrounds to west. Ashlar limestone entrance to northwest surmounted by cornice and stepped parapet and having round-arched gateway with dressed limestone voussoirs to north and concrete to arch to south; round-headed blocked openings to east of gateway formally giving access to interior or northwest building.
Appraisal
The Royal Phoenix Ironworks, also known as Robinsons Ironworks, appear to have been a substantial operation on the north bank of the Liffey and have left notable legacies on the riverscape with the parapet on Sarah Bridge (1816) and Sean Heuston Bridge (1827-28) both cast there. Of particular note is the site's solid riverside boundary wall with associated turret and tower which belie the buildings original function, though it was used in World War 1 as a bomb-making factory. With its brick northern boundary wall, ashlar entrance and largely intact early structures, the site forms an important component within the city's industrial heritage.

4.3. Previous Archaeological Excavations

No archaeological investigations have been carried out within the subject site. Some investigations have however been carried out in the environs of the site (Figure 13) but did not reveal any substantial findings that might illuminate the potential of the site.

Archaeological testing (Licence No. 98E0188 Halpin, 1988) in advance of the development immediately west of the site (now the TII offices), did not reveal any features of archaeological significance. Post-medieval soils were identified, these lay directly on natural riverine silts and clays and were probably the result of localised agricultural activity. There was also some evidence of reclamation from the river where introduced material was laid down.

Monitoring of drilling pits associated with the laying of gas main from the junction of Infirmary Road/Parkgate Street along Conyngham Road (Licence No. 08E0483, Frazer 2008) did not reveal any archaeological features or remains.

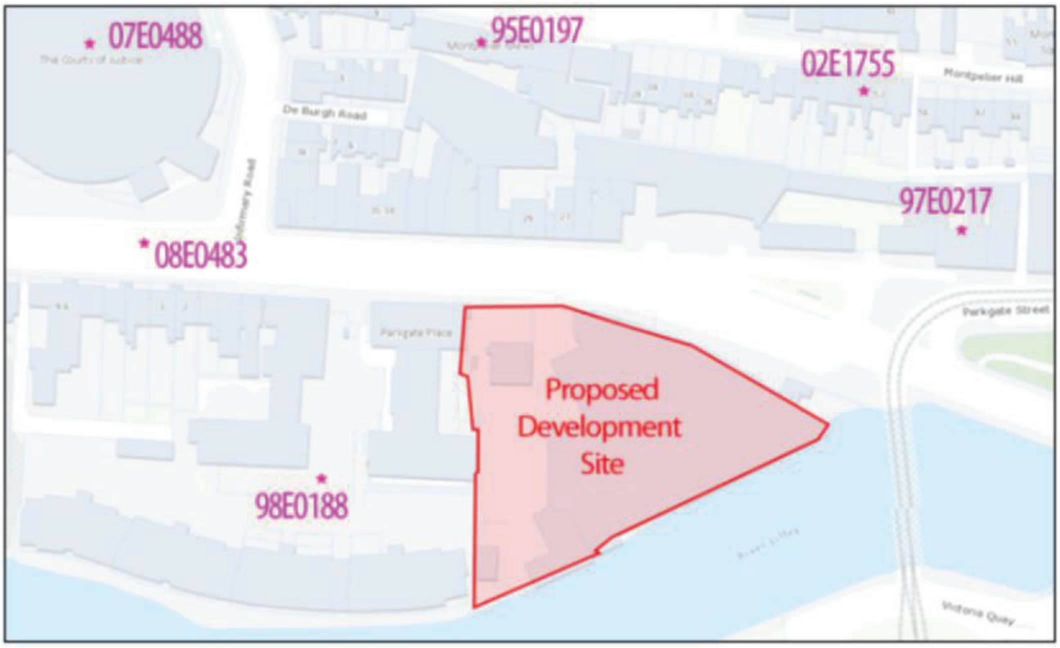

Figure 13 Archaeological investigations site locations (extracted from HeritageMaps.ie)

Archaeological investigation to the north of the proposed development in 15/16 Parkgate Street (Licence No. 97E0217), which lay upon a natural ridge overlooking the river Liffey, revealed no archaeological features. The assessment concluded that the terracing of the slope of the south facing gravel ridge would have destroyed any pre-existing topsoil levels of archaeological potential. Remarkably, a small, naturally occurring cave was identified on the site in glacial gravel and sand deposits dating back to the last ice age (Corlett, 1997). A second cavern, comprising a series of chambers, was found during the investigation in advance of the Aisling Hotel (Reid, 1996), this cavern appeared to have been artificially enhanced for use.

Archaeological monitoring carried out at the Criminal Courts Complex north of Parkgate street was carried out (Licence No. 07E0488, Myles & McNerney 2007). It followed a built heritage survey and documentary research into all above ground structures including a masonry wall along the Parliamentary Boundary, precinct walls of Phoenix Park along Infirmary Road and Parkgate Street, Porter's Lodge, a Laundry Building, a drinking fountain and evidence for a chemical factory and a Research and Production Plant, which occupied the site from 1942–7. Whilst no archaeological features were identified at the site, on the basis of the position of the watercourse depicted on Rocque in relation to the Liffey and on the immediate topography the possibility of the site being a 'longphort' could not be discounted due to the significant truncation at subsoil level at the site.

The monitoring of the insertion of two 0.5m deep drainage trenches at the rear of the house drainage trenches at 50 Montpelier Hill, a late 18th century building that may incorporate elements of an early 18th-century warehouse (Licence Ref: 02E1755, Simpson 2002). The excavation of the trenches revealed the remains of a brick surface or floor outside the house, at the south-east corner. This lay just beneath the existing concrete of the yard and presumably relates to a 3m^2 square return which is depicted on the OS map, dated to 1847.

Archaeological testing to the north of the site on 12-24 Montpelier Hill (Licence No. 95E0197, Murphy 1995) did not reveal any archaeological features the only finds recovered were of 18th century date or later.

5. MONITORING RESULTS

5.1. Summary of Findings

Archaeological monitoring of site investigation works took place under Licence No. 19E01779 from 30th March to the 13th May 2019. The ground investigation works comprised of 18 no. window sample holes to a depth of 4m BGL, 7 bore holes and 2 no. cable percussive boreholes with rotary core follow on (scheduled depth 15m BGL). Three slit trenches were excavated, one along the footpath to the northeast of the site on Parkgate Street, and two in the southwest corner of the site. TP101 was excavated against the boundary wall with the River Liffey. The pits were excavated by hand and a mechanical auger and also by mini-digger fitted with a drill and grading bucket that alternated between toothed and toothless as appropriate. All investigations are detailed in Appendix 1.

In summary, the results of the ground investigations confirmed the presence of made ground across the site to a depth of 3 – 5 meters BGL. Beneath the modern ground surfaces of concrete and tarmac is a layer of building rubble with a high concentration of red brick. These ranged in depth between 0.35m – 1.80m BGL.

The rubble fills overlay deposits of industrial materials, these were characterised by black charcoal-rich clays with varying degrees of sands and gravels. Inclusions of slag, shell, bone and mortar were noted. These deposits ranged between 0.45m – 1.90m BGL. They were predominately located in the southern half (south of ST101 and WS102) of the site and appear to infill sub-surface foundations/ structures. These deposits are possibly associated with the demolition of the 19th century Iron Works. The void revealed in WS 116 and the obstructions in WS 111 and WS101 would also indicate the presence of sub-surface structures at these points.

Largely beneath the industrial deposits were brown clays between 0.50m – 3.90m BGL. Inclusions of bone and ceramic were noted in these deposits. The uniform nature of these clays across the site would suggest that they are reclamation deposits, perhaps associated with agricultural improvements to the riverside meadow before the construction of the Iron Works.

These deposits overlay riverine sands and dark grey clay with high percentage of gravels and sands. In TP101 bone was recovered from the riverine sands.

Table 1 Summary of Monitoring results (Details in Appendix 1)

Investigation	Concrete & rubble (m)	Industrial (m)	Reclamation (m)	Gravel (m)	Note
BH 101	0.00 – 0.60	0.60 – 1.50	1.50 -3.40	3.40 – 7.10	
BH 102	0.00 – 0.30	0.30 – 2.10	2.10 – 3.50	3.50 – 6.40	Wood at 5.25m BGL
BH 103	0.00 – 1.00	1.00 – 2.40	2.40 – 5.70	5.70 – 6.70	
BH 104		0.00 – 5.00		5.00 – 7.40	Peat at 5.80m – 6.20m
BH 105	0.00 – 1.30	1.30 – 6.50		6.50 – 8.50	
BH 106	0.00 – 0.10	0.10 – 2.20	2.20 – 4.70	4.70 – 8.00	
BH 107	0.00 – 0.10		0.10 – 3.70	3.70 – 7.50	
ST 101	0.00 – 0.35	0.35 -1.15	1.15 – 2.50		
TP 01	0.00 – 1.80		1.80 – 2.80	2.80 -3.80	
TP 02	0.00 – 0.35	0.35 – 1.50	1.80 – 3.50	3.50	
TP 03	0.00 – 0.12	0.12 – 1.90			
WS 101	0.00 – 0.55	0.55 – 1.60	1.60 – 4.00		0.10m BGL stones
WS 102	0.00 -0.40	0.40 – 1.20			Asbestos 1.20m BGL
WS 102A	0.00 – 1.10	0.10 – 1.90	1.90 – 2.90	2.90 -4.00	
WS 103	0.0- 0.60	0.60 – 3.30	3.30 – 3.60	3.60 – 4.00	
WS 104	0.00 – 0.84	0.84- 1.80	1.80 - 2.60	2.60-2.84	
WS 105	0.00 -0.50				Asbestos 1.50m BGL
WS 105A	0.16 – 1.00	1.00 – 1.30			Obstruction 1.30m BGL
WS 106	0.00 – 0.65	0.65 – 2.50	2.50 - 3.00	3.00 – 3.70	
WS 107	0.00 – 1.60	1.60 – 2.10	2.10 – 3.10	3.10 – 3.70	
WS 108	0.00 – 0.70	0.70 – 1.90	1.90 – 3.50		
WS 109	0.00 -0.08		0.08 – 4.00		
WS 110	0.00 – 1.00		1.00 – 3.85	3.85 – 4.00	
WS 111	0.00-0.55				Obstruction 0.55m BGL
WS 112	0.00 – 0.60		0.60 – 3.00		
WS 113	0.00 – 1.40	1.40 – 2.50	2.50 – 3.00		
WS 114	0.00 – 1.30	1.30 – 2.60	2.60 – 3.00		
WS 115	0.00 – 0.30		0.30 – 3.30		
WS 116	0.00 – 0.20				0.20m BGL void- possible walls visible under concrete surface
WS 117	0.00 – 0.70		1.70 – 3.90	3.90 – 4.00	

TP 101 (Plates 1- 4) was excavated to a depth of 3.80m to establish the nature of the quay wall. Four phases of construction were visible. The upstanding breeze-block wall had concrete foundation supports which extended 1.80m north of the wall. Incorporated into the foundations and the backfill were two large cut-granite blocks, one of which had two mortise holes and two perforations. It is possible that these were associated with the jetty or pier, the wooden elements of which are visible on the river side of the wall.

These were probably in use when the site was an ammunitions factory. Under the breeze-block wall was a red-brick wall, 10 courses in height and set into a rubble and lime mortar foundation. These foundations lay directly on top of the remains of the limestone quay wall. The upper section of this quay wall consisted of limestone blocks to a depth of 2.20m, the lower section of the wall was constructed of irregular mudstones to a depth of 3.80m. The mudstone was visible in the section and tapered c.0.70m north from the wall.

Table 2 TP 101 - River trench - wall face

TP 101 - River Trench - wall face		
Depth (BGL)	**Description**	**Interpretation**
2.20 – 0.00	Breeze block wall	Modern
0.00 – 0.15	Concrete	Modern
0.15 – 0.20	Layer of red brick set in sandy mortar	Demolition material
0.20 – 0.30	Brown clay friable	Garden soils
0.30 – 1.50	Red brick – c.10 courses visible with grey- white lime mortar	Wall
1.50 – 1.80	Small to average sized lime stones and mortar	Foundation of redbrick wall
1.80 – 2.20	Limestone blocks and large stones	Quay wall upper
2.20 – 3.80	Mudstone slabs and irregular shapes stones	Quay wall lower

Plate 1 Concrete wall supports

Plate 2 Granite block removed from test trench

Plate 3 Inner face of quay wall

Plate 4 Mudstone at base of quay wall

FIP 101 (Plates 5 & 6) was excavated to a depth of 4m. Beneath the concrete slab and rubble fill were industrial fills, which abutted the upstanding limestone structure, and a subsurface redbrick structure to a depth of 1.50m. The granite cornerstones of the upstanding structure were visible beneath the current ground surface and extended to 1.50m below ground surface. The wall foundations extended from 1.50m – 3.50m.

In the south-facing section, the remains of a redbrick structure were visible (seven courses in height and constructed over a drain) abutting the upstanding structure. This drain was lined with red brick, two courses deep, and capped with a layer of lime mortar. The lime mortar layer was evident across the section and possibly delineates the original ground level when the upstanding structure was constructed. The brown reclamation clays lay directly under this mortar layer.

Plate 5 South-facing section of TP102

Plate 6 West-facing foundations of structure TP102

6. CONCLUSIONS

6.1. Summary

Buried beneath a meter of made ground consisting of gravel and red brick rubble which is sealed by a modern concrete slab, archaeological monitoring of the ground investigation works showed three main phases of deposition.

- 5m- 3.8m: The original river and meadow level as represented in the early cartographic sources appears to be represented at 4 – 5m below the current ground levels. The presence of fragments of wood (possible root/branch material) at 5.25 (BH102) and a layer of peat at 5.80 (BH104) would suggest that this level was either the original riverbank or the pre-reclamation river meadow ground surface. At 3.8m + gravels were encountered indicating a sealed riverine dynamic environment.
- At 3.8m-1.5m reclamation/ agricultural soils pre 1800's (prior to the Iron Works) were encountered, brown clays were imported onto the site. Ceramics (post medieval) and a fragment of animal bone were revealed.
- At 1.50m below present ground level a possible ground surface associated with the industrial structures is evident. Possible walls and sub-surface structures were visible within WS116.
- At 1.5m-0.8m there is a spread of black, rubble rich, material which varies in depth across the site, appears to be associated with the final phase/ shut down of the Iron Works (1880s) and represents the demolition material associated with the foundry. It is possible that demolition materials were

spread across the site to infill structures and to level the site in preparation for the next face of construction. Cartographic sources from the 19th century onwards, indicate a sequence of industrial installations on the site, commencing with the Royal Phoenix Iron Works.

- 0.80-0.30 – Redbrick rubble and gravel.
- 0.30-0.00 – Concrete modern surfaces.

The results of monitoring the ground investigation works appear to indicate foundations, possible wall and floor levels associated with the iron working phase and later phases on site (early 1800's onwards). In order to understand and ascertain the extent and nature of these remains it will be necessary to archaeologically investigate.

If structural remains of the nineteenth century iron works are discovered, they will be recorded prior to removal, to the specification of the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht and the City Archaeologist. Preservation in situ by design will also be explored in relation to the piling layout in order to avoid or minimise an impact on the industrial heritage remains.

6.2. Proposed Archaeological Strategy for the Site

The subject site is located on the banks of the River Liffey, within the Zone of Archaeological Potential for Dublin (DU018-020) in an area of the city where Viking activity has been recorded. A standard requirement within this statutory zone is archaeological testing in advance of development.

At this site, as demonstrated by the ground investigation works, a number of phases of infill have occurred across this site. It appears that industrial activity relating to the 19^{th} century iron works occurs at a depth between 1.50-2.90m beneath the present ground level.

Due to the environmental constraints at the site, and the unknown impact of the piling on the original ground levels, the specific strategy for the archaeological investigation and recording at the site will need to be devised in consultation with the City Archaeologist and the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht. Given the findings to date and the potential of the site, it was indicated by the City Archaeologist that test excavation would be required once the site has been vacated by the tenants.

It is recommended that the programme of archaeological works would commence in advance of the main construction stage at the site clearance/ ground reduction/demolition stage. Once existing structures and the ground slab have been cleared from the site, a systematic programme of investigation should take place to establish the nature and extent of the surviving sub-surface structures. It is envisaged that this could take place on a phased basis, utilising the ground slab as a working platform to investigate adjacent areas.

Where possible large testing blocks could be cut through the concrete slab to expose voids or structures beneath the concrete. Once structural elements were identified and recorded, a series of archaeological trial pits could be excavated within each of the blocks to confirm that depth of reclamation soils. This is to establish the original pre- 19th century ground levels and to ascertain the archaeological potential of these soils. It will also inform the subsequent piling programme.

We would suggest that a commitment to split the contract would somewhat alleviate the risk and remove the burden from the construction phase, this is a proven methodology in urban sites. The construction contract would be preceded by an archaeological investigation contract (i.e. in the site preparation phase supported by a small contractor team). The investigations would establish the location, nature and depths of the industrial archaeological deposits across the site. In this way, the impact of the developmental can be established and adequate time would be allowed for an integrated design response, by the archaeologist, engineer and architect to be developed in consultation with and approval from the City Archaeologist to ensure minimal impact to the archaeological remains. The detailed design will focus on the avoidance of significant industrial archaeological deposits and for the archaeological resolution and detailed recording of some areas if necessary (which will involve an archaeological excavation crew). Once this work is completed the main construction contract can commence.

6.3. General

All recommendations are subject to the approval of the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht and the City Archaeologist for Dublin. This suggested strategy does not prejudice recommendations made by the National Monuments Service, the Dublin City Archaeologist and the planning authority who may make additional recommendations.

The developer will make provision to allow for and fund whatever archaeological work may be required at the site and the post excavation requirements in accordance with the National Monuments Legislation (1930–2004; Appendix 2).

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APPENDIX 1 TABLES SHOWING RESULTS OF MONITORING

BH 101		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.10	Concrete	Modern
0.10 – 0.60	Rubble fills, gravels with inclusions of brink, bone and mortar	Demolition material
0.60 – 1.50	Dark brown to black silty clay with inclusions of shell and slag	Industrial materials
1.50 – 2.50	Brown slightly silty clay with occasional mortar charcoal and red brick	Reclamation soils
1.50 – 3.40	Soft light brown sandy silty clay	Reclamation soils
3.40 – 4.50	Medium dense brown sandy slightly clayey sub- angular to rounded fine to medium gravel	Gravel
4.50 – 5.50	Loose sandy slightly clayey sub- angular to rounded fine to medium gravel with sub-angular to round cobbles	Gravel
5.50 – 7.10	Medium dense grey slightly clayey sandy fine to medium angular to sub-rounded gravel	Gravel
7.10 – 8.60	Weathered mudstone and limestone	Rock
8.60 – 12.60	Bedrock	Rock
		

BH 102		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.05	Tramacadam	Modern
0.05 – 0.30	Grey brown slightly clayey sandy fine to coarse sub-angular. Gravel with cement.	Demolition material
0.30 – 1.50	Brown sandy very clayed fine to coarse angular to sub-round gravel	Industrial
1.50 – 2.10	Light brown mottled dark brown slightly sandy gravelly clay with mortar and redbrick fragments	Industrial
2.10 – 3.00	Soft dark grey slightly sandy slightly gravelly clay	Reclamation soils
3.00 – 3.50	Firm dark grey slightly sandy slightly gravelly clay	Reclamation soils

BH 102		
Depth (BGL)	**Description**	**Interpretation**
3.50 – 5.25	Loose brown slightly clayey sandy sub-angular to sub-rounded fine to medium gravel	Gravel
5.25 – 6.00	Medium dense brown slightly clayey sandy sub-angular to sub-rounded to medium gravel with wood fragments	Gravel
6.00 – 6.40	Firm dark grey slightly sandy slightly gravelly silty clay	Riverine
6.40 – 15.50	Bedrock	Rock

BH 103		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.30	Tramacadam	Modern
0.30 – 1.00	Brown slightly sandy very clayey fine to coarse angular to sub-rounded Gravel with concrete tarmacadam and redbrick.	Demolition material
1.00 – 2.40	Brown slightly sandy gravelly Clay with mortar and charcoal fragments.	Industrial materials
2.40 – 3.60	Firm grey slightly gravelly silty clay	Reclamation soils
3.60 – 3.90	Loose grey slightly sandy very clayey fine to coarse sub-angular to sub-rounded gravel	Reclamation soils
3.90 – 5.70	Soft to firm grey slightly sandy very gravelly clay	Riverine
5.70 – 6.70	Clay with fine gravels and boulders	Riverine
6.70 – 15.10	Bedrock	Rock

BH 104		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 5.00	Greyish brown slightly sandy gravelly clay with occasional subrounded cobbles and some ceramic, concrete and red brick fragments	Industrial materials
5.00 – 6.20	Stiff greyish brown slightly sandy gravelly clay. Gravel is angular to subrounded. Lense of soft grey mottled black gravelly clay with spongy Pseudofibrous Peat occurs between 5.80m to 6.20m BGL	Reclamation soils
6.20 – 7.40	Dense grey sandy gravel. Sand is predominately coarse and gravel is subangular to rounded	Riverine
7.40 – 15.60	Rock	Rock

BH 105		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 1.30	Concrete	Modern
1.30 – 6.50	Poor recovery - recovery consists of brown slightly sandy slightly gravelly silt. Gravel is fine subrounded and sand is predominately fine. Drillers notes: Sandy silt (Soft)	Industrial materials / Reclamation soils
6.50 – 8.50	Poor recovery - recovery consists of grey sandy fine to coarse angular to subrounded gravel of variable lithology. Drillers notes: Sand - Gravel (Loose)	Riverine

BH 105		
Depth (BGL)	**Description**	**Interpretation**
8.50 – 17.00	Rock	Bedrock

BH 106		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.10	Concrete	Modern
0.10 – 2.20	Clay and gravel	Industrial
2.20 – 3.70	Natural brown sandy gravelly clay (soft)	Reclamation soils
3.70 – 4.70	Brown slightly sandy silty clay (Soft to firm)	Reclamation soils
4.70 – 6.70	Loose to medium dense brown sandy clayey fine to coarse sub-angular to sub-rounded gravel	Riverine
6.70 – 8.00	Grey slightly sandy slightly clayey fine to coarse sub-angular to sub-rounded gravel (Loose) with occasional cobbles. Grey brown slightly sandy silt (Soft).	Riverine
8.00 – 12.70	Bedrock	Rock

BH 107		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.10	Concrete	Modern
0.10 – 3.70	Poor recovery. Brown sandy clay	Reclamation soils
3.70 – 7.50	Poor recovery. Sandy gravel	Riverine
7.50 – 12.00	Bedrock	Rock

Window Sampling

WS 101		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.10	Concrete	Modern
0.10 – 0.55	Stones gravel	Modern
0.55 – 1.60	Grey brown sandy very gravelly clay with some old redbrick, mortar, slag and charcoal fragments (1.00-2.00m - 65% Recovery)	Industrial
1.60 – 2.00	Light brown slightly sandy silty clay with occasional charcoal and mortar fragments	Reclamation
2.00 – 2.90	Soft light brown slightly sandy silty clay (2.00-3.00m – 45% Recovery)	Reclamation
2.90 – 4.00	Brown slightly clayey gravelly fine to coarse sand with occasional cobbles (3.00-4.00m – 55% Recovery)	Reclamation

WS 102		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.09	Concrete	Asbestos
0.09 – 0.40	Brown sandy very clayey angular to sub rounded fine to coarse gravel with some angular to sub angular cobbles and boulders	Modern
0.40 – 1.20	Dark grey mottled slightly sandy very gravelly clay with redbrick, ash and slag fragments	Industrial
1.20	Cobble or Boulder	

WS 102 A		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.10	Concrete	Modern
0.10– 1.90	Black to brown sandy clay flecked with charcoal and inclusion of mortar and post medieval ceramic (0.00-0.60m - Handpit 0.60-1.00m - 40% Recovery 1.00-2.00m - 65% Recovery)	Demolition material
1.90 – 2.90	Brown clay silt with inclusions of shell and slay	Reclamation soils
2.90 – 4.00	Brown fine sand and gravels	Riverine
		

WS 103		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.24	Concrete	Modern
0.24 – 0.60	Brown slightly sandy very gravelly clay	Modern
0.60 – 1.00	Dark brown black mottled orange sandy clayey angular to subrounded fine to medium gravel with redbrick, mortar and slag fragments	Industrial
1.00 – 1.60	Dark grey brown slightly sandy gravelly clay with ceramic and mortar fragments	Industrial
1.60 – 3.30	Dark grey brown sandy very clayey angular to subrounded fine to coarse gravel with many slag fragments	Industrial

WS 103		
Depth (BGL)	**Description**	**Interpretation**
	(2.00-3.00m - 50% Recovery)	
3.30 – 3.60	Soft to firm brown slightly sandy silty clay	Reclamation
3.60 – 4.00	Brown gravelly subangular to subrounded fine to coarse sand	Riverine

WS 104		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.14	Concrete	Modern
0.14 – 0.84	Rubble fills, gravels with inclusions of brink, bone and mortar	Demolition material
0.84 – 1.80	Dark brown to black silty clay with inclusions of charcoal shell and slag	Industrial material
1.80 – 2.00	Brown slightly sandy slightly gravelly silty clay with occasional mortar and charcoal fragments	Reclamation soils
2.00 – 2-60	Soft brown silt clay	Reclamation soils
2.60 – 2.80	Brown sandy gravels	Obstruction 2.80 cobble/boulder
		

WS 105		
Depth (BGL)	**Description**	**Interpretation**
0.00 -0.50	Asbestos	

WS 105A		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.16	Concrete	Modern
0.16 – 1.00	Dark grey brown slightly clayey angular to subrounded fine to medium gravel with many old redbrick, tarmacadam, mortar and slag fragments	Modern

WS 105A		
Depth (BGL)	**Description**	**Interpretation**
1.00 – 1.30	Brown slightly sandy very clayey angular to subangular fine to coarse gravel	Industrial (Obstruction 1.30 cobble/boulder)

WS 106		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.14	Concrete	Modern
0.14 – 0.65	Rubble fills, gravels with inclusions of brink, bone and mortar	Demolition material
0.65 – 1.25	Brown sandy clay with inclusions of shell and slag	Industrial material
1.25 – 2.10	Rubble fills, gravels with inclusions of brick, bone and mortar	Industrial material
2.10 – 2.50	Black sandy clay with inclusions of mortar and slag	Industrial material
2.50 – 3.00	Brown silty clay	Reclamation soils
3.00. – 4.00	Fine gravels and riverine sands	Riverine deposits
		

WS 107		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 1.60	Grey brown slightly sandy very gravelly clay with some redbrick fragments	Modern
1.60 – 2.10	Brown slightly sandy slightly gravelly clay with some redbrick fragments	Industrial material
2.10 – 3.10	Soft grey slightly gravelly silt/clay with occasional shell fragments	Reclamation soils
3.10 – 3.70	Grey brown sandy very clayey angular to subrounded fine to medium gravel	Reclamation soils (contamination?)

WS 107		
Depth (BGL)	**Description**	**Interpretation**
		

WS 108		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.12	Concrete	Modern
0.12 – 0.70	Rubble fills, gravels with inclusions of brink and mortar	Demolition material
0.70 – 1.90	Brown silty clay with inclusions of red brick, mortar and charcoal	Industrial material
1.90 – 2.60	Brown silty clay with flecks of mortar and charcoal	Reclamation soils
2.60 – 3.50	Soft to firm brown slightly sandy gravelly clay	Reclamation soils
3.00 – 3.50	Grey brown silty clay	
		

WS 109		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.08	Concrete	Modern
0.08 – 4.00	Brown sandy clay flecked with charcoal and inclusion of mortar and post medieval ceramic	Reclamation soils

WS 109		
Depth (BGL)	**Description**	**Interpretation**
		

WS 110		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.09	Concrete	Modern
0.09- 1.00	Rubble gravel fills with redbrick	Demolition material
1.00 – 2.40	Brown sandy clay flecked with charcoal and inclusion of mortar chuck and bone	Reclamation soils
2.40 – 3.30	Brown sandy clay similar to above but with a higher percentage of gravels	Reclamation soils
3.30 – 3.80	Dark grey silty clay with high percentage of gravels and sand with occasional shell. (Odorous)	Reclamation soils
3.80 – 4.00	Gravels	Riverine
		

WS 111		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.11	Concrete	Modern
0.11 – 0.55	Grey brown mottled yellow slightly sandy clayey fine to coarse angular to sub-rounded gravel with some yellow brick fragments	Demolition

WS 111		
Depth (BGL)	**Description**	**Interpretation**
0.55	Competed	Unknown

WS 112		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.60	Concrete	Modern
0.60 – 2.00	Brown sandy clay flecked with charcoal and inclusion of mortar chucks	Reclamation soils
2.00 – 2.60	Void	
2.60 – 2.80	Dark stained to brown clay with a higher percentage of gravels with inclusions of brick, mortar and charcoal	Reclamation soils
		

WS 113		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 1.10	Concrete	Modern
1.10 – 1.40	Rubble fills, gravels with inclusions of brink, shell and mortar	Demolition material
1.40 – 1.90	Dark brown to black silty clay with inclusions of shell and flecks of slag	Industrial material
1.90 – 2.50	Brown silty clay flecked with charcoal with inclusions of red brick and chunks of mortar	Industrial material
2.50 – 3.00	Brown silty clay	Reclamation soils

WS 113		
Depth (BGL)	**Description**	**Interpretation**
		

WS 114		
Depth (BGL)	**Description**	**Interpretation**
0.00 - 0.70	Concrete	Modern
0.70 - 1.00	Dark brown silty clay	Modern
1.00 - 1.30	Re-deposit brown clay with a high percentage of mica	Modern
1.30 – 2.00	Dark brown and black friable sandy clay with inclusions of rubble and brick	Industrial material
2.00 – 2.60	Brown gravelly silty clays flecked with charcoal and inclusions of mortar fragments	Industrial material
2.60 – 3.00	Brown silty clay	Reclamation soils
		

WS 115		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.08	Modern surface	Modern
0.08 – 0.30	Rubble gravel fills with redbrick	Demolition material
0.30 – 1.80	Brown silty clay flecked with charcoal and inclusions of pebbles	Reclamation soils
1.80 – 3.30	Brown clay flecked with charcoal and inclusion of mortar flecks	Reclamation soils
		

WS 116		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.20	Concrete	Modern
0.20	Void – Wall visible beneath the concrete	Unknown

WS 117		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.04	Black gravels ground surface	Modern
0.04 – 0.70	Rubble gravel fills with redbrick	Demolition material
0.70 – 2.90	Mid - brown silty clay flecked with charcoal and inclusions of pebbles and mortar flecks	Reclamation soils
2.90 – 3.90	Dark brown silty clay flecked with charcoal, inclusions of shell and ceramic	Reclamation soils (contamination?)
3.90 – 4.00	Dark grey silty clay with high percentage of gravels. (Odorous)	Riverine fills

WS 117		
Depth (BGL)	**Description**	**Interpretation**
		

Test Pits

TP 01- Foundation Trench 1 (River Trench)		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.10	Concrete	Modern
0.10 – 0.26	Rubble gravel fills with redbrick	Demolition material
0.26 – 0.80	Brown clay, friable	Garden soils
0.80 – 1.80	Dark brown mottled light grey slightly sandy very clayey angular to subangular fine to coarse gravel with many slag, redbrick and mortar fragments and some glass and ash fragments	Demolition material
1.80 – 2.20	Brown slightly sandy slightly gravelly clay with some charcoal and redbrick fragments and old rootlets and shell fragments	Reclamation soils
2.20 – 2.80	Mid - brown clay with a high percentage of fine sand	Reclamation soils
2.80 – 3.80	Fine sandy with pockets of clay and gravels, inclusions of bones	Riverine

TP 01- Foundation Trench 1 (River Trench) - wall face		
Depth (BGL)	**Description**	**Interpretation**
2.20 – 0.00	Breeze block wall	Modern
0.00 – 0.15	Concrete	Modern
0.15 – 0.20	Layer of red brick set in sandy mortar	Demolition material
0.20 – 0.30	Brown clay friable	Garden soils
0.30 – 1.50	Red brick – c.10 courses visible with grey- white lime mortar	Wall
1.50 – 1.80	Small to average sized lime stones and mortar	Foundation of redbrick wall
1.80 – 2.20	Limestone blocks and large stones	Quay wall upper
2.20 – 3.80	Mudstone slabs and irregular shapes stones	Quay wall lower

TP 02- Foundation Trench 2 (Yard Trench)		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.10	Concrete	Modern
0.10 – 0.35	Grey brown rubble fill with bricks	Demolition material
0.35 – 0.90	Dark brown slightly sandy very clayey angular to subangular fine to coarse Gravel with limestone boulders, redbrick, granite block and mortar fragments	Industrial material
0.90 – 1.50	Light brown stones and rubble	Industrial material
1.50 – 1.70	Layer of lime mortar	Ground surface when structure was built
1.80 – 3.00	Brown silty clay with inclusion of shell and bone	Reclamation soils
3.00 – 3.50	Brown sandy clay with inclusion of ceramic	Reclamation soils
3.50	Dark grey gravels	Riverine ?

TP 02- Foundation Trench 2 (Yard Trench) – wall face		
Depth (BGL)	**Description**	**Interpretation**
	Upstanding limestone block wall with granite corner stones	Upstanding structure
0.00 – 0.15	Concrete	Modern yard surface
0.15 – 1.00	Upstanding limestone block wall with granite corner stones	Upstanding structure
1.00 – 2.20	Rough limestone and mortar fill (set 0.15m) out from wall)	Foundation
2.20 – 2.90	Rough limestone and mortar fill (set 0.30m) out from wall)	Foundation
2.90 – 3.50	Brown clays	Reclamation soils

TP 03- Foundation Trench 3 (Warehouse Trench)		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.12	Concrete	Modern
0.10 – 1.90	Grey brown rubble fill with bricks, roof slates and limestone stones.	Demolition material

TP 03- Foundation Trench 3 (Warehouse Trench) – wall face		
Depth (BGL)	**Description**	**Interpretation**
	Upstanding limestone block wall	Upstanding structure
0.00 – 0.40	Upstanding limestone block wall	Upstanding structure
0.40 – 1.55	Limestone blocks/stones some signs of pointing (stepped 0.08m from wall)	Foundation
1.55 – 0.90	Limestone blocks/stones (stepped 0.12m from layer above)	Foundation

TP 04		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.17	Concrete	Modern

TP 04		
Depth (BGL)	**Description**	**Interpretation**
0.17 – 1.55	Brown sandy gravels with rebrick and mortar fragments East of concrete wall located directly below concrete slab and 1.30 m east of the boundary wall, orientated north south.	Industrial material
0.17 – 1.35	Dark brown black rubble fills with inclusions of redbrick slag, plastics and metal piping. Located west of concrete wall, lead piping 1.30m below ground surface.	Industrial material
		

TP 05		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.17	Concrete	Modern
0.17 – 1.40	Dark brown black rubble fills with inclusions of redbrick slag, plastics and metal piping	Industrial material
1.40	Concrete	Concrete floor of structure
		

Slot Trench

ST 01 – Slot Trench Road Side		
Depth (BGL)	**Description**	**Interpretation**
0.00 – 0.15	Concrete	Modern
0.15 – 0.35	Brown sandy gravels fills	Modern
0.35 – 0.65	Mid to dark brown sandy gravels with mortar chucks	Industrial material
0.65 – 0.95	Brown silty clay flecked with charcoal with inclusions of shell and bone	Industrial material
0.95- 1.15	Grey brown silty clays at the base of which was s higher concentration of mortar	Industrial material
1.15 – 2.50	Brown silty clay with gravels and inclusions of red brick	Reclamation soils
		

APPENDIX 2 SUMMARY OF RELEVANT LEGISLATION

National Monuments Legislation 1930-2004

All archaeological sites have the full protection of the national monuments legislation (Principal Act 1930; Amendments 1954, 1987, 1994 and 2004).

In the 1987 Amendment of Section 2 of the Principal Act (1930), the definition of a national monument is specified as:

any artificial or partly artificial building, structure or erection or group of such buildings, structures or erections,

any artificial cave, stone or natural product, whether forming part of the ground, that has been artificially carved, sculptured or worked upon or which (where it does not form part of the place where it is) appears to have been purposely put or arranged in position,

any, or any part of any, prehistoric or ancient

(i) tomb, grave or burial deposit, or

(ii) ritual, industrial or habitation site,

and

any place comprising the remains or traces of any such building, structure or erection, any cave, stone or natural product or any such tomb, grave, burial deposit or ritual, industrial or habitation site...

Under Section 14 of the Principal Act (1930):

It shall be unlawful...

to demolish or remove wholly or in part or to disfigure, deface, alter, or in any manner injure or interfere with any such national monument without or otherwise than in accordance with the consent hereinafter mentioned (a licence issued by the Office of Public Works National Monuments Branch),

or

to excavate, dig, plough or otherwise disturb the ground within, around, or in the proximity to any such national monument without or otherwise than in accordance...

Under Amendment to Section 23 of the Principal Act (1930),

A person who finds an archaeological object shall, within four days after the finding, make a report of it to a member of the Garda Síochána...or the Director of the National Museum...

The latter is of relevance to any finds made during a watching brief.

In the 1994 Amendment of Section 12 of the Principal Act (1930), all of the sites and 'places' recorded by the Sites and Monuments Record of the Office of Public Works are provided with a new status in law. This new status provides a level of protection to the listed sites that is equivalent to that accorded to 'registered' sites [Section 8(1), National Monuments Amendment Act 1954] as follows:

The Commissioners shall establish and maintain a record of monuments and places where they believe there are monuments and the record shall be comprised of a list of monuments and such places and a map or maps showing each monument and such place in respect of each county in the State.

The Commissioners shall cause to be exhibited in a prescribed manner in each county the list and map or maps of the county drawn up and publish in a prescribed manner information about when and where the lists and maps may be consulted.

- In addition, when the owner or occupier (not being the Commissioners) of a monument or place which has been recorded, or any person proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such monument or place, he shall give notice in writing of his proposal to carry out the work to the Commissioners and shall not, except in the case of urgent necessity and with the consent of the Commissioners, commence the work for a period of two months after having given the notice.

The National Monuments Amendment Act 2004

The National Monuments Amendment Act enacted in 2004 provides clarification in relation to the division of responsibilities between the Minister of Environment, Heritage and Local Government, Finance and Arts, Sports and Tourism together with the Commissioners of Public Works. The Minister of Environment, Heritage and Local Government will issue directions relating to archaeological works and will be advised by the National Monuments Section and the National Museum of Ireland. The Act gives discretion to the Minister of Environment, Heritage and Local Government to grant consent or issue directions in relation to road developments (Section 49 and 51) approved by An Bord Pleanála and/or in relation to the discovery of National Monuments

14A. (1) The consent of the Minister under section 14 of this Act and any further consent or licence under any other provision of the National Monuments Acts 1930 to 2004 shall not be required where the works involved are connected with an approved road development.

(2) Any works of an archaeological nature that are carried out in respect of an approved road development shall be carried out in accordance with the directions of the Minister, which directions shall be issued following consultation by the minister with the Director of the National Museum of Ireland.

Subsection 14A (4) Where a national monument has been discovered to which subsection (3) of this section relates, then

(a) the road authority carrying out the road development shall report the discovery to the Minister
(b) subject to subsection (7) of this section, and pending any directions by the minister under paragraph (d) of this subsection, no works which would interfere with the monument shall be carried out, except works urgently required to secure its preservation carried out in accordance with such measures as may be specified by the Minister

The Minister will consult with the Director of the National Museum of Ireland for a period not longer than 14 days before issuing further directions in relation to the national monument.

The Minister will not be restricted to archaeological considerations alone, but will also consider the wider public interest.

Courtney Deery Heritage Consultancy

Lynwood House

Ballinteer Road

Dublin 16

D16 H9V6

Telephone: 01 5475795

Email: info@courtneydeery.ie

Website: www.courtneydeery.ie

Registered Company No. 519676

VAT No. IE1111365WH

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42A Parkgate Street, Dublin 8

Appendix 13.1: Photomontages

265381-00

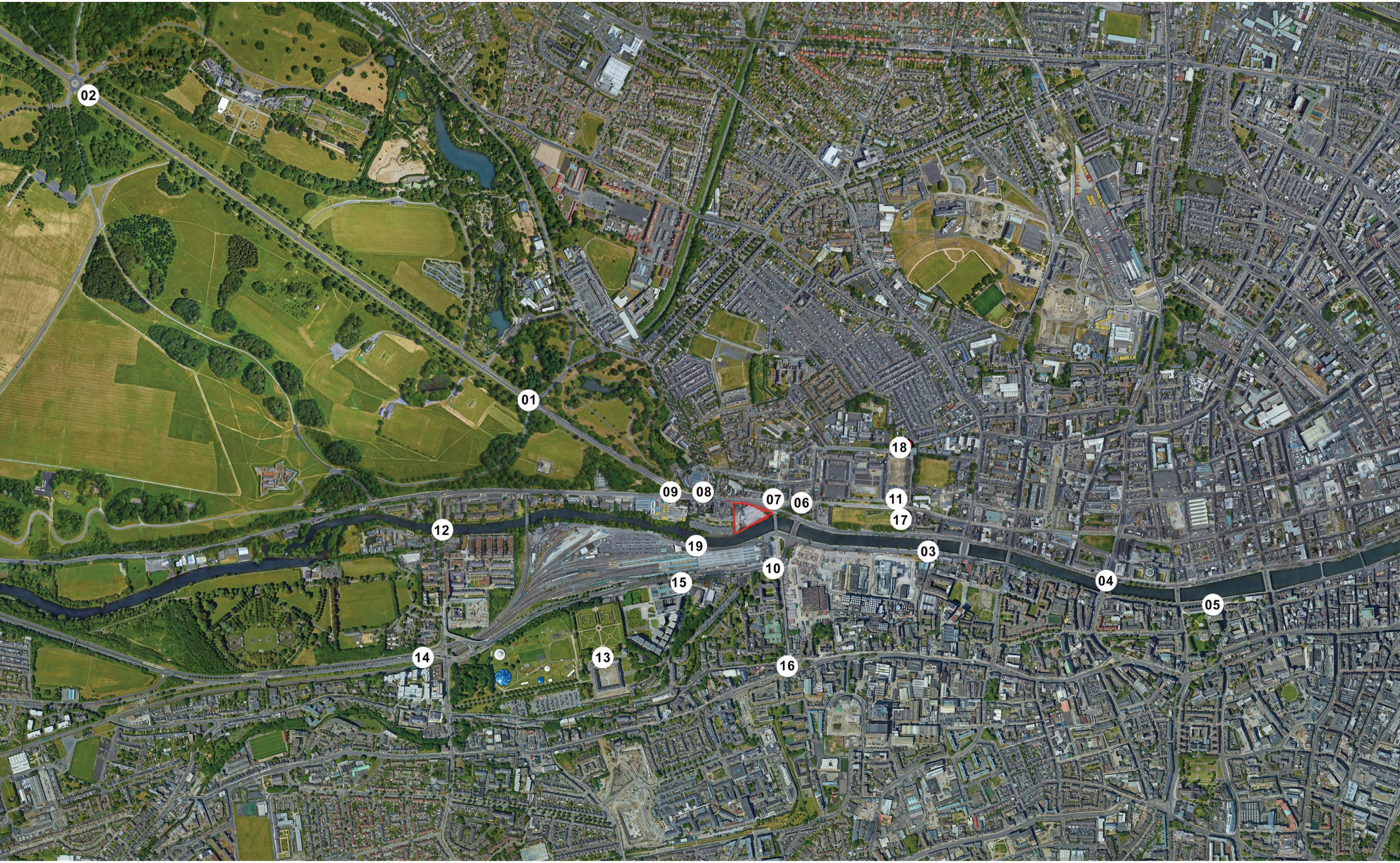
ARUP

Parkgate Street

Verified Photomontages

January 2020

MODEL WORKS



project: Parkgate Street	photography:	location:	viewpoint: **View Location Map**
			issued: 03-01-2020

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens)   Angle of View 39° Horizontal (50 mm Lens)

project:	Parkgate Street	*photography:*	22-10-2018 15:31 Canon 5D Mark II 24 mm Lens	*location:*	Chesterfield Avenue.	*viewpoint:* *issued:*	**View 01** **Baseline** 08-11-2019

MODEL WORKS

Angle of View 73^{o} Horizontal (24 mm Lens) Angle of View 39^{o} Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 15:31
Canon 5D Mark II
24 mm Lens

location: Chesterfield Avenue.

viewpoint: **View 01** **Proposed**

issued: 04-12-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens)   Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 16:04
Canon 5D Mark II
24 mm Lens

location: Chesterfield Avenue.

viewpoint: **View 02** **Baseline**

issued: 08-11-2019

MODEL WORKS

Angle of View 73^{O} Horizontal (24 mm Lens)
Angle of View 39^{O} Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 16:04
Canon 5D Mark II
24 mm Lens

location: Chesterfield Avenue.

viewpoint: **View 02** **Proposed**

issued: 02-12-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens) | Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 11:31
Canon 5D Mark II
24 mm Lens

location: Victoria Quay.

viewpoint: **View 03** **Baseline**

issued: 08-11-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens) Angle of View 39° Horizontal (50 mm Lens)

project:	Parkgate Street	*photography:*	22-10-2018 11:31 Canon 5D Mark II 24 mm Lens	*location:*	Victoria Quay.	*viewpoint:*	**View 03 Proposed**
						issued:	04-12-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens) Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 11:47
Canon 5D Mark II
24 mm Lens

location: Arran Quay.

viewpoint: **View 04** **Baseline**

issued: 08-11-2019

MODEL WORKS

Angle of View 73^{o} Horizontal (24 mm Lens)

Angle of View 39^{o} Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 11:47
Canon 5D Mark II
24 mm Lens

location: Arran Quay.

viewpoint: **View 04** **Proposed**

issued: 02-12-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 12:00
Canon 5D Mark II
24 mm Lens

location: Wood Quay.

viewpoint: **View 05** **Baseline**

issued: 08-11-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 12:00
Canon 5D Mark II
24 mm Lens

location: Wood Quay.

viewpoint: **View 05** **Proposed**

issued: 02-12-2019

MODEL WORKS

Angle of View 73^{O} Horizontal (24 mm Lens)   Angle of View 39^{O} Horizontal (50 mm Lens)

project: Parkgate Street

photography: 06-02-2019 15:02
Canon 5D Mark II
24 mm Lens

location: Benburb Street.

viewpoint: **View 06** **Baseline**

issued: 03-01-2020

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens) Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 06-02-2019 15:02
Canon 5D Mark II
24 mm Lens

location: Benburb Street.

viewpoint: **View 06** **Proposed**

issued: 03-01-2020

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens) Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 10:59
Canon 5D Mark II
24 mm Lens

location: Benburb Street.

viewpoint: **View 07** **Baseline**

issued: 03-01-2020

MODEL WORKS

Angle of View 73^{O} Horizontal (24 mm Lens)

Angle of View 39^{O} Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 10:59
Canon 5D Mark II
24 mm Lens

location: Benburb Street.

viewpoint: **View 07** **Proposed**

issued: 03-01-2020

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens)   Angle of View 39° Horizontal (50 mm Lens)

project:	Parkgate Street	*photography:*	22-10-2018 15:22 Canon 5D Mark II 24 mm Lens	*location:*	View from junction of Infirmary Road and Parkgate Street	*viewpoint:* *issued:*	**View 08** **Baseline** 08-11-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens)   Angle of View 39° Horizontal (50 mm Lens)

project:	Parkgate Street	*photography:*	22-10-2018 15:22 Canon 5D Mark II 24 mm Lens	*location:*	View from junction of Infirmary Road and Parkgate Street	*viewpoint:* *issued:*	**View 08** **Proposed** 04-12-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens) Angle of View 39° Horizontal (50 mm Lens)

project:	Parkgate Street	*photography:*	22-10-2018 15:17 Canon 5D Mark II 24 mm Lens	*location:*	Junction of Conyngham Road and Chesterfield Ave	*viewpoint:* **View 09** **Baseline** *issued:* 31-10-2019

MODEL WORKS

Angle of View 73^{o} Horizontal (24 mm Lens) Angle of View 39^{o} Horizontal (50 mm Lens)

project:	Parkgate Street	*photography:*	22-10-2018 15:17 Canon 5D Mark II 24 mm Lens	*location:*	Junction of Conyngham Road and Chesterfield Ave	*viewpoint:* *issued:*	**View 09** **Proposed** 04-12-2019

MODEL WORKS

Angle of View 73^{O} Horizontal (24 mm Lens) | Angle of View 39^{O} Horizontal (50 mm Lens)

project:	Parkgate Street	*photography:*	22-10-2018 11:08 Canon 5D Mark II 24 mm Lens	*location:*	St John's Road West	*viewpoint:*	**View 10** **Baseline**
						issued:	08-11-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 11:08
Canon 5D Mark II
24 mm Lens

location: St John's Road West

viewpoint: **View 10** **Proposed**

issued: 02-12-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens) Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 10:25
Canon 5D Mark II
24 mm Lens

location: Collins Baracks.

viewpoint: **View 11** **Baseline**

issued: 08-11-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens) Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 10:25
Canon 5D Mark II
24 mm Lens

location: Collins Baracks.

viewpoint: **View 11** **Proposed**

issued: 04-12-2019

MODEL WORKS

Angle of View 73^{o} Horizontal (24 mm Lens)   Angle of View 39^{o} Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 14:38
Canon 5D Mark II
24 mm Lens

location: South Circular Road

viewpoint: **View 12** **Baseline**

issued: 08-11-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens)   Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 14:38
Canon 5D Mark II
24 mm Lens

location: South Circular Road

viewpoint: **View 12** **Proposed**

issued: 04-12-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens)

Angle of View 39° Horizontal (50 mm Lens)

project:	Parkgate Street	*photography:*	22-10-2018 14:18 Canon 5D Mark II 24 mm Lens	*location:*	Royal Hospital Kilmainham	*viewpoint:*	**View 13** **Baseline**
						issued:	08-11-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens) | Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 14:18
Canon 5D Mark II
24 mm Lens

location: Royal Hospital Kilmainham

viewpoint: **View 13** **Proposed**

issued: 02-12-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens)   Angle of View 39° Horizontal (50 mm Lens)

project:	Parkgate Street	*photography:*	20-12-2019 12:32 Canon 5D Mark II 24 mm Lens	*location:*	Con Colbert Road	*viewpoint:* *issued:*	**View 14** **Baseline** 03-01-2020

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens)   Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 20-12-2019 12:32
Canon 5D Mark II
24 mm Lens

location: Con Colbert Road

viewpoint: **View 14** **Proposed**

issued: 03-01-2020

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens)   Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 10:04 am
Canon 5D Mark II
24 mm Lens

location: Junction on Military Road and St John's Road West

viewpoint: **View 15** **Baseline**

issued: 08-11-2019

MODEL WORKS

Angle of View 73^{O} Horizontal (24 mm Lens)   Angle of View 39^{O} Horizontal (50 mm Lens)

project:	Parkgate Street	*photography:*	22-10-2018 10:04 am Canon 5D Mark II 24 mm Lens	*location:*	Junction on Military Road and St John's Road West	*viewpoint:*	**View 15** **Proposed**
						issued:	04-12-2019

MODEL WORKS

Angle of View 73^{o} Horizontal (24 mm Lens) Angle of View 39^{o} Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 11:16 am
Canon 5D Mark II
24 mm Lens

location: Junction of Bow Lane West and Steeven's Lane.

viewpoint: **View 16** **Baseline**

issued: 08-11-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens) | Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 11:16 am
Canon 5D Mark II
24 mm Lens

location: Junction of Bow Lane West and Steeven's Lane.

viewpoint: **View 16** **Proposed**

issued: 02-12-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens) Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 12:24 pm
Canon 5D Mark II
24 mm Lens

location: Croppies Acre Memorial Park

viewpoint: **View 17** **Baseline**

issued: 08-11-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens) Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 12:24 pm
Canon 5D Mark II
24 mm Lens

location: Croppies Acre Memorial Park

viewpoint: **View 17** **Proposed**

issued: 02-12-2019

MODEL WORKS

Angle of View 73° Horizontal (24 mm Lens) Angle of View 39° Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 10:34 am
Canon 5D Mark II
24 mm Lens

location: Arbour Hill

viewpoint: **View 18** **Baseline**

issued: 08-11-2019

MODEL WORKS

Angle of View 73^{O} Horizontal (24 mm Lens)

Angle of View 39^{O} Horizontal (50 mm Lens)

project: Parkgate Street

photography: 22-10-2018 10:34 am
Canon 5D Mark II
24 mm Lens

location: Arbour Hill

viewpoint: **View 18** **Proposed**

issued: 02-12-2019

MODEL WORKS

Angle of View 73^{o} Horizontal (24 mm Lens) Angle of View 39^{o} Horizontal (50 mm Lens)

project: Parkgate Street

photography: 15-10-2019 16:31
Canon 5D Mark II
24 mm Lens

location: Entrance road to Heuston Station Car Park

viewpoint: **View 19** **Baseline**

issued: 08-11-2019

MODEL WORKS

Angle of View 73^{O} Horizontal (24 mm Lens)

Angle of View 39^{O} Horizontal (50 mm Lens)

project:	Parkgate Street	*photography:*	15-10-2019 16:31 Canon 5D Mark II 24 mm Lens	*location:*	Entrance road to Heuston Station Car Park	*viewpoint:*	**View 19** **Proposed**
						issued:	04-12-2019

MODEL WORKS

Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Appendix 14.1: Flood Risk Assessment

265381-00

ARUP

Ruirside Developments Limited

42A Parkgate Street

Site Specific Flood Risk Assessment

Issue | January 2020

Job number 265381-00

Ove Arup & Partners Ireland Ltd

Arup
50 Ringsend Road
Dublin 4
D04 T6X0
Ireland
www.arup.com

ARUP

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1 Introduction

1.1 Background

Arup was commissioned by Ruirside Developments Limited to prepare a Site-Specific Food Risk Assessment (FRA) for a proposed mixed-use development on 42A Parkgate Street in Dublin 8 ('the proposed development').

This report details the site-specific FRA which forms part of the planning application for the proposed development. It has been undertaken in accordance with the Guidelines for Planning Authorities on '*The Planning System and Flood Risk Management Guidelines for Planning Authorities*'[1] published in November 2009, jointly by the Office for Public Works (OPW) and the then Department of Environment, Heritage and Local Government (DEHLG).

1.2 Scope of Work

The scope of the study includes the following:

- Review of all relevant information and data from;
    - The Office of Public Works (OPW) *Preliminary Flood Risk Assessment Mapping (PFRA)[2];*
    - *Eastern Catchment Flood Risk Assessment and Management (CFRAM) Study[3];*
    - *The Dublin City Council Development Plan 2016 - 2022[4];*
    - Any historic flood information for the area and/or any relevant studies.
- Review of available site investigation data;
- Review of the risk of coastal, fluvial, pluvial and groundwater flooding; and
- Preparation of an FRA Report.

1.3 Summary of Data Used

In preparing this report, the following data was collated and reviewed:

[1] Office of Public Works (OPW), 2009. The Planning System and Flood Risk Management Guidelines for Planning Authorities.
[2] Office of Public Works (OPW), 2018. Preliminary Flood Risk Assessment Mapping. Available at: www.cfram.ie/pfra [Accessed: March 2019]
[3] Office of Public Works (OPW), 2018. Eastern Catchment and Flood Risk Assessment Management Mapping. www.floodinfo.ie [Accessed: March 2019]
[4] Dublin City Council, 2016. Dublin City Development Plan 2016-2022. http://www.dublincity.ie/main-menu-services-planning-city-development-plan/dublin-city-development-plan-2016-2022 [Accessed: March 2019].

- Flood history of the site from the OPW National Flood Hazard Mapping website (www.floodmaps.ie)[5];
- Catchment Flood Risk Assessment and Management (CFRAM) mapping[3] produced by the OPW (www.floodinfo.ie);
- Preliminary Flood Risk Assessment (PFRA) mapping produced by the OPW (www.cfram.ie/pfra)[2];
- Site geological and hydrogeological data from the Geological Survey of Ireland website (www.gsi.ie)[6];
- Guidelines for Planning Authorities on '*The Planning System and Flood Risk Management*'[1] published in November 2009, jointly by the Office of Public Works (OPW) and the then Department of Environment, Heritage and Local Government (DEHLG); and
- Aerial photography and mapping from Bing Maps and Google Maps.

Note that all Ordnance Datum (OD) levels referred to in this report are to Malin Head Ordnance Datum.

1.4 Site Description

The site of the proposed development is located on 42A Parkgate Street, Dublin 8 as indicated in Figure 1. The site is bordered to the north by Parkgate Street, to the south by the River Liffey, to the west by the Parkgate Business Centre and to the east by both the River Liffey and Parkgate Street. The site covers an area of approximately 0.82 hectares and contains a number of low rise buildings which will be demolished as part of the proposed development. The site also consists of an area of the Parkgate Street roadway which is to be upgraded.

---

[5] Office of Public Works, OPW, National Flood Hazard Mapping Web Site. http://www.floodmaps.ie/ [Accessed: March 2019].
[6] Geological Survey of Ireland (GSI), 2018. Groundwater Vulnerability Mapping. Available at: www.gsi.ie

Figure 1: Site location (Source: Adapted from Bing Maps)

Existing ground levels across the site vary from approximately 3.30mOD at the southwest boundary to 5.50mOD at the northeast boundary as indicated in Figure 1. Please refer to **Appendix A** for the detailed topographical survey of the existing site which was completed by Precision Surveys in July 2018.

1.5 Proposed Development

The proposed development is a mixed-use residential and commercial scheme comprising of 'Build to Rent' residential units with associated residential amenities and facilities, commercial office and café/ restaurant floor space. A 29-storey residential tower element is the main architectural feature of the development and this is surrounded by several smaller blocks varying from 8 to 13 stories in height. A new public square will be provided, along with a public riverside walk and private amenity courtyard.

The proposed development is presented in Figure 2.

Figure 2: Schematic of the proposed development (Source: Reddy Architecture)

2 Planning Context

The following planning policy documents are relevant to the assessment of the proposed development:

- The National Planning Guidelines published by the OPW and the Department of the Environment, Heritage and Local Government in November 2009 entitled '*The Planning System and Flood Risk Management Guidelines for Planning Authorities*'[1] ; and
- The *Dublin City Council Development Plan 2016 - 2022*[4].

2.1 The Planning System and the Flood Risk Management Guidelines

2.1.1 Introduction

In November 2009, the Department of Environment, Heritage and Local Government and the Office of Public Works jointly published a Guidance Document for Planning Authorities entitled "*The Planning System and Flood Risk Management Guidelines for Planning Authorities*[1]".

The Guidelines are issued under Section 28 of the *Planning and Development Act 2000*[7]. Planning Authorities and An Bord Pleanála are therefore required to implement these Guidelines in carrying out their functions under the Planning Acts.

The aim of the Guidelines is to ensure that flood risk is neither created nor increased by inappropriate development.

The Guidelines require the planning system to avoid development in areas at risk of flooding, unless the development can be justified on wider sustainability grounds and the risk can be reduced or managed to an acceptable level.

The Guidelines require the adoption of a Sequential Approach (to Flood Risk Management) of Avoidance, Reduction, Justification and Mitigation and they require the incorporation of Flood Risk Assessment into the process of making decisions on Planning Applications and Planning Appeals.

Fundamental to the Guidelines is the introduction of flood risk zoning and the classifications of different types of development having regard to their vulnerability.

The management of flood risk is now a key element of any development proposal in an area of potential flood risk and should therefore be addressed as early as possible in the site master planning stage.

[7] Planning and Development Act 2000 (S.I. No. 30 of 2000)

2.1.2 Definition of Flood Zones

Flood Zones are geographical areas within which the likelihood of flooding is in a particular range. There are three types of flood zones defined in the Guidelines as follows:

Table 1: Flood Zones (Source: OPW Guidelines)

Flood Zone	Probability
Flood Zone A	Probability of flooding from rivers and the sea is highest (greater than 1% or 1 in 100 for river flooding or 0.5% or 1 in 200 for coastal flooding).
Flood Zone B	Probability of flooding from rivers and the sea is moderate (between 0.1% or 1 in 1000 year and 1% or 1 in 100 for river flooding and between 0.1% or 1 in 1000 year and 0.5% or 1 in 200 for coastal flooding); and
Flood Zone C	Probability of flooding from rivers and the sea is low (less than 0.1% or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas of the plan which are not in zones A or B.

2.1.3 Definition of Vulnerability Classes

The following table summarises the Vulnerability Classes defined in the Guidelines and provides a sample of the most common type of development applicable to each.

Table 2: Vulnerability classes (Source: OPW Guidelines)

Vulnerability	Type of Development
Highly Vulnerable Development	Includes Garda, ambulance and fire stations, hospitals, schools, residential dwellings, residential institutions, essential infrastructure, such as primary transport and utilities distribution and SEVESO and IPPC sites, etc.
Less Vulnerable Development	Includes retail, leisure, warehousing, commercial, industrial and non-residential institutions, etc.
Water Compatible Development	Includes flood control infrastructure, docks, marinas, wharves, navigation facilities, water-based recreation facilities, amenity open spaces and outdoor sport and recreation facilities.

2.1.4 Types of Vulnerability Classes Appropriate to Each Zone

The following table illustrates the different types of Vulnerability Class appropriate to each Zone and indicates where a Justification Test will be required.

Table 3: Vulnerability classes for each zone (Source: OPW Guidelines)

Vulnerability Class	Flood Zone A	Flood Zone B	Flood Zone C
Highly Vulnerable	Justification Test	Justification Test	Appropriate
Less Vulnerable	Justification Test	Appropriate	Appropriate
Water Compatible	Appropriate	Appropriate	Appropriate

2.2 The Dublin City Council Development Plan 2016-2022

The *Dublin City Development Plan 2016-2022*[4] came into effect in October 2016.

The Plan sets out policies and objectives to create a sustainable and vibrant city at the heart of the Greater Dublin Region and is a guide to how and where development will take place in the city over the years covered. The following paragraphs summarise the relevant provisions contained within the Plan which deal with Flood Risk Management.

Section 9.5.3 of the Plan deals with Flood Management and outlines the key policies and objectives of Dublin City Council in relation to flood risk.

The policies are listed as:

- **SI9:** To assist the Office of Public Works in developing catchment-based Flood Risk Management Plans for rivers, coastlines and estuaries in the Dublin city area and have regard to their provisions/recommendations.
- **SI10:** To have regard to the Guidelines for Planning Authorities on the Planning System and Flood Risk Management, and Technical Appendices, November 2009, published by the Department of the Environment, Community, and Local Government as may be revised/updated when assessing planning applications and in the preparation of plans both statutory and non-statutory.
- **SI11:** To put in place adequate measures to protect the integrity of the existing Flood Defence Infrastructure in Dublin City Councils ownership and identified in the Strategic Flood Risk Assessment and to ensure that the new developments do not have the effect of reducing the effectiveness or integrity of any existing or new flood defence infrastructure and that flood defence infrastructure has regard also to nature conservation, open space and amenity issues.
- **SI12:** To implement and comply fully with the recommendations of the Strategic Flood Risk Assessment prepared as part of the Dublin City Development Plan.
- **SI13:** That development of basements or any above-ground buildings for residential use below the estimated flood levels for Zone A or Zone B will not be permitted.
- **SI14:** To protect the Dublin City coastline from flooding as far as reasonably practicable, by implementing the recommendations of the Dublin Coastal Flood Protection Project and the Dublin Safer Project.
- **SI15:** To minimise the risk of pluvial (intense rainfall) flooding in the city as far as is reasonably practicable and not to allow any development which would increase this risk.
- **SI16:** To minimise the flood risk in Dublin City from all other sources of flooding, including fluvial, reservoirs and dams and the piped water system.

- **SI17**: To require an environmental assessment of all proposed flood protection or flood alleviation works

The Objectives of Dublin City Council are listed as:

- **SIO8:** All development proposals shall carry out, to an appropriate level of detail, a Site-Specific Flood Risk Assessment (SSFRA) that shall demonstrate compliance with:
  - The Planning System and Flood Risk Management, Guidelines for Planning Authorities, Department of the Environment, Community and Local Government, November 2009, as may be revised/updated and the Strategic Flood Risk Assessment (SFRA) as prepared by this Development Plan.
  - The site-specific flood risk assessment (SSFRA) shall pay particular emphasis to residual flood risks, site-specific mitigation measures, flood-resilient design and construction, and any necessary management measures (the SFRA and Appendix B4 of the above mentioned national guidelines refer). Attention shall be given in the site-specific flood risk assessment to building design and creating a successful interface with the public realm through good design that addresses flood concerns but also maintains appealing functional streetscapes. All potential sources of flood risk must be addressed in the SSFRA.
- **SIO9:** Proposals which may be classed as ‘minor development’, for example small-scale infill, small extensions to houses or the rebuilding of houses or paving of front gardens to existing houses, most changes of use and small-scale extensions to existing commercial and industrial enterprises in Flood Zone A or B, should be assessed in accordance with the Guidelines for Planning Authorities on the Planning System and Flood Risk Management & Technical Appendices, November 2009 as may be revised/updated, with specific reference to Section 5.28 and in relation to the specific requirements of the Strategic Flood Risk Assessment. The policy shall be not to increase the risk of flooding and to ensure risk to the development is managed.
- **SIO10:** That recommendations and flood maps arising from the Fingal-East Meath CFRAM Study, the Dodder CFRAM Study and the Eastern CFRAM Study are taken into account in relation to the preparation of statutory plans and development proposals. This will include undertaking a review of the Strategic Flood Risk Assessment for Dublin city following the publication of the Final Eastern CFRAM Study, currently being produced by the OPW.
- **SIO11:** To work with neighbouring Local Authorities when developing cross-boundary flood management work programmes and when considering cross-boundary development.
- **SIO12:** To ensure each flood risk management activity is examined to determine actions required to embed and provide for effective climate change adaptation as set out in the Dublin City Council climate change adaption policy and in the OPW Climate Change Sectoral Adaptation Plan Flood Risk Management applicable at the time.

Regarding the provision of Sustainable Urban Drainage Systems (SuDS), the Plan also outlines specific policies and objectives. The policies of Dublin City Council are listed as:

- **SI18:** To require the use of Sustainable Urban Drainage Systems in all new developments, where appropriate, as set out in the Greater Dublin Regional Code of Practice for Drainage Works. The following measures will apply:
  - The infiltration into the ground through the development of porous pavement such as permeable paving, swales, and detention basins;
  - The holding of water in storage areas through the construction of green roofs, rainwater harvesting, detention basins, ponds, and wetlands; and
  - The slow-down of the movement of water.

The Objectives regarding SuDs are given as:

- **SIO13**: To provide additional and improved surface water networks to both reduce pollution and allow for sustainable development.
- **SIO14**: To require that any new paving of driveways or other grassed areas is carried out in a sustainable manner so that there is no increase in storm water run-off to the drainage network.

3 Overview of Flood Mechanisms at the Site

In broad terms, the potential sources of flooding at the site can be categorised as:

- Fluvial (River) Flooding: The main risk of fluvial flooding is from the River Liffey;
- Tidal Flooding/Coastal Flooding – The risk from tidal flooding is from surge events in the Irish Sea which can propagate up the River Liffey;
- Pluvial Flooding - Pluvial flooding occurs when the capacity of the local urban drainage network is exceeded during periods of intense rainfall. At these times, water can collect at low points in the topography and cause flooding; and
- Groundwater Flooding – this can occur during lengthy periods of heavy rainfall, typically during late winter/early spring when the groundwater table is already high. If the groundwater level rises above ground level, it can pond at local low points and cause periods of flooding.

Each of these potential sources of flooding is considered in this FRA.

3.1 Historic Flooding at the Site

3.1.1 Information from Floodmaps.ie

Reports and maps from the OPW's Flood Hazard Mapping website (*www.floodmaps.ie*)[5] have been examined as part of this flood risk assessment.

Figure 3 presents an extract from *floodmaps.ie* for the site and its immediate vicinity. It can be seen that there are two recorded flood events in the vicinity of the site and these are detailed in **Table 4** is presented within **Appendix B**.

Figure 3: Extract from *www.floodmaps.ie*

Table 4: Details on recorded flood event (Source: www.floodmaps.ie)

Location	Date	Source and Cause	Flood Depth	Impact
Aisling Hotel, Parkgate St, Dublin 8 approximately 100m from the proposed development	24-10-11 to 25-10-11	Significant rainfall resulted in overland flows from Conyngham Road. Some flow may have come from the Phoenix Park and possibly the nearby Viceregal Stream. The water then pooled in front of the Aisling Hotel and eventually flooded its ground floor entrance. Water from Montpellier Hill also came into the car park at the rear of the hotel	0.15m at the front of the hotel	The Aisling Hotel was affected by this flood event. Benburb Street was flooded for 100m in front of the hotel. The Luas red line was flooded for 100m in front of the hotel.
Bridgewater Quay Apartments, Islandbridge, Dublin 8	24-10-11	According to local residents, surface water runoff from the Phoenix Park flowed into the Bridgewater Quay apartment complex car park and onto the South Circular Road Bridge footpath. The area is in close proximity to the Magazine Stream, which rises in and transverses the Phoenix Park. The River Liffey did not burst its banks in this area, it flooded a low-lying pedestrian walkway.	0.1m-0.5m	There were 11 ground floor apartments affected by the event. 30m of the South Circular Road Bridge and footpath were affected by this event. Part of the wall on the bridge also collapsed.

As outlined in **Table 4** above, both of the historic flood events were caused by the local drainage network being exceeded which led to overland flow and water collecting in localised low-lying areas.

It is noted that the site of the proposed development was not flooded during either of the flood events. There is therefore no historic record of flooding of the site. The absence of a historic record of flooding however does not mean that the site has not flooded in the past.

3.1.2 Additional Historic Flood information

From previous Flood Risk Assessments of sites in the vicinity of Parkgate Street, Arup has identified other historic flood events in the area, including:

- On 01 February 2002 Dublin City experienced a very high tidal event which flooded Victoria Quay which is approximately 130m from the site of the proposed development. The recorded tidal level for the event was 3.12mOD at the Sarah Bridge approximately 0.5km upstream of the site;
- Victoria Quay (approximately 130m from site) was flooded on 24 October 2011; and
- Victoria Quay and Wolf Tone Quay were both flooded on 03 January 2014. The maximum recorded level during this event was 3.14mOD. Refer to Figure 4 below:

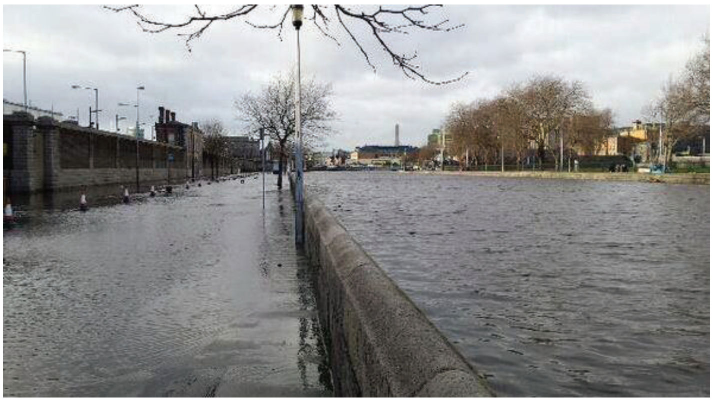

Figure 4: Flooding at Victoria Quay in January 2014

It is noted that the subject site has not been flooded in any of the historic flood events outlined above. While there have been recorded flood events in the vicinity of the proposed development site, there is no record of the site itself having flooded in the past.

3.2 Fluvial Flood Risk

Fluvial flood risk to the site has been assessed by assessing fluvial flood extents maps available produced as part of the *Eastern CFRAM Study*[3].

Figure 5 presents an extract from the *Eastern CFRAM Study* fluvial flood extent map which highlights the flood extents for the 10%, 1% and 0.1% Annual Exceedance Probability (AEP) events. It can be seen from the figure that the site of the proposed development is outside the 1% Fluvial AEP flood extent. A very small area along the southern boundary is indicated as being within the 0.1% AEP extent.

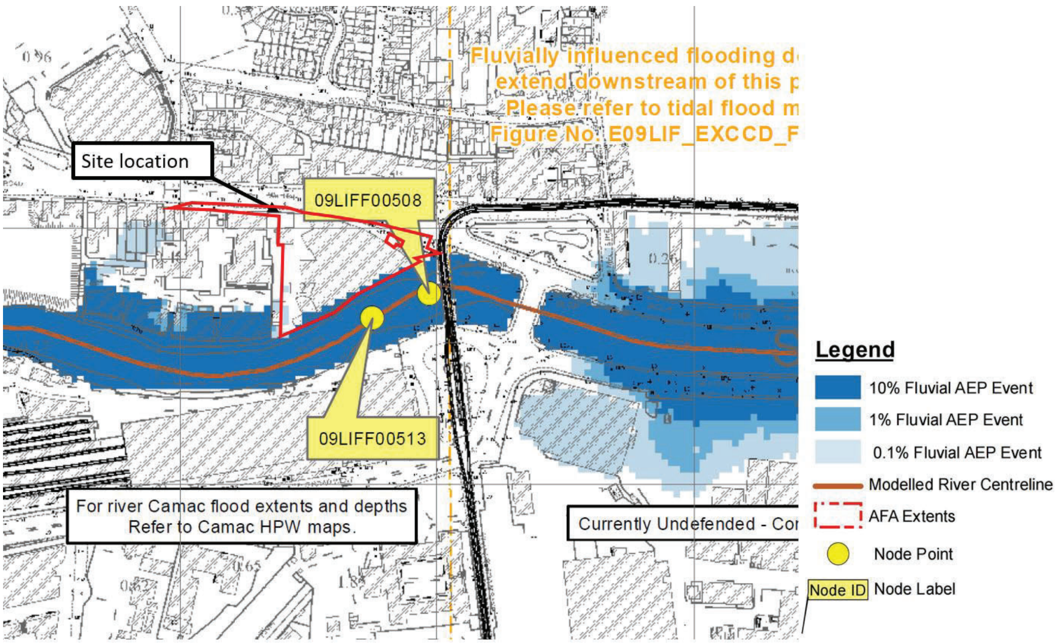

Figure 5: Extract from the Eastern CFRAM Study fluvial flood extents map with application boundary overlaid

Predicted maximum water levels from the hydraulic model used to generate the flood map for the nearest node point to the site are indicated in **Table 5** below. It can be seen from the table that the maximum water level for the 1% AEP fluvial flood event level is 3.11mOD which is circa 200mm below the lowest existing ground level of the site along the southern boundary of the site (approximately 3.30mOD).

Table 5: Maximum fluvial water levels at the model nodes closest to the site (Source: Eastern CFRAM Study)

Node Label	Water Level (OD) 10% AEP	Water Level (OD) 1% AEP	Water Level (OD) 0.1% AEP
09LIFF00513	2.82	3.10	3.50
09LIFF00508	2.82	3.11	3.51

We note that in the Mid-Range Future Scenario (30-year future scenario taking potential climate change implications into account) the site will be at risk from fluvial flooding. This however will be addressed as part of the proposed development as outlined in Section 4 of the report.

3.3 Tidal/Coastal Flooding

The risk of tidal or coastal flooding has been assessed by examining the tidal flood extents maps available as part of the *Eastern CFRAM Study*[3].

Figure 6 presents an extract from the Eastern CFRAM Study tidal flood map which shows the flood extents for the 10%, 0.5% and 0.1% Annual Exceedance Probability (AEP) events. It can be seen from the figure that the site is outside the predicted 0.5% AEP flood extents.

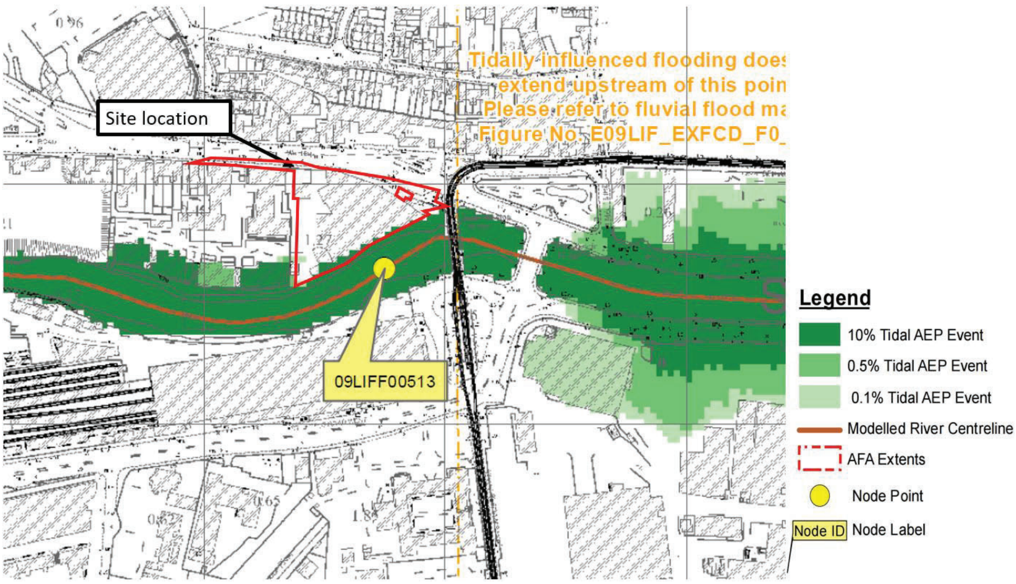

Figure 6: Extract from the Eastern CFRAM Study tidal flood extents map with application boundary overlaid

Predicted water levels from the hydraulic model used to generate the flood map for the nearest node point to the site are indicated in **Table 6** below. It can be seen from the table that the peak 0.5% AEP water level is 3.27mOD which is circa 0.03m below the lowest existing ground level at the site along its southern boundary (circa 3.30m).

Table 6: Maximum tidal water level at the node closest to the site (Source: Eastern CFRAM Study)

Node Label	Water Level (OD) 10% AEP	Water Level (OD) 0.5% AEP	Water Level (OD) 0.1% AEP
09LIFF00513	2.86	3.27	3.48

We note that in the Mid-Range Future Scenario (30-year future scenario taking potential climate change implications into account) the site will be at risk from tidal flooding. This however will be addressed as part of the proposed development as outlined in Section 4 of the report.

3.4 Pluvial Flooding

The risk of pluvial flooding has been assessed by the flood maps produced as part of the Preliminary Flood Risk Assessment (PRFA)[2] by Office of Public Works (OPW) which we note are readily available to view on *www.myplan.ie*.

Figure 7 presents the PRFA pluvial flood extents map for the site location. It can be seen from the figure that the majority of the site is outside of the 1% AEP pluvial flood extent.

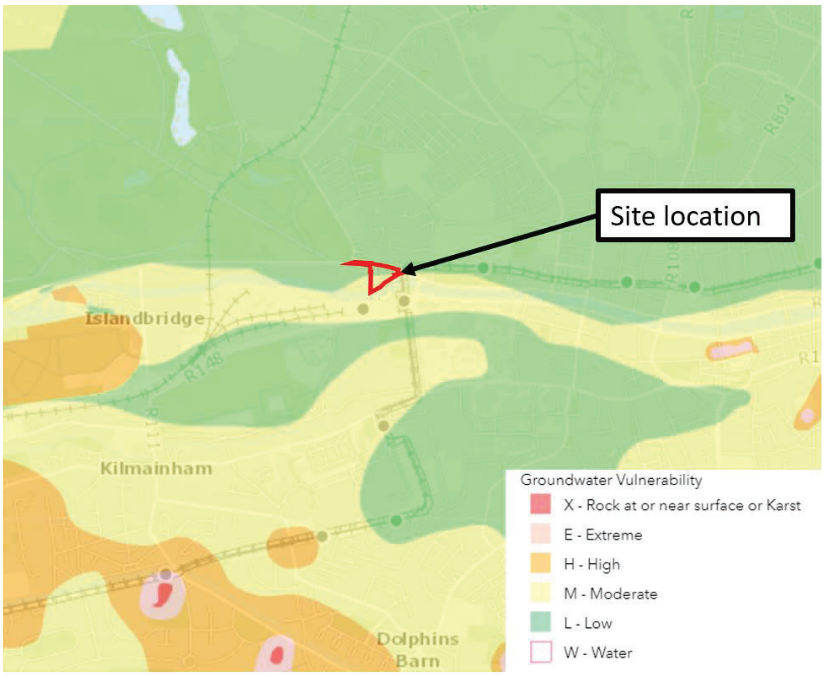

Figure 7: Extract from the PRFA pluvial flood extents map with the application boundary overlaid

3.5 Groundwater Flooding

Water levels in four boreholes were recorded over a four-week period between the 14th August and 12th September 2019 as part of the site investigation works for the proposed development. The groundwater level in both the natural sand and the gravel aquifer and in the limestone bedrock aquifer varied with the tide during the monitoring period. The groundwater levels for the four boreholes electronically monitored are presented in the table below:

Table 7: 2019 Site investigation groundwater levels

Location ID	Aquifer Type	Groundwater Level Maximum (m OD)	Groundwater Level Minimum (m OD)
BH101	Sand and Gravel	1.18	0.18
BH102	Limestone bedrock	0.91	0.12
BH103	Sand and Gravel	1.08	0.82
BH106	Sand and Gravel	1.45	-0.38

It can be seen from the data that water was generally encountered between -0.38mOD and 1.18mOD which is below the existing ground levels (3.30mOD – 5.5mOD) on the site.

Site investigation was also conducted on the site in 2002 and 2003 and this data has been reviewed by Arup as part of this FRA. Groundwater monitoring standpipes were installed in 6 of 8 boreholes drilled on the site at that time. Water was generally encountered in the gravel aquifer at 3.0m - 4.0m below ground level. This would indicate that the groundwater level lies at approximately 0.5m – 1.0mOD Malin and this generally correlates with the 2019 site investigation data outlined above.

Also, as the site is in close proximity to the River Liffey it can be expected that there will be hydraulic connectivity between groundwater levels and tidal levels and this was confirmed during the 2019 site investigation. As existing ground levels are higher than the tidal levels the risk of groundwater flooding is considered to be low.

4 Proposed Mitigation Measures

4.1 Establishment of Design Flood Levels

4.1.1 Predicted 1 in 200 Year Tidal Level at the Subject Site

As established in Section 3.3, the 1 in 200 year (0.5% AEP) maximum tidal water level at the site is 3.27mOD. As this level is higher than the 1% AEP fluvial water level it will be used as the flood level for the site.

4.1.2 Climate Change

The OPW has issued Draft Guidance on the "*Assessment of potential future scenarios for Flood Risk Management*"[8] which suggests the use of two scenarios; a mid-range future scenario (MRFS) and a high-end future scenario (HEFS). The MRFS represents a likely future scenario which is within the bounds of the widely accepted projections. The HEFS is a more extreme, but plausible future event, and is within the upper bounds of the widely accepted projections. These are detailed within the table below.

Table 8: Allowance in Flood Parameters for the Mid-Range and High-End Future Scenarios (Source: Table 3.2 OPW Climate Change Sectorial Adaption Plan)[8]

Parameter	MRFS	HEFS
Extreme Rainfall Depths	+20%	+3-%
Peak Flood Flows	+20%	+30%
Mean Sea Level Rise	+500mm	+1000mm
Land Movement	-0.5mm/year[1]	-0.5mm/year[1]
Urbanization	No general allowance – Review on Case-by-Case Basis	No general allowance – Review on Case-by-Case Basis
Forestation	-1/6 Tp[2]	-1/3 Tp[2] + 10% SPR[3]

Note 1: Applicable to the southern part of the country only (Dublin – Galway and south of this)

Note 2: Reduction in the time of peak (Tp) to allow for potential accelerated runoff that may arise as a result of drainage of afforested land

Note 3: Add 10% to the Standard Percentage Runoff (SPR) rate: This allows for temporary increased runoff rates that may arise following felling of forestry.

There are a number of conclusions that can be taken from the predictions made on climate change implications:

- Increases in sea levels may result in extreme tidal events, with tidal levels increasing by more than a meter in the next century; and
- Increase in the frequency of extreme events, particularly hydrological extremes, storms and droughts may cause an increase in rainfall intensity, duration and amount, resulting in increased surface water runoff.

[8] The Office of Public Works and the Department of Environment, Heritage and Local Government. Draft for Consultation Climate Change Sectorial Adaptation Plan Flood Risk Management (2015 – 2019)

Based on this, we propose accounting for climate change by considering a 550mm increase in the water levels in the estuary as per the Mid-Range Future Scenario.

4.1.3 Freeboard

A detailed freeboard analysis has not been undertaken as part of this study. However, it is generally recognised and accepted in Ireland, that a minimum freeboard of 300mm is appropriate with a higher freeboard where this is justified.

A freeboard of 300mm has therefore been adopted as part of the study.

4.1.4 Recommended Site Flood Defence Level

From our analysis of the available data and report, the 200-year design tidal level at our site of interest was estimated to be 3.27mOD.

Allowing for climate change and freeboard the recommended design level of the proposed development can be calculated as:

3.27mOD (200-year tidal level) + 0.55m (climate change allowance) + 0.30m (freeboard allowance) = **4.12mOD Malin**

5 Management of Residual Flood Risk at the Site

5.1 Proposed Ground Floor Level

It is proposed to set the ground floor levels of the proposed buildings of the development between 5.2mOD and 6.0mOD. This is between 1.08m and 1.88m above the minimum recommended site flood defence level as outlined in **Section 4.1.4.**

Flood risk to the buildings of the proposed development is therefore remote. The development therefore complies with the OPW Planning Guidelines.

5.2 Basement of the Development

The basement area of the proposed development will be split into two sections with a floor level of approximately 2.0mOD and 3.0mOD respectively. To mitigate against the risk of groundwater ingress the basement will be fully sealed and tanked to ensure water cannot penetrate it.

It is noted that policy objective SI13 of the Dublin City Council Development Plan 2016-2024[4] states that *"development of basements or any above-ground buildings for residential use below the estimated levels for Zone A or Zone B will not be permitted."* The basement for the proposed development will be compliant with this objective as it includes plant areas, office staff changing facilities, bicycle storage and car parking and will not be for residential use.

The vehicular entrance to the basement of the proposed development will be from Parkgate Street and will be set at level of approximately 5.7mOD. This is circa 1.58m above the site flood defence level and is therefore not at risk of tidal or fluvial ingress.

A 150mm high ramp will be provided at the basement entrance to prevent surface water ingress from Parkgate Street.

5.3 Access and Egress Routes to the Site

The internal river walk to be provided at the south west corner of the site which will be graded to facilitate the future tie into the existing boardwalk along the River Liffey at a level of approximately 2.9mOD. The proposed internal river walk slopes and steps down from an access and egress point at the ground level public plaza which is at a level of approximately 4.9mOD. This is shown in Figure 8 below:

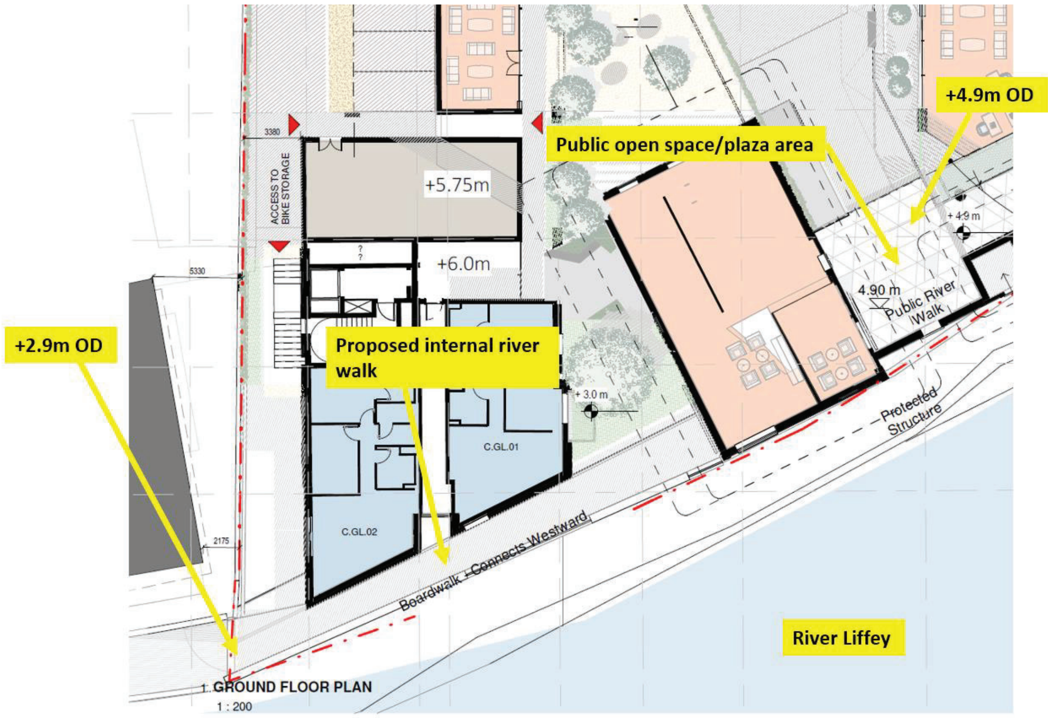

Figure 8: Proposed internal river walk at the south west corner of the site

It can be seen from the figure that a section of the internal river walk is below the 1 in 200-year tidal flood level of 3.27m and the recommended site flood defence level of 4.12mOD. The access and egress point is however at a level of 4.9mOD and is not a main access and egress point to the building. It is proposed that a security door be installed at this point which can be closed during a flood event.

No other access and egress routes to the site will be compromised during flood events.

5.4 Storage and conveyance

The proposed development will have no impact on floodplain storage and conveyance as it is located outside the 1 in 1000 year fluvial and coastal flood plain.

5.5 Pluvial Flood Risk

In the event of an extreme rainfall event and/or blockage of the drainage system of the site, the capacity of the drainage system could be exceeded leading to surface water ponding at the site.

The risk of surface water ingress to the proposed building is very low as ground levels around the site perimeter generally fall away from the buildings. There is a low point on Parkgate Street where there is potential for surface water to pond. In order to mitigate against this a drainage channel to collect surface water will be provided at this point which is between the entrance to the two buildings.

In addition to this all doorways and entrance points to the building will either be raised slightly above external ground levels or have a drainage channel installed across the entrance point to collect surface water. A minor fall will also be provided on all paved surfaces to direct surface water to the drainage system.

Figure 9 illustrates the direction of surface water drainage for the Parkgate Street perimeter of the site.

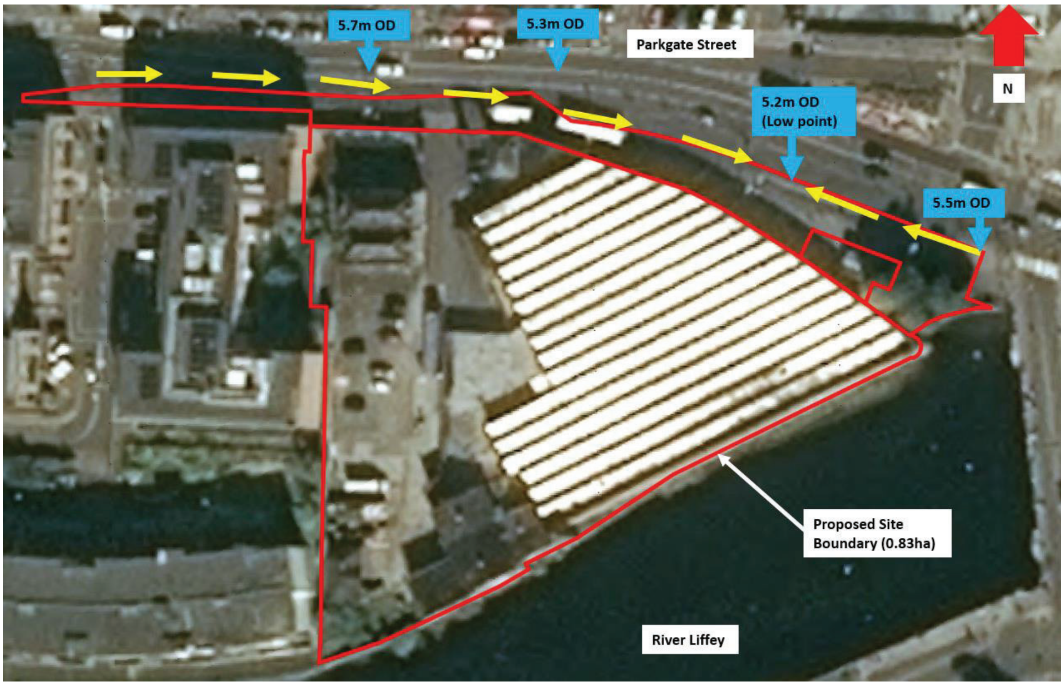

Figure 9: Surface water drainage directions (Source: adapted from Google Maps)

5.6 Flood Emergency Plan

A tidal flood forecasting and warning system for Dublin Bay is operated by Dublin City Council and provides warnings of extreme tidal flooding. Extreme flood events will therefore be well forecast. As part of the emergency response plan, staff in the buildings of the proposed development will be kept well informed of flood and weather forecasts on an on-going basis as well as receiving warnings from Dublin City Council. In the event of a significant flood event being forecast, the emergency response plan will be implemented. This will involve ensuring that no occupants of the proposed development remain at a level below 4.12mOD (for instance at the internal river walk area next to the River Liffey).

6 Application of "The Planning System and Flood Risk Management" Guidelines

6.1 Vulnerability Classification

It is considered that the development should be classed as a "*highly vulnerable development*" as per the vulnerability classification presented in **Table 9** below:

Table 9: Classification of vulnerability of different types of development (Source: OPW *"The Planning System and Flood Risk Management"* Guidelines)

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).
*Uses not listed here should be considered on their own merits	

6.2 Flood Zones

Based on the analysis presented in this FRA report, the subject site is not at risk of flooding from either the 0.5% AEP tidal event or the 1% AEP event. A very small area of the site is marginally within the 0.1% AEP tidal and fluvial extents. While this level of flood risk could be interpreted as a Flood Zone C classification we have adopted a conservative approach and considered the entire site as being within Flood Zone B.

6.3 Sequential Approach

Figure 10 below illustrates the sequential approach to be adopted under the "Planning System and Flood Risk Management Guidelines".

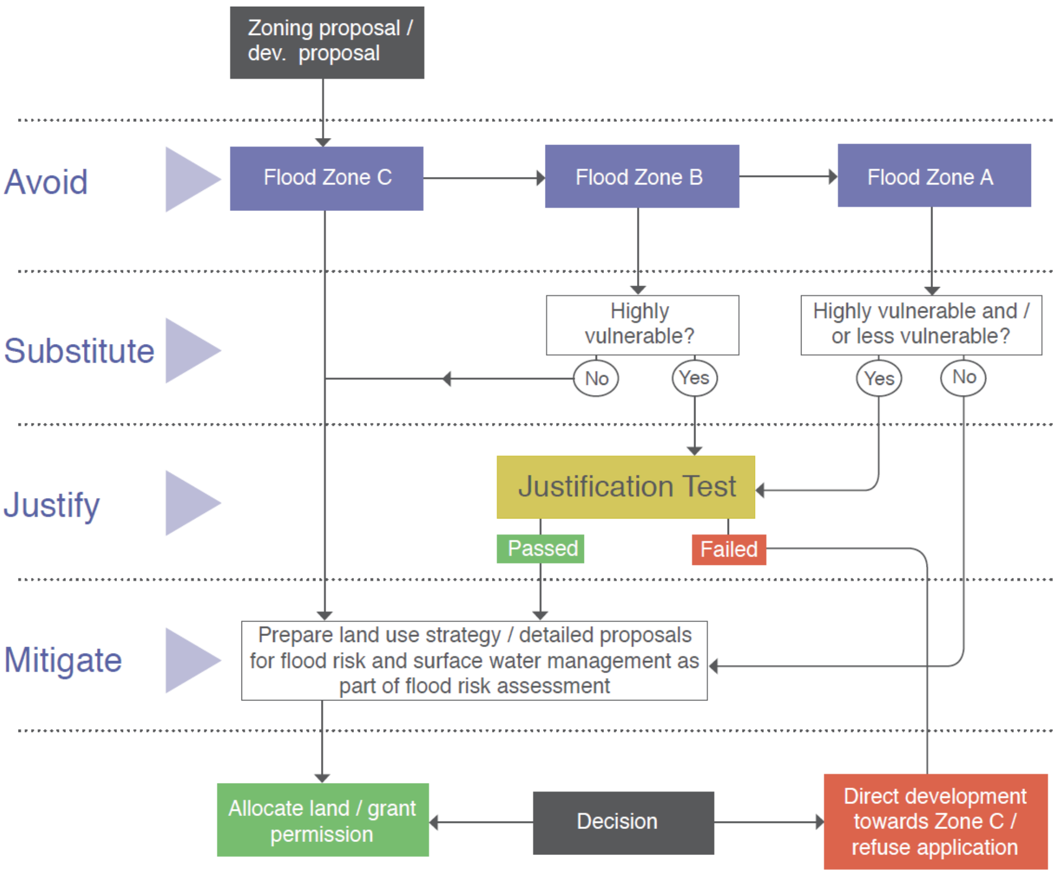

Figure 10: Sequential approach mechanism in the planning process (Source: OPW *"The Planning System and Flood Risk Management"* Guidelines

As per Figure 10 above the proposed development is a "highly vulnerable development" (for residential use) that lies within Flood Zone B. A Justification Test for development is therefore required and is presented in Section 6.4 and Section 6.5 of this report.

6.4 The "Plan Making Justification Test" from Chapter 4 of the OPW Flood Risk Management Guidelines

The Justification Test for Plan Making requires that three criteria must be met as shown in the following figure:

Box 4.1: Justification Test for development plans

Where, as part of the preparation and adoption or variation and amendment of a development/local area plan[1], a planning authority is considering the future development of areas in an urban settlement that are at moderate or high risk of flooding, for uses or development vulnerable to flooding that would generally be inappropriate as set out in Table 3.2, all of the following criteria must be satisfied:

1. The urban settlement is targeted for growth under the National Spatial Strategy, regional planning guidelines, statutory plans as defined above or under the Planning Guidelines or Planning Directives provisions of the Planning and Development Act, 2000, as amended.
2. The zoning or designation of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular:
   - (i) Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement[2];
   - (ii) Comprises significant previously developed and/or under-utilised lands;
   - (iii) Is within or adjoining the core[3] of an established or designated urban settlement;
   - (iv) Will be essential in achieving compact and sustainable urban growth; and
   - (v) There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement.
3. A flood risk assessment to an appropriate level of detail has been carried out as part of the Strategic Environmental Assessment as part of the development plan preparation process, which demonstrates that flood risk to the development can be adequately managed and the use or development of the lands will not cause unacceptable adverse impacts elsewhere.

   N.B. The acceptability or otherwise of levels of any residual risk should be made with consideration for the proposed development and the local context and should be described in the relevant flood risk assessment.

Figure 11: Justification Test for Development (Source: OPW "The Planning System and Flood Risk Management" Guidelines)

The "Plan Making Justification Test" relevant to the proposed development was completed and passed as part the Strategic Flood Risk Assessment (SFRA) undertaken for the *Dublin City Council Development Plan 2016 - 2022*.

The SFRA is included under Volume 7 of the DCC Development Plan and is available to download from the Dublin City Council website: (http://www.dublincity.ie/sites/default/files/content/Planning/DublinCityDevelopmentPlan/Documents/DCCo_DevelopmentPlan_Vol7.pdf.pdf).

The proposed development lies within Site 4 of the Justification Test Tables in the SFRA (refer to pages 115-118). The Justification Test Tables for Site 4 are included in full in Appendix E of this report.

Site: 4. Liffey: Sean Heuston Br. - O'Connell Bridge

Justification Test for Development Plans

1. **Section 1 is covered elsewhere in this SFRA Justifying all of Dublin City**

2. **The zoning or designation of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular:**

(i) **Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement**
Answer: Yes: This area forms part of the central area of the City, and comprises on the south side includes Burgh Quay, Aston Quay, Crampton Quay, Burgh Quay, Wellington Quay, Essex Quay, Wood Quay, Merchants Quay, Usher's Quay, Ushers Island and Victoria Quay and areas south of these. On the north side it includes Wolfe Tone Quay, Ellis Quay, Arran Quay, Inn's Quay, Ormond Quays Upper & Lower, Bachelor's Walk and areas north of these. Development in this area is a mixture of high density Commercial and Residential.

(ii) **Comprises significant previously developed and/or under-utilised lands**
Answer: Most of the lands within Flood Zone A and B are already built up or comprises of brownfield sites.

(iii) **Is within or adjoining the core of an established or designated urban settlement**
Answer: Yes: This area forms part of the Central Core of the City.

(iv) **Will be essential in achieving compact and sustainable urban growth**
Answer: Yes: This area is essential to achieving compact and sustainable urban growth.

(v) **There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement**
Answer: There are no suitable alternative lands for the particular uses or development type in areas at lower risk of flooding, within or adjoining the urban settlement. There are only limited areas idenitifed as being in Flood Zones A and B and they are considered essential to achieving a consolidated urban centre and to comply with the NSS and RPG.

3. **Strategic Flood Risk Assessment for Flood Zones A and B (for defended Flood Zones A & B see section 4.8)**

- To a large extent the areas indicated as being within Flood Risk Areas are generally built out or are existing brownfield sites and the opportunities for future development are limited.
- Climate change risks should be assessed and appropriately mitigated in all development.
- It is an objective of DCC in conjunction with the OPW to look at identified flood cells as above, and to look at overall flood alleviation scheme for the catchment. However, the extents of the Flood Zones are not significant enough to prevent infill development and well planned larger scale regeneration from occurring.
- FRA's should be carried out for all basements and underground structures with respect to any human access.

Figure 12: Justification Test for Development Plans (Source: Dublin City Council Development Plan 2016-2022 Strategic Flood Risk Assessment)

6.5 The "Development Management Justification Test" from Chapter 5 of the OPW Flood Risk Management Guidelines

The "Development Management Justification Test" requires that two criteria must be met as follows:

1. The subject lands have been zoned or otherwise designated for the particular use or form of development in an operative development plan, which has been adopted or varied taking account of these Guidelines.
2. The proposal has been subject to an appropriate flood risk assessment that demonstrates:
   (i) The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;
   (ii) The development proposal includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;
   (iii) The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measures and provisions for emergency services access; and
   (iv) The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to development of good urban design and vibrant and active streetscapes.

Figure 13: The Justification Test for development management (Source: OPW "The Planning System and Flood Risk Management" Guidelines)

6.5.1 Item 1

With regard to Item 1 in Figure 13, the applicable policy context is the *Dublin City Council Development Plan 2016 - 2022*. Under the scheme the subject site is specifically identified as being included within Specific Development Regeneration Area (SDRA) No. 7 Heuston and Environs. Figure 14 presents an extract from the map for SDRA No.7. It can be seen that that the area is identified for redevelopment as a new mixed-use and residential area.

As the DCC Development Plan as adopted took full account of the OPW Guidelines and incorporated an SFRA as part of an appraisal of the plan, and the site has been designated for the form of development proposed, we can therefore state this this criterion is passed.

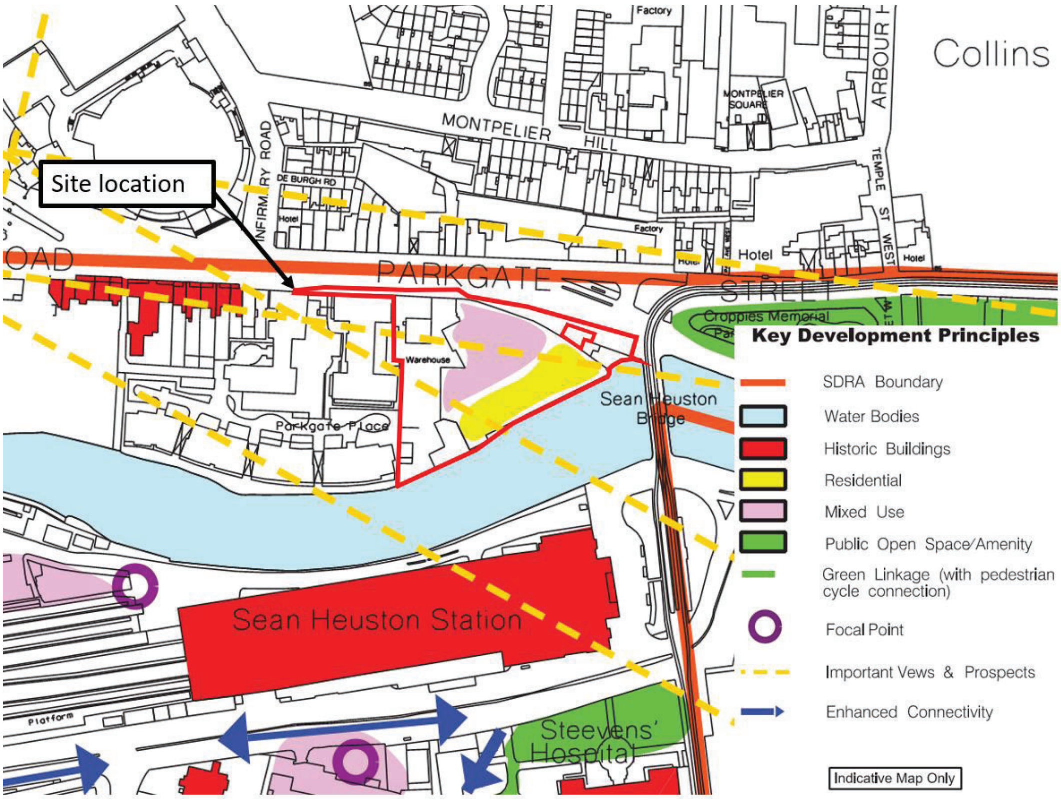

Figure 14: Key development principles for SDRA Area No.7 (Source: DCC Development Plan 2016-2022 Figure 27)

6.5.2 Item 2

With regard to Item 2, we consider that these criteria have been met as follows:

- *The development proposed will not increase flood risk elsewhere and, if practicable, will reduce overall flood risk;*

The proposed development will not increase the risk of flooding at adjacent sites. There will be no increase in the overall hardstanding area and the new drainage network to be provided as part of the development will be more effective than the current drainage on the site.

- *The proposed development includes measures to minimise flood risk to people, property, the economy and the environment as far as reasonably possible;*

The development proposal includes a number of measures to minimise flood risk which include the following:

1. The ground floor levels of the proposed buildings on the site will vary between 5.2mOD and 6.0mOD. This is between 1.08m and 1.88m above the minimum recommended site flood defence level as outlined in **Section 4.1.4.**

2. The basement will be fully sealed and tanked to ensure that water cannot penetrate it.

3. The proposed development will have no impact on floodplain storage and conveyance as it is located outside of the 1 in 1000 year fluvial and coastal flood plain.
4. The proposed drainage network to be constructed as part of the development includes a number of Sustainable (urban) Drainage features (SuDS)

    - *The development proposed includes measures to ensure that residual risks to the area and/or development can be managed to an acceptable level as regards the adequacy of existing flood protection measures or the design, implementation and funding of any future flood risk management measure and provisions for emergency service access*

As previously noted in this report, the residual risk will be managed by ensuring that the ground floor level is set above the site design flood defence level.

- *The development proposed addresses the above in a manner that is also compatible with the achievement of wider planning objectives in relation to the development of good urban design and vibrant and active streetscapes.*

The scheme has been designed to the highest standards and creates a successful and vibrant public realm. Measures to address the flood risk have been incorporated into the design without compromising the streetscape and functioning of the development.

It is deemed that these criteria are sufficient for the development to pass this section of the Justification Test.

7 Conclusion

This FRA reviews the risk of flooding for a proposed mixed-use development at Parkgate Street in Dublin 8. This FRA is to form part of the planning application for the development.

There is no historic record of the site having flooded in the past.

While the site borders the River Liffey, flood risk to the site is low and existing ground levels are above the maximum 1% AEP fluvial water level and the 0.5% AEP tidal level. The risk of groundwater and pluvial flooding is also low.

The minimum site flood defence level of the proposed development including an allowance for climate change and freeboard is 4.12mOD.

Flood risk to the buildings on site will be managed by raising ground levels to between 5.4mOD and 6.0mOD.

Access and egress routes will not be compromised during a flood event with the exception of the route to the internal river walk next to the River Liffey. This is not a primary access and egress route for the proposed development and the entrance/exit point to the building itself will be approximately 1.38m above the minimum site flood defence level.

The proposed development will also not impact on floodplain storage or conveyance.

As a small area of the existing site is within the 0.1% AEP tidal flood extent. The site is therefore classified as Flood Zone B and a Justification Test is required. Both the Plan Making and Development Management Justification elements of the Justification test have been assessed and both are deemed to be passed as part of this FRA.

8 References

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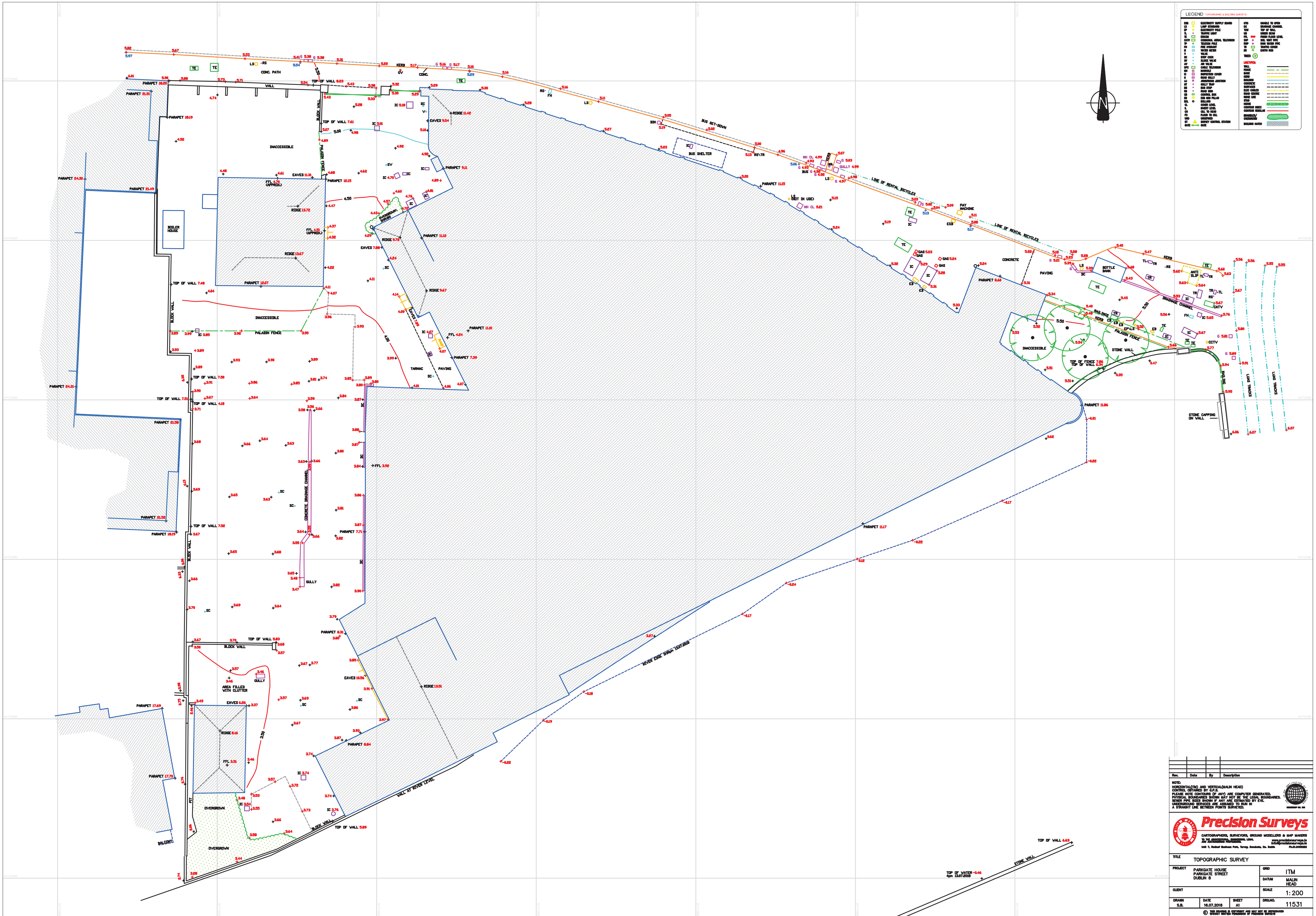
- Planning and Development Act 2000 (S.I. No. 30 of 2000)

Appendix A

Topographical Survey of Existing Site



LEGEND
BUS SHELTER
BUS SET-DOWN
LINE OF RENTAL BICYCLES
INACCESSIBLE
BOILER HOUSE
PALADIN FENCE
BLOCK WALL
TARMAC
PAVING
CONCRETE
BOTTLE BANK
STONE WALL
LUAS TRACKS
STONE CAPPING ON WALL
WALL AT RIVER LEVEL
AREA FILLED WITH CLUTTER
OVERGROWN
Rev.
Date
By
Description
NOTE:
HORIZONTAL(ITM) AND VERTICAL(MALIN HEAD)
CONTROL OBTAINED BY G.P.S.
PLEASE NOTE CONTOURS (IF ANY) ARE COMPUTER GENERATED.
PHYSICAL BOUNDARIES SHOWN MAY NOT BE THE LEGAL BOUNDARIES.
SEWER PIPE SIZES SHOWN IF ANY ARE ESTIMATED BY EYE.
UNDERGROUND SERVICES ARE ASSUMED TO RUN IN
A STRAIGHT LINE BETWEEN POINTS SURVEYED.
THE IRISH INSTITUTION OF SURVEYORS
Precision Surveys
CARTOGRAPHERS, SURVEYORS, GROUND MODELLERS & MAP MAKERS
www.precisionsurveys.ie
info@precisionsurveys.ie
TITLE
TOPOGRAPHIC SURVEY
PROJECT
PARKGATE HOUSE
PARKGATE STREET
DUBLIN 8
GRID
ITM
DATUM
MALIN HEAD
CLIENT
SCALE
1: 200
DRAWN
S.B.
DATE
16.07.2018
SHEET
A1
DRG.NO.
11531

Appendix B

Historical Flood Event
Information from *floodmaps.ie*

Ruirside Developments Limited

Parkgate Street Development

Statement of Consistency with Ministerial Guidance

Issue | 7 June 2019

Job number 265381-010

Ove Arup & Partners Ireland Ltd

Arup
50 Ringsend Road
Dublin 4
D04 T6X0
Ireland
www.arup.com

ARUP

Contents

1 Statement

This statement of consistency confirms the following:

- The Site Specific Flood Risk Assessment will form part of the Planning Application documentation to An Bord Plenála and will be prepared in accordance with the Planning System and Flood Risk Management Guidelines for Planning Authorities (2009).
- The Site Specific Flood Risk Assessment will also be in accordance with the recommendations in the Strategic Flood Risk Assessment produced as part of the Dublin City Development Plan 2016-2022.

2 Site Specific Flood Risk Assessment

The Site-Specific Flood Risk Assessment (SSFRA) will address the following:

- Review of all relevant information and data from;
  - The Office of Public Works (OPW) Preliminary Flood Risk Assessment Mapping (PFRA);
  - Eastern Catchment Flood Risk Assessment and Management (CFRAM) Study;
  - The Dublin City Council Development Plan 2016-2022;
  - Any historic flood information for the area and/or any relevant studies.
- Review of available site investigation data;
- Review of the risk of coastal, fluvial, pluvial and groundwater flooding; and
- Preparation of a Flood Risk Assessment Report.

Appendix C

Eastern CFRAM Study
Predictive Flood Maps

Flooding at Ashling Hotel, Parkgate Street, Dublin 8
24th October 2011

The information contained in this report has been extracted from a Flood Data Collection Form submitted to The Office Of Public Works (OPW) by Consultants working on the Eastern River Basin District (RBD) Catchment Flood Risk Assessment and Management (CFRAM) Project.

1 Location and date of flood event:

Location: Ashling Hotel, Parkgate Street, Arbour Hill, Dublin 8.
Irish Grid Co-ordinates: 313,857 234,438

This flooding event started at 3.30pm on 24th October 2011 and ended at 2am on 25th October 2011, the peak flood occurred at 8pm on 24th October 2011.

2 Source and cause:

Significant rainwater resulted in overland flows down Conyngham Road. Some flows may have come from the Phoenix Park and possibly the nearby Viceregal Stream. The water then pooled in front of the Ashling Hotel and eventually flooded its ground floor entrance. Water from Montpellier Hill also came into the car park at the rear of Hotel.

3 Flood data:

The following flood information was provided:

Flood Parameter	Max Value	Typical Value	Comments
Flood Level (metres OD Malin)			
Flood Depth (metres)		0.15	At front of hotel.
Flood Flow (m^3/s)			
Flood Velocity (m/s)			

Flooding has occurred numerous times at this location.

4 Impacts of flooding event:

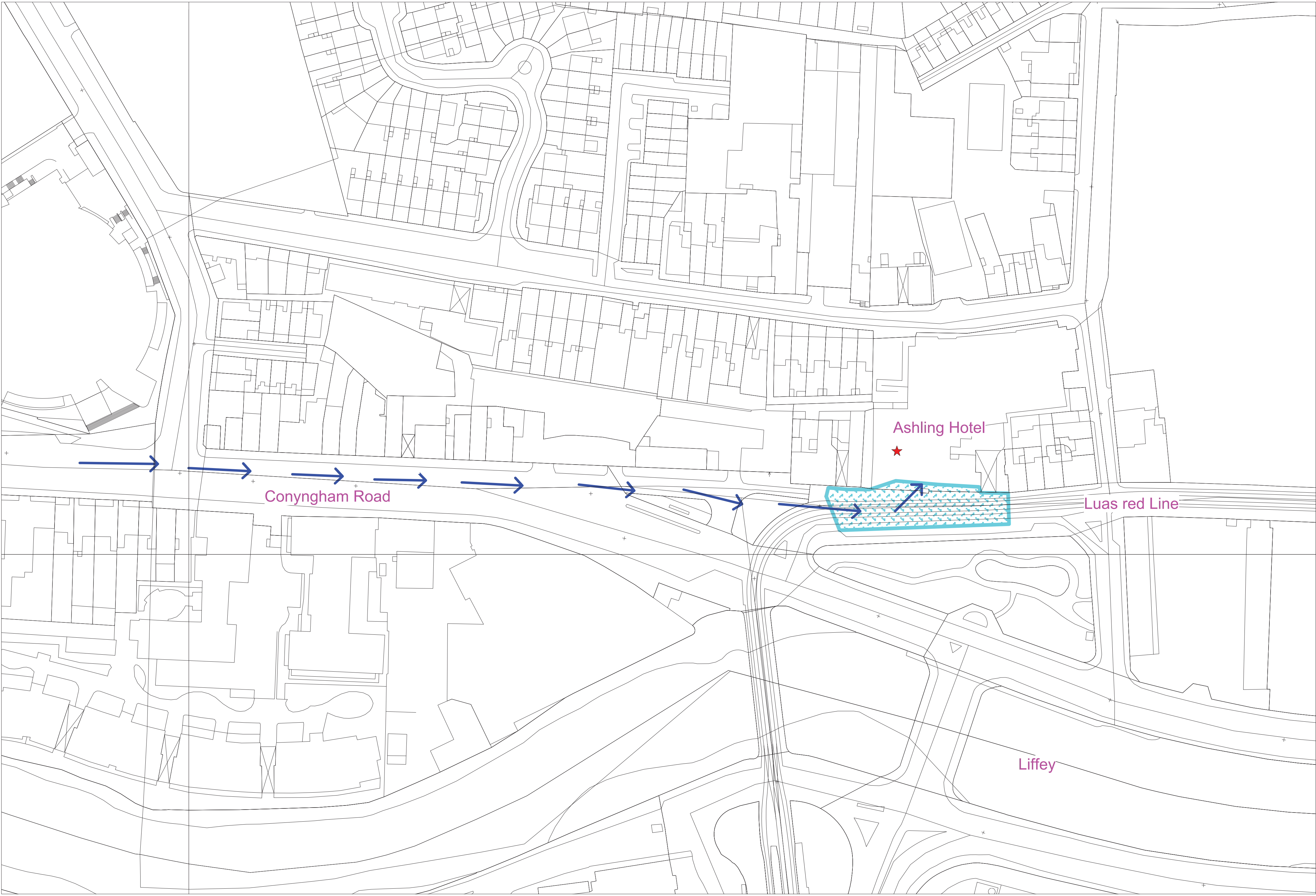
Impacts to Property: **Commercial**- The Ashling Hotel was affected by this flood event.
Impacts to transport infrastructure: Roads – Benburb Street (Urban) was flooded for 100m in front of the Ashling Hotel.
Luas Line: The Luas Red Line was flooded for 100m in front of the Ashling Hotel.

5 Additional information:

There is a historical flooding problem with this hotel. The owner has installed a flood prevention system inside the hotel doors.

6. Documents attached:

A map of the affected area is attached.


Ashling Hotel
Conyngham Road
Luas red Line
Liffey

Flooding at Bridgewater Quay Apartments, Islandbridge, Dublin 8.
24th October 2011

The information contained in this report has been extracted from a Flood Data Collection Form submitted to The Office Of Public Works (OPW) by Consultants working on the Eastern River Basin District (RBD) Catchment Flood Risk Assessment and Management (CFRAM) Project.

1 Location and date of flood event:

Location: Bridgewater Quay Apartments, Islandbridge, Dublin 8.
Irish Grid Co-ordinates: 313,006 234,402

This flooding event started at 6pm and ended at 11pm on 24th October 2011, the peak flood occurred at 7.30pm on 24th October 2011.

2 Source and cause:

According to local residents, surface water runoff from the Phoenix Park flowed into Bridgewater Quay apartment complex car park and onto South Circular Road Bridge footpath. The area is in close proximity to the Magazine Stream, which rises in and transverses the Phoenix Park. The River Liffey did not burst its banks in this area; it flooded a low-lying pedestrian walkway.

3 Flood data:

The following flood information was provided:

Flood Parameter	Max Value	Typical Value	Comments
Flood Level (metres OD Malin)			
Flood Depth (metres)	0.05	0.01	100mm level in car park, 500mm on SCR footpath.
Flood Flow (m^3/s)			
Flood Velocity (m/s)			

It is not known if flooding has previously occurred at this location.

4 Impacts of flooding event:

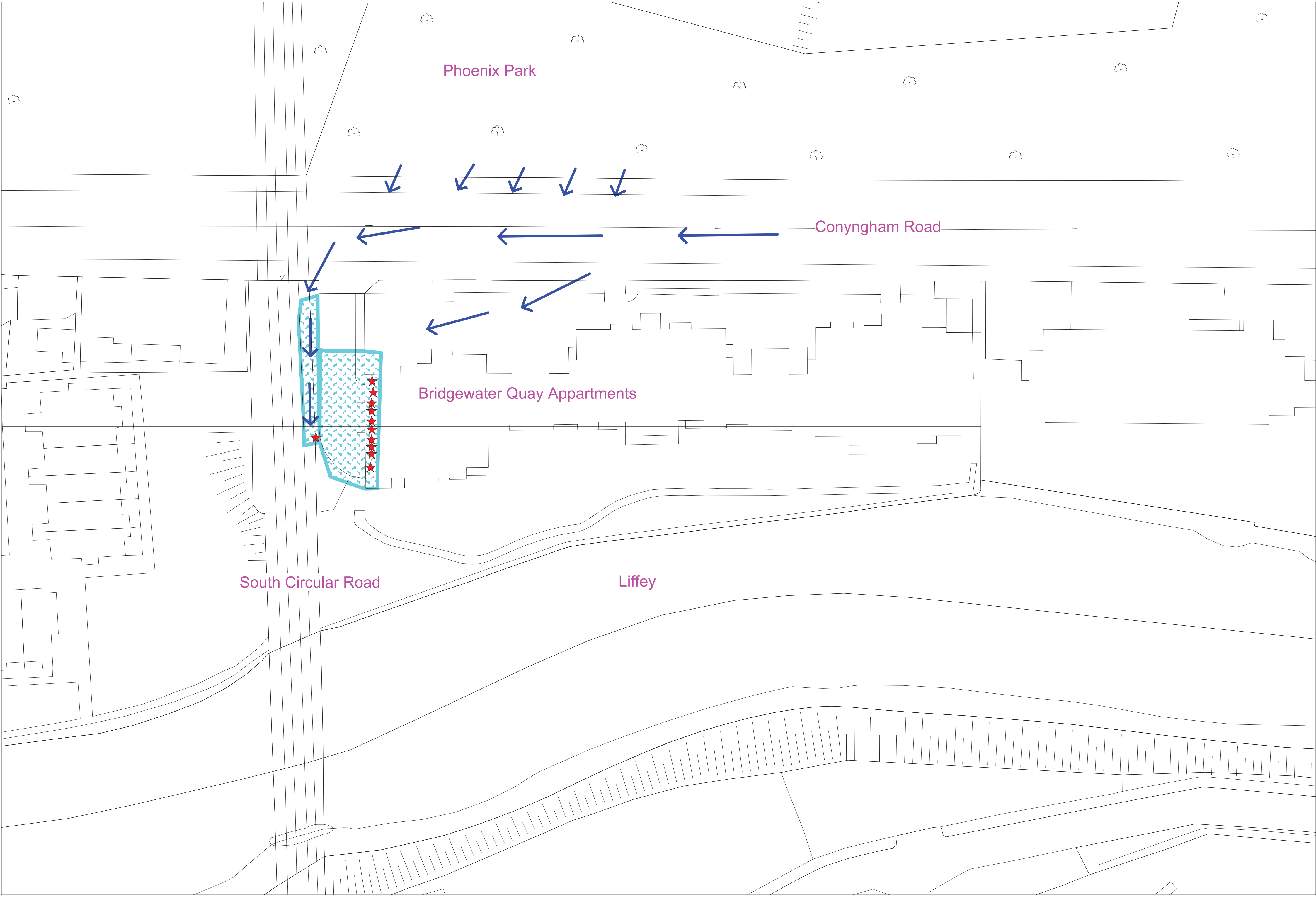
Impacts to people: There was no loss of life as a result of this flooding event.
Impacts to Property: Residential - There were 11ground floor apartments affected by this event.
Impacts to transport infrastructure: Roads – 30m of South Circular Road Bridge (urban) and footpath were affected by this event. Part of the wall on the bridge also collapsed.

5 Additional information:

A part of the high wall from the South Circular Bridge collapsed into the Bridgewater Quay Apartment complex. There was no damage caused to any of the buildings.

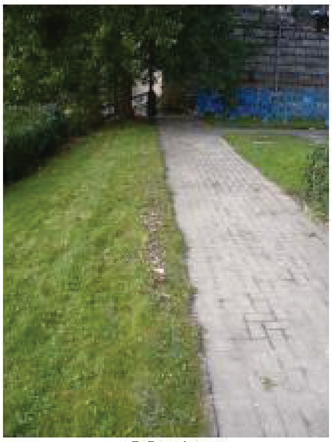
6. Documents Attached:

Photographs and a map of the area are attached.


Phoenix Park
Conyngham Road
Bridgewater Quay Appartments
South Circular Road
Liffey

Bridge Water Quay, Dublin 8


01.jpg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03.jpg


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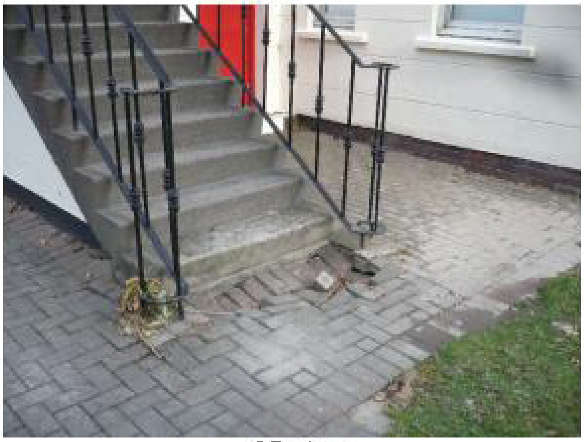
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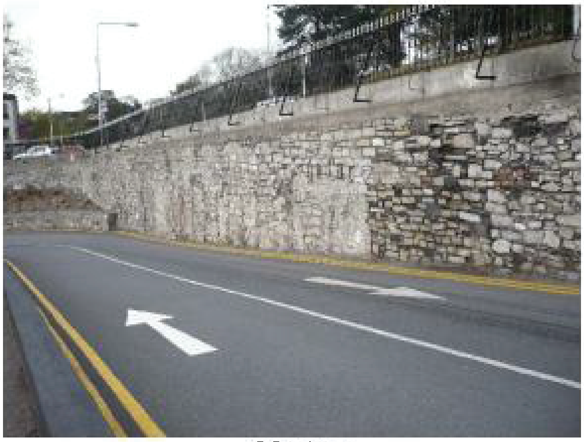
08.jpg

Bridge Water Quay, Dublin 8


09.jpg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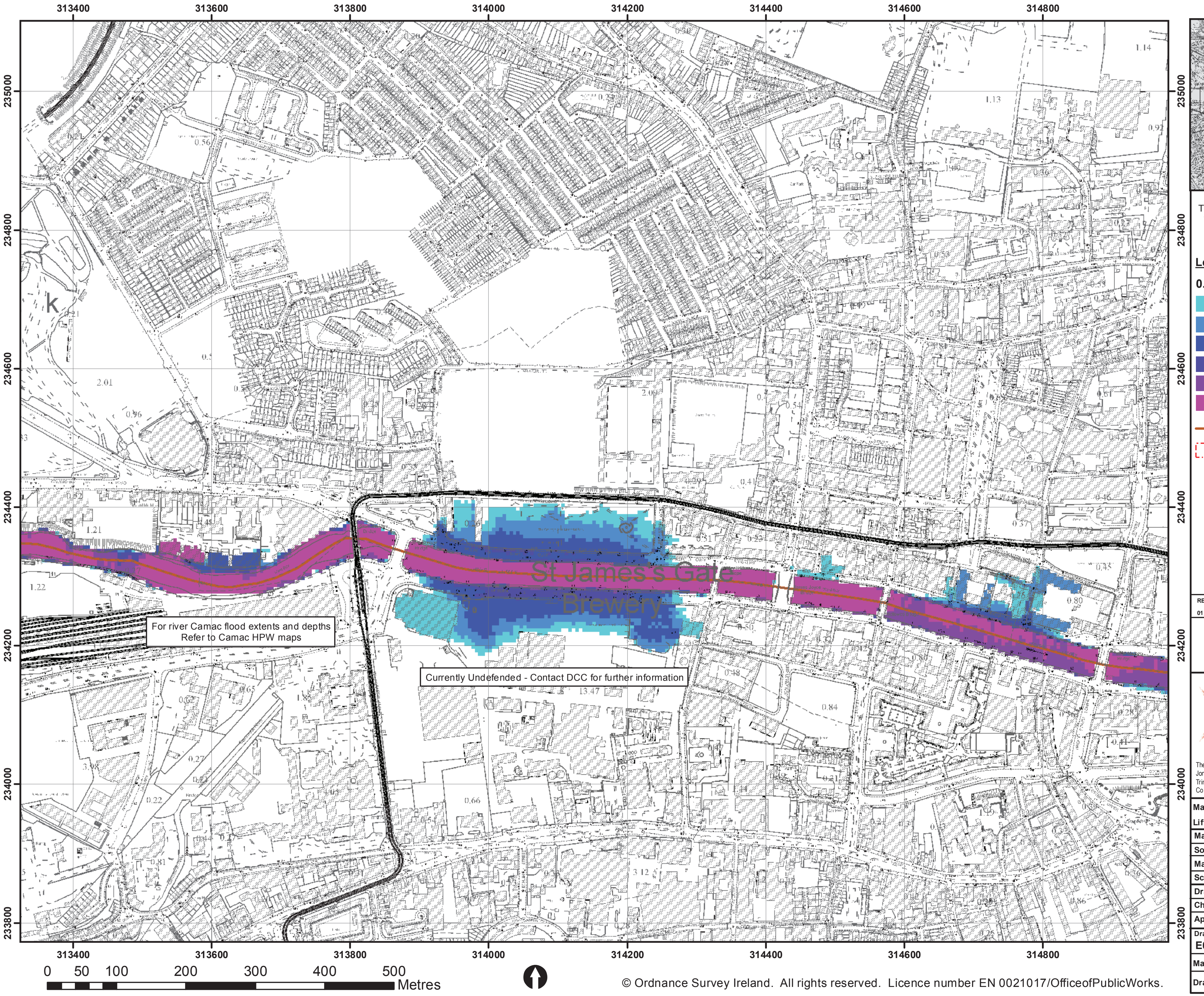
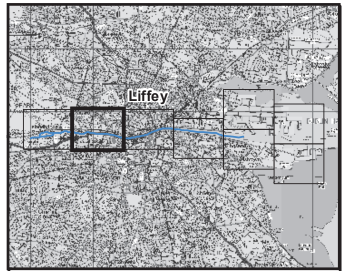
14.jpg


15.jpg

Appendix D

The Plan Making Justification Test - Site 4. Liffey: Sean Heuston Bridge - O’Connell Bridge





IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

0.1% Tidal AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m
- Modelled River Centreline
- AFA Extents

FINAL

REV:	NOTE:	DATE:
01	Amendments to Flood Extents.	05/12/16

EASTERN CFRAM STUDY

The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

Elmwood House
74 Boucher Road
Belfast
BT12 6RZ

T +44(0) 28 90 667914
F +44(0) 28 90 668286
W www.rpsgroup.com
E ireland@rpsgroup.com

Map:
Liffey Tidal Flood Depths

Map Type: DEPTH
Source: TIDAL
Map Area: COASTAL
Scenario: CURRENT

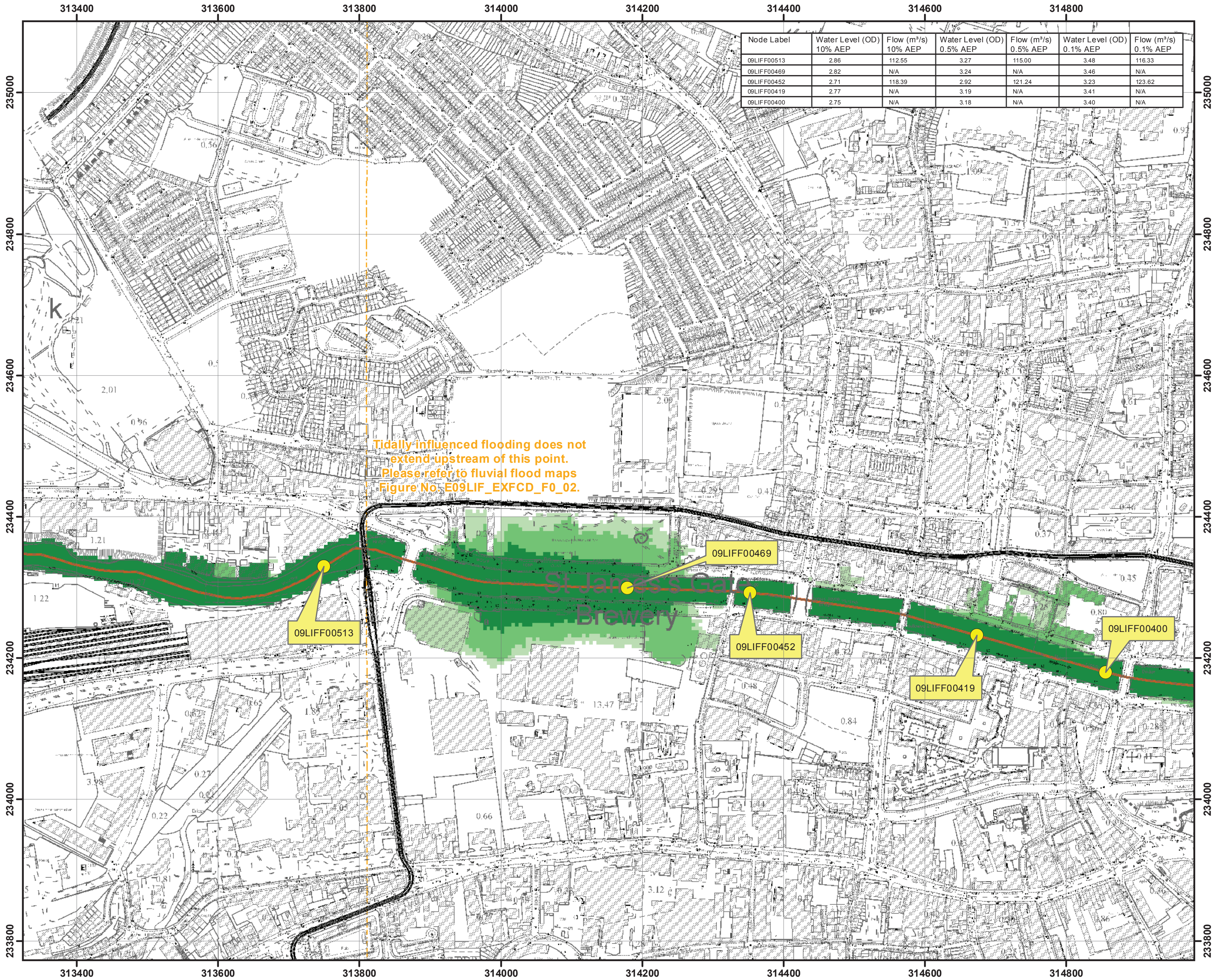
Drawn By :	C.McG.	Date : 9 May 2017
Checked By :	A.S.	Date : 9 May 2017
Approved By :	G.G	Date : 9 May 2017

Drawing No. :
E09LIF_DPCCD001_F1_02

Map Series : Page 2 of 8

Drawing Scale : 1:5,000 @A3

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 0.5% AEP	Flow (m³/s) 0.5% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09LIFF00513	2.86	112.55	3.27	115.00	3.48	116.33
09LIFF00469	2.82	N/A	3.24	N/A	3.46	N/A
09LIFF00452	2.71	118.39	2.92	121.24	3.23	123.62
09LIFF00419	2.77	N/A	3.19	N/A	3.41	N/A
09LIFF00400	2.75	N/A	3.18	N/A	3.40	N/A



0 50 100 200 300 400 500 Metres

IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

- 10% Tidal AEP Event
- 0.5% Tidal AEP Event
- 0.1% Tidal AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label

FINAL

REV:	NOTE:	DATE:
01	Amendments to Flood Extents.	05/12/16

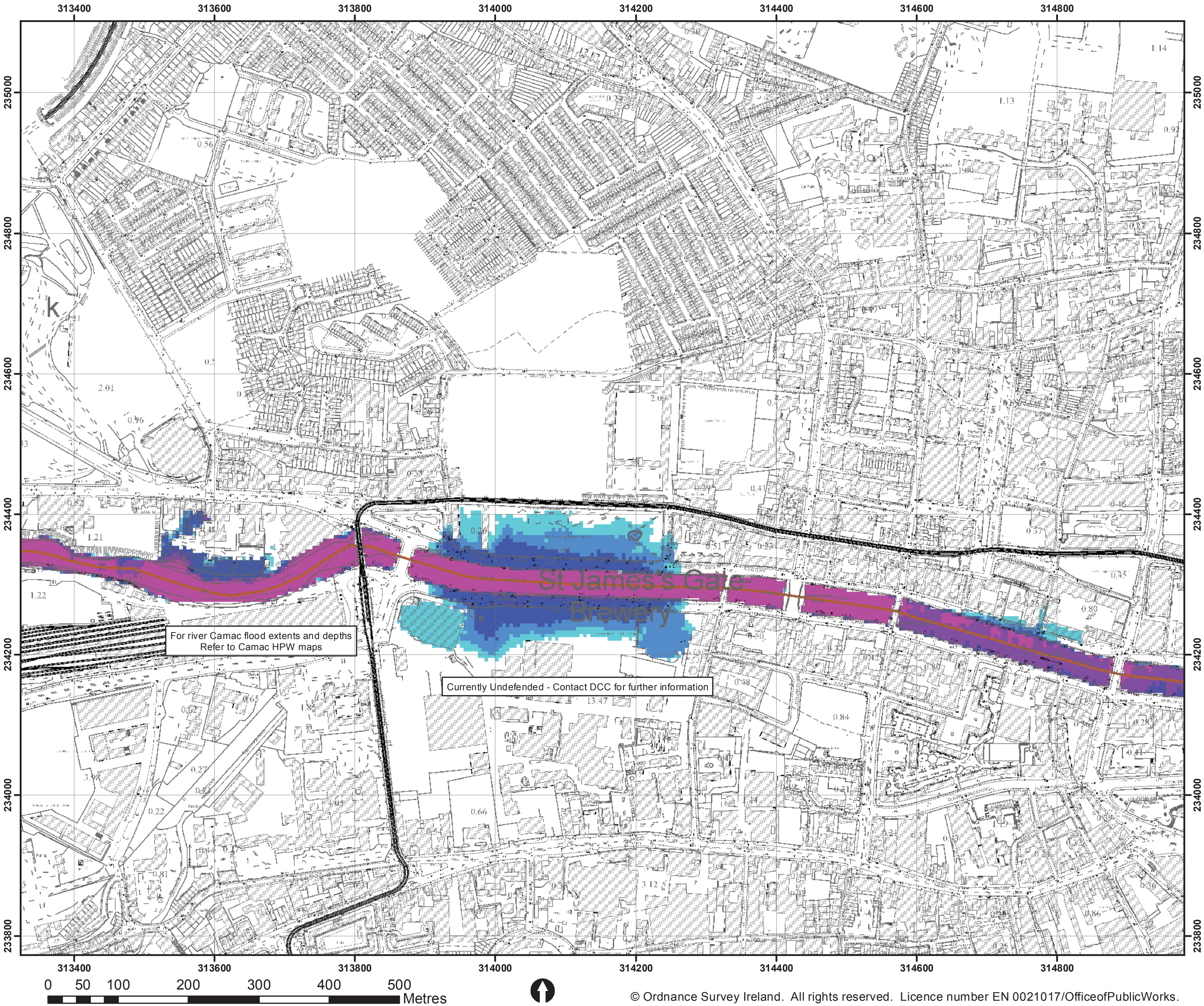
EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

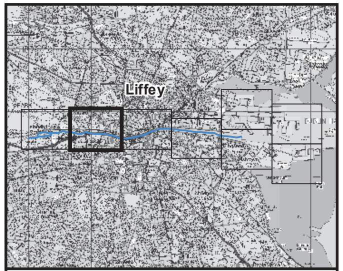
OPW
The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

RPS
Elmwood House
74 Boucher Road
Belfast
BT12 6RZ
T +44(0) 28 90 667914
F +44(0) 28 90 668286
W www.rpsgroup.com
E ireland@rpsgroup.com

Map:
Liffey Tidal Flood Extents

Map Type: EXTENT
Source: TIDAL
Map Area: COASTAL
Scenario: CURRENT
Drawn By : C.C. Date : 9 May 2017
Checked By : A.S. Date : 9 May 2017
Approved By : S.P. Date : 9 May 2017
Drawing No. :
E09LIF_EXCCD_F1_02
Map Series : Page 2 of 8
Drawing Scale : 1:5,000 @ A3





IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

0.1% Fluvial AEP Flood Depth

- 0 - 0.25m
- 0.25 - 0.5m
- 0.5 - 1m
- 1.0 - 1.5m
- 1.5 - 2m
- >2m
- Modelled River Centreline
- AFA Extents

FINAL

REV:	NOTE:	DATE:
01	Amendments to Flood Extents.	05/12/16

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW
Oifig na nOibreacha Poiblí
The Office of Public Works

RPS

The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

Elmwood House
74 Boucher Road
Belfast
BT12 6RZ

T +44(0) 28 90 667914
F +44(0) 28 90 668286
W www.rpsgroup.com
E ireland@rpsgroup.com

Map:
Liffey Fluvial Flood Depths

Map Type: DEPTH
Source: FLUVIAL
Map Area: HPW
Scenario: CURRENT

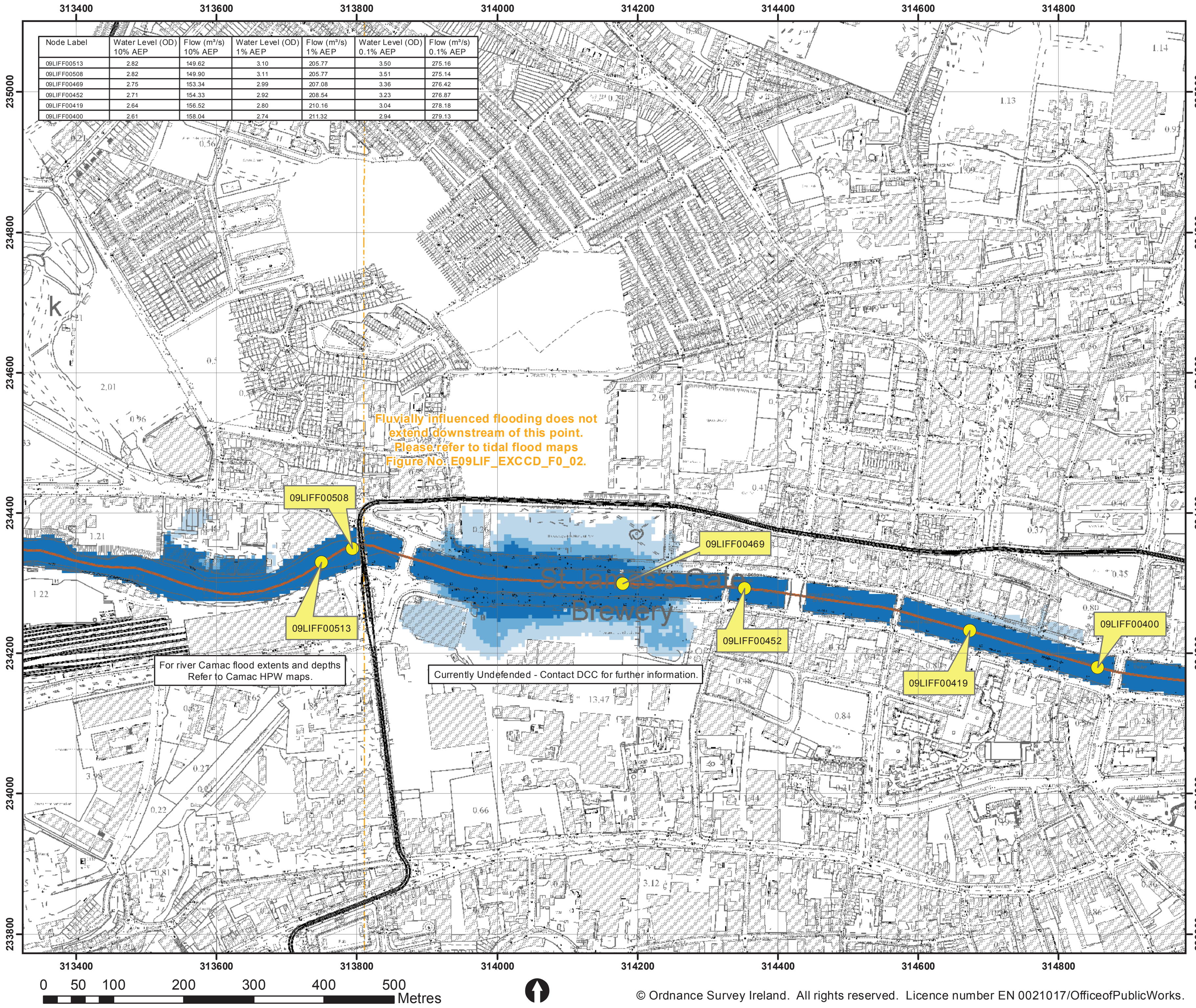
Drawn By :	C.McG.	Date : 9 May 2017
Checked By :	A.S.	Date : 9 May 2017
Approved By :	G.G	Date : 9 May 2017

Drawing No. :
E09LIF_DPFCD001_F1_02

Map Series : Page 2 of 8

Drawing Scale : 1:5,000 @A3

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
09LIFF00513	2.82	149.62	3.10	205.77	3.50	275.16
09LIFF00508	2.82	149.90	3.11	205.77	3.51	275.14
09LIFF00469	2.75	153.34	2.99	207.08	3.36	276.42
09LIFF00452	2.71	154.33	2.92	208.54	3.23	276.87
09LIFF00419	2.64	156.52	2.80	210.16	3.04	278.18
09LIFF00400	2.61	158.04	2.74	211.32	2.94	279.13



IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label

FINAL

REV:	NOTE:	DATE:
01	Amendments to Flood Extents.	05/12/16

EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW
Oifig na nOibreacha Poiblí
The Office of Public Works

RPS

The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

Elmwood House
74 Boucher Road
Belfast
BT12 6RZ

T +44(0) 28 90 667914
F +44(0) 28 90 668286
W www.rpsgroup.com
E ireland@rpsgroup.com

Map:
Liffey Fluvial Flood Extents

Map Type: EXTENT
Source: FLUVIAL
Map Area: HPW
Scenario: CURRENT

Drawn By : C.C. Date : 9 May 2017
Checked By : A.S. Date : 9 May 2017
Approved By : S.P. Date : 9 May 2017

Drawing No. :
E09LIF_EXFCD_F1_02

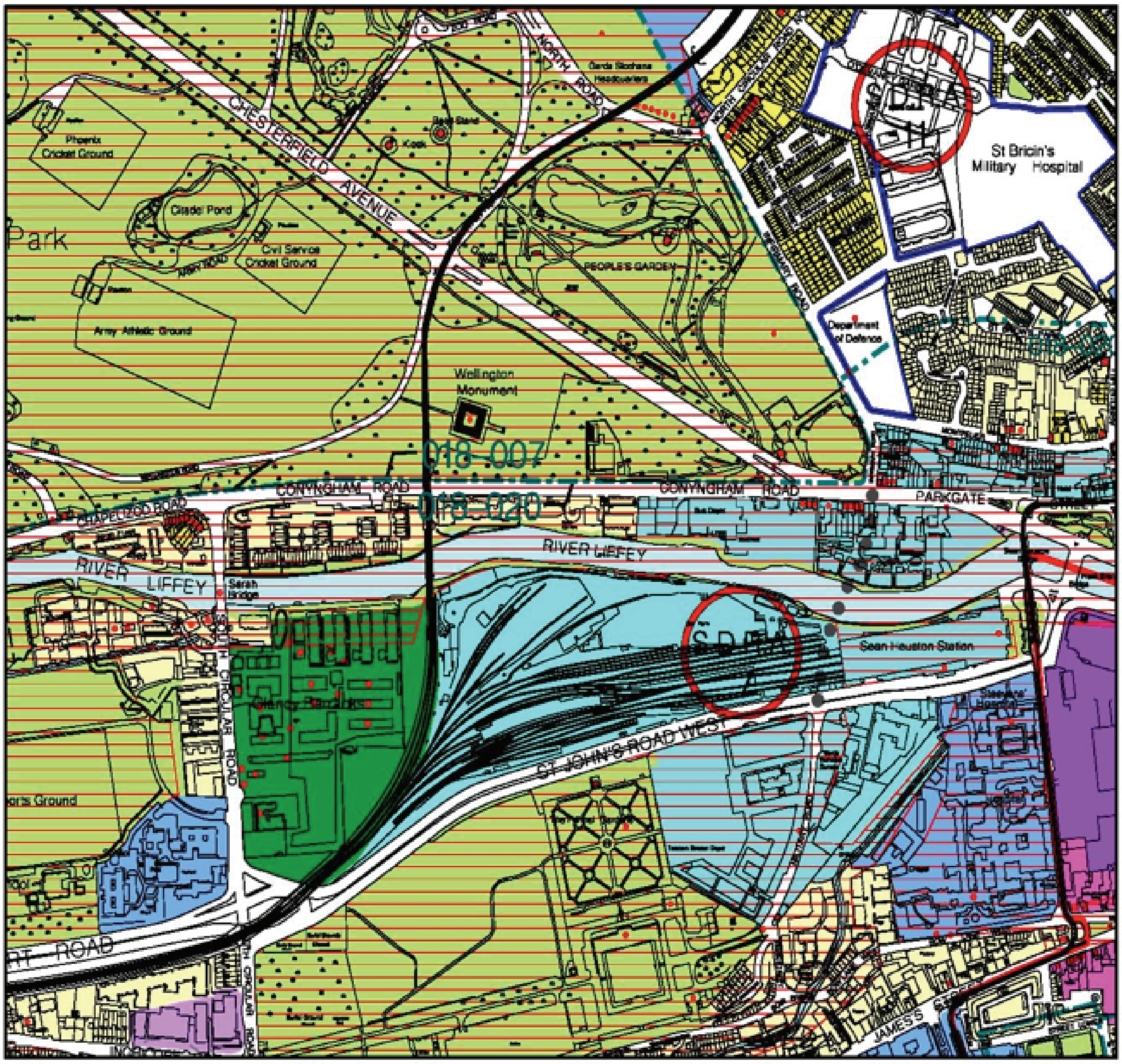
Map Series : Page 2 of 8

Drawing Scale : 1:5,000 @A3

Appendix E

Justification Test Tables

Site: 5. Liffey: Sean Heuston Br. – Sarah Bridge, South Circular Road



Dublin City Council Development Plan 2016–2022 (zoning map key at back of tables)

Site Description	The area on the south side includes Heuston Station to St. John's Road West, Riverbank House at Clancy Quay, the Camac outfall tunnel to the Liffey Estuary, the south city interceptor sewer in the south bank of the Liffey Estuary and areas south of these. On the north side it includes Parkgate, Conyngham Road and developments between these and the river estuary. Development in this area is a mixture of Commercial and high density Residential. Heuston Station and Irish Rail Infrastructure are a major part of this area.
Benefitting from Defences (flood relief scheme works)	Some of this area has existing Quay Walls to ground level but their design standards and capacity for flood defence is unknown and is therefore not used when estimating flood risk. In addition, their capacity is limited to the channel dimensions. Existing embankments would also need to be assessed before any further development is carried out behind them.

Site: 5. Liffey: Sean Heuston Br. – Sarah Bridge, South Circular Road	
Sensitivity to Climate Change	Moderate to high – the river in this location has combined fluvial and tidal influences which could result in greater increases in water level than elsewhere.
Residual Risk	Not applicable as existing defences are the channel walls to ground level.
Historical Flooding	The flood maps attached are consistent with previous flooding of this section of the Liffey Estuary. The main flood risk zones are sections of the north and south quays adjacent to the Liffey Estuary and areas connected with the Camac River junction.
Storm (surface) water	All storm (surface) water in this area needs to be carefully managed and provision made for significant rainfall events during high tides. A one year high tide event should be assumed during a 100-year rainfall event. Should development be permitted, best practice with regard to storm (surface) water management should be implemented across the development area, to limit storm (surface) water runoff to current values. All Developments shall have regard to the Pluvial Flood Maps in their Site Specific Flood Risk Assessment, see Flood ResilienCity Project, Volume 2 City Wide Pluvial Flood Risk Assessment at http://www.dublincity.ie/main-menu-services-water-waste-and-environment-drains-sewers-and-waste-water/flood-prevention-plans

Commentary on Flood Risk: The flood extents indicate flow paths generally coming directly out of the tidal region, some are through quay walls and underground chambers and pipelines near quay walls. The flood maps were produced based on the OPW CFRAM Study and checked against historic flooding in the area. Flooding from the River Camac is discussed in its assessment area.

Development Options:
The main flood cells are located just north and south of the River Estuary, which is currently zoned for a mix of different zonings, including to the south of the river, Z15 which is to protect and provide for institutional and community uses, Z5 which is to consolidate and facilitate the development of the central area, and to identify, reinforce, strengthen and protect its civic design character and identity. Part of the lands around Kilmainham are zoned Z1 in the Plan which is to protect, provide and improve residential amenities. Part of the lands to the north of the Quays within Flood Zone A would be zoned Z5 in the Plan (see above). No new development should be allowed in these green areas. Irish Rail developments should have cognisance of current estuary planning levels. All existing embankments should be evaluated for new developments behind them. New bridges and tunnels should be evaluated for critical sea level rises.

High density Commercial, Industrial, Infrastructural and Residential development (some infill) would be a natural extension of existing development. However, any development could reasonably be accommodated within the extents of Flood Zone C and should not need to extend into Flood Zone A or B.

Site: 5. Liffey: Sean Heuston Br. – Sarah Bridge, South Circular Road

Justification Test for Development Plans

1. Section 1 is covered elsewhere in this SFRA Justifying all of Dublin City

2. The zoning or designation of the lands for the particular use or development type is required to achieve the proper planning and sustainable development of the urban settlement and, in particular:

(i) Is essential to facilitate regeneration and/or expansion of the centre of the urban settlement
Answer: Yes: This area forms part of the central area of the City. The lands form part of an established built up part of the City close to Strategic Rail Infrastructure. The area around Heuston is identified as Strategic Development and Regeneration Area (SDRA 7 Heuston & Environs; See section 15.1.1.10 of the Written Statement) under the Core Strategy, which are important brownfield sites with the potential to deliver a significant quantum of mixed-uses and create synergies to regenerate their respective areas. An urban design land use framework plan for the regeneration of the Heuston area was produced in 2003. Since the publication of the 2003 report this area has undergone significant redevelopment, including much of the Heuston South Quarter and development at Clancy Barracks. A number of significant land banks still remain to be developed and for these the guiding principles have been set out in section Chapter 15 of the Written Statement.(see section 15.1.1.10 of the written statement)

(ii) Comprises significant previously developed and/or under-utilised lands
Answer: Most of the lands within Flood Zone A and B are already built up or comprise of brownfield sites.

(iii) Is within or adjoining the core of an established or designated urban settlement
Answer: Yes: This area forms part of the Central Core of the City.

(iv) Will be essential in achieving compact and sustainable urban growth
Answer: Yes: This area is essential to achieving compact and sustainable urban growth.

(v) There are no suitable alternative lands for the particular use or development type, in areas at lower risk of flooding within or adjoining the core of the urban settlement
Answer: There are no suitable alternative lands for the particular uses or development type in areas at lower risk of flooding, within or adjoining the urban settlement. Areas idenitifed as being in Flood Zones A and B are considered essential to achieving a consolidated urban centre and to comply with the NSS and RPG.

Site: 5. Liffey: Sean Heuston Br. – Sarah Bridge, South Circular Road	
3.	**Strategic Flood Risk Assessment for Flood Zones A and B (for defended Flood Zones A and B see section 4.8)** - To a large extent the areas indicated as being within Flood Risk Areas are generally built out or are existing brownfield sites and the opportunities for future development are limited. The extents of Flood Zone A and B are not significant along much of this reach of the Liffey, with most flood risk arising from the River Camac. - There are a number of identified flood cells along this stretch of the River Liffey, and cover areas currently zoned Z5 which is to consolidate and facilitate the development of the central areas and to identify, reinforce and strengthen and protect its civic design character and dignity. There are some areas zoned Z1 which is to protect, provide and improve residential amenities. - Given the combined tidal and fluvial influences in this section of the River Liffey, a joint probability assessment should be carried out to determine finished floor levels. The assessment should take into account the combined impacts of a peak tide and a peak flow occurring at the same time. Given that an event such as this would have a greater rarity that either event occurring individually a pragmatic approach should be taken to applying the findings. For example, whilst it would be appropriate to consider joint probability levels in the redevelopment of brown field sites, for individual or infill developments such allowances may prohibit connection with the existing streetscape. - The River Camac is currently subject to assessment under the Eastern CFRAM Study, which is reviewing the need for, and potential options to manage flood risk. Development at the downstream end of the Camac (around Heuston Station and St. James's Gate) should take into account the findings of the CFRAM Study. In this regard, until the Flood Risk Management Plan has been published, and any recommendations implemented, large scale development in this area should be proceeded with caution. - FRA's should be carried out for all basements and underground structures with respect to any human access.

Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

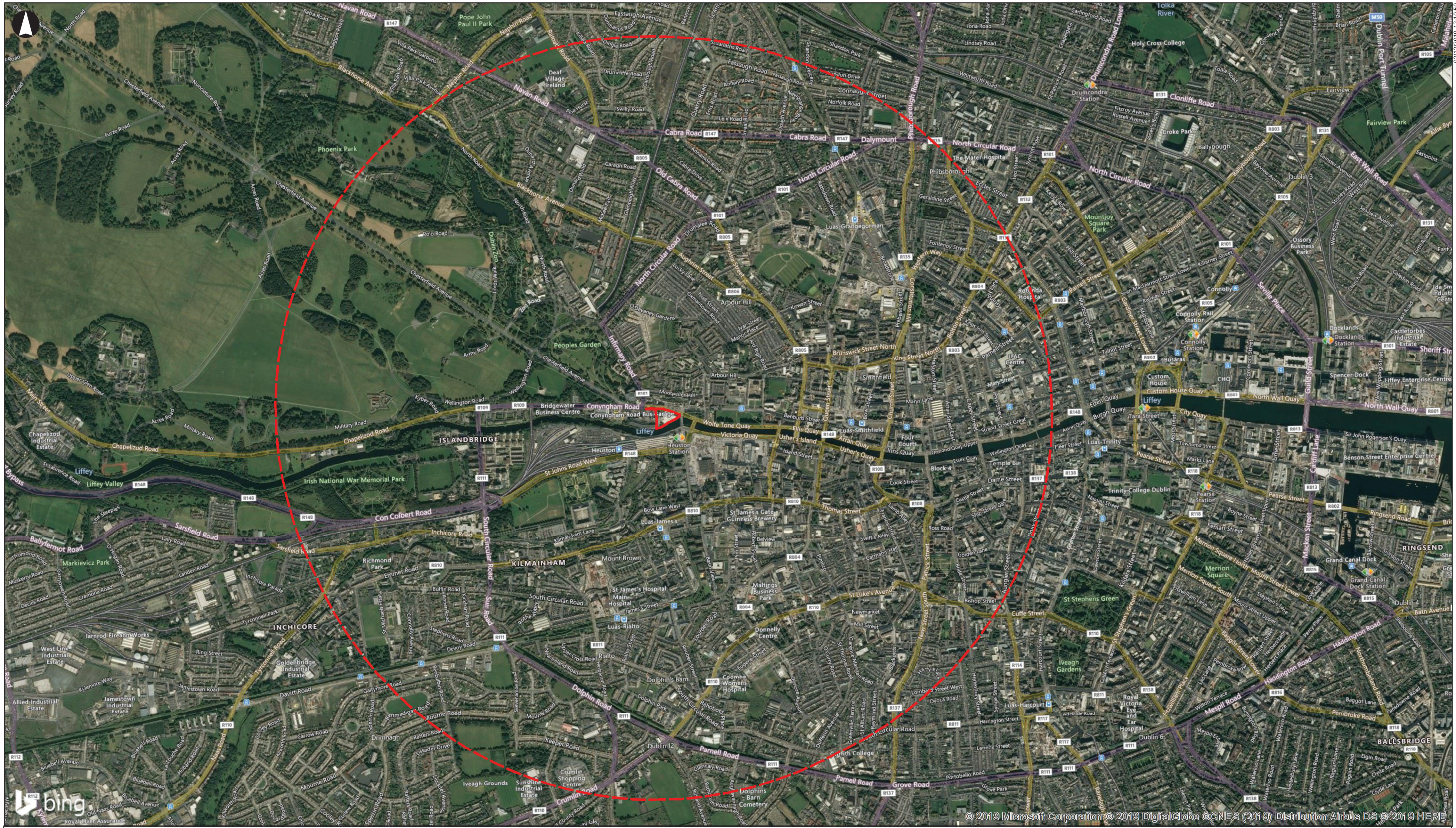
42A Parkgate Street, Dublin 8

Appendix 15.1: Figures

265381-00

ARUP

A3



02/12/2019 12:10:50

Proposed Site

2km Buffer Zone

Metres

0 237.5 475 950

Coordinate System: IRENET95 Irish Transverse Mercator

D1	2019-10-18	CF	EW	GB
Rev	Date	By	Chkd	Appd

ARUP

50 Ringsend Road
Dublin 4 DO4 T6XO Ireland
Tel +353 1 233 4030
www.arup.com

Client
Chartered Land

Project Title
Parkgate Street

Drawing Title
Site Location

Scale at A3
1:20,000

Job No
265381

Drawing Status
Draft

Rev
D1

Figure number
Figure 15.1

\\global\europe\dublin\jobs\270000\270978-00\4. Internal\4-03 Design\4-03-03 Infrastructure\01_Soils Geology and Hydrogeology\Regional Desk Study\Working GIS Files\265381_EIAR_MN.mxd

A3

02/12/2019 14:24:14

Quaternary Deposits
Description

- Alluvium
- Alluvium (gravelly)
- Bedrock outcrop or subcrop
- Embankment
- Gravels derived from Limestones
- Marine beach sands
- Till derived from limestones
- Urban
- Water
- Windblown sands
- Windblown sands and dunes

Metres
0 237.5 475 950

Coordinate System: IRENET95 Irish Transverse Mercator

D1	2019-10-18	CF	EW	GB
Rev	Date	By	Chkd	Appd

ARUP

50 Ringsend Road
Dublin 4 DO4 T6XO Ireland
Tel +353 1 233 4030
www.arup.com

Client
Ruirside Development

Project Title
Parkgate Street

Drawing Title
Quaternary Sediments

Scale at A3
1:20,000

Job No
265381

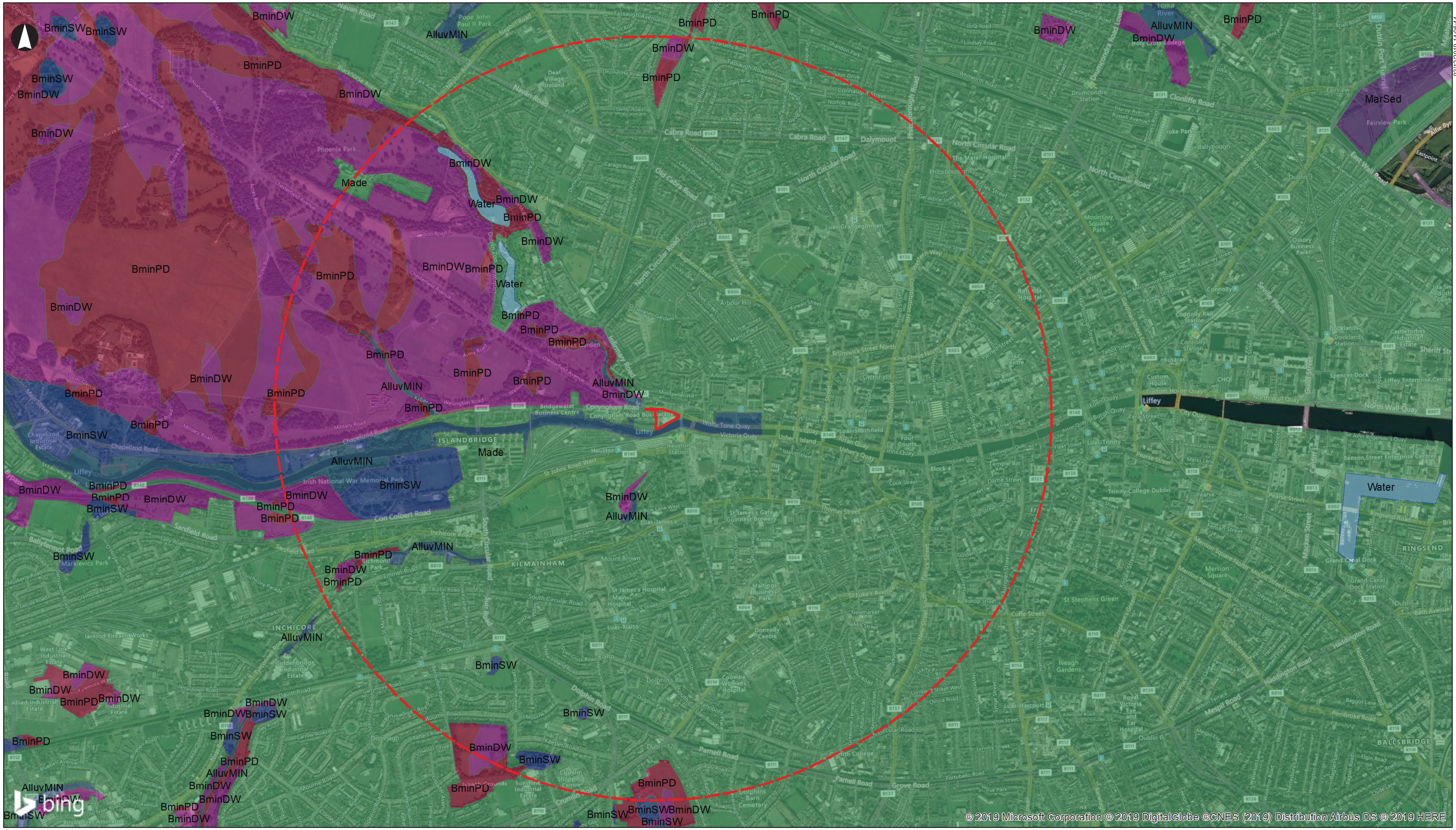
Drawing Status
Final

Rev
D1

Figure number
Figure 15.2

\\global\europe\dublin\jobs\270000\270978-00\4. Internal\4-03 Design\4-03-03 Infrastructure\01_Soils Geology and Hydrogeology\Regional Desk Study\Working GIS Files\265381_EIAR_MN.mxd

A3



Proposed Site
2km Buffer Zone

Soils

IFS_SOIL

- AlluvMIN- Mineral Alluvium
- BminDW- Deep well drained mineral soils (mainly basic)
- BminPD- Poorly drained mineral soils (mainly basic)
- BminSW- Shallow well drained mineral soil (mainly basic)
- Made
- MarSed- Marine Sediments
- Water

Metres
0 237.5 475 950

Coordinate System: IRENET95 Irish Transverse Mercator

Rev	Date	By	Chkd	Appd
D1	2019-10-18	CF	EW	GB

ARUP

50 Ringsend Road
Dublin 4 DO4 T6XO Ireland
Tel +353 1 233 4030
www.arup.com

Client
Ruirside Development

Project Title
Parkgate Street

Drawing Title
Teagasc Soils

Scale at A3
1:20,000

Job No
265381

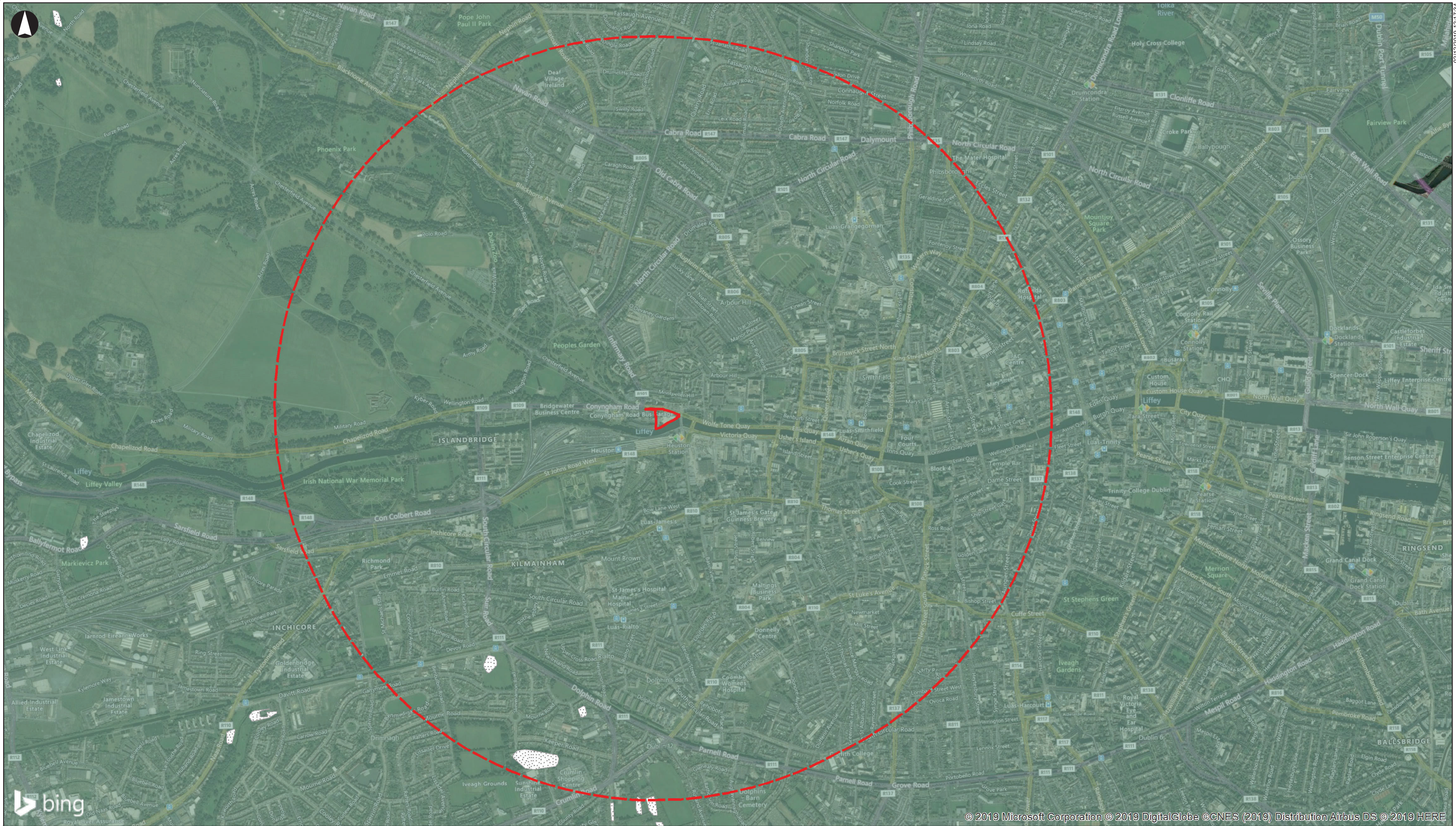
Drawing Status
Final

Rev
D1

Figure number
Figure 15.3

\\global\europe\dublin\jobs\270000\270978-00\4. Internal\4-03 Design\4-03-03 Infrastructure\01_Soils Geology and Hydrogeology\Regional Desk Study\Working GIS Files\265381_EIAR_MN.mxd

A3



Proposed Site
2km Buffer Zone
Bedrock Outcrops
Bedrock
Dark limestone & shale (`calp)

Metres
0 237.5 475 950

Coordinate System: IRENET95 Irish Transverse Mercator

D1	2019-10-18	CF	EW	GB
Rev	Date	By	Chkd	Appd

ARUP

50 Ringsend Road
Dublin 4 DO4 T6XO Ireland
Tel +353 1 233 4030
www.arup.com

Client
Ruirside Development

Project Title
Parkgate Street

Drawing Title
Bedrock Geology (1:100,000)

Scale at A3
1:20,000

Job No
265381

Drawing Status
Draft

Rev
D1

Figure number
Figure 15.4

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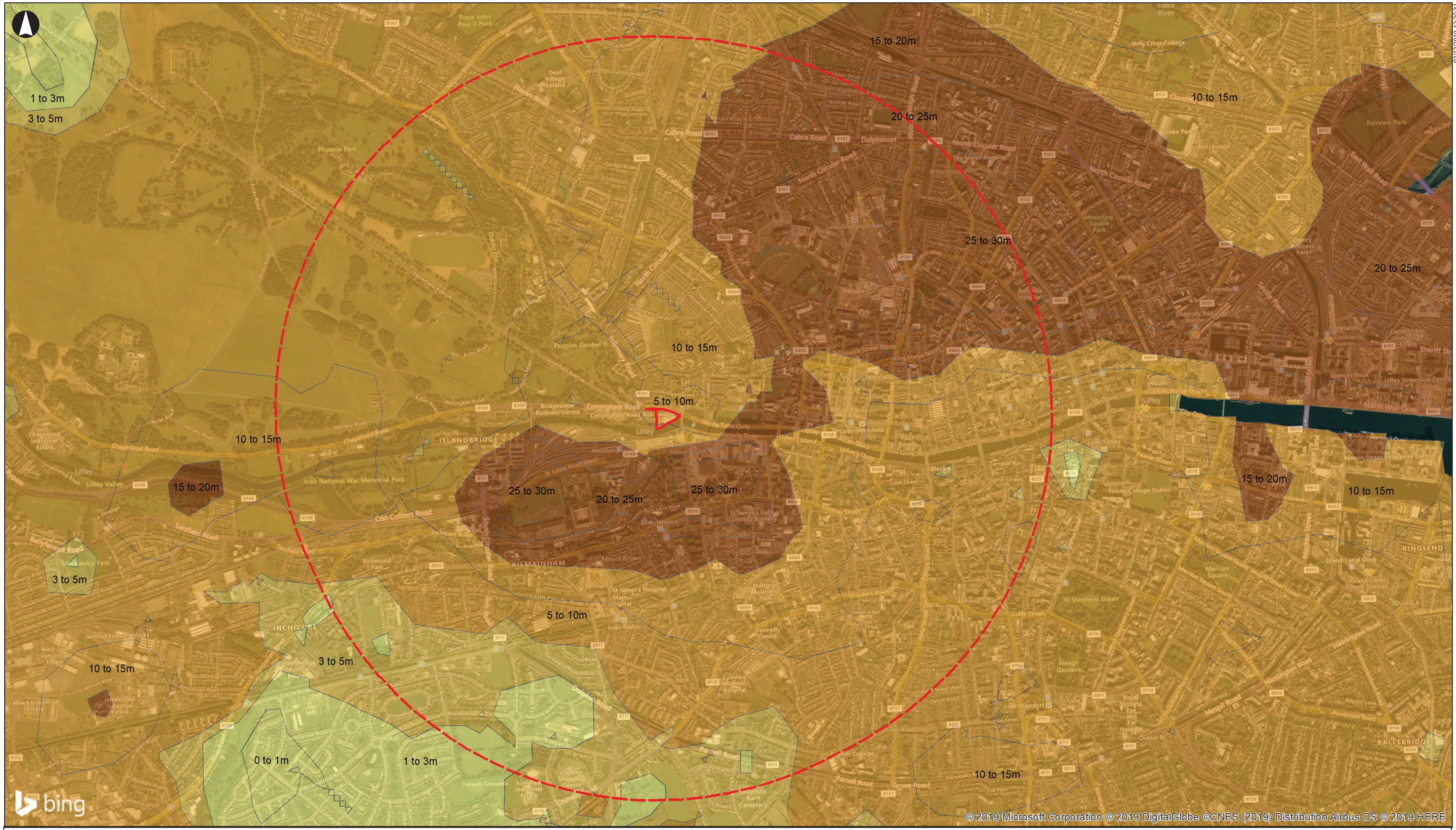
A3



02/12/2019 12:20:31

Proposed Site
2km Buffer Zone

Depth to Bedrock

- 0 - 3 m
- 3 - 5 m
- 5 - 15 m
- 15 - 30 m

Metres
0 237.5 475 950

Coordinate System: IRENET95 Irish Transverse Mercator

D1	2019-10-18	CF	EW	GB
Rev	Date	By	Chkd	Appd

ARUP

50 Ringsend Road
Dublin 4 DO4 T6XO Ireland
Tel +353 1 233 4030
www.arup.com

Client
Ruirside Development

Project Title
Parkgate Street

Drawing Title
Depth to Bedrock

Scale at A3
1:20,000

Job No
265381

Drawing Status
Final

Rev
D1

Figure number
Figure 15.5

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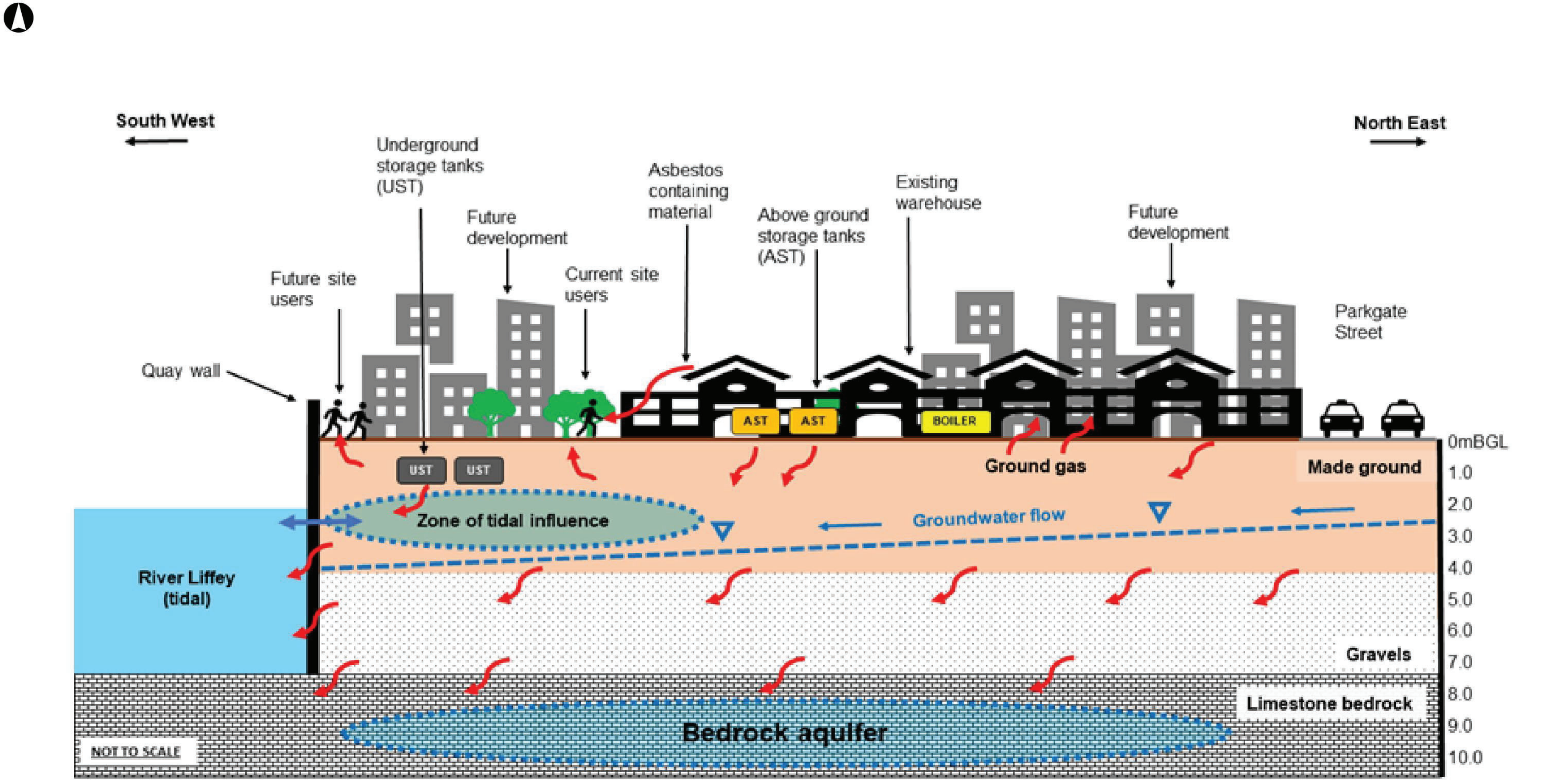
A3



The Preliminary Conceptual site model is updated based on the findings of the ground investigation and the DSA then outlines the revised SPR linkages based on factual information

Metres
0 237.5 475 950

Coordinate System: IRENET95 Irish Transverse Mercator

D1	2019-10-18	CF	EW	GB
Rev	Date	By	Chkd	Appd

ARUP

50 Ringsend Road
Dublin 4 D04 T6XO Ireland
Tel +353 1 233 4030
www.arup.com

Client
Ruirside Development

Project Title
Parkgate Street

Drawing Title
Conceptual Site Model

Scale at A3
1:20,000

Job No
265381

Drawing Status

Rev
D1

Figure number
Figure 15.6

Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Appendix 15.2: Site Investigation Report (2003)

265381-00

ARUP

FOREWORD

Notes on Site Investigation Procedure

The following notes should be read in conjunction with the report. Any modifications to the procedures outlined below are indicated in the main text.

GENERAL

The recommendations made and opinions expressed in the Report are based on the "Boring Records, an examination of samples and results of the site and laboratory tests. No responsibility can be held for conditions which have not been revealed by the boreholes, for example, between borehole positions. Whilst the report may express an opinion on a possible configuration of strata both between borehole positions and below the maximum depth of the investigation, this is for guidance only and no liability can be accepted for its accuracy.

BORING TECHNIQUE

Unless otherwise stated the 'Shell and Auger' technique of soft ground boring has been employed. Whilst this technique allows the maximum data to be obtained on strata conditions, a degree of mixing of some layered soils, (e.g. thin layers of coarse and fine granular material) is inevitable. Specific attention is drawn to this factor where evidence of such a condition is available.

GROUND WATER

The ground water conditions entered on the Boring Records are those appertaining at the time of the investigation. The normal rate of boring does not usually permit the recording of an equilibrium water level for any one water strike. Moreover, ground water levels are subject to variations caused by seasonal effects or changes in local drainage conditions. The table of each Boring Record shows the ground water level at the quoted borehole and casing depths, usually at the start of the day's work. The word "none" indicates that ground water was sealed off by the borehole casing.

GAS MONITORING

Unless otherwise stated gas monitoring is carried out using a GA2000 infra red gas detector. The gases monitored for and levels noted are recorded and plotted on the relevant test data sheets. Unless stated otherwise no monitoring is carried out for gas pressure or to calculate gas flow rates.

ROUTINE SAMPLING

Undisturbed samples of predominantly cohesive soils are obtained in a 102mm diameter open-drive sampler, complying with the requirements of the British Standard Code of Practice B.S. 5930. Large disturbed samples of granular soils, or of soils in which undisturbed sampling is not possible or appropriate, are taken from the boring tools and sealed into polythene bags. Small disturbed samples are taken at frequent intervals and sealed into 0.5 kg glass jars or polythene bags for subsequent visual classification. Where encountered in sufficient quantity, samples of groundwater are taken.

Unless otherwise stated in the main text, disturbed soil samples may not be at their natural water content.

REPORT ON A SITE INVESTIGATION FOR PROPOSED RESIDENTIAL / COMERCIAL DEVELOPMENT AT PARKGATE STREET, DUBLIN ON BEHALF OF ARUP, CONSULTING ENGINEERS

REPORT NO. 8483 / 1 **MARCH 2003**

1.INTRODUCTION

The proposed development site is located in the Hickeys commercial warehousing facility located off Parkgate Street in Dublin.

An investigation of sub-soil conditions was ordered by the projects consulting engineers , Arup Ireland, on behalf of their clients, Hickey & Company.

The programme of the investigation included,

- ✓ The construction of eight exploratory boreholes to establish stratification. During the course of boring in-situ tests were performed at regular intervals and representative soil samples were recovered for visual examination and laboratory analysis.
- ✓ The drilling of four rotary coreholes to establish the depth to, type of and quality of the underlying bedrock.
- ✓ The installation of six groundwater monitoring standpipes at selected borehole and corehole locations and the carrying out of in situ gas and groundwater monitoring / permeability tests at these locations.
- ✓ The drilling of sixteen window sample holes using a Terrier 1000 unit in areas of restricted access and to recover samples for environmental tests.
- ✓ The carrying out of laboratory soils testing (Geotechnical & Environmental) as specified by the projects engineers.

This report has been issued in two Volumes. This document is Volume 1 and details all information pertaining to the investigation while Volume 2 contains environmental test results from Geochem Report 02 – B02182.

II.FIELDWORK

The site is referred to as Hickeys Parkgate Street and the locations of all of the investigation points are shown on the detailed site plan enclosed in Appendix VIII to this report.

Site works were supervised by a representative of the consulting engineers and by an IGSL engineer.

The methods utilised during the course of the field investigations are outlined in the following sections .

Cable Tool Boreholes.

Conventional cable tool techniques (shell and auger) were employed at eight locations across the site . All field work was carried out in accordance with BS5930.

Sampling and in - situ testing were performed to BS1377. Disturbed and undisturbed soil samples were taken at regular intervals or at changes in stratification while standard penetration tests (SPT's) were also carried out to establish relative in - situ soil strength.

Full details of stratification, testing, sampling, comments on groundwater and notes on any obstructions to normal boring encountered are given in the detailed borehole records enclosed in Appendix I to this report.

Groundwater standpipes were installed in selected boreholes. Standpipes were installed to the specifications of the projects engineers.

Rotary Coring

A total of four rotary coreholes were constructed across the site. The results of these are enclosed in the detailed coring records enclosed in Appendix II to this report.

Rotary core drilling was undertaken using a top drive lorry mounted Hands England rotary coring rig

The coring operation utilised HQ coring techniques which open a 90mm hole and recover a 75mm core of rock. Air mist flush was used in the drillhole and the cores were packed in 3m core boxes and returned to I.G.S.L.'s laboratory in Newbridge, County Kildare.

The rock cores were then logged by I.G.S.L.'s engineering geologist and detailed core logs are presented in the relevant appendix. These logs include descriptions and the standard mechanical indices (TCR, SCR and RQD). In addition, a graphic fracture spacing log has been prepared, and this is incorporated as part of the engineering geological core records.

Window Sampling

A total of sixteen window samples were carried out at locations indicated on the attached site plan. The window sampler, a Terrier 1000, complies with the requirements of Eurocode 7, Part 2.

The window sample equipment consists of a hollow steel pipe with a plastic liner fitted inside the tube. The soil sample moves up inside the hollow tube as the steel casing is driven into the ground by a powered automatic drop hammer. The inner plastic liner is then removed from the steel tube, split and the recovered sample of soil is logged and sub samples taken for environmental / geotechnical laboratory analysis.

The window sample records are presented in Appendix III to this report.

III. TESTING

During the course of the investigation samples of the sub soils were taken from the boreholes and window sample holes.

The disturbed soil samples, along with the recovered rock cores, were returned to IGSL's laboratory where a programme of testing was scheduled by the projects engineers.

Geotechnical Testing – Soils & Rock

All of the geotechnical test data is included in Appendix VI to this report.

Tests carried out included

- ✓ Moisture Content Tests
- ✓ Atterburg Limits (Classification tests).
- ✓ pH and SO^3 Tests
- ✓ Particle Size Distribution Tests (Wet Sieve)
- ✓ Sedimentation Analysis (by Hydrometer).
- ✓ Organic Content Tests
- ✓ Point Load Tests
- ✓ Uniaxial Compressive Strength (UCS) Tests

Environmental Testing (Soils, Water & Leachate)

Selected soil and water samples were dispatched to the Alcontrol Geochem environmental testing facility in Dublin where they were tested for contaminants as specified by Arup.

Environmental tests were reported on in two sections,

- ✓ Section 1 – Geochem Report No.03 – B00011 containing soil and water samples from the boreholes (5nr tests) is contained in Appendix VII to this report.
- ✓ Section 2 – Geochem Report No. 02 – B02182 containing window sample test results and one groundwater sample (30 nr tests) are presented in Volume II and the tests carried out are summarised in Appendix VIII to this report.

In Situ Tests

1. Standard Penetration Tests

The relative in-situ strength of the sub-soils was established at intervals by cone penetration test . A solid conical point is hammered into the soil and the blow count for 300mm of penetration is recorded in four 75mm increments. Results are presented in the right - hand column of the boring and coring records.

2. Permeability Tests

The permeability tests of the soils was determined by falling head tests (standpipes). Falling head tests were carried out at four locations and are shown in Appendix VI to this report/

3. Gas Monitoring

Gas monitoring was carried out over a period of three site visits using a GA2000 infra red gas detector. This equipment monitors for Methane, Carbon Dioxide, Hydrogen Sulphide and Oxygen. Monitoring results are detailed in Appendix IV to this report.

APPENDIX I
CABLE TOOL BOREHOLE

130328

REPORT NO: 8483 **GEOTECHNICAL BORING RECORD** **IGSL**

CONTRACT : Hickeys Fabrics Ltd., Parkgate Street, Dublin.

BOREHOLE NO: BH1
Sheet 1 of 1

CLIENT :	Hickeys Fabrics Ltd.	GROUND LEVEL (mOD)	3.30	DATE STARTED:	11/12/2002
ENGINEER :	Arup Consulting Engineers	BOREHOLE DIAMETER (mm)	200	DATE COMPLETED:	11/12/2002
CO-ORDINATES :	E 313673.33 N 234317.40	BOREHOLE DEPTH (m)	6.00	BORED BY:	Carrington
		CASING DEPTH (m)			

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES REF. NUMBER	SAMPLES SAMPLE TYPE	SAMPLES DEPTH (m)	FIELD TEST RESULTS	STAND PIPE DETAILS
0	Made ground (Medium dense clayey sandy GRAVEL with bricks and cobbles)								
1					7936	B	1.00	N=23	
2					7937	B	2.00	N=33	
	Stiff brown sandy CLAY		0.80	2.50					
3	Medium dense brown sandy fine to coarse sub rounded GRAVEL		0.30	3.00	7938	B	3.00	N=13	
	Medium dense black sandy medium to coarse sub-rounded to rounded GRAVEL with cobbles		-0.20	3.50					
4					7939	B	4.00	N=21	
5	Contamination evident in Gravels				7940	B	5.00	N=25	
6	End of Borehole at 6.00 m		-2.70	6.00	7941	B	6.00	N=50/ 10mm	
7									
8									
9									
10									

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments
1.60	1.80	1hr	
2.30	2.50	1hr	
5.60	5.80	1hr	
6.00	6.00	1hr	

Water Strike Details

Water Strike	Casing Depth	Sealed At	Rise To	Time	Comments
4.00	6.50	-	2.00	20	

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type
11/12/2002	6.00	1.00	6.00	SP

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
11/12/2002	6.50	6.50	2.00	End of drilling

Remarks:

130329

REPORT NO: 8483 — **GEOTECHNICAL BORING RECORD** — **IGSL**

CONTRACT : Hickeys Fabrics Ltd., Parkgate Street, Dublin.

BOREHOLE NO: BH2
Sheet 1 of 1

CLIENT : Hickeys Fabrics Ltd.	GROUND LEVEL (mOD) 3.68	DATE STARTED: 12/12/2002
ENGINEER : Arup Consulting Engineers	BOREHOLE DIAMETER (mm) 200	DATE COMPLETED: 12/12/2002
CO-ORDINATES : E 313872.40 N 234347.22	BOREHOLE DEPTH (m) 7.00	BORED BY: Carrington
	CASING DEPTH (m)	

DESCRIPTION	ELEVATION (mOD)	DEPTH (m)	SAMPLES REF. NUMBER	SAMPLE TYPE	DEPTH (m)	FIELD TEST RESULTS
Made ground (Medium dense clayey sandy GRAVEL with bricks and cobbles)			7942	B	0.00	
Made ground (Loose to medium dense clayey sandy GRAVEL with bricks, ash and cobbles)	2.68	1.00	7943	B	1.00	N=19
			7944	B	2.00	N=8
Medium dense brown sandy fine to coarse sub rounded GRAVEL with cobbles	0.68	3.00	7945	B	3.00	N=13
			7946	B	4.00	N=15
			7947	B	5.00	N=19
			7948	B	6.00	N=26
End of Borehole at 7.00 m	-3.32	7.00	7949	B	7.00	N=50/ 10mm

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments
0.20	0.50	1hr	-
0.80	0.95	1hr	-
5.60	5.70	1hr	-
6.70	6.90	1hr	-
7.00	7.00	1hr	

Water Strike Details

Water Strike	Casing Depth	Sealed At	Rise To	Time	Comments
4.00	7.00	-	2.00	20	

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type
12/12/2002	7.00	1.00	7.00	SP

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
12/12/2002	7.00	7.00	-	Borehole dry at end of drilling

Remarks:

130330

REPORT NO: 8483 — **GEOTECHNICAL BORING RECORD** — **IGSL**

CONTRACT : Hickeys Fabrics Ltd., Parkgate Street, Dublin.

BOREHOLE NO: BH3
Sheet 1 of 1

CLIENT : Hickeys Fabrics Ltd.	GROUND LEVEL (mOD) 3.85	DATE STARTED: 13/12/2002
ENGINEER : Arup Consulting Engineers	BOREHOLE DIAMETER (mm) 200	DATE COMPLETED: 13/12/2002
CO-ORDINATES : E 313875.70 N 234376.31	BOREHOLE DEPTH (m) 0.40	BORED BY: Carrington
	CASING DEPTH (m)	

DESCRIPTION	ELEVATION (mOD)	DEPTH (m)	SAMPLES REF. NUMBER	SAMPLE TYPE	DEPTH (m)	FIELD TEST RESULTS
Concrete and fill						
End of Borehole at 0.40 m	3.45	0.40				

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments
0.00	0.40	1.00	-

Water Strike Details

Water Strike	Casing Depth	Sealed At	Rise To	Time	Comments

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
13/12/2002	0.40	0.40	-	Borehole dry at end of drilling

Remarks:

130331

REPORT NO: 8483

GEOTECHNICAL BORING RECORD

IGSL

CONTRACT: Hickeys Fabrics Ltd., Parkgate Street, Dublin.		BOREHOLE NO: BH4 Sheet 1 of 1
CLIENT: Hickeys Fabrics Ltd. ENGINEER: Arup Consulting Engineers	GROUND LEVEL (mOD) 4.57 BOREHOLE DIAMETER (mm) 200 BOREHOLE DEPTH (m) 5.00	DATE STARTED: 14/12/2002 DATE COMPLETED: 15/12/2002
CO-ORDINATES: E 313670.52 N 234409.35	CASING DEPTH (m)	BORED BY: Carrington

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES: REF. NUMBER	SAMPLE TYPE	DEPTH (m)	FIELD TEST RESULTS	STAND PIPE DETAILS
0	Made ground (Dense clayey sandy GRAVEL with bricks and cobbles)								
1					7965	B	1.00	N=32	
2					7966	B	2.00	N=31	
3					7967	B	3.00	N=24	
4	Medium dense brown sandy fine to coarse sub rounded GRAVEL		0.57	4.00	7968	B	4.00	N=23	
5	End of Borehole at 5.00 m		-0.43	5.00	7969	B	5.00	N=50/ 10mm	
6									
7									
8									
9									
10									

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments
0.20	0.40	1.00	-
0.80	1.00	1.00	-
1.40	1.60	1.00	-
5.00	5.00	1.00	-

Water Strike Details

Water Strike	Casing Depth	Sealed At	Rise To	Time	Comments
4.50	3.00	-	3.00	20	

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
15/12/2002	5.00	5.00	-	Borehole dry at end of drilling

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type
15/12/2002	5.00	1.00	5.00	SP

Remarks:

130332

REPORT NO: 8483

GEOTECHNICAL BORING RECORD

IGSL

CONTRACT: Hickeys Fabrics Ltd., Parkgate Street, Dublin.		BOREHOLE NO: BH5 Sheet 1 of 1
CLIENT: Hickeys Fabrics Ltd. ENGINEER: Arup Consulting Engineers	GROUND LEVEL (mOD) 3.84 BOREHOLE DIAMETER (mm) 200 BOREHOLE DEPTH (m) 7.20	DATE STARTED: 10/12/2002 DATE COMPLETED: 10/12/2002
CO-ORDINATES: E 313691.42 N 234335.97	CASING DEPTH (m)	BORED BY: Carrington

DEPTH (M)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES: REF. NUMBER	SAMPLE TYPE	DEPTH (m)	FIELD TEST RESULTS	STAND PIPE DETAILS
0	Made ground (Very loose GRAVEL with cobbles)				7928	B	0.00		
1					7929	B	1.00	N=4	
					7930	B	1.50		
2	Soft to firm brown sandy CLAY		1.84	2.00				N=4	
3					7931	B	3.00	N=6	
4	Medium dense sandy fine to coarse sub rounded GRAVEL		-0.16	4.00	7932	B	4.00	N=11	
5	Medium dense fine to medium GRAVEL with cobbles		-1.16	5.00	7933	B	5.00	N=15	
6					7934	B	6.00	N=11	
7					7935	B	7.00	N=98/ 160mm	
	End of Borehole at 6.50 m		-3.36	7.20					
8									
9									
10									

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments
0.10	0.40	1.00	-
0.50	0.70	1.00	-
0.80	1.00	1.00	-
4.70	4.80	1.00	-
6.70	6.90	1.00	-
7.20	7.20	1.00	-

Water Strike Details

Water Strike	Casing Depth	Sealed At	Rise To	Time	Comments
4.00	7.20	-	2.00	20	

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
10/12/2002	7.20	7.20	2.00	End of drilling

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type
10/12/2002	7.20	1.00	7.20	SP

Remarks:

130333

REPORT NO: 8483 — **GEOTECHNICAL BORING RECORD** — **IGSL**

CONTRACT : Hickeys Fabrics Ltd., Parkgate Street, Dublin.

BOREHOLE NO: BH6
Sheet 1 of 1

CLIENT : Hickeys Fabrics Ltd.	GROUND LEVEL (mOD)	3.60	DATE STARTED: 13/12/2002
ENGINEER : Arup Consulting Engineers	BOREHOLE DIAMETER (mm)	200	DATE COMPLETED: 13/12/2002
CO-ORDINATES : E 313681.75 N 234362.10	BOREHOLE DEPTH (m)	7.00	BORED BY: Carrington
	CASING DEPTH (m)		

DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES REF. NUMBER	SAMPLE TYPE	DEPTH (m)	FIELD TEST RESULTS	STAND PIPE DETAILS
Made ground (Medium dense clayey sandy GRAVEL with bricks and cobbles)				7950	B	0.00		
							N=29	
				7951	B	1.50		
				7952	B	2.00	N=9	
Medium dense sandy fine to coarse sub rounded GRAVEL		1.10	2.50					
				7953	B	3.00	N=13	
				7954	B	4.00	N=17	
				7955	B	5.00	N=17	
Soft grey SILT		-2.40	6.00	7956	B	6.00	N=10	
Loose black fine to coarse sub rounded GRAVEL with shells		-2.70	6.30					
End of Borehole at 7.00 m		-3.40	7.00	7957	B	7.00	N=R	

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments
0.20	0.50	1.00	.
0.70	0.90	1.00	.
1.90	2.00	1.00	.

Water Strike Details

Water Strike	Casing Depth	Sealed At	Rise To	Time	Comments
4.00	7.00	-	2.00	20	

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
13/12/2002	7.00	7.00	2.00	End of drilling

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type
12/12/2002	7.00	1.00	7.00	SP

Remarks:

130334

REPORT NO: 8483 — **GEOTECHNICAL BORING RECORD** — **IGSL**

CONTRACT : Hickeys Fabrics Ltd., Parkgate Street, Dublin.

BOREHOLE NO: BH7
Sheet 1 of 1

CLIENT : Hickeys Fabrics Ltd.	GROUND LEVEL (mOD)	4.01	DATE STARTED: 13/12/2002
ENGINEER : Arup Consulting Engineers	BOREHOLE DIAMETER (mm)	200	DATE COMPLETED: 14/12/2002
CO-ORDINATES : E 313700.10 N 234379.78	BOREHOLE DEPTH (m)	6.50	BORED BY: Carrington
	CASING DEPTH (m)		

DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES REF. NUMBER	SAMPLE TYPE	DEPTH (m)	FIELD TEST RESULTS	STAND PIPE DETAILS
Made ground (Medium dense clayey sandy GRAVEL with bricks and cobbles)								
				7958	B	0.50	N=28	
				7959	B	1.50	N=16	
				7960	B	2.50	N=11	
Soft grey SILT		1.01	3.00					
Medium dense brown sandy fine to coarse sub rounded GRAVEL		0.51	3.50	7961	B	3.50	N=17	
				7962	B	4.50	N=24	
				7963	B	5.50	N=21	
Medium dense black fine to coarse sub rounded to rounded GRAVEL		-1.99	6.00					
End of Borehole at 7.00 m		-2.49	6.50	7964	B	6.50	N=R	

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments
0.20	0.40	1.00	.
1.10	1.30	1.00	.
2.00	2.30	1.00	.
6.10	6.20	1.00	
6.50	6.50	1.00	

Water Strike Details

Water Strike	Casing Depth	Sealed At	Rise To	Time	Comments
4.00	6.50	-	3.00	20	

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
14/12/2002	6.50	6.50	-	Borehole dry at end of drilling

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type
14/12/2002	6.50	1.00	6.50	SP

Remarks:

130335

REPORT NO: 8483 | **GEOTECHNICAL BORING RECORD** | **IGSL**

CONTRACT :	Hickeys Fabrics Ltd., Parkgate Street, Dublin.		BOREHOLE NO: BH8 Sheet 1 of 1
CLIENT :	Hickeys Fabrics Ltd.	GROUND LEVEL (mOD) 4.80	DATE STARTED: 15/12/2002
ENGINEER :	Arup Consulting Engineers	BOREHOLE DIAMETER (mm) 200	DATE COMPLETED: 15/12/2002
CO-ORDINATES :	E 313679.24 N 234414.20	BOREHOLE DEPTH (m) 1.00 CASING DEPTH (m)	BORED BY: Carrington

DEPTH (m)	DESCRIPTION	LEGEND	ELEVATION (mOD)	DEPTH (m)	SAMPLES REF. NUMBER	SAMPLE TYPE	DEPTH (m)	FIELD TEST RESULTS	STAND PIPE DETAILS
0	Made ground (Medium dense clayey sandy GRAVEL with bricks and cobbles)								
1	End of Borehole at 1.00 m		3.80	1.00					
2									
3									
4									
5									
6									
7									
8									
9									
10									

Hard Strata Boring / Chiselling

From (m)	To (m)	Hours	Comments
0.10	0.40	1.00	.
0.25	0.50	1.00	.
0.60	0.90	1.00	.
1.00	1.00	1.00	.

Water Strike Details

Water Strike	Casing Depth	Sealed At	Rise To	Time	Comments

Standpipe Installation Details

Date	Tip Depth	RZ Top	RZ Base	Type

Groundwater Observations

Date	Hole Depth	Casing Depth	Depth to Water	Comments
15/12/2002	1.00	1.00	-	Borehole dry at end of drilling

Remarks:

APPENDIX II
ROTARY COREHOLES

130336

REPORT NO. 8483 — GEOTECHNICAL CORE LOG RECORD — IGSL

CONTRACT: Hickeys Fabrics Ltd., Parkgate Street, Dublin.

DRILLHOLE NO: RC1
SHEET: Sheet 1 of 2

CLIENT: Hickeys Fabrics Ltd.
ENGINEER: Arup Consulting Engineers

CORE DIAMETER (mm): 74
GROUND LEVEL (mOD): 3.30

DATE STARTED: 18/12/2002
DATE COMPLETED: 18/12/2002

CO-ORDINATES: 313673.33 234317.40

INCLINATION (Degrees): 90
FLUSH: Water

DRILLED BY: MHDRILL
LOGGED BY: IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	UCS (MPa)	Point Load Is(50) MPa	Symbolic Log	Elevation (mOD)	Depth (m)	SPT (N value)	Standpipe Details	Geotechnical Description
0–6.20		0	0	0							N=8, N=14, N=40, N=48/75mm		OPEN HOLE : No recovery, observed by driller as returns of sandy gravelly clay with occasional cobbles and boulders
	6.20								-2.90	6.20			
6.20–7.70		100	88	37									Strong to locally moderately strong, thickly beddded to locally thinly bedded, grey/dark grey, fine-grained, LIMESTONE, fresh to very locally slightly weathered intersected by smooth, planar, tight, locally clay/calcite-filled, locally slightly iron-oxide stained fractures of 30/45° & very locally sub-vertical dip. (Predominantly calci-siltite with more argillaceous layers at 6.55-7.0m, 8.5-9.0m, 9.2-9.4m & 9.84-10.7m) (Clay-filled fracture at 7.42-7.48m)
	7.70												
7.70–		100	75	7									

Continued next sheet

REMARKS:

INSTALLATION DETAILS
Instalation Type :
Depth to Response Zone top (m) :
Depth to Response Zone bottom (m) :
Comments :

REPORT NO. 8483 — GEOTECHNICAL CORE LOG RECORD — IGSL

CONTRACT: Hickeys Fabrics Ltd., Parkgate Street, Dublin.

DRILLHOLE NO: RC1
SHEET: Sheet 2 of 2

CLIENT: Hickeys Fabrics Ltd.
ENGINEER: Arup Consulting Engineers

CORE DIAMETER (mm): 74
GROUND LEVEL (mOD): 3.30

DATE STARTED: 18/12/2002
DATE COMPLETED: 18/12/2002

CO-ORDINATES: 313673.33 234317.40

INCLINATION (Degrees): 90
FLUSH: Water

DRILLED BY: MHDRILL
LOGGED BY: IGSL

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	UCS (MPa)	Point Load Is(50) MPa	Symbolic Log	Elevation (mOD)	Depth (m)	SPT (N value)	Standpipe Details	Geotechnical Description
	9.20												Strong to locally moderately strong, thickly beddded to locally thinly bedded, grey/dark grey, fine-grained, LIMESTONE, fresh to very locally slightly weathered intersected by smooth, planar, tight, locally clay/calcite-filled, locally slightly iron-oxide stained fractures of 30/45° & very locally sub-vertical dip. (Predominantly calci-siltite with more argillaceous layers at 6.55-7.0m, 8.5-9.0m, 9.2-9.4m & 9.84-10.7m) (Clay-filled fracture at 7.42-7.48m)
9.20–10.70		100	75	18									
	10.70								-7.40	10.70			End of Borehole at 10.70 m

REMARKS:

INSTALLATION DETAILS
Instalation Type :
Depth to Response Zone top (m) :
Depth to Response Zone bottom (m) :
Comments :

130337

REPORT NO. 8483 — **GEOTECHNICAL CORE LOG RECORD** — *IGSL*

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	DRILLHOLE NO :	RC2
		SHEET:	Sheet 1 of 2
CLIENT:	Hickeys Fabrics Ltd.	CORE DIAMETER (mm): 74	DATE STARTED: 19/12/2002
ENGINEER:	Arup Consulting Engineers	GROUND LEVEL (mOD): 3.68	DATE COMPLETED: 19/12/2002
CO-ORDINATES:	313672.40	INCLINATION (Degrees): 90	DRILLED BY: MHDRILL
	234347.22	FLUSH: Water	LOGGED BY: IGSL

DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
0 – 6.00		0	0	0							N=23 N=24 N=33		OPEN HOLE : No recovery, observed by driller as returns of sandy gravelly clay with occasional cobbles and boulders
6.00 – 7.80	6.00	11	3	0					-2.32	6.00	N=50/ 250mm		Angular gravel, cobble and boulder-sized returns of limestone with traces of grey/black clay -PROBABLE BOULDER CLAY
7.80 –	7.80	100	77	32					-4.12	7.80			Strong to locally moderately strong, thickly beddded to locally thinly bedded, grey/dark grey, fine-grained, LIMESTONE, fresh to very locally slightly/moderately weathered intersected by smooth, planar, tight,

Continued next sheet

REMARKS:

INSTALLATION DETAILS
Instalation Type :
Depth to Response Zone top (m) :
Depth to Response Zone bottom (m) :
Comments :

REPORT NO. 8483 — **GEOTECHNICAL CORE LOG RECORD** — *IGSL*

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	DRILLHOLE NO :	RC2
		SHEET:	Sheet 2 of 2
CLIENT:	Hickeys Fabrics Ltd.	CORE DIAMETER (mm): 74	DATE STARTED: 19/12/2002
ENGINEER:	Arup Consulting Engineers	GROUND LEVEL (mOD): 3.68	DATE COMPLETED: 19/12/2002
CO-ORDINATES:	313672.40	INCLINATION (Degrees): 90	DRILLED BY: MHDRILL
	234347.22	FLUSH: Water	LOGGED BY: IGSL

DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
9.30 – 10.80	9.30	100	70	17									locally clay/calcite-filled fractures of 60/45° & very locally sub-horizontal & sub-vertical dip. (Predominantly calci-siltite with more argillaceous layers at 8.1-8.19m, 8.94-9.14m & 10.53-11.1m)
10.80 – 12.30	10.80	100	63	24									
12.30 – 12.90	12.30	100	100	23					-9.22	12.90			End of Borehole at 12.90 m
	12.90												

REMARKS:

INSTALLATION DETAILS
Instalation Type :
Depth to Response Zone top (m) :
Depth to Response Zone bottom (m) :
Comments :

130338

REPORT NO. 8483 — GEOTECHNICAL CORE LOG RECORD — IGSL

CONTRACT: Hickeys Fabrics Ltd., Parkgate Street, Dublin.

DRILLHOLE NO : RC3
SHEET: Sheet 1 of 2

CLIENT: Hickeys Fabrics Ltd.
ENGINEER: Arup Consulting Engineers

CORE DIAMETER (mm): 74
GROUND LEVEL (mOD): 3.85

DATE STARTED: 18/12/2002
DATE COMPLETED: 19/12/2002

CO-ORDINATES: 313675.70
234376.31

INCLINATION (Degrees): 90
FLUSH: Water

DRILLED BY: MHDRILL
LOGGED BY: IGSL

DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
0													OPEN HOLE : No recovery, observed by driller as returns of sandy gravelly clay with occasional cobbles and boulders
1											N=10		
2													
3		0	0	0							N=16		
4											N=46		
5													
6											N=51/ 225mm		
7	7.00								-3.15	7.00			Angular gravel, cobble and boulder-sized returns of limestone with traces of grey/black clay -PROBABLE BOULDER CLAY
		40	20	0					-4.05	7.90			Strong to locally moderately strong, thickly beddded to locally thinly bedded, black/ grey, fine-grained, LIMESTONE (ARGILLACEOUS), fresh to very locally slightly/moderately
	8.50												

Continued next sheet

REMARKS:

INSTALLATION DETAILS
Instalation Type :
Depth to Response Zone top (m) :
Depth to Response Zone bottom (m) :
Comments :

REPORT NO. 8483 — GEOTECHNICAL CORE LOG RECORD — IGSL

CONTRACT: Hickeys Fabrics Ltd., Parkgate Street, Dublin.

DRILLHOLE NO : RC3
SHEET: Sheet 2 of 2

CLIENT: Hickeys Fabrics Ltd.
ENGINEER: Arup Consulting Engineers

CORE DIAMETER (mm): 74
GROUND LEVEL (mOD): 3.85

DATE STARTED: 18/12/2002
DATE COMPLETED: 19/12/2002

CO-ORDINATES: 313675.70
234376.31

INCLINATION (Degrees): 90
FLUSH: Water

DRILLED BY: MHDRILL
LOGGED BY: IGSL

DOWNHOLE DEPTH (m)	CORE RUN DEPTH (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing (mm) 0 250 500	UCS (MPa)	POINT LOAD Is(50) MPa	SYMBOLIC LOG	ELEVATION (mOD)	DEPTH (m)	SPT (N value)	STANDPIPE DETAILS	GEOTECHNICAL DESCRIPTION
		100	43	7									weathered intersected by smooth, planar, tight, locally clay-smeared, calcite-filled fractures of 45° & very locally sub-horizontal dip. (Moderately weathered layer at 8.3-8.5m)
10	10.00												
11		100	47	0									
	11.50												
12		100	85	9									
13	13.00								-9.15	13.00			End of Borehole at 13.00 m
14													
15													
16													

REMARKS:

INSTALLATION DETAILS
Instalation Type :
Depth to Response Zone top (m) :
Depth to Response Zone bottom (m) :
Comments :

130339

REPORT NO. 8483 — GEOTECHNICAL CORE LOG RECORD — IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.
DRILLHOLE NO:	RC4
SHEET:	Sheet 1 of 2
CLIENT:	Hickeys Fabrics Ltd.
ENGINEER:	Arup Consulting Engineers
CORE DIAMETER (mm):	74
GROUND LEVEL (mOD):	4.57
DATE STARTED:	19/12/2002
DATE COMPLETED:	19/12/2002
CO-ORDINATES:	313670.52 234409.35
INCLINATION (Degrees):	90
FLUSH:	Water
DRILLED BY:	MHDRILL
LOGGED BY:	IGSL

CORE RUN DEPTH (m)	T.C.R.%	S.C.R.%	R.Q.D.%	ELEVATION (mOD)	DEPTH (m)	GEOTECHNICAL DESCRIPTION
0.00–7.00	0	0	0			OPEN HOLE : No recovery, observed by driller as returns of sandy gravelly clay with occasional cobbles and boulders
7.00–8.50	33	1	0	-2.43	7.00	Angular gravel, cobble and boulder-sized returns of limestone with traces of grey/black clay -PROBABLE BOULDER CLAY

Column headings: DOWNHOLE DEPTH (m), CORE RUN DEPTH (m), T.C.R.%, S.C.R.%, R.Q.D.%, Fracture Spacing (mm) (0, 250, 500), UCS (MPa), POINT LOAD Is(50) MPa, SYMBOLIC LOG, ELEVATION (mOD), DEPTH (m), SPT (N value), STANDPIPE DETAILS, GEOTECHNICAL DESCRIPTION

Downhole depth scale: 1, 2, 3, 4, 5, 6, 7

Continued next sheet

REMARKS:

INSTALLATION DETAILS
Instalation Type :
Depth to Response Zone top (m) :
Depth to Response Zone bottom (m) :
Comments :

REPORT NO. 8483 — GEOTECHNICAL CORE LOG RECORD — IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.
DRILLHOLE NO:	RC4
SHEET:	Sheet 2 of 2
CLIENT:	Hickeys Fabrics Ltd.
ENGINEER:	Arup Consulting Engineers
CORE DIAMETER (mm):	74
GROUND LEVEL (mOD):	4.57
DATE STARTED:	19/12/2002
DATE COMPLETED:	19/12/2002
CO-ORDINATES:	313670.52 234409.35
INCLINATION (Degrees):	90
FLUSH:	Water
DRILLED BY:	MHDRILL
LOGGED BY:	IGSL

CORE RUN DEPTH (m)	T.C.R.%	S.C.R.%	R.Q.D.%	ELEVATION (mOD)	DEPTH (m)	GEOTECHNICAL DESCRIPTION
8.50–10.00	100	48	18			Angular gravel, cobble and boulder-sized returns of limestone with traces of grey/black clay -PROBABLE BOULDER CLAY
				-4.58	9.15	Strong to locally moderately strong, thickly beddded to locally thinly bedded, grey/dark grey, fine-grained, LIMESTONE, fresh to very locally slightly/moderately weathered intersected by smooth, planar, tight, locally clay smeared, very locally moderately iron-oxide stained fractures of 45° & locally irregular dip. (Predominantly argillaceous with more calci-siltite layers at 9.15-10.0m, 10.7-10.92m, 11.05-11.14m & 11.67-12.4m) (Slightly/moderately weathered layers at 10.0-10.7m, 11.14-11.5m & 12.42-12.9m)
10.00–11.50	100	35	0			
11.50–13.00	100	49	9			
13.00				-8.43	13.00	End of Borehole at 13.00 m

Column headings: DOWNHOLE DEPTH (m), CORE RUN DEPTH (m), T.C.R.%, S.C.R.%, R.Q.D.%, Fracture Spacing (mm) (0, 250, 500), UCS (MPa), POINT LOAD Is(50) MPa, SYMBOLIC LOG, ELEVATION (mOD), DEPTH (m), SPT (N value), STANDPIPE DETAILS, GEOTECHNICAL DESCRIPTION

Downhole depth scale: 10, 11, 12, 13, 14, 15, 16

REMARKS:

INSTALLATION DETAILS
Instalation Type :
Depth to Response Zone top (m) :
Depth to Response Zone bottom (m) :
Comments :

APPENDIX III
WINDOW SAMPLE LOGS

130340

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS1
		Sheet:	Sheet 1 of 2
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	11/12/2002
CO-ORDINATES:	E 313680.90 N 234328.61	Date Completed:	11/12/2002
HAMMER MASS (kg): 60.0 INCREMENT SIZE (mm): 1000 FALL HEIGHT (mm): 500.00		Ground Level (mOD):	3.53

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Samples: Ref. No.	Samples: Type	Samples: Depth (m)	Probe Type:DPH Blowcount	Window Sample Recovery
0.0	Made ground (slightly clayey sandy GRAVEL)								191	0m to 1m - 90% recovery
1.0									36	1m to 2m - 36% recovery
2.0									39	2m to 3m - 39% recovery
	Brown sandy fine to menium sub rounded to rounded GRAVEL		2.20	1.33						
3.0									47	3m to 4m - 47% recovery
4.0	Continued next sheet		4.00	-0.47					53	4m to 5m - 53% recovery

Groundwater Observations:

Stability:

Remarks: Pipe installed at 2.5m

130341

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS1
		Sheet:	Sheet 2 of 2
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	11/12/2002
CO-ORDINATES:	E 313680.90 N 234328.61	Date Completed:	11/12/2002
HAMMER MASS (kg) : 50.0	INCREMENT SIZE (mm) : 1000	FALL HEIGHT (mm) : 500.00	Ground Level (mOD): 3.53

Samples / Probe Type:DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Ref. No.	Type	Depth (m)	Blowcount	Window Sample Recovery
4.0	Final depth, 5.00 m									
5.0										
6.0										
7.0										
8.0										

Groundwater Observations:

Stability:

Remarks: Pipe installed at 2.5m

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS2
		Sheet:	Sheet 1 of 1
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	11/12/2002
CO-ORDINATES:	E 313689.29 N 234344.11	Date Completed:	11/12/2002
HAMMER MASS (kg) : 50.0	INCREMENT SIZE (mm) : 1000	FALL HEIGHT (mm) : 500.00	Ground Level (mOD): 3.75

Samples / Probe Type:DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Ref. No.	Type	Depth (m)	Blowcount	Window Sample Recovery
0.0	Made ground (slightly clayey sandy GRAVEL)								206	0m to 1m - 50% recovery
1.0									156	1m to 2m - 60% recovery
2.0									107	2m to 3m - 40% recovery
	Brown clayey sandy fine to menium sub rounded to rounded GRAVEL		2.20	1.55						
3.0									121	3m to 4m - 90% recovery
4.0	Final depth, 4.00 m		4.00	-0.25						

Groundwater Observations:

Stability:

Remarks: Pipe installed at 2.5m

130342

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS3
		Sheet:	Sheet 1 of 1
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	11/12/2002
CO-ORDINATES:	E 313676.46 N 234350.12 HAMMER MASS (kg) : 50.0 INCREMENT SIZE (mm) : 1000 FALL HEIGHT (mm) : 500.00	Date Completed:	11/12/2002
		Ground Level (mOD):	3.61

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Samples: Ref. No.	Type	Depth (m)	Probe Type:DPH Blowcount	Window Sample Recovery
0.0	Made ground (slightly clayey sandy GRAVEL)								35	0m to 1m - 80% recove
1.0									39	1m to 2m - 60% recove
2.0									108	2m to 3m - 10% recove
	Brown clayey sandy fine to menium sub rounded to rounded GRAVEL		2.20	1.41						
3.0									129	3m to 4m - 10% recove
4.0	Final depth, 4.00 m		4.00	-0.39						

Groundwater Observations:

Stability:

Remarks: Pipe installed at 3m

130343

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS4
		Sheet:	Sheet 1 of 2
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	11/12/2002
CO-ORDINATES:	E 313675.78 N 234376.36 HAMMER MASS (kg) : 50.0 INCREMENT SIZE (mm) : 1000 FALL HEIGHT (mm) : 500.00	Date Completed:	11/12/2002
		Ground Level (mOD):	3.62

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Samples: Ref. No.	Type	Depth (m)	Probe Type:DPH Blowcount	Window Sample Recovery
0.0	Made ground (slightly clayey sandy GRAVEL)								75	0m to 1m - 40% recovery
1.0									65	1m to 2m - 80% recovery
2.0									68	2m to 3m - 80% recovery
	Brown clayey gravelly SAND		2.30	1.32						
3.0	Brown very sandy fine to medium sub rounded to rounded GRAVEL becoming coarser with depth		3.00	0.62					47	3m to 4m - 68% recovery
4.0	Continued next sheet								47	4m to 5m - 47% recovery

Groundwater Observations:

Stability:

Remarks:

130344

REPORT NO. 8483 **GEOTECHNICAL WINDOW SAMPLE RECORD** IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS4
		Sheet:	Sheet 2 of 2
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	11/12/2002
CO-ORDINATES:	E 313675.78 N 234376.36	Date Completed:	11/12/2002
HAMMER MASS (kg): 50.0 INCREMENT SIZE (mm): 1000 FALL HEIGHT (mm): 500.00		Ground Level (mOD):	3.62

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Samples: Ref. No.	Type	Depth (m)	Probe Type:DPH Blowcount	Window Sample Recovery
4.0	Brown very sandy fine to medium sub rounded to rounded GRAVEL becoming coarser with depth									
5.0	Final depth, 5.00 m		5.00	-1.38						
6.0										
7.0										
8.0										

Groundwater Observations:

Stability:

Remarks:

REPORT NO. 8483 **GEOTECHNICAL WINDOW SAMPLE RECORD** IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS5
		Sheet:	Sheet 1 of 2
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	14/12/2002
CO-ORDINATES:	E 313670.86 N 234393.94	Date Completed:	14/12/2002
HAMMER MASS (kg): 50.0 INCREMENT SIZE (mm): 1000 FALL HEIGHT (mm): 500.00		Ground Level (mOD):	4.02

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Samples: Ref. No.	Type	Depth (m)	Probe Type:DPH Blowcount	Window Sample Recovery
0.0	Made ground (slightly clayey sandy GRAVEL)								61	0m to 1m - 80% recovery
1.0									27	1m to 2m - 80% recovery
2.0									31	2m to 3m - 80% recovery
	Brown slightly sandy slightly gravelly CLAY		2.20	1.82						
3.0									68	3m to 4m - 80% recovery
	Brown fine to coarse angular GRAVEL Continued next sheet		3.80	0.22						
4.0									52	4m to 5m - 90% recovery

Groundwater Observations:

Stability:

Remarks: Pipe installed at 4m

130345

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS5
		Sheet:	Sheet 2 of 2
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	14/12/2002
CO-ORDINATES:	E 313670.86 N 234393.94 — HAMMER MASS (kg): 50.0 INCREMENT SIZE (mm): 1000 FALL HEIGHT (mm): 500.00	Date Completed:	14/12/2002
		Ground Level (mOD):	4.02

Samples / Probe Type:DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Ref. No.	Type	Depth (m)	Blowcount	Window Sample Recovery
4.0	Brown fine to coarse angular GRAVEL									
	Grey sandy fine to coarse angular gravelly CLAY		4.70	-0.68						
5.0	Final depth, 5.00 m		5.00	-0.98						
6.0										
7.0										
8.0										

Groundwater Observations:

Stability:

Remarks: Pipe installed at 4m

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS6
		Sheet:	Sheet 1 of 1
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	14/12/2002
CO-ORDINATES:	E 313665.32 N 234405.39 — HAMMER MASS (kg): 50.0 INCREMENT SIZE (mm): 1000 FALL HEIGHT (mm): 500.00	Date Completed:	14/12/2002
		Ground Level (mOD):	4.11

Samples / Probe Type:DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Ref. No.	Type	Depth (m)	Blowcount	Window Sample Recovery
0.0	Made ground (slightly clayey sandy GRAVEL)								92	0m to 1m - 90% recovery
1.0									37	1m to 2m - 50% recovery
2.0									39	2m to 3m - 10% recovery
	Grey very sandy CLAY		2.59	1.52						
3.0									33	3m to 4m - 0% recovery
4.0	Final depth, 4.00 m		4.00	0.11						

Groundwater Observations:

Stability:

Remarks: Pipe installed at 2.7m

130346

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS7
		Sheet:	Sheet 1 of 2
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	14/12/2002
CO-ORDINATES:	E 313720.04 N 234404.35	Date Completed:	14/12/2002
HAMMER MASS (kg): 50.0 INCREMENT SIZE (mm): 1000 FALL HEIGHT (mm): 500.00		Ground Level (mOD):	4.23

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Ref. No.	Type	Depth (m)	Blowcount	Window Sample Recovery
0.0	Made ground (slightly clayey sandy GRAVEL)								105	0m to 1m - 90% recove
1.0									67	1m to 2m - 10% recover
2.0									39	2m to 3m - 40% recover
3.0	Brown very gravelly CLAY		3.00	1.23					44	3m to 4m - 10% recover
	Grey very sandy CLAY		3.28	0.95						
4.0	Continued next sheet								36	4m to 5m - 40% recover

Groundwater Observations:

Stability:

Remarks: Pipe installed at 4m

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS7
		Sheet:	Sheet 2 of 2
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	14/12/2002
CO-ORDINATES:	E 313720.04 N 234404.35	Date Completed:	14/12/2002
HAMMER MASS (kg): 50.0 INCREMENT SIZE (mm): 1000 FALL HEIGHT (mm): 500.00		Ground Level (mOD):	4.23

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Ref. No.	Type	Depth (m)	Blowcount	Window Sample Recovery
4.0	Grey very sandy CLAY									
	Brown fine well rounded GRAVEL		4.70	-0.47						
5.0	Final depth, 5.00 m		5.00	-0.77						
6.0										
7.0										
8.0										

Groundwater Observations:

Stability:

Remarks: Pipe installed at 4m

130347

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS8
		Sheet:	Sheet 1 of 1
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	14/12/2002
CO-ORDINATES:	E 313717.57 N 234389.02 HAMMER MASS (kg): 50.0 INCREMENT SIZE (mm): 1000 FALL HEIGHT (mm): 500.00	Date Completed:	14/12/2002
		Ground Level (mOD):	4.23

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Samples Ref. No.	Samples Type	Samples Depth (m)	Probe Type:DPH Blowcount	Window Sample Recovery
0.0	Made ground (slightly clayey sandy GRAVEL)								82	0m to 1m - 80% recove
1.0									73	1m to 2m - 70% recove
2.0	Final depth, 2.00 m		2.00	2.23						
3.0										
4.0										

Groundwater Observations:

Stability:

Remarks:

130348

REPORT NO.8483 DYNAMIC PROBE WITH WINDOW SAMPLES I.G.S.L.

CONTRACT: Hickeys Fabrics Ltd.			PROBE NO.: WS9 SHEET: 1 of 1
CLIENT Hickeys Fabrics Ltd.	PROBE WEIGHT (DPL,DPM,DPH):	DPH	DATE STARTED: 14/12/02
ENGINEER: ARUP Consulting Engineers	HAMMER MASS (kg):	50	DATE COMPLETED: 14/12/02
	FALL HEIGHT (mm):	500	PROBED BY: I.G.S.L.
LOCATION:Park Gate Street, Dublin	90° CONE DIAMETER (mm):	43.7	
	SPECIFIC WORK PER BLOW (kJ/m^2):	167	GROUND LEVEL (mOD):
	BLOWS COUNTED OVER (mm):	100	DATUM:

DOWNHOLE DEPTH (m)	SOIL DESCRIPTION	Depth (m)	WINDOW SAMPLE DEPTH	RECOVERY (%)	BLOWCOUNT	ELEVATION (mOD)	DEPTH (m)	BLOWS PER 100mm	GRAPHIC PROBE RECORD 0 10 20 30 40
0.0	Made ground (slightly clayey sandy GRAVEL)	0.25							
	Refusal large cobbles - hole abandoned								
0.5									
1.0									
1.5									
2.0									
2.5									
3.0									
3.5									
4.0									
4.5									
5.0									

COMMENTS:

INSTALLATIONS:

130349

REPORT NO. 8483 **GEOTECHNICAL WINDOW SAMPLE RECORD** **IGSL**

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.
CLIENT:	Hickeys Fabrics Ltd.
ENGINEER:	Arup Consulting Engineers
CO-ORDINATES:	E 313721.55 N 234364.87
HAMMER MASS (kg):	50.0
INCREMENT SIZE (mm):	1000
FALL HEIGHT (mm):	500.00
Trial Pit No.:	WS10
Sheet:	Sheet 1 of 1
Excavation Method:	Window Sampler
Date Started:	14/12/2002
Date Completed:	14/12/2002
Ground Level (mOD):	4.21

Probe Type:DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Ref. No.	Type	Depth (m)	Blowcount	Window Sample Recovery
0.0	Made ground (slightly clayey sandy GRAVEL)								56	0m to 1m - 70% recovery
1.0									43	1m to 2m - 70% recovery
2.0									38	2m to 3m - 80% recovery
3.0									44	3m to 4m - 10% recovery
	Grey slightly sandy CLAY		3.34	0.87						
4.0	Final depth, 4.00 m		4.00	0.21						

Groundwater Observations:

Stability:

Remarks: Pipe installed at 2.6m

130350

REPORT NO. 8483 **GEOTECHNICAL WINDOW SAMPLE RECORD** **IGSL**

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.
CLIENT:	Hickeys Fabrics Ltd.
ENGINEER:	Arup Consulting Engineers
CO-ORDINATES:	E 313740.67 N 234375.04
HAMMER MASS (kg):	50.0
INCREMENT SIZE (mm):	1000
FALL HEIGHT (mm):	500.00
Trial Pit No.:	WS11
Sheet:	Sheet 1 of 2
Excavation Method:	Window Sampler
Date Started:	14/12/2002
Date Completed:	14/12/2002
Ground Level (mOD):	4.22

Probe Type:DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Ref. No.	Type	Depth (m)	Blowcount	Window Sample Recovery
0.0	Made ground (slightly clayey sandy GRAVEL)								71	0m to 1m - 10% recovery
1.0									52	1m to 2m - 80% recovery
2.0									41	2m to 3m - 80% recovery
	Brown slightly gravelly sandy CLAY		2.50	1.72						
3.0									20	3m to 4m - 80% recovery
	Grey sandy CLAY		3.70	0.52						
4.0	Continued next sheet								30	4m to 5m - 70% recovery

Groundwater Observations:

Stability:

Remarks: Pipe installed at 5m

130351

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS11
		Sheet:	Sheet 2 of 2
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	14/12/2002
CO-ORDINATES:	E 313740.67 N 234375.04	HAMMER MASS (kg) : 50.0 INCREMENT SIZE (mm) : 1000 FALL HEIGHT (mm) : 500.00	Date Completed: 14/12/2002
		Ground Level (mOD):	4.22

Probe Type:DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Ref. No.	Type	Depth (m)	Blowcount	Window Sample Recovery
4.0	Grey sandy CLAY		4.90	-0.68						
5.0	Brown fine to medium sub angular GRAVEL Final depth, 5.00 m		5.00	-0.78						
6.0										
7.0										
8.0										

Groundwater Observations:

Stability:

Remarks: Pipe installed at 5m

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS12
		Sheet:	Sheet 1 of 2
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	14/12/2002
CO-ORDINATES:	E 313775.98 N 234374.47	HAMMER MASS (kg) : 50.0 INCREMENT SIZE (mm) : 1000 FALL HEIGHT (mm) : 500.00	Date Completed: 14/12/2002
		Ground Level (mOD):	4.27

Probe Type:DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Ref. No.	Type	Depth (m)	Blowcount	Window Sample Recovery
0.0	Made ground (slightly clayey sandy GRAVEL)								82	0m to 1m - 70% recovery
1.0									27	1m to 2m - 80% recovery
2.0	Brown slightly sandy gravelly CLAY		2.00	2.27					24	2m to 3m - 80% recovery
3.0									26	3m to 4m - 60% recovery
4.0	Continued next sheet								33	4m to 5m - 10% recovery

Groundwater Observations:

Stability:

Remarks: Pipe installed at 4m

130352

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS12
		Sheet:	Sheet 2 of 2
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	14/12/2002
CO-ORDINATES:	E 313775.98 N 234374.47	Date Completed:	14/12/2002
HAMMER MASS (kg): 50.0 INCREMENT SIZE (mm): 1000 FALL HEIGHT (mm): 500.00		Ground Level (mOD):	4.27

Probe Type:DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Samples: Ref. No.	Samples: Type	Samples: Depth (m)	Blowcount	Window Sample	Recovery
4.0	Brown slightly sandy gravelly CLAY										
5.0	Final depth, 5.00 m		5.00	-0.73							
6.0											
7.0											
8.0											

Groundwater Observations:

Stability:

Remarks: Pipe installed at 4m

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS13
		Sheet:	Sheet 1 of 2
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	14/12/2002
CO-ORDINATES:	E 313741.78 N 234354.43	Date Completed:	14/12/2002
HAMMER MASS (kg): 50.0 INCREMENT SIZE (mm): 1000 FALL HEIGHT (mm): 500.00		Ground Level (mOD):	4.25

Probe Type:DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Samples: Ref. No.	Samples: Type	Samples: Depth (m)	Blowcount	Window Sample	Recovery
0.0	Made ground (slightly clayey sandy GRAVEL)								25	0m to 1m - 60% recovery	
1.0									23	1m to 2m - 70% recovery	
2.0									15	2m to 3m - 10% recovery	
3.0									23	3m to 4m - 70% recovery	
	Brown slightly gravelly sandy CLAY		3.70	0.55							
4.0	Continued next sheet								30	4m to 5m - 60% recovery	

Groundwater Observations:

Stability:

Remarks: Pipe installed at 4m

130353

REPORT NO. 8483 **GEOTECHNICAL WINDOW SAMPLE RECORD** **IGSL**

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS13
		Sheet:	Sheet 2 of 2
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	14/12/2002
CO-ORDINATES:	E 313741.78 N 234354.43 — HAMMER MASS (kg) : 50.0; INCREMENT SIZE (mm) : 1000; FALL HEIGHT (mm) : 500.00	Date Completed:	14/12/2002
		Ground Level (mOD):	4.25

Probe Type:DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Samples: Ref. No.	Type	Depth (m)	Blowcount	Window Sample Recovery
4.0	Brown slightly gravelly sandy CLAY									
	Brown sandy fine rounded GRAVEL		4.85	-0.60						
5.0	Final depth, 5.00 m		5.00	-0.75						
6.0										
7.0										
8.0										

Groundwater Observations:

Stability:

Remarks: Pipe installed at 4m

REPORT NO. 8483 **GEOTECHNICAL WINDOW SAMPLE RECORD** **IGSL**

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS14
		Sheet:	Sheet 1 of 1
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	14/12/2002
CO-ORDINATES:	E 313755.03 N 234361.44 — HAMMER MASS (kg) : 50.0; INCREMENT SIZE (mm) : 1000; FALL HEIGHT (mm) : 500.00	Date Completed:	14/12/2002
		Ground Level (mOD):	4.27

Probe Type:DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Samples: Ref. No.	Type	Depth (m)	Blowcount	Window Sample Recovery
0.0	Made ground (slightly clayey sandy GRAVEL)								73	0m to 1m - 50% recovery
1.0									57	1m to 2m - 10% recovery
2.0									65	2m to 3m - 70% recovery
3.0									54	3m to 4m - 60% recovery
	Brown slightly gravelly sandy CLAY		3.10	1.17						
	Brown slightly gravelly sandy CLAY with cobbles		3.60	0.67						
4.0	Final depth, 4.00 m		4.00	0.27						

Groundwater Observations:

Stability:

Remarks: Pipe installed at 3.6m

130354

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS15
		Sheet:	Sheet 1 of 1
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	15/12/2002
CO-ORDINATES:	E 313724.44 N 234353.80	HAMMER MASS (kg) : 50.0 INCREMENT SIZE (mm) : 1000 FALL HEIGHT (mm) : 500.00	Date Completed: 15/12/2002 Ground Level (mOD): 4.24

Probe Type:DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Ref. No.	Type	Depth (m)	Blowcount	Window Sample Recovery
0.0	Made ground (slightly clayey sandy GRAVEL)								45	0m to 1m - 50% recovery
1.0									46	1m to 2m - 80% recovery
	Black SILT		1.80	2.44						
2.0	Made ground (slightly clayey sandy GRAVEL)		2.00	2.24					38	2m to 3m - 70% recovery
3.0									38	3m to 4m - 10% recovery
	Brown slightly sandy CLAY		3.20	1.04						
	Brown fine to medium GRAVEL		3.72	0.52						
4.0	Final depth, 4.00 m		4.00	0.24						

Groundwater Observations:

Stability:

Remarks:

130355

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

		Trial Pit No.:	WS16
CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Sheet:	Sheet 1 of 2
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	15/12/2002
CO-ORDINATES:	E 313705.45 N 234344.07	HAMMER MASS (kg) : 50.0 INCREMENT SIZE (mm) : 1000 FALL HEIGHT (mm) : 500.00	Date Completed: 15/12/2002 Ground Level (mOD): 4.17

Probe Type:DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Ref. No.	Type	Depth (m)	Blowcount	Window Sample Recovery
0.0	Made ground (slightly clayey sandy GRAVEL)								33	0m to 1m - 80% recovery
1.0									36	1m to 2m - 80% recovery
2.0									27	2m to 3m - 10% recovery
	Brown very clayey SAND		2.30	1.87						
3.0									52	3m to 4m - 90% recovery
			3.52	0.65						
4.0	Continued next sheet								49	4m to 5m - 20% recovery

Groundwater Observations:

Stability:

Remarks: Pipe installed at 4m

REPORT NO. 8483 GEOTECHNICAL WINDOW SAMPLE RECORD IGSL

CONTRACT:	Hickeys Fabrics Ltd., Parkgate Street, Dublin.	Trial Pit No.:	WS16
		Sheet:	Sheet 2 of 2
CLIENT:	Hickeys Fabrics Ltd.	Excavation Method:	Window Sampler
ENGINEER:	Arup Consulting Engineers	Date Started:	15/12/2002
CO-ORDINATES:	E 313705.45 N 234344.07 HAMMER MASS (kg) : 50.0 INCREMENT SIZE (mm) : 1000 FALL HEIGHT (mm) : 500.00	Date Completed:	15/12/2002
		Ground Level (mOD):	4.17

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water Strike (m)	Samples: Ref. No.	Samples: Type	Samples: Depth (m)	Probe Type:DPH Blowcount	Window Sample Recovery
4.0	Final depth, 5.00 m									
5.0										
6.0										
7.0										
8.0										

Groundwater Observations:

Stability:

Remarks: Pipe installed at 4m

APPENDIX V
IN SITU MONITORING RESULTS

Note: Appendix IV was not included in original 2003 report- this was a clerical error in appendix numbering

APPENDIX V
IN SITU MONITORING RESULTS

Gas Monitoring & Water Level Report

Client :	Hickeys Fabrics Ltd.	Consultant Engineers:	Arup Consulting Engineers	Contract No:	8483
Location:	Parkgate Street, Dublin	Date: 25/2/03			

Borehole No.	METHANE % CH_4	CARBON DIOXIDE % CO_2	OXYGEN % O_2	CARBON MONOXIDE CO (ppm)	HYDROGEN SULPHIDE H_2S (ppm)	BAROMETRIC PRESSURE (mb)	RELATIVE PRESSURE (mb)	Water Level (m)	Hole Depth(m)
WS2	0.0	0.0	20.7	0.0	0.0	1012	-1.1	DRY	2.50
WS3	0.0	0.0	20.4	0.0	0.0	1012	-1.1	DRY	3.00
WS5	3.9	1.2	17.5	0.0	0.0	1012	-1.1	3.70	4.00
WS6	0.0	0.0	20.7	0.0	0.0	1012	-1.1	2.53	2.70
WS7	0.0	0.0	20.8	0.0	0.0	1012	-1.1	2.57	4.00
WS10	0.0	0.1	20.7	0.0	0.0	1012	-1.1	2.40	2.60
WS11	0.0	0.5	20.4	0.0	0.0	1012	-1.1	3.92	5.00
WS12	0.0	0.0	20.7	0.0	0.0	1012	-1.1	3.55	4.00
WS13	0.0	0.0	20.7	0.0	0.0	1012	-1.1	3.66	4.00
WS14	0.0	0.0	20.7	0.0	0.0	1012	-1.1	DRY	3.60
WS16	0.0	0.0	20.7	0.0	0.0	1012	-1.1	DRY	4.00
BH1	0.0	0.0	20.7	0.0	0.0	1012	-1.1	3.51	6.50
BH2	0.0	0.0	20.4	0.0	0.0	1012	-1.1	3.43	7.00
BH4	0.0	0.0	20.4	0.0	0.0	1012	-1.1	3.66	5.00
BH5	0.0	0.0	20.7	0.0	0.0	1012	-1.1	3.45	7.20
BH6	0.0	2.3	19.7	0.0	0.0	1012	-1.1	DRY	7.00
BH7	0.0	0.0	20.5	0.0	0.0	1012	-1.1	3.77	6.50

Gas detection employed by a GA2000 Landfill Gas Analyser which measures CH_4 and CO_2 in % by Infra-red measurement, CO and H_2S in ppm and O_2 in % by internal electrochemical cell measurement.

IGSL

Gas Monitoring & Water Level Report

Client :	Hickeys Fabrics Ltd.	Consultant Engineers:	Arup Consulting Engineers	Contract No:	8483
Location:	Parkgate Street, Dublin	Date: 3/3/03			

Borehole No.	METHANE % CH_4	CARBON DIOXIDE % CO_2	OXYGEN % O_2	CARBON MONOXIDE CO (ppm)	HYDROGEN SULPHIDE H_2S (ppm)	BAROMETRIC PRESSURE (mb)	RELATIVE PRESSURE (mb)	Water Level (m)	Hole Depth(m)
WS2	0.0	0.0	20.4	0.0	0.0	992	-1.1	DRY	2.50
WS3	0.0	0.0	20.1	0.0	0.0	992	-1.1	DRY	3.00
WS5	3.4	1.3	16.4	0.0	0.0	992	-1.1	3.50	4.00
WS6	0.0	0.0	20.2	0.0	0.0	992	-1.1	2.5	2.70
WS7	0.0	0.0	19.9	0.0	0.0	992	-1.1	2.5	4.00
WS10	0.0	0.1	19.7	0.0	0.0	992	-1.1	2.40	2.60
WS11	0.0	0.6	19.2	0.0	0.0	992	-1.1	3.87	5.00
WS12	0.0	0.0	20.4	0.0	0.0	992	-1.1	3.4	4.00
WS13	0.0	0.1	19.8	0.0	0.0	992	-1.1	3.56	4.00
WS14	0.0	0.0	20.1	0.0	0.0	992	-1.1	DRY	3.60
WS16	0.0	0.0	20.3	0.0	0.0	992	-1.1	DRY	4.00
BH1	0.0	0.0	20.1	0.0	0.0	992	-1.1	3.59	6.50
BH2	0.0	0.0	20.1	0.0	0.0	992	-1.1	3.25	7.00
BH4	0.0	0.2	19.7	0.0	0.0	992	-1.1	3.54	5.00
BH5	0.0	0.0	20.7	0.0	0.0	992	-1.1	3.45	7.20
BH6	0.0	2.1	18.9	0.0	0.0	992	-1.1	DRY	7.00
BH7	0.0	0.0	20.0	0.0	0.0	992	-1.1	3.60	6.50

Gas detection employed by a GA2000 Landfill Gas Analyser which measures CH_4 and CO_2 in % by Infra-red measurement, CO and H_2S in ppm and O_2 in % by internal electrochemical cell measurement.

IGSL

Gas Monitoring & Water Level Report

Client :	Hickeys Fabrics Ltd.	Consultant Engineers:	Arup Consulting Engineers	Contract No:	8483
Location:	Parkgate Street, Dublin	Date: 15/3/03			

Borehole No.	METHANE % CH_4	CARBON DIOXIDE % CO_2	OXYGEN % O_2	CARBON MONOXIDE CO (ppm)	HYDROGEN SULPHIDE H_2S (ppm)	BAROMETRIC PRESSURE (mb)	RELATIVE PRESSURE (mb)	Water Level (m)	Hole Depth(m)
WS2	0.0	0.0	20.3	0.0	0.0	1015	-1.1	DRY	2.50
WS3	0.0	0.0	20.2	0.0	0.0	1015	-1.1	DRY	3.00
WS5	3.3	1.4	16.5	0.0	0.0	1015	-1.1	2.54	4.00
WS6	0.0	0.0	20.3	0.0	0.0	1015	-1.1	2.5	2.70
WS7	0.0	0.0	19.9	0.0	0.0	1015	-1.1	2.54	4.00
WS10	0.0	0.1	19.9	0.0	0.0	1015	-1.1	2.42	2.60
WS11	0.0	0.8	19.5	0.0	0.0	1015	-1.1	3.79	5.00
WS12	0.0	0.0	20.6	0.0	0.0	1015	-1.1	3.51	4.00
WS13	0.0	0.2	19.7	0.0	0.0	1015	-1.1	3.66	4.00
WS14	0.0	0.0	20.3	0.0	0.0	1015	-1.1	DRY	3.60
WS16	0.0	0.0	20.3	0.0	0.0	1015	-1.1	DRY	4.00
BH1	0.0	0.0	20.2	0.0	0.0	1015	-1.1	3.53	6.50
BH2	0.0	0.0	20.1	0.0	0.0	1015	-1.1	3.46	7.00
BH4	0.0	0.3	19.6	0.0	0.0	1015	-1.1	3.69	5.00
BH5	0.0	0.0	20.7	0.0	0.0	1015	-1.1	3.49	7.20
BH6	0.0	2.2	19.1	0.0	0.0	1015	-1.1	DRY	7.00
BH7	0.0	0.0	20.1	0.0	0.0	1015	-1.1	3.74	6.50

Gas detection employed by a GA2000 Landfill Gas Analyser which measures CH_4 and CO_2 in % by infra-red measurement, CO and H_2S in ppm and O_2 in % by internal electrochemical cell measurement.

IGSL

Set 1

Groundwater - Permeability Summary Sheet

Location Parkgate Street, Dublin

BOREHOLE	Date	Comments
Borehole 1	17.3.03	Poured 20 gallons of water (4 x =5 gallon drums) into standpipe. Wtare flowing away instantly
	27.3.03	Rising Head Test Attempted - Bailed out 10 gallons of wate using Watterra tubing - immediate recovery
	30.3.03	Pumped out water approx. 20gallons using 2" pump and section hose. Removed suction hose GW at same level
Borehole 5	17.3.03	Poured 20 gallons of water (4 x =5 gallon drums) into standpipe. Wtare flowing away instantly
	27.3.03	Rising Head Test Attempted - Bailed out 10 gallons of wate using Watterra tubing - immediate recovery
	30.3.03	Pumped out water approx. 20gallons using 2" pump and section hose. Removed suction hose GW at same level
Borehole 7	17.3.03	Poured 20 gallons of water (4 x =5 gallon drums) into standpipe. Wtare flowing away instantly
	27.3.03	Rising Head Test Attempted - Bailed out 10 gallons of wate using Watterra tubing - immediate recovery
	30.3.03	Pumped out water approx. 20gallons using 2" pump and section hose. Removed suction hose GW at same level

APPENDIX VI
LABORATORY TEST RECORDS
(GEOTECHNICAL)

Determination of Moisture Content

BS1377:Part 2:1990, clauses 3.2

BH/TP No.	Sample No.	Depth (m)	Sample Type	Moisture Content %	Description
BH 1	7936	1.00	DB	10.9	Grey brown sandy gravelly SILT/CLAY with broken red brick
BH 1	7938	3.00	DB	14.4	Brown clayey/silty very sandy GRAVEL
BH 1	7939	4.00	DB	10.8	Grey clayey/silty sandy GRAVEL with some cobbles
BH 1	7940	5.00	DB	4.1	Grey brown very sandy GRAVEL
BH 1	7941	6.00	DB	5.8	Grey brown sandy GRAVEL with some cobbles
BH 2	7942	0.00	DB	12.2	Grey clayey/silty sandy GRAVEL
BH 2	7943	1.00	DB	19.7	Grey sandy gravelly SILT/CLAY with some shells
BH 2	7944	2.00	DB	27.7	Dark grey sandy gravelly SILT/CLAY with broken red brick
BH 2	7945	3.00	DB	7.8	Grey brown very gravelly SAND
BH 2	7946	4.00	DB	5.0	Grey brown sandy GRAVEL with some cobbles
BH 2	7947	5.00	DB	1.2	COBBLES with grey brown slightly sandy gravel
BH 2	7948	6.00	DB	4.3	Grey brown sandy GRAVEL with some cobbles
BH 2	7949	7.00	DB	7.6	Grey brown slightly silty/clayey sandy GRAVEL with some cobbles
BH 4	7965	1.00	DB	10.8	Grey brown slightly silty/clayey sandy GRAVEL with some cobbles
BH 4	7966	2.00	DB	8.4	Grey clayey/silty sandy GRAVEL with many cobbles
BH 4	7967	3.00	DB	20.4	Brown slightly sandy slightly gravelly SILT/CLAY
BH 4	7969	5.00	DB	7.6	Grey brown slightly clayey/silty very sandy GRAVEL

IGSL	Contract	PARKGATE STREET DUBLIN	Contract No. 8483
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Determination of Moisture Content
BS1377:Part 2:1990, clauses 3.2

BH/TP No.	Sample No.	Depth (m)	Sample Type	Moisture Content %	Description
BH 5	7929	1.00	DB	20.4	Grey brown slightly sandy gravelly SILT/CLAY with broken red brick
BH 5	7932	4.00	DB	14.0	Brown clayey/silty very sandy GRAVEL
BH 5	7933	5.00	DB	6.7	Grey brown very sandy GRAVEL
BH 5	7934	6.00	DB	6.2	Grey brown very sandy GRAVEL
BH 5	7935	7.00	DB	7.9	Grey brown very sandy GRAVEL
BH 6	7950	0.00	DB	28.2	Dark grey slightly sandy gravelly SILT/CLAY with broken concrete
BH 6	7952	1.00	DB	21.9	Brown black sl. sandy gravelly SILT/CLAY with many cobbles & with broken red brick
BH 6	7953	2.00	DB	16.5	Brown clayey/silty very sandy GRAVEL
BH 6	7954	3.00	DB	5.9	Grey brown sandy GRAVEL with some cobbles
BH 6	7955	4.00	DB	6.2	Grey brown sandy GRAVEL
BH 7	7958	0.50	DB	10.1	Grey brown slightly silty/clayey sandy GRAVEL with red brick
BH 7	7959	1.50	DB	12.4	Grey brown slightly sandy gravelly SILT/CLAY with broken red brick
BH 7	7961	3.50	DB	4.8	Grey brown very sandy GRAVEL
BH 7	7962	4.50	DB	6.1	Grey brown very sandy GRAVEL
BH 7	7963	5.50	DB	3.9	Grey brown very sandy GRAVEL with many cobbles
BH 7	7964	6.50	DB	5.2	Grey brown clayey/silty slightly sandy GRAVEL

IGSL	Contract: PARKGATE STREET DUBLIN	Contract No. 8483	
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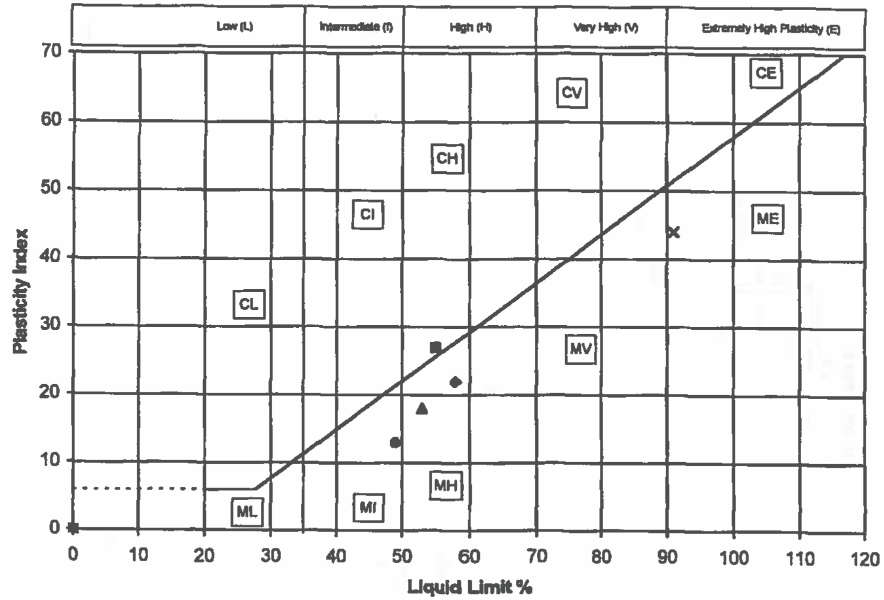
Plasticity Chart - Summary of Liquid & Plastic Limit Tests
BS1377:Part 2:1990, clauses 3.2, 4 & 5
Chart in accordance with BS5930:1999, fig.18

Contract No. 8483 Contract: PARKGATE STREET DUBLIN



Code	BH/TP	Sample	Depth (m)	MC%	LL%	PL%	PI%	%<425μm	Description
▲	BH 1	7937	2.00	20.4	53	35	18	29.7	Grey slightly sandy gravelly SILT
■	BH 5	7930	2.00	38.3	55	28	27	49.9	Brown sandy slightly gravelly CLAY
●	BH 5	7931	3.00	34	49	36	13	86	Brown sandy slightly gravelly SILT
◆	BH 6	7951	1.00	36.9	58	36	22	60.1	Grey brown slightly sandy gravelly SILT
×	BH 6	7956	6.00	41.7	91	47	44	74.7	Black brown slightly sandy gravelly SILT
+									
△									
□									
○									
◇									
▲									
■									
●									
◆									
×									
+									
△									

NP denotes specimen is non-plastic.

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Summary of Classification Tests

BS1377:Part 2:1990, clauses 3.2, 4.3, 5.3 & 5.4

BH/TP No.	Sample No.	Depth (m)	Sample Type	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	<425µm %	Preparation	Description	Classification
BH 1	7937	2.00	D	20.4	53	35	18	29.7	WS	Grey slightly sandy gravelly SILT	M H
BH 5	7930	2.00	D	38.3	55	28	27	49.9	WS	Brown sandy slightly gravelly CLAY	C H
BH 5	7931	3.00	D	34	49	36	13	88	WS	Brown sandy slightly gravelly SILT	M I
BH 6	7951	1.00	D	36.9	58	36	22	60.1	WS	Grey brown slightly sandy gravelly SILT	M H
BH 6	7956	6.00	D	41.7	91	47	44	74.7	WS	Black brown slightly sandy gravelly SILT	M E

Notes: NAT - tested as received WS - Wet sieved (425µm) NP - Non Plastic

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SULPHATE ANALYSIS

REPORT NO. — IGSL

CONTRACT: PARKGATE STREET

BH/TP NO.	DEPTH (M)	SAMPLE NO.	SAMPLE TYPE	TEST CODE	SULPHUR TRIOXIDE: WATER SO3 g/L	SULPHUR TRIOXIDE: TOTAL SOIL SO3 %	pH VALUE
BH 1	2.00	7937	D	S		0.028	8.4
BH 2	2.00	7944	D	S		0.025	7.2
BH 5	2.00	7930	D	S		0.006	7.1
BH 5	3.00	7931	D	S		0.01	7.3
BH 6	1.00	7951	D	S		0.008	6.9
BH 6	6.00	7956	D	S		0.595	7.1
BH 7	3.50	7961	D	S		0.02	8.0

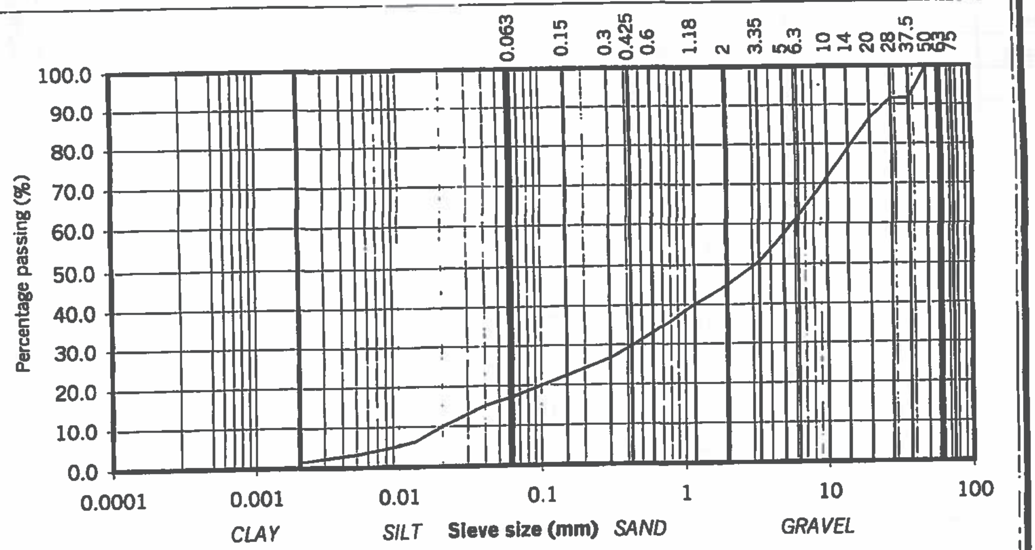
TEST CODE: W = WATER S = SOIL A = AQUEOUS SOIL EXTRACT(2:1)

Determination of Particle Size Distribution

BS1377:Part2:1990 , clauses 9.2

Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 1
SAMPLE No.: 7937
DEPTH (m): 2.00
TEST METHOD: Wet sieve and hydrometer
DESCRIPTION: Grey slightly sandy, gravelly, SILT

particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	100.0	
37.5	91.6	
28	91.6	
20	86.3	
14	78.8	
10	71.6	
6.3	62.1	
5	57.3	
3.35	50.6	
2	44.9	SAND
1.18	40.1	
0.6	33.1	
0.425	29.7	
0.3	26.6	
0.15	22.4	
0.063	17.3	SILT/CLAY
0.04	15.2	
0.03	13.1	
0.02	10.0	
0.013	6.3	
0.009	4.9	
0.005	3.1	
0.002	1.5	



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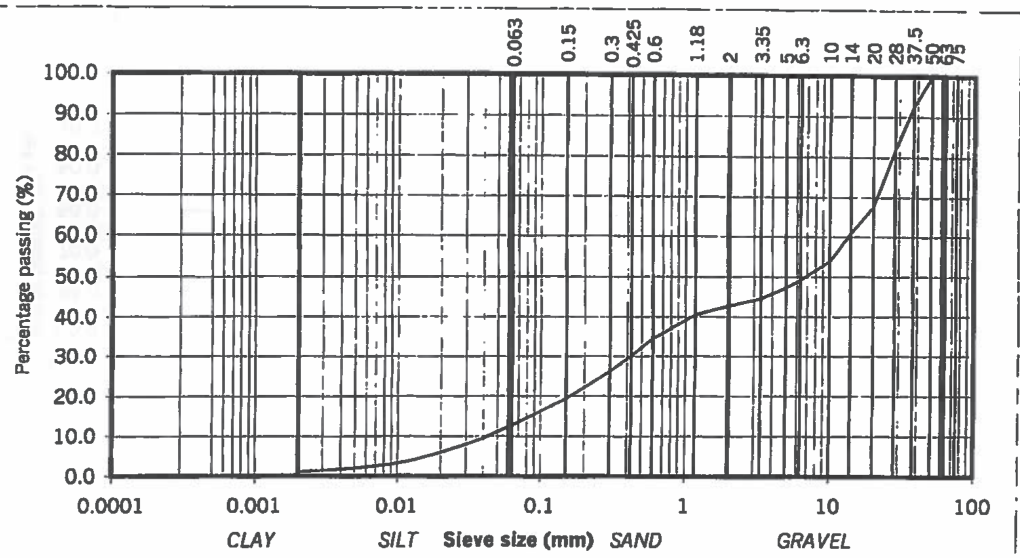
Determination of Particle Size Distribution

BS1377:Part2:1990 , clauses 9.2

Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 1
SAMPLE No.: 7938
DEPTH (m): 3.00
TEST METHOD: Wet sieve and hydrometer
DESCRIPTION: Brown clayey/silty, very sandy, GRAVEL

particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	100.0	
37.5	92.5	
28	81.6	
20	67.5	
14	60.7	
10	53.9	
6.3	49.1	
5	47.2	
3.35	44.4	
2	42.7	SAND
1.18	40.5	
0.6	34.5	
0.425	30.2	
0.3	26.1	
0.15	19.3	
0.063	12.8	SILT/CLAY
0.04	9.6	
0.03	7.9	
0.02	5.9	
0.013	4.1	
0.009	3.1	
0.005	2.1	
0.002	1.1	



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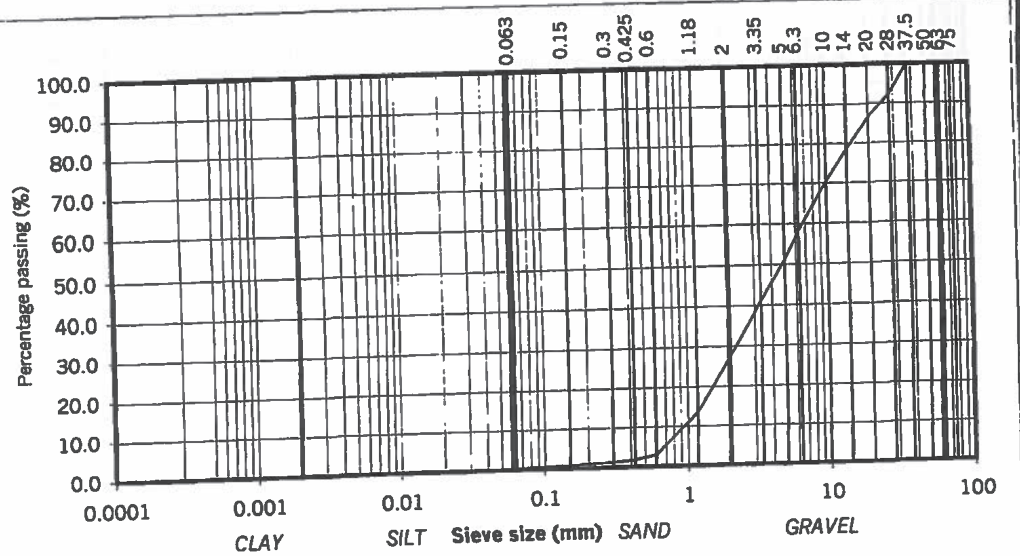
Determination of Particle Size Distribution

BS1377:Part2:1990 , clauses 9.2

Contract No:	8483
Contract:	PARKGATE STREET, DUBLIN
BH/TP No:	BH 1
SAMPLE No.:	7940
DEPTH (m):	5.00
TEST METHOD:	Wet sieve
DESCRIPTION:	Grey brown very sandy, GRAVEL

particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	100.0	
37.5	100.0	
28	92.2	
20	86.4	
14	78.4	
10	70.3	
6.3	58.2	
5	51.0	
3.35	41.2	
2	27.2	SAND
1.18	13.5	
0.6	2.9	
0.425	1.8	
0.3	1.3	
0.15	0.8	
0.063	0.4	SILT/CLAY
0.04	#N/A	
0.03	#N/A	
0.02	#N/A	
0.013	#N/A	
0.009	#N/A	
0.005	#N/A	
0.002	#N/A	



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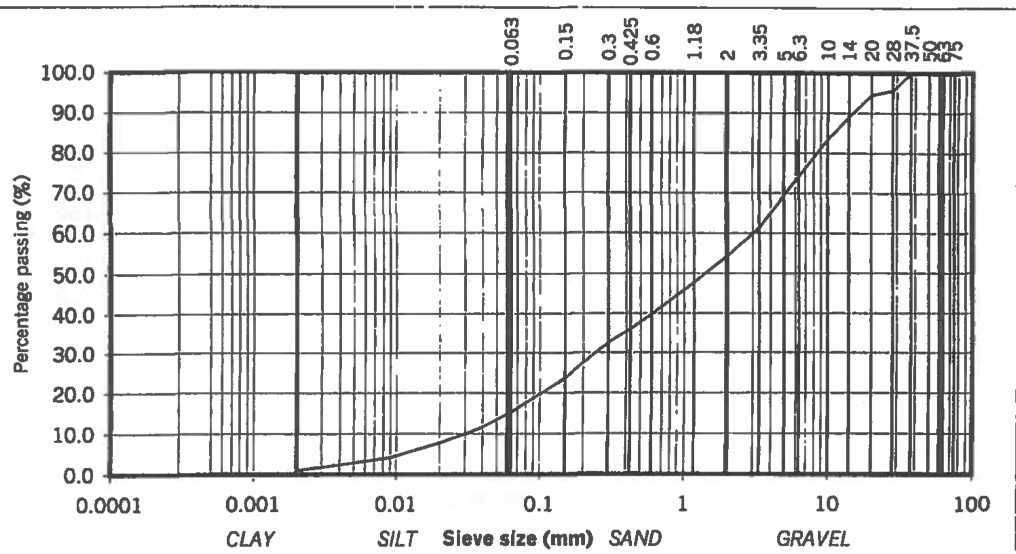
Determination of Particle Size Distribution

BS1377:Part2:1990 , clauses 9.2

Contract No:	8483
Contract:	PARKGATE STREET, DUBLIN
BH/TP No:	BH 2
SAMPLE No.:	7943
DEPTH (m):	1.00
TEST METHOD:	Wet sieve and hydrometer
DESCRIPTION:	Grey sandy, gravelly, SILT/CLAY with some shells

particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	100.0	
37.5	100.0	
28	95.5	
20	94.4	
14	89.0	
10	83.4	
6.3	74.1	
5	69.4	
3.35	61.2	
2	54.2	SAND
1.18	47.6	
0.6	39.8	
0.425	36.1	
0.3	32.6	
0.15	23.6	
0.063	15.2	SILT/CLAY
0.04	11.6	
0.03	9.9	
0.02	7.7	
0.013	5.8	
0.009	4.1	
0.005	2.9	
0.002	0.9	



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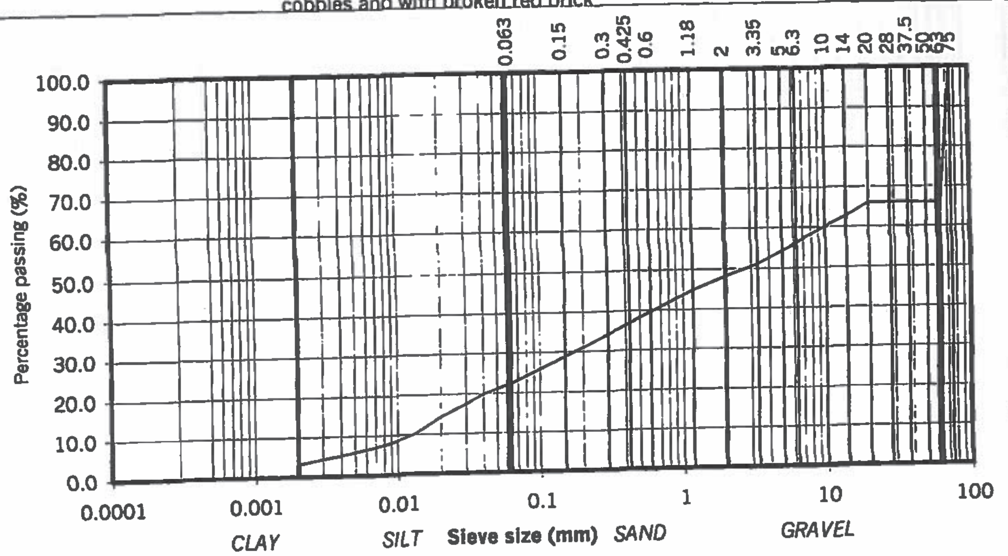
Determination of Particle Size Distribution

BS1377:Part2:1990 , clauses 9.2

Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 6
SAMPLE No.: 7952
DEPTH (m): 2.00
TEST METHOD: Wet sieve and hydrometer
DESCRIPTION: Brownblack slightly sandy, gravelly, SILT/CLAY with many cobbles and with broken red brick

particle size	% passing	
75	100.0	COBBLES
63	66.0	GRAVEL
50	66.0	
37.5	66.0	
28	66.0	
20	66.0	
14	62.5	
10	60.0	
6.3	56.3	
5	54.3	
3.35	51.1	
2	48.1	SAND
1.18	44.8	
0.6	39.7	
0.425	37.1	
0.3	34.2	
0.15	28.9	
0.063	22.5	SILT/CLAY
0.04	19.9	
0.03	17.4	
0.02	14.4	
0.013	10.0	
0.009	8.1	
0.005	5.9	
0.002	3.2	



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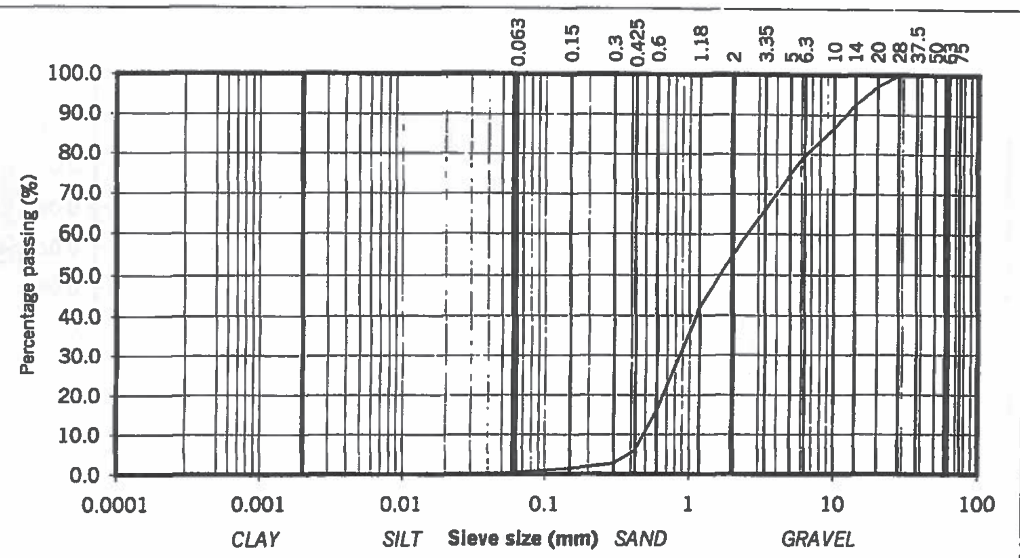
Determination of Particle Size Distribution

BS1377:Part2:1990 , clauses 9.2

Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 2
SAMPLE No.: 7945
DEPTH (m): 3.00
TEST METHOD: Wet sieve
DESCRIPTION: Grey brown very gravelly, SAND

particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	100.0	
37.5	100.0	
28	100.0	
20	97.0	
14	92.4	
10	86.6	
6.3	79.5	
5	75.0	
3.35	66.0	
2	54.8	SAND
1.18	42.0	
0.6	16.2	
0.425	6.0	
0.3	2.7	
0.15	1.5	
0.063	0.4	SILT/CLAY
0.04	#N/A	
0.03	#N/A	
0.02	#N/A	
0.013	#N/A	
0.009	#N/A	
0.005	#N/A	
0.002	#N/A	



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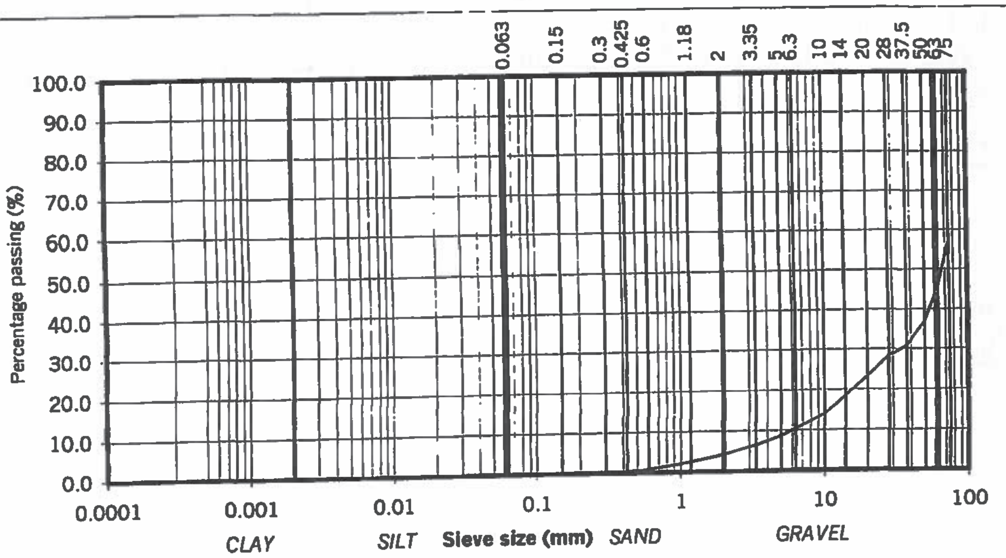
Determination of Particle Size Distribution

BS1377:Part2:1990 , clauses 9.2

Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 2
SAMPLE No.: 7947
DEPTH (m): 5.00
TEST METHOD: Wet sieve
DESCRIPTION: COBBLES with grey brown slightly sandy, gravel

particle size	% passing	
75	57.6	COBBLES
63	46.1	GRAVEL
50	37.2	
37.5	30.8	
28	28.2	
20	23.3	
14	18.5	
10	14.2	
6.3	10.4	
5	8.6	
3.35	6.5	
2	4.2	SAND
1.18	2.6	
0.6	0.8	
0.425	0.5	
0.3	0.3	
0.15	0.2	
0.063	0.1	SILT/CLAY
0.04	#N/A	
0.03	#N/A	
0.02	#N/A	
0.013	#N/A	
0.009	#N/A	
0.005	#N/A	
0.002	#N/A	



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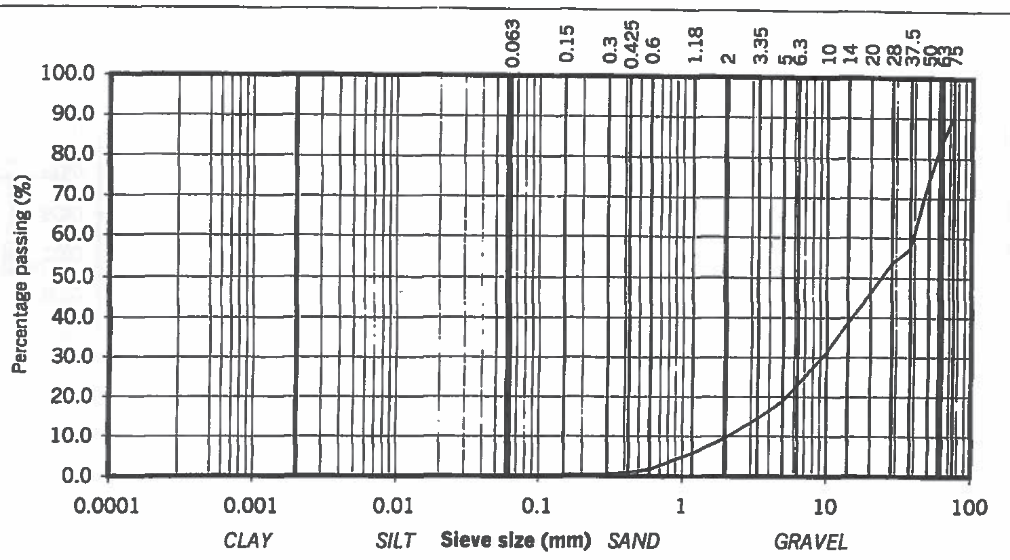
Determination of Particle Size Distribution

BS1377:Part2:1990 , clauses 9.2

Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 2
SAMPLE No.: 7948
DEPTH (m): 6.00
TEST METHOD: Wet sieve
DESCRIPTION: Grey brown sandy, GRAVEL with some cobbles

particle size	% passing	
75	90.6	COBBLES
63	84.4	GRAVEL
50	74.6	
37.5	57.2	
28	53.6	
20	46.0	
14	38.9	
10	31.5	
6.3	23.0	
5	19.0	
3.35	14.5	
2	9.6	SAND
1.18	5.8	
0.6	1.8	
0.425	0.9	
0.3	0.6	
0.15	0.4	
0.063	0.1	SILT/CLAY
0.04	#N/A	
0.03	#N/A	
0.02	#N/A	
0.013	#N/A	
0.009	#N/A	
0.005	#N/A	
0.002	#N/A	



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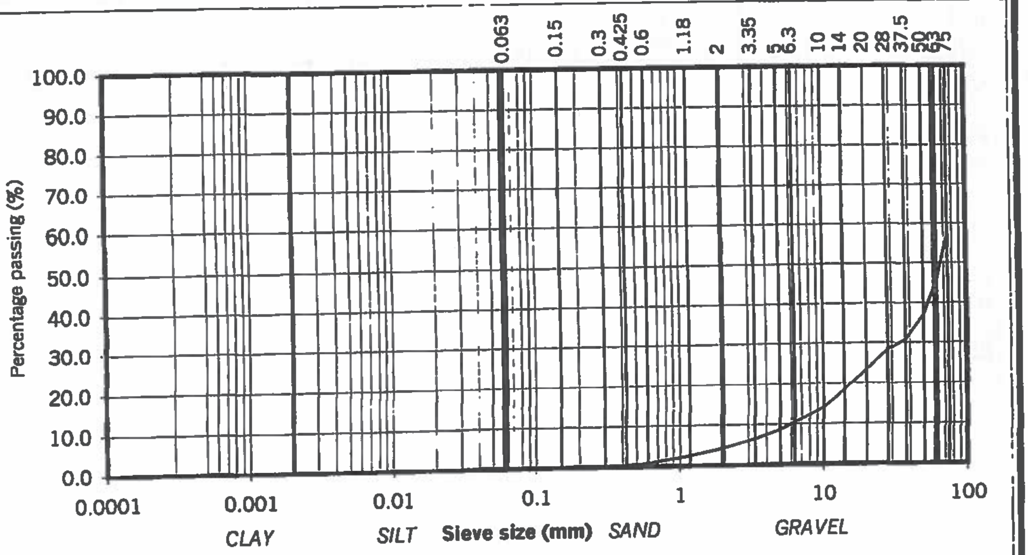
Irish Geotechnical Services Ltd., Industrial Estate, Newbridge, Co kildare PSD V3.1 12.01

Determination of Particle Size Distribution

BS1377:Part2:1990 , clauses 9.2

Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 2
SAMPLE No.: 7947
DEPTH (m): 5.00
TEST METHOD: Wet sieve
DESCRIPTION: COBBLES with grey brown slightly sandy, gravel

particle size	% passing	
75	57.6	COBBLES
63	46.1	GRAVEL
50	37.2	
37.5	30.8	
28	28.2	
20	23.3	
14	18.5	
10	14.2	
6.3	10.4	
5	8.6	
3.35	6.5	
2	4.2	SAND
1.18	2.6	
0.6	0.8	
0.425	0.5	
0.3	0.3	
0.15	0.2	
0.063	0.1	SILT/CLAY
0.04	#N/A	
0.03	#N/A	
0.02	#N/A	
0.013	#N/A	
0.009	#N/A	
0.005	#N/A	
0.002	#N/A	



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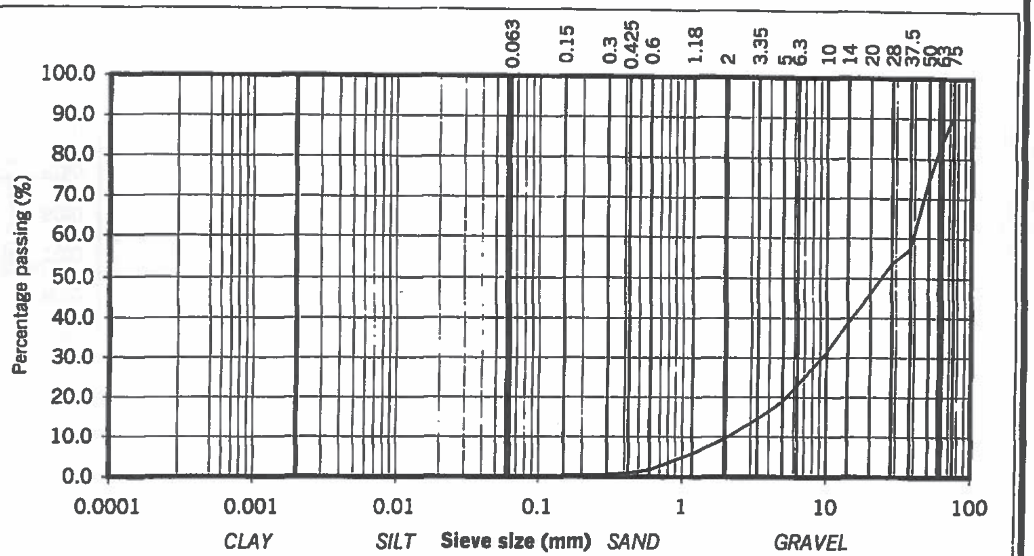
Determination of Particle Size Distribution

BS1377:Part2:1990 , clauses 9.2

Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 2
SAMPLE No.: 7948
DEPTH (m): 6.00
TEST METHOD: Wet sieve
DESCRIPTION: Grey brown sandy, GRAVEL with some cobbles

particle size	% passing	
75	90.6	COBBLES
63	84.4	GRAVEL
50	74.6	
37.5	57.2	
28	53.6	
20	46.0	
14	38.9	
10	31.5	
6.3	23.0	
5	19.0	
3.35	14.5	
2	9.6	SAND
1.18	5.8	
0.6	1.8	
0.425	0.9	
0.3	0.6	
0.15	0.4	
0.063	0.1	SILT/CLAY
0.04	#N/A	
0.03	#N/A	
0.02	#N/A	
0.013	#N/A	
0.009	#N/A	
0.005	#N/A	
0.002	#N/A	



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Determination of Particle Size Distribution

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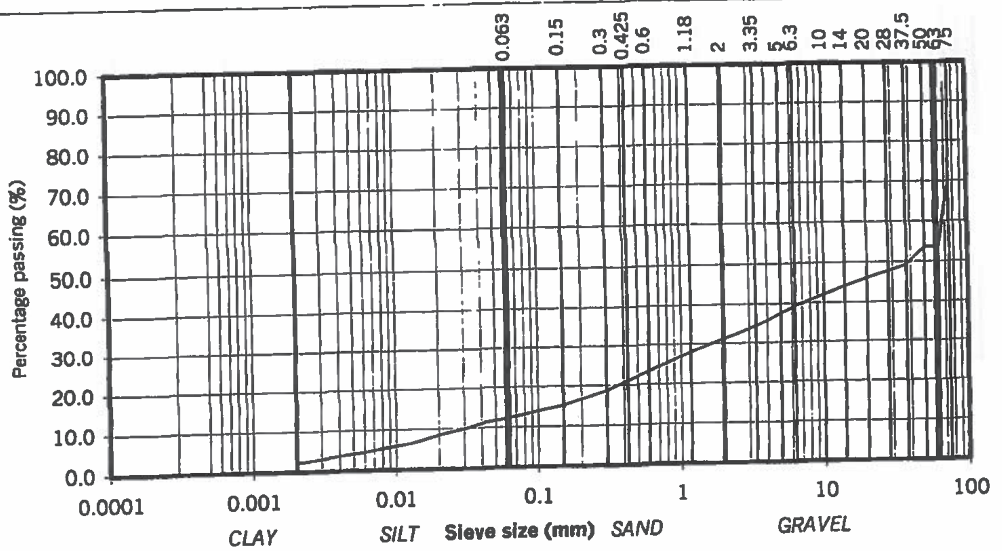
particle size	% passing	
75	70.3	COBBLES
63	53.5	GRAVEL
50	53.5	
37.5	49.1	
28	47.7	
20	45.9	
14	44.0	
10	42.1	
6.3	39.2	
5	37.6	
3.35	34.4	
2	31.3	SAND
1.18	27.9	
0.6	23.3	
0.425	21.1	
0.3	18.7	
0.15	15.3	
0.063	12.4	SILT/CLAY
0.04	11.2	
0.03	9.9	
0.02	8.5	
0.013	6.6	
0.009	5.6	
0.005	4.2	
0.002	2.3	

Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 4
SAMPLE No.: 7966
DEPTH (m): 2.00
TEST METHOD: Wet sieve and hydrometer
DESCRIPTION: Grey clayey/silty, sandy, GRAVEL with many cobbles



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Determination of Particle Size Distribution

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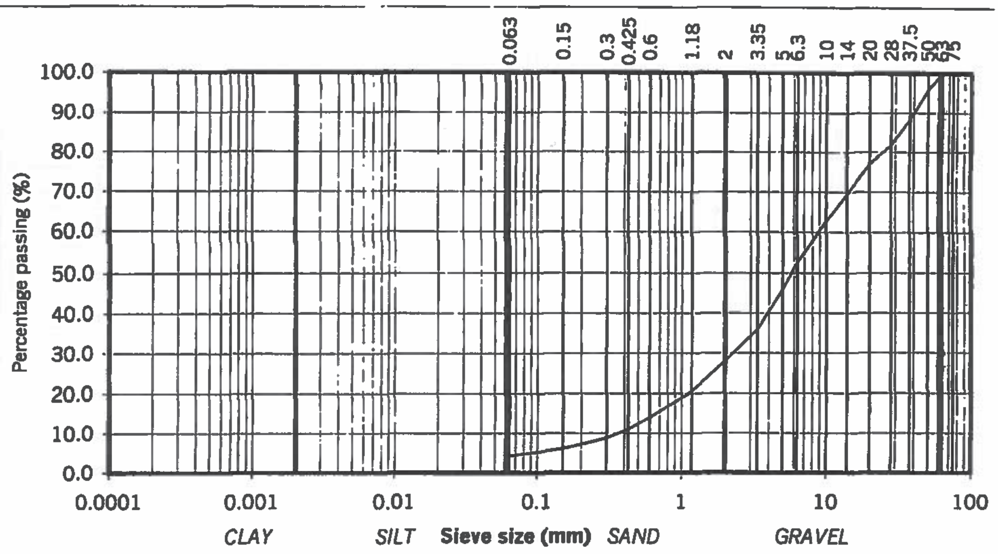
particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	95.8	
37.5	88.3	
28	81.8	
20	77.0	
14	69.4	
10	62.6	
6.3	52.6	
5	45.9	
3.35	35.9	
2	28.0	SAND
1.18	20.4	
0.6	14.0	
0.425	11.0	
0.3	8.7	
0.15	6.1	
0.063	4.3	SILT/CLAY
0.04	#N/A	
0.03	#N/A	
0.02	#N/A	
0.013	#N/A	
0.009	#N/A	
0.005	#N/A	
0.002	#N/A	

Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 4
SAMPLE No.: 7968
DEPTH (m): 4.00
TEST METHOD: Wet sieve
DESCRIPTION: Grey brown slightly clayey/silty, very sandy, GRAVEL



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Determination of Particle Size Distribution

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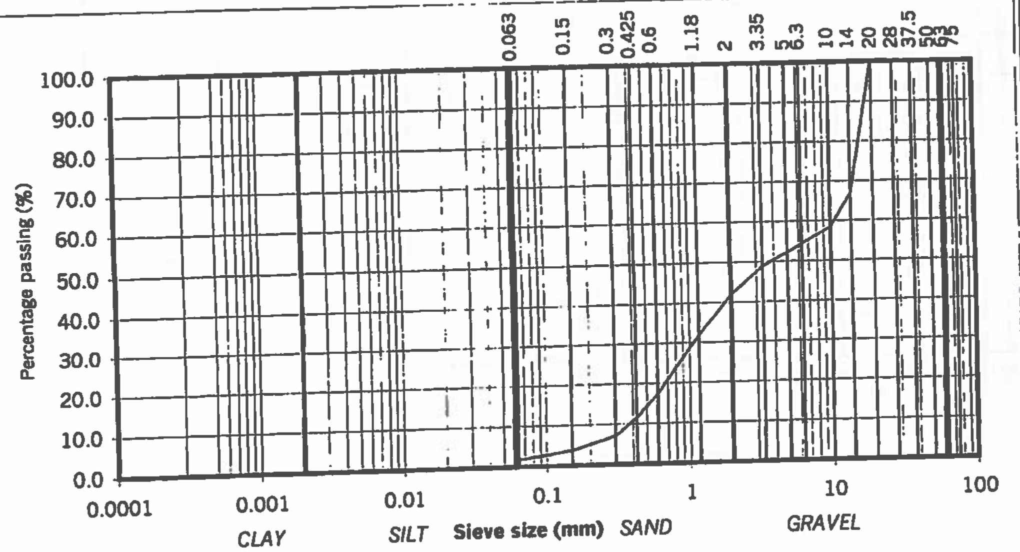
Contract No:	8483
Contract:	PARKGATE STREET, DUBLIN
BH/TP No:	BH 4
SAMPLE No.:	7969
DEPTH (m):	5.00
TEST METHOD:	Wet sieve
DESCRIPTION:	Grey brown slightly clayey/silty, very sandy, GRAVEL

particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	100.0	
37.5	100.0	
28	100.0	
20	100.0	
14	66.7	
10	58.3	
6.3	54.2	
5	52.1	
3.35	48.8	
2	42.0	SAND
1.18	31.9	
0.6	17.2	
0.425	11.5	
0.3	7.1	
0.15	3.7	
0.063	1.7	SILT/CLAY
0.04	#N/A	
0.03	#N/A	
0.02	#N/A	
0.013	#N/A	
0.009	#N/A	
0.005	#N/A	
0.002	#N/A	



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Determination of Particle Size Distribution

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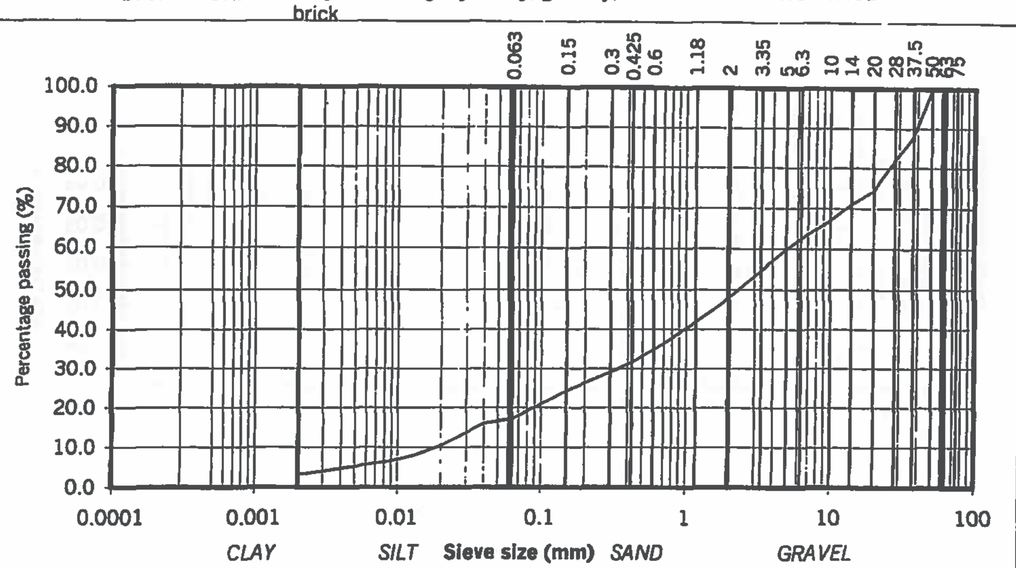
Contract No:	8483
Contract:	PARKGATE STREET, DUBLIN
BH/TP No:	BH 5
SAMPLE No.:	7929
DEPTH (m):	1.00
TEST METHOD:	Wet sieve and hydrometer
DESCRIPTION:	Grey brown slightly sandy, gravelly, SILT/CLAY with broken red brick

particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	100.0	
37.5	88.0	
28	81.9	
20	74.2	
14	70.9	
10	67.0	
6.3	62.5	
5	59.8	
3.35	54.6	
2	47.8	SAND
1.18	41.9	
0.6	34.9	
0.425	31.8	
0.3	29.0	
0.15	24.2	
0.063	17.2	SILT/CLAY
0.04	16.1	
0.03	13.7	
0.02	10.4	
0.013	7.9	
0.009	6.6	
0.005	5.2	
0.002	3.1	



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Determination of Particle Size Distribution

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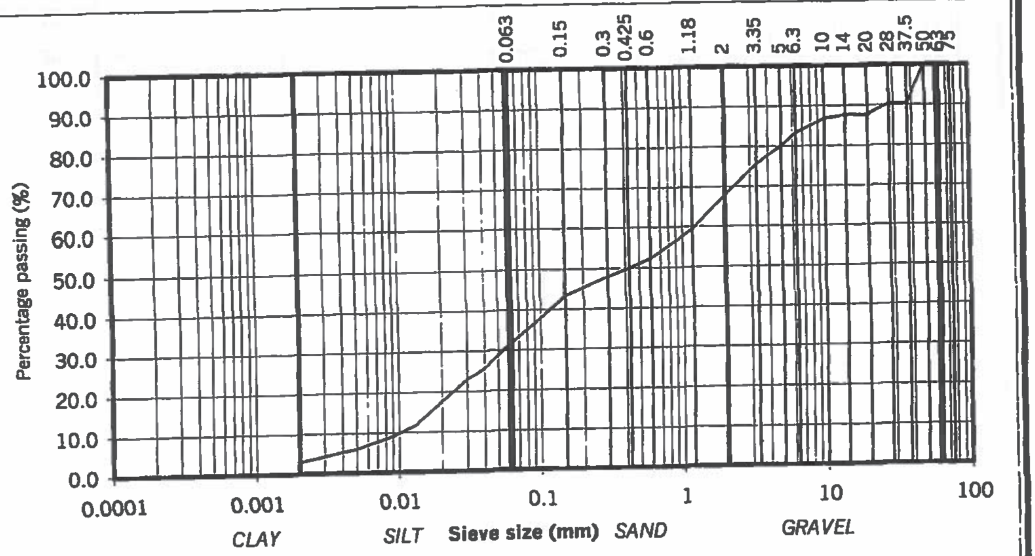
Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 5
SAMPLE No.: 7930
DEPTH (m): 2.00
TEST METHOD: Wet sieve and hydrometer
DESCRIPTION: Brown sandy, slightly gravelly, CLAY

particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	100.0	
37.5	90.3	
28	90.3	
20	87.6	
14	87.6	
10	86.8	
6.3	83.3	
5	80.0	
3.35	75.7	
2	67.8	SAND
1.18	59.3	
0.6	52.2	
0.425	49.9	
0.3	47.9	
0.15	43.3	
0.063	32.1	SILT/CLAY
0.04	25.6	
0.03	23.0	
0.02	17.6	
0.013	11.7	
0.009	9.1	
0.005	6.1	
0.002	3.0	



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Determination of Particle Size Distribution

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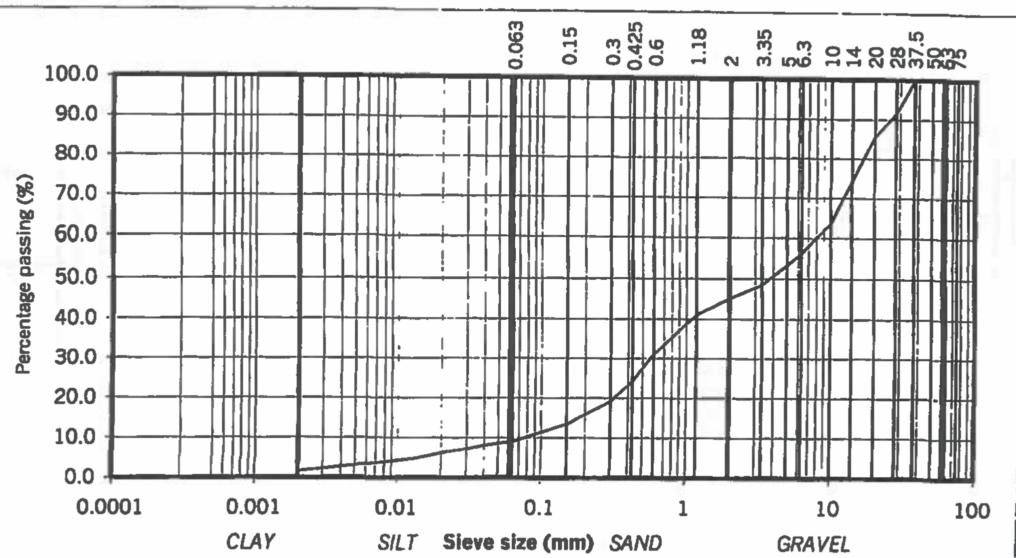
Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 5
SAMPLE No.: 7932
DEPTH (m): 4.00
TEST METHOD: Wet sieve and hydrometer
DESCRIPTION: Brown clayey/silty, very sandy, GRAVEL

particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	100.0	
37.5	100.0	
28	91.6	
20	85.4	
14	74.0	
10	63.4	
6.3	56.2	
5	53.2	
3.35	48.5	
2	45.1	SAND
1.18	41.1	
0.6	31.2	
0.425	24.2	
0.3	19.1	
0.15	13.5	
0.063	8.9	SILT/CLAY
0.04	8.1	
0.03	7.1	
0.02	6.1	
0.013	4.8	
0.009	4.1	
0.005	3.1	
0.002	1.6	



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Determination of Particle Size Distribution

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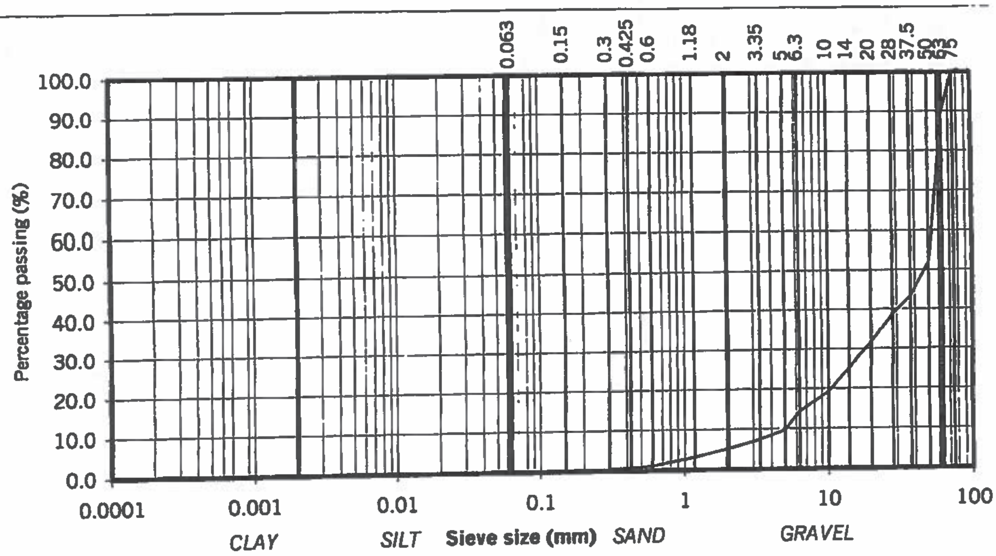
particle size	% passing	
75	100.0	COBBLES
63	89.5	GRAVEL
50	52.0	
37.5	43.3	
28	38.8	
20	31.8	
14	25.2	
10	19.3	
6.3	14.4	
5	9.7	
3.35	7.4	
2	5.2	SAND
1.18	3.2	
0.6	1.1	
0.425	0.6	
0.3	0.4	
0.15	0.3	
0.063	0.1	SILT/CLAY
0.04	#N/A	
0.03	#N/A	
0.02	#N/A	
0.013	#N/A	
0.009	#N/A	
0.005	#N/A	
0.002	#N/A	

Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 5
SAMPLE No.: 7934
DEPTH (m): 6.00
TEST METHOD: Wet sieve
DESCRIPTION: Grey brown sandy, GRAVEL with some cobbles



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Determination of Particle Size Distribution

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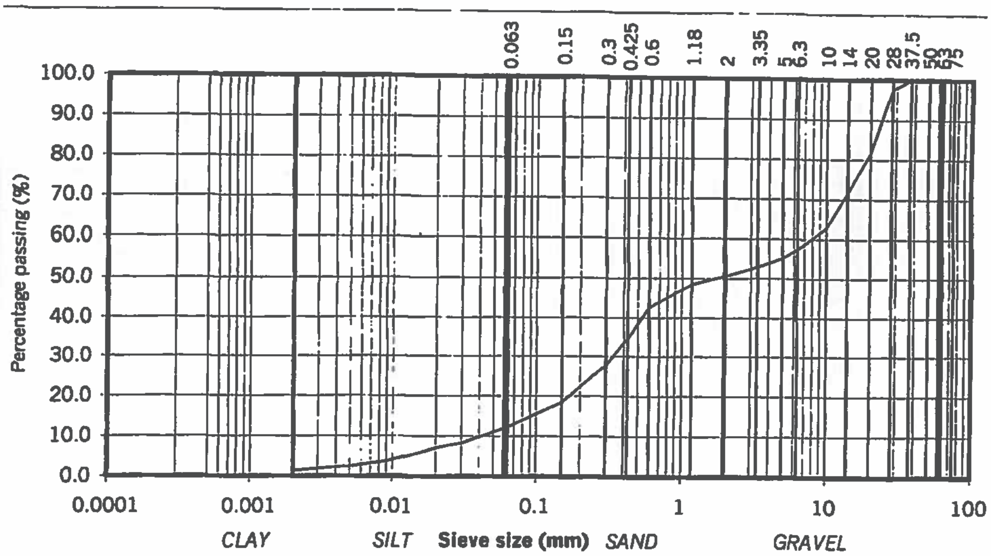
particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	100.0	
37.5	100.0	
28	97.5	
20	81.5	
14	71.6	
10	62.8	
6.3	57.4	
5	55.2	
3.35	52.9	
2	50.5	SAND
1.18	48.5	
0.6	42.5	
0.425	34.8	
0.3	27.8	
0.15	18.4	
0.063	12.2	SILT/CLAY
0.04	9.8	
0.03	8.3	
0.02	7.0	
0.013	5.1	
0.009	3.8	
0.005	2.5	
0.002	1.3	

Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 6
SAMPLE No.: 7953
DEPTH (m): 3.00
TEST METHOD: Wet sieve and hydrometer
DESCRIPTION: Brown clayey/silty, very sandy, GRAVEL



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Determination of Particle Size Distribution

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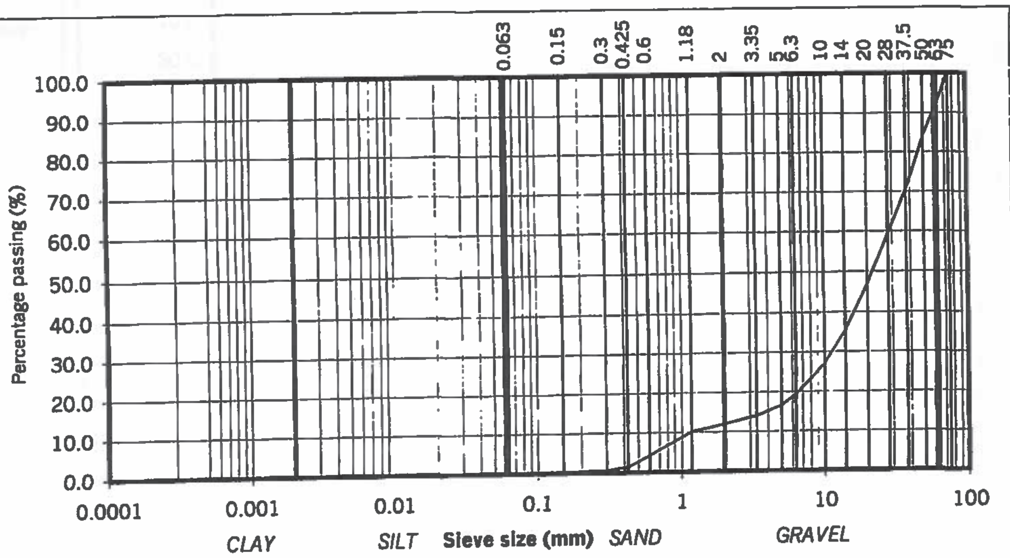
Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 6
SAMPLE No.: 7954
DEPTH (m): 4.00
TEST METHOD: Wet sieve
DESCRIPTION: Grey brown sandy, GRAVEL with some cobbles

particle size	% passing	
75	100.0	COBBLES
63	92.5	GRAVEL
50	84.1	
37.5	70.3	
28	59.3	
20	46.8	
14	35.5	
10	27.1	
6.3	19.3	
5	16.6	
3.35	14.0	
2	12.0	SAND
1.18	10.1	
0.6	4.2	
0.425	1.4	
0.3	0.6	
0.15	0.3	
0.063	0.1	SILT/CLAY
0.04	#N/A	
0.03	#N/A	
0.02	#N/A	
0.013	#N/A	
0.009	#N/A	
0.005	#N/A	
0.002	#N/A	



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Determination of Particle Size Distribution

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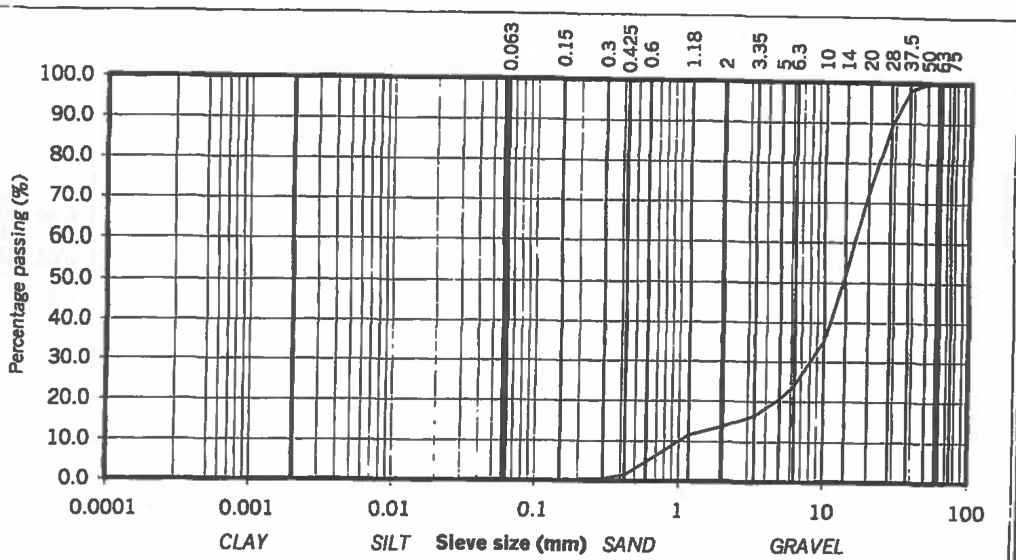
Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 6
SAMPLE No.: 7955
DEPTH (m): 5.00
TEST METHOD: Wet sieve
DESCRIPTION: Grey brown sandy, GRAVEL

particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	100.0	
37.5	98.0	
28	89.1	
20	72.0	
14	52.0	
10	35.4	
6.3	24.0	
5	20.6	
3.35	16.5	
2	13.8	SAND
1.18	11.6	
0.6	4.7	
0.425	1.5	
0.3	0.5	
0.15	0.2	
0.063	-0.1	SILT/CLAY
0.04	#N/A	
0.03	#N/A	
0.02	#N/A	
0.013	#N/A	
0.009	#N/A	
0.005	#N/A	
0.002	#N/A	



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Determination of Particle Size Distribution

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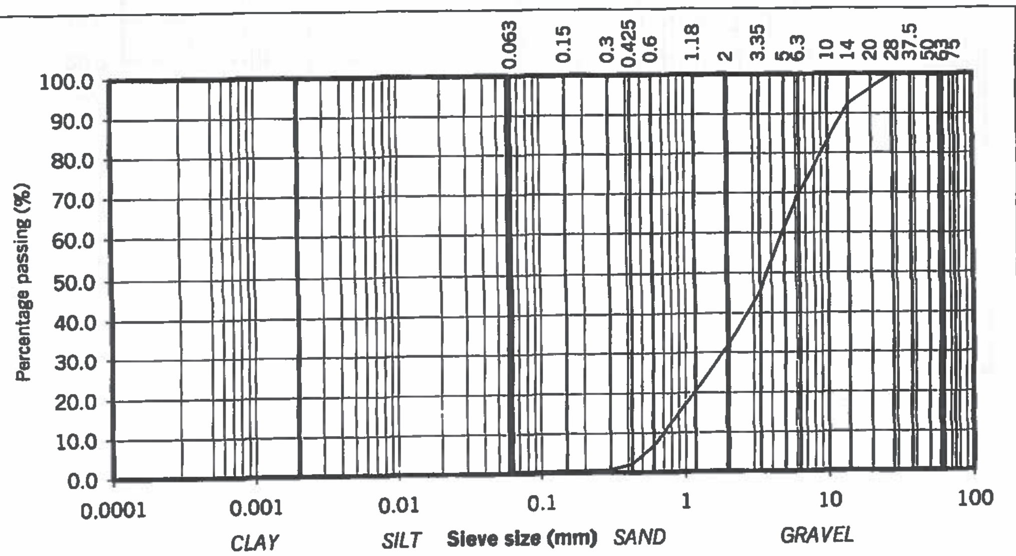
Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 7
SAMPLE No.: 7961
DEPTH (m): 3.50
TEST METHOD: Wet sieve
DESCRIPTION: Grey brown very sandy, GRAVEL

particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	100.0	
37.5	100.0	
28	100.0	
20	96.4	
14	92.4	
10	83.1	
6.3	69.9	
5	61.3	
3.35	45.5	
2	31.9	SAND
1.18	20.3	
0.6	6.8	
0.425	2.1	
0.3	0.6	
0.15	0.4	
0.063	0.3	SILT/CLAY
0.04	#N/A	
0.03	#N/A	
0.02	#N/A	
0.013	#N/A	
0.009	#N/A	
0.005	#N/A	
0.002	#N/A	



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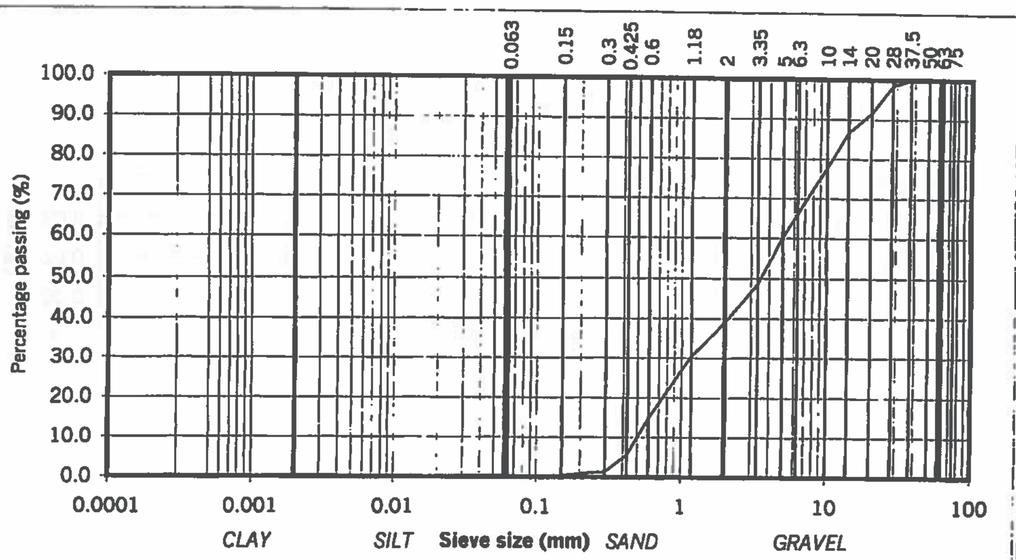
Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 7
SAMPLE No.: 7962
DEPTH (m): 4.50
TEST METHOD: Wet sieve
DESCRIPTION: Grey brown very sandy, GRAVEL

particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	100.0	
37.5	100.0	
28	98.5	
20	91.4	
14	86.7	
10	77.7	
6.3	66.2	
5	60.1	
3.35	48.6	
2	39.1	SAND
1.18	30.5	
0.6	14.9	
0.425	5.6	
0.3	1.4	
0.15	0.3	
0.063	0.1	SILT/CLAY
0.04	#N/A	
0.03	#N/A	
0.02	#N/A	
0.013	#N/A	
0.009	#N/A	
0.005	#N/A	
0.002	#N/A	



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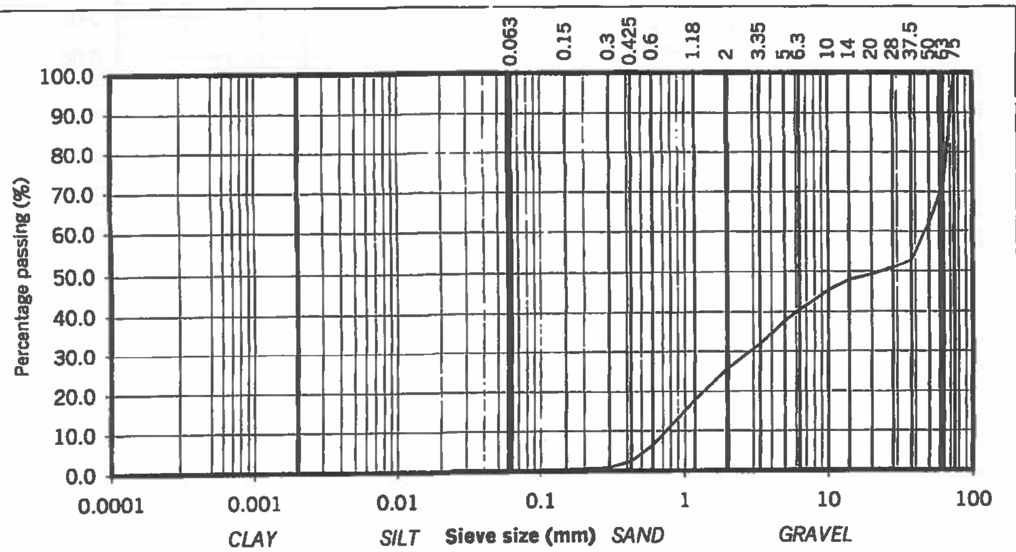
Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 7
SAMPLE No.: 7963
DEPTH (m): 5.50
TEST METHOD: Wet sieve
DESCRIPTION: Grey brown very sandy, GRAVEL with many cobbles

particle size	% passing	
75	100.0	COBBLES
63	71.9	GRAVEL
50	62.2	
37.5	52.7	
28	50.9	
20	49.2	
14	47.9	
10	45.2	
6.3	40.5	
5	37.8	
3.35	32.0	
2	25.7	SAND
1.18	17.9	
0.6	6.4	
0.425	2.3	
0.3	0.8	
0.15	0.3	
0.063	0.2	SILT/CLAY
0.04	#N/A	
0.03	#N/A	
0.02	#N/A	
0.013	#N/A	
0.009	#N/A	
0.005	#N/A	
0.002	#N/A	



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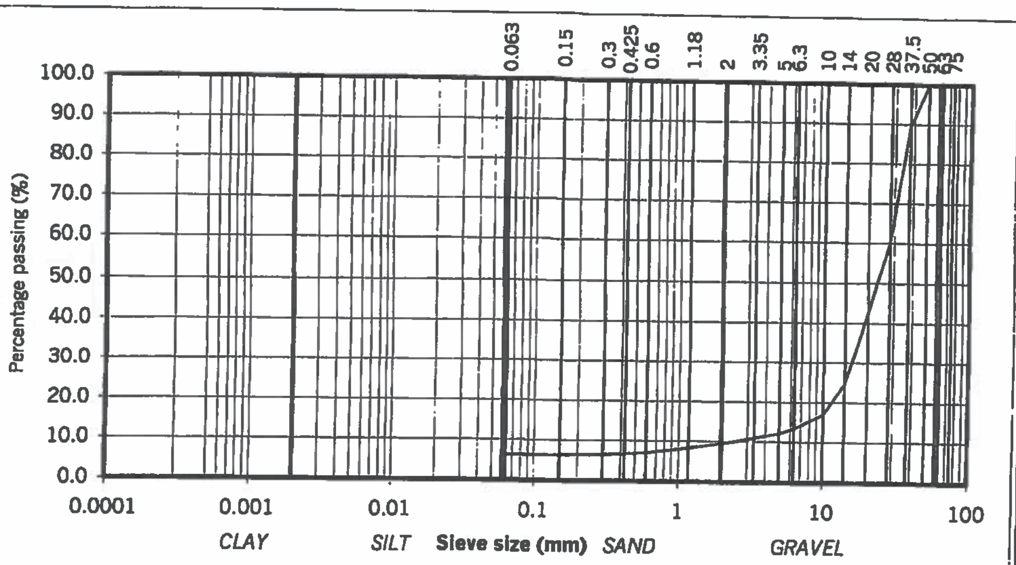
Contract No: 8483
Contract: PARKGATE STREET, DUBLIN
BH/TP No: BH 7
SAMPLE No.: 7964
DEPTH (m): 6.50
TEST METHOD: Wet sieve
DESCRIPTION: Grey brown clayey/silty, slightly sandy, GRAVEL

particle size	% passing	
75	100.0	COBBLES
63	100.0	GRAVEL
50	100.0	
37.5	89.5	
28	60.0	
20	42.5	
14	24.7	
10	17.0	
6.3	13.3	
5	12.0	
3.35	10.8	
2	9.4	SAND
1.18	8.3	
0.6	7.1	
0.425	6.7	
0.3	6.5	
0.15	6.4	
0.063	6.3	SILT/CLAY
0.04	#N/A	
0.03	#N/A	
0.02	#N/A	
0.013	#N/A	
0.009	#N/A	
0.005	#N/A	
0.002	#N/A	



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D CONNOLLY	19/02/03			

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Irish Geotechnical Services Ltd., Industrial Estate, Newbridge, Co kildare

PSD V3.1 12.01

IGSL

CHEMICAL ANALYSIS

REPORT NO.

CONTRACT: PARKGATE STREET DUBLIN

BOREHOLE NO.	SAMPLE NO.	DEPTH (METRES)	SAMPLE TYPE	% PASSING 2mm	ORGANIC CONTENT OF MATERIAL PASSING 2 mm %	REMARKS
BH 5	7931	3.00	D	92.4	3.63	
BH 6	7956	6.00	D	88.1	9.41	
BH 7	7961	3.50	D	31.9	0.88	

PEAK AND RESIDUAL SHEAR BOX TEST

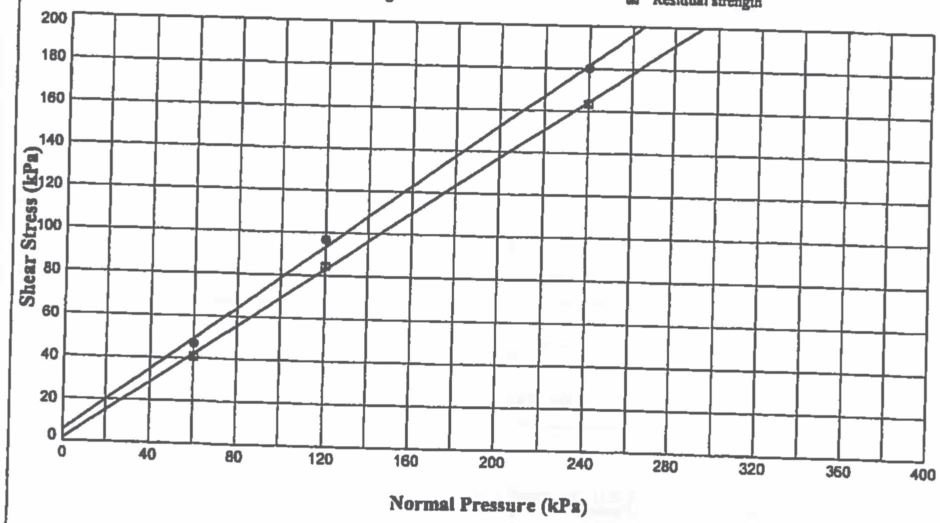
In accordance with clause 4.5 of BS1377:Part 7:1990

Borehole : BH2 Sample Ref : 7946 Sample Type : D Depth (m) : 4.00

Width x Length (mm) : 60 x 60 Sample Height (mm) : 20.0 S.G. (assumed) : 2.65

Description : Brown slightly gravelly silty SAND Sample Condition : Recompacted

	SPECIMEN NUMBER		1	2	3
PROPERTIES	Initial Moisture Content	(%)	8.2	8.2	8.2
	Initial Bulk Density	(Mg/m³)	1.76	1.75	1.75
	Initial Dry Density	(Mg/m³)	1.63	1.61	1.62
	Initial Voids Ratio		0.6278	0.6427	0.6407
CONSOLIDATION	Normal Pressure	(kPa)	60	120	240
	Initial Height	(mm)	19.610	19.746	19.834
	Consolidated Height	(mm)	17.318	18.582	17.577
SHEAR	Rate of Strain	(mm/min)	0.0240	0.0240	0.0240
	Strain at Peak Shear Stress	(%)	10.5	30.7	16.8
	Peak Shear Stress	(kPa)	47	97	180
	Residual Shear Stress	(kPa)	41	84	164
PEAK STRENGTH	Effective Cohesion (C') 5	(kPa)	Effective Angle of Friction (ϕ ')	36.5	(deg)
	Residual Cohesion (C') 1	(kPa)	Residual Angle of Friction (ϕ ')	34	(deg)

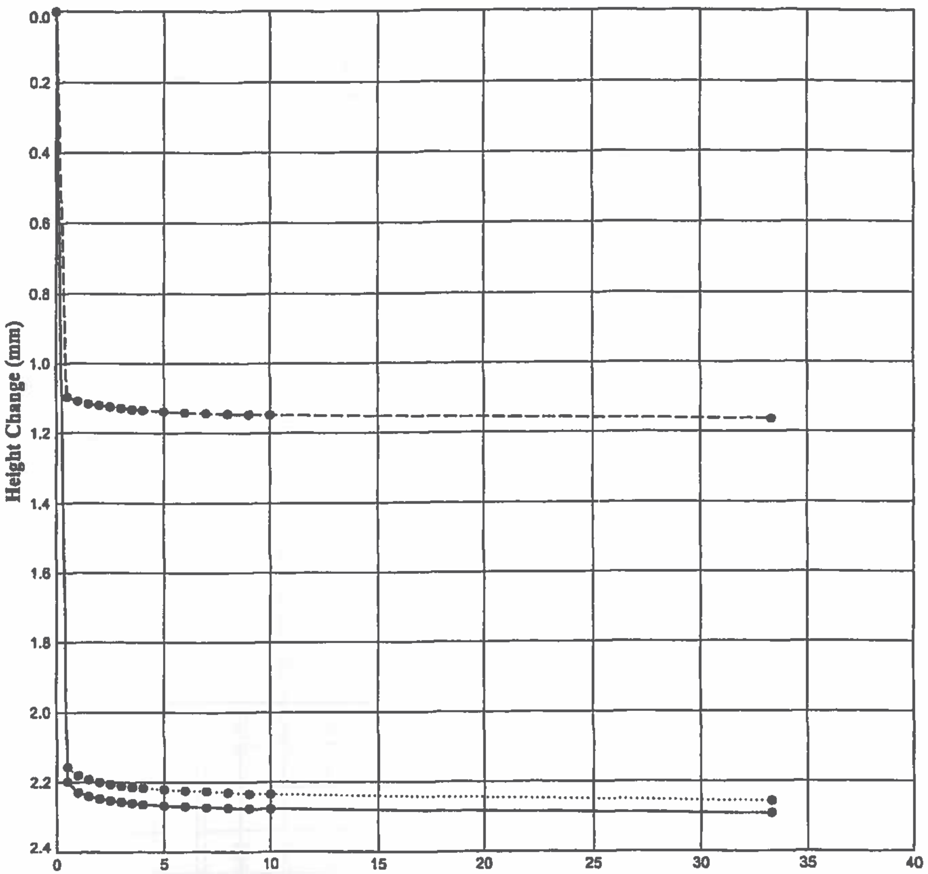


STRUCTURAL SOILS The Old School House Stillhouse Lane Bedminster Bristol BS3 4EB	Compiled By A. D. Fe	Date 26/03/03	Checked By [signature]	Date 27/3/03
	Contract Parkgate Street, Dublin		Job No 32307	
			Page 3 of 10	

PEAK AND RESIDUAL SHEAR BOX - CONSOLIDATION GRAPH

In accordance with clause 4.5 of BS1377:Part 7:1990

Borehole : BH2 Sample Ref : 7946 Sample Type : D Depth (m) : 4.00



KEY :

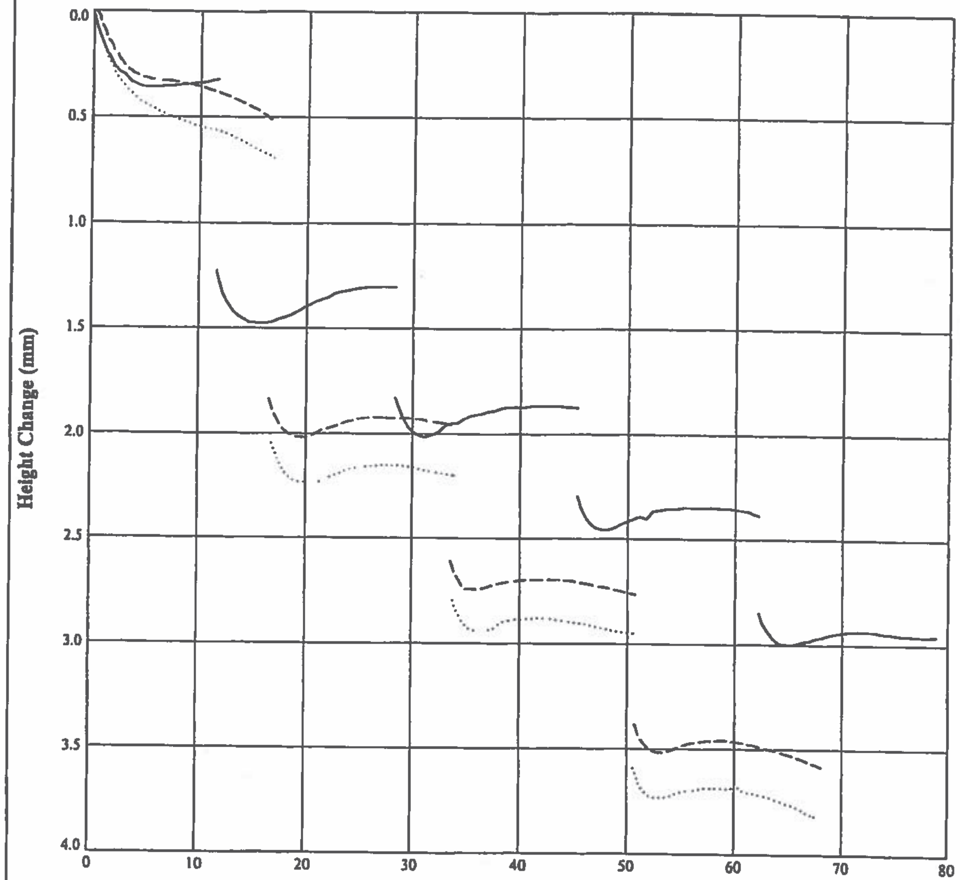
Solid Line = Specimen 1 (60 kPa), *Dashed Line* = Specimen 2 (120 kPa), *Dotted Line* = Specimen 3 (240 kPa).

STRUCTURAL SOILS The Old School House Stillhouse Lane Bedminster Bristol BS3 4EB	Compiled By	Date	Checked By	Date
	A. D. Fe	26/03/03	[signature]	27/3/03
	Contract: Parkgate Street, Dublin		Job No: 32307	
			Page 4 of 10	

PEAK AND RESIDUAL SHEAR BOX - HEIGHT CHANGE vs STRAIN

In accordance with clause 4.5 of BS1377:Part 7:1990

Borehole : BH2 Sample Ref : 7946 Sample Type : D Depth (m) : 4.00



KEY :

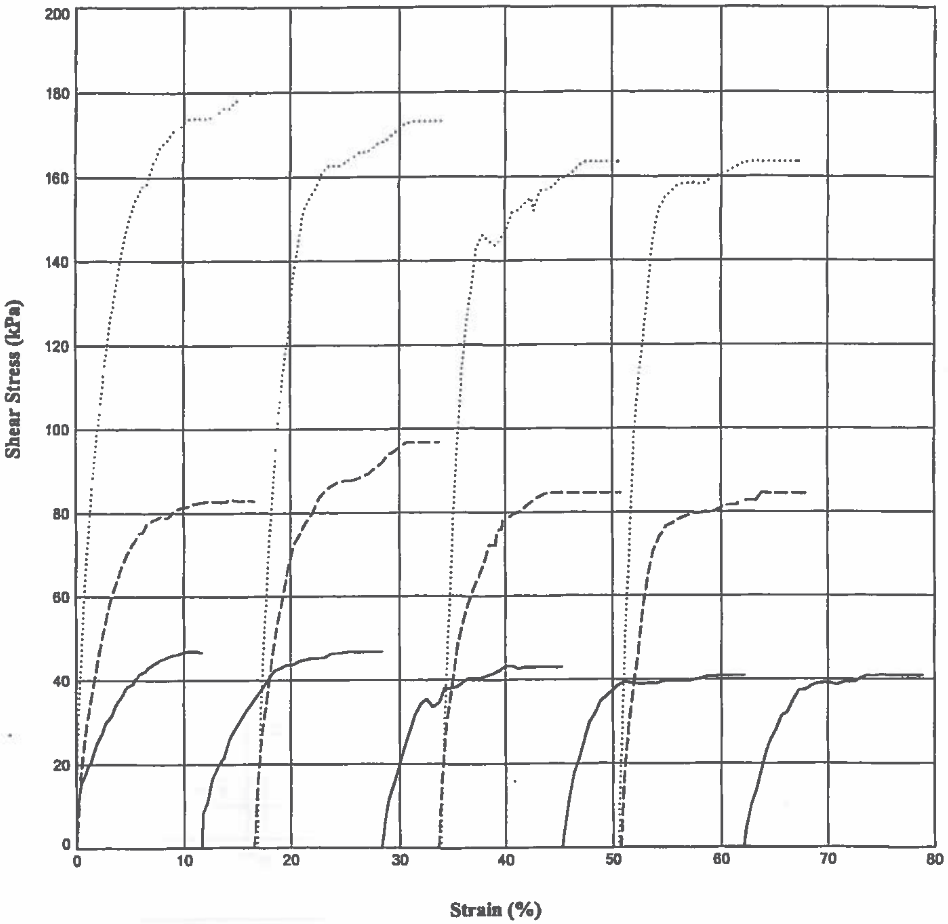
Solid Line = Specimen 1 (60 kPa), *Dashed Line* = Specimen 2 (120 kPa), *Dotted Line* = Specimen 3 (240 kPa).

STRUCTURAL SOILS The Old School House Stillhouse Lane Bedminster Bristol BS3 4EB	Compiled By	Date	Checked By	Date
	A. D. Fe	26/03/03	[signature]	27/3/03
	Contract: Parkgate Street, Dublin		Job No: 32307	
			Page 5 of 10	

PEAK AND RESIDUAL SHEAR BOX - SHEAR STRESS vs STRAIN

In accordance with clause 4.5 of BS1377:Part 7:1990

Borehole : BH2 Sample Ref : 7946 Sample Type : D Depth (m) : 4.00



KEY :

Solid Line = Specimen 1 (60 kPa), *Dashed Line* = Specimen 2 (120 kPa), *Dotted Line* = Specimen 3 (240 kPa).

STRUCTURAL SOILS The Old School House Stillhouse Lane Bedminster Bristol BS3 4EB	Compiled By A. D.	Date 26/03/03	Checked By	Date 27/3/03
	Contract Parkgate Street, Dublin		Job No 32307	
			Page 6 of 10	

PEAK AND RESIDUAL SHEAR BOX TEST

In accordance with clause 4.5 of BS1377:Part 7:1990

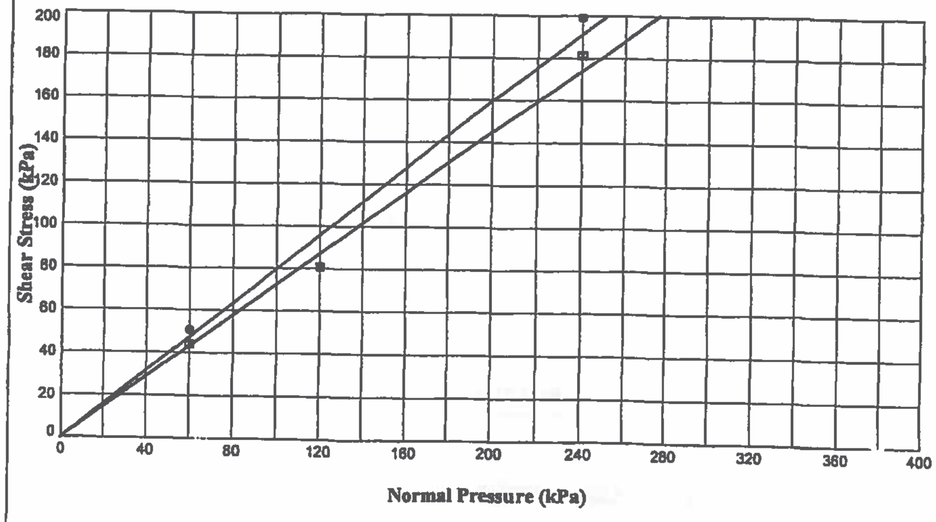
Borehole : BH4 Sample Ref : 7968 Sample Type : D Depth (m) : 4.00

Width x Length (mm) : 60 x 60 Sample Height (mm) : 20.0 S.G. (assumed) : 2.65

Description : Brown slightly gravelly silty SAND Sample Condition : Recompacted

	SPECIMEN NUMBER		1	2	3
PROPERTIES	Initial Moisture Content	(%)	8.3	8.3	8.3
	Initial Bulk Density	(Mg/m³)	1.72	1.83	1.79
	Initial Dry Density	(Mg/m³)	1.59	1.69	1.65
	Initial Voids Ratio		0.6643	0.5657	0.6021
CONSOLIDATION	Normal Pressure	(kPa)	60	120	240
	Initial Height	(mm)	19.834	19.844	19.678
	Consolidated Height	(mm)	17.467	17.706	16.288
SHEAR	Rate of Strain	(mm/min)	0.0240	0.0240	0.0240
	Strain at Peak Shear Stress	(%)	30.3	21.1	24.9
	Peak Shear Stress	(kPa)	51	81	199
	Residual Shear Stress	(kPa)	44	81	182
PEAK STRENGTH	Effective Cohesion (C') 0	(kPa)	Effective Angle of Friction (ϕ ')	39	(deg)
	Residual Cohesion (C') 0	(kPa)	Residual Angle of Friction (ϕ ')	36.5	(deg)

● Peak strength ⊠ Residual strength

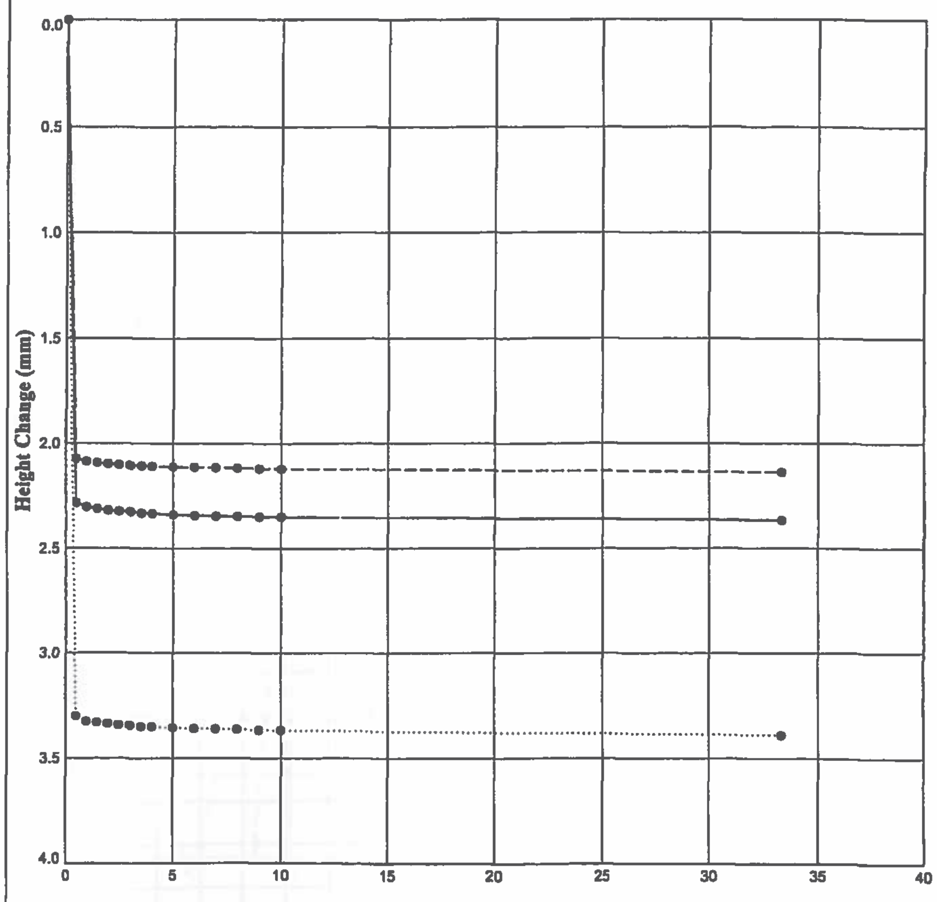


STRUCTURAL SOILS The Old School House Stillhouse Lane Bedminster Bristol BS3 4EB	Compiled By A. D.	Date 26/03/03	Checked By	Date 27/3/03
	Contract Parkgate Street, Dublin		Job No 32307	
			Page 7 of 10	

PEAK AND RESIDUAL SHEAR BOX - CONSOLIDATION GRAPH

In accordance with clause 4.5 of BS1377:Part 7:1990

Borehole : BH4 Sample Ref : 7968 Sample Type : D Depth (m) : 4.00



KEY :

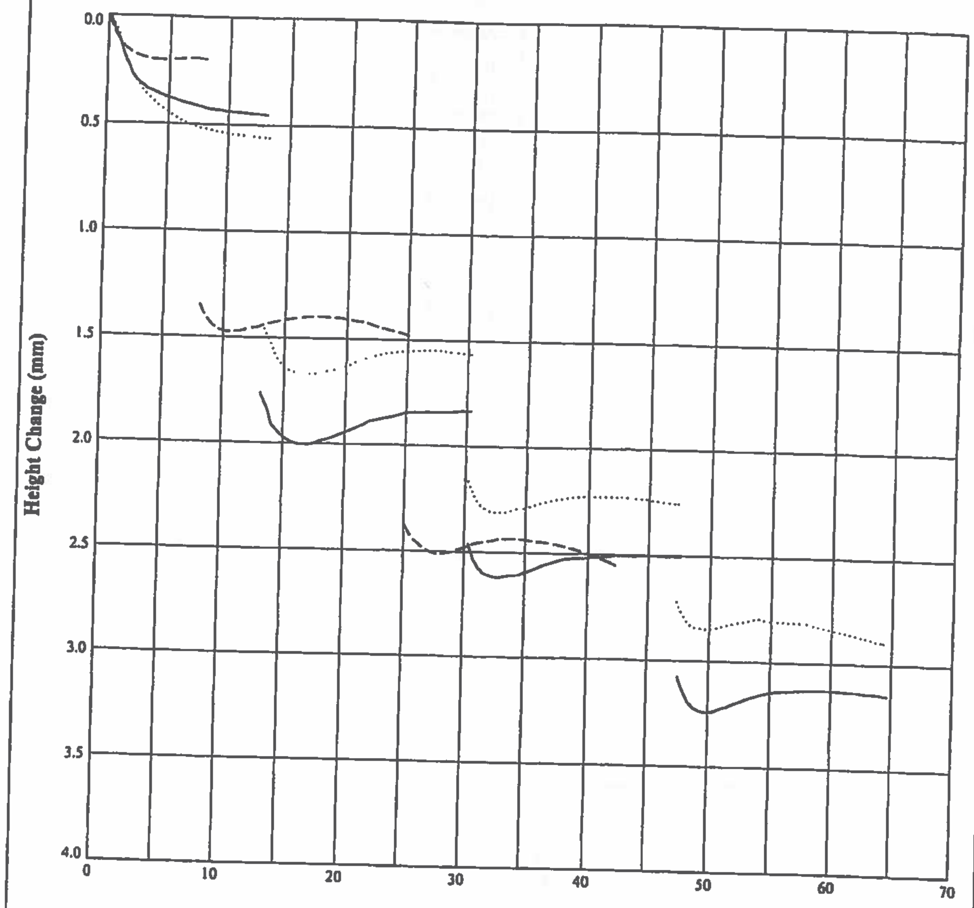
Solid Line = Specimen 1 (60 kPa), *Dashed Line* = Specimen 2 (120 kPa), *Dotted Line* = Specimen 3 (240 kPa).

STRUCTURAL SOILS The Old School House Stillhouse Lane Bedminster Bristol BS3 4EB	Compiled By: A. D. Fe	Date: 26/03/03	Checked By: [signature]	Date: 27/3/03
	Contract: Parkgate Street, Dublin		Job No: 32307	Page 8 of 10

PEAK AND RESIDUAL SHEAR BOX - HEIGHT CHANGE vs STRAIN

In accordance with clause 4.5 of BS1377:Part 7:1990

Borehole : BH4 Sample Ref : 7968 Sample Type : D Depth (m) : 4.00



KEY :

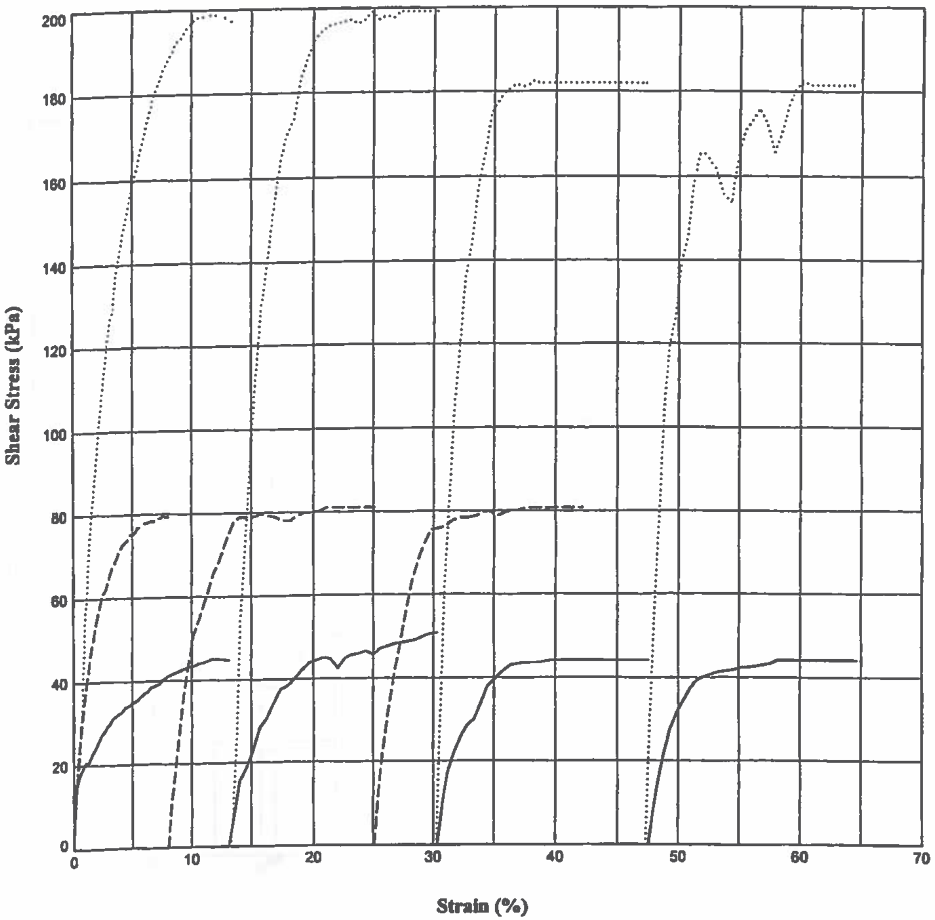
Solid Line = Specimen 1 (60 kPa), *Dashed Line* = Specimen 2 (120 kPa), *Dotted Line* = Specimen 3 (kPa).

STRUCTURAL SOILS The Old School House Stillhouse Lane Bedminster Bristol BS3 4EB	Compiled By: A. D. Fe	Date: 26/03/03	Checked By: [signature]	Date: 27/3/03
	Contract: Parkgate Street, Dublin		Job No: 32307	Page 9 of 10

PEAK AND RESIDUAL SHEAR BOX - SHEAR STRESS vs STRAIN

In accordance with clause 4.5 of BS1377:Part 7:1990

Borehole : BH4 Sample Ref : 7968 Sample Type : D Depth (m) : 4.00



KEY :

Solid Line = Specimen 1 (60 kPa), *Dashed Line* = Specimen 2 (120 kPa), *Dotted Line* = Specimen 3 (kPa).

STRUCTURAL SOILS The Old School House Stillhouse Lane Bedminster Bristol BS3 4EB	Compiled By	Date	Checked By	Date
	A. D. Fe	26/03/03	[signature]	27/3/03
	Contract: Parkgate Street, Dublin		Job No: 32307	
			Page 10 of 10	

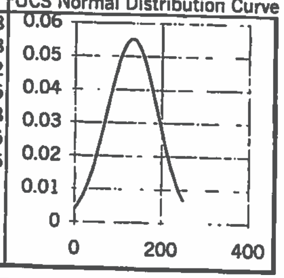
POINT LOAD DATA SHEET — IGSL

Contract: Hickeys Fabrics Ltd., Parkgate Street, Dublin.

DH No.	Depth m	D mm	P kN	F	Is MPa	Is(50) MPa	*UCS MPa
RC1	7.6	74	32	1.193	5.84	6.97	139
	9.8	74	45	1.193	8.22	9.80	196
RC2	8.5	73	32	1.186	6.00	7.12	142
	11.5	73	34	1.186	6.38	7.56	151
RC3	12	73	21	1.186	3.94	4.67	93
	12.55	73	4	1.186	0.75	0.89	18
RC4	9.9	74	45	1.193	8.22	9.80	196
	11.9	74	28	1.193	5.11	6.10	122

al Summary Data	Is(50)	UCS*
Number of Samples Tested	8	8
Minimum	0.89	18
Average	6.62	132
Maximum	9.80	196
Standard Dev.	2.89	58
Upper 95% Confidence Limit	12.28	245.56
Lower 95% Confidence Limit	0.95	19.06

*UCS Normal Distribution Curve



Comments:

*UCS taken as k x Point Load Is(50): 20

Uniaxial Compression Test Report Sheet — *I.G.S.L.*

Sample Identification

Date Tested : 30/1/03
Technician : J.Langley

Contract	Hickey's Fabric Ltd	Job Number : 8483
Corehole No.	RC1	
Depth (m)	6.8-7.1m	
Sample Ref.	A03/0110	

Sample Description

Colour	Grey/dark grey
Grain size	Fine-grained
Weathering Grade	Fresh to locally slightly weathered
Rock Type	LIMESTONE

Weathering Grade Criteria

I. Fresh: No discolouration
II. Slightly weathered: Discolouration on joint surfaces only
III. Moderately weathered: Discolouration penetrating into rock from joint surfaces
IV. Highly weathered: Complete discolouration of rock.

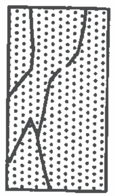
Sample Measurements

Length	182.6	mm
Diameter (Ø)	75.3	mm

Testing

Load Rate	0.915	kN/sec
Load at Failure (P)	346	kN

Sketch of Failure Surfaces



Stength Calculations

Uniaxial Compressive Strength = $\frac{\text{Load at Failure}}{\text{Cross Sectional Area}}$

$= \frac{1000 \times P}{\Pi \times (Ø/2)^2}$

= 78 (Mpa)

Notes: Bulk Density 2.64 (Mg/m^3)

Uniaxial Compression Test Report Sheet — *I.G.S.L.*

Sample Identification

Date Tested : 30/1/03
Technician : J.Langley

Contract	Hickey's Fabric Ltd	Job Number : 8483
Corehole No.	RC2	
Depth (m)	8.65-8.94m	
Sample Ref.	A03/0111	

Sample Description

Colour	Grey/dark grey
Grain size	Fine-grained
Weathering Grade	Fresh to locally moderately/highly weathered
Rock Type	LIMESTONE

Weathering Grade Criteria

I. Fresh: No discolouration
II. Slightly weathered: Discolouration on joint surfaces only
III. Moderately weathered: Discolouration penetrating into rock from joint surfaces
IV. Highly weathered: Complete discolouration of rock.

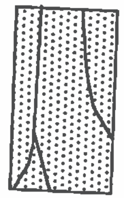
Sample Measurements

Length	155.2	mm
Diameter (Ø)	75.7	mm

Testing

Load Rate	0.63166666	kN/sec
Load at Failure (P)	236	kN

Sketch of Failure Surfaces



Stength Calculations

Uniaxial Compressive Strength = $\frac{\text{Load at Failure}}{\text{Cross Sectional Area}}$

$= \frac{1000 \times P}{\Pi \times (Ø/2)^2}$

= 52 (Mpa)

Notes: Bulk Density 2.67 (Mg/m^3)

Uniaxial Compression Test Report Sheet — I.G.S.L.

Sample Identification

Date Tested :	30/1/03
Technician :	J.Langley

Contract	Hickey's Fabric Ltd — Job Number : 8483
Corehole No.	RC4
Depth (m)	9.2-9.5m
Sample Ref.	A03/0112

Sample Description

Colour	Grey/dark grey
Grain size	Fine-grained
Weathering Grade	Fresh to locally moderately/highly weathered
Rock Type	LIMESTONE

Weathering Grade Criteria

I. Fresh: No discolouration
II. Slightly weathered: Discolouration on joint surfaces only
III. Moderately weathered: Discolouration penetrating into rock from joint surfaces
IV. Highly weathered: Complete discolouration of rock.

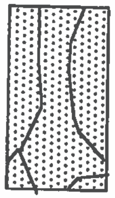
Sample Measurements

Length	143.3	mm
Diameter (Ø)	75.4	mm

Testing

Load Rate	0.986666	kN/sec
Load at Failure (P)	363	kN

Sketch of Failure Surfaces



Stength Calculations

Uniaxial Compressive Strength $= \dfrac{\text{Load at Failure}}{\text{Cross Sectional Area}}$

$= \dfrac{1000 \times P}{\Pi \times (Ø/2)^2}$

= 81 (Mpa)

Notes: Bulk Density 2.67 (Mg/m^3)

APPENDIX VII
LABORATORY TEST RECORDS
(ENVIRONMENTAL)

ALcontrol Laboratories Ireland

Test Schedule

Ref Number: 03-B00011
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 02/01/2003
Turnaround: 10 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: HICKEYS FABRIC

ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Mercury Low Level in NRA Leachate**	Surfactants in NRA Leachate	EOX in NRA Leachate*	DRO + Mineral Oil by GC	DRO + Mineral Oil by GC in NRA Leachate	PRO, BTEX & MTBE	PAH EPA (16)	PAH EPA (16) in NRA Leachate	Semi Volatile Organics	Volatile Organic Compounds	Moisture Content	Total Dissolved Solids in NRA Leachate	Dissolved Arsenic Low Level in NRA Leachate**	Arsenic Low Level
Detection Method				CV AA	DR LANGE	DUTCH STD	GC	GC	GC	GCMS	GCMS	GCMS	GCMS	GRAVIMETRIC	GRAVIMETRIC	Hydride AA	ICP
UKAS Accredited							✓	✓	✓	✓	✓						✓
03-B00011-S0005-A01	BH1 1-1.5	UNKNOWN	Glass Bottle	X	X	X	-	X	-	-	X	-	-	-	X	X	-
03-B00011-S0005-A24	BH1 1-1.5	UNKNOWN	Glass Bottle	-	-	-	X	-	-	X	-	X	-	X	-	-	X
03-B00011-S0005-A31	BH1 1-1.5	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-
03-B00011-S0006-A01	BH1 5-5.5	UNKNOWN	Glass Bottle	X	X	X	-	X	-	-	X	-	-	-	X	X	-
03-B00011-S0006-A24	BH1 5-5.5	UNKNOWN	Glass Bottle	-	-	-	X	-	-	X	-	X	-	X	-	-	X
03-B00011-S0006-A31	BH1 5-5.5	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By David Clarke

ALcontrol Laboratories Ireland

Test Schedule

Ref Number: 03-B00011
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 02/01/2003
Turnaround: 10 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: HICKEYS FABRIC

ALcontrol Reference	Sample Identity	Other ID	P / V	Cadmium Low Level	Chromium	Copper	Lead	Mercury Low Level	Molybdenum	Nickel	Water Soluble Boron	Zinc	Dissolved Boron in NRA Leachate	Dissolved Cadmium Low Level in NRA Leachate	Dissolved Chromium Low Level in NRA Leachate	Dissolved Copper Low Level in NRA Leachate	Dissolved Lead Low Level in NRA Leachate
Detection Method				ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP USN	ICP USN	ICP USN	ICP USN
UKAS Accredited				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
03-B00011-S0005-A01	BH1 1-1.5	UNKNOWN	Glass Bottle	-	-	-	-	-	-	-	-	-	X	X	X	X	X
03-B00011-S0005-A24	BH1 1-1.5	UNKNOWN	Glass Bottle	X	X	X	X	X	X	X	X	X	-	-	-	-	-
03-B00011-S0005-A31	BH1 1-1.5	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03-B00011-S0006-A01	BH1 5-5.5	UNKNOWN	Glass Bottle	-	-	-	-	-	-	-	-	-	X	X	X	X	X
03-B00011-S0006-A24	BH1 5-5.5	UNKNOWN	Glass Bottle	X	X	X	X	X	X	X	X	X	-	-	-	-	-
03-B00011-S0006-A31	BH1 5-5.5	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By David Clarke

* SUBCONTRACTED TO OTHER LABORATORY / ** SUBCONTRACTED TO ALCONTROL CHESTER

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 03-B00011
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 02/01/2003
Turnaround: 10 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: HICKEYS FABRIC

ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Molybdenum Low Level in NRA Leachate	Dissolved Nickel Low Level in NRA Leachate	Dissolved Zinc Low Level in NRA Leachate	Total Organic Carbon in NRA Leachate	Ammoniacal Nitrogen in NRA Leachate	Chloride in NRA Leachate	Fluoride in NRA Leachate**	Nitrate in NRA Leachate	Nitrite in NRA Leachate	ortho Phosphate in NRA Leachate	Sulphate in NRA Leachate	Conductivity in NRA Leachate	pH of NRA Leachate	NRA Leachate Test
Detection Method				ICP USN	ICP USN	ICP USN	IR	KONE	KONE	KONE	KONE	KONE	KONE	KONE	METER	METER	NRA
UKAS Accredited								✓	✓		✓	✓	✓	✓	✓	✓	
03-B00011-S0005-A01	BH1 1-1.5	UNKNOWN	Glass Bottle	X	X	X	X	X	X	X	X	X	X	X	X	X	X
03-B00011-S0005-A24	BH1 1-1.5	UNKNOWN	Glass Bottle	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03-B00011-S0005-A31	BH1 1-1.5	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03-B00011-S0006-A01	BH1 5-5.5	UNKNOWN	Glass Bottle	X	X	X	X	X	X	X	X	X	X	X	X	X	X
03-B00011-S0006-A24	BH1 5-5.5	UNKNOWN	Glass Bottle	-	-	-	-	-	-	-	-	-	-	-	-	-	-
03-B00011-S0006-A31	BH1 5-5.5	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By David Clel

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 03-B00011
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 02/01/2003
Turnaround: 10 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: HICKEYS FABRIC

ALcontrol Reference	Sample Identity	Other ID	P / V	Chromium VI in NRA Leachate	Free Cyanide in NRA Leachate
Detection Method				SPECTRO	SPECTRO
UKAS Accredited				✓	
03-B00011-S0005-A01	BH1 1-1.5	UNKNOWN	Glass Bottle	X	X
03-B00011-S0005-A24	BH1 1-1.5	UNKNOWN	Glass Bottle	-	-
03-B00011-S0005-A31	BH1 1-1.5	UNKNOWN	Volatile Vial	-	-
03-B00011-S0006-A01	BH1 5-5.5	UNKNOWN	Glass Bottle	X	X
03-B00011-S0006-A24	BH1 5-5.5	UNKNOWN	Glass Bottle	-	-
03-B00011-S0006-A31	BH1 5-5.5	UNKNOWN	Volatile Vial	-	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By David Clel

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 03-B00011
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 02/01/2003
Turnaround: 10 days

Sample Type: WATER
Location:
Client Contact: Neil Hannaway
Client Ref: HICKEYS FABRIC

Detection Method				CV AA	GC	GC	GCMS	GCMS	GCMS	GCMS	Hydride AA	ICP	ICP USN	ICP USN	ICP USN	ICP USN	ICP USN
UKAS Accredited					✓	✓	✓					✓					
ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Mercury Low Level**	DRO + Mineral Oil by GC	PRO, BTEX & MTBE	PAH EPA (16)	Semi Volatile Organics	Total PCB**	Volatile Organic Compounds	Dissolved Arsenic Low Level**	Dissolved Boron	Dissolved Cadmium Low Level	Dissolved Chromium Low Level	Dissolved Copper Low Level	Dissolved Lead Low Level	Dissolved Molybdenum Low Level
03-B00011-S0007-A01	BH7 3.5	UNKNOWN	Glass Bottle	X	X	X	X	X	X	X	X	X	X	X	X	X	X
03-B00011-S0008-A01	BH5 3.4	UNKNOWN	Glass Bottle	X	X	X	X	X	X	X	X	X	X	X	X	X	X
03-B00011-S0009-A01	BH2 3.1	UNKNOWN	Glass Bottle	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By David Clel

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 03-B00011
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 02/01/2003
Turnaround: 10 days

Sample Type: WATER
Location:
Client Contact: Neil Hannaway
Client Ref: HICKEYS FABRIC

Detection Method				ICP USN	ICP USN
UKAS Accredited					
ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Nickel Low Level	Dissolved Zinc Low Level
03-B00011-S0007-A01	BH7 3.5	UNKNOWN	Glass Bottle	X	X
03-B00011-S0008-A01	BH5 3.4	UNKNOWN	Glass Bottle	X	X
03-B00011-S0009-A01	BH2 3.1	UNKNOWN	Glass Bottle	X	X

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By David Clel

* SUBCONTRACTED TO OTHER LABORATORY / ** SUBCONTRACTED TO ALCONTROL CHESTER

Geochem Analytical Services
Diesel Range Organics
by
G.C.

Client Name IGSL
Client Ref Hickeys Fabric
Sample Matrix Leachate

Job Number 03-B00011
Date Extracted/Prepared 22/1/03
Date Analysed 23/1/03

Separatory Funnel Ext Yes
Soxtec Extraction No
Column Extraction Yes

Sample number	Sample Identity	Depth	Diesel Range Hydrocarbons (µg/litre)	Interpretation
005	BH1	1.0-1.5	< 10	No Identification Possible
006	BH1	5.0-5.5	< 10	No Identification Possible

Checked by

Geochem Analytical Services
Diesel Range Organics
by
G.C.

Client Name Irish Geotechnical Services Ltd
Client Ref Hickeys Fabrics
Sample Matrix Soil

Job Number 03-B00011
Date Extracted/Prepared 16/01/03
Date Analysed 17/01/03

Separatory Funnel Ext No
Soxtec Extraction No
Column Extraction No

Sample number	Sample Identity	Depth	Diesel Range Hydrocarbons (mg/kg)	Interpretation
S0005	BH1	1.0-1.5	< 1	No Identification Possible
S0006	BH1	5.0-5.5	< 1	No Identification Possible

Checked by

Geochem Analytical Services
Mineral Oil
by
G.C.

Client Name IGSL
Client Ref Hickeys Fabric
Sample Matrix Leachate

Job Number 03-B00011
Date Extracted/Prepared 22/1/03
Date Analysed 23/1/03

Separatory Funnel Ext Yes
Soxtec Extraction No
Column Extraction Yes

Sample number	Sample Identity	Depth	Mineral Oil (µg/litre)	Interpretation
005	BH1	1.0-1.5	< 10	No Identification Possible
006	BH1	5.0-5.5	< 10	No Identification Possible

Checked by

Geochem Analytical Services
Mineral Oil
by
G.C.

Client Name Irish Geotechnical Services Ltd
Client Ref Hickeys Fabrics
Sample Matrix Soil

Job Number 03-B00011
Date Extracted/Prepared 16/01/03
Date Analysed 17/01/03

Separatory Funnel Ext No
Soxtec Extraction No
Column Extraction No

Sample number	Sample Identity	Depth	Mineral Oil (mg/kg)	Interpretation
S0005	BH1	1.0-1.5	< 1	No Identification Possible
S0006	BH1	5.0-5.5	< 1	No Identification Possible

Checked by

Geochem Analytical Services

Diesel Range Organics
by
G.C.

Client Name IGSL
Client Ref Hickeys Fabric
Sample Matrix Water

Job Number 02-B00011
Date Extracted/Prepared 10/1/03
Date Analysed 13/1/03

Separatory Funnel Ext Yes
Soxtec Extraction No
Column Extraction Yes

Sample number	Sample Identity	Depth	Diesel Range Hydrocarbons (µg/litre)	Interpretation
007	BH7	3.50	< 10	No Identification Possible
008	BH5	3.40	< 10	No Identification Possible
009	BH2	3.10	< 10	No Identification Possible

Checked by Mathilde Erasmus

Geochem Analytical Services

Mineral Oil
by
G.C.

Client Name IGSL
Client Ref Hickeys Fabric
Sample Matrix Water

Job Number 02-B00011
Date Extracted/Prepared 10/1/03
Date Analysed 13/1/03

Separatory Funnel Ext Yes
Soxtec Extraction No
Column Extraction Yes

Sample number	Sample Identity	Depth	Mineral Oil (µg/litre)	Interpretation
007	BH7	3.50	< 10	No Identification Possible
008	BH5	3.40	< 10	No Identification Possible
009	BH2	3.10	< 10	No Identification Possible

Checked by Mathilde Erasmus

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B00011-S0005 BH1 1.0-1.5m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 14 Jan 2003 18:56
Instrument Name - Instrumen

CAS No	Compound	Conc.	CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1	106-93-4	1,2-Dibromoethane	<1
74-87-3	Chloromethane	<1	127-18-4	Tetrachloroethene	<1
75-01-4	Vinyl Chloride	<1	630-20-6	1,1,1,2-Tetrachloroethane	<1
74-83-9	Bromomethane	<1	108-90-7	Chlorobenzene	<1
75-00-3	Chloroethane	<1	100-41-4	Ethylbenzene	<1
75-69-4	Trichlorofluoromethane	<1	108-38-3*	p/m-Xylene	<1
156-60-5	trans-1,2-Dichloroethene	<1	75-25-2	Bromoform	<1
75-09-2	Dichloromethane	<1	100-42-5	Styrene	[illegible]
75-15-0	Carbon disulphide	<1	79-34-5	1,1,2,2-Tetrachloroethane	<1
75-35-4	1,1-Dichloroethene	<1	95-47-6	o-Xylene	<1
75-34-3	1,1-Dichloroethane	<1	96-18-4	1,2,3-Trichloropropane	<1
1634-04-4	tert-butyl methyl ether	<1	98-82-8	Isopropylbenzene	<1
156-59-2	cis-1,2-Dichloroethene	<1	108-86-1	Bromobenzene	<1
74-97-5	Bromochloromethane	<1	95-49-8	2-Chlorotoluene	<1
67-66-3	Chloroform	<1	103-65-1	Propylbenzene	<1
594-20-7	2,2-Dichloropropane	<1	106-43-4	4-Chlorotoluene	<1
107-06-2	1,2-Dichloroethane	<1	95-63-6,	1,2,4-Trimethylbenzene	<1
71-55-6	1,1,1-Trichloroethane	<1	99-87-6	4-Isopropyltoluene	<1
563-58-6	1,1-Dichloropropene	<1	108-67-8	1,3,5-Trimethylbenzene	<1
71-43-2	Benzene	<1	541-73-1	1,3-Dichlorobenzene	<1
56-23-5	Carbontetrachloride	<1	106-46-7	1,4-Dichlorobenzene	<1
74-95-3	Dibromomethane	<1	135-98-8	sec-Butylbenzene	<1
78-87-5	1,2-Dichloropropane	<1	98-06-6	tert-Butylbenzene	<1
75-27-4	Bromodichloromethane	<1	95-50-1	1,2-Dichlorobenzene	<1
79-01-6	Trichloroethene	<1	104-51-8	n-Butylbenzene	<1
10061-01-5	cis-1,3-Dichloropropene	<1	96-12-8	1,2-Dibromo-3-chloropropane	<1
10061-02-6	trans-1,3-Dichloropropene	<1	120-82-1	1,2,4-Trichlorobenzene	<1
79-00-5	1,1,2-Trichloroethane	<1	91-20-3	Naphthalene	<1
108-88-3	Toluene	<1	87-61-6	1,2,3-Trichlorobenzene	<1
142-28-9	1,3-Dichloropropane	<1	87-68-3	Hexachlorobutadiene	<1
124-48-1	Dibromochloromethane	<1			

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B00011-S0006 BH1 5.0-5.5m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 14 Jan 2003 18:21
Instrument Name - Instrumen

CAS No	Compound	Conc.	CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1	106-93-4	1,2-Dibromoethane	<1
74-87-3	Chloromethane	<1	127-18-4	Tetrachloroethene	<1
75-01-4	Vinyl Chloride	<1	630-20-6	1,1,1,2-Tetrachloroethane	<1
74-83-9	Bromomethane	<1	108-90-7	Chlorobenzene	<1
75-00-3	Chloroethane	<1	100-41-4	Ethylbenzene	<1
75-69-4	Trichlorofluoromethane	<1	108-38-3*	p/m-Xylene	<1
156-60-5	trans-1,2-Dichloroethene	<1	75-25-2	Bromoform	<1
75-09-2	Dichloromethane	<1	100-42-5	Styrene	[illegible]
75-15-0	Carbon disulphide	<1	79-34-5	1,1,2,2-Tetrachloroethane	<1
75-35-4	1,1-Dichloroethene	<1	95-47-6	o-Xylene	<1
75-34-3	1,1-Dichloroethane	<1	96-18-4	1,2,3-Trichloropropane	<1
1634-04-4	tert-butyl methyl ether	<1	98-82-8	Isopropylbenzene	<1
156-59-2	cis-1,2-Dichloroethene	<1	108-86-1	Bromobenzene	<1
74-97-5	Bromochloromethane	<1	95-49-8	2-Chlorotoluene	<1
67-66-3	Chloroform	<1	103-65-1	Propylbenzene	<1
594-20-7	2,2-Dichloropropane	<1	106-43-4	4-Chlorotoluene	<1
107-06-2	1,2-Dichloroethane	<1	95-63-6	1,2,4-Trimethylbenzene	<1
71-55-6	1,1,1-Trichloroethane	<1	99-87-6	4-Isopropyltoluene	<1
563-58-6	1,1-Dichloropropene	<1	108-67-8	1,3,5-Trimethylbenzene	<1
71-43-2	Benzene	<1	541-73-1	1,3-Dichlorobenzene	<1
56-23-5	Carbontetrachloride	<1	106-46-7	1,4-Dichlorobenzene	<1
74-95-3	Dibromomethane	<1	135-98-8	sec-Butylbenzene	<1
78-87-5	1,2-Dichloropropane	<1	98-06-6	tert-Butylbenzene	<1
75-27-4	Bromodichloromethane	<1	95-50-1	1,2-Dichlorobenzene	<1
79-01-6	Trichloroethene	<1	104-51-8	n-Butylbenzene	<1
10061-01-5	cis-1,3-Dichloropropene	<1	96-12-8	1,2-Dibromo-3-chloropropane	<1
10061-02-6	trans-1,3-Dichloropropene	<1	120-82-1	1,2,4-Trichlorobenzene	<1
79-00-5	1,1,2-Trichloroethane	<1	91-20-3	Naphthalene	<1
108-88-3	Toluene	<1	87-61-6	1,2,3-Trichlorobenzene	<1
142-28-9	1,3-Dichloropropane	<1	87-68-3	Hexachlorobutadiene	<1
124-48-1	Dibromochloromethane	<1			

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B00011-S0009 BH2 3.1m
Client / Sample matrix - Irish Geotechnical Services Ltd/Water
Units - µg/l
Date Acquired - 14 Jan 2003 20:42
Instrument Name - Instrumen

CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1
74-87-3	Chloromethane	<1
75-01-4	Vinyl Chloride	<1
74-83-9	Bromomethane	<1
75-00-3	Chloroethane	<1
75-69-4	Trichlorofluoromethane	<1
156-60-5	trans-1,2-Dichloroethene	<1
75-09-2	Dichloromethane	<1
75-15-0	Carbon disulphide	<1
75-35-4	1,1-Dichloroethene	<1
75-34-3	1,1-Dichloroethane	<1
1634-04-4	tert-butyl methyl ether	<1
156-59-2	cis-1,2-Dichloroethene	<1
74-97-5	Bromochloromethane	<1
67-66-3	Chloroform	<1
594-20-7	2,2-Dichloropropane	<1
107-06-2	1,2-Dichloroethane	<1
71-55-6	1,1,1-Trichloroethane	<1
563-58-6	1,1-Dichloropropene	<1
71-43-2	Benzene	<1
56-23-5	Carbontetrachloride	<1
74-95-3	Dibromomethane	<1
78-87-5	1,2-Dichloropropane	<1
75-27-4	Bromodichloromethane	<1
79-01-6	Trichloroethene	<1
10061-01-5	cis-1,3-Dichloropropene	<1
10061-02-6	trans-1,3-Dichloropropene	<1
79-00-5	1,1,2-Trichloroethane	<1
108-88-3	Toluene	<1
142-28-9	1,3-Dichloropropane	<1
124-48-1	Dibromochloromethane	<1

CAS No	Compound	Conc.
106-93-4	1,2-Dibromoethane	<1
127-18-4	Tetrachloroethene	<1
630-20-6	1,1,1,2-Tetrachloroethane	<1
108-90-7	Chlorobenzene	<1
100-41-4	Ethylbenzene	<1
108-38-3*	p/m-Xylene	<1
75-25-2	Bromoform	<1
100-42-5	Styrene	<1
79-34-5	1,1,2,2-Tetrachloroethane	<1
95-47-6	o-Xylene	<1
96-18-4	1,2,3-Trichloropropane	<1
98-82-8	Isopropylbenzene	<1
108-86-1	Bromobenzene	<1
95-49-8	2-Chlorotoluene	<1
103-65-1	Propylbenzene	<1
106-43-4	4-Chlorotoluene	<1
95-63-6	1,2,4-Trimethylbenzene	<1
99-87-6	4-Isopropyltoluene	<1
108-67-8	1,3,5-Trimethylbenzene	<1
541-73-1	1,3-Dichlorobenzene	<1
106-46-7	1,4-Dichlorobenzene	<1
135-98-8	sec-Butylbenzene	<1
98-06-6	tert-Butylbenzene	<1
95-50-1	1,2-Dichlorobenzene	<1
104-51-8	n-Butylbenzene	<1
96-12-8	1,2-Dibromo-3-chloropropane	<1
120-82-1	1,2,4-Trichlorobenzene	<1
91-20-3	Naphthalene	<1
87-61-6	1,2,3-Trichlorobenzene	<1
87-68-3	Hexachlorobutadiene	<1

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B00011-S0008 BH5 3.4m
Client / Sample matrix - Irish Geotechnical Services Ltd/Water
Units - µg/l
Date Acquired - 14 Jan 2003 20:06
Instrument Name - Instrumen

CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1
74-87-3	Chloromethane	<1
75-01-4	Vinyl Chloride	<1
74-83-9	Bromomethane	<1
75-00-3	Chloroethane	<1
75-69-4	Trichlorofluoromethane	<1
156-60-5	trans-1,2-Dichloroethene	<1
75-09-2	Dichloromethane	<1
75-15-0	Carbon disulphide	<1
75-35-4	1,1-Dichloroethene	<1
75-34-3	1,1-Dichloroethane	<1
1634-04-4	tert-butyl methyl ether	<1
156-59-2	cis-1,2-Dichloroethene	<1
74-97-5	Bromochloromethane	<1
67-66-3	Chloroform	<1
594-20-7	2,2-Dichloropropane	<1
107-06-2	1,2-Dichloroethane	<1
71-55-6	1,1,1-Trichloroethane	<1
563-58-6	1,1-Dichloropropene	<1
71-43-2	Benzene	<1
56-23-5	Carbontetrachloride	<1
74-95-3	Dibromomethane	<1
78-87-5	1,2-Dichloropropane	<1
75-27-4	Bromodichloromethane	<1
79-01-6	Trichloroethene	<1
10061-01-5	cis-1,3-Dichloropropene	<1
10061-02-6	trans-1,3-Dichloropropene	<1
79-00-5	1,1,2-Trichloroethane	<1
108-88-3	Toluene	<1
142-28-9	1,3-Dichloropropane	<1
124-48-1	Dibromochloromethane	<1

CAS No	Compound	Conc.
106-93-4	1,2-Dibromoethane	<1
127-18-4	Tetrachloroethene	<1
630-20-6	1,1,1,2-Tetrachloroethane	<1
108-90-7	Chlorobenzene	<1
100-41-4	Ethylbenzene	<1
108-38-3*	p/m-Xylene	<1
75-25-2	Bromoform	<1
100-42-5	Styrene	<1
79-34-5	1,1,2,2-Tetrachloroethane	<1
95-47-6	o-Xylene	<1
96-18-4	1,2,3-Trichloropropane	<1
98-82-8	Isopropylbenzene	<1
108-86-1	Bromobenzene	<1
95-49-8	2-Chlorotoluene	<1
103-65-1	Propylbenzene	<1
106-43-4	4-Chlorotoluene	<1
95-63-6	1,2,4-Trimethylbenzene	<1
99-87-6	4-Isopropyltoluene	<1
108-67-8	1,3,5-Trimethylbenzene	<1
541-73-1	1,3-Dichlorobenzene	<1
106-46-7	1,4-Dichlorobenzene	<1
135-98-8	sec-Butylbenzene	<1
98-06-6	tert-Butylbenzene	<1
95-50-1	1,2-Dichlorobenzene	<1
104-51-8	n-Butylbenzene	<1
96-12-8	1,2-Dibromo-3-chloropropane	<1
120-82-1	1,2,4-Trichlorobenzene	<1
91-20-3	Naphthalene	<1
87-61-6	1,2,3-Trichlorobenzene	<1
87-68-3	Hexachlorobutadiene	<1

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B00011-S0007 BH7 3.5m
Client / Sample matrix - Irish Geotechnical Services Ltd/Water
Units - µg/l
Date Acquired - 14 Jan 2003 19:31
Instrument Name - Instrumen

CAS No	Compound	Conc.	CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1	106-93-4	1,2-Dibromoethane	<1
74-87-3	Chloromethane	<1	127-18-4	Tetrachloroethene	<1
75-01-4	Vinyl Chloride	<1	630-20-6	1,1,1,2-Tetrachloroethane	<1
74-83-9	Bromomethane	<1	108-90-7	Chlorobenzene	<1
75-00-3	Chloroethane	<1	100-41-4	Ethylbenzene	<1
75-69-4	Trichlorofluoromethane	<1	108-38-3*	p/m-Xylene	<1
156-60-5	trans-1,2-Dichloroethene	<1	75-25-2	Bromoform	<1
75-09-2	Dichloromethane	<1	100-42-5	Styrene	<1
75-15-0	Carbon disulphide	<1	79-34-5	1,1,2,2-Tetrachloroethane	<1
75-35-4	1,1-Dichloroethene	<1	95-47-6	o-Xylene	<1
75-34-3	1,1-Dichloroethane	<1	96-18-4	1,2,3-Trichloropropane	<1
1634-04-4	tert-butyl methyl ether	<1	98-82-8	Isopropylbenzene	<1
156-59-2	cis-1,2-Dichloroethene	<1	108-86-1	Bromobenzene	<1
74-97-5	Bromochloromethane	<1	95-49-8	2-Chlorotoluene	<1
67-66-3	Chloroform	<1	103-65-1	Propylbenzene	<1
594-20-7	2,2-Dichloropropane	<1	106-43-4	4-Chlorotoluene	<1
107-06-2	1,2-Dichloroethane	<1	95-63-6	1,2,4-Trimethylbenzene	<1
71-55-6	1,1,1-Trichloroethane	<1	99-87-6	4-Isopropyltoluene	<1
563-58-6	1,1-Dichloropropene	<1	108-67-8	1,3,5-Trimethylbenzene	<1
71-43-2	Benzene	<1	541-73-1	1,3-Dichlorobenzene	<1
56-23-5	Carbontetrachloride	<1	106-46-7	1,4-Dichlorobenzene	<1
74-95-3	Dibromomethane	<1	135-98-8	sec-Butylbenzene	<1
78-87-5	1,2-Dichloropropane	<1	98-06-6	tert-Butylbenzene	<1
75-27-4	Bromodichloromethane	<1	95-50-1	1,2-Dichlorobenzene	<1
79-01-6	Trichloroethene	<1	104-51-8	n-Butylbenzene	<1
10061-01-5	cis-1,3-Dichloropropene	<1	96-12-8	1,2-Dibromo-3-chloropropane	<1
10061-02-6	trans-1,3-Dichloropropene	<1	120-82-1	1,2,4-Trichlorobenzene	<1
79-00-5	1,1,2-Trichloroethane	<1	91-20-3	Naphthalene	<1
108-88-3	Toluene	<1	87-61-6	1,2,3-Trichlorobenzene	<1
142-28-9	1,3-Dichloropropane	<1	87-68-3	Hexachlorobutadiene	<1
124-48-1	Dibromochloromethane	<1			

N.B. * also CAS No. 106-42-3

** Water blank subtracted

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-03-B00011-S0005 BH1 1.0-1.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.	CAS No	Compound	Conc.
108-95-2	Phenol	<100	207-08-9	Benzo(k)fluoranthene	<100
95-57-8	2-Chlorophenol	<100	50-32-8	Benzo(a)pyrene	<100
95-48-7	2-Methylphenol	<100	193-39-5	Indeno(1,2,3-cd)pyrene	<100
106-44-5	4-Methylphenol	<100	53-70-3	Dibenzo(a,h)anthracene	<100
88-75-5	2-Nitrophenol	<100	191-24-2	Benzo(ghi)perylene	<100
100-02-7	4-Nitrophenol	<100	91-58-7	2-Chloronaphthalene	<100
120-83-2	2,4-Dichlorophenol	<100	91-57-6	2-Methylnaphthalene	<100
105-67-9	2,4-Dimethylphenol	<100	86-74-8	Carbazole	<100
59-50-7	4-Chloro-3-methylphenol	<100	78-59-1	Isophorone	<100
88-06-2	2,4,6-Trichlorophenol	<100	132-64-9	Dibenzofuran	<100
95-95-4	2,4,5-Trichlorophenol	<100	131-11-3	Dimethyl phthalate	<100
87-86-5	Pentachlorophenol	<100	84-66-2	Diethyl phthalate	<100
541-73-1	1,3-Dichlorobenzene	<100	84-74-2	Di-n-butylphthalate	<100
106-46-7	1,4-Dichlorobenzene	<100	117-84-0	Di-n-octylphthalate	<100
95-50-1	1,2-Dichlorobenzene	<100	117-81-7	Bis(2-ethylhexyl)phthalate	<100
120-82-1	1,2,4-Trichlorobenzene	<100	85-68-7	Butylbenzylphthalate	<100
98-95-3	Nitrobenzene	<100	106-47-8	4-Chloroaniline	<100
103-33-3	Azobenzene	<100	88-74-4	2-Nitroaniline	<100
118-74-1	Hexachlorobenzene	<100	99-09-2	3-Nitroaniline	<100
91-20-3	Naphthalene	<100	100-01-6	4-Nitroaniline	<100
208-96-8	Acenaphthylene	<100	121-14-2	2,4-Dinitrotoluene	<100
83-32-9	Acenaphthene	<100	606-20-2	2,6-Dinitrotoluene	<100
86-73-7	Fluorene	<100	111-44-4	Bis(2-chloroethyl)ether	<100
85-01-8	Phenanthrene	<100	101-55-3	4-Bromophenylphenylether	<100
120-12-7	Anthracene	<100	7005-72-3	4-Chlorophenylphenylether	<100
206-44-0	Fluoranthrene	<100	67-72-1	Hexachloroethane	<100
129-00-0	Pyrene	<100	87-68-3	Hexachlorobutadiene	<100
56-55-3	Benzo(a)anthracene	<100	77-47-4	Hexchlorocyclopentadiene	<100
218-01-9	Chrysene	<100	111-91-1	Bis(2-chloroethoxy)methane	<100
205-99-2	Benzo(b)fluoranthrene	<100	621-64-7	N-nitrosodi-n-propylamine	<100

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-03-B00011-S0006 BH1 5.0-5.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.	CAS No	Compound	Conc.
108-95-2	Phenol	<100	207-08-9	Benzo(k)fluoranthrene	<100
95-57-8	2-Chlorophenol	<100	50-32-8	Benzo(a)pyrene	<100
95-48-7	2-Methylphenol	<100	193-39-5	Indeno(1,2,3-cd)pyrene	<100
106-44-5	4-Methylphenol	<100	53-70-3	Dibenzo(a,h)anthracene	<100
88-75-5	2-Nitrophenol	<100	191-24-2	Benzo(ghi)perylene	<100
100-02-7	4-Nitrophenol	<100	91-58-7	2-Chloronaphthalene	<100
120-83-2	2,4-Dichlorophenol	<100	91-57-6	2-Methylnaphthalene	<100
105-67-9	2,4-Dimethylphenol	<100	86-74-8	Carbazole	<100
59-50-7	4-Chloro-3-methylphenol	<100	78-59-1	Isophorone	<100
88-06-2	2,4,6-Trichlorophenol	<100	132-64-9	Dibenzofuran	<100
95-95-4	2,4,5-Trichlorophenol	<100	131-11-3	Dimethyl phthalate	<100
87-86-5	Pentachlorophenol	<100	84-66-2	Diethyl phthalate	<100
541-73-1	1,3-Dichlorobenzene	<100	84-74-2	Di-n-butylphthalate	<100
106-46-7	1,4-Dichlorobenzene	<100	117-84-0	Di-n-octylphthalate	<100
95-50-1	1,2-Dichlorobenzene	<100	117-81-7	Bis(2-ethylhexyl)phthalate	<100
120-82-1	1,2,4-Trichlorobenzene	<100	85-68-7	Butylbenzylphthalate	<100
98-95-3	Nitrobenzene	<100	106-47-8	4-Chloroaniline	<100
103-33-3	Azobenzene	<100	88-74-4	2-Nitroanaline	<100
118-74-1	Hexachlorobenzene	<100	99-09-2	3-Nitroaniline	<100
91-20-3	Naphthalene	<100	100-01-6	4-Nitroaniline	<100
208-96-8	Acenaphthylene	<100	121-14-2	2,4-Dinitrotoluene	<100
83-32-9	Acenaphthene	<100	606-20-2	2,6-Dinitrotoluene	<100
86-73-7	Fluorene	<100	111-44-4	Bis(2-chloroethyl)ether	<100
85-01-8	Phenanthrene	<100	101-55-3	4-Bromophenylphenylether	<100
120-12-7	Anthracene	<100	7005-72-3	4-Chlorophenylphenylether	<100
206-44-0	Fluoranthrene	<100	67-72-1	Hexachloroethane	<100
129-00-0	Pyrene	<100	87-68-3	Hexachlorobutadiene	<100
56-55-3	Benzo(a)anthracene	<100	77-47-4	Hexchlorocyclopentadiene	<100
218-01-9	Chrysene	<100	111-91-1	Bis(2-chloroethoxy)methane	<100
205-99-2	Benzo(b)fluoranthrene	<100	621-64-7	N-nitrosodi-n-propylamine	<100

Geochem Analytical Services

Polychlorinated Biphenyls
by
GCMS

Sample Matrix : Water
Our Reference: 03/00341 011
Date Sample Received: 13/01/2003
Date Extracted/Prepared: N/A
Extraction procedure: SPE
Column Extraction: Yes
Date Analysed: 14/01/2003
GC-MS Mode: SIM
Internal Standard: External

	Sample No.	001	002	003	004	
	Client Ref.	0011-07	0011-08	0011-09	BLK EXT	
	P.Q.L.	1	1	1	1	
CAS Number	Units	µg/l	µg/l	µg/l	µg/l	
12674-11-2	Aroclor 1016					
11104-28-2	Aroclor 1221					
11141-16-5	Aroclor 1232					
53469-21-9	Aroclor 1242					
12672-29-6	Aroclor 1248					
11097-69-1	Aroclor 1254					
11096-82-5	Aroclor 1260					
	Total	<1	<1	<1	<1	

Calculated against Aroclor 1254.

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-03-B00011-S0009 BH2 3.1
Client / Sample matrix - Irish Geotechnical Services Ltd/Water
Units - µg/l

CAS No	Compound	Conc.	CAS No	Compound	Conc.
108-95-2	Phenol	<1	207-08-9	Benzo(k)fluoranthrene	<1
95-57-8	2-Chlorophenol	<1	50-32-8	Benzo(a)pyrene	<1
95-48-7	2-Methylphenol	<1	193-39-5	Indeno(1,2,3-cd)pyrene	<1
106-44-5	4-Methylphenol	<1	53-70-3	Dibenzo(a,h)anthracene	<1
88-75-5	2-Nitrophenol	<1	191-24-2	Benzo(ghi)perylene	<1
100-02-7	4-Nitrophenol	<1	91-58-7	2-Chloronaphthalene	<1
120-83-2	2,4-Dichlorophenol	<1	91-57-6	2-Methylnaphthalene	<1
105-67-9	2,4-Dimethylphenol	<1	86-74-8	Carbazole	<1
59-50-7	4-Chloro-3-methylphenol	<1	78-59-1	Isophorone	<1
88-06-2	2,4,6-Trichlorophenol	<1	132-64-9	Dibenzofuran	<1
95-95-4	2,4,5-Trichlorophenol	<1	131-11-3	Dimethyl phthalate	<1
87-86-5	Pentachlorophenol	<1	84-66-2	Diethyl phthalate	<1
541-73-1	1,3-Dichlorobenzene	<1	84-74-2	Di-n-butylphthalate	<1
106-46-7	1,4-Dichlorobenzene	<1	117-84-0	Di-n-octylphthalate	<1
95-50-1	1,2-Dichlorobenzene	<1	117-81-7	Bis(2-ethylhexyl)phthalate	<1
120-82-1	1,2,4-Trichlorobenzene	<1	85-68-7	Butylbenzylphthalate	<1
98-95-3	Nitrobenzene	<1	106-47-8	4-Chloroaniline	<1
103-33-3	Azobenzene	<1	88-74-4	2-Nitroanaline	<1
118-74-1	Hexachlorobenzene	<1	99-09-2	3-Nitroaniline	<1
91-20-3	Naphthalene	<1	100-01-6	4-Nitroaniline	<1
208-96-8	Acenaphthylene	<1	121-14-2	2,4-Dinitrotoluene	<1
83-32-9	Acenaphthene	<1	606-20-2	2,6-Dinitrotoluene	<1
86-73-7	Fluorene	<1	111-44-4	Bis(2-chloroethyl)ether	<1
85-01-8	Phenanthrene	<1	101-55-3	4-Bromophenylphenylether	<1
120-12-7	Anthracene	<1	7005-72-3	4-Chlorophenylphenylether	<1
206-44-0	Fluoranthrene	<1	67-72-1	Hexachloroethane	<1
129-00-0	Pyrene	<1	87-68-3	Hexachlorobutadiene	<1
56-55-3	Benzo(a)anthracene	<1	77-47-4	Hexchlorocyclopentadiene	<1
218-01-9	Chrysene	<1	111-91-1	Bis(2-chloroethoxy)methane	<1
205-99-2	Benzo(b)fluoranthrene	<1	621-64-7	N-nitrosodi-n-propylamine	<1

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-03-B00011-S0008 BH5 3.4
Client / Sample matrix - Irish Geotechnical Services Ltd/Water
Units - µg/l

CAS No	Compound	Conc.	CAS No	Compound	Conc.
108-95-2	Phenol	<1	207-08-9	Benzo(k)fluoranthrene	<1
95-57-8	2-Chlorophenol	<1	50-32-8	Benzo(a)pyrene	<1
95-48-7	2-Methylphenol	<1	193-39-5	Indeno(1,2,3-cd)pyrene	<1
106-44-5	4-Methylphenol	<1	53-70-3	Dibenzo(a,h)anthracene	<1
88-75-5	2-Nitrophenol	<1	191-24-2	Benzo(ghi)perylene	<1
100-02-7	4-Nitrophenol	<1	91-58-7	2-Chloronaphthalene	<1
120-83-2	2,4-Dichlorophenol	<1	91-57-6	2-Methylnaphthalene	<1
105-67-9	2,4-Dimethylphenol	<1	86-74-8	Carbazole	<1
59-50-7	4-Chloro-3-methylphenol	<1	78-59-1	Isophorone	<1
88-06-2	2,4,6-Trichlorophenol	<1	132-64-9	Dibenzofuran	<1
95-95-4	2,4,5-Trichlorophenol	<1	131-11-3	Dimethyl phthalate	<1
87-86-5	Pentachlorophenol	<1	84-66-2	Diethyl phthalate	<1
541-73-1	1,3-Dichlorobenzene	<1	84-74-2	Di-n-butylphthalate	<1
106-46-7	1,4-Dichlorobenzene	<1	117-84-0	Di-n-octylphthalate	<1
95-50-1	1,2-Dichlorobenzene	<1	117-81-7	Bis(2-ethylhexyl)phthalate	<1
120-82-1	1,2,4-Trichlorobenzene	<1	85-68-7	Butylbenzylphthalate	<1
98-95-3	Nitrobenzene	<1	106-47-8	4-Chloroaniline	<1
103-33-3	Azobenzene	<1	88-74-4	2-Nitroanaline	<1
118-74-1	Hexachlorobenzene	<1	99-09-2	3-Nitroaniline	<1
91-20-3	Naphthalene	<1	100-01-6	4-Nitroaniline	<1
208-96-8	Acenaphthylene	<1	121-14-2	2,4-Dinitrotoluene	<1
83-32-9	Acenaphthene	<1	606-20-2	2,6-Dinitrotoluene	<1
86-73-7	Fluorene	<1	111-44-4	Bis(2-chloroethyl)ether	<1
85-01-8	Phenanthrene	<1	101-55-3	4-Bromophenylphenylether	<1
120-12-7	Anthracene	<1	7005-72-3	4-Chlorophenylphenylether	<1
206-44-0	Fluoranthrene	<1	67-72-1	Hexachloroethane	<1
129-00-0	Pyrene	<1	87-68-3	Hexachlorobutadiene	<1
56-55-3	Benzo(a)anthracene	<1	77-47-4	Hexchlorocyclopentadiene	<1
218-01-9	Chrysene	<1	111-91-1	Bis(2-chloroethoxy)methane	<1
205-99-2	Benzo(b)fluoranthrene	<1	621-64-7	N-nitrosodi-n-propylamine	<1

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-03-B00011-S0007 BH7 3.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Water
Units - µg/l

CAS No	Compound	Conc.	CAS No	Compound	Conc.
108-95-2	Phenol	<1	207-08-9	Benzo(k)fluoranthrene	<1
95-57-8	2-Chlorophenol	<1	50-32-8	Benzo(a)pyrene	<1
95-48-7	2-Methylphenol	<1	193-39-5	Indeno(1,2,3-cd)pyrene	<1
106-44-5	4-Methylphenol	<1	53-70-3	Dibenzo(a,h)anthracene	<1
88-75-5	2-Nitrophenol	<1	191-24-2	Benzo(ghi)perylene	<1
100-02-7	4-Nitrophenol	<1	91-58-7	2-Chloronaphthalene	<1
120-83-2	2,4-Dichlorophenol	<1	91-57-6	2-Methylnaphthalene	<1
105-67-9	2,4-Dimethylphenol	<1	86-74-8	Carbazole	<1
59-50-7	4-Chloro-3-methylphenol	<1	78-59-1	Isophorone	<1
88-06-2	2,4,6-Trichlorophenol	<1	132-64-9	Dibenzofuran	<1
95-95-4	2,4,5-Trichlorophenol	<1	131-11-3	Dimethyl phthalate	<1
87-86-5	Pentachlorophenol	<1	84-66-2	Diethyl phthalate	<1
541-73-1	1,3-Dichlorobenzene	<1	84-74-2	Di-n-butylphthalate	<1
106-46-7	1,4-Dichlorobenzene	<1	117-84-0	Di-n-octylphthalate	<1
95-50-1	1,2-Dichlorobenzene	<1	117-81-7	Bis(2-ethylhexyl)phthalate	<1
120-82-1	1,2,4-Trichlorobenzene	<1	85-68-7	Butylbenzylphthalate	<1
98-95-3	Nitrobenzene	<1	106-47-8	4-Chloroaniline	<1
103-33-3	Azobenzene	<1	88-74-4	2-Nitroaniline	<1
118-74-1	Hexachlorobenzene	<1	99-09-2	3-Nitroaniline	<1
91-20-3	Naphthalene	<1	100-01-6	4-Nitroaniline	<1
208-96-8	Acenaphthylene	<1	121-14-2	2,4-Dinitrotoluene	<1
83-32-9	Acenaphthene	<1	606-20-2	2,6-Dinitrotoluene	<1
86-73-7	Fluorene	<1	111-44-4	Bis(2-chloroethyl)ether	<1
85-01-8	Phenanthrene	<1	101-55-3	4-Bromophenylphenylether	<1
120-12-7	Anthracene	<1	7005-72-3	4-Chlorophenylphenylether	<1
206-44-0	Fluoranthrene	<1	67-72-1	Hexachloroethane	<1
129-00-0	Pyrene	<1	87-68-3	Hexachlorobutadiene	<1
56-55-3	Benzo(a)anthracene	<1	77-47-4	Hexchlorocyclopentadiene	<1
218-01-9	Chrysene	<1	111-91-1	Bis(2-chloroethoxy)methane	<1
205-99-2	Benzo(b)fluoranthrene	<1	621-64-7	N-nitrosodi-n-propylamine	<1

ALcontrol Laboratories Ireland

Test Schedule Summary

Ref Number: 03-B00011 | Sample Type: WATER
Client: Irish Geotechnical Services Ltd (Newbridge) | Location:
Date of Receipt: 02/01/2003 | Client Contact: Neil Hannaway
Turnaround: 10 days | Client Ref: HICKEYS FABRIC

* SUBCONTRACTED TO OTHER LABORATORY / ** SUBCONTRACTED TO ALCONTROL CHESTER

SCHEDULE	METHOD	TEST NAME	TOTAL
X	CV AA	Dissolved Mercury Low Level**	3
X	GC	DRO + Mineral Oil by GC	3
X	GC	PRO, BTEX & MTBE	3
X	GCMS	PAH EPA (16)	3
X	GCMS	Semi Volatile Organics	3
X	GCMS	Total PCB**	3
X	GCMS	Volatile Organic Compounds	3
X	Hydride AA	Dissolved Arsenic Low Level**	3
X	ICP	Dissolved Boron	3
X	ICP USN	Dissolved Cadmium Low Level	3
X	ICP USN	Dissolved Chromium Low Level	3
X	ICP USN	Dissolved Copper Low Level	3
X	ICP USN	Dissolved Lead Low Level	3
X	ICP USN	Dissolved Molybdenum Low Level	3
X	ICP USN	Dissolved Nickel Low Level	3
X	ICP USN	Dissolved Zinc Low Level	3

Printed at 12:02 on 03/01/2003

ALcontrol Laboratories Ireland
Test Schedule Summary

Ref Number: 03-B00011 **Sample Type:** SOIL
Client: Irish Geotechnical Services Ltd (Newbridge) **Location:**
Date of Receipt: 02/01/2003 **Client Contact:** Neil Hannaway
Turnaround: 10 days **Client Ref:** HICKEYS FABRIC

* SUBCONTRACTED TO OTHER LABORATORY / ** SUBCONTRACTED TO ALCONTROL CHESTER

SCHEDULE	METHOD	TEST NAME	TOTAL
X	CV AA	Dissolved Mercury Low Level in NRA Leachate**	2
X	DR LANGE	Surfactants in NRA Leachate	2
X	DUTCH STD	EOX in NRA Leachate*	2
X	GC	DRO + Mineral Oil by GC	2
X	GC	DRO + Mineral Oil by GC in NRA Leachate	2
X	GC	PRO, BTEX & MTBE	2
X	GCMS	PAH EPA (16)	2
X	GCMS	PAH EPA (16) in NRA Leachate	2
X	GCMS	Semi Volatile Organics	2
X	GCMS	Volatile Organic Compounds	2
X	GRAVIMETRIC	Moisture Content	2
X	GRAVIMETRIC	Total Dissolved Solids in NRA Leachate	2
X	Hydride AA	Dissolved Arsenic Low Level in NRA Leachate**	2
X	ICP	Arsenic Low Level	2
X	ICP	Cadmium Low Level	2
X	ICP	Chromium	2
X	ICP	Copper	2
X	ICP	Lead	2
X	ICP	Mercury Low Level	2
X	ICP	Molybdenum	2
X	ICP	Nickel	2
X	ICP	Water Soluble Boron	2
X	ICP	Zinc	2
X	ICP	Dissolved Boron in NRA Leachate	2
X	ICP USN	Dissolved Cadmium Low Level in NRA Leachate	2
X	ICP USN	Dissolved Chromium Low Level in NRA Leachate	2
X	ICP USN	Dissolved Copper Low Level in NRA Leachate	2
X	ICP USN	Dissolved Lead Low Level in NRA Leachate	2
X	ICP USN	Dissolved Molybdenum Low Level in NRA Leachate	2
X	ICP USN	Dissolved Nickel Low Level in NRA Leachate	2
X	ICP USN	Dissolved Zinc Low Level in NRA Leachate	2
X	IR	Total Organic Carbon in NRA Leachate	2
X	KONE	Ammoniacal Nitrogen in NRA Leachate	2
X	KONE	Chloride in NRA Leachate	2
X	KONE	Fluoride in NRA Leachate**	2
X	KONE	Nitrate in NRA Leachate	2
X	KONE	Nitrite in NRA Leachate	2
X	KONE	*ortho* Phosphate in NRA Leachate	2
X	KONE	Sulphate in NRA Leachate	2
X	METER	Conductivity in NRA Leachate	2
X	METER	pH of NRA Leachate	2

ALcontrol Laboratories Ireland
Test Schedule Summary

Ref Number: 03-B00011 **Sample Type:** SOIL
Client: Irish Geotechnical Services Ltd (Newbridge) **Location:**
Date of Receipt: 02/01/2003 **Client Contact:** Neil Hannaway
Turnaround: 10 days **Client Ref:** HICKEYS FABRIC

* SUBCONTRACTED TO OTHER LABORATORY / ** SUBCONTRACTED TO ALCONTROL CHESTER

SCHEDULE	METHOD	TEST NAME	TOTAL
X	NRA	NRA Leachate Test	2
X	SPECTRO	Chromium VI in NRA Leachate	2
X	SPECTRO	Free Cyanide in NRA Leachate	2

Printed at 12:02 on 03/01/2003

Ireland
Tel: + 353 (0) 1 8829893
Fax: + 353 (0) 1 8829895

CERTIFICATE OF ANALYSIS

Client: Irish Geotechnical Services Ltd (Newbridge)
Industrial Estate
Newbridge
Co. Kildare
Ireland

Attention: Neil Hannaway

Date: 28 January, 2003

Our Reference: 02-B02182

Your Reference: Hickeys Fabrics

Location:

A total of 44 samples was received for analysis on Thursday, 16 January 2003. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

Signed

P.P.
Ken Scally
Site Manager

Compiled By ....Dylan Halpin........
Dylan Halpin

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

Detection Method				CV AA	DR LANGE	DUTCH STD	GC	GC	GC	GCMS	GCMS	GCMS	GCMS	GRAVIMETRIC	GRAVIMETRIC	Hydride AA	ICP
UKAS Accredited							✓	✓	✓	✓	✓						✓
ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Mercury Low Level in NRA Leachate**	Surfactants in NRA Leachate	EOX in NRA Leachate*	DRO + Mineral Oil by GC	DRO + Mineral Oil by GC in NRA Leachate	PRO, BTEX & MTBE	PAH EPA (16)	PAH EPA (16) in NRA Leachate	Semi Volatile Organics	Volatile Organic Compounds	Moisture Content	Total Dissolved Solids in NRA Leachate	Dissolved Arsenic Low Level in NRA Leachate**	Arsenic Low Level
02-B02182-S0007-A01	WS1 0.5m	UNKNOWN	Amber Jar	-	-	-	X	-	X	X	-	X	X	X	-	-	X
02-B02182-S0008-A24	WS1 1.5m	UNKNOWN	Amber Jar	X	X	X	-	X	-	-	X	-	-	-	X	X	-
02-B02182-S0009-A01	WS1 2.5m	UNKNOWN	Amber Jar	-	-	-	X	-	X	X	-	X	X	X	-	-	X
02-B02182-S0010-A01	WS1 3.5m	UNKNOWN	Amber Jar	-	-	-	X	-	X	X	-	X	X	X	-	-	X
02-B02182-S0011-A01	WS2 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	X	-	X	X	-	X	X	X	-	-	X
02-B02182-S0013-A01	WS2 1.5-2.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0013-A02	WS2 1.5-2.0m	UNKNOWN	Amber Jar	-	-	-	X	-	X	X	-	X	X	X	-	-	X
02-B02182-S0014-A01	WS2 3.0m	UNKNOWN	Amber Jar	X	X	X	-	X	-	-	X	-	-	-	X	X	-
02-B02182-S0015-A01	WS2 4.0m	UNKNOWN	Glass Bottle	On Hold													
02-B02182-S0015-A02	WS2 4.0m	UNKNOWN	Amber Jar	-	-	-	X	-	X	X	-	X	X	X	-	-	X
02-B02182-S0016-A01	WS3 0.5m	UNKNOWN	Glass Bottle	On Hold													
02-B02182-S0016-A02	WS3 0.5m	UNKNOWN	Amber Jar	-	-	-	X	-	X	X	-	X	X	X	-	-	X
02-B02182-S0017-A01	WS3 1.5-2.0m	UNKNOWN	Glass Bottle														
02-B02182-S0017-A02	WS3 1.5-2.0m	UNKNOWN	Amber Jar	-	-	-	2	-	2	2	-	-	-	X	-	-	2
02-B02182-S0018-A01	WS3 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	-	X	-	-	X	-	-	-	X	X	-
02-B02182-S0019-A01	WS4 1.5-2.0	UNKNOWN	Glass Bottle	On Hold													
02-B02182-S0019-A02	WS4 1.5-2.0	UNKNOWN	Amber Jar	-	-	-	X	-	X	X	-	X	X	X	-	-	X
02-B02182-S0021-A01	WS5 0.5-1.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0021-A02	WS5 0.5-1.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0022-A01	WS5 1.5-2.0m	UNKNOWN	Amber Jar	X	X	X	-	X	-	-	X	-	-	-	X	X	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

* SUBCONTRACTED TO OTHER LABORATORY / ** SUBCONTRACTED TO ALCONTROL CHESTER

ALcontrol Laboratories Ire'‌and
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Mercury Low Level in NRA Leachate**	Surfactants in NRA Leachate	EOX in NRA Leachate*	DRO + Mineral Oil by GC	DRO + Mineral Oil by GC in NRA Leachate	PRO, BTEX & MTBE	PAH EPA (16)	PAH EPA (16) in NRA Leachate	Semi Volatile Organics	Volatile Organic Compounds	Moisture Content	Total Dissolved Solids in NRA Leachate	Dissolved Arsenic Low Level in NRA Leachate**	Arsenic Low Level
Detection Method				CV AA	DR LANGE	DUTCH STD	GC	GC	GC	GCMS	GCMS	GCMS	GCMS	GRAVIMETRIC	GRAVIMETRIC	Hydride AA	ICP
UKAS Accredited							✓	✓	✓	✓	✓						✓
02-B02182-S0023-A01	WS5 2.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	X	-	-	X
02-B02182-S0023-A07	WS5 2.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	-	-	-	-
02-B02182-S0024-A01	WS5 4.5-5.0m	UNKNOWN	Amber Jar	X	X	X	-	X	-	-	X	-	-	-	X	X	-
02-B02182-S0025-A01	WS5 4.5-5.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X
02-B02182-S0025-A08	WS5 4.5-5.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-
02-B02182-S0026-A01	WS6 1.5-2.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0026-A02	WS6 1.5-2.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0028-A01	WS7 1.0-1.5m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X
02-B02182-S0028-A08	WS7 1.0-1.5m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-
02-B02182-S0030-A01	WS7 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0031-A01	WS7 4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0031-A02	WS7 4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0032-A01	WS10 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X
02-B02182-S0032-A08	WS10 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-
02-B02182-S0034-A01	WS10 3.0m	UNKNOWN	Amber Jar	-	-	-	2	-	2	2	-	-	-	X	-	-	2
02-B02182-S0035-A01	WS10 4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0035-A02	WS10 4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0036-A01	WS11 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	2	-	-	2	-	-	-	X	-	-	2
02-B02182-S0036-A02	WS11 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	2	-	-	-	-	-	-	-	-
02-B02182-S0038-A01	WS11 3.5-4.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ______________________

ALcontrol Laboratories Ire'‌and
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Mercury Low Level in NRA Leachate**	Surfactants in NRA Leachate	EOX in NRA Leachate*	DRO + Mineral Oil by GC	DRO + Mineral Oil by GC in NRA Leachate	PRO, BTEX & MTBE	PAH EPA (16)	PAH EPA (16) in NRA Leachate	Semi Volatile Organics	Volatile Organic Compounds	Moisture Content	Total Dissolved Solids in NRA Leachate	Dissolved Arsenic Low Level in NRA Leachate**	Arsenic Low Level
Detection Method				CV AA	DR LANGE	DUTCH STD	GC	GC	GC	GCMS	GCMS	GCMS	GCMS	GRAVIMETRIC	GRAVIMETRIC	Hydride AA	ICP
UKAS Accredited							✓	✓	✓	✓	✓						✓
02-B02182-S0038-A08	WS11 3.5-4.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-
02-B02182-S0039-A01	WS11 4.5-5.0m	UNKNOWN	Amber Jar	-	-	-	2	-	2	2	-	-	-	X	-	-	2
02-B02182-S0040-A01	WS12 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	2	-	-	2	-	-	-	X	-	-	2
02-B02182-S0040-A02	WS12 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	2	-	-	-	-	-	-	-	-
02-B02182-S0042-A01	WS12 3.5-4.0m	UNKNOWN	Amber Jar	-	-	-	2	-	-	2	-	-	-	X	-	-	2
02-B02182-S0042-A02	WS12 3.5-4.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	2	-	-	-	-	-	-	-	-
02-B02182-S0043-A01	WS12 4.5-5.0m	UNKNOWN	Amber Jar	-	-	-	2	-	2	2	-	-	-	X	-	-	2
02-B02182-S0044-A01	WS13 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X
02-B02182-S0044-A08	WS13 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-
02-B02182-S0045-A01	WS13 1.5-2.0m	UNKNOWN	Amber Jar	X	X	X	2	X	2	2	X	-	-	X	X	X	2
02-B02182-S0046-A01	WS13 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0046-A02	WS13 3.5-4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0047-A01	WS13 4.5-5.0m	UNKNOWN	Amber Jar	-	-	-	2	-	2	2	-	-	-	X	-	-	2
02-B02182-S0048-A01	WS14 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	-	X	-	-	X	-	-	-	X	X	-
02-B02182-S0049-A01	WS14 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X
02-B02182-S0049-A08	WS14 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-
02-B02182-S0050-A01	WS14 2.5-3.0m	UNKNOWN	Amber Jar	-	-	-	2	-	-	2	-	-	-	X	-	-	2
02-B02182-S0050-A02	WS14 2.5-3.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	2	-	-	-	-	-	-	-	-
02-B02182-S0051-A01	WS15 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X
02-B02182-S0051-A08	WS15 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ______________________

ALcontrol Laboratories Ireland

Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

			Detection Method	CV AA	DR LANGE	DUTCH STD	GC	GC	GC	GCMS	GCMS	GCMS	GCMS	GRAVIMETRIC	GRAVIMETRIC	Hydride AA	ICP
			UKAS Accredited				✓	✓	✓	✓	✓						✓
ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Mercury Low Level in NRA Leachate**	Surfactants in NRA Leachate	EOX in NRA Leachate*	DRO + Mineral Oil by GC	DRO + Mineral Oil by GC in NRA Leachate	PRO, BTEX & MTBE	PAH EPA (16)	PAH EPA (16) in NRA Leachate	Semi Volatile Organics	Volatile Organic Compounds	Moisture Content	Total Dissolved Solids in NRA Leachate	Dissolved Arsenic Low Level in NRA Leachate**	Arsenic Low Level
02-B02182-S0053-A01	WS15 3.5-4.0m	UNKNOWN	Amber Jar	-	-	-	2	-	-	2	-	-	-	X	-	-	2
02-B02182-S0053-A02	WS15 3.5-4.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	2	-	-	-	-	-	-	-	-
02-B02182-S0054-A01	WS16 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X
02-B02182-S0054-A08	WS16 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-
02-B02182-S0055-A01	WS16 1.5-2.0m	UNKNOWN	Amber Jar	X	X	X	-	X	-	-	X	-	-	-	X	X	-
02-B02182-S0056-A01	WS16 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0056-A02	WS16 3.5-4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0057-A01	WS8 1.5-2.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X
02-B02182-S0057-A02	WS8 1.5-2.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ireland

Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

			Detection Method	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP USN	ICP USN	ICP USN	ICP USN
			UKAS Accredited	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
ALcontrol Reference	Sample Identity	Other ID	P / V	Cadmium Low Level	Chromium	Copper	Lead	Mercury Low Level	Molybdenum	Nickel	Water Soluble Boron	Zinc	Dissolved Boron in NRA Leachate	Dissolved Cadmium Low Level in NRA Leachate	Dissolved Chromium Low Level in NRA Leachate	Dissolved Copper Low Level in NRA Leachate	Dissolved Lead Low Level in NRA Leachate
02-B02182-S0007-A01	WS1 0.5m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0008-A24	WS1 1.5m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	X	X	X	X	X
02-B02182-S0009-A01	WS1 2.5m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0010-A01	WS1 3.5m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0011-A01	WS2 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0013-A01	WS2 1.5-2.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0013-A02	WS2 1.5-2.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0014-A01	WS2 3.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0015-A01	WS2 4.0m	UNKNOWN	Glass Bottle	On Hold									X	X	X	X	X
02-B02182-S0015-A02	WS2 4.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0016-A01	WS3 0.5m	UNKNOWN	Glass Bottle	On Hold													
02-B02182-S0016-A02	WS3 0.5m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0017-A01	WS3 1.5-2.0m	UNKNOWN	Glass Bottle	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0017-A02	WS3 1.5-2.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0018-A01	WS3 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0019-A01	WS4 1.5-2.0	UNKNOWN	Glass Bottle	On Hold									X	X	X	X	X
02-B02182-S0019-A02	WS4 1.5-2.0	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0021-A01	WS5 0.5-1.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0021-A02	WS5 0.5-1.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0022-A01	WS5 1.5-2.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	X	X	X	X	X

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ire'and
Test Schedule

Ref Number: 02-B02182 | **Sample Type:** SOIL
Client: Irish Geotechnical Services Ltd (Newbridge) | **Location:**
Date of Receipt: 16/01/2003 | **Client Contact:** Neil Hannaway
Turnaround: 5 days | **Client Ref:** Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Cadmium Low Level	Chromium	Copper	Lead	Mercury Low Level	Molybdenum	Nickel	Water Soluble Boron	Zinc	Dissolved Boron in NRA Leachate	Dissolved Cadmium Low Level in NRA Leachate	Dissolved Chromium Low Level in NRA Leachate	Dissolved Copper Low Level in NRA Leachate	Dissolved Lead Low Level in NRA Leachate
Detection Method				ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP USN	ICP USN	ICP USN	ICP USN
UKAS Accredited				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
02-B02182-S0023-A01	WS5 2.0m	UNKNOWN	Volatile Vial	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0023-A07	WS5 2.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0024-A01	WS5 4.5-5.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	X	X	X	X	X
02-B02182-S0025-A01	WS5 4.5-5.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0025-A08	WS5 4.5-5.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0026-A01	WS6 1.5-2.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0026-A02	WS6 1.5-2.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0028-A01	WS7 1.0-1.5m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0028-A08	WS7 1.0-1.5m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0030-A01	WS7 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0031-A01	WS7 4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0031-A02	WS7 4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0032-A01	WS10 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0032-A08	WS10 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0034-A01	WS10 3.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0035-A01	WS10 4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0035-A02	WS10 4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0036-A01	WS11 0.5-1.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0036-A02	WS11 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0038-A01	WS11 3.5-4.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ire'and
Test Schedule

Ref Number: 02-B02182 | **Sample Type:** SOIL
Client: Irish Geotechnical Services Ltd (Newbridge) | **Location:**
Date of Receipt: 16/01/2003 | **Client Contact:** Neil Hannaway
Turnaround: 5 days | **Client Ref:** Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Cadmium Low Level	Chromium	Copper	Lead	Mercury Low Level	Molybdenum	Nickel	Water Soluble Boron	Zinc	Dissolved Boron in NRA Leachate	Dissolved Cadmium Low Level in NRA Leachate	Dissolved Chromium Low Level in NRA Leachate	Dissolved Copper Low Level in NRA Leachate	Dissolved Lead Low Level in NRA Leachate
Detection Method				ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP USN	ICP USN	ICP USN	ICP USN
UKAS Accredited				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
02-B02182-S0038-A08	WS11 3.5-4.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0039-A01	WS11 4.5-5.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0040-A01	WS12 0.5-1.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0040-A02	WS12 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0042-A01	WS12 3.5-4.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0042-A02	WS12 3.5-4.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0043-A01	WS12 4.5-5.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0044-A01	WS13 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0044-A08	WS13 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0045-A01	WS13 1.5-2.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	X	X	X	X	X
02-B02182-S0046-A01	WS13 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0046-A02	WS13 3.5-4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0047-A01	WS13 4.5-5.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0048-A01	WS14 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	X	X	X	X	X
02-B02182-S0049-A01	WS14 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0049-A08	WS14 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0050-A01	WS14 2.5-3.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0050-A02	WS14 2.5-3.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0051-A01	WS15 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0051-A08	WS15 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ire'and

Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

Detection Method				ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP USN	ICP USN	ICP USN	ICP USN
UKAS Accredited				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
ALcontrol Reference	Sample Identity	Other ID	P / V	Cadmium Low Level	Chromium	Copper	Lead	Mercury Low Level	Molybdenum	Nickel	Water Soluble Boron	Zinc	Dissolved Boron in NRA Leachate	Dissolved Cadmium Low Level in NRA Leachate	Dissolved Chromium Low Level in NRA Leachate	Dissolved Copper Low Level in NRA Leachate	Dissolved Lead Low Level in NRA Leachate
02-B02182-S0053-A01	WS15 3.5-4.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2					
02-B02182-S0053-A02	WS15 3.5-4.0m	UNKNOWN	Volatile Vial														
02-B02182-S0054-A01	WS16 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X					
02-B02182-S0054-A08	WS16 0.5-1.0m	UNKNOWN	Volatile Vial														
02-B02182-S0055-A01	WS16 1.5-2.0m	UNKNOWN	Amber Jar										X	X	X	X	X
02-B02182-S0056-A01	WS16 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0056-A02	WS16 3.5-4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0057-A01	WS8 1.5-2.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X					
02-B02182-S0057-A02	WS8 1.5-2.0m	UNKNOWN	Volatile Vial														

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ire'and

Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

Detection Method				ICP USN	ICP USN	ICP USN	IR	KONE	KONE	KONE	KONE	KONE	KONE	KONE	METER	METER	NRA
UKAS Accredited								✓	✓		✓	✓	✓	✓	✓	✓	
ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Molybdenum Low Level in NRA Leachate	Dissolved Nickel Low Level in NRA Leachate	Dissolved Zinc Low Level in NRA Leachate	Total Organic Carbon in NRA Leachate	Ammoniacal Nitrogen in NRA Leachate	Chloride in NRA Leachate	Fluoride in NRA Leachate**	Nitrate in NRA Leachate	Nitrite in NRA Leachate	ortho Phosphate in NRA Leachate	Sulphate in NRA Leachate	Conductivity in NRA Leachate	pH of NRA Leachate	NRA Leachate Test
02-B02182-S0007-A01	WS1 0.5m	UNKNOWN	Amber Jar														
02-B02182-S0008-A24	WS1 1.5m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	X	X	X	X	X
02-B02182-S0009-A01	WS1 2.5m	UNKNOWN	Amber Jar														
02-B02182-S0010-A01	WS1 3.5m	UNKNOWN	Amber Jar														
02-B02182-S0011-A01	WS2 0.5-1.0m	UNKNOWN	Amber Jar														
02-B02182-S0013-A01	WS2 1.5-2.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0013-A02	WS2 1.5-2.0m	UNKNOWN	Amber Jar														
02-B02182-S0014-A01	WS2 3.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	X	X	X	X	X
02-B02182-S0015-A01	WS2 4.0m	UNKNOWN	Glass Bottle	On Hold													
02-B02182-S0015-A02	WS2 4.0m	UNKNOWN	Amber Jar														
02-B02182-S0016-A01	WS3 0.5m	UNKNOWN	Glass Bottle	On Hold													
02-B02182-S0016-A02	WS3 0.5m	UNKNOWN	Amber Jar														
02-B02182-S0017-A01	WS3 1.5-2.0m	UNKNOWN	Glass Bottle														
02-B02182-S0017-A02	WS3 1.5-2.0m	UNKNOWN	Amber Jar														
02-B02182-S0018-A01	WS3 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	X	X	X	X	X
02-B02182-S0019-A01	WS4 1.5-2.0	UNKNOWN	Glass Bottle	On Hold													
02-B02182-S0019-A02	WS4 1.5-2.0	UNKNOWN	Amber Jar														
02-B02182-S0021-A01	WS5 0.5-1.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0021-A02	WS5 0.5-1.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0022-A01	WS5 1.5-2.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ireland

Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Molybdenum Low Level in NRA Leachate	Dissolved Nickel Low Level in NRA Leachate	Dissolved Zinc Low Level in NRA Leachate	Total Organic Carbon in NRA Leachate	Ammoniacal Nitrogen in NRA Leachate	Chloride in NRA Leachate	Fluoride in NRA Leachate**	Nitrate in NRA Leachate	Nitrite in NRA Leachate	ortho Phosphate in NRA Leachate	Sulphate in NRA Leachate	Conductivity in NRA Leachate	pH of NRA Leachate	NRA Leachate Test
Detection Method				ICP USN	ICP USN	ICP USN	IR	KONE	KONE	KONE	KONE	KONE	KONE	KONE	METER	METER	NRA
UKAS Accredited								✓	✓		✓	✓	✓	✓	✓	✓	
02-B02182-S0023-A01	WS5 2.0m	UNKNOWN	Volatile Vial														
02-B02182-S0023-A07	WS5 2.0m	UNKNOWN	Amber Jar														
02-B02182-S0024-A01	WS5 4.5-5.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	X	X	X	X	X
02-B02182-S0025-A01	WS5 4.5-5.0m	UNKNOWN	Amber Jar														
02-B02182-S0025-A08	WS5 4.5-5.0m	UNKNOWN	Volatile Vial														
02-B02182-S0026-A01	WS6 1.5-2.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0026-A02	WS6 1.5-2.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0028-A01	WS7 1.0-1.5m	UNKNOWN	Amber Jar														
02-B02182-S0028-A08	WS7 1.0-1.5m	UNKNOWN	Volatile Vial														
02-B02182-S0030-A01	WS7 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0031-A01	WS7 4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0031-A02	WS7 4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0032-A01	WS10 0.5-1.0m	UNKNOWN	Amber Jar														
02-B02182-S0032-A08	WS10 0.5-1.0m	UNKNOWN	Volatile Vial														
02-B02182-S0034-A01	WS10 3.0m	UNKNOWN	Amber Jar														
02-B02182-S0035-A01	WS10 4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0035-A02	WS10 4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0036-A01	WS11 0.5-1.0m	UNKNOWN	Amber Jar														
02-B02182-S0036-A02	WS11 0.5-1.0m	UNKNOWN	Volatile Vial														
02-B02182-S0038-A01	WS11 3.5-4.0m	UNKNOWN	Amber Jar														

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ireland

Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Molybdenum Low Level in NRA Leachate	Dissolved Nickel Low Level in NRA Leachate	Dissolved Zinc Low Level in NRA Leachate	Total Organic Carbon in NRA Leachate	Ammoniacal Nitrogen in NRA Leachate	Chloride in NRA Leachate	Fluoride in NRA Leachate**	Nitrate in NRA Leachate	Nitrite in NRA Leachate	ortho Phosphate in NRA Leachate	Sulphate in NRA Leachate	Conductivity in NRA Leachate	pH of NRA Leachate	NRA Leachate Test
Detection Method				ICP USN	ICP USN	ICP USN	IR	KONE	KONE	KONE	KONE	KONE	KONE	KONE	METER	METER	NRA
UKAS Accredited								✓	✓		✓	✓	✓	✓	✓	✓	
02-B02182-S0038-A08	WS11 3.5-4.0m	UNKNOWN	Volatile Vial														
02-B02182-S0039-A01	WS11 4.5-5.0m	UNKNOWN	Amber Jar														
02-B02182-S0040-A01	WS12 0.5-1.0m	UNKNOWN	Amber Jar														
02-B02182-S0040-A02	WS12 0.5-1.0m	UNKNOWN	Volatile Vial														
02-B02182-S0042-A01	WS12 3.5-4.0m	UNKNOWN	Amber Jar														
02-B02182-S0042-A02	WS12 3.5-4.0m	UNKNOWN	Volatile Vial														
02-B02182-S0043-A01	WS12 4.5-5.0m	UNKNOWN	Amber Jar														
02-B02182-S0044-A01	WS13 0.5-1.0m	UNKNOWN	Amber Jar														
02-B02182-S0044-A08	WS13 0.5-1.0m	UNKNOWN	Volatile Vial														
02-B02182-S0045-A01	WS13 1.5-2.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	X	X	X	X	X
02-B02182-S0046-A01	WS13 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0046-A02	WS13 3.5-4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0047-A01	WS13 4.5-5.0m	UNKNOWN	Amber Jar														
02-B02182-S0048-A01	WS14 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	X	X	X	X	X
02-B02182-S0049-A01	WS14 0.5-1.0m	UNKNOWN	Amber Jar														
02-B02182-S0049-A08	WS14 0.5-1.0m	UNKNOWN	Volatile Vial														
02-B02182-S0050-A01	WS14 2.5-3.0m	UNKNOWN	Amber Jar														
02-B02182-S0050-A02	WS14 2.5-3.0m	UNKNOWN	Volatile Vial														
02-B02182-S0051-A01	WS15 0.5-1.0m	UNKNOWN	Amber Jar														
02-B02182-S0051-A08	WS15 0.5-1.0m	UNKNOWN	Volatile Vial														

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

Detection Method				ICP USN	ICP USN	ICP USN	IR	KONE	KONE	KONE	KONE	KONE	KONE	KONE	METER	METER	NRA
UKAS Accredited								✓	✓		✓	✓	✓	✓	✓	✓	
ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Molybdenum Low Level in NRA Leachate	Dissolved Nickel Low Level in NRA Leachate	Dissolved Zinc Low Level in NRA Leachate	Total Organic Carbon in NRA Leachate	Ammoniacal Nitrogen in NRA Leachate	Chloride in NRA Leachate	Fluoride in NRA Leachate**	Nitrate in NRA Leachate	Nitrite in NRA Leachate	ortho Phosphate in NRA Leachate	Sulphate in NRA Leachate	Conductivity in NRA Leachate	pH of NRA Leachate	NRA Leachate Test
02-B02182-S0053-A01	WS15 3.5-4.0m	UNKNOWN	Amber Jar														
02-B02182-S0053-A02	WS15 3.5-4.0m	UNKNOWN	Volatile Vial														
02-B02182-S0054-A01	WS16 0.5-1.0m	UNKNOWN	Amber Jar														
02-B02182-S0054-A08	WS16 0.5-1.0m	UNKNOWN	Volatile Vial														
02-B02182-S0055-A01	WS16 1.5-2.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	X	X	X	X	X
02-B02182-S0056-A01	WS16 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0056-A02	WS16 3.5-4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0057-A01	WS8 1.5-2.0m	UNKNOWN	Amber Jar														
02-B02182-S0057-A02	WS8 1.5-2.0m	UNKNOWN	Volatile Vial														

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

Detection Method				SPECTRO	SPECTRO
UKAS Accredited				✓	
ALcontrol Reference	Sample Identity	Other ID	P / V	Chromium VI in NRA Leachate	Free Cyanide in NRA Leachate
02-B02182-S0007-A01	WS1 0.5m	UNKNOWN	Amber Jar		
02-B02182-S0008-A24	WS1 1.5m	UNKNOWN	Amber Jar	X	X
02-B02182-S0009-A01	WS1 2.5m	UNKNOWN	Amber Jar		
02-B02182-S0010-A01	WS1 3.5m	UNKNOWN	Amber Jar		
02-B02182-S0011-A01	WS2 0.5-1.0m	UNKNOWN	Amber Jar		
02-B02182-S0013-A01	WS2 1.5-2.0m	UNKNOWN	Amber Jar	On Hold	
02-B02182-S0013-A02	WS2 1.5-2.0m	UNKNOWN	Amber Jar		
02-B02182-S0014-A01	WS2 3.0m	UNKNOWN	Amber Jar	X	X
02-B02182-S0015-A01	WS2 4.0m	UNKNOWN	Glass Bottle	On Hold	
02-B02182-S0015-A02	WS2 4.0m	UNKNOWN	Amber Jar		
02-B02182-S0016-A01	WS3 0.5m	UNKNOWN	Glass Bottle	On Hold	
02-B02182-S0016-A02	WS3 0.5m	UNKNOWN	Amber Jar		
02-B02182-S0017-A01	WS3 1.5-2.0m	UNKNOWN	Glass Bottle		
02-B02182-S0017-A02	WS3 1.5-2.0m	UNKNOWN	Amber Jar		
02-B02182-S0018-A01	WS3 0.5-1.0m	UNKNOWN	Amber Jar	X	X
02-B02182-S0019-A01	WS4 1.5-2.0	UNKNOWN	Glass Bottle	On Hold	
02-B02182-S0019-A02	WS4 1.5-2.0	UNKNOWN	Amber Jar		
02-B02182-S0021-A01	WS5 0.5-1.0m	UNKNOWN	Volatile Vial	On Hold	
02-B02182-S0021-A02	WS5 0.5-1.0m	UNKNOWN	Amber Jar	On Hold	
02-B02182-S0022-A01	WS5 1.5-2.0m	UNKNOWN	Amber Jar	X	X

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Chromium VI in NRA Leachate	Free Cyanide in NRA Leachate
Detection Method				SPECTRO	SPECTRO
UKAS Accredited				✓	
02-B02182-S0023-A01	WS5 2.0m	UNKNOWN	Volatile Vial		
02-B02182-S0023-A07	WS5 2.0m	UNKNOWN	Amber Jar		
02-B02182-S0024-A01	WS5 4.5-5.0m	UNKNOWN	Amber Jar	X	X
02-B02182-S0025-A01	WS5 4.5-5.0m	UNKNOWN	Amber Jar		
02-B02182-S0025-A08	WS5 4.5-5.0m	UNKNOWN	Volatile Vial		
02-B02182-S0026-A01	WS6 1.5-2.0m	UNKNOWN	Amber Jar	On Hold	
02-B02182-S0026-A02	WS6 1.5-2.0m	UNKNOWN	Volatile Vial	On Hold	
02-B02182-S0028-A01	WS7 1.0-1.5m	UNKNOWN	Amber Jar		
02-B02182-S0028-A08	WS7 1.0-1.5m	UNKNOWN	Volatile Vial		
02-B02182-S0030-A01	WS7 3.5-4.0m	UNKNOWN	Amber Jar	On Hold	
02-B02182-S0031-A01	WS7 4.0m	UNKNOWN	Amber Jar	On Hold	
02-B02182-S0031-A02	WS7 4.0m	UNKNOWN	Volatile Vial	On Hold	
02-B02182-S0032-A01	WS10 0.5-1.0m	UNKNOWN	Amber Jar		
02-B02182-S0032-A08	WS10 0.5-1.0m	UNKNOWN	Volatile Vial		
02-B02182-S0034-A01	WS10 3.0m	UNKNOWN	Amber Jar		
02-B02182-S0035-A01	WS10 4.0m	UNKNOWN	Volatile Vial	On Hold	
02-B02182-S0035-A02	WS10 4.0m	UNKNOWN	Amber Jar	On Hold	
02-B02182-S0036-A01	WS11 0.5-1.0m	UNKNOWN	Amber Jar		
02-B02182-S0036-A02	WS11 0.5-1.0m	UNKNOWN	Volatile Vial		
02-B02182-S0038-A01	WS11 3.5-4.0m	UNKNOWN	Amber Jar		

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ______________________

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Chromium VI in NRA Leachate	Free Cyanide in NRA Leachate
Detection Method				SPECTRO	SPECTRO
UKAS Accredited				✓	
02-B02182-S0038-A08	WS11 3.5-4.0m	UNKNOWN	Volatile Vial		
02-B02182-S0039-A01	WS11 4.5-5.0m	UNKNOWN	Amber Jar		
02-B02182-S0040-A01	WS12 0.5-1.0m	UNKNOWN	Amber Jar		
02-B02182-S0040-A02	WS12 0.5-1.0m	UNKNOWN	Volatile Vial		
02-B02182-S0042-A01	WS12 3.5-4.0m	UNKNOWN	Amber Jar		
02-B02182-S0042-A02	WS12 3.5-4.0m	UNKNOWN	Volatile Vial		
02-B02182-S0043-A01	WS12 4.5-5.0m	UNKNOWN	Amber Jar		
02-B02182-S0044-A01	WS13 0.5-1.0m	UNKNOWN	Amber Jar		
02-B02182-S0044-A08	WS13 0.5-1.0m	UNKNOWN	Volatile Vial		
02-B02182-S0045-A01	WS13 1.5-2.0m	UNKNOWN	Amber Jar	X	X
02-B02182-S0046-A01	WS13 3.5-4.0m	UNKNOWN	Amber Jar	On Hold	
02-B02182-S0046-A02	WS13 3.5-4.0m	UNKNOWN	Volatile Vial	On Hold	
02-B02182-S0047-A01	WS13 4.5-5.0m	UNKNOWN	Amber Jar		
02-B02182-S0048-A01	WS14 0.5-1.0m	UNKNOWN	Amber Jar	X	X
02-B02182-S0049-A01	WS14 0.5-1.0m	UNKNOWN	Amber Jar		
02-B02182-S0049-A08	WS14 0.5-1.0m	UNKNOWN	Volatile Vial		
02-B02182-S0050-A01	WS14 2.5-3.0m	UNKNOWN	Amber Jar		
02-B02182-S0050-A02	WS14 2.5-3.0m	UNKNOWN	Volatile Vial		
02-B02182-S0051-A01	WS15 0.5-1.0m	UNKNOWN	Amber Jar		
02-B02182-S0051-A08	WS15 0.5-1.0m	UNKNOWN	Volatile Vial		

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ______________________

ALcontrol Laboratories Ir[illegible]land

Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

			Detection Method	SPECTRO	SPECTRO
			UKAS Accredited	✓	
ALcontrol Reference	Sample Identity	Other ID	P / V	Chromium VI in NRA Leachate	Free Cyanide in NRA Leachate
02-B02182-S0053-A01	WS15 3.5-4.0m	UNKNOWN	Amber Jar		
02-B02182-S0053-A02	WS15 3.5-4.0m	UNKNOWN	Volatile Vial		
02-B02182-S0054-A01	WS16 0.5-1.0m	UNKNOWN	Amber Jar		
02-B02182-S0054-A08	WS16 0.5-1.0m	UNKNOWN	Volatile Vial		
02-B02182-S0055-A01	WS16 1.5-2.0m	UNKNOWN	Amber Jar	X	X
02-B02182-S0056-A01	WS16 3.5-4.0m	UNKNOWN	Amber Jar	On Hold	
02-B02182-S0056-A02	WS16 3.5-4.0m	UNKNOWN	Volatile Vial	On Hold	
02-B02182-S0057-A01	WS8 1.5-2.0m	UNKNOWN	Amber Jar		
02-B02182-S0057-A02	WS8 1.5-2.0m	UNKNOWN	Volatile Vial		

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ir[illegible]land

Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: WATER
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

			Detection Method	CV AA	GC	GC	GCMS	GCMS	GCMS	GCMS	Hydride AA	ICP	ICP USN	ICP USN	ICP USN	ICP USN ¹	ICP USN
			UKAS Accredited		✓	✓	✓					✓					
ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Mercury Low Level**	DRO + Mineral Oil by GC	PRO, BTEX & MTBE	PAH EPA (16)	Semi Volatile Organics	Total PCB**	Volatile Organic Compounds	Dissolved Arsenic Low Level**	Dissolved Boron	Dissolved Cadmium Low Level	Dissolved Chromium Low Level	Dissolved Copper Low Level	Dissolved Lead Low Level	Dissolved Molybdenum Low Level
02-B02182-S0006-A01	BH1 3.5m	UNKNOWN	Glass Bottle	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ireland

Test Schedule

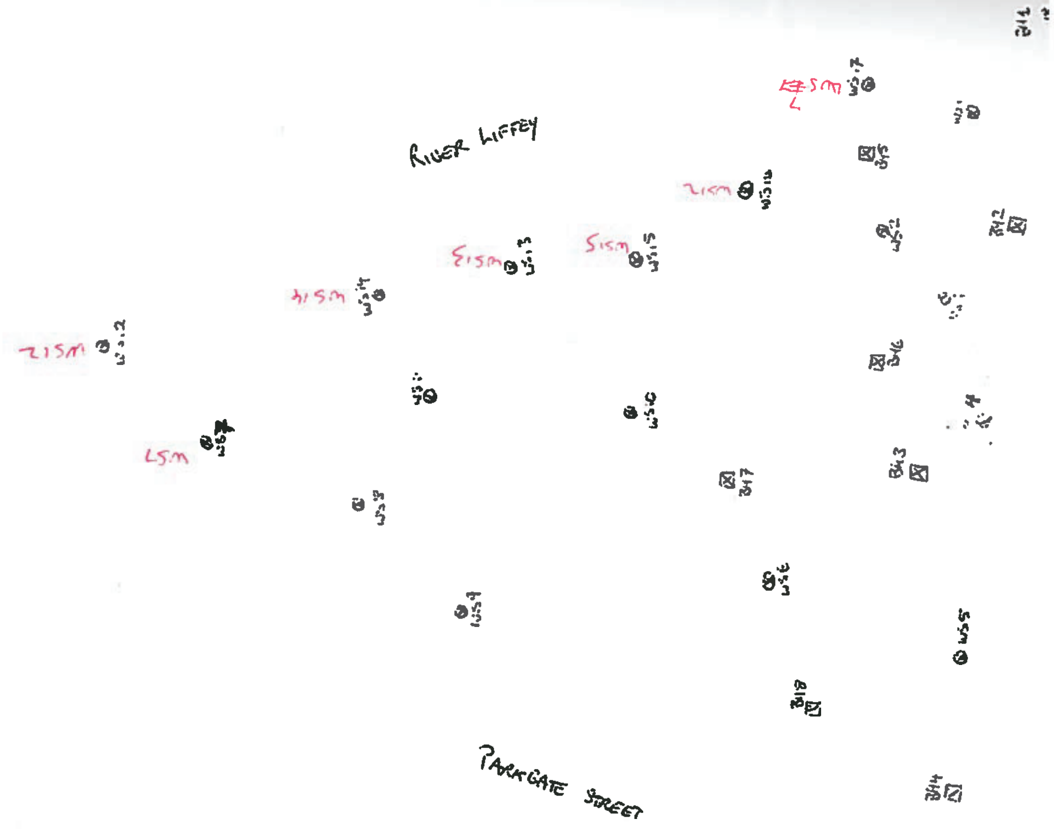
Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

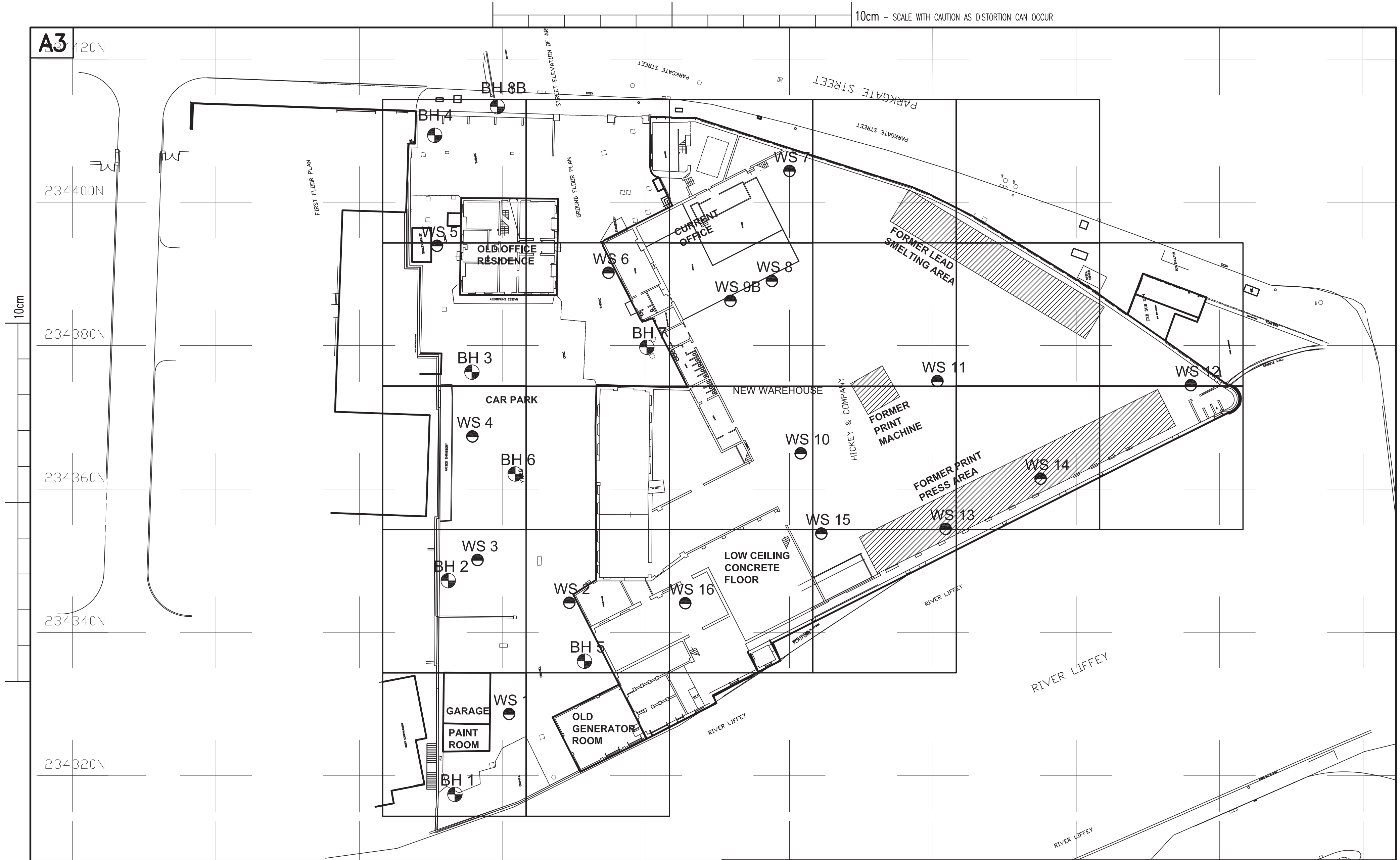
Sample Type: WATER
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

Detection Method				ICP USN	ICP USN
UKAS Accredited					
ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Nickel Low Level	Dissolved Zinc Low Level
02-B02182-S0006-A01	BH1 3.5m	UNKNOWN	Glass Bottle	X	X

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ______________________


RIVER LIFFEY
PARKGATE STREET



LEGEND

WS 4 – WINDOW SAMPLE

BH 6 – BOREHOLE

Rev.	Date	By	Description	Chd By

Job Title
HICKEYS FABRIC & CO. LTD.
NO 43 PARKGATE HOUSE
PARKGATE STREET
DUBLIN 8

Drawing Title
BOREHOLE/WINDOW SAMPLE LOCATIONS AND EXTENT OF HISTORICAL OPERATIONS

Drawing Status
FOR INFORMATION ONLY

ARUP
10 Wellington Road Dublin 4
Tel 01-6144200 Fax 01-6683169
EMail dublin@arup.com
DUBLIN CORK LIMERICK

Scales NTS
Originator
Checked
Approved
Date

Job No.	Drawing No.	Rev.
D3586.11	FIGURE 2	

J:\D3500-D3599\D3586\3) Drawings\(e) Geotechnical\10\Figure 2.dwg 20 Mar 2006 12:30:13

Ground Investigation
IGSL Report No. 8483
Hickey & Co., Parkgate Street
On Behalf Of
Arup
Consulting Engineers

Volume 2

FOREWORD

Notes on Site Investigation Procedure

The following notes should be read in conjunction with the report. Any modifications to the procedures outlined below are indicated in the main text.

GENERAL

The recommendations made and opinions expressed in the Report are based on the "Boring Records, an examination of samples and results of the site and laboratory tests. No responsibility can be held for conditions which have not been revealed by the boreholes, for example, between borehole positions. Whilst the report may express an opinion on a possible configuration of strata both between borehole positions and below the maximum depth of the investigation, this is for guidance only and no liability can be accepted for its accuracy.

BORING TECHNIQUE

Unless otherwise stated the 'Shell and Auger' technique of soft ground boring has been employed. Whilst this technique allows the maximum data to be obtained on strata conditions, a degree of mixing of some layered soils, (e.g. thin layers of coarse and fine granular material) is inevitable. Specific attention is drawn to this factor where evidence of such a condition is available.

GROUND WATER

The ground water conditions entered on the Boring Records are those appertaining at the time of the investi gation. The normal rate of boring does not usually permit the recording of an equilibrium water level for any one water strike. Moreover, ground water levels are subject to variations caused by seasonal effects or changes in local drainage conditions. The table of each Boring Record shows the ground water level at the quoted borehole and casing depths, usually at the start of the day's work. The word "none" indicates that ground water was sealed off by the borehole casing.

GAS MONITORING

Unless otherwise stated gas monitoring is carried out using a GA2000 infra red gas detector. The gases monitored for and levels noted are recorded and plotted on the relevant test data sheets. Unless stated otherwise no monitoring is carried out for gas pressure or to calculate gas flow rates.

ROUTINE SAMPLING

Undisturbed samples of predominantly cohesive soils are obtained in a 102mm diameter open-drive sampler, complying with the requirements of the British Standard Code of Practice B.S. 5930. Large disturbed samples of granular soils, or of soils in which undisturbed sampling is not possible or appropriate, are taken from the boring tools and sealed into polythene bags. Small disturbed samples are taken at frequent intervals and sealed into 0.5 kg glass jars or polythene bags for subsequent visual classification. Where encountered in sufficient quantity, samples of groundwater are taken.

Unless otherwise stated in the main text, disturbed soil samples may not be at their natural water content.

REPORT ON A SITE INVESTIGATION FOR PROPOSED RESIDENTIAL / COMERCIAL DEVELOPMENT AT PARKGATE STREET, DUBLIN ON BEHALF OF ARUP, CONSULTING ENGINEERS

REPORT NO. 8483 / 2 **MARCH 2003**

I.INTRODUCTION

The proposed development site is located in the Hickeys commercial warehousing facility located off Parkgate Street in Dublin.

An investigation of sub-soil conditions was ordered by the projects consulting engineers , Arup Ireland, on behalf of their clients, Hickey & Company.

The programme of the investigation included,

- ✓ The construction of eight exploratory boreholes .
- ✓ The drilling of four rotary coreholes.
- ✓ The installation of six groundwater monitoring standpipes.
- ✓ The drilling of sixteen window sample holes using a Terrier 1000.
- ✓ The carrying out of laboratory soils testing (Geotechnical & Environmental) as specified by the projects engineers.

The project report has been subdivided into two sections. This document is Volume 2 of the main SI report and contains Geochem Report No. 02 – B02182 (Containing window sample test results and one groundwater sample (30 nr tests).

Volume 1 of the ground investigation report details all of the factual information pertaining to this investigation

CERTIFICATE OF ANALYSIS

Client: Irish Geotechnical Services Ltd (Newbridge)
Industrial Estate
Newbridge
Co. Kildare
Ireland

Attention: Neil Hannaway

Date: 28 January, 2003

Our Reference: 02-B02182

Your Reference: Hickeys Fabrics

Location:

A total of 44 samples was received for analysis on Thursday, 16 January 2003. We are pleased to enclose our final report, it was a pleasure to be of service to you, and we look forward to our continuing association.

Signed

P.P. [signature]

Ken Scally
Site Manager

Compiled By ....Dylan Halpin............
Dylan Halpin

ALcontrol Laboratories Ireland

Test Schedule

Ref Number: 02-B02182 **Sample Type:** SOIL
Client: Irish Geotechnical Services Ltd (Newbridge) **Location:**
Date of Receipt: 16/01/2003 **Client Contact:** Neil Hannaway
Turnaround: 5 days **Client Ref:** Hickeys Fabrics

Detection Method				CV AA	DR LANGE	DUTCH STD	GC	GC	GC	GCMS	GCMS	GCMS	GCMS	GRAVIMETRIC	GRAVIMETRIC	Hydride AA	ICP
UKAS Accredited							✓	✓	✓	✓	✓						✓
ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Mercury Low Level in NRA Leachate**	Surfactants in NRA Leachate	EOX in NRA Leachate*	DRO + Mineral Oil by GC	DRO + Mineral Oil by GC in NRA Leachate	PRO, BTEX & MTBE	PAH EPA (16)	PAH EPA (16) in NRA Leachate	Semi Volatile Organics	Volatile Organic Compounds	Moisture Content	Total Dissolved Solids in NRA Leachate	Dissolved Arsenic Low Level in NRA Leachate**	Arsenic Low Level
02-B02182-S0007-A01	WS1 0.5m	UNKNOWN	Amber Jar	-	-	-	X	-	X	X	-	X	X	X	-	-	X
02-B02182-S0008-A24	WS1 1.5m	UNKNOWN	Amber Jar	X	X	X	-	X	-	-	X	-	-	-	X	X	-
02-B02182-S0009-A01	WS1 2.5m	UNKNOWN	Amber Jar	-	-	-	X	-	X	X	-	X	X	X	-	-	X
02-B02182-S0010-A01	WS1 3.5m	UNKNOWN	Amber Jar	-	-	-	X	-	X	X	-	X	X	X	-	-	X
02-B02182-S0011-A01	WS2 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	X	-	X	X	-	X	X	X	-	-	X
02-B02182-S0013-A01	WS2 1.5-2.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0013-A02	WS2 1.5-2.0m	UNKNOWN	Amber Jar	-	-	-	X	-	X	X	-	X	X	X	-	-	X
02-B02182-S0014-A01	WS2 3.0m	UNKNOWN	Amber Jar	X	X	X	-	X	-	-	X	-	-	-	X	X	-
02-B02182-S0015-A01	WS2 4.0m	UNKNOWN	Glass Bottle	On Hold													
02-B02182-S0015-A02	WS2 4.0m	UNKNOWN	Amber Jar	-	-	-	X	-	X	X	-	X	X	X	-	-	X
02-B02182-S0016-A01	WS3 0.5m	UNKNOWN	Glass Bottle	On Hold													
02-B02182-S0016-A02	WS3 0.5m	UNKNOWN	Amber Jar	-	-	-	X	-	X	X	-	X	X	X	-	-	X
02-B02182-S0017-A01	WS3 1.5-2.0m	UNKNOWN	Glass Bottle	-	-	-	-	-	2	-	-	-	-	-	-	-	-
02-B02182-S0017-A02	WS3 1.5-2.0m	UNKNOWN	Amber Jar	-	-	-	2	-	-	2	-	-	-	X	-	-	2
02-B02182-S0018-A01	WS3 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	-	X	-	-	X	-	-	-	X	X	-
02-B02182-S0019-A01	WS4 1.5-2.0	UNKNOWN	Glass Bottle	On Hold													
02-B02182-S0019-A02	WS4 1.5-2.0	UNKNOWN	Amber Jar	-	-	-	X	-	X	X	-	X	X	X	-	-	X
02-B02182-S0021-A01	WS5 0.5-1.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0021-A02	WS5 0.5-1.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0022-A01	WS5 1.5-2.0m	UNKNOWN	Amber Jar	X	X	X	-	X	-	-	X	-	-	-	X	X	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

* SUBCONTRACTED TO OTHER LABORATORY / ** SUBCONTRACTED TO ALCONTROL CHESTER

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Mercury Low Level in NRA Leachate**	Surfactants in NRA Leachate	EOX in NRA Leachate*	DRO + Mineral Oil by GC	DRO + Mineral Oil by GC in NRA Leachate	PRO, BTEX & MTBE	PAH EPA (16)	PAH EPA (16) in NRA Leachate	Semi Volatile Organics	Volatile Organic Compounds	Moisture Content	Total Dissolved Solids in NRA Leachate	Dissolved Arsenic Low Level in NRA Leachate**	Arsenic Low Level
Detection Method				CV AA	DR LANGE	DUTCH STD	GC	GC	GC	GCMS	GCMS	GCMS	GCMS	GRAVIMETRIC	GRAVIMETRIC	Hydride AA	ICP
UKAS Accredited							✓	✓	✓	✓	✓						✓
02-B02182-S0023-A01	WS5 2.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	X	-	-	X
02-B02182-S0023-A07	WS5 2.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	-	-	-	-
02-B02182-S0024-A01	WS5 4.5-5.0m	UNKNOWN	Amber Jar	X	X	X	-	X	-	-	X	-	-	-	X	X	-
02-B02182-S0025-A01	WS5 4.5-5.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X
02-B02182-S0025-A08	WS5 4.5-5.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-
02-B02182-S0026-A01	WS6 1.5-2.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0026-A02	WS6 1.5-2.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0028-A01	WS7 1.0-1.5m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X
02-B02182-S0028-A08	WS7 1.0-1.5m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-
02-B02182-S0030-A01	WS7 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0031-A01	WS7 4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0031-A02	WS7 4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0032-A01	WS10 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X
02-B02182-S0032-A08	WS10 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-
02-B02182-S0034-A01	WS10 3.0m	UNKNOWN	Amber Jar	-	-	-	2	-	2	2	-	-	-	X	-	-	2
02-B02182-S0035-A01	WS10 4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0035-A02	WS10 4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0036-A01	WS11 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	2	-	-	2	-	-	-	X	-	-	2
02-B02182-S0036-A02	WS11 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	2	-	-	-	-	-	-	-	-
02-B02182-S0038-A01	WS11 3.5-4.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ______________________

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Mercury Low Level in NRA Leachate**	Surfactants in NRA Leachate	EOX in NRA Leachate*	DRO + Mineral Oil by GC	DRO + Mineral Oil by GC in NRA Leachate	PRO, BTEX & MTBE	PAH EPA (16)	PAH EPA (16) in NRA Leachate	Semi Volatile Organics	Volatile Organic Compounds	Moisture Content	Total Dissolved Solids in NRA Leachate	Dissolved Arsenic Low Level in NRA Leachate**	Arsenic Low Level
Detection Method				CV AA	DR LANGE	DUTCH STD	GC	GC	GC	GCMS	GCMS	GCMS	GCMS	GRAVIMETRIC	GRAVIMETRIC	Hydride AA	ICP
UKAS Accredited							✓	✓	✓	✓	✓						✓
02-B02182-S0038-A08	WS11 3.5-4.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-
02-B02182-S0039-A01	WS11 4.5-5.0m	UNKNOWN	Amber Jar	-	-	-	2	-	2	2	-	-	-	X	-	-	2
02-B02182-S0040-A01	WS12 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	2	-	-	2	-	-	-	X	-	-	2
02-B02182-S0040-A02	WS12 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	2	-	-	-	-	-	-	-	-
02-B02182-S0042-A01	WS12 3.5-4.0m	UNKNOWN	Amber Jar	-	-	-	2	-	-	2	-	-	-	X	-	-	2
02-B02182-S0042-A02	WS12 3.5-4.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	2	-	-	-	-	-	-	-	-
02-B02182-S0043-A01	WS12 4.5-5.0m	UNKNOWN	Amber Jar	-	-	-	2	-	2	2	-	-	-	X	-	-	2
02-B02182-S0044-A01	WS13 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X
02-B02182-S0044-A08	WS13 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-
02-B02182-S0045-A01	WS13 1.5-2.0m	UNKNOWN	Amber Jar	X	X	X	2	X	2	2	X	-	-	X	X	X	2
02-B02182-S0046-A01	WS13 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0046-A02	WS13 3.5-4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0047-A01	WS13 4.5-5.0m	UNKNOWN	Amber Jar	-	-	-	2	-	2	2	-	-	-	X	-	-	2
02-B02182-S0048-A01	WS14 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	-	X	-	-	X	-	-	-	X	X	-
02-B02182-S0049-A01	WS14 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X
02-B02182-S0049-A08	WS14 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-
02-B02182-S0050-A01	WS14 2.5-3.0m	UNKNOWN	Amber Jar	-	-	-	2	-	-	2	-	-	-	X	-	-	2
02-B02182-S0050-A02	WS14 2.5-3.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	2	-	-	-	-	-	-	-	-
02-B02182-S0051-A01	WS15 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X
02-B02182-S0051-A08	WS15 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ______________________

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

	Detection Method			CV AA	DR LANGE	DUTCH STD	GC	GC	GC	GCMS	GCMS	GCMS	GCMS	GRAVIMETRIC	GRAVIMETRIC	Hydride AA	ICP
	UKAS Accredited						✓	✓	✓	✓	✓						✓
ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Mercury Low Level in NRA Leachate**	Surfactants in NRA Leachate	EOX in NRA Leachate*	DRO + Mineral Oil by GC	DRO + Mineral Oil by GC in NRA Leachate	PRO, BTEX & MTBE	PAH EPA (16)	PAH EPA (16) in NRA Leachate	Semi Volatile Organics	Volatile Organic Compounds	Moisture Content	Total Dissolved Solids in NRA Leachate	Dissolved Arsenic Low Level in NRA Leachate**	Arsenic Low Level
02-B02182-S0053-A01	WS15 3.5-4.0m	UNKNOWN	Amber Jar	-	-	-	2	-	-	2	-	-	-	X	-	-	2
02-B02182-S0053-A02	WS15 3.5-4.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	2	-	-	-	-	-	-	-	-
02-B02182-S0054-A01	WS16 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X
02-B02182-S0054-A08	WS16 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-
02-B02182-S0055-A01	WS16 1.5-2.0m	UNKNOWN	Amber Jar	X	X	X	-	X	-	-	X	-	-	-	X	X	-
02-B02182-S0056-A01	WS16 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0056-A02	WS16 3.5-4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0057-A01	WS8 1.5-2.0m	UNKNOWN	Amber Jar	-	-	-	X	-	-	X	-	X	-	X	-	-	X
02-B02182-S0057-A02	WS8 1.5-2.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	X	-	-	-	X	-	-	-	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

	Detection Method			ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP USN	ICP USN	ICP USN	ICP USN
	UKAS Accredited			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
ALcontrol Reference	Sample Identity	Other ID	P / V	Cadmium Low Level	Chromium	Copper	Lead	Mercury Low Level	Molybdenum	Nickel	Water Soluble Boron	Zinc	Dissolved Boron in NRA Leachate	Dissolved Cadmium Low Level in NRA Leachate	Dissolved Chromium Low Level in NRA Leachate	Dissolved Copper Low Level in NRA Leachate	Dissolved Lead Low Level in NRA Leachate
02-B02182-S0007-A01	WS1 0.5m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0008-A24	WS1 1.5m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	X	X	X	X	X
02-B02182-S0009-A01	WS1 2.5m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0010-A01	WS1 3.5m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0011-A01	WS2 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0013-A01	WS2 1.5-2.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0013-A02	WS2 1.5-2.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0014-A01	WS2 3.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	X	X	X	X	X
02-B02182-S0015-A01	WS2 4.0m	UNKNOWN	Glass Bottle	On Hold													
02-B02182-S0015-A02	WS2 4.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0016-A01	WS3 0.5m	UNKNOWN	Glass Bottle	On Hold													
02-B02182-S0016-A02	WS3 0.5m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0017-A01	WS3 1.5-2.0m	UNKNOWN	Glass Bottle	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0017-A02	WS3 1.5-2.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0018-A01	WS3 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	X	X	X	X	X
02-B02182-S0019-A01	WS4 1.5-2.0	UNKNOWN	Glass Bottle	On Hold													
02-B02182-S0019-A02	WS4 1.5-2.0	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0021-A01	WS5 0.5-1.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0021-A02	WS5 0.5-1.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0022-A01	WS5 1.5-2.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	X	X	X	X	X

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ireland

Test Schedule

Ref Number: 02-B02182 **Sample Type:** SOIL
Client: Irish Geotechnical Services Ltd (Newbridge) Location:
Date of Receipt: 16/01/2003 Client Contact: Neil Hannaway
Turnaround: 5 days Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Cadmium Low Level	Chromium	Copper	Lead	Mercury Low Level	Molybdenum	Nickel	Water Soluble Boron	Zinc	Dissolved Boron in NRA Leachate	Dissolved Cadmium Low Level in NRA Leachate	Dissolved Chromium Low Level in NRA Leachate	Dissolved Copper Low Level in NRA Leachate	Dissolved Lead Low Level in NRA Leachate
Detection Method				ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP USN	ICP USN	ICP USN	ICP USN
UKAS Accredited				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
02-B02182-S0023-A01	WS5 2.0m	UNKNOWN	Volatile Vial	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0023-A07	WS5 2.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0024-A01	WS5 4.5-5.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	X	X	X	X	X
02-B02182-S0025-A01	WS5 4.5-5.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0025-A08	WS5 4.5-5.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0026-A01	WS6 1.5-2.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0026-A02	WS6 1.5-2.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0028-A01	WS7 1.0-1.5m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0028-A08	WS7 1.0-1.5m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0030-A01	WS7 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0031-A01	WS7 4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0031-A02	WS7 4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0032-A01	WS10 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0032-A08	WS10 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0034-A01	WS10 3.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0035-A01	WS10 4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0035-A02	WS10 4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0036-A01	WS11 0.5-1.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0036-A02	WS11 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0038-A01	WS11 3.5-4.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ireland

Test Schedule

Ref Number: 02-B02182 **Sample Type:** SOIL
Client: Irish Geotechnical Services Ltd (Newbridge) Location:
Date of Receipt: 16/01/2003 Client Contact: Neil Hannaway
Turnaround: 5 days Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Cadmium Low Level	Chromium	Copper	Lead	Mercury Low Level	Molybdenum	Nickel	Water Soluble Boron	Zinc	Dissolved Boron in NRA Leachate	Dissolved Cadmium Low Level in NRA Leachate	Dissolved Chromium Low Level in NRA Leachate	Dissolved Copper Low Level in NRA Leachate	Dissolved Lead Low Level in NRA Leachate
Detection Method				ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP USN	ICP USN	ICP USN	ICP USN
UKAS Accredited				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
02-B02182-S0038-A08	WS11 3.5-4.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0039-A01	WS11 4.5-5.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0040-A01	WS12 0.5-1.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0040-A02	WS12 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0042-A01	WS12 3.5-4.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0042-A02	WS12 3.5-4.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0043-A01	WS12 4.5-5.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0044-A01	WS13 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0044-A08	WS13 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0045-A01	WS13 1.5-2.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	X	X	X	X	X
02-B02182-S0046-A01	WS13 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0046-A02	WS13 3.5-4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0047-A01	WS13 4.5-5.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0048-A01	WS14 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	X	X	X	X	X
02-B02182-S0049-A01	WS14 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0049-A08	WS14 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0050-A01	WS14 2.5-3.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0050-A02	WS14 2.5-3.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0051-A01	WS15 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0051-A08	WS15 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ireland

Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Cadmium Low Level	Chromium	Copper	Lead	Mercury Low Level	Molybdenum	Nickel	Water Soluble Boron	Zinc	Dissolved Boron in NRA Leachate	Dissolved Cadmium Low Level in NRA Leachate	Dissolved Chromium Low Level in NRA Leachate	Dissolved Copper Low Level in NRA Leachate	Dissolved Lead Low Level in NRA Leachate
			Detection Method	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP	ICP USN	ICP USN	ICP USN	ICP USN
			UKAS Accredited	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				
02-B02182-S0053-A01	WS15 3.5-4.0m	UNKNOWN	Amber Jar	2	2	2	2	2	2	2	2	2	-	-	-	-	-
02-B02182-S0053-A02	WS15 3.5-4.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0054-A01	WS16 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0054-A08	WS16 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0055-A01	WS16 1.5-2.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	X	X	X	X	X
02-B02182-S0056-A01	WS16 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0056-A02	WS16 3.5-4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0057-A01	WS8 1.5-2.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	-	-	-	-	-
02-B02182-S0057-A02	WS8 1.5-2.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ______________________

ALcontrol Laboratories Ireland

Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Molybdenum Low Level in NRA Leachate	Dissolved Nickel Low Level in NRA Leachate	Dissolved Zinc Low Level in NRA Leachate	Total Organic Carbon in NRA Leachate	Ammoniacal Nitrogen in NRA Leachate	Chloride in NRA Leachate	Fluoride in NRA Leachate**	Nitrate in NRA Leachate	Nitrite in NRA Leachate	ortho Phosphate in NRA Leachate	Sulphate in NRA Leachate	Conductivity in NRA Leachate	pH of NRA Leachate	NRA Leachate Test
			Detection Method	ICP USN	ICP USN	ICP USN	IR	KONE	KONE	KONE	KONE	KONE	KONE	KONE	METER	METER	NRA
			UKAS Accredited					✓	✓		✓	✓	✓	✓	✓	✓	
02-B02182-S0007-A01	WS1 0.5m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0008-A24	WS1 1.5m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	X	X	X	X	X
02-B02182-S0009-A01	WS1 2.5m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0010-A01	WS1 3.5m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0011-A01	WS2 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0013-A01	WS2 1.5-2.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0013-A02	WS2 1.5-2.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0014-A01	WS2 3.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	X	X	X	X	X
02-B02182-S0015-A01	WS2 4.0m	UNKNOWN	Glass Bottle	On Hold													
02-B02182-S0015-A02	WS2 4.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0016-A01	WS3 0.5m	UNKNOWN	Glass Bottle	On Hold													
02-B02182-S0016-A02	WS3 0.5m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0017-A01	WS3 1.5-2.0m	UNKNOWN	Glass Bottle	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0017-A02	WS3 1.5-2.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0018-A01	WS3 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	X	X	X	X	X
02-B02182-S0019-A01	WS4 1.5-2.0	UNKNOWN	Glass Bottle	On Hold													
02-B02182-S0019-A02	WS4 1.5-2.0	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0021-A01	WS5 0.5-1.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0021-A02	WS5 0.5-1.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0022-A01	WS5 1.5-2.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ______________________

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days
Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Molybdenum Low Level in NRA Leachate	Dissolved Nickel Low Level in NRA Leachate	Dissolved Zinc Low Level in NRA Leachate	Total Organic Carbon in NRA Leachate	Ammoniacal Nitrogen in NRA Leachate	Chloride in NRA Leachate	Fluoride in NRA Leachate**	Nitrate in NRA Leachate	Nitrite in NRA Leachate	ortho Phosphate in NRA Leachate	Sulphate in NRA Leachate	Conductivity in NRA Leachate	pH of NRA Leachate	NRA Leachate Test
Detection Method				ICP USN	ICP USN	ICP USN	IR	KONE	KONE	KONE	KONE	KONE	KONE	KONE	METER	METER	NRA
UKAS Accredited								✓	✓		✓	✓	✓	✓	✓	✓	
02-B02182-S0023-A01	WS5 2.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0023-A07	WS5 2.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0024-A01	WS5 4.5-5.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	X	X	X	X	X
02-B02182-S0025-A01	WS5 4.5-5.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0025-A08	WS5 4.5-5.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0026-A01	WS6 1.5-2.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0026-A02	WS6 1.5-2.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0028-A01	WS7 1.0-1.5m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0028-A08	WS7 1.0-1.5m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0030-A01	WS7 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0031-A01	WS7 4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0031-A02	WS7 4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0032-A01	WS10 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0032-A08	WS10 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0034-A01	WS10 3.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0035-A01	WS10 4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0035-A02	WS10 4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0036-A01	WS11 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0036-A02	WS11 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0038-A01	WS11 3.5-4.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days
Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Molybdenum Low Level in NRA Leachate	Dissolved Nickel Low Level in NRA Leachate	Dissolved Zinc Low Level in NRA Leachate	Total Organic Carbon in NRA Leachate	Ammoniacal Nitrogen in NRA Leachate	Chloride in NRA Leachate	Fluoride in NRA Leachate**	Nitrate in NRA Leachate	Nitrite in NRA Leachate	ortho Phosphate in NRA Leachate	Sulphate in NRA Leachate	Conductivity in NRA Leachate	pH of NRA Leachate	NRA Leachate Test
Detection Method				ICP USN	ICP USN	ICP USN	IR	KONE	KONE	KONE	KONE	KONE	KONE	KONE	METER	METER	NRA
UKAS Accredited								✓	✓		✓	✓	✓	✓	✓	✓	
02-B02182-S0038-A08	WS11 3.5-4.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0039-A01	WS11 4.5-5.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0040-A01	WS12 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0040-A02	WS12 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0042-A01	WS12 3.5-4.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0042-A02	WS12 3.5-4.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0043-A01	WS12 4.5-5.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0044-A01	WS13 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0044-A08	WS13 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0045-A01	WS13 1.5-2.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	X	X	X	X	X
02-B02182-S0046-A01	WS13 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0046-A02	WS13 3.5-4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0047-A01	WS13 4.5-5.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0048-A01	WS14 0.5-1.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	X	X	X	X	X
02-B02182-S0049-A01	WS14 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0049-A08	WS14 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0050-A01	WS14 2.5-3.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0050-A02	WS14 2.5-3.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0051-A01	WS15 0.5-1.0m	UNKNOWN	Amber Jar	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0051-A08	WS15 0.5-1.0m	UNKNOWN	Volatile Vial	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

	Detection Method			ICP USN	ICP USN	ICP USN	IR	KONE	KONE	KONE	KONE	KONE	KONE	KONE	METER	METER	NRA
	UKAS Accredited							✓	✓		✓	✓	✓	✓	✓	✓	
ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Molybdenum Low Level in NRA Leachate	Dissolved Nickel Low Level in NRA Leachate	Dissolved Zinc Low Level in NRA Leachate	Total Organic Carbon in NRA Leachate	Ammoniacal Nitrogen in NRA Leachate	Chloride in NRA Leachate	Fluoride in NRA Leachate**	Nitrate in NRA Leachate	Nitrite in NRA Leachate	ortho Phosphate in NRA Leachate	Sulphate in NRA Leachate	Conductivity in NRA Leachate	pH of NRA Leachate	NRA Leachate Test
02-B02182-S0053-A01	WS15 3.5-4.0m	UNKNOWN	Amber Jar														
02-B02182-S0053-A02	WS15 3.5-4.0m	UNKNOWN	Volatile Vial														
02-B02182-S0054-A01	WS16 0.5-1.0m	UNKNOWN	Amber Jar														
02-B02182-S0054-A08	WS16 0.5-1.0m	UNKNOWN	Volatile Vial														
02-B02182-S0055-A01	WS16 1.5-2.0m	UNKNOWN	Amber Jar	X	X	X	X	X	X	X	X	X	X	X	X	X	X
02-B02182-S0056-A01	WS16 3.5-4.0m	UNKNOWN	Amber Jar	On Hold													
02-B02182-S0056-A02	WS16 3.5-4.0m	UNKNOWN	Volatile Vial	On Hold													
02-B02182-S0057-A01	WS8 1.5-2.0m	UNKNOWN	Amber Jar														
02-B02182-S0057-A02	WS8 1.5-2.0m	UNKNOWN	Volatile Vial														

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

	Detection Method			SPECTRO	SPECTRO
	UKAS Accredited			✓	
ALcontrol Reference	Sample Identity	Other ID	P / V	Chromium VI in NRA Leachate	Free Cyanide in NRA Leachate
02-B02182-S0007-A01	WS1 0.5m	UNKNOWN	Amber Jar		
02-B02182-S0008-A24	WS1 1.5m	UNKNOWN	Amber Jar	X	X
02-B02182-S0009-A01	WS1 2.5m	UNKNOWN	Amber Jar		
02-B02182-S0010-A01	WS1 3.5m	UNKNOWN	Amber Jar		
02-B02182-S0011-A01	WS2 0.5-1.0m	UNKNOWN	Amber Jar		
02-B02182-S0013-A01	WS2 1.5-2.0m	UNKNOWN	Amber Jar	On Hold	
02-B02182-S0013-A02	WS2 1.5-2.0m	UNKNOWN	Amber Jar		
02-B02182-S0014-A01	WS2 3.0m	UNKNOWN	Amber Jar	X	X
02-B02182-S0015-A01	WS2 4.0m	UNKNOWN	Glass Bottle	On Hold	
02-B02182-S0015-A02	WS2 4.0m	UNKNOWN	Amber Jar		
02-B02182-S0016-A01	WS3 0.5m	UNKNOWN	Glass Bottle	On Hold	
02-B02182-S0016-A02	WS3 0.5m	UNKNOWN	Amber Jar		
02-B02182-S0017-A01	WS3 1.5-2.0m	UNKNOWN	Glass Bottle		
02-B02182-S0017-A02	WS3 1.5-2.0m	UNKNOWN	Amber Jar		
02-B02182-S0018-A01	WS3 0.5-1.0m	UNKNOWN	Amber Jar	X	X
02-B02182-S0019-A01	WS4 1.5-2.0	UNKNOWN	Glass Bottle	On Hold	
02-B02182-S0019-A02	WS4 1.5-2.0	UNKNOWN	Amber Jar		
02-B02182-S0021-A01	WS5 0.5-1.0m	UNKNOWN	Volatile Vial	On Hold	
02-B02182-S0021-A02	WS5 0.5-1.0m	UNKNOWN	Amber Jar	On Hold	
02-B02182-S0022-A01	WS5 1.5-2.0m	UNKNOWN	Amber Jar	X	X

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

			Detection Method	SPECTRO	SPECTRO
			UKAS Accredited	✓	
ALcontrol Reference	**Sample Identity**	**Other ID**	**P / V**	**Chromium VI in NRA Leachate**	**Free Cyanide in NRA Leachate**
02-B02182-S0023-A01	WS5 2.0m	UNKNOWN	Volatile Vial		
02-B02182-S0023-A07	WS5 2.0m	UNKNOWN	Amber Jar		
02-B02182-S0024-A01	WS5 4.5-5.0m	UNKNOWN	Amber Jar	X	X
02-B02182-S0025-A01	WS5 4.5-5.0m	UNKNOWN	Amber Jar		
02-B02182-S0025-A08	WS5 4.5-5.0m	UNKNOWN	Volatile Vial		
02-B02182-S0026-A01	WS6 1.5-2.0m	UNKNOWN	Amber Jar	On Hold	
02-B02182-S0026-A02	WS6 1.5-2.0m	UNKNOWN	Volatile Vial	On Hold	
02-B02182-S0028-A01	WS7 1.0-1.5m	UNKNOWN	Amber Jar		
02-B02182-S0028-A08	WS7 1.0-1.5m	UNKNOWN	Volatile Vial		
02-B02182-S0030-A01	WS7 3.5-4.0m	UNKNOWN	Amber Jar	On Hold	
02-B02182-S0031-A01	WS7 4.0m	UNKNOWN	Amber Jar	On Hold	
02-B02182-S0031-A02	WS7 4.0m	UNKNOWN	Volatile Vial	On Hold	
02-B02182-S0032-A01	WS10 0.5-1.0m	UNKNOWN	Amber Jar		
02-B02182-S0032-A08	WS10 0.5-1.0m	UNKNOWN	Volatile Vial		
02-B02182-S0034-A01	WS10 3.0m	UNKNOWN	Amber Jar		
02-B02182-S0035-A01	WS10 4.0m	UNKNOWN	Volatile Vial	On Hold	
02-B02182-S0035-A02	WS10 4.0m	UNKNOWN	Amber Jar	On Hold	
02-B02182-S0036-A01	WS11 0.5-1.0m	UNKNOWN	Amber Jar		
02-B02182-S0036-A02	WS11 0.5-1.0m	UNKNOWN	Volatile Vial		
02-B02182-S0038-A01	WS11 3.5-4.0m	UNKNOWN	Amber Jar		

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ______________________

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

			Detection Method	SPECTRO	SPECTRO
			UKAS Accredited	✓	
ALcontrol Reference	**Sample Identity**	**Other ID**	**P / V**	**Chromium VI in NRA Leachate**	**Free Cyanide in NRA Leachate**
02-B02182-S0038-A08	WS11 3.5-4.0m	UNKNOWN	Volatile Vial		
02-B02182-S0039-A01	WS11 4.5-5.0m	UNKNOWN	Amber Jar		
02-B02182-S0040-A01	WS12 0.5-1.0m	UNKNOWN	Amber Jar		
02-B02182-S0040-A02	WS12 0.5-1.0m	UNKNOWN	Volatile Vial		
02-B02182-S0042-A01	WS12 3.5-4.0m	UNKNOWN	Amber Jar		
02-B02182-S0042-A02	WS12 3.5-4.0m	UNKNOWN	Volatile Vial		
02-B02182-S0043-A01	WS12 4.5-5.0m	UNKNOWN	Amber Jar		
02-B02182-S0044-A01	WS13 0.5-1.0m	UNKNOWN	Amber Jar		
02-B02182-S0044-A08	WS13 0.5-1.0m	UNKNOWN	Volatile Vial		
02-B02182-S0045-A01	WS13 1.5-2.0m	UNKNOWN	Amber Jar	X	X
02-B02182-S0046-A01	WS13 3.5-4.0m	UNKNOWN	Amber Jar	On Hold	
02-B02182-S0046-A02	WS13 3.5-4.0m	UNKNOWN	Volatile Vial	On Hold	
02-B02182-S0047-A01	WS13 4.5-5.0m	UNKNOWN	Amber Jar		
02-B02182-S0048-A01	WS14 0.5-1.0m	UNKNOWN	Amber Jar	X	X
02-B02182-S0049-A01	WS14 0.5-1.0m	UNKNOWN	Amber Jar		
02-B02182-S0049-A08	WS14 0.5-1.0m	UNKNOWN	Volatile Vial		
02-B02182-S0050-A01	WS14 2.5-3.0m	UNKNOWN	Amber Jar		
02-B02182-S0050-A02	WS14 2.5-3.0m	UNKNOWN	Volatile Vial		
02-B02182-S0051-A01	WS15 0.5-1.0m	UNKNOWN	Amber Jar		
02-B02182-S0051-A08	WS15 0.5-1.0m	UNKNOWN	Volatile Vial		

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ______________________

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Chromium VI in NRA Leachate	Free Cyanide in NRA Leachate
Detection Method				SPECTRO	SPECTRO
UKAS Accredited				✓	
02-B02182-S0053-A01	WS15 3.5-4.0m	UNKNOWN	Amber Jar		
02-B02182-S0053-A02	WS15 3.5-4.0m	UNKNOWN	Volatile Vial		
02-B02182-S0054-A01	WS16 0.5-1.0m	UNKNOWN	Amber Jar		
02-B02182-S0054-A08	WS16 0.5-1.0m	UNKNOWN	Volatile Vial		
02-B02182-S0055-A01	WS16 1.5-2.0m	UNKNOWN	Amber Jar	X	X
02-B02182-S0056-A01	WS16 3.5-4.0m	UNKNOWN	Amber Jar	On Hold	
02-B02182-S0056-A02	WS16 3.5-4.0m	UNKNOWN	Volatile Vial	On Hold	
02-B02182-S0057-A01	WS8 1.5-2.0m	UNKNOWN	Amber Jar		
02-B02182-S0057-A02	WS8 1.5-2.0m	UNKNOWN	Volatile Vial		

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ireland
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: WATER
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Mercury Low Level**	DRO + Mineral Oil by GC	PRO, BTEX & MTBE	PAH EPA (16)	Semi Volatile Organics	Total PCB**	Volatile Organic Compounds	Dissolved Arsenic Low Level**	Dissolved Boron	Dissolved Cadmium Low Level	Dissolved Chromium Low Level	Dissolved Copper Low Level	Dissolved Lead Low Level	Dissolved Molybdenum Low Level
Detection Method				CV AA	GC	GC	GCMS	GCMS	GCMS	GCMS	Hydride AA	ICP	ICP USN	ICP USN	ICP USN	ICP USN	ICP USN
UKAS Accredited					✓	✓	✓					✓					
02-B02182-S0006-A01	BH1 3.5m	UNKNOWN	Glass Bottle	X	X	X	X	X	X	X	X	X	X	X	X	X	X

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

ALcontrol Laboratories Ire'and
Test Schedule

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
Turnaround: 5 days

Sample Type: WATER
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

			Detection Method	ICP USN	ICP USN
			UKAS Accredited		
ALcontrol Reference	Sample Identity	Other ID	P / V	Dissolved Nickel Low Level	Dissolved Zinc Low Level
02-B02182-S0006-A01	BH1 3.5m	UNKNOWN	Glass Bottle	X	X

Notes : NUMERIC VALUES INDICATE ADDITIONAL SCHEDULING

Checked By ____________________

☐ Interim
☑ Validated

ALcontrol Laboratories Irel-d
Table Of Results

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
(of first sample)

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

		Detection Method	CV AA	DR LANGE	DUTCH STD	GC	GC	GC	GC	GC	GC	GC	GC	GC	GC	GC	GC
		Method Detection Limit	<0.05ug/l	<0.2mg/l	<0.1mg/kgdm	<1mg/kg	<1mg/kg	n/a	<10ug/l	<10ug/l	n/a	<10ug/kg	<10ug/kg	<10ug/kg	<10ug/kg	<10ug/kg	<10ug/kg
		UKAS Accredited				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ALcontrol Reference	Sample Identity	Other ID	Dissolved Mercury Low In NRA Leachate**	Surfactants in NRA Leachate	EOX in NRA Leachate*	Diesel Range Organics	Mineral Oil by GC	DRO Interpretation	Diesel Range Organics in NRA Leachate	Mineral Oil by GC in NRA Leachate	DRO Interpretation of NRA Leachate	Petrol Range Organics C4-C10	Petrol Range Organics C10+	Benzene	Toluene	Ethylbenzene	Total Xylene
			ug/l	mg/l	mg/kgdm	mg/kg	mg/kg		ug/l	ug/l		ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
02-B02182-S0007	WS1 0.5m	UNKNOWN	-	-	-	747	597	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0008	WS1 1.5m	UNKNOWN	<0.05	<0.2	See Attached	-	-	-	<10	<10	See attached	-	-	-	-	-	-
02-B02182-S0009	WS1 2.5m	UNKNOWN	-	-	-	296	237	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0010	WS1 3.5m	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0011	WS2 0.5-1.0m	UNKNOWN	-	-	-	7090	4609	See attached	-	-	-	<10	106357	<10	<10	<10	<10
02-B02182-S0013	WS2 1.5-2.0m	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0014	WS2 3.0m	UNKNOWN	0.12	<0.2	See Attached	-	-	-	<10	<10	See attached	-	-	-	-	-	-
02-B02182-S0015	WS2 4.0m	UNKNOWN	-	-	-	3967	2578	See attached	-	-	-	<10	40913	<10	<10	<10	<10
02-B02182-S0016	WS3 0.5m	UNKNOWN	-	-	-	231	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0017	WS3 1.5-2.0m	UNKNOWN	-	-	-	21	1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0018	WS3 0.5-1.0m	UNKNOWN	0.41	<0.2	See Attached	-	-	-	<10	<10	See attached	-	-	-	-	-	-
02-B02182-S0019	WS4 1.5-2.0	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0021	WS5 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0022	WS5 1.5-2.0m	UNKNOWN	0.05	<0.2	See Attached	-	-	-	<10	<10	See attached	-	-	-	-	-	-
02-B02182-S0023	WS5 2.0m	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0024	WS5 4.5-5.0m	UNKNOWN	<0.05	<0.2	See Attached	-	-	-	<10	<10	See attached	-	-	-	-	-	-
02-B02182-S0025	WS5 4.5-5.0m	UNKNOWN	-	-	-	242	157	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0026	WS6 1.5-2.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0028	WS7 1.0-1.5m	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0030	WS7 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE
NFP = NO FIBRES PRESENT

Checked By Dylan Halpin Dylan Halpin

☐ Interim
☑ Validated

ALcontrol Laboratories Ireland
Table Of Results

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
(of first sample)

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

Detection Method			CV AA	DR LANGE	DUTCH STD	GC	GC	GC	GC	GC	GC	GC	GC	GC	GC	GC	GC
Method Detection Limit			<0.05ug/l	<0.2mg/l	<0.1mg/kgdm	<1mg/kg	<1mg/kg	n/a	<10ug/l	<10ug/l	n/a	<10ug/kg	<10ug/kg	<10ug/kg	<10ug/kg	<10ug/kg	<10ug/kg
UKAS Accredited						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ALcontrol Reference	Sample Identity	Other ID	Dissolved Mercury Low in NRA Leachate**	Surfactants in NRA Leachate	EOX in NRA Leachate*	Diesel Range Organics	Mineral Oil by GC	DRO Interpretation	Diesel Range Organics in NRA Leachate	Mineral Oil by GC in NRA Leachate	DRO Interpretation of NRA Leachate	Petrol Range Organics C4-C10	Petrol Range Organics C10+	Benzene	Toluene	Ethylbenzene	Total Xylene
			ug/l	mg/l	mg/kgdm	mg/kg	mg/kg		ug/l	ug/l		ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
02-B02182-S0031	WS7 4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0032	WS10 0.5-1.0m	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0034	WS10 3.0m	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0035	WS10 4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0036	WS11 0.5-1.0m	UNKNOWN	-	-	-	28	1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0038	WS11 3.5-4.0m	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0039	WS11 4.5-5.0m	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0040	WS12 0.5-1.0m	UNKNOWN	-	-	-	99	5	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0042	WS12 3.5-4.0m	UNKNOWN	-	-	-	370	18	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0043	WS12 4.5-5.0m	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0044	WS13 0.5-1.0m	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0045	WS13 1.5-2.0m	UNKNOWN	<0.05	<0.2	See Attached	33	2	See attached	<10	<10	See attached	<10	<10	<10	<10	<10	<10
02-B02182-S0046	WS13 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0047	WS13 4.5-5.0m	UNKNOWN	-	-	-	450	22	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0048	WS14 0.5-1.0m	UNKNOWN	<0.05	<0.2	See Attached	-	-	-	181	118	See attached	-	-	-	-	-	-
02-B02182-S0049	WS14 0.5-1.0m	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0050	WS14 2.5-3.0m	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0051	WS15 0.5-1.0m	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0053	WS15 3.5-4.0m	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10
02-B02182-S0054	WS16 0.5-1.0m	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE
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Checked By Dylan Halpin ______ Dylan Halpin

☐ Interim
☑ Validated

ALcontrol Laboratories Ireland
Table Of Results

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
(of first sample)

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

Detection Method			CV AA	DR LANGE	DUTCH STD	GC	GC	GC	GC	GC	GC	GC	GC	GC	GC	GC	GC
Method Detection Limit			<0.05ug/l	<0.2mg/l	<0.1mg/kgdm	<1mg/kg	<1mg/kg	n/a	<10ug/l	<10ug/l	n/a	<10ug/kg	<10ug/kg	<10ug/kg	<10ug/kg	<10ug/kg	<10ug/kg
UKAS Accredited						✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ALcontrol Reference	Sample Identity	Other ID	Dissolved Mercury Low in NRA Leachate**	Surfactants in NRA Leachate	EOX in NRA Leachate*	Diesel Range Organics	Mineral Oil by GC	DRO Interpretation	Diesel Range Organics in NRA Leachate	Mineral Oil by GC in NRA Leachate	DRO Interpretation of NRA Leachate	Petrol Range Organics C4-C10	Petrol Range Organics C10+	Benzene	Toluene	Ethylbenzene	Total Xylene
			ug/l	mg/l	mg/kgdm	mg/kg	mg/kg		ug/l	ug/l		ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
02-B02182-S0055	WS16 1.5-2.0m	UNKNOWN	<0.05	<0.2	See Attached	-	-	-	<10	<10	See attached	-	-	-	-	-	-
02-B02182-S0056	WS16 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0057	WS8 1.5-2.0m	UNKNOWN	-	-	-	<1	<1	See attached	-	-	-	<10	<10	<10	<10	<10	<10

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

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☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
(of first sample)

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	MTBE	Semi Volatile Organics	Volatile Organic Compounds	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene
	Detection Method		GC	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS
	Method Detection Limit		<10ug/kg	n/a	n/a	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg
	UKAS Accredited		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			ug/kg			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
02-B02182-S0007	WS1 0.5m	UNKNOWN	<10	Done	Done	87	51	38	29	532	92	791	766	454	586	739	332
02-B02182-S0008	WS1 1.5m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0009	WS1 2.5m	UNKNOWN	<10	Done	Done	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
02-B02182-S0010	WS1 3.5m	UNKNOWN	<10	Done	Done	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
02-B02182-S0011	WS2 0.5-1.0m	UNKNOW	<10	Done	Done	517	118	184	434	1063	352	831	1112	383	575	420	156
02-B02182-S0013	WS2 1.5-2.0m	UNKNOWN	<10	Done	Done	33	15	15	6	80	26	108	98	128	139	168	80
02-B02182-S0014	WS2 3.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0015	WS2 4.0m	UNKNOWN	<10	Done	Done	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
02-B02182-S0016	WS3 0.5m	UNKNOWN	<10	Done	Done	189	124	94	89	1504	296	3042	2811	1645	1841	2106	1161
02-B02182-S0017	WS3 1.5-2.0m	UNKNOWN	<10	-	-	66	46	65	37	720	238	1118	1097	712	654	662	503
02-B02182-S0018	WS3 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0019	WS4 1.5-2.0	UNKNOWN	<10	Done	Done	61	71	60	55	795	198	1312	1228	729	811	1131	367
02-B02182-S0021	WS5 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0022	WS5 1.5-2.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0023	WS5 2.0m	UNKNOWN	<10	Done	Done	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
02-B02182-S0024	WS5 4.5-5.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0025	WS5 4.5-5.0m	UNKNOWN	<10	Done	Done	39	7	7	40	54	10	12	27	16	10	<1	<1
02-B02182-S0026	WS6 1.5-2.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0028	WS7 1.0-1.5m	UNKNOWN	<10	Done	Done	<1	<1	<1	<1	29	5	16	13	21	18	11	4
02-B02182-S0030	WS7 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

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☑ Validated

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
(of first sample)

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	MTBE	Semi Volatile Organics	Volatile Organic Compounds	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene
	Detection Method		GC	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS
	Method Detection Limit		<10ug/kg	n/a	n/a	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg
	UKAS Accredited		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
			ug/kg			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
02-B02182-S0031	WS7 4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0032	WS10 0.5-1.0m	UNKNOWN	<10	Done	Done	24	25	3	8	275	44	283	236	159	192	194	91
02-B02182-S0034	WS10 3.0m	UNKNOWN	<10	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
02-B02182-S0035	WS10 4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0036	WS11 0.5-1.0m	UNKNOWN	<10	-	-	79	337	98	293	2706	970	2344	1746	1190	890	831	602
02-B02182-S0038	WS11 3.5-4.0m	UNKNOWN	<10	Done	Done	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
02-B02182-S0039	WS11 4.5-5.0m	UNKNOWN	<10	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
02-B02182-S0040	WS12 0.5-1.0m	UNKNOWN	<10	-	-	162	10	5	12	188	59	74	107	94	103	54	80
02-B02182-S0042	WS12 3.5-4.0m	UNKNOWN	<10	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
02-B02182-S0043	WS12 4.5-5.0m	UNKNOWN	<10	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
02-B02182-S0044	WS13 0.5-1.0m	UNKNOWN	<10	Done	Done	<1	<1	<1	<1	66	14	77	60	58	50	33	24
02-B02182-S0045	WS13 1.5-2.0m	UNKNOWN	<10	-	-	19	82	10	41	726	205	704	527	353	421	348	270
02-B02182-S0046	WS13 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0047	WS13 4.5-5.0m	UNKNOWN	<10	-	-	154	10	7	9	161	59	67	86	113	108	114	89
02-B02182-S0048	WS14 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0049	WS14 0.5-1.0m	UNKNOWN	<10	Done	Done	12	11	1	4	55	18	71	61	110	106	98	37
02-B02182-S0050	WS14 2.5-3.0m	UNKNOWN	<10	-	-	17	4	4	5	90	27	54	52	67	50	30	21
02-B02182-S0051	WS15 0.5-1.0m	UNKNOWN	<10	Done	Done	43	14	6	9	405	69	270	213	173	162	94	47
02-B02182-S0053	WS15 3.5-4.0m	UNKNOWN	<10	-	-	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1
02-B02182-S0054	WS16 0.5-1.0m	UNKNOWN	<10	Done	Done	13	3	3	4	53	11	34	30	33	41	33	11

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Table Of Results

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
(of first sample)

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

	Detection Method		GC	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS
	Method Detection Limit		<10ug/kg	n/a	n/a	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg
	UKAS Accredited		✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ALcontrol Reference	Sample Identity	Other ID	MTBE	Semi Volatile Organics	Volatile Organic Compounds	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene
			ug/kg			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ug/kg
02-B02182-S0055	WS16 1.5-2.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0056	WS16 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0057	WS8 1.5-2.0m	UNKNOWN	<10	Done	Done	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1

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(of first sample)

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

	Detection Method		GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS
	Method Detection Limit		<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l
	UKAS Accredited		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ALcontrol Reference	Sample Identity	Other ID	Benzo(a)pyrene	Indeno(123cd)pyrene	Dibenzo(ah)anthracene	Benzo(ghi)perylene	Total 16 EPA PAHs	Naphthalene in NRA Leachate	Acenaphthylene in NRA Leachate	Acenaphthene in NRA Leachate	Fluorene in NRA Leachate	Phenanthrene in NRA Leachate	Anthracene in NRA Leachate	Fluoranthene in NRA Leachate	Pyrene in NRA Leachate	Benzo(a)anthracene in NRA Leachate	Chrysene in NRA Leachate
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l
02-B02182-S0007	WS1 0.5m	UNKNOWN	325	380	88	319	5608	-	-	-	-	-	-	-	-	-	-
02-B02182-S0008	WS1 1.5m	UNKNOWN	-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
02-B02182-S0009	WS1 2.5m	UNKNOWN	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-
02-B02182-S0010	WS1 3.5m	UNKNOWN	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-
02-B02182-S0011	WS2 0.5-1.0m	UNKNOWN	221	181	58	170	6775	-	-	-	-	-	-	-	-	-	-
02-B02182-S0013	WS2 1.5-2.0m	UNKNOWN	91	95	29	73	1184	-	-	-	-	-	-	-	-	-	-
02-B02182-S0014	WS2 3.0m	UNKNOWN	-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
02-B02182-S0015	WS2 4.0m	UNKNOWN	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-
02-B02182-S0016	WS3 0.5m	UNKNOWN	1577	1215	268	1000	18961	-	-	-	-	-	-	-	-	-	-
02-B02182-S0017	WS3 1.5-2.0m	UNKNOWN	510	400	153	326	7305	-	-	-	-	-	-	-	-	-	-
02-B02182-S0018	WS3 0.5-1.0m	UNKNOWN	-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
02-B02182-S0019	WS4 1.5-2.0	UNKNOWN	671	580	131	455	8654	-	-	-	-	-	-	-	-	-	-
02-B02182-S0021	WS5 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0022	WS5 1.5-2.0m	UNKNOWN	-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
02-B02182-S0023	WS5 2.0m	UNKNOWN	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-
02-B02182-S0024	WS5 4.5-5.0m	UNKNOWN	-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
02-B02182-S0025	WS5 4.5-5.0m	UNKNOWN	<1	<1	<1	<1	223	-	-	-	-	-	-	-	-	-	-
02-B02182-S0026	WS6 1.5-2.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0028	WS7 1.0-1.5m	UNKNOWN	7	6	2	6	139	-	-	-	-	-	-	-	-	-	-
02-B02182-S0030	WS7 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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Date of Receipt: 16/01/2003
(of first sample)

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

		Detection Method	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS
		Method Detection Limit	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l
		UKAS Accredited	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ALcontrol Reference	Sample Identity	Other ID	Benzo(a)pyrene	Indeno(123cd)pyrene	Dibenzo(ah)anthracene	Benzo(ghi)perylene	Total 16 EPA PAHs	Naphthalene in NRA Leachate	Acenaphthylene in NRA Leachate	Acenaphthene in NRA Leachate	Fluorene in NRA Leachate	Phenanthrene in NRA Leachate	Anthracene in NRA Leachate	Fluoranthene in NRA Leachate	Pyrene in NRA Leachate	Benzo(a)anthracene in NRA Leachate	Chrysene in NRA Leachate
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l
02-B02182-S0031	WS7 4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0032	WS10 0.5-1.0m	UNKNOWN	106	111	15	95	1860	-	-	-	-	-	-	-	-	-	-
02-B02182-S0034	WS10 3.0m	UNKNOWN	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-
02-B02182-S0035	WS10 4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0036	WS11 0.5-1.0m	UNKNOWN	666	417	254	280	13704	-	-	-	-	-	-	-	-	-	-
02-B02182-S0038	WS11 3.5-4.0m	UNKNOWN	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-
02-B02182-S0039	WS11 4.5-5.0m	UNKNOWN	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-
02-B02182-S0040	WS12 0.5-1.0m	UNKNOWN	66	87	54	54	1210	-	-	-	-	-	-	-	-	-	-
02-B02182-S0042	WS12 3.5-4.0m	UNKNOWN	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-
02-B02182-S0043	WS12 4.5-5.0m	UNKNOWN	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-
02-B02182-S0044	WS13 0.5-1.0m	UNKNOWN	25	23	6	20	457	-	-	-	-	-	-	-	-	-	-
02-B02182-S0045	WS13 1.5-2.0m	UNKNOWN	271	278	163	311	4730	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
02-B02182-S0046	WS13 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0047	WS13 4.5-5.0m	UNKNOWN	84	59	27	50	1198	-	-	-	-	-	-	-	-	-	-
02-B02182-S0048	WS14 0.5-1.0m	UNKNOWN	-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
02-B02182-S0049	WS14 0.5-1.0m	UNKNOWN	61	53	12	46	755	-	-	-	-	-	-	-	-	-	-
02-B02182-S0050	WS14 2.5-3.0m	UNKNOWN	25	19	23	17	505	-	-	-	-	-	-	-	-	-	-
02-B02182-S0051	WS15 0.5-1.0m	UNKNOWN	64	47	8	44	1668	-	-	-	-	-	-	-	-	-	-
02-B02182-S0053	WS15 3.5-4.0m	UNKNOWN	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-
02-B02182-S0054	WS16 0.5-1.0m	UNKNOWN	15	16	4	14	317	-	-	-	-	-	-	-	-	-	-

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(of first sample)

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
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		Detection Method	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS
		Method Detection Limit	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<1ug/kg	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l
		UKAS Accredited	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ALcontrol Reference	Sample Identity	Other ID	Benzo(a)pyrene	Indeno(123cd)pyrene	Dibenzo(ah)anthracene	Benzo(ghi)perylene	Total 16 EPA PAHs	Naphthalene in NRA Leachate	Acenaphthylene in NRA Leachate	Acenaphthene in NRA Leachate	Fluorene in NRA Leachate	Phenanthrene in NRA Leachate	Anthracene in NRA Leachate	Fluoranthene in NRA Leachate	Pyrene in NRA Leachate	Benzo(a)anthracene in NRA Leachate	Chrysene in NRA Leachate
			ug/kg	ug/kg	ug/kg	ug/kg	ug/kg	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l
02-B02182-S0055	WS16 1.5-2.0m	UNKNOWN	-	-	-	-	-	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
02-B02182-S0056	WS16 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0057	WS8 1.5-2.0m	UNKNOWN	<1	<1	<1	<1	<1	-	-	-	-	-	-	-	-	-	-

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Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	Benzo(b)fluoranthene in NRA Leachate	Benzo(k)fluoranthene in NRA Leachate	Benzo(a)pyrene in NRA Leachate	Indeno(123cd)pyrene in NRA Leachate	Dibenzo(ah)anthracene in NRA Leachate	Benzo(ghi)perylene in NRA Leachate	Total 16 EPA PAHs in NRA Leachate	Moisture Content	Total Dissolved Solids in NRA Leachate	Dissolved Arsenic Low in NRA Leachate**	Arsenic Low Level	Cadmium Low Level	Chromium	Copper	Lead
Detection Method			GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GRAVIMETRIC	GRAVIMETRIC	Hydride AA	ICP	ICP	ICP	ICP	ICP
Method Detection Limit			<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<0.1%	<35mg/l	<5ug/l	<0.5mg/kg	<0.5mg/kg	<1mg/kg	<1mg/kg	<1mg/kg
UKAS Accredited			✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓
			ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	%	mg/l	ug/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
02-B02182-S0007	WS1 0.5m	UNKNOWN	-	-	-	-	-	-	-	10.6	-	-	8.7	1.9	15	38	87
02-B02182-S0008	WS1 1.5m	UNKNOWN	<10	<10	<10	<10	<10	<10	<10	-	102	<5	-	-	-	-	-
02-B02182-S0009	WS1 2.5m	UNKNOWN	-	-	-	-	-	-	-	21.7	-	-	8.3	1.5	11	32	31
02-B02182-S0010	WS1 3.5m	UNKNOWN	-	-	-	-	-	-	-	8.1	-	-	5.7	<0.5	6	4	4
02-B02182-S0011	WS2 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	15.6	-	-	14.5	<0.5	64	86	946
02-B02182-S0013	WS2 1.5-2.0m	UNKNOWN	-	-	-	-	-	-	-	11.2	-	-	12.5	0.8	11	56	275
02-B02182-S0014	WS2 3.0m	UNKNOWN	<10	<10	<10	<10	<10	<10	<10	-	82	<5	-	-	-	-	-
02-B02182-S0015	WS2 4.0m	UNKNOWN	-	-	-	-	-	-	-	21.7	-	-	15.3	<0.5	15	77	193
02-B02182-S0016	WS3 0.5m	UNKNOWN	-	-	-	-	-	-	-	19.9	-	-	27.2	<0.5	20	134	1031
02-B02182-S0017	WS3 1.5-2.0m	UNKNOWN	-	-	-	-	-	-	-	22.0	-	-	4.8	<0.5	10	32	79
02-B02182-S0018	WS3 0.5-1.0m	UNKNOWN	<10	<10	<10	<10	<10	<10	<10	-	45	<5	-	-	-	-	-
02-B02182-S0019	WS4 1.5-2.0	UNKNOWN	-	-	-	-	-	-	-	19.8	-	-	38.0	<0.5	22	191	552
02-B02182-S0021	WS5 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0022	WS5 1.5-2.0m	UNKNOWN	<10	<10	<10	<10	<10	<10	<10	-	126	<5	-	-	-	-	-
02-B02182-S0023	WS5 2.0m	UNKNOWN	-	-	-	-	-	-	-	13.6	-	-	12.2	1.2	13	42	66
02-B02182-S0024	WS5 4.5-5.0m	UNKNOWN	<10	<10	<10	<10	<10	<10	<10	-	222	<5	-	-	-	-	-
02-B02182-S0025	WS5 4.5-5.0m	UNKNOWN	-	-	-	-	-	-	-	11.6	-	-	8.8	0.5	10	11	13
02-B02182-S0026	WS6 1.5-2.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0028	WS7 1.0-1.5m	UNKNOWN	-	-	-	-	-	-	-	12.1	-	-	13.5	0.9	14	10	13
02-B02182-S0030	WS7 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

NDP = NO DETERMINATION POSSIBLE
NFP = NO FIBRES PRESENT

Checked By Dylan Halpin   Dylan Halpin

ALcontrol Laboratories Ireland

Table Of Results

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
(of first sample)

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	Benzo(b)fluoranthene in NRA Leachate	Benzo(k)fluoranthene in NRA Leachate	Benzo(a)pyrene in NRA Leachate	Indeno(123cd)pyrene in NRA Leachate	Dibenzo(ah)anthracene in NRA Leachate	Benzo(ghi)perylene in NRA Leachate	Total 16 EPA PAHs in NRA Leachate	Moisture Content	Total Dissolved Solids in NRA Leachate	Dissolved Arsenic Low in NRA Leachate**	Arsenic Low Level	Cadmium Low Level	Chromium	Copper	Lead
Detection Method			GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GRAVIMETRIC	GRAVIMETRIC	Hydride AA	ICP	ICP	ICP	ICP	ICP
Method Detection Limit			<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<0.1%	<35mg/l	<5ug/l	<0.5mg/kg	<0.5mg/kg	<1mg/kg	<1mg/kg	<1mg/kg
UKAS Accredited			✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓
			ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	%	mg/l	ug/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
02-B02182-S0031	WS7 4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0032	WS10 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	11.7	-	-	22.8	<0.5	8	100	433
02-B02182-S0034	WS10 3.0m	UNKNOWN	-	-	-	-	-	-	-	18.2	-	-	15.4	1.7	12	47	38
02-B02182-S0035	WS10 4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0036	WS11 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	11.4	-	-	41.6	0.7	14	403	625
02-B02182-S0038	WS11 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	29.4	-	-	14.3	1.3	18	27	44
02-B02182-S0039	WS11 4.5-5.0m	UNKNOWN	-	-	-	-	-	-	-	27.8	-	-	6.4	1.4	14	15	17
02-B02182-S0040	WS12 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	15.1	-	-	126.0	3.2	16	186	981
02-B02182-S0042	WS12 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	28.7	-	-	12.8	1.8	17	29	42
02-B02182-S0043	WS12 4.5-5.0m	UNKNOWN	-	-	-	-	-	-	-	31.7	-	-	11.2	1.5	15	22	25
02-B02182-S0044	WS13 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	12.2	-	-	22.3	1.1	13	33	66
02-B02182-S0045	WS13 1.5-2.0m	UNKNOWN	<10	<10	<10	<10	<10	<10	<10	15.4	214	<5	28.6	1.7	14	67	163
02-B02182-S0046	WS13 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0047	WS13 4.5-5.0m	UNKNOWN	-	-	-	-	-	-	-	12.1	-	-	2.2	<0.5	7	5	7
02-B02182-S0048	WS14 0.5-1.0m	UNKNOWN	<10	<10	<10	<10	<10	<10	<10	-	276	<5	-	-	-	-	-
02-B02182-S0049	WS14 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	12.8	-	-	10.4	0.9	13	45	99
02-B02182-S0050	WS14 2.5-3.0m	UNKNOWN	-	-	-	-	-	-	-	14.2	-	-	22.2	<0.5	12	167	187
02-B02182-S0051	WS15 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	15.9	-	-	9.9	<0.5	848	299	710
02-B02182-S0053	WS15 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	25.0	-	-	16.4	1.8	19	14	20
02-B02182-S0054	WS16 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	14.5	-	-	13.8	0.6	14	31	79

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Interim
☑ Validated

ALcontrol Laboratories Ireland
Table Of Results

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
(of first sample)

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

Detection Method			GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GRAVIMETRIC	GRAVIMETRIC	Hydride AA	ICP	ICP	ICP	ICP	ICP
Method Detection Limit			<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<0.1%	<35mg/l	<5ug/l	<0.5mg/kg	<0.5mg/kg	<1mg/kg	<1mg/kg	<1mg/kg
UKAS Accredited			✓	✓	✓	✓	✓	✓	✓				✓	✓	✓	✓	✓
ALcontrol Reference	Sample Identity	Other ID	Benzo(b)fluoranthene in NRA Leachate	Benzo(k)fluoranthene in NRA Leachate	Benzo(a)pyrene in NRA Leachate	Indeno(123cd)pyrene in NRA Leachate	Dibenzo(ah)anthracene in NRA Leachate	Benzo(ghi)perylene in NRA Leachate	Total 16 EPA PAHs in NRA Leachate	Moisture Content	Total Dissolved Solids in NRA Leachate	Dissolved Arsenic Low in NRA Leachate**	Arsenic Low Level	Cadmium Low Level	Chromium	Copper	Lead
			ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	%	mg/l	ug/l	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
02-B02182-S0055	WS16 1.5-2.0m	UNKNOWN	<10	<10	<10	<10	<10	<10	<10	-	92	<5	-	-	-	-	-
02-B02182-S0056	WS16 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0057	WS8 1.5-2.0m	UNKNOWN	-	-	-	-	-	-	-	14.5	-	-	12.8	1.4	13	39	57

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(of first sample)

Sample Type: SOIL
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Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

Detection Method			ICP	ICP	ICP	ICP	ICP	ICP	ICP USN	ICP USN	ICP USN	ICP USN	ICP USN	ICP USN	ICP USN	IR	KONE
Method Detection Limit			<0.3mg/kg	<1mg/kg	<1mg/kg	<1mg/kg	<1mg/kg	<0.05mg/l	<0.4ug/l	<1ug/l	<5ug/l	<5ug/l	<5ug/l	<10ug/l	<5ug/l	<2mg/l	<0.2mg/l
UKAS Accredited			✓	✓	✓	✓	✓	✓									✓
ALcontrol Reference	Sample Identity	Other ID	Mercury Low Level	Molybdenum	Nickel	Water Soluble Boron	Zinc	Dissolved Boron in NRA Leachate	Dissolved Cadmium Low in NRA Leachate	Dissolved Chromium Low in NRA Leachate	Dissolved Copper Low in NRA Leachate	Dissolved Lead Low in NRA Leachate	Dissolved Molybdenum Low in NRA Leach	Dissolved Nickel Low in NRA Leachate	Dissolved Zinc Low in NRA Leachate	Total Organic Carbon in NRA Leachate	Ammoniacal Nitrogen in NRA Leachate as N**
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
02-B02182-S0007	WS1 0.5m	UNKNOWN	<0.3	4	41	<1	95	-	-	-	-	-	-	-	-	-	-
02-B02182-S0008	WS1 1.5m	UNKNOWN	-	-	-	-	-	<0.05	<0.4	1	<5	<5	<5	<10	30	<2	0.3
02-B02182-S0009	WS1 2.5m	UNKNOWN	<0.3	4	38	<1	74	-	-	-	-	-	-	-	-	-	-
02-B02182-S0010	WS1 3.5m	UNKNOWN	<0.3	1	9	<1	26	-	-	-	-	-	-	-	-	-	-
02-B02182-S0011	WS2 0.5-1.0m	UNKNOWN	0.6	4	41	<1	234	-	-	-	-	-	-	-	-	-	-
02-B02182-S0013	WS2 1.5-2.0m	UNKNOWN	<0.3	4	31	<1	71	-	-	-	-	-	-	-	-	-	-
02-B02182-S0014	WS2 3.0m	UNKNOWN	-	-	-	-	-	<0.05	<0.4	<1	<5	<5	<5	<10	29	2	<0.2
02-B02182-S0015	WS2 4.0m	UNKNOWN	<0.3	4	30	1	53	-	-	-	-	-	-	-	-	-	-
02-B02182-S0016	WS3 0.5m	UNKNOWN	<0.3	8	52	3	537	-	-	-	-	-	-	-	-	-	-
02-B02182-S0017	WS3 1.5-2.0m	UNKNOWN	<0.3	4	11	<1	58	-	-	-	-	-	-	-	-	-	-
02-B02182-S0018	WS3 0.5-1.0m	UNKNOWN	-	-	-	-	-	<0.05	<0.4	3	<5	<5	7	<10	34	<2	<0.2
02-B02182-S0019	WS4 1.5-2.0	UNKNOWN	<0.3	4	44	3	161	-	-	-	-	-	-	-	-	-	-
02-B02182-S0021	WS5 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0022	WS5 1.5-2.0m	UNKNOWN	-	-	-	-	-	<0.05	<0.4	<1	<5	<5	<5	<10	28	<2	<0.2
02-B02182-S0023	WS5 2.0m	UNKNOWN	<0.3	3	36	1	111	-	-	-	-	-	-	-	-	-	-
02-B02182-S0024	WS5 4.5-5.0m	UNKNOWN	-	-	-	-	-	<0.05	<0.4	<1	<5	<5	<5	<10	57	<2	<0.2
02-B02182-S0025	WS5 4.5-5.0m	UNKNOWN	<0.3	2	20	<1	48	-	-	-	-	-	-	-	-	-	-
02-B02182-S0026	WS6 1.5-2.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0028	WS7 1.0-1.5m	UNKNOWN	<0.3	1	23	1	71	-	-	-	-	-	-	-	-	-	-
02-B02182-S0030	WS7 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

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☐ Interim
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ALcontrol Laboratories Irela[illegible]d
Table Of Results

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
(of first sample)

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	Mercury Low Level	Molybdenum	Nickel	Water Soluble Boron	Zinc	Dissolved Boron in NRA Leachate	Dissolved Cadmium Low in NRA Leachate	Dissolved Chromium Low in NRA Leachate	Dissolved Copper Low in NRA Leachate	Dissolved Lead Low in NRA Leachate	Dissolved Molybdenum Low in NRA Leach	Dissolved Nickel Low in NRA Leachate	Dissolved Zinc Low in NRA Leachate	Total Organic Carbon in NRA Leachate	Ammoniacal Nitrogen in NRA Leachate as N**
Detection Method			ICP	ICP	ICP	ICP	ICP	ICP	ICP USN	ICP USN	ICP USN	ICP USN	ICP USN	ICP USN	ICP USN	IR	KONE
Method Detection Limit			<0.3mg/kg	<1mg/kg	<1mg/kg	<1mg/kg	<1mg/kg	<0.05mg/l	<0.4ug/l	<1ug/l	<5ug/l	<5ug/l	<5ug/l	<10ug/l	<5ug/l	<2mg/l	<0.2mg/l
UKAS Accredited			✓	✓	✓	✓	✓	✓									✓
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
02-B02182-S0031	WS7 4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0032	WS10 0.5-1.0m	UNKNOWN	<0.3	3	31	12	106	-	-	-	-	-	-	-	-	-	-
02-B02182-S0034	WS10 3.0m	UNKNOWN	<0.3	3	32	<1	70	-	-	-	-	-	-	-	-	-	-
02-B02182-S0035	WS10 4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0036	WS11 0.5-1.0m	UNKNOWN	<0.3	3	25	<1	100	-	-	-	-	-	-	-	-	-	-
02-B02182-S0038	WS11 3.5-4.0m	UNKNOWN	<0.3	2	33	3	101	-	-	-	-	-	-	-	-	-	-
02-B02182-S0039	WS11 4.5-5.0m	UNKNOWN	<0.3	1	19	<1	72	-	-	-	-	-	-	-	-	-	-
02-B02182-S0040	WS12 0.5-1.0m	UNKNOWN	<0.3	4	30	<1	245	-	-	-	-	-	-	-	-	-	-
02-B02182-S0042	WS12 3.5-4.0m	UNKNOWN	<0.3	2	25	<1	97	-	-	-	-	-	-	-	-	-	-
02-B02182-S0043	WS12 4.5-5.0m	UNKNOWN	<0.3	1	20	<1	84	-	-	-	-	-	-	-	-	-	-
02-B02182-S0044	WS13 0.5-1.0m	UNKNOWN	<0.3	3	25	1	93	-	-	-	-	-	-	-	-	-	-
02-B02182-S0045	WS13 1.5-2.0m	UNKNOWN	<0.3	3	26	<1	117	<0.05	<0.4	<1	<5	<5	<5	<10	27	<2	0.4
02-B02182-S0046	WS13 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0047	WS13 4.5-5.0m	UNKNOWN	<0.3	1	5	<1	33	-	-	-	-	-	-	-	-	-	-
02-B02182-S0048	WS14 0.5-1.0m	UNKNOWN	-	-	-	-	-	0.11	<0.4	<1	<5	<5	<5	<10	29	<2	0.2
02-B02182-S0049	WS14 0.5-1.0m	UNKNOWN	<0.3	3	23	6	71	-	-	-	-	-	-	-	-	-	-
02-B02182-S0050	WS14 2.5-3.0m	UNKNOWN	<0.3	4	28	<1	75	-	-	-	-	-	-	-	-	-	-
02-B02182-S0051	WS15 0.5-1.0m	UNKNOWN	6.8	3	41	11	157	-	-	-	-	-	-	-	-	-	-
02-B02182-S0053	WS15 3.5-4.0m	UNKNOWN	<0.3	1	22	<1	88	-	-	-	-	-	-	-	-	-	-
02-B02182-S0054	WS16 0.5-1.0m	UNKNOWN	<0.3	1	22	<1	76	-	-	-	-	-	-	-	-	-	-

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Date of Receipt: 16/01/2003
(of first sample)

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	Mercury Low Level	Molybdenum	Nickel	Water Soluble Boron	Zinc	Dissolved Boron in NRA Leachate	Dissolved Cadmium Low in NRA Leachate	Dissolved Chromium Low in NRA Leachate	Dissolved Copper Low in NRA Leachate	Dissolved Lead Low in NRA Leachate	Dissolved Molybdenum Low in NRA Leach	Dissolved Nickel Low in NRA Leachate	Dissolved Zinc Low in NRA Leachate	Total Organic Carbon in NRA Leachate	Ammoniacal Nitrogen in NRA Leachate as N**
Detection Method			ICP	ICP	ICP	ICP	ICP	ICP	ICP USN	ICP USN	ICP USN	ICP USN	ICP USN	ICP USN	ICP USN	IR	KONE
Method Detection Limit			<0.3mg/kg	<1mg/kg	<1mg/kg	<1mg/kg	<1mg/kg	<0.05mg/l	<0.4ug/l	<1ug/l	<5ug/l	<5ug/l	<5ug/l	<10ug/l	<5ug/l	<2mg/l	<0.2mg/l
UKAS Accredited			✓	✓	✓	✓	✓	✓									✓
			mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	mg/l	mg/l
02-B02182-S0055	WS16 1.5-2.0m	UNKNOWN	-	-	-	-	-	<0.05	<0.4	<1	<5	<5	<5	<10	34	<2	<0.2
02-B02182-S0056	WS16 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
02-B02182-S0057	WS8 1.5-2.0m	UNKNOWN	<0.3	3	39	<1	99	-	-	-	-	-	-	-	-	-	-

Notes : METHOD DETECTION LIMITS ARE NOT ALWAYS ACHIEVABLE DUE TO VARIOUS CIRCUMSTANCES BEYOND OUR CONTROL.

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Checked By Dylan Halpin   Dylan Halpin

ALcontrol Laboratories Ireland

☑ Validated

Table Of Results

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
(of first sample)

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	Chloride in NRA Leachate	Fluoride in NRA Leachate**	Nitrate in NRA Leachate as NO3	Nitrite in NRA Leachate as NO2	ortho Phosphate as PO4 in NRA Leachate	Sulphate in NRA Leachate	Conductivity in NRA Leachate	pH of NRA Leachate	Chromium VI in NRA Leachate	Free Cyanide in NRA Leachate
Detection Method			KONE	KONE	KONE	KONE	KONE	KONE	METER	METER	SPECTRO	SPECTRO
Method Detection Limit			<1mg/l	<0.5mg/l	<0.3mg/l	<0.05mg/l	<0.03mg/l	<3mg/l	<0.014mS/cm	napH Unit	<0.03mg/l	<0.05mg/l
UKAS Accredited			✓		✓	✓	✓	✓	✓	✓	✓	
			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mS/cm	pH Unit	mg/l	mg/l
02-B02182-S0007	WS1 0.5m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0008	WS1 1.5m	UNKNOWN	12	<0.5	5.8	<0.05	0.80	30	0.125	7.92	<0.03	<0.05
02-B02182-S0009	WS1 2.5m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0010	WS1 3.5m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0011	WS2 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0013	WS2 1.5-2.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0014	WS2 3.0m	UNKNOWN	12	0.5	0.5	0.05	0.10	21	0.157	7.58	<0.03	<0.05
02-B02182-S0015	WS2 4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0016	WS3 0.5m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0017	WS3 1.5-2.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0018	WS3 0.5-1.0m	UNKNOWN	21	<0.5	1.9	<0.05	0.30	9	0.077	8.04	<0.03	<0.05
02-B02182-S0019	WS4 1.5-2.0	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0021	WS5 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0022	WS5 1.5-2.0m	UNKNOWN	8	<0.5	0.4	<0.05	0.20	21	0.119	7.73	<0.03	<0.05
02-B02182-S0023	WS5 2.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0024	WS5 4.5-5.0m	UNKNOWN	10	<0.5	<0.3	0.06	<0.03	96	0.285	7.48	<0.03	<0.05
02-B02182-S0025	WS5 4.5-5.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0026	WS6 1.5-2.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0028	WS7 1.0-1.5m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0030	WS7 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-

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Checked By Dylan Halpin Dylan Halpin

ALcontrol Laboratories Ireland

☑ Validated

Table Of Results

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
(of first sample)

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	Chloride in NRA Leachate	Fluoride in NRA Leachate**	Nitrate in NRA Leachate as NO3	Nitrite in NRA Leachate as NO2	ortho Phosphate as PO4 in NRA Leachate	Sulphate in NRA Leachate	Conductivity in NRA Leachate	pH of NRA Leachate	Chromium VI in NRA Leachate	Free Cyanide in NRA Leachate
Detection Method			KONE	KONE	KONE	KONE	KONE	KONE	METER	METER	SPECTRO	SPECTRO
Method Detection Limit			<1mg/l	<0.5mg/l	<0.3mg/l	<0.05mg/l	<0.03mg/l	<3mg/l	<0.014mS/cm	napH Unit	<0.03mg/l	<0.05mg/l
UKAS Accredited			✓		✓	✓	✓	✓	✓	✓	✓	
			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mS/cm	pH Unit	mg/l	mg/l
02-B02182-S0031	WS7 4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0032	WS10 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0034	WS10 3.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0035	WS10 4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0036	WS11 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0038	WS11 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0039	WS11 4.5-5.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0040	WS12 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0042	WS12 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0043	WS12 4.5-5.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0044	WS13 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0045	WS13 1.5-2.0m	UNKNOWN	16	<0.5	4.2	<0.05	0.40	133	0.366	7.52	<0.03	<0.05
02-B02182-S0046	WS13 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0047	WS13 4.5-5.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0048	WS14 0.5-1.0m	UNKNOWN	31	<0.5	31.7	<0.05	0.10	90	0.420	7.58	<0.03	<0.05
02-B02182-S0049	WS14 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0050	WS14 2.5-3.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0051	WS15 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0053	WS15 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0054	WS16 0.5-1.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-

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Checked By Dylan Halpin Dylan Halpin

☐ Interim
☑ Validated

ALcontrol Laboratories Ireland
Table Of Results

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
(of first sample)

Sample Type: SOIL
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	Chloride in NRA Leachate	Fluoride in NRA Leachate**	Nitrate in NRA Leachate as NO3	Nitrite in NRA Leachate as NO2	ortho Phosphate as PO4 in NRA Leachate	Sulphate in NRA Leachate	Conductivity in NRA Leachate	pH of NRA Leachate	Chromium VI in NRA Leachate	Free Cyanide in NRA Leachate
Detection Method			KONE	KONE	KONE	KONE	KONE	KONE	METER	METER	SPECTRO	SPECTRO
Method Detection Limit			<1mg/l	<0.5mg/l	<0.3mg/l	<0.05mg/l	<0.03mg/l	<3mg/l	<0.014mS/cm	napH Unit	<0.03mg/l	<0.05mg/l
UKAS Accredited			✓		✓	✓	✓	✓	✓	✓	✓	
			mg/l	mg/l	mg/l	mg/l	mg/l	mg/l	mS/cm	pH Unit	mg/l	mg/l
02-B02182-S0055	WS16 1.5-2.0m	UNKNOWN	22	<0.5	20.3	0.07	0.20	7	0.158	7.54	<0.03	<0.05
02-B02182-S0056	WS16 3.5-4.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-
02-B02182-S0057	WS8 1.5-2.0m	UNKNOWN	-	-	-	-	-	-	-	-	-	-

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ALcontrol Laboratories Ireland
Table Of Results

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
(of first sample)

Sample Type: WATER
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

ALcontrol Reference	Sample Identity	Other ID	Dissolved Mercury Low Level**	Diesel Range Organics	Mineral Oil by GC	DRO Interpretation	Petrol Range Organics C4-C10	Petrol Range Organics C10+	Benzene	Toluene	Ethylbenzene	Total Xylene	MTBE	Semi Volatile Organics	Total PCB**	Volatile Organic Compounds	Naphthalene
Detection Method			CV AA	GC	GC	GC	GC	GC	GC	GC	GC	GC	GC	GCMS	GCMS	GCMS	GCMS
Method Detection Limit			<0.05ug/l	<10ug/l	<10ug/l	n/a	<10ug/l	<10ug/l	<10ug/l	<10ug/l	<10ug/l	<10ug/l	<10ug/l	n/a	<1ug/l	n/a	<10ng/l
UKAS Accredited				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓				✓
			ug/l	ug/l	ug/l		ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l		ug/l		ng/l
02-B02182-S0006	BH1 3.5m	UNKNOWN	<0.05	5239	2881	See attached	19027	118331	<10	<10	<10	<10	<10	Done	See Attached	Done	<10

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Checked By Dylan Halpin Dylan Halpin

- [ ] Interim
- [x] Validated

ALcontrol Laboratories Ireland
Table Of Results

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
(of first sample)

Sample Type: WATER
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

Detection Method			GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS	GCMS
Method Detection Limit			<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l	<10ng/l
UKAS Accredited			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
ALcontrol Reference	Sample Identity	Other ID	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(123cd)pyrene	Dibenzo(ah)anthracene	Benzo(ghi)perylene
			ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l	ng/l
02-B02182-S0006	BH1 3.5m	UNKNOWN	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10

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ALcontrol Laboratories Ireland
Table Of Results

Ref Number: 02-B02182
Client: Irish Geotechnical Services Ltd (Newbridge)
Date of Receipt: 16/01/2003
(of first sample)

Sample Type: WATER
Location:
Client Contact: Neil Hannaway
Client Ref: Hickeys Fabrics

Detection Method			GCMS	Hydride AA	ICP	ICP USN	ICP USN	ICP USN	ICP USN	ICP USN	ICP USN	ICP USN
Method Detection Limit			<10ng/l	<5ug/l	<0.05mg/l	<0.4ug/l	<1ug/l	<5ug/l	<5ug/l	<5ug/l	<10ug/l	<5ug/l
UKAS Accredited			✓		✓							
ALcontrol Reference	Sample Identity	Other ID	Total 16 EPA PAHs	Dissolved Arsenic Low Level**	Dissolved Boron	Dissolved Cadmium Low Level	Dissolved Chromium Low Level	Dissolved Copper Low Level	Dissolved Lead Low Level	Dissolved Molybdenum Low Level	Dissolved Nickel Low Level**	Dissolved Zinc Low Level
			ng/l	ug/l	mg/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l	ug/l
02-B02182-S0006	BH1 3.5m	UNKNOWN	<10	<5	<0.05	<0.4	<1	<5	<5	<5	<10	<5

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Checked By Dylan Halpin Dylan Halpin

Diesel Range Organics
by
G.C.

Client Name Irish Geotechnical Services Ltd	Job Number 02-B02182	Separatory Funnel Ext No
Client Ref Hickeys Fabrics	Date Extracted/Prepared 6/1/03	Soxtec Extraction No
Sample Matrix Soil	Date Analysed 7/1/03	Column Extraction No

Sample number	Sample Identity	Depth	Diesel Range Hydrocarbons (mg/kg)	Interpretation
S0007	WS1	0.50	747	Possible lube oil
S0009	WS1	2.50	296	Possible lube oil
S0010	WS1	3.50	< 1	No Identification Possible
S0011	WS2	0.5-1.0	7090	Biodegraded diesel
S0013	WS2	1.5-2.0	< 1	No Identification Possible
S0015	WS2	4.00	3967	Biodegraded diesel
S0016	WS3	0.50	231	Possible (PAH'S)
S0019	WS4	1.5-2.0	< 1	No Identification Possible
S0023	WS5	2.00	< 1	No Identification Possible
S0025	WS5	4.5-5.0	242	Biodegraded diesel
S0028	WS7	1.0-1.5	< 1	No Identification Possible
S0032	WS10	0.5-1.0	< 1	No Identification Possible
S0038	WS11	3.5-4.0	< 1	No Identification Possible
S0044	WS13	0.5-1.0	< 1	No Identification Possible
S0049	WS14	0.5-1.0	< 1	No Identification Possible
S0051	WS15	0.5-1.0	< 1	No Identification Possible
S0054	WS16	0.5-1.0	< 1	No Identification Possible
S0057	WS8	1.5-2.0	< 1	No Identification Possible

Checked by L. McNamara

Mineral Oil
by
G.C.

Client Name Irish Geotechnical Services Ltd	Job Number 02-B02182	Separatory Funnel Ext No
Client Ref Hickeys Fabrics	Date Extracted/Prepared 6/1/03	Soxtec Extraction No
Sample Matrix Soil	Date Analysed 7/1/03	Column Extraction No

Sample number	Sample Identity	Depth	Mineral Oil (mg/kg)	Interpretation
S0007	WS1	0.50	597	Possible lube oil
S0009	WS1	2.50	237	Possible lube oil
S0010	WS1	3.50	< 1	No Identification Possible
S0011	WS2	0.5-1.0	4609	Biodegraded diesel
S0013	WS2	1.5-2.0	< 1	No Identification Possible
S0015	WS2	4.00	2578	Biodegraded diesel
S0016	WS3	0.50	< 1	Possible (PAH'S)
S0019	WS4	1.5-2.0	< 1	No Identification Possible
S0023	WS5	2.00	< 1	No Identification Possible
S0025	WS5	4.5-5.0	157	Biodegraded diesel
S0028	WS7	1.0-1.5	< 1	No Identification Possible
S0032	WS10	0.5-1.0	< 1	No Identification Possible
S0038	WS11	3.5-4.0	< 1	No Identification Possible
S0044	WS13	0.5-1.0	< 1	No Identification Possible
S0049	WS14	0.5-1.0	< 1	No Identification Possible
S0051	WS15	0.5-1.0	< 1	No Identification Possible
S0054	WS16	0.5-1.0	< 1	No Identification Possible
S0057	WS8	1.5-2.0	< 1	No Identification Possible

Checked by L. McNamara

Diesel Range Organics
by
G.C.

Client Name IGSL
Client Ref Hickeys Fabric
Sample Matrix Soil

Job Number 02-B02182
Date Extracted/Prepared 20/1/03
Date Analysed 23/1/03

Separatory Funnel Ext No
Soxtec Extraction No
Column Extraction No

Sample number	Sample Identity	Depth	Diesel Range Hydrocarbons (mg/kg)	Interpretation
017	WS3	1.5-2.0	21	No Identification Possible
034	WS10	3.00	< 1	No Identification Possible
036	WS11	0.5-1.0	28	No Identification Possible
039	WS11	4.5-5.0	< 1	No Identification Possible
040	WS12	0.5-1.0	99	Naturally Occuring Products
042	WS12	3.5-4.0	370	Naturally Occuring Products
043	WS12	4.5-5.0	< 1	No Identification Possible
045	WS13	1.5-2.0	33	No Identification Possible
047	WS13	4.5-5.0	450	Naturally Occuring Products
050	WS14	2.5-3.0	< 1	No Identification Possible
053	WS15	3.5-4.0	< 1	No Identification Possible

Checked by

Mineral Oil
by
G.C.

Client Name IGSL
Client Ref Hickeys Fabric
Sample Matrix Soil

Job Number 02-B02182
Date Extracted/Prepared 20/1/03
Date Analysed 23/1/03

Separatory Funnel Ext No
Soxtec Extraction No
Column Extraction No

Sample number	Sample Identity	Depth	Mineral Oil (mg/kg)	Interpretation
017	WS3	1.5-2.0	1	No Identification Possible
034	WS10	3.00	< 1	No Identification Possible
036	WS11	0.5-1.0	1	No Identification Possible
039	WS11	4.5-5.0	< 1	No Identification Possible
040	WS12	0.5-1.0	5	Naturally Occuring Products
042	WS12	3.5-4.0	18	Naturally Occuring Products
043	WS12	4.5-5.0	< 1	No Identification Possible
045	WS13	1.5-2.0	2	No Identification Possible
047	WS13	4.5-5.0	22	Naturally Occuring Products
050	WS14	2.5-3.0	< 1	No Identification Possible
053	WS15	3.5-4.0	< 1	No Identification Possible

Checked by

[redacted]

Diesel Range Organics
by
G.C.

Client Name Irish Geotechnical Services
Client Ref Hickeys Fabrics
Sample Matrix Water

Job Number 02-B02182
Date Extracted/Prepared 2/1/03
Date Analysed 7/1/03

Separatory Funnel Ext Yes
Soxtec Extraction No
Column Extraction Yes

Sample number	Sample Identity	Depth	Diesel Range Hydrocarbons (µg/litre)	Interpretation
S0006	BH1	3.50	5239	Possible gasoline residues

Checked by [illegible]

Mineral Oil
by
G.C.

Client Name Irish Geotechnical Services
Client Ref Hickeys Fabrics
Sample Matrix Water

Job Number 02-B02182
Date Extracted/Prepared 2/1/03
Date Analysed 7/1/03

Separatory Funnel Ext Yes
Soxtec Extraction No
Column Extraction Yes

Sample number	Sample Identity	Depth	Mineral Oil (µg/litre)	Interpretation
S0006	BH1	3.50	2881	Possible gasoline residues

Checked by [illegible]

[redacted]

Diesel Range Organics

by

G.C.

Client Name Irish Geotechnical Services Ltd
Client Ref Hickeys Fabric
Sample Matrix Leachate

Job Number 02-B02182
Date Extracted/Prepared 9/1/02
Date Analysed 10/1/02

Separatory Funnel Ext Yes
Soxtec Extraction No
Column Extraction Yes

Sample number	Sample Identity	Depth	Diesel Range Hydrocarbons (µg/litre)	Interpretation
S0008	WS1	1.50	< 10	No Identification Possible
S0014	WS2	3.00	< 10	No Identification Possible
S0018	WS3	0.5-1.0	< 10	No Identification Possible
S0022	WS5	1.5-2.0	< 10	No Identification Possible
S0024	WS5	4.5-5.0	< 10	No Identification Possible
S0045	WS13	1.5-2.	< 10	No Identification Possible
S0048	WS14	0.5-1.0	181	Possible Biodegraded Diesel
S0055	WS16	1.5-2.0	< 10	No Identification Possible

Checked by ....

Mineral Oil

by

G.C.

Client Name Irish Geotechnical Services Ltd
Client Ref Hickeys Fabric
Sample Matrix Leachate

Job Number 02-B02182
Date Extracted/Prepared 9/1/02
Date Analysed 10/1/02

Separatory Funnel Ext Yes
Soxtec Extraction No
Column Extraction Yes

Sample number	Sample Identity	Depth	Mineral Oil (µg/litre)	Interpretation
S0008	WS1	1.50	< 10	No Identification Possible
S0014	WS2	3.00	< 10	No Identification Possible
S0018	WS3	0.5-1.0	< 10	No Identification Possible
S0022	WS5	1.5-2.0	< 10	No Identification Possible
S0024	WS5	4.5-5.0	< 10	No Identification Possible
S0045	WS13	1.5-2.	< 10	No Identification Possible
S0048	WS14	0.5-1.0	118	Possible Biodegraded Diesel
S0055	WS16	1.5-2.0	< 10	No Identification Possible

Checked by ....

Geochem Analytical Services

Gasoline Range Organics

By

GC

Job No: DUB-02-B02182
Client: Irish Geotechnical Services Ltd
Client Ref: Hickeys Farrics
Matrix: Soil
Units: µg/kg

Sample No	Sample Ref	Depth m/ft	Total C4-C10	Total C10+
S0007	WS1	0.5	<10	<10
S0009	WS1	2.5	<10	<10
S0010	WS1	3.5	<10	<10
S0011	WS2	0.5-1.0	<10	106357
S0013	WS2	1.5-2.0	<10	<10
S0015	WS2	4.0	<10	40913
S0016	WS3	0.5	<10	<10
S0019	WS4	1.5-2.0	<10	<10
S0023	WS5	2.0	<10	<10
S0025	WS5	4.5-5.0	<10	<10
S0028	WS7	1.0-1.5	<10	<10
S0032	WS10	0.5-1.0	<10	<10
S0038	WS11	3.5-4.0	<10	<10
S0044	WS13	0.5-1.0	<10	<10
S0049	WS14	0.5-1.0	<10	<10
S0051	WS15	0.5-1.0	<10	<10
S0054	WS16	0.5-1.0	<10	<10
S0057	WS8	1.5-2.0	<10	<10

Checked by: Anita Marley

Geochem Analytical Services

BTEX (MTBE) Analysis

By

G.C.

Job No: DUB-02-B02182
Client: Irish Geotechnical Services Ltd
Client Ref: Hickeys Farrics
Matrix: Soil
Units: µg/kg

Smpl No	Sample Ref	Depth m/ft	MTBE	Benzene	Toluene	Ethyl Benzene	Total Xylene
S0007	WS1	0.50	<10	<10	<10	<10	<10
S0009	WS1	2.50	<10	<10	<10	<10	<10
S0010	WS1	3.50	<10	<10	<10	<10	<10
S0011	WS2	0.5-1.0	<10	<10	<10	<10	<10
S0013	WS2	1.5-2.0	<10	<10	<10	<10	<10
S0015	WS2	4.00	<10	<10	<10	<10	<10
S0016	WS3	0.50	<10	<10	<10	<10	<10
S0019	WS4	1.5-2.0	<10	<10	<10	<10	<10
S0023	WS5	2.00	<10	<10	<10	<10	<10
S0025	WS5	4.5-5.0	<10	<10	<10	<10	<10
S0028	WS7	1.0-1.5	<10	<10	<10	<10	<10
S0032	WS10	0.5-1.0	<10	<10	<10	<10	<10
S0038	WS11	3.5-4.0	<10	<10	<10	<10	<10
S0044	WS13	0.5-1.0	<10	<10	<10	<10	<10
S0049	WS14	0.5-1.0	<10	<10	<10	<10	<10
S0051	WS15	0.5-1.0	<10	<10	<10	<10	<10
S0054	WS16	0.5-1.0	<10	<10	<10	<10	<10
S0057	WS8	1.5-2.0	<10	<10	<10	<10	<10

Checked by: Anita Marley

Geochem Analytical Services

Gasoline Range Organics

By

GC

Job No: DUB-02-B02182

Client: Irish Geotechnical Services Ltd.

Client Ref: Hickeys Fabrics

Matrix: Soil

Units: µg/kg

Sample No	Sample Ref	Depth m/ft	Total C4-C10	Total C10+
S0017	WS3	1.5-2.0	<10	<10
S0034	WS10	3.0	<10	<10
S0036	WS11	0.5-1.0	<10	<10
S0039	WS11	4.5-5.0	<10	<10
S0040	WS12	0.5-1.0	<10	<10
S0042	WS12	3.5-4.0	<10	<10
S0043	WS12	4.5-5.0	<10	<10
S0045	WS13	1.5-2.0	<10	<10
S0047	WS13	4.5-5.0	<10	<10
S0050	WS14	2.5-3.0	<10	<10
S0053	WS15	3.5-4.0	<10	<10

Checked by S. Baird

Geochem Analytical Services

BTEX (MTBE) Analysis

By

G.C.

Job No: DUB-02-B02182

Client: Irish Geotechnical Services Ltd.

Client Ref: Hickeys Fabrics

Matrix: Soil

Units: µg/kg

Smpl No	Sample Ref	Depth m/ft	MTBE	Benzene	Toluene	Ethyl Benzene	Total Xylene
S0017	WS3	1.5-2.0	<10	<10	<10	<10	<10
S0034	WS10	3.00	<10	<10	<10	<10	<10
S0036	WS11	0.5-1.0	<10	<10	<10	<10	<10
S0039	WS11	4.5-5.0	<10	<10	<10	<10	<10
S0040	WS12	0.5-1.0	<10	<10	<10	<10	<10
S0042	WS12	3.5-4.0	<10	<10	<10	<10	<10
S0043	WS12	4.5-5.0	<10	<10	<10	<10	<10
S0045	WS13	1.5-2.0	<10	<10	<10	<10	<10
S0047	WS13	4.5-5.0	<10	<10	<10	<10	<10
S0050	WS14	2.5-3.0	<10	<10	<10	<10	<10
S0053	WS15	3.5-4.0	<10	<10	<10	<10	<10

Checked by S. Baird

Geochem Analytical Services
Gasoline Range Organics
By
GC

Job No: DUB-02-B02182
Client: Irish Gotechnical Services Ltd
Client Ref: Hickeys Fabrics
Matrix: Water
Units: µg/l

Sample No	Sample Ref	Depth m/ft	Total C4-C10	Total C10+
S0006	BH1	3.5	19027	118331

Checked by Anita Morley

Geochem Analytical Services
BTEX (MTBE) Analysis
By
G.C.

Job No: DUB-02-B02182
Client: Irish Gotechnical Services Ltd
Client Ref: Hickeys Fabrics
Matrix: Water
Units: µg/l

Smpl No	Sample Ref	Depth m/ft	MTBE	Benzene	Toluene	Ethyl Benzene	Total Xylene
S0006	BH1	3.5	<10	<10	<10	<10	<10

Checked by Anita Morley

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0007WS1 0.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	87
208-96-8	Acenaphthylene	51
83-32-9	Acenaphthene	38
86-73-7	Fluorene	29
85-01-8	Phenanthrene	532
120-12-7	Anthracene	92
206-44-0	Fluoranthene	791
129-00-0	Pyrene	766
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	454
218-01-9	Chrysene	586
205-99-2	Benzo(b)fluoranthene	739
207-08-9	Benzo(k)fluoranthene	332
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	325
193-39-5	Indeno(123cd)pyrene	380
53-70-3	Dibenzo(ah)anthracene	88
191-24-2	Benzo(ghi)perylene	319
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	5608

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0009 WS1 2.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<1
208-96-8	Acenaphthylene	<1
83-32-9	Acenaphthene	<1
86-73-7	Fluorene	<1
85-01-8	Phenanthrene	<1
120-12-7	Anthracene	<1
206-44-0	Fluoranthene	<1
129-00-0	Pyrene	<1
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	<1
218-01-9	Chrysene	<1
205-99-2	Benzo(b)fluoranthene	<1
207-08-9	Benzo(k)fluoranthene	<1
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	<1
193-39-5	Indeno(123cd)pyrene	<1
53-70-3	Dibenzo(ah)anthracene	<1
191-24-2	Benzo(ghi)perylene	<1
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	<1

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0010 WS1 3.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<1
208-96-8	Acenaphthylene	<1
83-32-9	Acenaphthene	<1
86-73-7	Fluorene	<1
85-01-8	Phenanthrene	<1
120-12-7	Anthracene	<1
206-44-0	Fluoranthene	<1
129-00-0	Pyrene	<1
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	<1
218-01-9	Chrysene	<1
205-99-2	Benzo(b)fluoranthene	<1
207-08-9	Benzo(k)fluoranthene	<1
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	<1
193-39-5	Indeno(123cd)pyrene	<1
53-70-3	Dibenzo(ah)anthracene	<1
191-24-2	Benzo(ghi)perylene	<1
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	<1

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0011 WS2 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	517
208-96-8	Acenaphthylene	118
83-32-9	Acenaphthene	184
86-73-7	Fluorene	434
85-01-8	Phenanthrene	1063
120-12-7	Anthracene	352
206-44-0	Fluoranthene	831
129-00-0	Pyrene	1112
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	383
218-01-9	Chrysene	575
205-99-2	Benzo(b)fluoranthene	420
207-08-9	Benzo(k)fluoranthene	156
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	221
193-39-5	Indeno(123cd)pyrene	181
53-70-3	Dibenzo(ah)anthracene	58
191-24-2	Benzo(ghi)perylene	170
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	6775

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0013 WS2 1.5-2.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	33
208-96-8	Acenaphthylene	15
83-32-9	Acenaphthene	15
86-73-7	Fluorene	6
85-01-8	Phenanthrene	80
120-12-7	Anthracene	26
206-44-0	Fluoranthene	108
129-00-0	Pyrene	98
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	128
218-01-9	Chrysene	139
205-99-2	Benzo(b)fluoranthene	168
207-08-9	Benzo(k)fluoranthene	80
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	91
193-39-5	Indeno(123cd)pyrene	95
53-70-3	Dibenzo(ah)anthracene	29
191-24-2	Benzo(ghi)perylene	73
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	1184

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0015 WS2 4.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<1
208-96-8	Acenaphthylene	<1
83-32-9	Acenaphthene	<1
86-73-7	Fluorene	<1
85-01-8	Phenanthrene	<1
120-12-7	Anthracene	<1
206-44-0	Fluoranthene	<1
129-00-0	Pyrene	<1
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	<1
218-01-9	Chrysene	<1
205-99-2	Benzo(b)fluoranthene	<1
207-08-9	Benzo(k)fluoranthene	<1
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	<1
193-39-5	Indeno(123cd)pyrene	<1
53-70-3	Dibenzo(ah)anthracene	<1
191-24-2	Benzo(ghi)perylene	<1
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	<1

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0016 WS3 0.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	189
208-96-8	Acenaphthylene	124
83-32-9	Acenaphthene	94
86-73-7	Fluorene	89
85-01-8	Phenanthrene	1504
120-12-7	Anthracene	296
206-44-0	Fluoranthene	3042
129-00-0	Pyrene	2811
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	1645
218-01-9	Chrysene	1841
205-99-2	Benzo(b)fluoranthene	2106
207-08-9	Benzo(k)fluoranthene	1161
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	1577
193-39-5	Indeno(123cd)pyrene	1215
53-70-3	Dibenzo(ah)anthracene	268
191-24-2	Benzo(ghi)perylene	1000
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	18961

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0019 WS4 1.5-2.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	61
208-96-8	Acenaphthylene	71
83-32-9	Acenaphthene	60
86-73-7	Fluorene	55
85-01-8	Phenanthrene	795
120-12-7	Anthracene	198
206-44-0	Fluoranthene	1312
129-00-0	Pyrene	1228
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	729
218-01-9	Chrysene	811
205-99-2	Benzo(b)fluoranthene	1131
207-08-9	Benzo(k)fluoranthene	367
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	671
193-39-5	Indeno(123cd)pyrene	580
53-70-3	Dibenzo(ah)anthracene	131
191-24-2	Benzo(ghi)perylene	455
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	8654

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0023 WS5 2.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<1
208-96-8	Acenaphthylene	<1
83-32-9	Acenaphthene	<1
86-73-7	Fluorene	<1
85-01-8	Phenanthrene	<1
120-12-7	Anthracene	<1
206-44-0	Fluoranthene	<1
129-00-0	Pyrene	<1
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	<1
218-01-9	Chrysene	<1
205-99-2	Benzo(b)fluoranthene	<1
207-08-9	Benzo(k)fluoranthene	<1
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	<1
193-39-5	Indeno(123cd)pyrene	<1
53-70-3	Dibenzo(ah)anthracene	<1
191-24-2	Benzo(ghi)perylene	<1
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	<1

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0025 WS5 4.5-5.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	39
208-96-8	Acenaphthylene	7
83-32-9	Acenaphthene	7
86-73-7	Fluorene	40
85-01-8	Phenanthrene	54
120-12-7	Anthracene	10
206-44-0	Fluoranthene	12
129-00-0	Pyrene	27
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	16
218-01-9	Chrysene	10
205-99-2	Benzo(b)fluoranthene	<1
207-08-9	Benzo(k)fluoranthene	<1
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	<1
193-39-5	Indeno(123cd)pyrene	<1
53-70-3	Dibenzo(ah)anthracene	<1
191-24-2	Benzo(ghi)perylene	<1
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	223

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0028 WS7 1.0-1.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<1
208-96-8	Acenaphthylene	<1
83-32-9	Acenaphthene	<1
86-73-7	Fluorene	<1
85-01-8	Phenanthrene	29
120-12-7	Anthracene	5
206-44-0	Fluoranthene	16
129-00-0	Pyrene	13
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	21
218-01-9	Chrysene	18
205-99-2	Benzo(b)fluoranthene	11
207-08-9	Benzo(k)fluoranthene	4
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	7
193-39-5	Indeno(123cd)pyrene	6
53-70-3	Dibenzo(ah)anthracene	2
191-24-2	Benzo(ghi)perylene	6
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	139

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0032 WS10 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	24
208-96-8	Acenaphthylene	25
83-32-9	Acenaphthene	3
86-73-7	Fluorene	8
85-01-8	Phenanthrene	275
120-12-7	Anthracene	44
206-44-0	Fluoranthene	283
129-00-0	Pyrene	236
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	159
218-01-9	Chrysene	192
205-99-2	Benzo(b)fluoranthene	194
207-08-9	Benzo(k)fluoranthene	91
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	106
193-39-5	Indeno(123cd)pyrene	111
53-70-3	Dibenzo(ah)anthracene	15
191-24-2	Benzo(ghi)perylene	95
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	1860

ALcontrol Geochem

19 PAH Analysis

Sample Identity - **DUB-02-B02182-S0038 WS11 3.5-4.0**
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<1
208-96-8	Acenaphthylene	<1
83-32-9	Acenaphthene	<1
86-73-7	Fluorene	<1
85-01-8	Phenanthrene	<1
120-12-7	Anthracene	<1
206-44-0	Fluoranthene	<1
129-00-0	Pyrene	<1
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	<1
218-01-9	Chrysene	<1
205-99-2	Benzo(b)fluoranthene	<1
207-08-9	Benzo(k)fluoranthene	<1
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	<1
193-39-5	Indeno(123cd)pyrene	<1
53-70-3	Dibenzo(ah)anthracene	<1
191-24-2	Benzo(ghi)perylene	<1
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	<1

ALcontrol Geochem

19 PAH Analysis

Sample Identity - **DUB-02-B02182-S0044 WS13-0.5-1.0**
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<1
208-96-8	Acenaphthylene	<1
83-32-9	Acenaphthene	<1
86-73-7	Fluorene	<1
85-01-8	Phenanthrene	66
120-12-7	Anthracene	14
206-44-0	Fluoranthene	77
129-00-0	Pyrene	60
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	58
218-01-9	Chrysene	50
205-99-2	Benzo(b)fluoranthene	33
207-08-9	Benzo(k)fluoranthene	24
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	25
193-39-5	Indeno(123cd)pyrene	23
53-70-3	Dibenzo(ah)anthracene	6
191-24-2	Benzo(ghi)perylene	20
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	457

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0049 WS14 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	12
208-96-8	Acenaphthylene	11
83-32-9	Acenaphthene	1
86-73-7	Fluorene	4
85-01-8	Phenanthrene	55
120-12-7	Anthracene	18
206-44-0	Fluoranthene	71
129-00-0	Pyrene	61
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	110
218-01-9	Chrysene	106
205-99-2	Benzo(b)fluoranthene	98
207-08-9	Benzo(k)fluoranthene	37
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	61
193-39-5	Indeno(123cd)pyrene	53
53-70-3	Dibenzo(ah)anthracene	12
191-24-2	Benzo(ghi)perylene	46
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	755

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0051 WS15 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	43
208-96-8	Acenaphthylene	14
83-32-9	Acenaphthene	6
86-73-7	Fluorene	9
85-01-8	Phenanthrene	405
120-12-7	Anthracene	69
206-44-0	Fluoranthene	270
129-00-0	Pyrene	213
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	173
218-01-9	Chrysene	162
205-99-2	Benzo(b)fluoranthene	94
207-08-9	Benzo(k)fluoranthene	47
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	64
193-39-5	Indeno(123cd)pyrene	47
53-70-3	Dibenzo(ah)anthracene	8
191-24-2	Benzo(ghi)perylene	44
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	1668

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0008 WS1 1.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Leachate
Units - ng/l

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<10
208-96-8	Acenaphthylene	<10
83-32-9	Acenaphthene	<10
86-73-7	Fluorene	<10
85-01-8	Phenanthrene	<10
120-12-7	Anthracene	<10
206-44-0	Fluoranthene	<10
129-00-0	Pyrene	<10
27208-37-3	Cyclopenta(cd)pyrene	<10
56-55-3	Benz(a)anthracene	<10
218-01-9	Chrysene	<10
205-99-2	Benzo(b)fluoranthene	<10
207-08-9	Benzo(k)fluoranthene	<10
192-97-2	Benzo(e)pyrene	<10
50-32-8	Benzo(a)pyrene	<10
193-39-5	Indeno(123cd)pyrene	<10
53-70-3	Dibenzo(ah)anthracene	<10
191-24-2	Benzo(ghi)perylene	<10
191-26-4	Anthanthrene	<10
	Total of 16 PAH's	<10

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0054 WS16 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	13
208-96-8	Acenaphthylene	3
83-32-9	Acenaphthene	3
86-73-7	Fluorene	4
85-01-8	Phenanthrene	53
120-12-7	Anthracene	11
206-44-0	Fluoranthene	34
129-00-0	Pyrene	30
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	33
218-01-9	Chrysene	41
205-99-2	Benzo(b)fluoranthene	33
207-08-9	Benzo(k)fluoranthene	11
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	15
193-39-5	Indeno(123cd)pyrene	16
53-70-3	Dibenzo(ah)anthracene	4
191-24-2	Benzo(ghi)perylene	14
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	317

ALcontrol Geochem

19 PAH Analysis

Sample Identity - **DUB-02-B02182-S0057 WS8 1.5-2.0**
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<1
208-96-8	Acenaphthylene	<1
83-32-9	Acenaphthene	<1
86-73-7	Fluorene	<1
85-01-8	Phenanthrene	<1
120-12-7	Anthracene	<1
206-44-0	Fluoranthene	<1
129-00-0	Pyrene	<1
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	<1
218-01-9	Chrysene	<1
205-99-2	Benzo(b)fluoranthene	<1
207-08-9	Benzo(k)fluoranthene	<1
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	<1
193-39-5	Indeno(123cd)pyrene	<1
53-70-3	Dibenzo(ah)anthracene	<1
191-24-2	Benzo(ghi)perylene	<1
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	<1

ALcontrol Geochem

19 PAH Analysis

Sample Identity - **DUB-02-B02182-S0017 WS3 1.5-2.0**
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	66
208-96-8	Acenaphthylene	46
83-32-9	Acenaphthene	65
86-73-7	Fluorene	37
85-01-8	Phenanthrene	720
120-12-7	Anthracene	238
206-44-0	Fluoranthene	1118
129-00-0	Pyrene	1097
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	712
218-01-9	Chrysene	654
205-99-2	Benzo(b)fluoranthene	662
207-08-9	Benzo(k)fluoranthene	503
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	510
193-39-5	Indeno(123cd)pyrene	400
53-70-3	Dibenzo(ah)anthracene	153
191-24-2	Benzo(ghi)perylene	326
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	7305

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0034 WS10 3.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<1
208-96-8	Acenaphthylene	<1
83-32-9	Acenaphthene	<1
86-73-7	Fluorene	<1
85-01-8	Phenanthrene	<1
120-12-7	Anthracene	<1
206-44-0	Fluoranthene	<1
129-00-0	Pyrene	<1
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	<1
218-01-9	Chrysene	<1
205-99-2	Benzo(b)fluoranthene	<1
207-08-9	Benzo(k)fluoranthene	<1
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	<1
193-39-5	Indeno(123cd)pyrene	<1
53-70-3	Dibenzo(ah)anthracene	<1
191-24-2	Benzo(ghi)perylene	<1
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	<1

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0036 WS11 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	79
208-96-8	Acenaphthylene	337
83-32-9	Acenaphthene	98
86-73-7	Fluorene	293
85-01-8	Phenanthrene	2706
120-12-7	Anthracene	970
206-44-0	Fluoranthene	2344
129-00-0	Pyrene	1746
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	1190
218-01-9	Chrysene	890
205-99-2	Benzo(b)fluoranthene	831
207-08-9	Benzo(k)fluoranthene	602
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	666
193-39-5	Indeno(123cd)pyrene	417
53-70-3	Dibenzo(ah)anthracene	254
191-24-2	Benzo(ghi)perylene	280
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	13704

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0039 WS11 4.5-5.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<1
208-96-8	Acenaphthylene	<1
83-32-9	Acenaphthene	<1
86-73-7	Fluorene	<1
85-01-8	Phenanthrene	<1
120-12-7	Anthracene	<1
206-44-0	Fluoranthene	<1
129-00-0	Pyrene	<1
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	<1
218-01-9	Chrysene	<1
205-99-2	Benzo(b)fluoranthene	<1
207-08-9	Benzo(k)fluoranthene	<1
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	<1
193-39-5	Indeno(123cd)pyrene	<1
53-70-3	Dibenzo(ah)anthracene	<1
191-24-2	Benzo(ghi)perylene	<1
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	<1

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0040 WS12 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	162
208-96-8	Acenaphthylene	10
83-32-9	Acenaphthene	5
86-73-7	Fluorene	12
85-01-8	Phenanthrene	188
120-12-7	Anthracene	59
206-44-0	Fluoranthene	74
129-00-0	Pyrene	107
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	94
218-01-9	Chrysene	103
205-99-2	Benzo(b)fluoranthene	54
207-08-9	Benzo(k)fluoranthene	80
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	66
193-39-5	Indeno(123cd)pyrene	87
53-70-3	Dibenzo(ah)anthracene	54
191-24-2	Benzo(ghi)perylene	54
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	1210

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0042 WS12 3.5-4.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<1
208-96-8	Acenaphthylene	<1
83-32-9	Acenaphthene	<1
86-73-7	Fluorene	<1
85-01-8	Phenanthrene	<1
120-12-7	Anthracene	<1
206-44-0	Fluoranthene	<1
129-00-0	Pyrene	<1
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	<1
218-01-9	Chrysene	<1
205-99-2	Benzo(b)fluoranthene	<1
207-08-9	Benzo(k)fluoranthene	<1
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	<1
193-39-5	Indeno(123cd)pyrene	<1
53-70-3	Dibenzo(ah)anthracene	<1
191-24-2	Benzo(ghi)perylene	<1
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	<1

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0043 WS12 4.5-5.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<1
208-96-8	Acenaphthylene	<1
83-32-9	Acenaphthene	<1
86-73-7	Fluorene	<1
85-01-8	Phenanthrene	<1
120-12-7	Anthracene	<1
206-44-0	Fluoranthene	<1
129-00-0	Pyrene	<1
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	<1
218-01-9	Chrysene	<1
205-99-2	Benzo(b)fluoranthene	<1
207-08-9	Benzo(k)fluoranthene	<1
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	<1
193-39-5	Indeno(123cd)pyrene	<1
53-70-3	Dibenzo(ah)anthracene	<1
191-24-2	Benzo(ghi)perylene	<1
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	<1

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0045 WS13 1.5-2.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	19
208-96-8	Acenaphthylene	82
83-32-9	Acenaphthene	10
86-73-7	Fluorene	41
85-01-8	Phenanthrene	726
120-12-7	Anthracene	205
206-44-0	Fluoranthene	704
129-00-0	Pyrene	527
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	353
218-01-9	Chrysene	421
205-99-2	Benzo(b)fluoranthene	348
207-08-9	Benzo(k)fluoranthene	270
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	271
193-39-5	Indeno(123cd)pyrene	278
53-70-3	Dibenzo(ah)anthracene	163
191-24-2	Benzo(ghi)perylene	311
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	4730

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0047 WS13 4.5-5.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	154
208-96-8	Acenaphthylene	10
83-32-9	Acenaphthene	7
86-73-7	Fluorene	9
85-01-8	Phenanthrene	161
120-12-7	Anthracene	59
206-44-0	Fluoranthene	67
129-00-0	Pyrene	86
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	113
218-01-9	Chrysene	108
205-99-2	Benzo(b)fluoranthene	114
207-08-9	Benzo(k)fluoranthene	89
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	84
193-39-5	Indeno(123cd)pyrene	59
53-70-3	Dibenzo(ah)anthracene	27
191-24-2	Benzo(ghi)perylene	50
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	1198

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0050 WS14 2.5-3.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	17
208-96-8	Acenaphthylene	4
83-32-9	Acenaphthene	4
86-73-7	Fluorene	5
85-01-8	Phenanthrene	90
120-12-7	Anthracene	27
206-44-0	Fluoranthene	54
129-00-0	Pyrene	52
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	67
218-01-9	Chrysene	50
205-99-2	Benzo(b)fluoranthene	30
207-08-9	Benzo(k)fluoranthene	21
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	25
193-39-5	Indeno(123cd)pyrene	19
53-70-3	Dibenzo(ah)anthracene	23
191-24-2	Benzo(ghi)perylene	17
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	505

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0053 WS15 3.5-4.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<1
208-96-8	Acenaphthylene	<1
83-32-9	Acenaphthene	<1
86-73-7	Fluorene	<1
85-01-8	Phenanthrene	<1
120-12-7	Anthracene	<1
206-44-0	Fluoranthene	<1
129-00-0	Pyrene	<1
27208-37-3	Cyclopenta(cd)pyrene	<1
56-55-3	Benz(a)anthracene	<1
218-01-9	Chrysene	<1
205-99-2	Benzo(b)fluoranthene	<1
207-08-9	Benzo(k)fluoranthene	<1
192-97-2	Benzo(e)pyrene	<1
50-32-8	Benzo(a)pyrene	<1
193-39-5	Indeno(123cd)pyrene	<1
53-70-3	Dibenzo(ah)anthracene	<1
191-24-2	Benzo(ghi)perylene	<1
191-26-4	Anthanthrene	<1
	Total of 16 PAH's	<1

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0006 BH1 3.5m
Client / Sample matrix - Irish Geotechnical Services Ltd/Water
Units - ng/l

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<10
208-96-8	Acenaphthylene	<10
83-32-9	Acenaphthene	<10
86-73-7	Fluorene	<10
85-01-8	Phenanthrene	<10
120-12-7	Anthracene	<10
206-44-0	Fluoranthene	<10
129-00-0	Pyrene	<10
27208-37-3	Cyclopenta(cd)pyrene	<10
56-55-3	Benz(a)anthracene	<10
218-01-9	Chrysene	<10
205-99-2	Benzo(b)fluoranthene	<10
207-08-9	Benzo(k)fluoranthene	<10
192-97-2	Benzo(e)pyrene	<10
50-32-8	Benzo(a)pyrene	<10
193-39-5	Indeno(123cd)pyrene	<10
53-70-3	Dibenzo(ah)anthracene	<10
191-24-2	Benzo(ghi)perylene	<10
191-26-4	Anthanthrene	<10
	Total of 16 PAH's	<10

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0014 WS2 3.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Leachate
Units - ng/l

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<10
208-96-8	Acenaphthylene	<10
83-32-9	Acenaphthene	<10
86-73-7	Fluorene	<10
85-01-8	Phenanthrene	<10
120-12-7	Anthracene	<10
206-44-0	Fluoranthene	<10
129-00-0	Pyrene	<10
27208-37-3	Cyclopenta(cd)pyrene	<10
56-55-3	Benz(a)anthracene	<10
218-01-9	Chrysene	<10
205-99-2	Benzo(b)fluoranthene	<10
207-08-9	Benzo(k)fluoranthene	<10
192-97-2	Benzo(e)pyrene	<10
50-32-8	Benzo(a)pyrene	<10
193-39-5	Indeno(123cd)pyrene	<10
53-70-3	Dibenzo(ah)anthracene	<10
191-24-2	Benzo(ghi)perylene	<10
191-26-4	Anthanthrene	<10
	Total of 16 PAH's	<10

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0018 WS3 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services/Leachate
Units - ng/l

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<10
208-96-8	Acenaphthylene	<10
83-32-9	Acenaphthene	<10
86-73-7	Fluorene	<10
85-01-8	Phenanthrene	<10
120-12-7	Anthracene	<10
206-44-0	Fluoranthene	<10
129-00-0	Pyrene	<10
27208-37-3	Cyclopenta(cd)pyrene	<10
56-55-3	Benz(a)anthracene	<10
218-01-9	Chrysene	<10
205-99-2	Benzo(b)fluoranthene	<10
207-08-9	Benzo(k)fluoranthene	<10
192-97-2	Benzo(e)pyrene	<10
50-32-8	Benzo(a)pyrene	<10
193-39-5	Indeno(123cd)pyrene	<10
53-70-3	Dibenzo(ah)anthracene	<10
191-24-2	Benzo(ghi)perylene	<10
191-26-4	Anthanthrene	<10
	Total of 16 PAH's	<10

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0022 WS5 1.5-2.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Leachate
Units - ng/l

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<10
208-96-8	Acenaphthylene	<10
83-32-9	Acenaphthene	<10
86-73-7	Fluorene	<10
85-01-8	Phenanthrene	<10
120-12-7	Anthracene	<10
206-44-0	Fluoranthene	<10
129-00-0	Pyrene	<10
27208-37-3	Cyclopenta(cd)pyrene	<10
56-55-3	Benz(a)anthracene	<10
218-01-9	Chrysene	<10
205-99-2	Benzo(b)fluoranthene	<10
207-08-9	Benzo(k)fluoranthene	<10
192-97-2	Benzo(e)pyrene	<10
50-32-8	Benzo(a)pyrene	<10
193-39-5	Indeno(123cd)pyrene	<10
53-70-3	Dibenzo(ah)anthracene	<10
191-24-2	Benzo(ghi)perylene	<10
191-26-4	Anthanthrene	<10
	Total of 16 PAH's	<10

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0024 WS5 4.0-5.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Leachate
Units - ng/l

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<10
208-96-8	Acenaphthylene	<10
83-32-9	Acenaphthene	<10
86-73-7	Fluorene	<10
85-01-8	Phenanthrene	<10
120-12-7	Anthracene	<10
206-44-0	Fluoranthene	<10
129-00-0	Pyrene	<10
27208-37-3	Cyclopenta(cd)pyrene	<10
56-55-3	Benz(a)anthracene	<10
218-01-9	Chrysene	<10
205-99-2	Benzo(b)fluoranthene	<10
207-08-9	Benzo(k)fluoranthene	<10
192-97-2	Benzo(e)pyrene	<10
50-32-8	Benzo(a)pyrene	<10
193-39-5	Indeno(123cd)pyrene	<10
53-70-3	Dibenzo(ah)anthracene	<10
191-24-2	Benzo(ghi)perylene	<10
191-26-4	Anthanthrene	<10
	Total of 16 PAH's	<10

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0045 WS13 1.5-2.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Leachate
Units - ng/l

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<10
208-96-8	Acenaphthylene	<10
83-32-9	Acenaphthene	<10
86-73-7	Fluorene	<10
85-01-8	Phenanthrene	<10
120-12-7	Anthracene	<10
206-44-0	Fluoranthene	<10
129-00-0	Pyrene	<10
27208-37-3	Cyclopenta(cd)pyrene	<10
56-55-3	Benz(a)anthracene	<10
218-01-9	Chrysene	<10
205-99-2	Benzo(b)fluoranthene	<10
207-08-9	Benzo(k)fluoranthene	<10
192-97-2	Benzo(e)pyrene	<10
50-32-8	Benzo(a)pyrene	<10
193-39-5	Indeno(123cd)pyrene	<10
53-70-3	Dibenzo(ah)anthracene	<10
191-24-2	Benzo(ghi)perylene	<10
191-26-4	Anthanthrene	<10
	Total of 16 PAH's	<10

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0048 WS14 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Leachate
Units - ng/l

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<10
208-96-8	Acenaphthylene	<10
83-32-9	Acenaphthene	<10
86-73-7	Fluorene	<10
85-01-8	Phenanthrene	<10
120-12-7	Anthracene	<10
206-44-0	Fluoranthene	<10
129-00-0	Pyrene	<10
27208-37-3	Cyclopenta(cd)pyrene	<10
56-55-3	Benz(a)anthracene	<10
218-01-9	Chrysene	<10
205-99-2	Benzo(b)fluoranthene	<10
207-08-9	Benzo(k)fluoranthene	<10
192-97-2	Benzo(e)pyrene	<10
50-32-8	Benzo(a)pyrene	<10
193-39-5	Indeno(123cd)pyrene	<10
53-70-3	Dibenzo(ah)anthracene	<10
191-24-2	Benzo(ghi)perylene	<10
191-26-4	Anthanthrene	<10
	Total of 16 PAH's	<10

ALcontrol Geochem

19 PAH Analysis

Sample Identity - DUB-02-B02182-S0055 WS16 1.5-2.0
Client / Sample matrix - Irish Geotechnical Services/Leachate
Units - ng/l

CAS Number	Compound	Concentration
91-20-3	Naphthalene	<10
208-96-8	Acenaphthylene	<10
83-32-9	Acenaphthene	<10
86-73-7	Fluorene	<10
85-01-8	Phenanthrene	<10
120-12-7	Anthracene	<10
206-44-0	Fluoranthene	<10
129-00-0	Pyrene	<10
27208-37-3	Cyclopenta(cd)pyrene	<10
56-55-3	Benz(a)anthracene	<10
218-01-9	Chrysene	<10
205-99-2	Benzo(b)fluoranthene	<10
207-08-9	Benzo(k)fluoranthene	<10
192-97-2	Benzo(e)pyrene	<10
50-32-8	Benzo(a)pyrene	<10
193-39-5	Indeno(123cd)pyrene	<10
53-70-3	Dibenzo(ah)anthracene	<10
191-24-2	Benzo(ghi)perylene	<10
191-26-4	Anthanthrene	<10
	Total of 16 PAH's	<10

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0006 BH1 3.5m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 6 Jan 2003 23:07
Instrument Name - Instrumen

CAS No	Compound	Conc.	CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1	106-93-4	1,2-Dibromoethane	<1
74-87-3	Chloromethane	<1	127-18-4	Tetrachloroethene	<1
75-01-4	Vinyl Chloride	<1	630-20-6	1,1,1,2-Tetrachloroethane	<1
74-83-9	Bromomethane	<1	108-90-7	Chlorobenzene	<1
75-00-3	Chloroethane	<1	100-41-4	Ethylbenzene	<1
75-69-4	Trichlorofluoromethane	<1	108-38-3*	p/m-Xylene	<1
156-60-5	trans-1,2-Dichloroethene	<1	75-25-2	Bromoform	<1
75-09-2	Dichloromethane	<1	100-42-5	Styrene	<1
75-15-0	Carbon disulphide	<1	79-34-5	1,1,2,2-Tetrachloroethane	<1
75-35-4	1,1-Dichloroethene	<1	95-47-6	o-Xylene	<1
75-34-3	1,1-Dichloroethane	<1	96-18-4	1,2,3-Trichloropropane	<1
1634-04-4	tert-butyl methyl ether	<1	98-82-8	Isopropylbenzene	<1
156-59-2	cis-1,2-Dichloroethene	<1	108-86-1	Bromobenzene	<1
74-97-5	Bromochloromethane	<1	95-49-8	2-Chlorotoluene	<1
67-66-3	Chloroform	13	103-65-1	Propylbenzene	<1
594-20-7	2,2-Dichloropropane	<1	106-43-4	4-Chlorotoluene	<1
107-06-2	1,2-Dichloroethane	<1	95-63-6	1,2,4-Trimethylbenzene	<1
71-55-6	1,1,1-Trichloroethane	<1	99-87-6	4-Isopropyltoluene	<1
563-58-6	1,1-Dichloropropene	<1	108-67-8	1,3,5-Trimethylbenzene	<1
71-43-2	Benzene	<1	541-73-1	1,3-Dichlorobenzene	<1
56-23-5	Carbontetrachloride	<1	106-46-7	1,4-Dichlorobenzene	<1
74-95-3	Dibromomethane	<1	135-98-8	sec-Butylbenzene	<1
78-87-5	1,2-Dichloropropane	<1	98-06-6	tert-Butylbenzene	<1
75-27-4	Bromodichloromethane	<1	95-50-1	1,2-Dichlorobenzene	<1
79-01-6	Trichloroethene	<1	104-51-8	n-Butylbenzene	<1
10061-01-5	cis-1,3-Dichloropropene	<1	96-12-8	1,2-Dibromo-3-chloropropane	<1
10061-02-6	trans-1,3-Dichloropropene	<1	120-82-1	1,2,4-Trichlorobenzene	<1
79-00-5	1,1,2-Trichloroethane	<1	91-20-3	Naphthalene	<1
108-88-3	Toluene	<1	87-61-6	1,2,3-Trichlorobenzene	<1
142-28-9	1,3-Dichloropropane	<1	87-68-3	Hexachlorobutadiene	<1
124-48-1	Dibromochloromethane	<1			

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0006 BH1 3.5m
Client / Sample matrix - Irish Geotechnical Services Ltd/Water
Units - µg/l

Compound	RetentionTime min	Concentration µg/l
C11-C13 hydrocarbon fraction	8.00-24.00	4933880

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0007 WS1 0.5m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 00:18
Instrument Name - Instrumen

CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1
74-87-3	Chloromethane	<1
75-01-4	Vinyl Chloride	<1
74-83-9	Bromomethane	<1
75-00-3	Chloroethane	<1
75-69-4	Trichlorofluoromethane	<1
156-60-5	trans-1,2-Dichloroethene	<1
75-09-2	Dichloromethane	<1
75-15-0	Carbon disulphide	<1
75-35-4	1,1-Dichloroethene	<1
75-34-3	1,1-Dichloroethane	<1
1634-04-4	tert-butyl methyl ether	<1
156-59-2	cis-1,2-Dichloroethene	<1
74-97-5	Bromochloromethane	<1
67-66-3	Chloroform	<1
594-20-7	2,2-Dichloropropane	<1
107-06-2	1,2-Dichloroethane	<1
71-55-6	1,1,1-Trichloroethane	<1
563-58-6	1,1-Dichloropropene	<1
71-43-2	Benzene	<1
56-23-5	Carbontetrachloride	<1
74-95-3	Dibromomethane	<1
78-87-5	1,2-Dichloropropane	<1
75-27-4	Bromodichloromethane	<1
79-01-6	Trichloroethene	<1
10061-01-5	cis-1,3-Dichloropropene	<1
10061-02-6	trans-1,3-Dichloropropene	<1
79-00-5	1,1,2-Trichloroethane	<1
108-88-3	Toluene	<1
142-28-9	1,3-Dichloropropane	<1
124-48-1	Dibromochloromethane	<1

CAS No	Compound	Conc.
106-93-4	1,2-Dibromoethane	<1
127-18-4	Tetrachloroethene	<1
630-20-6	1,1,1,2-Tetrachloroethane	<1
108-90-7	Chlorobenzene	<1
100-41-4	Ethylbenzene	<1
108-38-3*	p/m-Xylene	<1
75-25-2	Bromoform	<1
100-42-5	Styrene	<1
79-34-5	1,1,2,2-Tetrachloroethane	<1
95-47-6	o-Xylene	<1
96-18-4	1,2,3-Trichloropropane	<1
98-82-8	Isopropylbenzene	<1
108-86-1	Bromobenzene	<1
95-49-8	2-Chlorotoluene	<1
103-65-1	Propylbenzene	<1
106-43-4	4-Chlorotoluene	<1
95-63-6	1,2,4-Trimethylbenzene	<1
99-87-6	4-Isopropyltoluene	<1
108-67-8	1,3,5-Trimethylbenzene	<1
541-73-1	1,3-Dichlorobenzene	<1
106-46-7	1,4-Dichlorobenzene	<1
135-98-8	sec-Butylbenzene	<1
98-06-6	tert-Butylbenzene	<1
95-50-1	1,2-Dichlorobenzene	<1
104-51-8	n-Butylbenzene	<1
96-12-8	1,2-Dibromo-3-chloropropane	<1
120-82-1	1,2,4-Trichlorobenzene	<1
91-20-3	Naphthalene	<1
87-61-6	1,2,3-Trichlorobenzene	<1
87-68-3	Hexachlorobutadiene	<1

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0007 WS1 0.5m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
no compounds detected		<1

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0009 WS1 2.5m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 00:53
Instrument Name - Instrumen

CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1
74-87-3	Chloromethane	<1
75-01-4	Vinyl Chloride	<1
74-83-9	Bromomethane	<1
75-00-3	Chloroethane	<1
75-69-4	Trichlorofluoromethane	<1
156-60-5	trans-1,2-Dichloroethene	<1
75-09-2	Dichloromethane	<1
75-15-0	Carbon disulphide	<1
75-35-4	1,1-Dichloroethene	<1
75-34-3	1,1-Dichloroethane	<1
1634-04-4	tert-butyl methyl ether	<1
156-59-2	cis-1,2-Dichloroethene	<1
74-97-5	Bromochloromethane	<1
67-66-3	Chloroform	<1
594-20-7	2,2-Dichloropropane	<1
107-06-2	1,2-Dichloroethane	<1
71-55-6	1,1,1-Trichloroethane	<1
563-58-6	1,1-Dichloropropene	<1
71-43-2	Benzene	<1
56-23-5	Carbontetrachloride	<1
74-95-3	Dibromomethane	<1
78-87-5	1,2-Dichloropropane	<1
75-27-4	Bromodichloromethane	<1
79-01-6	Trichloroethene	<1
10061-01-5	cis-1,3-Dichloropropene	<1
10061-02-6	trans-1,3-Dichloropropene	<1
79-00-5	1,1,2-Trichloroethane	<1
108-88-3	Toluene	<1
142-28-9	1,3-Dichloropropane	<1
124-48-1	Dibromochloromethane	<1

CAS No	Compound	Conc.
106-93-4	1,2-Dibromoethane	<1
127-18-4	Tetrachloroethene	<1
630-20-6	1,1,1,2-Tetrachloroethane	<1
108-90-7	Chlorobenzene	<1
100-41-4	Ethylbenzene	<1
108-38-3*	p/m-Xylene	<1
75-25-2	Bromoform	<1
100-42-5	Styrene	<1
79-34-5	1,1,2,2-Tetrachloroethane	<1
95-47-6	o-Xylene	<1
96-18-4	1,2,3-Trichloropropane	<1
98-82-8	Isopropylbenzene	<1
108-86-1	Bromobenzene	<1
95-49-8	2-Chlorotoluene	<1
103-65-1	Propylbenzene	<1
106-43-4	4-Chlorotoluene	<1
95-63-6	1,2,4-Trimethylbenzene	<1
99-87-6	4-Isopropyltoluene	<1
108-67-8	1,3,5-Trimethylbenzene	<1
541-73-1	1,3-Dichlorobenzene	<1
106-46-7	1,4-Dichlorobenzene	<1
135-98-8	sec-Butylbenzene	<1
98-06-6	tert-Butylbenzene	<1
95-50-1	1,2-Dichlorobenzene	<1
104-51-8	n-Butylbenzene	<1
96-12-8	1,2-Dibromo-3-chloropropane	<1
120-82-1	1,2,4-Trichlorobenzene	<1
91-20-3	Naphthalene	<1
87-61-6	1,2,3-Trichlorobenzene	<1
87-68-3	Hexachlorobutadiene	<1

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0009 WS1 2.5m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
no compounds detected		<1

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0010 WS1 3.5m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 1:28
Instrument Name - Instrumen

CAS No	Compound	Conc.	CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1	106-93-4	1,2-Dibromoethane	<1
74-87-3	Chloromethane	<1	127-18-4	Tetrachloroethene	<1
75-01-4	Vinyl Chloride	<1	630-20-6	1,1,1,2-Tetrachloroethane	<1
74-83-9	Bromomethane	<1	108-90-7	Chlorobenzene	<1
75-00-3	Chloroethane	<1	100-41-4	Ethylbenzene	<1
75-69-4	Trichlorofluoromethane	<1	108-38-3*	p/m-Xylene	<1
156-60-5	trans-1,2-Dichloroethene	<1	75-25-2	Bromoform	<1
75-09-2	Dichloromethane	<1	100-42-5	Styrene	<1
75-15-0	Carbon disulphide	<1	79-34-5	1,1,2,2-Tetrachloroethane	<1
75-35-4	1,1-Dichloroethene	<1	95-47-6	o-Xylene	<1
75-34-3	1,1-Dichloroethane	<1	96-18-4	1,2,3-Trichloropropane	<1
1634-04-4	tert-butyl methyl ether	<1	98-82-8	Isopropylbenzene	<1
156-59-2	cis-1,2-Dichloroethene	<1	108-86-1	Bromobenzene	<1
74-97-5	Bromochloromethane	<1	95-49-8	2-Chlorotoluene	<1
67-66-3	Chloroform	<1	103-65-1	Propylbenzene	<1
594-20-7	2,2-Dichloropropane	<1	106-43-4	4-Chlorotoluene	<1
107-06-2	1,2-Dichloroethane	<1	95-63-6	1,2,4-Trimethylbenzene	<1
71-55-6	1,1,1-Trichloroethane	<1	99-87-6	4-Isopropyltoluene	<1
563-58-6	1,1-Dichloropropene	<1	108-67-8	1,3,5-Trimethylbenzene	<1
71-43-2	Benzene	<1	541-73-1	1,3-Dichlorobenzene	<1
56-23-5	Carbontetrachloride	<1	106-46-7	1,4-Dichlorobenzene	<1
74-95-3	Dibromomethane	<1	135-98-8	sec-Butylbenzene	<1
78-87-5	1,2-Dichloropropane	<1	98-06-6	tert-Butylbenzene	<1
75-27-4	Bromodichloromethane	<1	95-50-1	1,2-Dichlorobenzene	<1
79-01-6	Trichloroethene	<1	104-51-8	n-Butylbenzene	<1
10061-01-5	cis-1,3-Dichloropropene	<1	96-12-8	1,2-Dibromo-3-chloropropane	<1
10061-02-6	trans-1,3-Dichloropropene	<1	120-82-1	1,2,4-Trichlorobenzene	<1
79-00-5	1,1,2-Trichloroethane	<1	91-20-3	Naphthalene	<1
108-88-3	Toluene	<1	87-61-6	1,2,3-Trichlorobenzene	<1
142-28-9	1,3-Dichloropropane	<1	87-68-3	Hexachlorobutadiene	<1
124-48-1	Dibromochloromethane	<1			

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0010 WS1 3.5m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
no compounds detected		<1

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0011 WS2 0.5-1.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 2:03
Instrument Name - Instrumen

CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1
74-87-3	Chloromethane	<1
75-01-4	Vinyl Chloride	<1
74-83-9	Bromomethane	<1
75-00-3	Chloroethane	<1
75-69-4	Trichlorofluoromethane	<1
156-60-5	trans-1,2-Dichloroethene	<1
75-09-2	Dichloromethane	<1
75-15-0	Carbon disulphide	<1
75-35-4	1,1-Dichloroethene	<1
75-34-3	1,1-Dichloroethane	<1
1634-04-4	tert-butyl methyl ether	<1
156-59-2	cis-1,2-Dichloroethene	<1
74-97-5	Bromochloromethane	<1
67-66-3	Chloroform	<1
594-20-7	2,2-Dichloropropane	<1
107-06-2	1,2-Dichloroethane	<1
71-55-6	1,1,1-Trichloroethane	<1
563-58-6	1,1-Dichloropropene	<1
71-43-2	Benzene	8
56-23-5	Carbontetrachloride	<1
74-95-3	Dibromomethane	<1
78-87-5	1,2-Dichloropropane	<1
75-27-4	Bromodichloromethane	<1
79-01-6	Trichloroethene	<1
10061-01-5	cis-1,3-Dichloropropene	<1
10061-02-6	trans-1,3-Dichloropropene	<1
79-00-5	1,1,2-Trichloroethane	<1
108-88-3	Toluene	4
142-28-9	1,3-Dichloropropane	<1
124-48-1	Dibromochloromethane	<1

CAS No	Compound	Conc.
106-93-4	1,2-Dibromoethane	<1
127-18-4	Tetrachloroethene	<1
630-20-6	1,1,1,2-Tetrachloroethane	<1
108-90-7	Chlorobenzene	<1
100-41-4	Ethylbenzene	<1
108-38-3*	p/m-Xylene	5
75-25-2	Bromoform	<1
100-42-5	Styrene	<1
79-34-5	1,1,2,2-Tetrachloroethane	<1
95-47-6	o-Xylene	<1
96-18-4	1,2,3-Trichloropropane	<1
98-82-8	Isopropylbenzene	<1
108-86-1	Bromobenzene	<1
95-49-8	2-Chlorotoluene	<1
103-65-1	Propylbenzene	<1
106-43-4	4-Chlorotoluene	<1
95-63-6	1,2,4-Trimethylbenzene	3
99-87-6	4-Isopropyltoluene	<1
108-67-8	1,3,5-Trimethylbenzene	5
541-73-1	1,3-Dichlorobenzene	<1
106-46-7	1,4-Dichlorobenzene	<1
135-98-8	sec-Butylbenzene	<1
98-06-6	tert-Butylbenzene	<1
95-50-1	1,2-Dichlorobenzene	<1
104-51-8	n-Butylbenzene	<1
96-12-8	1,2-Dibromo-3-chloropropane	<1
120-82-1	1,2,4-Trichlorobenzene	<1
91-20-3	Naphthalene	<1
87-61-6	1,2,3-Trichlorobenzene	<1
87-68-3	Hexachlorobutadiene	<1

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0011 WS2 0.5-1.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
C11-C13 hydrocarbon fraction*	12.50-24.00	71990

*includes identified peaks

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0013 WS2 1.5-2.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 2:39
Instrument Name - Instrumen

CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1
74-87-3	Chloromethane	<1
75-01-4	Vinyl Chloride	<1
74-83-9	Bromomethane	<1
75-00-3	Chloroethane	<1
75-69-4	Trichlorofluoromethane	<1
156-60-5	trans-1,2-Dichloroethene	<1
75-09-2	Dichloromethane	<1
75-15-0	Carbon disulphide	<1
75-35-4	1,1-Dichloroethene	<1
75-34-3	1,1-Dichloroethane	<1
1634-04-4	tert-butyl methyl ether	<1
156-59-2	cis-1,2-Dichloroethene	<1
74-97-5	Bromochloromethane	<1
67-66-3	Chloroform	<1
594-20-7	2,2-Dichloropropane	<1
107-06-2	1,2-Dichloroethane	<1
71-55-6	1,1,1-Trichloroethane	<1
563-58-6	1,1-Dichloropropene	<1
71-43-2	Benzene	<1
56-23-5	Carbontetrachloride	<1
74-95-3	Dibromomethane	<1
78-87-5	1,2-Dichloropropane	<1
75-27-4	Bromodichloromethane	<1
79-01-6	Trichloroethene	<1
10061-01-5	cis-1,3-Dichloropropene	<1
10061-02-6	trans-1,3-Dichloropropene	<1
79-00-5	1,1,2-Trichloroethane	<1
108-88-3	Toluene	<1
142-28-9	1,3-Dichloropropane	<1
124-48-1	Dibromochloromethane	<1

CAS No	Compound	Conc.
106-93-4	1,2-Dibromoethane	<1
127-18-4	Tetrachloroethene	<1
630-20-6	1,1,1,2-Tetrachloroethane	<1
108-90-7	Chlorobenzene	<1
100-41-4	Ethylbenzene	<1
108-38-3*	p/m-Xylene	<1
75-25-2	Bromoform	<1
100-42-5	Styrene	<1
79-34-5	1,1,2,2-Tetrachloroethane	<1
95-47-6	o-Xylene	<1
96-18-4	1,2,3-Trichloropropane	<1
98-82-8	Isopropylbenzene	<1
108-86-1	Bromobenzene	<1
95-49-8	2-Chlorotoluene	<1
103-65-1	Propylbenzene	<1
106-43-4	4-Chlorotoluene	<1
95-63-6	1,2,4-Trimethylbenzene	<1
99-87-6	4-Isopropyltoluene	<1
108-67-8	1,3,5-Trimethylbenzene	<1
541-73-1	1,3-Dichlorobenzene	<1
106-46-7	1,4-Dichlorobenzene	<1
135-98-8	sec-Butylbenzene	<1
98-06-6	tert-Butylbenzene	<1
95-50-1	1,2-Dichlorobenzene	<1
104-51-8	n-Butylbenzene	<1
96-12-8	1,2-Dibromo-3-chloropropane	<1
120-82-1	1,2,4-Trichlorobenzene	<1
91-20-3	Naphthalene	<1
87-61-6	1,2,3-Trichlorobenzene	<1
87-68-3	Hexachlorobutadiene	<1

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0013 WS2 1.5-2.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
no compounds detected		<1

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0015 WS2 4.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 3:14
Instrument Name - Instrumen

CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1
74-87-3	Chloromethane	<1
75-01-4	Vinyl Chloride	<1
74-83-9	Bromomethane	<1
75-00-3	Chloroethane	<1
75-69-4	Trichlorofluoromethane	<1
156-60-5	trans-1,2-Dichloroethene	<1
75-09-2	Dichloromethane	<1
75-15-0	Carbon disulphide	<1
75-35-4	1,1-Dichloroethene	<1
75-34-3	1,1-Dichloroethane	<1
1634-04-4	tert-butyl methyl ether	<1
156-59-2	cis-1,2-Dichloroethene	<1
74-97-5	Bromochloromethane	<1
67-66-3	Chloroform	<1
594-20-7	2,2-Dichloropropane	<1
107-06-2	1,2-Dichloroethane	<1
71-55-6	1,1,1-Trichloroethane	<1
563-58-6	1,1-Dichloropropene	<1
71-43-2	Benzene	13
56-23-5	Carbontetrachloride	<1
74-95-3	Dibromomethane	<1
78-87-5	1,2-Dichloropropane	<1
75-27-4	Bromodichloromethane	<1
79-01-6	Trichloroethene	<1
10061-01-5	cis-1,3-Dichloropropene	<1
10061-02-6	trans-1,3-Dichloropropene	<1
79-00-5	1,1,2-Trichloroethane	<1
108-88-3	Toluene	11
142-28-9	1,3-Dichloropropane	<1
124-48-1	Dibromochloromethane	<1

CAS No	Compound	Conc.
106-93-4	1,2-Dibromoethane	<1
127-18-4	Tetrachloroethene	<1
630-20-6	1,1,1,2-Tetrachloroethane	<1
108-90-7	Chlorobenzene	<1
100-41-4	Ethylbenzene	<1
108-38-3*	p/m-Xylene	<1
75-25-2	Bromoform	<1
100-42-5	Styrene	<1
79-34-5	1,1,2,2-Tetrachloroethane	<1
95-47-6	o-Xylene	<1
96-18-4	1,2,3-Trichloropropane	<1
98-82-8	Isopropylbenzene	<1
108-86-1	Bromobenzene	<1
95-49-8	2-Chlorotoluene	<1
103-65-1	Propylbenzene	<1
106-43-4	4-Chlorotoluene	<1
95-63-6	1,2,4-Trimethylbenzene	<1
99-87-6	4-Isopropyltoluene	<1
108-67-8	1,3,5-Trimethylbenzene	<1
541-73-1	1,3-Dichlorobenzene	<1
106-46-7	1,4-Dichlorobenzene	<1
135-98-8	sec-Butylbenzene	<1
98-06-6	tert-Butylbenzene	<1
95-50-1	1,2-Dichlorobenzene	<1
104-51-8	n-Butylbenzene	<1
96-12-8	1,2-Dibromo-3-chloropropane	<1
120-82-1	1,2,4-Trichlorobenzene	<1
91-20-3	Naphthalene	<1
87-61-6	1,2,3-Trichlorobenzene	<1
87-68-3	Hexachlorobutadiene	<1

N.B. * also CAS No. 106-42-3

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Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0015 WS2 4.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
C11-C13 hydrocarbon fraction	15.50-24.00	37590

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0016 WS3 0.5m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 3:49
Instrument Name - Instrumen

CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1
74-87-3	Chloromethane	<1
75-01-4	Vinyl Chloride	<1
74-83-9	Bromomethane	<1
75-00-3	Chloroethane	<1
75-69-4	Trichlorofluoromethane	<1
156-60-5	trans-1,2-Dichloroethene	<1
75-09-2	Dichloromethane	<1
75-15-0	Carbon disulphide	<1
75-35-4	1,1-Dichloroethene	<1
75-34-3	1,1-Dichloroethane	<1
1634-04-4	tert-butyl methyl ether	<1
156-59-2	cis-1,2-Dichloroethene	<1
74-97-5	Bromochloromethane	<1
67-66-3	Chloroform	<1
594-20-7	2,2-Dichloropropane	<1
107-06-2	1,2-Dichloroethane	<1
71-55-6	1,1,1-Trichloroethane	<1
563-58-6	1,1-Dichloropropene	<1
71-43-2	Benzene	<1
56-23-5	Carbontetrachloride	<1
74-95-3	Dibromomethane	<1
78-87-5	1,2-Dichloropropane	<1
75-27-4	Bromodichloromethane	<1
79-01-6	Trichloroethene	<1
10061-01-5	cis-1,3-Dichloropropene	<1
10061-02-6	trans-1,3-Dichloropropene	<1
79-00-5	1,1,2-Trichloroethane	<1
108-88-3	Toluene	<1
142-28-9	1,3-Dichloropropane	<1
124-48-1	Dibromochloromethane	<1

CAS No	Compound	Conc.
106-93-4	1,2-Dibromoethane	<1
127-18-4	Tetrachloroethene	<1
630-20-6	1,1,1,2-Tetrachloroethane	<1
108-90-7	Chlorobenzene	<1
100-41-4	Ethylbenzene	<1
108-38-3*	p/m-Xylene	<1
75-25-2	Bromoform	<1
100-42-5	Styrene	<1
79-34-5	1,1,2,2-Tetrachloroethane	<1
95-47-6	o-Xylene	<1
96-18-4	1,2,3-Trichloropropane	<1
98-82-8	Isopropylbenzene	<1
108-86-1	Bromobenzene	<1
95-49-8	2-Chlorotoluene	<1
103-65-1	Propylbenzene	<1
106-43-4	4-Chlorotoluene	<1
95-63-6	1,2,4-Trimethylbenzene	<1
99-87-6	4-Isopropyltoluene	<1
108-67-8	1,3,5-Trimethylbenzene	<1
541-73-1	1,3-Dichlorobenzene	<1
106-46-7	1,4-Dichlorobenzene	<1
135-98-8	sec-Butylbenzene	<1
98-06-6	tert-Butylbenzene	<1
95-50-1	1,2-Dichlorobenzene	<1
104-51-8	n-Butylbenzene	<1
96-12-8	1,2-Dibromo-3-chloropropane	<1
120-82-1	1,2,4-Trichlorobenzene	<1
91-20-3	Naphthalene	<1
87-61-6	1,2,3-Trichlorobenzene	<1
87-68-3	Hexachlorobutadiene	<1

N.B. * also CAS No. 106-42-3

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Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0016 WS3 0.5m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
no compounds detected		<1

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0019 WS4 1.5-2.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 4:24
Instrument Name - Instrumen

CAS No	Compound	Conc.	CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1	106-93-4	1,2-Dibromoethane	<1
74-87-3	Chloromethane	<1	127-18-4	Tetrachloroethene	<1
75-01-4	Vinyl Chloride	<1	630-20-6	1,1,1,2-Tetrachloroethane	<1
74-83-9	Bromomethane	<1	108-90-7	Chlorobenzene	<1
75-00-3	Chloroethane	<1	100-41-4	Ethylbenzene	<1
75-69-4	Trichlorofluoromethane	<1	108-38-3*	p/m-Xylene	<1
156-60-5	trans-1,2-Dichloroethene	<1	75-25-2	Bromoform	<1
75-09-2	Dichloromethane	<1	100-42-5	Styrene	<1
75-15-0	Carbon disulphide	<1	79-34-5	1,1,2,2-Tetrachloroethane	<1
75-35-4	1,1-Dichloroethene	<1	95-47-6	o-Xylene	<1
75-34-3	1,1-Dichloroethane	<1	96-18-4	1,2,3-Trichloropropane	<1
1634-04-4	tert-butyl methyl ether	<1	98-82-8	Isopropylbenzene	<1
156-59-2	cis-1,2-Dichloroethene	<1	108-86-1	Bromobenzene	<1
74-97-5	Bromochloromethane	<1	95-49-8	2-Chlorotoluene	<1
67-66-3	Chloroform	<1	103-65-1	Propylbenzene	<1
594-20-7	2,2-Dichloropropane	<1	106-43-4	4-Chlorotoluene	<1
107-06-2	1,2-Dichloroethane	<1	95-63-6	1,2,4-Trimethylbenzene	<1
71-55-6	1,1,1-Trichloroethane	<1	99-87-6	4-Isopropyltoluene	<1
563-58-6	1,1-Dichloropropene	<1	108-67-8	1,3,5-Trimethylbenzene	<1
71-43-2	Benzene	<1	541-73-1	1,3-Dichlorobenzene	<1
56-23-5	Carbontetrachloride	<1	106-46-7	1,4-Dichlorobenzene	<1
74-95-3	Dibromomethane	<1	135-98-8	sec-Butylbenzene	<1
78-87-5	1,2-Dichloropropane	<1	98-06-6	tert-Butylbenzene	<1
75-27-4	Bromodichloromethane	<1	95-50-1	1,2-Dichlorobenzene	<1
79-01-6	Trichloroethene	<1	104-51-8	n-Butylbenzene	<1
10061-01-5	cis-1,3-Dichloropropene	<1	96-12-8	1,2-Dibromo-3-chloropropane	<1
10061-02-6	trans-1,3-Dichloropropene	<1	120-82-1	1,2,4-Trichlorobenzene	<1
79-00-5	1,1,2-Trichloroethane	<1	91-20-3	Naphthalene	<1
108-88-3	Toluene	<1	87-61-6	1,2,3-Trichlorobenzene	<1
142-28-9	1,3-Dichloropropane	<1	87-68-3	Hexachlorobutadiene	<1
124-48-1	Dibromochloromethane	<1			

N.B. * also CAS No. 106-42-3

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Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0019 WS4 1.5-2.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
no compounds detected		<1

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0023 WS5 2.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 9:06
Instrument Name - Instrumen

CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1
74-87-3	Chloromethane	<1
75-01-4	Vinyl Chloride	<1
74-83-9	Bromomethane	<1
75-00-3	Chloroethane	<1
75-69-4	Trichlorofluoromethane	<1
156-60-5	trans-1,2-Dichloroethene	<1
75-09-2	Dichloromethane	<1
75-15-0	Carbon disulphide	<1
75-35-4	1,1-Dichloroethene	<1
75-34-3	1,1-Dichloroethane	<1
1634-04-4	tert-butyl methyl ether	<1
156-59-2	cis-1,2-Dichloroethene	<1
74-97-5	Bromochloromethane	<1
67-66-3	Chloroform	<1
594-20-7	2,2-Dichloropropane	<1
107-06-2	1,2-Dichloroethane	<1
71-55-6	1,1,1-Trichloroethane	<1
563-58-6	1,1-Dichloropropene	<1
71-43-2	Benzene	7
56-23-5	Carbontetrachloride	<1
74-95-3	Dibromomethane	<1
78-87-5	1,2-Dichloropropane	<1
75-27-4	Bromodichloromethane	<1
79-01-6	Trichloroethene	<1
10061-01-5	cis-1,3-Dichloropropene	<1
10061-02-6	trans-1,3-Dichloropropene	<1
79-00-5	1,1,2-Trichloroethane	<1
108-88-3	Toluene	8
142-28-9	1,3-Dichloropropane	<1
124-48-1	Dibromochloromethane	<1

CAS No	Compound	Conc.
106-93-4	1,2-Dibromoethane	<1
127-18-4	Tetrachloroethene	<1
630-20-6	1,1,1,2-Tetrachloroethane	<1
108-90-7	Chlorobenzene	<1
100-41-4	Ethylbenzene	<1
108-38-3*	p/m-Xylene	<1
75-25-2	Bromoform	<1
100-42-5	Styrene	<1
79-34-5	1,1,2,2-Tetrachloroethane	<1
95-47-6	o-Xylene	<1
96-18-4	1,2,3-Trichloropropane	<1
98-82-8	Isopropylbenzene	<1
108-86-1	Bromobenzene	<1
95-49-8	2-Chlorotoluene	<1
103-65-1	Propylbenzene	<1
106-43-4	4-Chlorotoluene	<1
95-63-6	1,2,4-Trimethylbenzene	<1
99-87-6	4-Isopropyltoluene	<1
108-67-8	1,3,5-Trimethylbenzene	<1
541-73-1	1,3-Dichlorobenzene	<1
106-46-7	1,4-Dichlorobenzene	<1
135-98-8	sec-Butylbenzene	<1
98-06-6	tert-Butylbenzene	<1
95-50-1	1,2-Dichlorobenzene	<1
104-51-8	n-Butylbenzene	<1
96-12-8	1,2-Dibromo-3-chloropropane	<1
120-82-1	1,2,4-Trichlorobenzene	<1
91-20-3	Naphthalene	<1
87-61-6	1,2,3-Trichlorobenzene	<1
87-68-3	Hexachlorobutadiene	<1

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0023 WS5 2.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
no compounds detected		<1

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0028 WS7 1.0-1.5m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 8:31
Instrument Name - Instrumen

CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1
74-87-3	Chloromethane	<1
75-01-4	Vinyl Chloride	<1
74-83-9	Bromomethane	<1
75-00-3	Chloroethane	<1
75-69-4	Trichlorofluoromethane	<1
156-60-5	trans-1,2-Dichloroethene	<1
75-09-2	Dichloromethane	<1
75-15-0	Carbon disulphide	<1
75-35-4	1,1-Dichloroethene	<1
75-34-3	1,1-Dichloroethane	<1
1634-04-4	tert-butyl methyl ether	<1
156-59-2	cis-1,2-Dichloroethene	<1
74-97-5	Bromochloromethane	<1
67-66-3	Chloroform	<1
594-20-7	2,2-Dichloropropane	<1
107-06-2	1,2-Dichloroethane	<1
71-55-6	1,1,1-Trichloroethane	<1
563-58-6	1,1-Dichloropropene	<1
71-43-2	Benzene	13
56-23-5	Carbontetrachloride	<1
74-95-3	Dibromomethane	<1
78-87-5	1,2-Dichloropropane	<1
75-27-4	Bromodichloromethane	<1
79-01-6	Trichloroethene	<1
10061-01-5	cis-1,3-Dichloropropene	<1
10061-02-6	trans-1,3-Dichloropropene	<1
79-00-5	1,1,2-Trichloroethane	<1
108-88-3	Toluene	10
142-28-9	1,3-Dichloropropane	<1
124-48-1	Dibromochloromethane	<1

CAS No	Compound	Conc.
106-93-4	1,2-Dibromoethane	<1
127-18-4	Tetrachloroethene	<1
630-20-6	1,1,1,2-Tetrachloroethane	<1
108-90-7	Chlorobenzene	<1
100-41-4	Ethylbenzene	<1
108-38-3*	p/m-Xylene	4
75-25-2	Bromoform	<1
100-42-5	Styrene	<1
79-34-5	1,1,2,2-Tetrachloroethane	<1
95-47-6	o-Xylene	5
96-18-4	1,2,3-Trichloropropane	<1
98-82-8	Isopropylbenzene	<1
108-86-1	Bromobenzene	<1
95-49-8	2-Chlorotoluene	<1
103-65-1	Propylbenzene	<1
106-43-4	4-Chlorotoluene	<1
95-63-6	1,2,4-Trimethylbenzene	<1
99-87-6	4-Isopropyltoluene	<1
108-67-8	1,3,5-Trimethylbenzene	<1
541-73-1	1,3-Dichlorobenzene	<1
106-46-7	1,4-Dichlorobenzene	<1
135-98-8	sec-Butylbenzene	<1
98-06-6	tert-Butylbenzene	<1
95-50-1	1,2-Dichlorobenzene	<1
104-51-8	n-Butylbenzene	<1
96-12-8	1,2-Dibromo-3-chloropropane	<1
120-82-1	1,2,4-Trichlorobenzene	<1
91-20-3	Naphthalene	<1
87-61-6	1,2,3-Trichlorobenzene	<1
87-68-3	Hexachlorobutadiene	<1

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0028 WS7 1.0-1.5m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	Retention Time min	Concentration µg/kg
no compounds detected		<1

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0032 WS10 0.5-1.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 6:45
Instrument Name - Instrumen

CAS No	Compound	Conc.	CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1	106-93-4	1,2-Dibromoethane	<1
74-87-3	Chloromethane	<1	127-18-4	Tetrachloroethene	<1
75-01-4	Vinyl Chloride	<1	630-20-6	1,1,1,2-Tetrachloroethane	<1
74-83-9	Bromomethane	<1	108-90-7	Chlorobenzene	<1
75-00-3	Chloroethane	<1	100-41-4	Ethylbenzene	<1
75-69-4	Trichlorofluoromethane	<1	108-38-3*	p/m-Xylene	5
156-60-5	trans-1,2-Dichloroethene	<1	75-25-2	Bromoform	<1
75-09-2	Dichloromethane	<1	100-42-5	Styrene	<1
75-15-0	Carbon disulphide	<1	79-34-5	1,1,2,2-Tetrachloroethane	<1
75-35-4	1,1-Dichloroethene	<1	95-47-6	o-Xylene	<1
75-34-3	1,1-Dichloroethane	<1	96-18-4	1,2,3-Trichloropropane	<1
1634-04-4	tert-butyl methyl ether	<1	98-82-8	Isopropylbenzene	<1
156-59-2	cis-1,2-Dichloroethene	<1	108-86-1	Bromobenzene	<1
74-97-5	Bromochloromethane	<1	95-49-8	2-Chlorotoluene	<1
67-66-3	Chloroform	<1	103-65-1	Propylbenzene	<1
594-20-7	2,2-Dichloropropane	<1	106-43-4	4-Chlorotoluene	<1
107-06-2	1,2-Dichloroethane	<1	95-63-6	1,2,4-Trimethylbenzene	<1
71-55-6	1,1,1-Trichloroethane	<1	99-87-6	4-Isopropyltoluene	<1
563-58-6	1,1-Dichloropropene	<1	108-67-8	1,3,5-Trimethylbenzene	<1
71-43-2	Benzene	8	541-73-1	1,3-Dichlorobenzene	<1
56-23-5	Carbontetrachloride	<1	106-46-7	1,4-Dichlorobenzene	<1
74-95-3	Dibromomethane	<1	135-98-8	sec-Butylbenzene	<1
78-87-5	1,2-Dichloropropane	<1	98-06-6	tert-Butylbenzene	<1
75-27-4	Bromodichloromethane	<1	95-50-1	1,2-Dichlorobenzene	<1
79-01-6	Trichloroethene	<1	104-51-8	n-Butylbenzene	<1
10061-01-5	cis-1,3-Dichloropropene	<1	96-12-8	1,2-Dibromo-3-chloropropane	<1
10061-02-6	trans-1,3-Dichloropropene	<1	120-82-1	1,2,4-Trichlorobenzene	<1
79-00-5	1,1,2-Trichloroethane	<1	91-20-3	Naphthalene	<1
108-88-3	Toluene	8	87-61-6	1,2,3-Trichlorobenzene	<1
142-28-9	1,3-Dichloropropane	<1	87-68-3	Hexachlorobutadiene	<1
124-48-1	Dibromochloromethane	<1			

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0032 WS10 0.5-1.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
no compounds detected		<1

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0038 WS11 3.5-4.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 10:52
Instrument Name - Instrumen

CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1
74-87-3	Chloromethane	<1
75-01-4	Vinyl Chloride	<1
74-83-9	Bromomethane	<1
75-00-3	Chloroethane	<1
75-69-4	Trichlorofluoromethane	<1
156-60-5	trans-1,2-Dichloroethene	<1
75-09-2	Dichloromethane	<1
75-15-0	Carbon disulphide	<1
75-35-4	1,1-Dichloroethene	<1
75-34-3	1,1-Dichloroethane	<1
1634-04-4	tert-butyl methyl ether	<1
156-59-2	cis-1,2-Dichloroethene	<1
74-97-5	Bromochloromethane	<1
67-66-3	Chloroform	<1
594-20-7	2,2-Dichloropropane	<1
107-06-2	1,2-Dichloroethane	<1
71-55-6	1,1,1-Trichloroethane	<1
563-58-6	1,1-Dichloropropene	<1
71-43-2	Benzene	18
56-23-5	Carbontetrachloride	<1
74-95-3	Dibromomethane	<1
78-87-5	1,2-Dichloropropane	<1
75-27-4	Bromodichloromethane	<1
79-01-6	Trichloroethene	<1
10061-01-5	cis-1,3-Dichloropropene	<1
10061-02-6	trans-1,3-Dichloropropene	<1
79-00-5	1,1,2-Trichloroethane	<1
108-88-3	Toluene	27
142-28-9	1,3-Dichloropropane	<1
124-48-1	Dibromochloromethane	<1

CAS No	Compound	Conc.
106-93-4	1,2-Dibromoethane	<1
127-18-4	Tetrachloroethene	<1
630-20-6	1,1,1,2-Tetrachloroethane	<1
108-90-7	Chlorobenzene	<1
100-41-4	Ethylbenzene	3
108-38-3*	p/m-Xylene	24
75-25-2	Bromoform	<1
100-42-5	Styrene	<1
79-34-5	1,1,2,2-Tetrachloroethane	<1
95-47-6	o-Xylene	9
96-18-4	1,2,3-Trichloropropane	<1
98-82-8	Isopropylbenzene	<1
108-86-1	Bromobenzene	<1
95-49-8	2-Chlorotoluene	<1
103-65-1	Propylbenzene	<1
106-43-4	4-Chlorotoluene	<1
95-63-6	1,2,4-Trimethylbenzene	<1
99-87-6	4-Isopropyltoluene	<1
108-67-8	1,3,5-Trimethylbenzene	4
541-73-1	1,3-Dichlorobenzene	<1
106-46-7	1,4-Dichlorobenzene	<1
135-98-8	sec-Butylbenzene	<1
98-06-6	tert-Butylbenzene	<1
95-50-1	1,2-Dichlorobenzene	<1
104-51-8	n-Butylbenzene	<1
96-12-8	1,2-Dibromo-3-chloropropane	<1
120-82-1	1,2,4-Trichlorobenzene	<1
91-20-3	Naphthalene	<1
87-61-6	1,2,3-Trichlorobenzene	<1
87-68-3	Hexachlorobutadiene	<1

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0038 WS11 3.5-4.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
no compounds detected		<1

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0044 WS13 0.5-1.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 10:16
Instrument Name - Instrumen

CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1
74-87-3	Chloromethane	<1
75-01-4	Vinyl Chloride	<1
74-83-9	Bromomethane	<1
75-00-3	Chloroethane	<1
75-69-4	Trichlorofluoromethane	<1
156-60-5	trans-1,2-Dichloroethene	<1
75-09-2	Dichloromethane	<1
75-15-0	Carbon disulphide	<1
75-35-4	1,1-Dichloroethene	<1
75-34-3	1,1-Dichloroethane	<1
1634-04-4	tert-butyl methyl ether	<1
156-59-2	cis-1,2-Dichloroethene	<1
74-97-5	Bromochloromethane	<1
67-66-3	Chloroform	<1
594-20-7	2,2-Dichloropropane	<1
107-06-2	1,2-Dichloroethane	<1
71-55-6	1,1,1-Trichloroethane	<1
563-58-6	1,1-Dichloropropene	<1
71-43-2	Benzene	3
56-23-5	Carbontetrachloride	<1
74-95-3	Dibromomethane	<1
78-87-5	1,2-Dichloropropane	<1
75-27-4	Bromodichloromethane	<1
79-01-6	Trichloroethene	<1
10061-01-5	cis-1,3-Dichloropropene	<1
10061-02-6	trans-1,3-Dichloropropene	<1
79-00-5	1,1,2-Trichloroethane	<1
108-88-3	Toluene	4
142-28-9	1,3-Dichloropropane	<1
124-48-1	Dibromochloromethane	<1

CAS No	Compound	Conc.
106-93-4	1,2-Dibromoethane	<1
127-18-4	Tetrachloroethene	<1
630-20-6	1,1,1,2-Tetrachloroethane	<1
108-90-7	Chlorobenzene	<1
100-41-4	Ethylbenzene	<1
108-38-3*	p/m-Xylene	<1
75-25-2	Bromoform	<1
100-42-5	Styrene	<1
79-34-5	1,1,2,2-Tetrachloroethane	<1
95-47-6	o-Xylene	<1
96-18-4	1,2,3-Trichloropropane	<1
98-82-8	Isopropylbenzene	<1
108-86-1	Bromobenzene	<1
95-49-8	2-Chlorotoluene	<1
103-65-1	Propylbenzene	<1
106-43-4	4-Chlorotoluene	<1
95-63-6	1,2,4-Trimethylbenzene	<1
99-87-6	4-Isopropyltoluene	<1
108-67-8	1,3,5-Trimethylbenzene	<1
541-73-1	1,3-Dichlorobenzene	<1
106-46-7	1,4-Dichlorobenzene	<1
135-98-8	sec-Butylbenzene	<1
98-06-6	tert-Butylbenzene	<1
95-50-1	1,2-Dichlorobenzene	<1
104-51-8	n-Butylbenzene	<1
96-12-8	1,2-Dibromo-3-chloropropane	<1
120-82-1	1,2,4-Trichlorobenzene	<1
91-20-3	Naphthalene	<1
87-61-6	1,2,3-Trichlorobenzene	<1
87-68-3	Hexachlorobutadiene	<1

N.B. * also CAS No. 106-42-3

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Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0044 WS13 0.5-1.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
no compounds detected		<1

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0049 WS14 0.5-1.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 7:20
Instrument Name - Instrumen

CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1
74-87-3	Chloromethane	<1
75-01-4	Vinyl Chloride	<1
74-83-9	Bromomethane	<1
75-00-3	Chloroethane	<1
75-69-4	Trichlorofluoromethane	<1
156-60-5	trans-1,2-Dichloroethene	<1
75-09-2	Dichloromethane	<1
75-15-0	Carbon disulphide	<1
75-35-4	1,1-Dichloroethene	<1
75-34-3	1,1-Dichloroethane	<1
1634-04-4	tert-butyl methyl ether	<1
156-59-2	cis-1,2-Dichloroethene	<1
74-97-5	Bromochloromethane	<1
67-66-3	Chloroform	<1
594-20-7	2,2-Dichloropropane	<1
107-06-2	1,2-Dichloroethane	<1
71-55-6	1,1,1-Trichloroethane	<1
563-58-6	1,1-Dichloropropene	<1
71-43-2	Benzene	<1
56-23-5	Carbontetrachloride	<1
74-95-3	Dibromomethane	<1
78-87-5	1,2-Dichloropropane	<1
75-27-4	Bromodichloromethane	<1
79-01-6	Trichloroethene	<1
10061-01-5	cis-1,3-Dichloropropene	<1
10061-02-6	trans-1,3-Dichloropropene	<1
79-00-5	1,1,2-Trichloroethane	<1
108-88-3	Toluene	<1
142-28-9	1,3-Dichloropropane	<1
124-48-1	Dibromochloromethane	<1

CAS No	Compound	Conc.
106-93-4	1,2-Dibromoethane	<1
127-18-4	Tetrachloroethene	<1
630-20-6	1,1,1,2-Tetrachloroethane	<1
108-90-7	Chlorobenzene	<1
100-41-4	Ethylbenzene	<1
108-38-3*	p/m-Xylene	<1
75-25-2	Bromoform	<1
100-42-5	Styrene	<1
79-34-5	1,1,2,2-Tetrachloroethane	<1
95-47-6	o-Xylene	<1
96-18-4	1,2,3-Trichloropropane	<1
98-82-8	Isopropylbenzene	<1
108-86-1	Bromobenzene	<1
95-49-8	2-Chlorotoluene	<1
103-65-1	Propylbenzene	<1
106-43-4	4-Chlorotoluene	<1
95-63-6	1,2,4-Trimethylbenzene	<1
99-87-6	4-Isopropyltoluene	<1
108-67-8	1,3,5-Trimethylbenzene	<1
541-73-1	1,3-Dichlorobenzene	<1
106-46-7	1,4-Dichlorobenzene	<1
135-98-8	sec-Butylbenzene	<1
98-06-6	tert-Butylbenzene	<1
95-50-1	1,2-Dichlorobenzene	<1
104-51-8	n-Butylbenzene	<1
96-12-8	1,2-Dibromo-3-chloropropane	<1
120-82-1	1,2,4-Trichlorobenzene	<1
91-20-3	Naphthalene	<1
87-61-6	1,2,3-Trichlorobenzene	<1
87-68-3	Hexachlorobutadiene	<1

N.B. * also CAS No. 106-42-3

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Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0049 WS14 0.5-1.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
no compounds detected		<1

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0051 WS15 0.5-1.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 9:41
Instrument Name - Instrumen

CAS No	Compound	Conc.	CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1	106-93-4	1,2-Dibromoethane	<1
74-87-3	Chloromethane	<1	127-18-4	Tetrachloroethene	<1
75-01-4	Vinyl Chloride	<1	630-20-6	1,1,1,2-Tetrachloroethane	<1
74-83-9	Bromomethane	<1	108-90-7	Chlorobenzene	<1
75-00-3	Chloroethane	<1	100-41-4	Ethylbenzene	2
75-69-4	Trichlorofluoromethane	<1	108-38-3*	p/m-Xylene	10
156-60-5	trans-1,2-Dichloroethene	<1	75-25-2	Bromoform	<1
75-09-2	Dichloromethane	<1	100-42-5	Styrene	<1
75-15-0	Carbon disulphide	<1	79-34-5	1,1,2,2-Tetrachloroethane	<1
75-35-4	1,1-Dichloroethene	<1	95-47-6	o-Xylene	4
75-34-3	1,1-Dichloroethane	<1	96-18-4	1,2,3-Trichloropropane	<1
1634-04-4	tert-butyl methyl ether	<1	98-82-8	Isopropylbenzene	<1
156-59-2	cis-1,2-Dichloroethene	<1	108-86-1	Bromobenzene	<1
74-97-5	Bromochloromethane	<1	95-49-8	2-Chlorotoluene	<1
67-66-3	Chloroform	<1	103-65-1	Propylbenzene	<1
594-20-7	2,2-Dichloropropane	<1	106-43-4	4-Chlorotoluene	<1
107-06-2	1,2-Dichloroethane	<1	95-63-6	1,2,4-Trimethylbenzene	<1
71-55-6	1,1,1-Trichloroethane	<1	99-87-6	4-Isopropyltoluene	<1
563-58-6	1,1-Dichloropropene	<1	108-67-8	1,3,5-Trimethylbenzene	<1
71-43-2	Benzene	16	541-73-1	1,3-Dichlorobenzene	<1
56-23-5	Carbontetrachloride	<1	106-46-7	1,4-Dichlorobenzene	<1
74-95-3	Dibromomethane	<1	135-98-8	sec-Butylbenzene	<1
78-87-5	1,2-Dichloropropane	<1	98-06-6	tert-Butylbenzene	<1
75-27-4	Bromodichloromethane	<1	95-50-1	1,2-Dichlorobenzene	<1
79-01-6	Trichloroethene	<1	104-51-8	n-Butylbenzene	<1
10061-01-5	cis-1,3-Dichloropropene	<1	96-12-8	1,2-Dibromo-3-chloropropane	<1
10061-02-6	trans-1,3-Dichloropropene	<1	120-82-1	1,2,4-Trichlorobenzene	<1
79-00-5	1,1,2-Trichloroethane	<1	91-20-3	Naphthalene	<1
108-88-3	Toluene	16	87-61-6	1,2,3-Trichlorobenzene	<1
142-28-9	1,3-Dichloropropane	<1	87-68-3	Hexachlorobutadiene	<1
124-48-1	Dibromochloromethane	<1			

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0051 WS15 0.5-1.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
no compounds detected		<1

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0054 WS16 0.5-1.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 6:10
Instrument Name - Instrumen

CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1
74-87-3	Chloromethane	<1
75-01-4	Vinyl Chloride	<1
74-83-9	Bromomethane	<1
75-00-3	Chloroethane	<1
75-69-4	Trichlorofluoromethane	<1
156-60-5	trans-1,2-Dichloroethene	<1
75-09-2	Dichloromethane	<1
75-15-0	Carbon disulphide	<1
75-35-4	1,1-Dichloroethene	<1
75-34-3	1,1-Dichloroethane	<1
1634-04-4	tert-butyl methyl ether	<1
156-59-2	cis-1,2-Dichloroethene	<1
74-97-5	Bromochloromethane	<1
67-66-3	Chloroform	<1
594-20-7	2,2-Dichloropropane	<1
107-06-2	1,2-Dichloroethane	<1
71-55-6	1,1,1-Trichloroethane	<1
563-58-6	1,1-Dichloropropene	<1
71-43-2	Benzene	25
56-23-5	Carbontetrachloride	<1
74-95-3	Dibromomethane	<1
78-87-5	1,2-Dichloropropane	<1
75-27-4	Bromodichloromethane	<1
79-01-6	Trichloroethene	<1
10061-01-5	cis-1,3-Dichloropropene	<1
10061-02-6	trans-1,3-Dichloropropene	<1
79-00-5	1,1,2-Trichloroethane	<1
108-88-3	Toluene	22
142-28-9	1,3-Dichloropropane	<1
124-48-1	Dibromochloromethane	<1

CAS No	Compound	Conc.
106-93-4	1,2-Dibromoethane	<1
127-18-4	Tetrachloroethene	<1
630-20-6	1,1,1,2-Tetrachloroethane	<1
108-90-7	Chlorobenzene	<1
100-41-4	Ethylbenzene	2
108-38-3*	p/m-Xylene	13
75-25-2	Bromoform	<1
100-42-5	Styrene	<1
79-34-5	1,1,2,2-Tetrachloroethane	<1
95-47-6	o-Xylene	7
96-18-4	1,2,3-Trichloropropane	<1
98-82-8	Isopropylbenzene	<1
108-86-1	Bromobenzene	<1
95-49-8	2-Chlorotoluene	<1
103-65-1	Propylbenzene	<1
106-43-4	4-Chlorotoluene	<1
95-63-6	1,2,4-Trimethylbenzene	1
99-87-6	4-Isopropyltoluene	<1
108-67-8	1,3,5-Trimethylbenzene	3
541-73-1	1,3-Dichlorobenzene	<1
106-46-7	1,4-Dichlorobenzene	<1
135-98-8	sec-Butylbenzene	<1
98-06-6	tert-Butylbenzene	<1
95-50-1	1,2-Dichlorobenzene	<1
104-51-8	n-Butylbenzene	<1
96-12-8	1,2-Dibromo-3-chloropropane	<1
120-82-1	1,2,4-Trichlorobenzene	<1
91-20-3	Naphthalene	<1
87-61-6	1,2,3-Trichlorobenzene	<1
87-68-3	Hexachlorobutadiene	<1

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0054 WS16 0.5-1.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
no compounds detected		<1

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0057 WS8 1.5-2.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 4:59
Instrument Name - Instrumen

CAS No	Compound	Conc.	CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1	106-93-4	1,2-Dibromoethane	<1
74-87-3	Chloromethane	<1	127-18-4	Tetrachloroethene	<1
75-01-4	Vinyl Chloride	<1	630-20-6	1,1,1,2-Tetrachloroethane	<1
74-83-9	Bromomethane	<1	108-90-7	Chlorobenzene	<1
75-00-3	Chloroethane	<1	100-41-4	Ethylbenzene	<1
75-69-4	Trichlorofluoromethane	<1	108-38-3*	p/m-Xylene	<1
156-60-5	trans-1,2-Dichloroethene	<1	75-25-2	Bromoform	<1
75-09-2	Dichloromethane	<1	100-42-5	Styrene	<1
75-15-0	Carbon disulphide	<1	79-34-5	1,1,2,2-Tetrachloroethane	<1
75-35-4	1,1-Dichloroethene	<1	95-47-6	o-Xylene	<1
75-34-3	1,1-Dichloroethane	<1	96-18-4	1,2,3-Trichloropropane	<1
1634-04-4	tert-butyl methyl ether	<1	98-82-8	Isopropylbenzene	<1
156-59-2	cis-1,2-Dichloroethene	<1	108-86-1	Bromobenzene	<1
74-97-5	Bromochloromethane	<1	95-49-8	2-Chlorotoluene	<1
67-66-3	Chloroform	<1	103-65-1	Propylbenzene	<1
594-20-7	2,2-Dichloropropane	<1	106-43-4	4-Chlorotoluene	<1
107-06-2	1,2-Dichloroethane	<1	95-63-6	1,2,4-Trimethylbenzene	<1
71-55-6	1,1,1-Trichloroethane	<1	99-87-6	4-Isopropyltoluene	<1
563-58-6	1,1-Dichloropropene	<1	108-67-8	1,3,5-Trimethylbenzene	<1
71-43-2	Benzene	18	541-73-1	1,3-Dichlorobenzene	<1
56-23-5	Carbontetrachloride	<1	106-46-7	1,4-Dichlorobenzene	<1
74-95-3	Dibromomethane	<1	135-98-8	sec-Butylbenzene	<1
78-87-5	1,2-Dichloropropane	<1	98-06-6	tert-Butylbenzene	<1
75-27-4	Bromodichloromethane	<1	95-50-1	1,2-Dichlorobenzene	<1
79-01-6	Trichloroethene	<1	104-51-8	n-Butylbenzene	<1
10061-01-5	cis-1,3-Dichloropropene	<1	96-12-8	1,2-Dibromo-3-chloropropane	<1
10061-02-6	trans-1,3-Dichloropropene	<1	120-82-1	1,2,4-Trichlorobenzene	<1
79-00-5	1,1,2-Trichloroethane	<1	91-20-3	Naphthalene	<1
108-88-3	Toluene	10	87-61-6	1,2,3-Trichlorobenzene	<1
142-28-9	1,3-Dichloropropane	<1	87-68-3	Hexachlorobutadiene	<1
124-48-1	Dibromochloromethane	<1			

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0057 WS8 1.5-2.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
no compounds detected		<1

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - Spiked Blank
Client / Sample matrix - Spiked Blank/Water
Units - µg/l
Date Acquired - 2 Jan 2003 19:37
Instrument Name - Instrumen

CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1
74-87-3	Chloromethane	<1
75-01-4	Vinyl Chloride	<1
74-83-9	Bromomethane	<1
75-00-3	Chloroethane	<1
75-69-4	Trichlorofluoromethane	<1
156-60-5	trans-1,2-Dichloroethene	<1
75-09-2	Dichloromethane	<1
75-15-0	Carbon disulphide	<1
75-35-4	1,1-Dichloroethene	<1
75-34-3	1,1-Dichloroethane	<1
1634-04-4	tert-butyl methyl ether	<1
156-59-2	cis-1,2-Dichloroethene	<1
74-97-5	Bromochloromethane	<1
67-66-3	Chloroform	<1
594-20-7	2,2-Dichloropropane	<1
107-06-2	1,2-Dichloroethane	<1
71-55-6	1,1,1-Trichloroethane	<1
563-58-6	1,1-Dichloropropene	<1
71-43-2	Benzene	<1
56-23-5	Carbontetrachloride	<1
74-95-3	Dibromomethane	<1
78-87-5	1,2-Dichloropropane	<1
75-27-4	Bromodichloromethane	<1
79-01-6	Trichloroethene	<1
10061-01-5	cis-1,3-Dichloropropene	<1
10061-02-6	trans-1,3-Dichloropropene	<1
79-00-5	1,1,2-Trichloroethane	<1
108-88-3	Toluene	<1
142-28-9	1,3-Dichloropropane	<1
124-48-1	Dibromochloromethane	<1

CAS No	Compound	Conc.
106-93-4	1,2-Dibromoethane	<1
127-18-4	Tetrachloroethene	<1
630-20-6	1,1,1,2-Tetrachloroethane	<1
108-90-7	Chlorobenzene	<1
100-41-4	Ethylbenzene	<1
108-38-3*	p/m-Xylene	<1
75-25-2	Bromoform	<1
100-42-5	Styrene	<1
79-34-5	1,1,2,2-Tetrachloroethane	<1
95-47-6	o-Xylene	<1
96-18-4	1,2,3-Trichloropropane	<1
98-82-8	Isopropylbenzene	<1
108-86-1	Bromobenzene	<1
95-49-8	2-Chlorotoluene	<1
103-65-1	Propylbenzene	<1
106-43-4	4-Chlorotoluene	<1
95-63-6	1,2,4-Trimethylbenzene	<1
99-87-6	4-Isopropyltoluene	<1
108-67-8	1,3,5-Trimethylbenzene	<1
541-73-1	1,3-Dichlorobenzene	<1
106-46-7	1,4-Dichlorobenzene	<1
135-98-8	sec-Butylbenzene	<1
98-06-6	tert-Butylbenzene	<1
95-50-1	1,2-Dichlorobenzene	<1
104-51-8	n-Butylbenzene	<1
96-12-8	1,2-Dibromo-3-chloropropane	<1
120-82-1	1,2,4-Trichlorobenzene	<1
91-20-3	Naphthalene	<1
87-61-6	1,2,3-Trichlorobenzene	<1
87-68-3	Hexachlorobutadiene	<1

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - 500ppb VOC
Client / Sample matrix - Calibration Std/Water
Units - µg/l
Date Acquired - 2 Jan 2003 17:51
Instrument Name - Instrumen

CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	512
74-87-3	Chloromethane	524
75-01-4	Vinyl Chloride	504
74-83-9	Bromomethane	517
75-00-3	Chloroethane	515
75-69-4	Trichlorofluoromethane	502
156-60-5	trans-1,2-Dichloroethene	503
75-09-2	Dichloromethane	519
75-15-0	Carbon disulphide	513
75-35-4	1,1-Dichloroethene	500
75-34-3	1,1-Dichloroethane	504
1634-04-4	tert-butyl methyl ether	524
156-59-2	cis-1,2-Dichloroethene	505
74-97-5	Bromochloromethane	495
67-66-3	Chloroform	516
594-20-7	2,2-Dichloropropane	491
107-06-2	1,2-Dichloroethane	518
71-55-6	1,1,1-Trichloroethane	498
563-58-6	1,1-Dichloropropene	498
71-43-2	Benzene	509
56-23-5	Carbontetrachloride	499
74-95-3	Dibromomethane	506
78-87-5	1,2-Dichloropropane	506
75-27-4	Bromodichloromethane	499
79-01-6	Trichloroethene	504
10061-01-5	cis-1,3-Dichloropropene	481
10061-02-6	trans-1,3-Dichloropropene	481
79-00-5	1,1,2-Trichloroethane	514
108-88-3	Toluene	493
142-28-9	1,3-Dichloropropane	506
124-48-1	Dibromochloromethane	504

CAS No	Compound	Conc.
106-93-4	1,2-Dibromoethane	497
127-18-4	Tetrachloroethene	491
630-20-6	1,1,1,2-Tetrachloroethane	513
108-90-7	Chlorobenzene	529
100-41-4	Ethylbenzene	510
108-38-3*	p/m-Xylene	1051
75-25-2	Bromoform	510
100-42-5	Styrene	509
79-34-5	1,1,2,2-Tetrachloroethane	524
95-47-6	o-Xylene	523
96-18-4	1,2,3-Trichloropropane	533
98-82-8	Isopropylbenzene	517
108-86-1	Bromobenzene	529
95-49-8	2-Chlorotoluene	515
103-65-1	Propylbenzene	523
106-43-4	4-Chlorotoluene	523
95-63-6	1,2,4-Trimethylbenzene	515
99-87-6	4-Isopropyltoluene	520
108-67-8	1,3,5-Trimethylbenzene	523
541-73-1	1,3-Dichlorobenzene	531
106-46-7	1,4-Dichlorobenzene	496
135-98-8	sec-Butylbenzene	477
98-06-6	tert-Butylbenzene	474
95-50-1	1,2-Dichlorobenzene	492
104-51-8	n-Butylbenzene	476
96-12-8	1,2-Dibromo-3-chloropropane	491
120-82-1	1,2,4-Trichlorobenzene	476
91-20-3	Naphthalene	475
87-61-6	1,2,3-Trichlorobenzene	485
87-68-3	Hexachlorobutadiene	487

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Volatile Organic Compounds (EPA 624/8260)

Sample Identity - B02182-S0025 WS5 4.5-5.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg
Date Acquired - 7 Jan 2003 5:35
Instrument Name - Instrumen

CAS No	Compound	Conc.	CAS No	Compound	Conc.
75-71-8	Dichlorodifluoromethane	<1	106-93-4	1,2-Dibromoethane	<1
74-87-3	Chloromethane	<1	127-18-4	Tetrachloroethene	<1
75-01-4	Vinyl Chloride	<1	630-20-6	1,1,1,2-Tetrachloroethane	<1
74-83-9	Bromomethane	<1	108-90-7	Chlorobenzene	<1
75-00-3	Chloroethane	<1	100-41-4	Ethylbenzene	<1
75-69-4	Trichlorofluoromethane	<1	108-38-3*	p/m-Xylene	<1
156-60-5	trans-1,2-Dichloroethene	<1	75-25-2	Bromoform	<1
75-09-2	Dichloromethane	<1	100-42-5	Styrene	<1
75-15-0	Carbon disulphide	<1	79-34-5	1,1,2,2-Tetrachloroethane	<1
75-35-4	1,1-Dichloroethene	<1	95-47-6	o-Xylene	<1
75-34-3	1,1-Dichloroethane	<1	96-18-4	1,2,3-Trichloropropane	<1
1634-04-4	tert-butyl methyl ether	<1	98-82-8	Isopropylbenzene	<1
156-59-2	cis-1,2-Dichloroethene	<1	108-86-1	Bromobenzene	<1
74-97-5	Bromochloromethane	<1	95-49-8	2-Chlorotoluene	<1
67-66-3	Chloroform	<1	103-65-1	Propylbenzene	<1
594-20-7	2,2-Dichloropropane	<1	106-43-4	4-Chlorotoluene	<1
107-06-2	1,2-Dichloroethane	<1	95-63-6	1,2,4-Trimethylbenzene	<1
71-55-6	1,1,1-Trichloroethane	<1	99-87-6	4-Isopropyltoluene	<1
563-58-6	1,1-Dichloropropene	<1	108-67-8	1,3,5-Trimethylbenzene	<1
71-43-2	Benzene	4	541-73-1	1,3-Dichlorobenzene	<1
56-23-5	Carbontetrachloride	<1	106-46-7	1,4-Dichlorobenzene	<1
74-95-3	Dibromomethane	<1	135-98-8	sec-Butylbenzene	<1
78-87-5	1,2-Dichloropropane	<1	98-06-6	tert-Butylbenzene	<1
75-27-4	Bromodichloromethane	<1	95-50-1	1,2-Dichlorobenzene	<1
79-01-6	Trichloroethene	<1	104-51-8	n-Butylbenzene	<1
10061-01-5	cis-1,3-Dichloropropene	<1	96-12-8	1,2-Dibromo-3-chloropropane	<1
10061-02-6	trans-1,3-Dichloropropene	<1	120-82-1	1,2,4-Trichlorobenzene	<1
79-00-5	1,1,2-Trichloroethane	<1	91-20-3	Naphthalene	<1
108-88-3	Toluene	4	87-61-6	1,2,3-Trichlorobenzene	<1
142-28-9	1,3-Dichloropropane	<1	87-68-3	Hexachlorobutadiene	<1
124-48-1	Dibromochloromethane	<1			

N.B. * also CAS No. 106-42-3

** Water blank subtracted

Alcontrol Geochem

VOC Tentatively Identified Compounds

Sample Identity - B02182-S0025 WS5 4.5-5.0m
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
no compounds detected		<1

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0006 BH1 3.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Water
Units - µg/l

CAS No	Compound	Conc.
108-95-2	Phenol	<1
95-57-8	2-Chlorophenol	<1
95-48-7	2-Methylphenol	<1
106-44-5	4-Methylphenol	<1
88-75-5	2-Nitrophenol	<1
100-02-7	4-Nitrophenol	<1
120-83-2	2,4-Dichlorophenol	<1
105-67-9	2,4-Dimethylphenol	<1
59-50-7	4-Chloro-3-methylphenol	<1
88-06-2	2,4,6-Trichlorophenol	<1
95-95-4	2,4,5-Trichlorophenol	<1
87-86-5	Pentachlorophenol	<1
541-73-1	1,3-Dichlorobenzene	<1
106-46-7	1,4-Dichlorobenzene	<1
95-50-1	1,2-Dichlorobenzene	<1
120-82-1	1,2,4-Trichlorobenzene	<1
98-95-3	Nitrobenzene	<1
103-33-3	Azobenzene	<1
118-74-1	Hexachlorobenzene	<1
91-20-3	Naphthalene	<1
208-96-8	Acenaphthylene	<1
83-32-9	Acenaphthene	<1
86-73-7	Fluorene	<1
85-01-8	Phenanthrene	<1
120-12-7	Anthracene	<1
206-44-0	Fluoranthrene	<1
129-00-0	Pyrene	<1
56-55-3	Benzo(a)anthracene	<1
218-01-9	Chrysene	<1
205-99-2	Benzo(b)fluoranthrene	<1

CAS No	Compound	Conc.
207-08-9	Benzo(k)fluoranthrene	<1
50-32-8	Benzo(a)pyrene	<1
193-39-5	Indeno(1,2,3-cd)pyrene	<1
53-70-3	Dibenzo(a,h)anthracene	<1
191-24-2	Benzo(ghi)perylene	<1
91-58-7	2-Chloronaphthalene	<1
91-57-6	2-Methylnaphthalene	<1
86-74-8	Carbazole	<1
78-59-1	Isophorone	<1
132-64-9	Dibenzofuran	<1
131-11-3	Dimethyl phthalate	<1
84-66-2	Diethyl phthalate	<1
84-74-2	Di-n-butylphthalate	<1
117-84-0	Di-n-octylphthalate	<1
117-81-7	Bis(2-ethylhexyl)phthalate	<1
85-68-7	Butylbenzylphthalate	<1
106-47-8	4-Chloroaniline	<1
88-74-4	2-Nitroanaline	<1
99-09-2	3-Nitroaniline	<1
100-01-6	4-Nitroaniline	<1
121-14-2	2,4-Dinitrotoluene	<1
606-20-2	2,6-Dinitrotoluene	<1
111-44-4	Bis(2-chloroethyl)ether	<1
101-55-3	4-Bromophenylphenylether	<1
7005-72-3	4-Chlorophenylphenylether	<1
67-72-1	Hexachloroethane	<1
87-68-3	Hexachlorobutadiene	<1
77-47-4	Hexchlorocyclopentadiene	<1
111-91-1	Bis(2-chloroethoxy)methane	<1
621-64-7	N-nitrosodi-n-propylamine	<1

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0006 BH1 3.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Water
Units - µg/l

Compound	RetentionTime min	Concentration µg/l
C9-C14 Hydrocarbons	-	2650

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0007 WS1 0.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.
108-95-2	Phenol	<100
95-57-8	2-Chlorophenol	<100
95-48-7	2-Methylphenol	<100
106-44-5	4-Methylphenol	<100
88-75-5	2-Nitrophenol	<100
100-02-7	4-Nitrophenol	<100
120-83-2	2,4-Dichlorophenol	<100
105-67-9	2,4-Dimethylphenol	<100
59-50-7	4-Chloro-3-methylphenol	<100
88-06-2	2,4,6-Trichlorophenol	<100
95-95-4	2,4,5-Trichlorophenol	<100
87-86-5	Pentachlorophenol	<100
541-73-1	1,3-Dichlorobenzene	<100
106-46-7	1,4-Dichlorobenzene	<100
95-50-1	1,2-Dichlorobenzene	<100
120-82-1	1,2,4-Trichlorobenzene	<100
98-95-3	Nitrobenzene	<100
103-33-3	Azobenzene	<100
118-74-1	Hexachlorobenzene	<100
91-20-3	Naphthalene	<100
208-96-8	Acenaphthylene	<100
83-32-9	Acenaphthene	<100
86-73-7	Fluorene	<100
85-01-8	Phenanthrene	<100
120-12-7	Anthracene	<100
206-44-0	Fluoranthrene	<100
129-00-0	Pyrene	<100
56-55-3	Benzo(a)anthracene	<100
218-01-9	Chrysene	<100
205-99-2	Benzo(b)fluoranthrene	<100

CAS No	Compound	Conc.
207-08-9	Benzo(k)fluoranthrene	<100
50-32-8	Benzo(a)pyrene	<100
193-39-5	Indeno(1,2,3-cd)pyrene	<100
53-70-3	Dibenzo(a,h)anthracene	<100
191-24-2	Benzo(ghi)perylene	<100
91-58-7	2-Chloronaphthalene	<100
91-57-6	2-Methylnaphthalene	<100
86-74-8	Carbazole	<100
78-59-1	Isophorone	<100
132-64-9	Dibenzofuran	<100
131-11-3	Dimethyl phthalate	<100
84-66-2	Diethyl phthalate	<100
84-74-2	Di-n-butylphthalate	<100
117-84-0	Di-n-octylphthalate	<100
117-81-7	Bis(2-ethylhexyl)phthalate	<100
85-68-7	Butylbenzylphthalate	<100
106-47-8	4-Chloroaniline	<100
88-74-4	2-Nitroanaline	<100
99-09-2	3-Nitroaniline	<100
100-01-6	4-Nitroaniline	<100
121-14-2	2,4-Dinitrotoluene	<100
606-20-2	2,6-Dinitrotoluene	<100
111-44-4	Bis(2-chloroethyl)ether	<100
101-55-3	4-Bromophenylphenylether	<100
7005-72-3	4-Chlorophenylphenylether	<100
67-72-1	Hexachloroethane	<100
87-68-3	Hexachlorobutadiene	<100
77-47-4	Hexchlorocyclopentadiene	<100
111-91-1	Bis(2-chloroethoxy)methane	<100
621-64-7	N-nitrosodi-n-propylamine	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0007 WS1 0.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
No Compounds Detected	-	<100

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0009 WS1 2.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.
108-95-2	Phenol	<100
95-57-8	2-Chlorophenol	<100
95-48-7	2-Methylphenol	<100
106-44-5	4-Methylphenol	<100
88-75-5	2-Nitrophenol	<100
100-02-7	4-Nitrophenol	<100
120-83-2	2,4-Dichlorophenol	<100
105-67-9	2,4-Dimethylphenol	<100
59-50-7	4-Chloro-3-methylphenol	<100
88-06-2	2,4,6-Trichlorophenol	<100
95-95-4	2,4,5-Trichlorophenol	<100
87-86-5	Pentachlorophenol	<100
541-73-1	1,3-Dichlorobenzene	<100
106-46-7	1,4-Dichlorobenzene	<100
95-50-1	1,2-Dichlorobenzene	<100
120-82-1	1,2,4-Trichlorobenzene	<100
98-95-3	Nitrobenzene	<100
103-33-3	Azobenzene	<100
118-74-1	Hexachlorobenzene	<100
91-20-3	Naphthalene	<100
208-96-8	Acenaphthylene	<100
83-32-9	Acenaphthene	<100
86-73-7	Fluorene	<100
85-01-8	Phenanthrene	<100
120-12-7	Anthracene	<100
206-44-0	Fluoranthrene	<100
129-00-0	Pyrene	<100
56-55-3	Benzo(a)anthracene	<100
218-01-9	Chrysene	<100
205-99-2	Benzo(b)fluoranthrene	<100

CAS No	Compound	Conc.
207-08-9	Benzo(k)fluoranthrene	<100
50-32-8	Benzo(a)pyrene	<100
193-39-5	Indeno(1,2,3-cd)pyrene	<100
53-70-3	Dibenzo(a,h)anthracene	<100
191-24-2	Benzo(ghi)perylene	<100
91-58-7	2-Chloronaphthalene	<100
91-57-6	2-Methylnaphthalene	<100
86-74-8	Carbazole	<100
78-59-1	Isophorone	<100
132-64-9	Dibenzofuran	<100
131-11-3	Dimethyl phthalate	<100
84-66-2	Diethyl phthalate	<100
84-74-2	Di-n-butylphthalate	<100
117-84-0	Di-n-octylphthalate	<100
117-81-7	Bis(2-ethylhexyl)phthalate	<100
85-68-7	Butylbenzylphthalate	<100
106-47-8	4-Chloroaniline	<100
88-74-4	2-Nitroanaline	<100
99-09-2	3-Nitroaniline	<100
100-01-6	4-Nitroaniline	<100
121-14-2	2,4-Dinitrotoluene	<100
606-20-2	2,6-Dinitrotoluene	<100
111-44-4	Bis(2-chloroethyl)ether	<100
101-55-3	4-Bromophenylphenylether	<100
7005-72-3	4-Chlorophenylphenylether	<100
67-72-1	Hexachloroethane	<100
87-68-3	Hexachlorobutadiene	<100
77-47-4	Hexchlorocyclopentadiene	<100
111-91-1	Bis(2-chloroethoxy)methane	<100
621-64-7	N-nitrosodi-n-propylamine	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0009 WS1 2.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
No Compounds Detected	-	<100

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0010 WS1 3.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.
108-95-2	Phenol	<100
95-57-8	2-Chlorophenol	<100
95-48-7	2-Methylphenol	<100
106-44-5	4-Methylphenol	<100
88-75-5	2-Nitrophenol	<100
100-02-7	4-Nitrophenol	<100
120-83-2	2,4-Dichlorophenol	<100
105-67-9	2,4-Dimethylphenol	<100
59-50-7	4-Chloro-3-methylphenol	<100
88-06-2	2,4,6-Trichlorophenol	<100
95-95-4	2,4,5-Trichlorophenol	<100
87-86-5	Pentachlorophenol	<100
541-73-1	1,3-Dichlorobenzene	<100
106-46-7	1,4-Dichlorobenzene	<100
95-50-1	1,2-Dichlorobenzene	<100
120-82-1	1,2,4-Trichlorobenzene	<100
98-95-3	Nitrobenzene	<100
103-33-3	Azobenzene	<100
118-74-1	Hexachlorobenzene	<100
91-20-3	Naphthalene	<100
208-96-8	Acenaphthylene	<100
83-32-9	Acenaphthene	<100
86-73-7	Fluorene	<100
85-01-8	Phenanthrene	<100
120-12-7	Anthracene	<100
206-44-0	Fluoranthrene	<100
129-00-0	Pyrene	<100
56-55-3	Benzo(a)anthracene	<100
218-01-9	Chrysene	<100
205-99-2	Benzo(b)fluoranthrene	<100

CAS No	Compound	Conc.
207-08-9	Benzo(k)fluoranthrene	<100
50-32-8	Benzo(a)pyrene	<100
193-39-5	Indeno(1,2,3-cd)pyrene	<100
53-70-3	Dibenzo(a,h)anthracene	<100
191-24-2	Benzo(ghi)perylene	<100
91-58-7	2-Chloronaphthalene	<100
91-57-6	2-Methylnaphthalene	<100
86-74-8	Carbazole	<100
78-59-1	Isophorone	<100
132-64-9	Dibenzofuran	<100
131-11-3	Dimethyl phthalate	<100
84-66-2	Diethyl phthalate	<100
84-74-2	Di-n-butylphthalate	<100
117-84-0	Di-n-octylphthalate	<100
117-81-7	Bis(2-ethylhexyl)phthalate	<100
85-68-7	Butylbenzylphthalate	<100
106-47-8	4-Chloroaniline	<100
88-74-4	2-Nitroanaline	<100
99-09-2	3-Nitroaniline	<100
100-01-6	4-Nitroaniline	<100
121-14-2	2,4-Dinitrotoluene	<100
606-20-2	2,6-Dinitrotoluene	<100
111-44-4	Bis(2-chloroethyl)ether	<100
101-55-3	4-Bromophenylphenylether	<100
7005-72-3	4-Chlorophenylphenylether	<100
67-72-1	Hexachloroethane	<100
87-68-3	Hexachlorobutadiene	<100
77-47-4	Hexchlorocyclopentadiene	<100
111-91-1	Bis(2-chloroethoxy)methane	<100
621-64-7	N-nitrosodi-n-propylamine	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0010 WS1 3.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
No Compounds Detected	-	<100

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0011 WS2 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.
108-95-2	Phenol	<100
95-57-8	2-Chlorophenol	<100
95-48-7	2-Methylphenol	<100
106-44-5	4-Methylphenol	<100
88-75-5	2-Nitrophenol	<100
100-02-7	4-Nitrophenol	<100
120-83-2	2,4-Dichlorophenol	<100
105-67-9	2,4-Dimethylphenol	<100
59-50-7	4-Chloro-3-methylphenol	<100
88-06-2	2,4,6-Trichlorophenol	<100
95-95-4	2,4,5-Trichlorophenol	<100
87-86-5	Pentachlorophenol	<100
541-73-1	1,3-Dichlorobenzene	<100
106-46-7	1,4-Dichlorobenzene	<100
95-50-1	1,2-Dichlorobenzene	<100
120-82-1	1,2,4-Trichlorobenzene	<100
98-95-3	Nitrobenzene	<100
103-33-3	Azobenzene	<100
118-74-1	Hexachlorobenzene	<100
91-20-3	Naphthalene	599
208-96-8	Acenaphthylene	<100
83-32-9	Acenaphthene	<100
86-73-7	Fluorene	<100
85-01-8	Phenanthrene	1116
120-12-7	Anthracene	<100
206-44-0	Fluoranthrene	754
129-00-0	Pyrene	1270
56-55-3	Benzo(a)anthracene	340
218-01-9	Chrysene	465
205-99-2	Benzo(b)fluoranthrene	<100

CAS No	Compound	Conc.
207-08-9	Benzo(k)fluoranthrene	<100
50-32-8	Benzo(a)pyrene	<100
193-39-5	Indeno(1,2,3-cd)pyrene	<100
53-70-3	Dibenzo(a,h)anthracene	<100
191-24-2	Benzo(ghi)perylene	<100
91-58-7	2-Chloronaphthalene	<100
91-57-6	2-Methylnaphthalene	1406
86-74-8	Carbazole	<100
78-59-1	Isophorone	<100
132-64-9	Dibenzofuran	<100
131-11-3	Dimethyl phthalate	<100
84-66-2	Diethyl phthalate	<100
84-74-2	Di-n-butylphthalate	<100
117-84-0	Di-n-octylphthalate	<100
117-81-7	Bis(2-ethylhexyl)phthalate	<100
85-68-7	Butylbenzylphthalate	<100
106-47-8	4-Chloroaniline	<100
88-74-4	2-Nitroanaline	<100
99-09-2	3-Nitroaniline	<100
100-01-6	4-Nitroaniline	<100
121-14-2	2,4-Dinitrotoluene	<100
606-20-2	2,6-Dinitrotoluene	<100
111-44-4	Bis(2-chloroethyl)ether	<100
101-55-3	4-Bromophenylphenylether	<100
7005-72-3	4-Chlorophenylphenylether	<100
67-72-1	Hexachloroethane	<100
87-68-3	Hexachlorobutadiene	<100
77-47-4	Hexchlorocyclopentadiene	<100
111-91-1	Bis(2-chloroethoxy)methane	<100
621-64-7	N-nitrosodi-n-propylamine	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0011 WS2 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	Retention Time min	Concentration µg/kg
C10-C28 Hydrocarbons	-	14500

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0013 WS2 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.
108-95-2	Phenol	<100
95-57-8	2-Chlorophenol	<100
95-48-7	2-Methylphenol	<100
106-44-5	4-Methylphenol	<100
88-75-5	2-Nitrophenol	<100
100-02-7	4-Nitrophenol	<100
120-83-2	2,4-Dichlorophenol	<100
105-67-9	2,4-Dimethylphenol	<100
59-50-7	4-Chloro-3-methylphenol	<100
88-06-2	2,4,6-Trichlorophenol	<100
95-95-4	2,4,5-Trichlorophenol	<100
87-86-5	Pentachlorophenol	<100
541-73-1	1,3-Dichlorobenzene	<100
106-46-7	1,4-Dichlorobenzene	<100
95-50-1	1,2-Dichlorobenzene	<100
120-82-1	1,2,4-Trichlorobenzene	<100
98-95-3	Nitrobenzene	<100
103-33-3	Azobenzene	<100
118-74-1	Hexachlorobenzene	<100
91-20-3	Naphthalene	<100
208-96-8	Acenaphthylene	<100
83-32-9	Acenaphthene	<100
86-73-7	Fluorene	<100
85-01-8	Phenanthrene	<100
120-12-7	Anthracene	<100
206-44-0	Fluoranthrene	<100
129-00-0	Pyrene	<100
56-55-3	Benzo(a)anthracene	<100
218-01-9	Chrysene	<100
205-99-2	Benzo(b)fluoranthrene	<100

CAS No	Compound	Conc.
207-08-9	Benzo(k)fluoranthrene	<100
50-32-8	Benzo(a)pyrene	<100
193-39-5	Indeno(1,2,3-cd)pyrene	<100
53-70-3	Dibenzo(a,h)anthracene	<100
191-24-2	Benzo(ghi)perylene	<100
91-58-7	2-Chloronaphthalene	<100
91-57-6	2-Methylnaphthalene	<100
86-74-8	Carbazole	<100
78-59-1	Isophorone	<100
132-64-9	Dibenzofuran	<100
131-11-3	Dimethyl phthalate	<100
84-66-2	Diethyl phthalate	<100
84-74-2	Di-n-butylphthalate	<100
117-84-0	Di-n-octylphthalate	<100
117-81-7	Bis(2-ethylhexyl)phthalate	<100
85-68-7	Butylbenzylphthalate	<100
106-47-8	4-Chloroaniline	<100
88-74-4	2-Nitroanaline	<100
99-09-2	3-Nitroaniline	<100
100-01-6	4-Nitroaniline	<100
121-14-2	2,4-Dinitrotoluene	<100
606-20-2	2,6-Dinitrotoluene	<100
111-44-4	Bis(2-chloroethyl)ether	<100
101-55-3	4-Bromophenylphenylether	<100
7005-72-3	4-Chlorophenylphenylether	<100
67-72-1	Hexachloroethane	<100
87-68-3	Hexachlorobutadiene	<100
77-47-4	Hexchlorocyclopentadiene	<100
111-91-1	Bis(2-chloroethoxy)methane	<100
621-64-7	N-nitrosodi-n-propylamine	<100

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0015 WS2 4.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.
108-95-2	Phenol	<100
95-57-8	2-Chlorophenol	<100
95-48-7	2-Methylphenol	<100
106-44-5	4-Methylphenol	<100
88-75-5	2-Nitrophenol	<100
100-02-7	4-Nitrophenol	<100
120-83-2	2,4-Dichlorophenol	<100
105-67-9	2,4-Dimethylphenol	<100
59-50-7	4-Chloro-3-methylphenol	<100
88-06-2	2,4,6-Trichlorophenol	<100
95-95-4	2,4,5-Trichlorophenol	<100
87-86-5	Pentachlorophenol	<100
541-73-1	1,3-Dichlorobenzene	<100
106-46-7	1,4-Dichlorobenzene	<100
95-50-1	1,2-Dichlorobenzene	<100
120-82-1	1,2,4-Trichlorobenzene	<100
98-95-3	Nitrobenzene	<100
103-33-3	Azobenzene	<100
118-74-1	Hexachlorobenzene	<100
91-20-3	Naphthalene	<100
208-96-8	Acenaphthylene	<100
83-32-9	Acenaphthene	<100
86-73-7	Fluorene	<100
85-01-8	Phenanthrene	<100
120-12-7	Anthracene	<100
206-44-0	Fluoranthrene	<100
129-00-0	Pyrene	<100
56-55-3	Benzo(a)anthracene	<100
218-01-9	Chrysene	<100
205-99-2	Benzo(b)fluoranthrene	<100

CAS No	Compound	Conc.
207-08-9	Benzo(k)fluoranthrene	<100
50-32-8	Benzo(a)pyrene	<100
193-39-5	Indeno(1,2,3-cd)pyrene	<100
53-70-3	Dibenzo(a,h)anthracene	<100
191-24-2	Benzo(ghi)perylene	<100
91-58-7	2-Chloronaphthalene	<100
91-57-6	2-Methylnaphthalene	<100
86-74-8	Carbazole	<100
78-59-1	Isophorone	<100
132-64-9	Dibenzofuran	<100
131-11-3	Dimethyl phthalate	<100
84-66-2	Diethyl phthalate	<100
84-74-2	Di-n-butylphthalate	<100
117-84-0	Di-n-octylphthalate	<100
117-81-7	Bis(2-ethylhexyl)phthalate	<100
85-68-7	Butylbenzylphthalate	<100
106-47-8	4-Chloroaniline	<100
88-74-4	2-Nitroanaline	<100
99-09-2	3-Nitroaniline	<100
100-01-6	4-Nitroaniline	<100
121-14-2	2,4-Dinitrotoluene	<100
606-20-2	2,6-Dinitrotoluene	<100
111-44-4	Bis(2-chloroethyl)ether	<100
101-55-3	4-Bromophenylphenylether	<100
7005-72-3	4-Chlorophenylphenylether	<100
67-72-1	Hexachloroethane	<100
87-68-3	Hexachlorobutadiene	<100
77-47-4	Hexchlorocyclopentadiene	<100
111-91-1	Bis(2-chloroethoxy)methane	<100
621-64-7	N-nitrosodi-n-propylamine	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0013 WS2 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
No Compounds Detected	-	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0015 WS2 4.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
C10-C28 Hydrocarbons	-	2700000

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0016 WS3 0.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.
108-95-2	Phenol	<100
95-57-8	2-Chlorophenol	<100
95-48-7	2-Methylphenol	<100
106-44-5	4-Methylphenol	<100
88-75-5	2-Nitrophenol	<100
100-02-7	4-Nitrophenol	<100
120-83-2	2,4-Dichlorophenol	<100
105-67-9	2,4-Dimethylphenol	<100
59-50-7	4-Chloro-3-methylphenol	<100
88-06-2	2,4,6-Trichlorophenol	<100
95-95-4	2,4,5-Trichlorophenol	<100
87-86-5	Pentachlorophenol	<100
541-73-1	1,3-Dichlorobenzene	<100
106-46-7	1,4-Dichlorobenzene	<100
95-50-1	1,2-Dichlorobenzene	<100
120-82-1	1,2,4-Trichlorobenzene	<100
98-95-3	Nitrobenzene	<100
103-33-3	Azobenzene	<100
118-74-1	Hexachlorobenzene	<100
91-20-3	Naphthalene	191
208-96-8	Acenaphthylene	<100
83-32-9	Acenaphthene	<100
86-73-7	Fluorene	<100
85-01-8	Phenanthrene	1455
120-12-7	Anthracene	197
206-44-0	Fluoranthrene	3136
129-00-0	Pyrene	3065
56-55-3	Benzo(a)anthracene	1457
218-01-9	Chrysene	1509
205-99-2	Benzo(b)fluoranthrene	1170

CAS No	Compound	Conc.
207-08-9	Benzo(k)fluoranthrene	1039
50-32-8	Benzo(a)pyrene	1271
193-39-5	Indeno(1,2,3-cd)pyrene	1873
53-70-3	Dibenzo(a,h)anthracene	362
191-24-2	Benzo(ghi)perylene	569
91-58-7	2-Chloronaphthalene	<100
91-57-6	2-Methylnaphthalene	359
86-74-8	Carbazole	<100
78-59-1	Isophorone	<100
132-64-9	Dibenzofuran	143
131-11-3	Dimethyl phthalate	<100
84-66-2	Diethyl phthalate	<100
84-74-2	Di-n-butylphthalate	<100
117-84-0	Di-n-octylphthalate	<100
117-81-7	Bis(2-ethylhexyl)phthalate	<100
85-68-7	Butylbenzylphthalate	<100
106-47-8	4-Chloroaniline	<100
88-74-4	2-Nitroanaline	<100
99-09-2	3-Nitroaniline	<100
100-01-6	4-Nitroaniline	<100
121-14-2	2,4-Dinitrotoluene	<100
606-20-2	2,6-Dinitrotoluene	<100
111-44-4	Bis(2-chloroethyl)ether	<100
101-55-3	4-Bromophenylphenylether	<100
7005-72-3	4-Chlorophenylphenylether	<100
67-72-1	Hexachloroethane	<100
87-68-3	Hexachlorobutadiene	<100
77-47-4	Hexchlorocyclopentadiene	<100
111-91-1	Bis(2-chloroethoxy)methane	<100
621-64-7	N-nitrosodi-n-propylamine	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0016 WS3 0.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	Retention Time min	Concentration µg/kg
No Compounds Detected	-	<100

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0019 WS4 1.5-2.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.
108-95-2	Phenol	<100
95-57-8	2-Chlorophenol	<100
95-48-7	2-Methylphenol	<100
106-44-5	4-Methylphenol	<100
88-75-5	2-Nitrophenol	<100
100-02-7	4-Nitrophenol	<100
120-83-2	2,4-Dichlorophenol	<100
105-67-9	2,4-Dimethylphenol	<100
59-50-7	4-Chloro-3-methylphenol	<100
88-06-2	2,4,6-Trichlorophenol	<100
95-95-4	2,4,5-Trichlorophenol	<100
87-86-5	Pentachlorophenol	<100
541-73-1	1,3-Dichlorobenzene	<100
106-46-7	1,4-Dichlorobenzene	<100
95-50-1	1,2-Dichlorobenzene	<100
120-82-1	1,2,4-Trichlorobenzene	<100
98-95-3	Nitrobenzene	<100
103-33-3	Azobenzene	<100
118-74-1	Hexachlorobenzene	<100
91-20-3	Naphthalene	<100
208-96-8	Acenaphthylene	<100
83-32-9	Acenaphthene	<100
86-73-7	Fluorene	<100
85-01-8	Phenanthrene	774
120-12-7	Anthracene	124
206-44-0	Fluoranthrene	1293
129-00-0	Pyrene	1251
56-55-3	Benzo(a)anthracene	643
218-01-9	Chrysene	655
205-99-2	Benzo(b)fluoranthrene	526

CAS No	Compound	Conc.
207-08-9	Benzo(k)fluoranthrene	454
50-32-8	Benzo(a)pyrene	574
193-39-5	Indeno(1,2,3-cd)pyrene	652
53-70-3	Dibenzo(a,h)anthracene	<100
191-24-2	Benzo(ghi)perylene	289
91-58-7	2-Chloronaphthalene	<100
91-57-6	2-Methylnaphthalene	<100
86-74-8	Carbazole	<100
78-59-1	Isophorone	<100
132-64-9	Dibenzofuran	<100
131-11-3	Dimethyl phthalate	<100
84-66-2	Diethyl phthalate	<100
84-74-2	Di-n-butylphthalate	<100
117-84-0	Di-n-octylphthalate	<100
117-81-7	Bis(2-ethylhexyl)phthalate	<100
85-68-7	Butylbenzylphthalate	<100
106-47-8	4-Chloroaniline	<100
88-74-4	2-Nitroanaline	<100
99-09-2	3-Nitroaniline	<100
100-01-6	4-Nitroaniline	<100
121-14-2	2,4-Dinitrotoluene	<100
606-20-2	2,6-Dinitrotoluene	<100
111-44-4	Bis(2-chloroethyl)ether	<100
101-55-3	4-Bromophenylphenylether	<100
7005-72-3	4-Chlorophenylphenylether	<100
67-72-1	Hexachloroethane	<100
87-68-3	Hexachlorobutadiene	<100
77-47-4	Hexchlorocyclopentadiene	<100
111-91-1	Bis(2-chloroethoxy)methane	<100
621-64-7	N-nitrosodi-n-propylamine	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0019 WS4 1.5-2.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	Retention Time min	Concentration µg/kg
No Compounds Detected	-	<100

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0023 WS5 2.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.	CAS No	Compound	Conc.
108-95-2	Phenol	<100	207-08-9	Benzo(k)fluoranthrene	<100
95-57-8	2-Chlorophenol	<100	50-32-8	Benzo(a)pyrene	<100
95-48-7	2-Methylphenol	<100	193-39-5	Indeno(1,2,3-cd)pyrene	<100
106-44-5	4-Methylphenol	<100	53-70-3	Dibenzo(a,h)anthracene	<100
88-75-5	2-Nitrophenol	<100	191-24-2	Benzo(ghi)perylene	<100
100-02-7	4-Nitrophenol	<100	91-58-7	2-Chloronaphthalene	<100
120-83-2	2,4-Dichlorophenol	<100	91-57-6	2-Methylnaphthalene	<100
105-67-9	2,4-Dimethylphenol	<100	86-74-8	Carbazole	<100
59-50-7	4-Chloro-3-methylphenol	<100	78-59-1	Isophorone	<100
88-06-2	2,4,6-Trichlorophenol	<100	132-64-9	Dibenzofuran	<100
95-95-4	2,4,5-Trichlorophenol	<100	131-11-3	Dimethyl phthalate	<100
87-86-5	Pentachlorophenol	<100	84-66-2	Diethyl phthalate	<100
541-73-1	1,3-Dichlorobenzene	<100	84-74-2	Di-n-butylphthalate	<100
106-46-7	1,4-Dichlorobenzene	<100	117-84-0	Di-n-octylphthalate	<100
95-50-1	1,2-Dichlorobenzene	<100	117-81-7	Bis(2-ethylhexyl)phthalate	<100
120-82-1	1,2,4-Trichlorobenzene	<100	85-68-7	Butylbenzylphthalate	<100
98-95-3	Nitrobenzene	<100	106-47-8	4-Chloroaniline	<100
103-33-3	Azobenzene	<100	88-74-4	2-Nitroanaline	<100
118-74-1	Hexachlorobenzene	<100	99-09-2	3-Nitroaniline	<100
91-20-3	Naphthalene	<100	100-01-6	4-Nitroaniline	<100
208-96-8	Acenaphthylene	<100	121-14-2	2,4-Dinitrotoluene	<100
83-32-9	Acenaphthene	<100	606-20-2	2,6-Dinitrotoluene	<100
86-73-7	Fluorene	<100	111-44-4	Bis(2-chloroethyl)ether	<100
85-01-8	Phenanthrene	<100	101-55-3	4-Bromophenylphenylether	<100
120-12-7	Anthracene	<100	7005-72-3	4-Chlorophenylphenylether	<100
206-44-0	Fluoranthrene	<100	67-72-1	Hexachloroethane	<100
129-00-0	Pyrene	<100	87-68-3	Hexachlorobutadiene	<100
56-55-3	Benzo(a)anthracene	<100	77-47-4	Hexchlorocyclopentadiene	<100
218-01-9	Chrysene	<100	111-91-1	Bis(2-chloroethoxy)methane	<100
205-99-2	Benzo(b)fluoranthrene	<100	621-64-7	N-nitrosodi-n-propylamine	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0023 WS5 2.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
No Compounds Detected	-	<100

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0025 WS5 4.5-5.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.	CAS No	Compound	Conc.
108-95-2	Phenol	<100	207-08-9	Benzo(k)fluoranthrene	<100
95-57-8	2-Chlorophenol	<100	50-32-8	Benzo(a)pyrene	<100
95-48-7	2-Methylphenol	<100	193-39-5	Indeno(1,2,3-cd)pyrene	<100
106-44-5	4-Methylphenol	<100	53-70-3	Dibenzo(a,h)anthracene	<100
88-75-5	2-Nitrophenol	<100	191-24-2	Benzo(ghi)perylene	<100
100-02-7	4-Nitrophenol	<100	91-58-7	2-Chloronaphthalene	<100
120-83-2	2,4-Dichlorophenol	<100	91-57-6	2-Methylnaphthalene	<100
105-67-9	2,4-Dimethylphenol	<100	86-74-8	Carbazole	<100
59-50-7	4-Chloro-3-methylphenol	<100	78-59-1	Isophorone	<100
88-06-2	2,4,6-Trichlorophenol	<100	132-64-9	Dibenzofuran	<100
95-95-4	2,4,5-Trichlorophenol	<100	131-11-3	Dimethyl phthalate	<100
87-86-5	Pentachlorophenol	<100	84-66-2	Diethyl phthalate	<100
541-73-1	1,3-Dichlorobenzene	<100	84-74-2	Di-n-butylphthalate	<100
106-46-7	1,4-Dichlorobenzene	<100	117-84-0	Di-n-octylphthalate	<100
95-50-1	1,2-Dichlorobenzene	<100	117-81-7	Bis(2-ethylhexyl)phthalate	<100
120-82-1	1,2,4-Trichlorobenzene	<100	85-68-7	Butylbenzylphthalate	<100
98-95-3	Nitrobenzene	<100	106-47-8	4-Chloroaniline	<100
103-33-3	Azobenzene	<100	88-74-4	2-Nitroanaline	<100
118-74-1	Hexachlorobenzene	<100	99-09-2	3-Nitroaniline	<100
91-20-3	Naphthalene	<100	100-01-6	4-Nitroaniline	<100
208-96-8	Acenaphthylene	<100	121-14-2	2,4-Dinitrotoluene	<100
83-32-9	Acenaphthene	<100	606-20-2	2,6-Dinitrotoluene	<100
86-73-7	Fluorene	<100	111-44-4	Bis(2-chloroethyl)ether	<100
85-01-8	Phenanthrene	<100	101-55-3	4-Bromophenylphenylether	<100
120-12-7	Anthracene	<100	7005-72-3	4-Chlorophenylphenylether	<100
206-44-0	Fluoranthrene	<100	67-72-1	Hexachloroethane	<100
129-00-0	Pyrene	<100	87-68-3	Hexachlorobutadiene	<100
56-55-3	Benzo(a)anthracene	<100	77-47-4	Hexchlorocyclopentadiene	<100
218-01-9	Chrysene	<100	111-91-1	Bis(2-chloroethoxy)methane	<100
205-99-2	Benzo(b)fluoranthrene	<100	621-64-7	N-nitrosodi-n-propylamine	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0025 WS5 4.5-5.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
C12-C23 Hydrocarbons	-	63500

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0028 WS7 1.0-1.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.	CAS No	Compound	Conc.
108-95-2	Phenol	<100	207-08-9	Benzo(k)fluoranthrene	<100
95-57-8	2-Chlorophenol	<100	50-32-8	Benzo(a)pyrene	<100
95-48-7	2-Methylphenol	<100	193-39-5	Indeno(1,2,3-cd)pyrene	<100
106-44-5	4-Methylphenol	<100	53-70-3	Dibenzo(a,h)anthracene	<100
88-75-5	2-Nitrophenol	<100	191-24-2	Benzo(ghi)perylene	<100
100-02-7	4-Nitrophenol	<100	91-58-7	2-Chloronaphthalene	<100
120-83-2	2,4-Dichlorophenol	<100	91-57-6	2-Methylnaphthalene	<100
105-67-9	2,4-Dimethylphenol	<100	86-74-8	Carbazole	<100
59-50-7	4-Chloro-3-methylphenol	<100	78-59-1	Isophorone	<100
88-06-2	2,4,6-Trichlorophenol	<100	132-64-9	Dibenzofuran	<100
95-95-4	2,4,5-Trichlorophenol	<100	131-11-3	Dimethyl phthalate	<100
87-86-5	Pentachlorophenol	<100	84-66-2	Diethyl phthalate	<100
541-73-1	1,3-Dichlorobenzene	<100	84-74-2	Di-n-butylphthalate	<100
106-46-7	1,4-Dichlorobenzene	<100	117-84-0	Di-n-octylphthalate	<100
95-50-1	1,2-Dichlorobenzene	<100	117-81-7	Bis(2-ethylhexyl)phthalate	<100
120-82-1	1,2,4-Trichlorobenzene	<100	85-68-7	Butylbenzylphthalate	<100
98-95-3	Nitrobenzene	<100	106-47-8	4-Chloroaniline	<100
103-33-3	Azobenzene	<100	88-74-4	2-Nitroanaline	<100
118-74-1	Hexachlorobenzene	<100	99-09-2	3-Nitroaniline	<100
91-20-3	Naphthalene	<100	100-01-6	4-Nitroaniline	<100
208-96-8	Acenaphthylene	<100	121-14-2	2,4-Dinitrotoluene	<100
83-32-9	Acenaphthene	<100	606-20-2	2,6-Dinitrotoluene	<100
86-73-7	Fluorene	<100	111-44-4	Bis(2-chloroethyl)ether	<100
85-01-8	Phenanthrene	<100	101-55-3	4-Bromophenylphenylether	<100
120-12-7	Anthracene	<100	7005-72-3	4-Chlorophenylphenylether	<100
206-44-0	Fluoranthrene	<100	67-72-1	Hexachloroethane	<100
129-00-0	Pyrene	<100	87-68-3	Hexachlorobutadiene	<100
56-55-3	Benzo(a)anthracene	<100	77-47-4	Hexchlorocyclopentadiene	<100
218-01-9	Chrysene	<100	111-91-1	Bis(2-chloroethoxy)methane	<100
205-99-2	Benzo(b)fluoranthrene	<100	621-64-7	N-nitrosodi-n-propylamine	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0028 WS7 1.0-1.5
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
No Compounds Detected	-	<100

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0032 WS10 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.	CAS No	Compound	Conc.
108-95-2	Phenol	<100	207-08-9	Benzo(k)fluoranthrene	<100
95-57-8	2-Chlorophenol	<100	50-32-8	Benzo(a)pyrene	<100
95-48-7	2-Methylphenol	<100	193-39-5	Indeno(1,2,3-cd)pyrene	<100
106-44-5	4-Methylphenol	<100	53-70-3	Dibenzo(a,h)anthracene	<100
88-75-5	2-Nitrophenol	<100	191-24-2	Benzo(ghi)perylene	<100
100-02-7	4-Nitrophenol	<100	91-58-7	2-Chloronaphthalene	<100
120-83-2	2,4-Dichlorophenol	<100	91-57-6	2-Methylnaphthalene	<100
105-67-9	2,4-Dimethylphenol	<100	86-74-8	Carbazole	<100
59-50-7	4-Chloro-3-methylphenol	<100	78-59-1	Isophorone	<100
88-06-2	2,4,6-Trichlorophenol	<100	132-64-9	Dibenzofuran	<100
95-95-4	2,4,5-Trichlorophenol	<100	131-11-3	Dimethyl phthalate	<100
87-86-5	Pentachlorophenol	<100	84-66-2	Diethyl phthalate	<100
541-73-1	1,3-Dichlorobenzene	<100	84-74-2	Di-n-butylphthalate	<100
106-46-7	1,4-Dichlorobenzene	<100	117-84-0	Di-n-octylphthalate	<100
95-50-1	1,2-Dichlorobenzene	<100	117-81-7	Bis(2-ethylhexyl)phthalate	<100
120-82-1	1,2,4-Trichlorobenzene	<100	85-68-7	Butylbenzylphthalate	<100
98-95-3	Nitrobenzene	<100	106-47-8	4-Chloroaniline	<100
103-33-3	Azobenzene	<100	88-74-4	2-Nitroanaline	<100
118-74-1	Hexachlorobenzene	<100	99-09-2	3-Nitroaniline	<100
91-20-3	Naphthalene	<100	100-01-6	4-Nitroaniline	<100
208-96-8	Acenaphthylene	<100	121-14-2	2,4-Dinitrotoluene	<100
83-32-9	Acenaphthene	<100	606-20-2	2,6-Dinitrotoluene	<100
86-73-7	Fluorene	<100	111-44-4	Bis(2-chloroethyl)ether	<100
85-01-8	Phenanthrene	260	101-55-3	4-Bromophenylphenylether	<100
120-12-7	Anthracene	<100	7005-72-3	4-Chlorophenylphenylether	<100
206-44-0	Fluoranthrene	246	67-72-1	Hexachloroethane	<100
129-00-0	Pyrene	214	87-68-3	Hexachlorobutadiene	<100
56-55-3	Benzo(a)anthracene	<100	77-47-4	Hexchlorocyclopentadiene	<100
218-01-9	Chrysene	<100	111-91-1	Bis(2-chloroethoxy)methane	<100
205-99-2	Benzo(b)fluoranthrene	<100	621-64-7	N-nitrosodi-n-propylamine	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0032 WS10 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	Retention Time min	Concentration µg/kg
No Compounds Detected	-	<100

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0038 WS11 3.5-4.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.
108-95-2	Phenol	<100
95-57-8	2-Chlorophenol	<100
95-48-7	2-Methylphenol	<100
106-44-5	4-Methylphenol	<100
88-75-5	2-Nitrophenol	<100
100-02-7	4-Nitrophenol	<100
120-83-2	2,4-Dichlorophenol	<100
105-67-9	2,4-Dimethylphenol	<100
59-50-7	4-Chloro-3-methylphenol	<100
88-06-2	2,4,6-Trichlorophenol	<100
95-95-4	2,4,5-Trichlorophenol	<100
87-86-5	Pentachlorophenol	<100
541-73-1	1,3-Dichlorobenzene	<100
106-46-7	1,4-Dichlorobenzene	<100
95-50-1	1,2-Dichlorobenzene	<100
120-82-1	1,2,4-Trichlorobenzene	<100
98-95-3	Nitrobenzene	<100
103-33-3	Azobenzene	<100
118-74-1	Hexachlorobenzene	<100
91-20-3	Naphthalene	<100
208-96-8	Acenaphthylene	<100
83-32-9	Acenaphthene	<100
86-73-7	Fluorene	<100
85-01-8	Phenanthrene	<100
120-12-7	Anthracene	<100
206-44-0	Fluoranthrene	<100
129-00-0	Pyrene	<100
56-55-3	Benzo(a)anthracene	<100
218-01-9	Chrysene	<100
205-99-2	Benzo(b)fluoranthrene	<100

CAS No	Compound	Conc.
207-08-9	Benzo(k)fluoranthrene	<100
50-32-8	Benzo(a)pyrene	<100
193-39-5	Indeno(1,2,3-cd)pyrene	<100
53-70-3	Dibenzo(a,h)anthracene	<100
191-24-2	Benzo(ghi)perylene	<100
91-58-7	2-Chloronaphthalene	<100
91-57-6	2-Methylnaphthalene	<100
86-74-8	Carbazole	<100
78-59-1	Isophorone	<100
132-64-9	Dibenzofuran	<100
131-11-3	Dimethyl phthalate	<100
84-66-2	Diethyl phthalate	<100
84-74-2	Di-n-butylphthalate	<100
117-84-0	Di-n-octylphthalate	<100
117-81-7	Bis(2-ethylhexyl)phthalate	<100
85-68-7	Butylbenzylphthalate	<100
106-47-8	4-Chloroaniline	<100
88-74-4	2-Nitroanaline	<100
99-09-2	3-Nitroaniline	<100
100-01-6	4-Nitroaniline	<100
121-14-2	2,4-Dinitrotoluene	<100
606-20-2	2,6-Dinitrotoluene	<100
111-44-4	Bis(2-chloroethyl)ether	<100
101-55-3	4-Bromophenylphenylether	<100
7005-72-3	4-Chlorophenylphenylether	<100
67-72-1	Hexachloroethane	<100
87-68-3	Hexachlorobutadiene	<100
77-47-4	Hexchlorocyclopentadiene	<100
111-91-1	Bis(2-chloroethoxy)methane	<100
621-64-7	N-nitrosodi-n-propylamine	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0038 WS11 3.5-4.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
No Compounds Detected	-	<100

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0044 WS13 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.	CAS No	Compound	Conc.
108-95-2	Phenol	<100	207-08-9	Benzo(k)fluoranthrene	<100
95-57-8	2-Chlorophenol	<100	50-32-8	Benzo(a)pyrene	<100
95-48-7	2-Methylphenol	<100	193-39-5	Indeno(1,2,3-cd)pyrene	<100
106-44-5	4-Methylphenol	<100	53-70-3	Dibenzo(a,h)anthracene	<100
88-75-5	2-Nitrophenol	<100	191-24-2	Benzo(ghi)perylene	<100
100-02-7	4-Nitrophenol	<100	91-58-7	2-Chloronaphthalene	<100
120-83-2	2,4-Dichlorophenol	<100	91-57-6	2-Methylnaphthalene	<100
105-67-9	2,4-Dimethylphenol	<100	86-74-8	Carbazole	<100
59-50-7	4-Chloro-3-methylphenol	<100	78-59-1	Isophorone	<100
88-06-2	2,4,6-Trichlorophenol	<100	132-64-9	Dibenzofuran	<100
95-95-4	2,4,5-Trichlorophenol	<100	131-11-3	Dimethyl phthalate	<100
87-86-5	Pentachlorophenol	<100	84-66-2	Diethyl phthalate	<100
541-73-1	1,3-Dichlorobenzene	<100	84-74-2	Di-n-butylphthalate	<100
106-46-7	1,4-Dichlorobenzene	<100	117-84-0	Di-n-octylphthalate	<100
95-50-1	1,2-Dichlorobenzene	<100	117-81-7	Bis(2-ethylhexyl)phthalate	<100
120-82-1	1,2,4-Trichlorobenzene	<100	85-68-7	Butylbenzylphthalate	<100
98-95-3	Nitrobenzene	<100	106-47-8	4-Chloroaniline	<100
103-33-3	Azobenzene	<100	88-74-4	2-Nitroanaline	<100
118-74-1	Hexachlorobenzene	<100	99-09-2	3-Nitroaniline	<100
91-20-3	Naphthalene	<100	100-01-6	4-Nitroaniline	<100
208-96-8	Acenaphthylene	<100	121-14-2	2,4-Dinitrotoluene	<100
83-32-9	Acenaphthene	<100	606-20-2	2,6-Dinitrotoluene	<100
86-73-7	Fluorene	<100	111-44-4	Bis(2-chloroethyl)ether	<100
85-01-8	Phenanthrene	<100	101-55-3	4-Bromophenylphenylether	<100
120-12-7	Anthracene	<100	7005-72-3	4-Chlorophenylphenylether	<100
206-44-0	Fluoranthrene	<100	67-72-1	Hexachloroethane	<100
129-00-0	Pyrene	<100	87-68-3	Hexachlorobutadiene	<100
56-55-3	Benzo(a)anthracene	<100	77-47-4	Hexchlorocyclopentadiene	<100
218-01-9	Chrysene	<100	111-91-1	Bis(2-chloroethoxy)methane	<100
205-99-2	Benzo(b)fluoranthrene	<100	621-64-7	N-nitrosodi-n-propylamine	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0044 WS13 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
No Compounds Detected	-	<100

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0049 WS14 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.	CAS No	Compound	Conc.
108-95-2	Phenol	<100	207-08-9	Benzo(k)fluoranthrene	<100
95-57-8	2-Chlorophenol	<100	50-32-8	Benzo(a)pyrene	<100
95-48-7	2-Methylphenol	<100	193-39-5	Indeno(1,2,3-cd)pyrene	<100
106-44-5	4-Methylphenol	<100	53-70-3	Dibenzo(a,h)anthracene	<100
88-75-5	2-Nitrophenol	<100	191-24-2	Benzo(ghi)perylene	<100
100-02-7	4-Nitrophenol	<100	91-58-7	2-Chloronaphthalene	<100
120-83-2	2,4-Dichlorophenol	<100	91-57-6	2-Methylnaphthalene	<100
105-67-9	2,4-Dimethylphenol	<100	86-74-8	Carbazole	<100
59-50-7	4-Chloro-3-methylphenol	<100	78-59-1	Isophorone	<100
88-06-2	2,4,6-Trichlorophenol	<100	132-64-9	Dibenzofuran	<100
95-95-4	2,4,5-Trichlorophenol	<100	131-11-3	Dimethyl phthalate	<100
87-86-5	Pentachlorophenol	<100	84-66-2	Diethyl phthalate	<100
541-73-1	1,3-Dichlorobenzene	<100	84-74-2	Di-n-butylphthalate	<100
106-46-7	1,4-Dichlorobenzene	<100	117-84-0	Di-n-octylphthalate	<100
95-50-1	1,2-Dichlorobenzene	<100	117-81-7	Bis(2-ethylhexyl)phthalate	<100
120-82-1	1,2,4-Trichlorobenzene	<100	85-68-7	Butylbenzylphthalate	<100
98-95-3	Nitrobenzene	<100	106-47-8	4-Chloroaniline	<100
103-33-3	Azobenzene	<100	88-74-4	2-Nitroanaline	<100
118-74-1	Hexachlorobenzene	<100	99-09-2	3-Nitroaniline	<100
91-20-3	Naphthalene	<100	100-01-6	4-Nitroaniline	<100
208-96-8	Acenaphthylene	<100	121-14-2	2,4-Dinitrotoluene	<100
83-32-9	Acenaphthene	<100	606-20-2	2,6-Dinitrotoluene	<100
86-73-7	Fluorene	<100	111-44-4	Bis(2-chloroethyl)ether	<100
85-01-8	Phenanthrene	<100	101-55-3	4-Bromophenylphenylether	<100
120-12-7	Anthracene	<100	7005-72-3	4-Chlorophenylphenylether	<100
206-44-0	Fluoranthrene	<100	67-72-1	Hexachloroethane	<100
129-00-0	Pyrene	<100	87-68-3	Hexachlorobutadiene	<100
56-55-3	Benzo(a)anthracene	<100	77-47-4	Hexchlorocyclopentadiene	<100
218-01-9	Chrysene	<100	111-91-1	Bis(2-chloroethoxy)methane	<100
205-99-2	Benzo(b)fluoranthrene	<100	621-64-7	N-nitrosodi-n-propylamine	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0049 WS14 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
No Compounds Detected	-	<100

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0051WS15 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.	CAS No	Compound	Conc.
108-95-2	Phenol	<100	207-08-9	Benzo(k)fluoranthrene	<100
95-57-8	2-Chlorophenol	<100	50-32-8	Benzo(a)pyrene	<100
95-48-7	2-Methylphenol	<100	193-39-5	Indeno(1,2,3-cd)pyrene	<100
106-44-5	4-Methylphenol	<100	53-70-3	Dibenzo(a,h)anthracene	<100
88-75-5	2-Nitrophenol	<100	191-24-2	Benzo(ghi)perylene	<100
100-02-7	4-Nitrophenol	<100	91-58-7	2-Chloronaphthalene	<100
120-83-2	2,4-Dichlorophenol	<100	91-57-6	2-Methylnaphthalene	<100
105-67-9	2,4-Dimethylphenol	<100	86-74-8	Carbazole	<100
59-50-7	4-Chloro-3-methylphenol	<100	78-59-1	Isophorone	<100
88-06-2	2,4,6-Trichlorophenol	<100	132-64-9	Dibenzofuran	<100
95-95-4	2,4,5-Trichlorophenol	<100	131-11-3	Dimethyl phthalate	<100
87-86-5	Pentachlorophenol	<100	84-66-2	Diethyl phthalate	<100
541-73-1	1,3-Dichlorobenzene	<100	84-74-2	Di-n-butylphthalate	<100
106-46-7	1,4-Dichlorobenzene	<100	117-84-0	Di-n-octylphthalate	<100
95-50-1	1,2-Dichlorobenzene	<100	117-81-7	Bis(2-ethylhexyl)phthalate	<100
120-82-1	1,2,4-Trichlorobenzene	<100	85-68-7	Butylbenzylphthalate	<100
98-95-3	Nitrobenzene	<100	106-47-8	4-Chloroaniline	<100
103-33-3	Azobenzene	<100	88-74-4	2-Nitroanaline	<100
118-74-1	Hexachlorobenzene	<100	99-09-2	3-Nitroaniline	<100
91-20-3	Naphthalene	<100	100-01-6	4-Nitroaniline	<100
208-96-8	Acenaphthylene	<100	121-14-2	2,4-Dinitrotoluene	<100
83-32-9	Acenaphthene	<100	606-20-2	2,6-Dinitrotoluene	<100
86-73-7	Fluorene	<100	111-44-4	Bis(2-chloroethyl)ether	<100
85-01-8	Phenanthrene	400	101-55-3	4-Bromophenylphenylether	<100
120-12-7	Anthracene	<100	7005-72-3	4-Chlorophenylphenylether	<100
206-44-0	Fluoranthrene	251	67-72-1	Hexachloroethane	<100
129-00-0	Pyrene	217	87-68-3	Hexachlorobutadiene	<100
56-55-3	Benzo(a)anthracene	<100	77-47-4	Hexchlorocyclopentadiene	<100
218-01-9	Chrysene	<100	111-91-1	Bis(2-chloroethoxy)methane	<100
205-99-2	Benzo(b)fluoranthrene	<100	621-64-7	N-nitrosodi-n-propylamine	<100

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0054 WS16 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.	CAS No	Compound	Conc.
108-95-2	Phenol	<100	207-08-9	Benzo(k)fluoranthrene	<100
95-57-8	2-Chlorophenol	<100	50-32-8	Benzo(a)pyrene	<100
95-48-7	2-Methylphenol	<100	193-39-5	Indeno(1,2,3-cd)pyrene	<100
106-44-5	4-Methylphenol	<100	53-70-3	Dibenzo(a,h)anthracene	<100
88-75-5	2-Nitrophenol	<100	191-24-2	Benzo(ghi)perylene	<100
100-02-7	4-Nitrophenol	<100	91-58-7	2-Chloronaphthalene	<100
120-83-2	2,4-Dichlorophenol	<100	91-57-6	2-Methylnaphthalene	<100
105-67-9	2,4-Dimethylphenol	<100	86-74-8	Carbazole	<100
59-50-7	4-Chloro-3-methylphenol	<100	78-59-1	Isophorone	<100
88-06-2	2,4,6-Trichlorophenol	<100	132-64-9	Dibenzofuran	<100
95-95-4	2,4,5-Trichlorophenol	<100	131-11-3	Dimethyl phthalate	<100
87-86-5	Pentachlorophenol	<100	84-66-2	Diethyl phthalate	<100
541-73-1	1,3-Dichlorobenzene	<100	84-74-2	Di-n-butylphthalate	<100
106-46-7	1,4-Dichlorobenzene	<100	117-84-0	Di-n-octylphthalate	<100
95-50-1	1,2-Dichlorobenzene	<100	117-81-7	Bis(2-ethylhexyl)phthalate	<100
120-82-1	1,2,4-Trichlorobenzene	<100	85-68-7	Butylbenzylphthalate	<100
98-95-3	Nitrobenzene	<100	106-47-8	4-Chloroaniline	<100
103-33-3	Azobenzene	<100	88-74-4	2-Nitroanaline	<100
118-74-1	Hexachlorobenzene	<100	99-09-2	3-Nitroaniline	<100
91-20-3	Naphthalene	<100	100-01-6	4-Nitroaniline	<100
208-96-8	Acenaphthylene	<100	121-14-2	2,4-Dinitrotoluene	<100
83-32-9	Acenaphthene	<100	606-20-2	2,6-Dinitrotoluene	<100
86-73-7	Fluorene	<100	111-44-4	Bis(2-chloroethyl)ether	<100
85-01-8	Phenanthrene	<100	101-55-3	4-Bromophenylphenylether	<100
120-12-7	Anthracene	<100	7005-72-3	4-Chlorophenylphenylether	<100
206-44-0	Fluoranthrene	<100	67-72-1	Hexachloroethane	<100
129-00-0	Pyrene	<100	87-68-3	Hexachlorobutadiene	<100
56-55-3	Benzo(a)anthracene	<100	77-47-4	Hexchlorocyclopentadiene	<100
218-01-9	Chrysene	<100	111-91-1	Bis(2-chloroethoxy)methane	<100
205-99-2	Benzo(b)fluoranthrene	<100	621-64-7	N-nitrosodi-n-propylamine	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0051WS15 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	Retention Time min	Concentration µg/kg
No Compounds Detected	-	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0054 WS16 0.5-1.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	Retention Time min	Concentration µg/kg
No Compounds Detected	-	<100

ALcontrol Geochem

Semivolatiles

Sample Identity - DUB-02-B02182-S0057 WS8 1.5-2.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

CAS No	Compound	Conc.	CAS No	Compound	Conc.
108-95-2	Phenol	<100	207-08-9	Benzo(k)fluoranthrene	<100
95-57-8	2-Chlorophenol	<100	50-32-8	Benzo(a)pyrene	<100
95-48-7	2-Methylphenol	<100	193-39-5	Indeno(1,2,3-cd)pyrene	<100
106-44-5	4-Methylphenol	<100	53-70-3	Dibenzo(a,h)anthracene	<100
88-75-5	2-Nitrophenol	<100	191-24-2	Benzo(ghi)perylene	<100
100-02-7	4-Nitrophenol	<100	91-58-7	2-Chloronaphthalene	<100
120-83-2	2,4-Dichlorophenol	<100	91-57-6	2-Methylnaphthalene	<100
105-67-9	2,4-Dimethylphenol	<100	86-74-8	Carbazole	<100
59-50-7	4-Chloro-3-methylphenol	<100	78-59-1	Isophorone	<100
88-06-2	2,4,6-Trichlorophenol	<100	132-64-9	Dibenzofuran	<100
95-95-4	2,4,5-Trichlorophenol	<100	131-11-3	Dimethyl phthalate	<100
87-86-5	Pentachlorophenol	<100	84-66-2	Diethyl phthalate	<100
541-73-1	1,3-Dichlorobenzene	<100	84-74-2	Di-n-butylphthalate	<100
106-46-7	1,4-Dichlorobenzene	<100	117-84-0	Di-n-octylphthalate	<100
95-50-1	1,2-Dichlorobenzene	<100	117-81-7	Bis(2-ethylhexyl)phthalate	<100
120-82-1	1,2,4-Trichlorobenzene	<100	85-68-7	Butylbenzylphthalate	<100
98-95-3	Nitrobenzene	<100	106-47-8	4-Chloroaniline	<100
103-33-3	Azobenzene	<100	88-74-4	2-Nitroanaline	<100
118-74-1	Hexachlorobenzene	<100	99-09-2	3-Nitroaniline	<100
91-20-3	Naphthalene	<100	100-01-6	4-Nitroaniline	<100
208-96-8	Acenaphthylene	<100	121-14-2	2,4-Dinitrotoluene	<100
83-32-9	Acenaphthene	<100	606-20-2	2,6-Dinitrotoluene	<100
86-73-7	Fluorene	<100	111-44-4	Bis(2-chloroethyl)ether	<100
85-01-8	Phenanthrene	<100	101-55-3	4-Bromophenylphenylether	<100
120-12-7	Anthracene	<100	7005-72-3	4-Chlorophenylphenylether	<100
206-44-0	Fluoranthrene	<100	67-72-1	Hexachloroethane	<100
129-00-0	Pyrene	<100	87-68-3	Hexachlorobutadiene	<100
56-55-3	Benzo(a)anthracene	<100	77-47-4	Hexchlorocyclopentadiene	<100
218-01-9	Chrysene	<100	111-91-1	Bis(2-chloroethoxy)methane	<100
205-99-2	Benzo(b)fluoranthrene	<100	621-64-7	N-nitrosodi-n-propylamine	<100

Alcontrol Geochem

Tentatively Identified Compounds
SVOC

Sample Identity - DUB-02-B02182-S0057 WS8 1.5-2.0
Client / Sample matrix - Irish Geotechnical Services Ltd/Soil
Units - µg/kg

Compound	RetentionTime min	Concentration µg/kg
No Compounds Detected	-	<100

Geochem Analytical Services

Polychlorinated Biphenyls
by
GCMS

Sample Matrix : Water
Our Reference: 14074/01/02
Date Sample Received: 3/1/2003
Date Extracted/Prepared: 8/1/2003
Extraction procedure: N/A
Column Extraction: Yes
Date Analysed: 13/01/03
GC-MS Mode: SIM
Internal Standard: External

	Sample No.	002				
	Client Ref.	2182-6				
	P.Q.L.	1				
CAS Number	Units	µg/l				
12674-11-2	Aroclor 1016					
11104-28-2	Aroclor 1221					
11141-16-5	Aroclor 1232					
53469-21-9	Aroclor 1242					
12672-29-6	Aroclor 1248					
11097-69-1	Aroclor 1254					
11096-82-5	Aroclor 1260					
	Total	<1				

Calculated against Aroclor 1254.

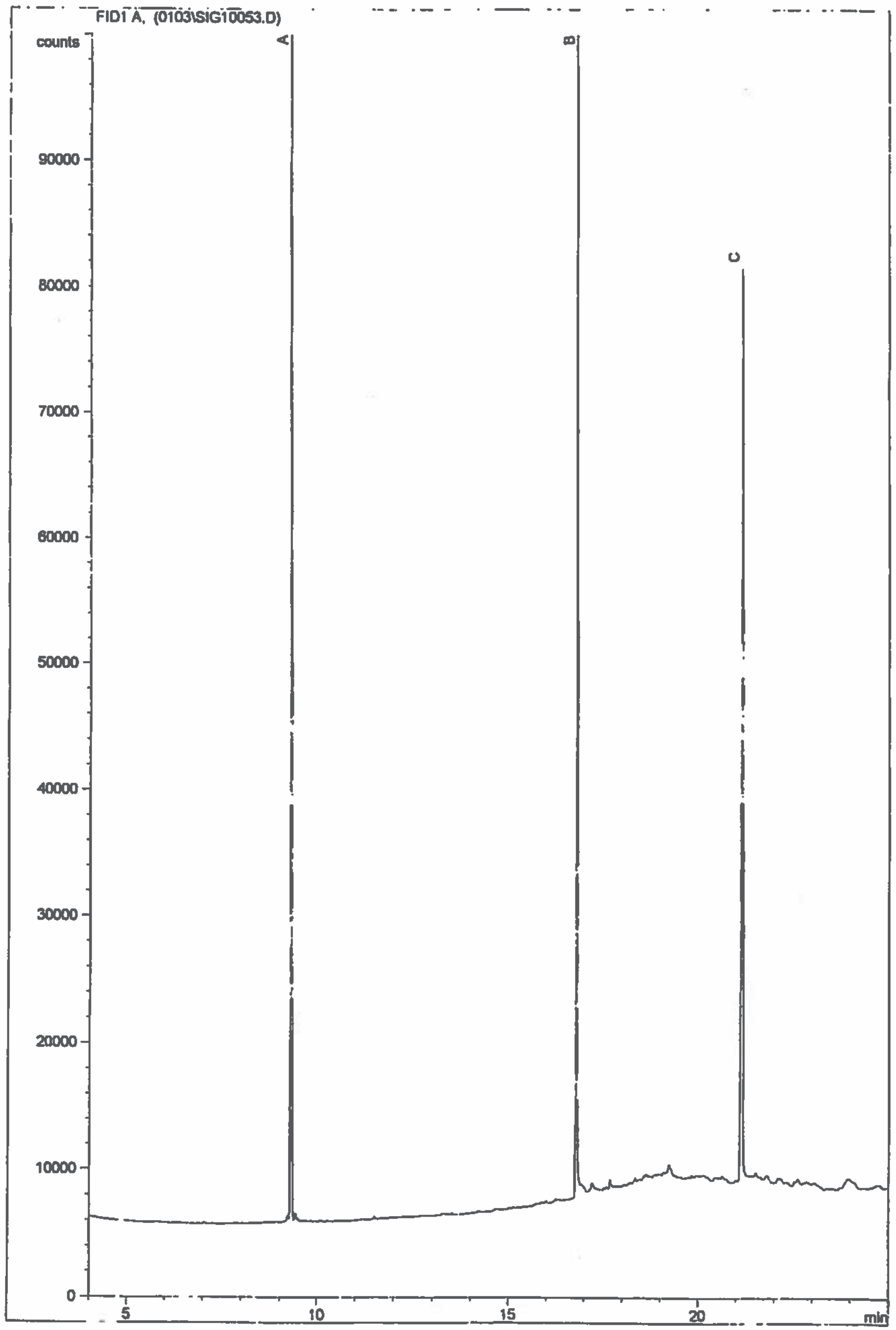
APPENDIX

APPENDIX

1. Results are expressed as mg/kg dry weight unless otherwise stated, excluding analyses in (2) below.
2. Leach tests, cyanide, phenols by MS, hexavalent chrome, flash point, acid soluble sulphides, TPH by IR and volatiles are performed on wet soil as received, and results are expressed as mg/Kg of wet soil or mg/l of leachate of specified leach test. Ammoniacal nitrogen and total phenols by HPLC are performed on wet sample but are then re-calculated and expressed as mg/kg of dry soil.
3. ICP metals results are analysed using a screening program and the data is accurate to within 20%.
4. The majority of analyses are run to an accuracy of 10%, but this may be improved upon if legally defensible data is required.
5. A sub sample of all samples received will be retained free of charge for two months for soils and one month for waters (sample size permitting), but may then be discarded unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage.
6. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.
7. Please note that we take no responsibility for any test performed by sub-contractors (marked with an asterisk).
8. Asbestos screen is done in-house on soils and if no fibres are found will be reported as NFP-no fibres present. If asbestos is detected then identification & quantification is carried out by a sub-contractor. If a sample is suspected of containing asbestos then drying & crushing will be suspended on that sample until the asbestos result is known. If asbestos is present then no analysis requiring dry sample will be undertaken.
9. NDP-No determination possible due to insufficient/unsuitable sample.

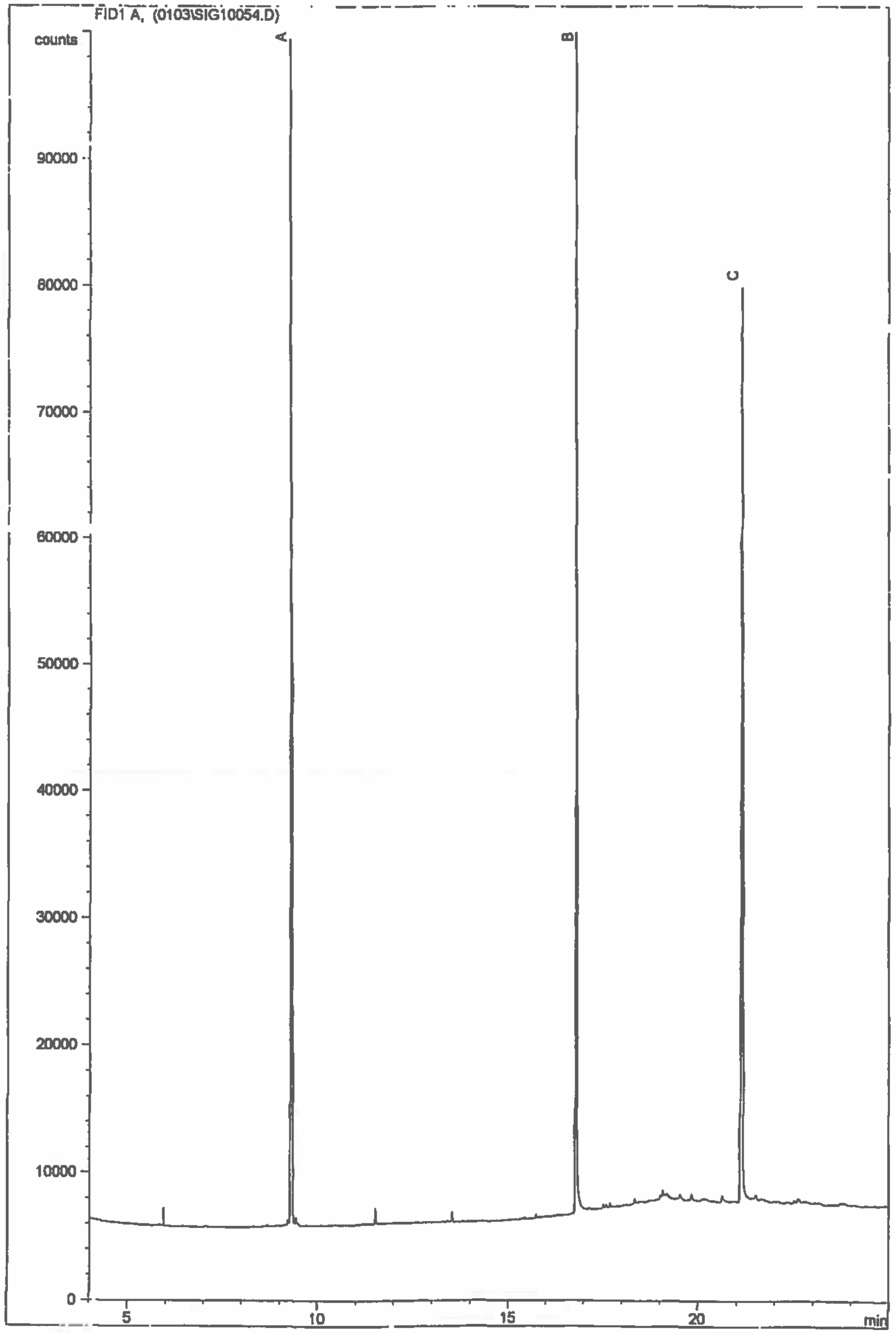
Alcontrol Laboratories Ireland
Diesel Range Organics Analysis
By G.C.

2182-7



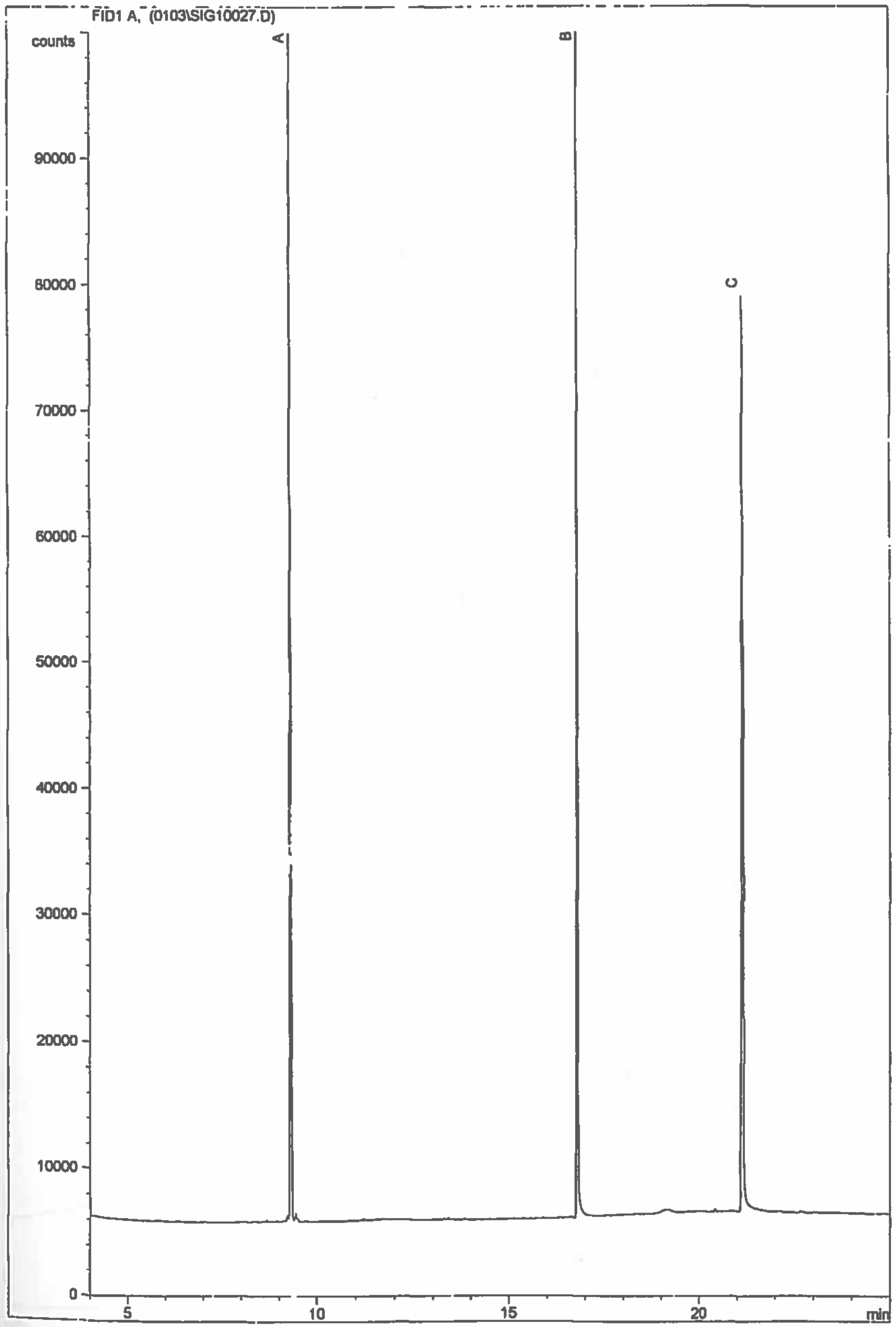
ALcontrol Laboratories Ireland
Diesel Range Organics Analysis
By G.C.

2182-9



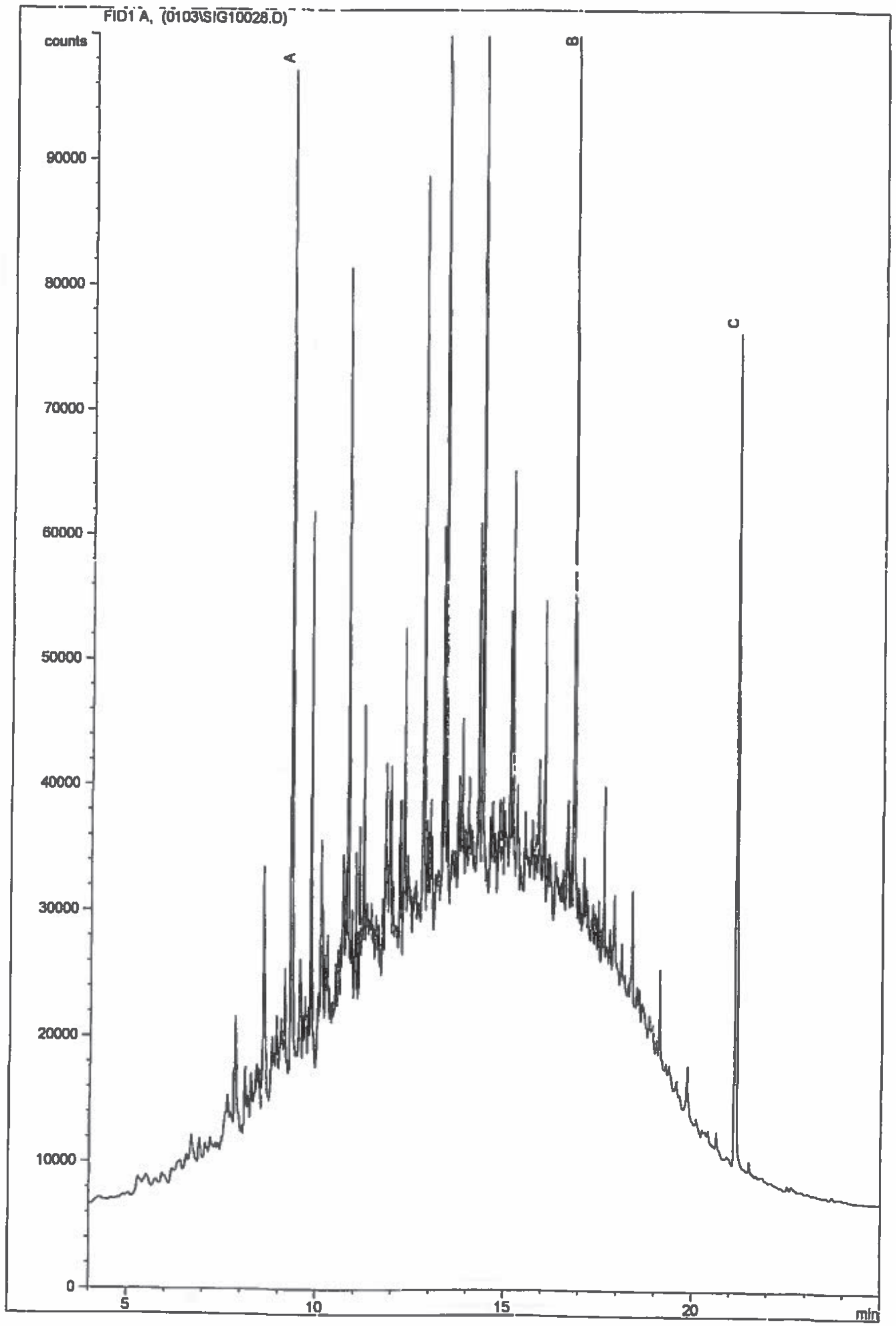
ALcontrol Laboratories Ireland
Diesel Range Organics Analysis
By G.C.

2182-10



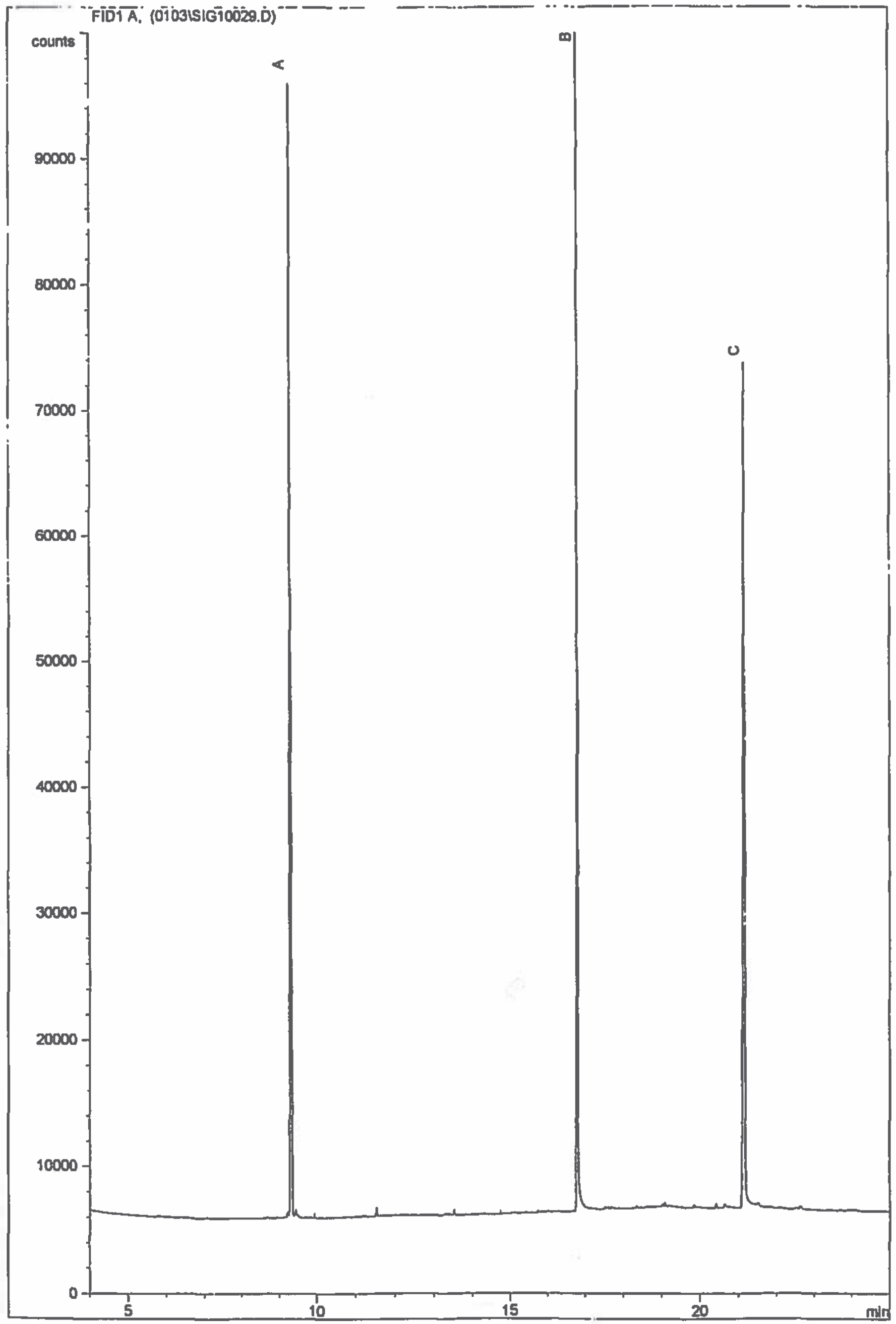
ALcontrol Laboratories Ireland
Diesel Range Organics Analysis
By G.C.

2182-11



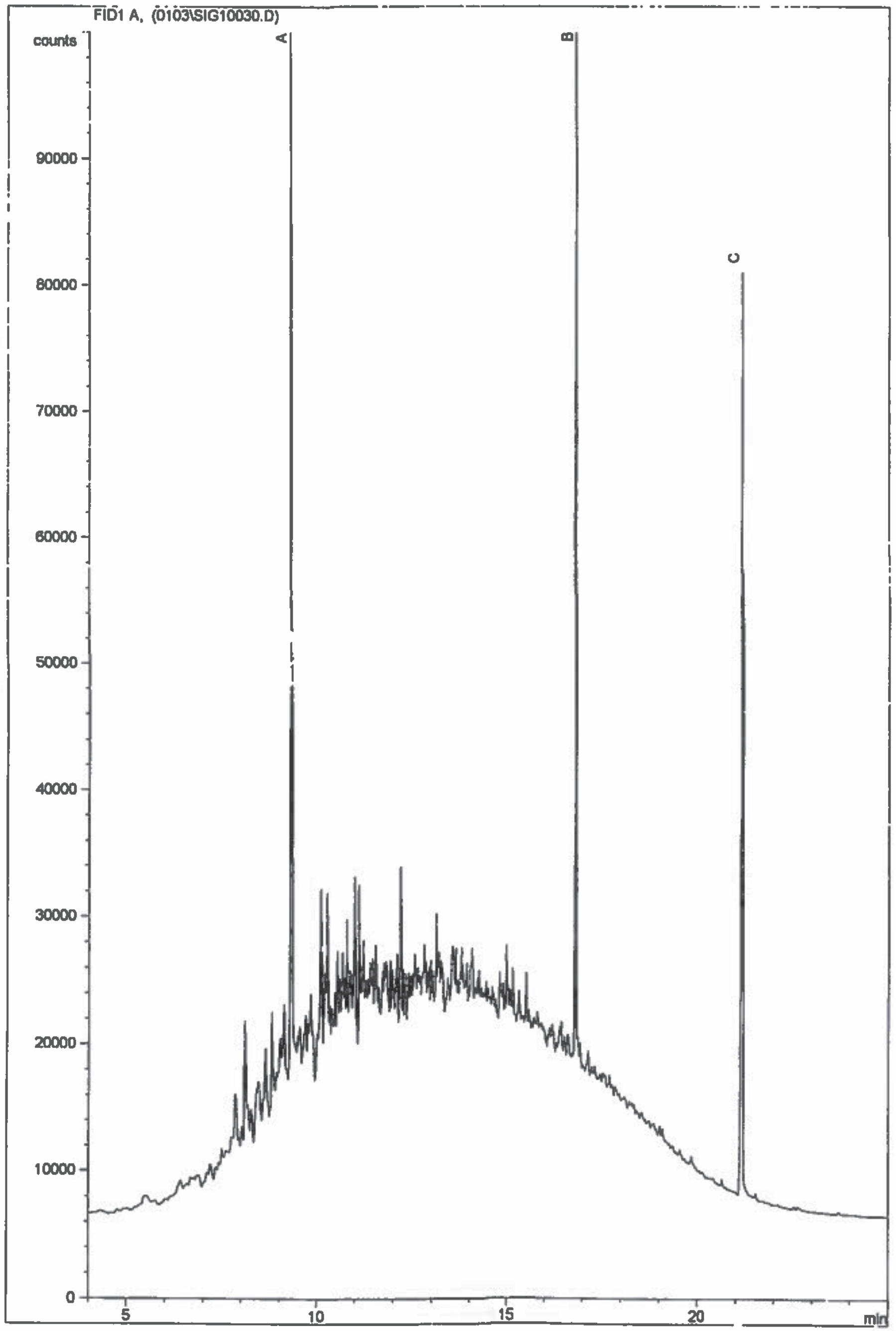
ALcontrol Laboratories Ireland
Diesel Range Organics Analysis
By G.C.

2182-13



Alcontrol Laboratories Ireland
Diesel Range Organics Analysis
By G.C.

2182-15



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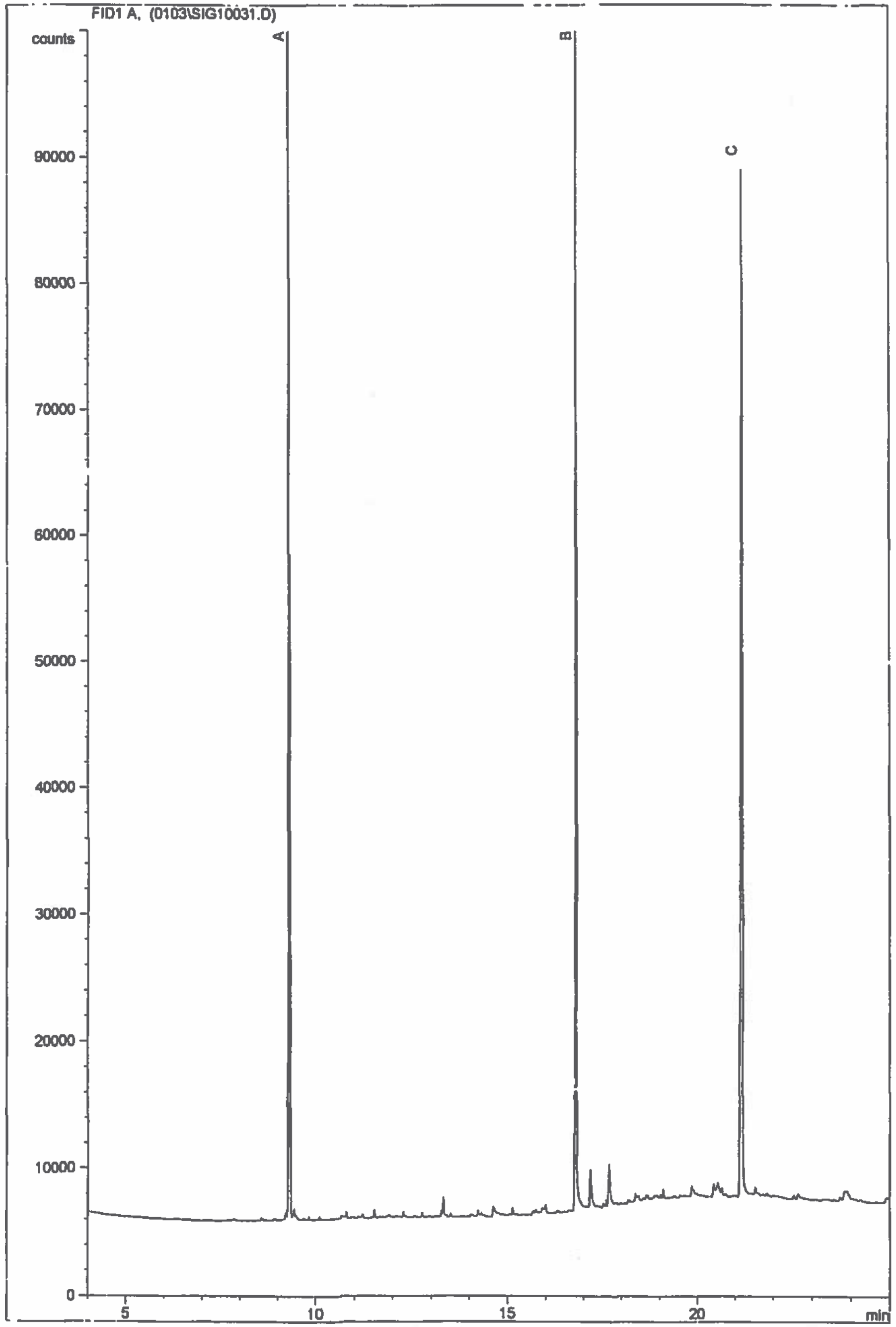
Diesel Range Organics Analysis
By G.C.

2182-16



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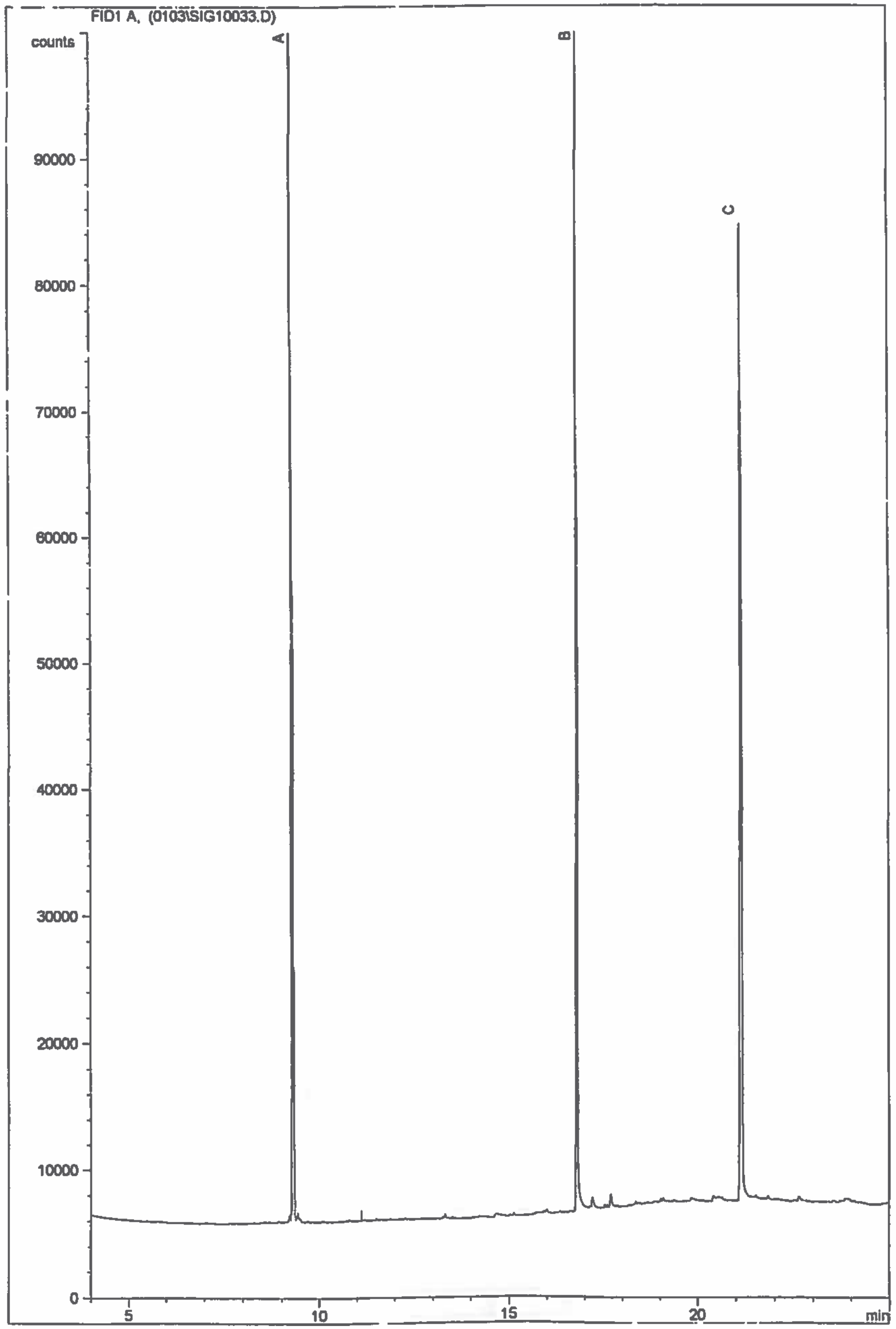
Diesel Range Organics Analysis
By G.C.

2182-19



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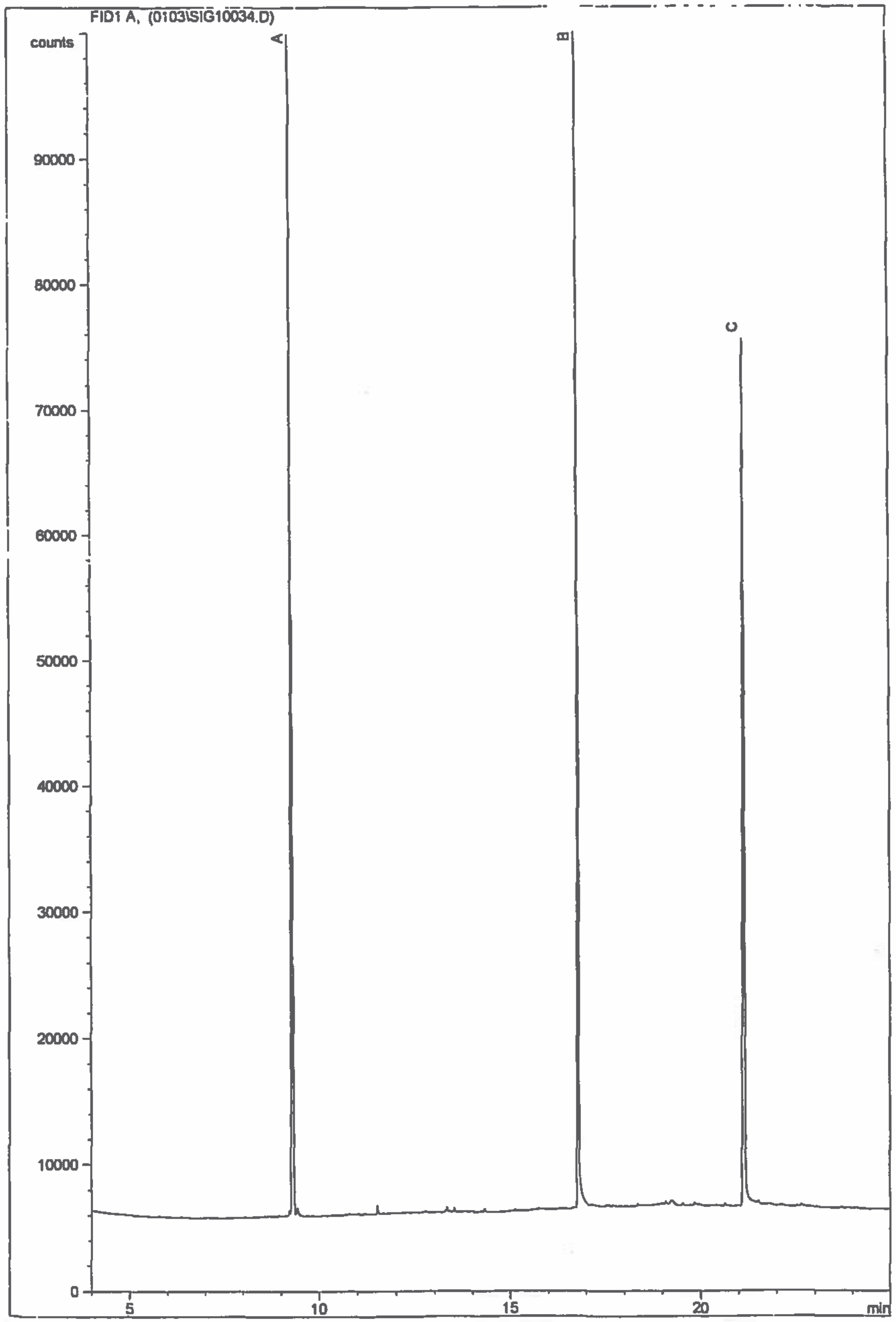
Diesel Range Organics Analysis
By G.C.

2182-23



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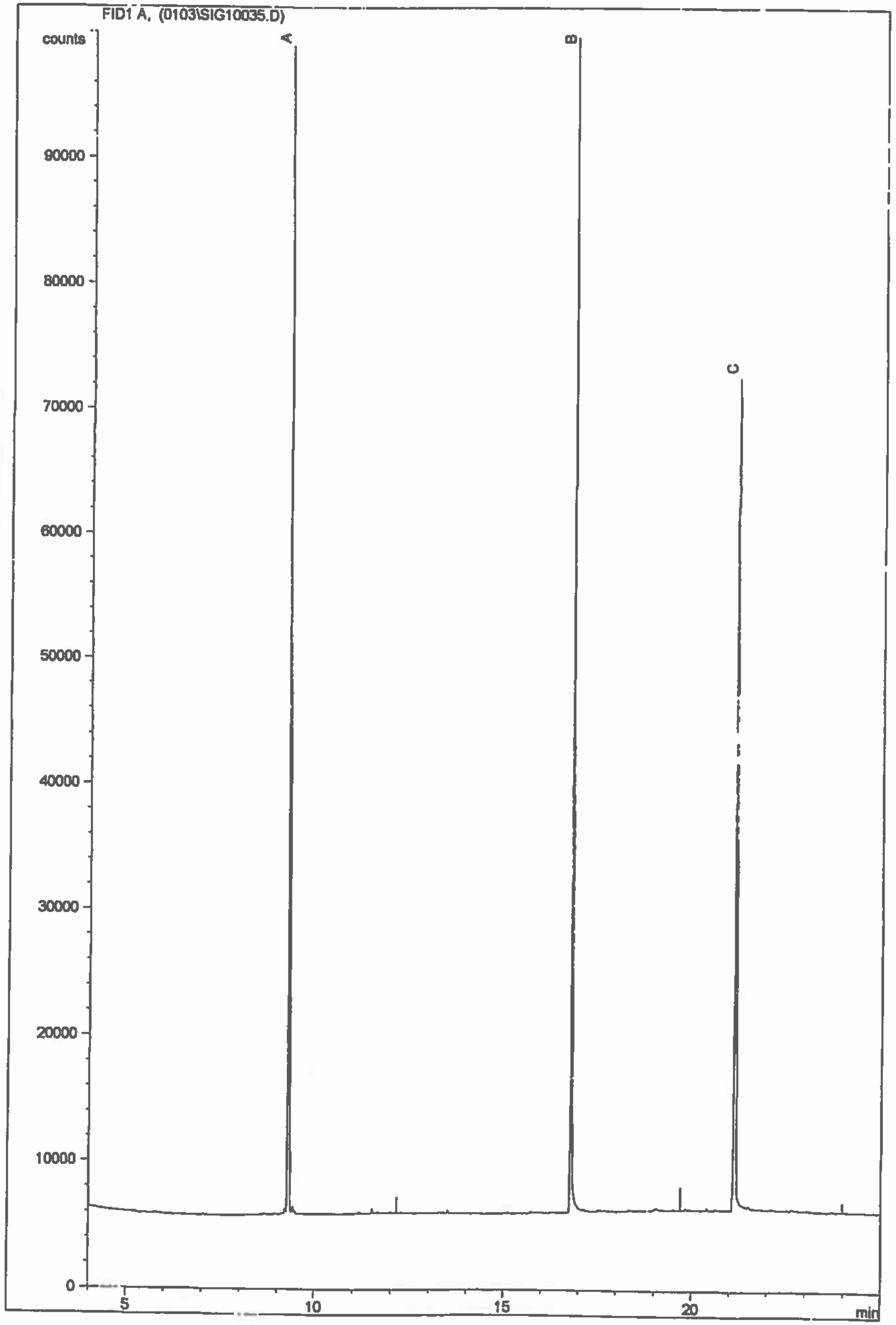
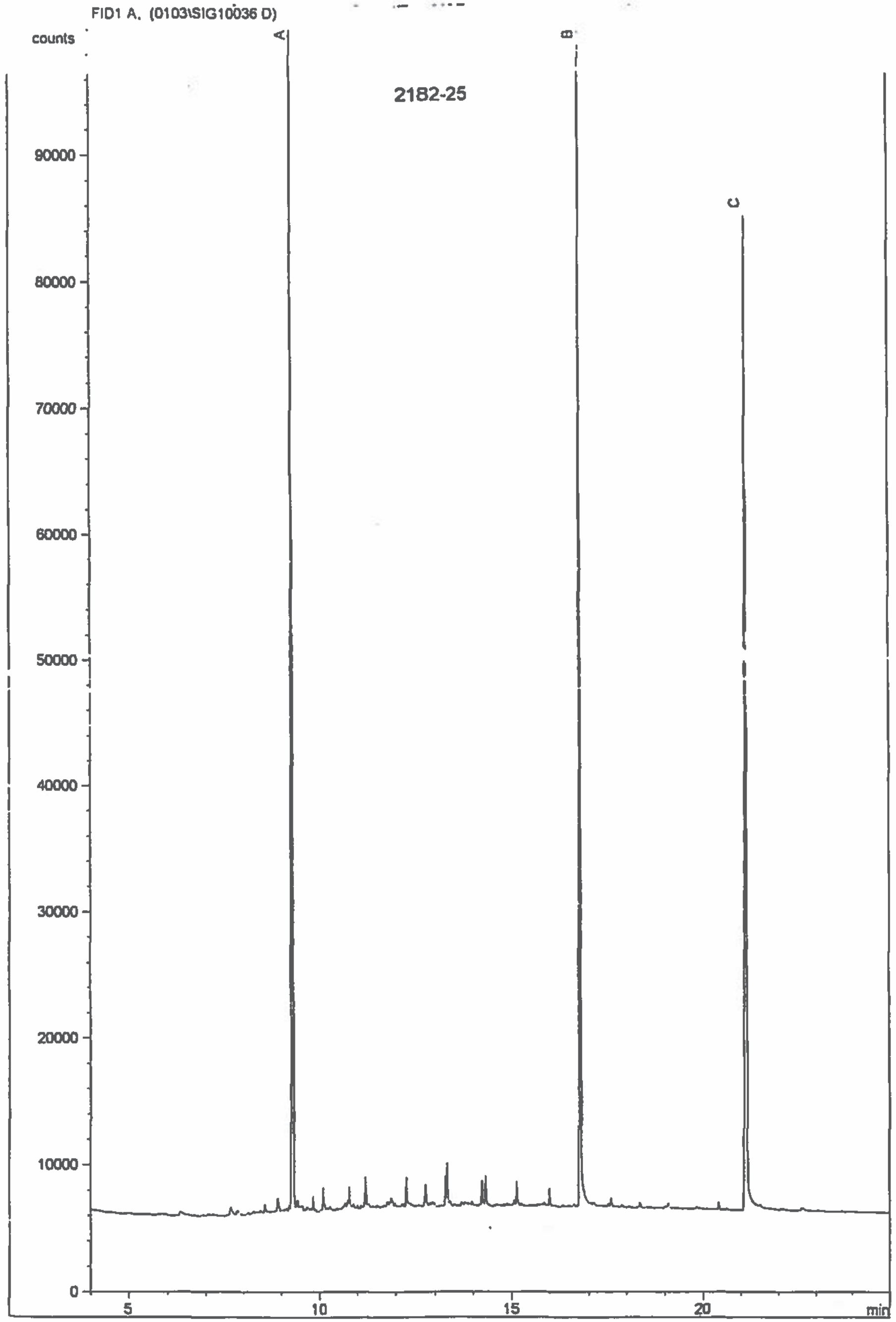
Diesel Range Organics Analysis
By G.C.

2182-28





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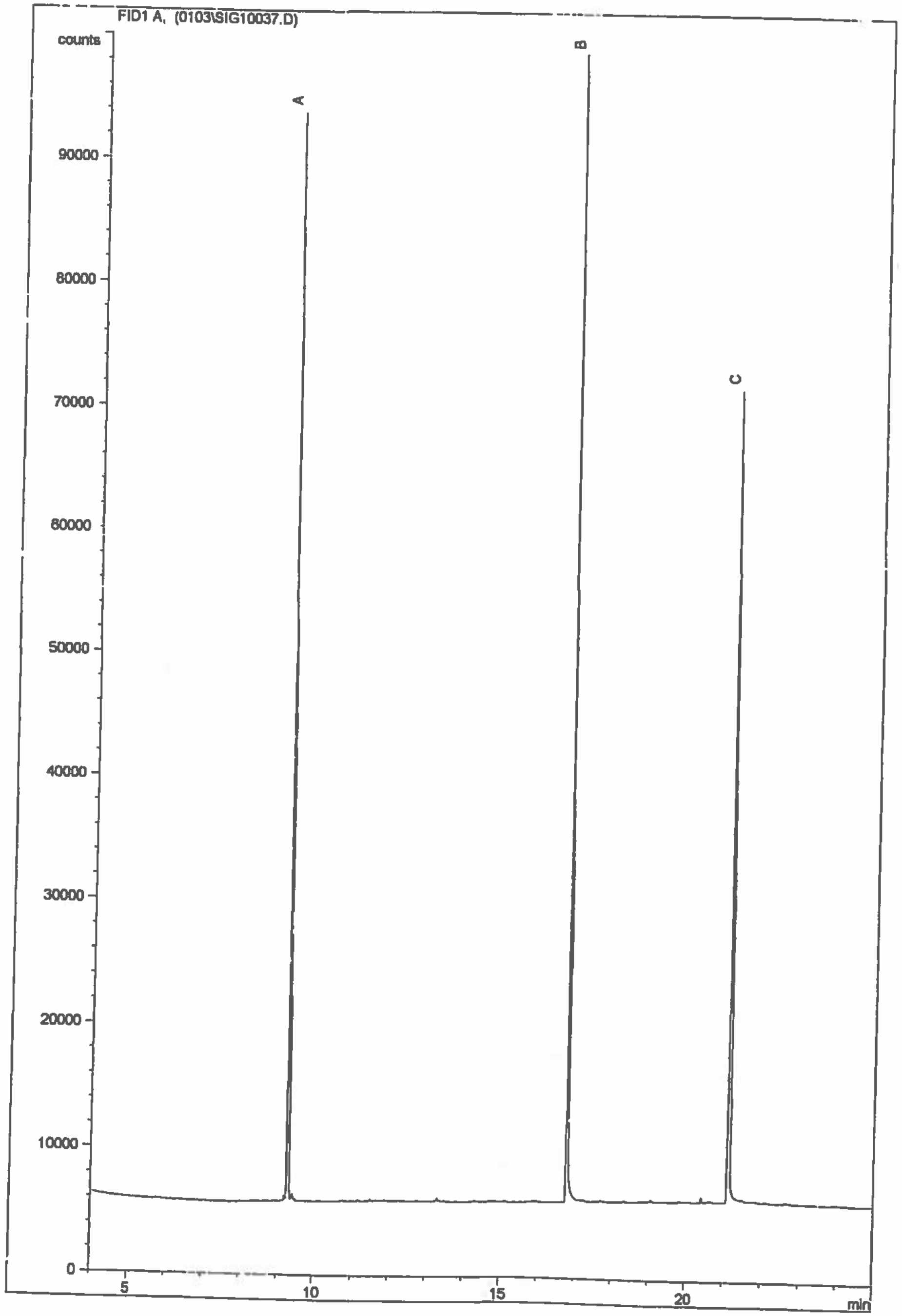
Diesel Range Organics Analysis
By G.C.

2182-32



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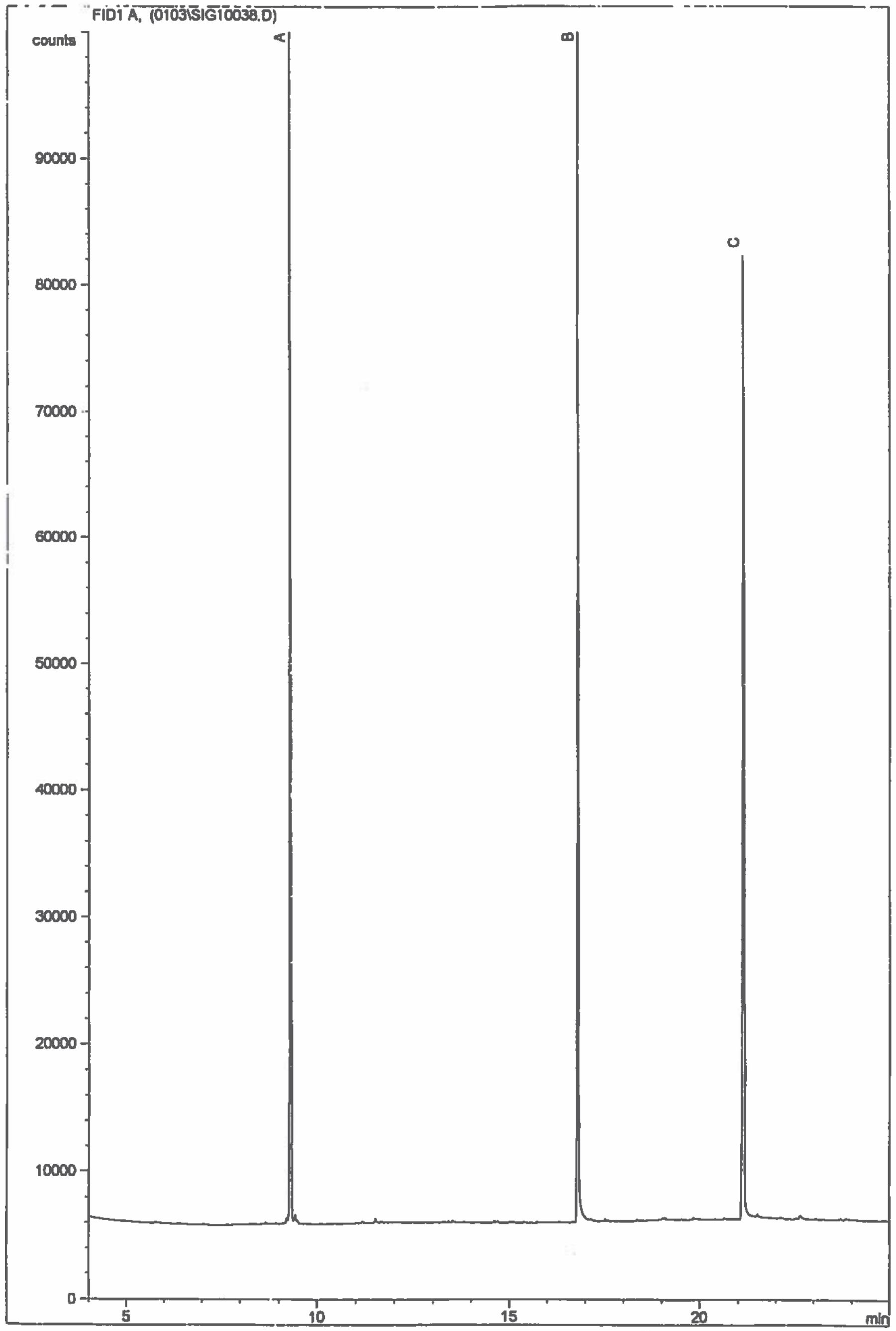
Diesel Range Organics Analysis
By G.C.

2182-38



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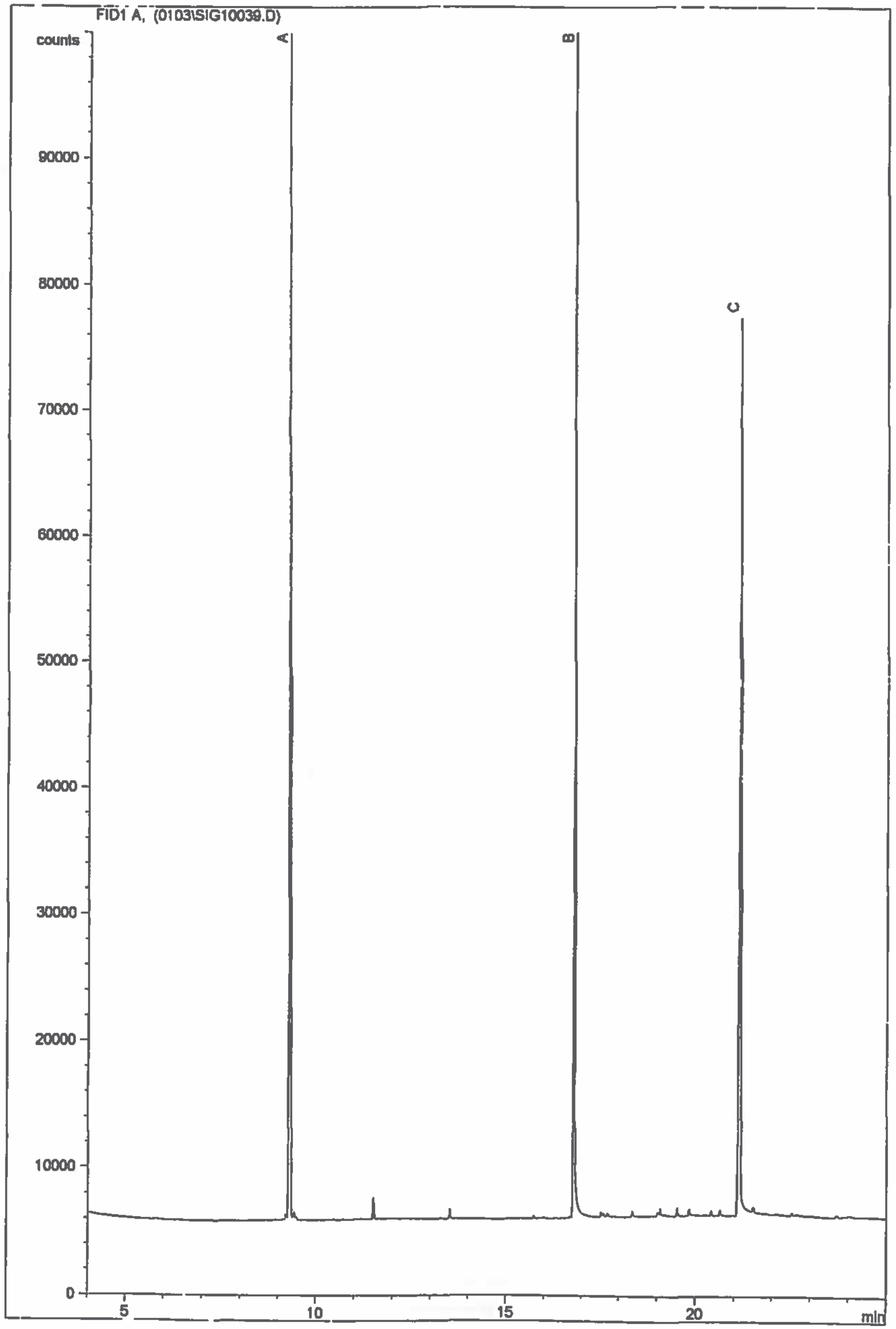
By G.C.

2182-44



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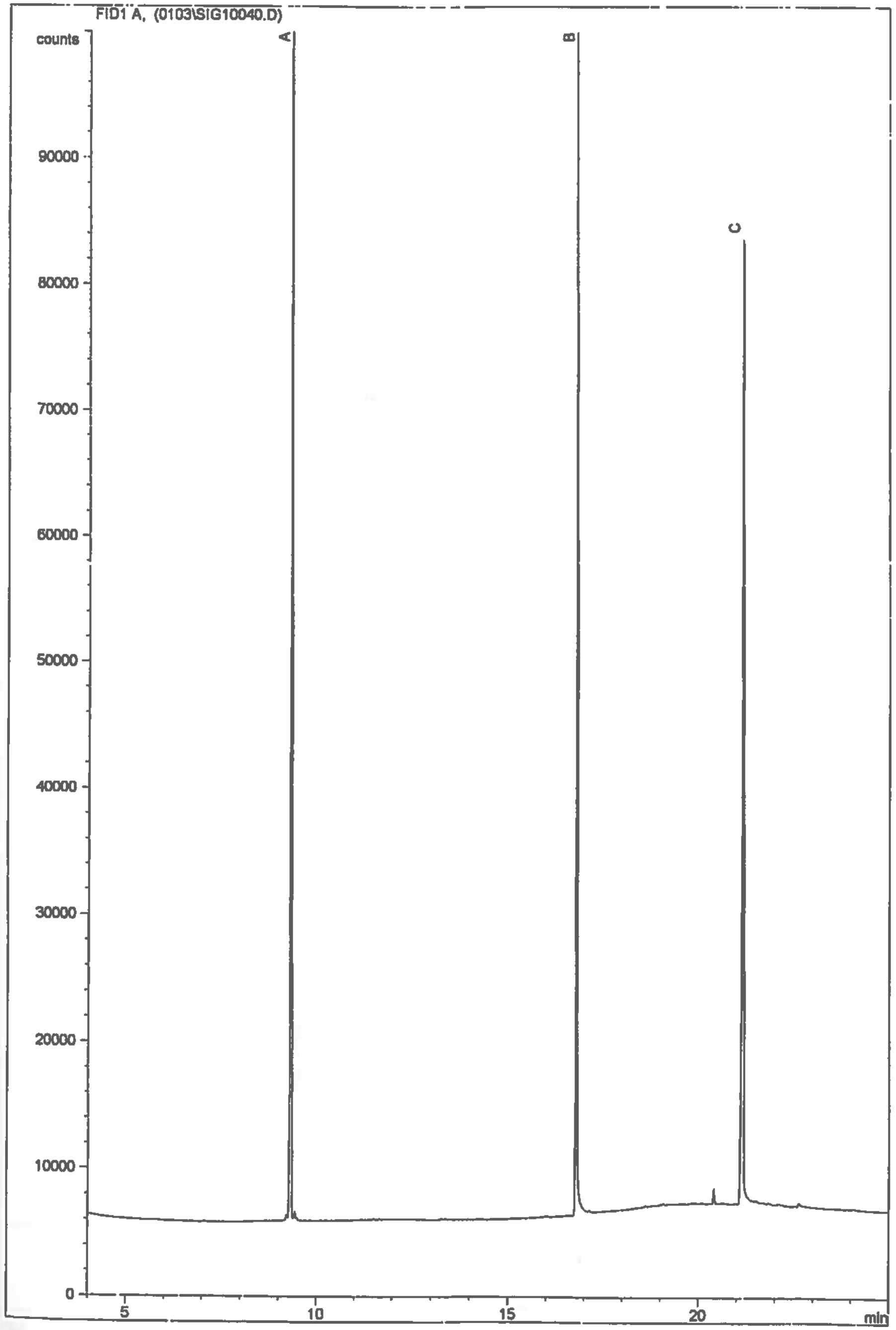
Diesel Range Organics Analysis
By G.C.

2182-49



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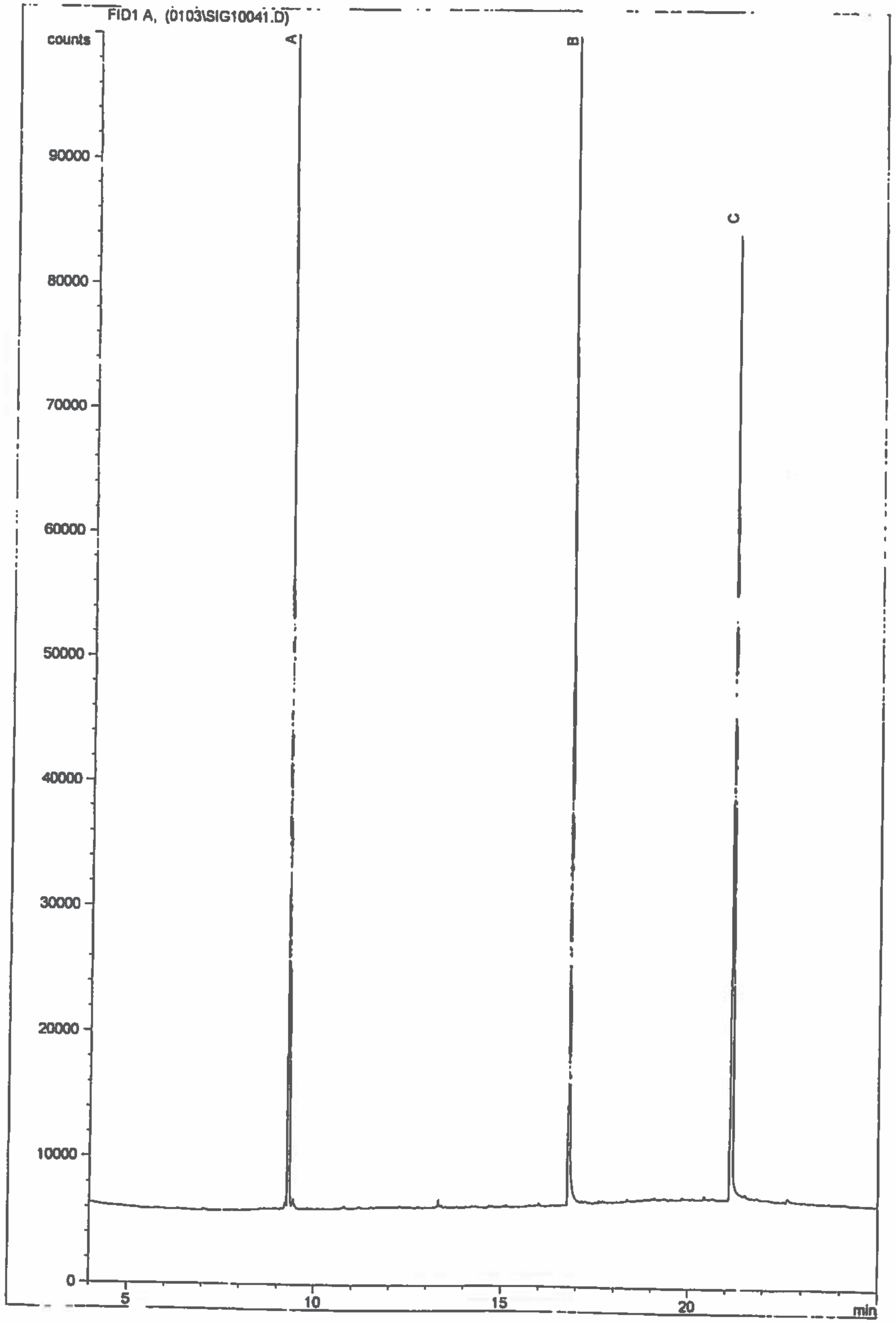
Diesel Range Organics Analysis
By G.C.

2182-51



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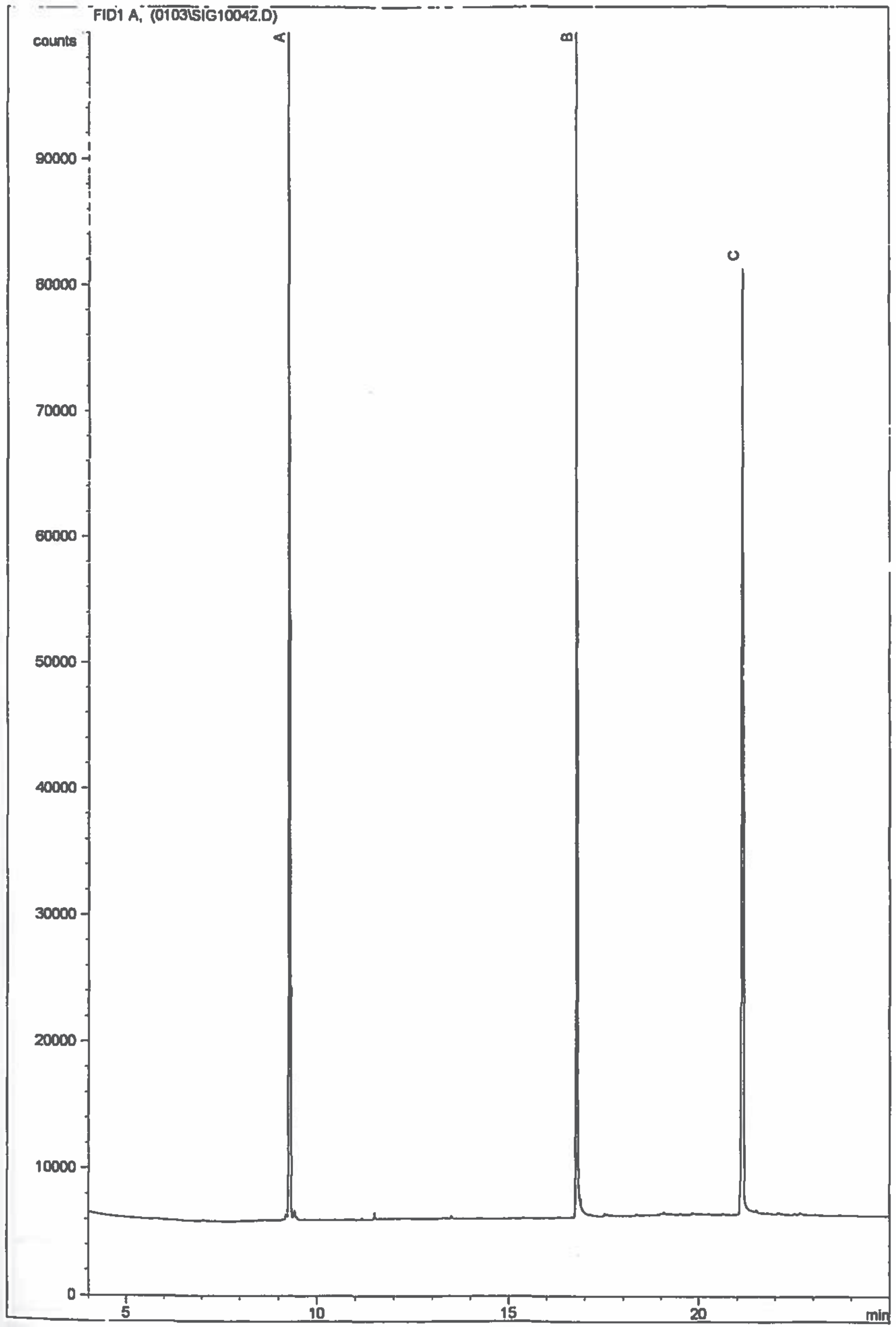
Diesel Range Organics Analysis
By G.C.

2182-54



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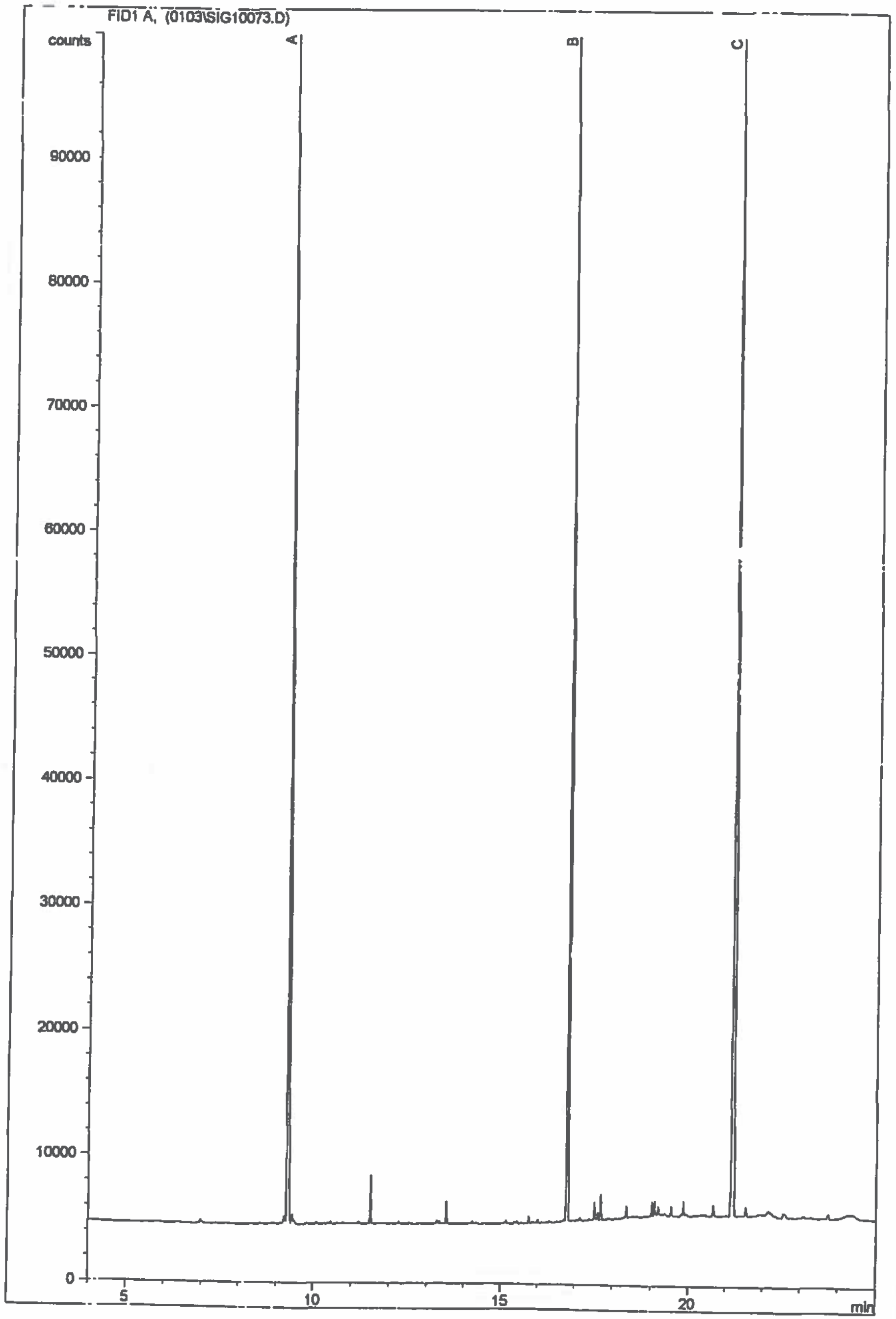
Diesel Range Organics Analysis
By G.C.

2182-57



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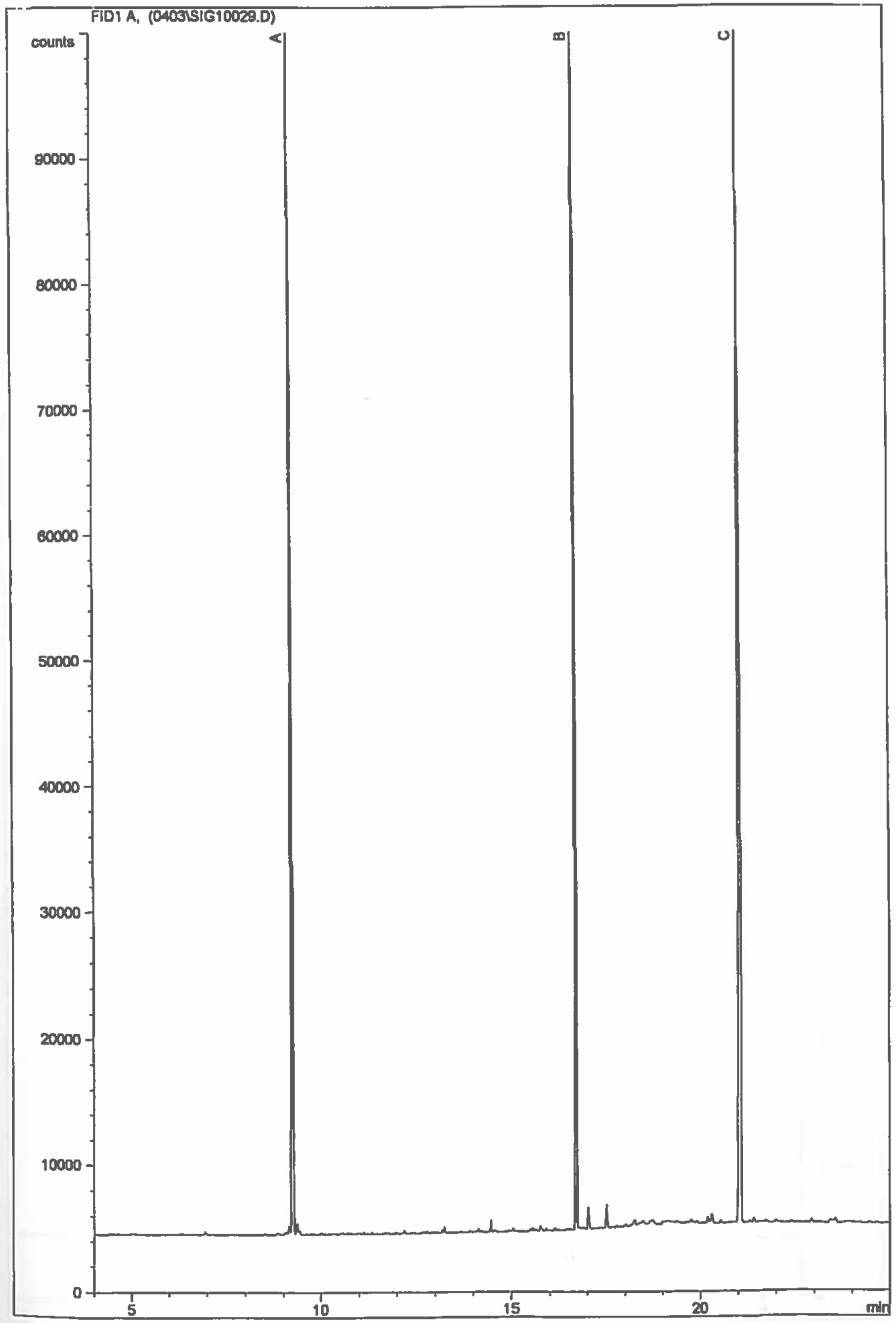
Diesel Range Organics Analysis
By G.C.

2182-17



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Diesel Range Organics Analysis
By G.C.

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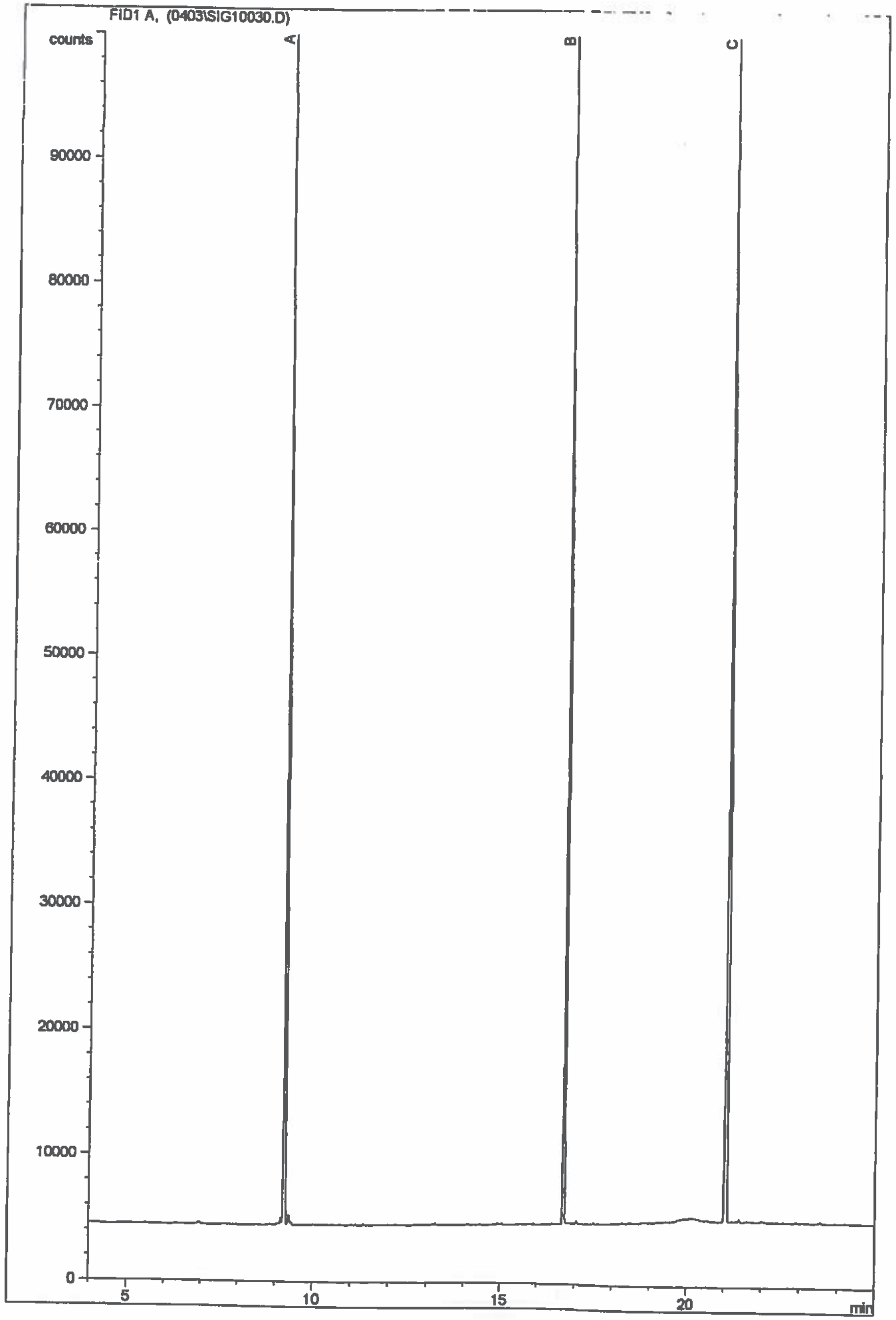

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Diesel Range Organics Analysis
By G.C.

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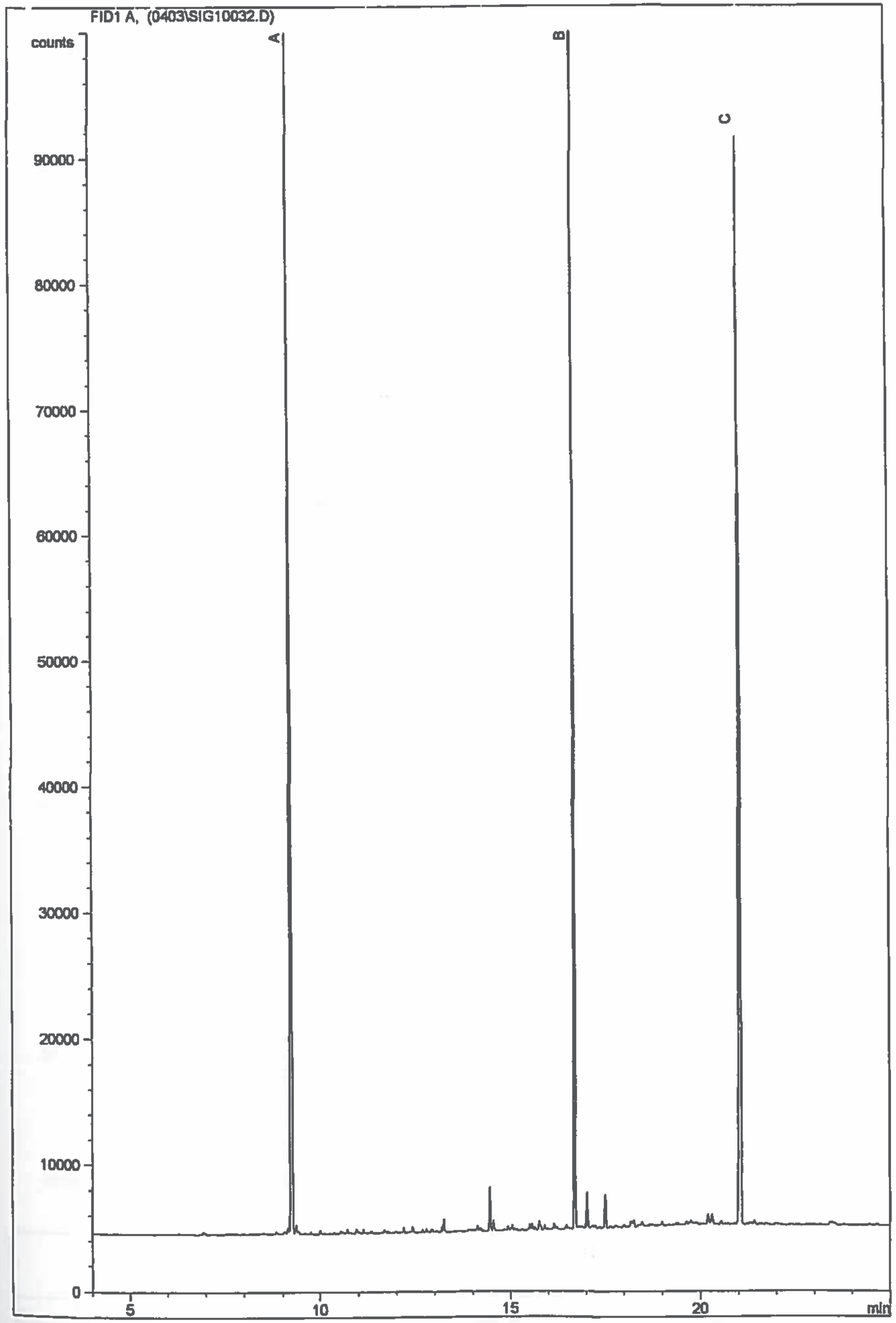

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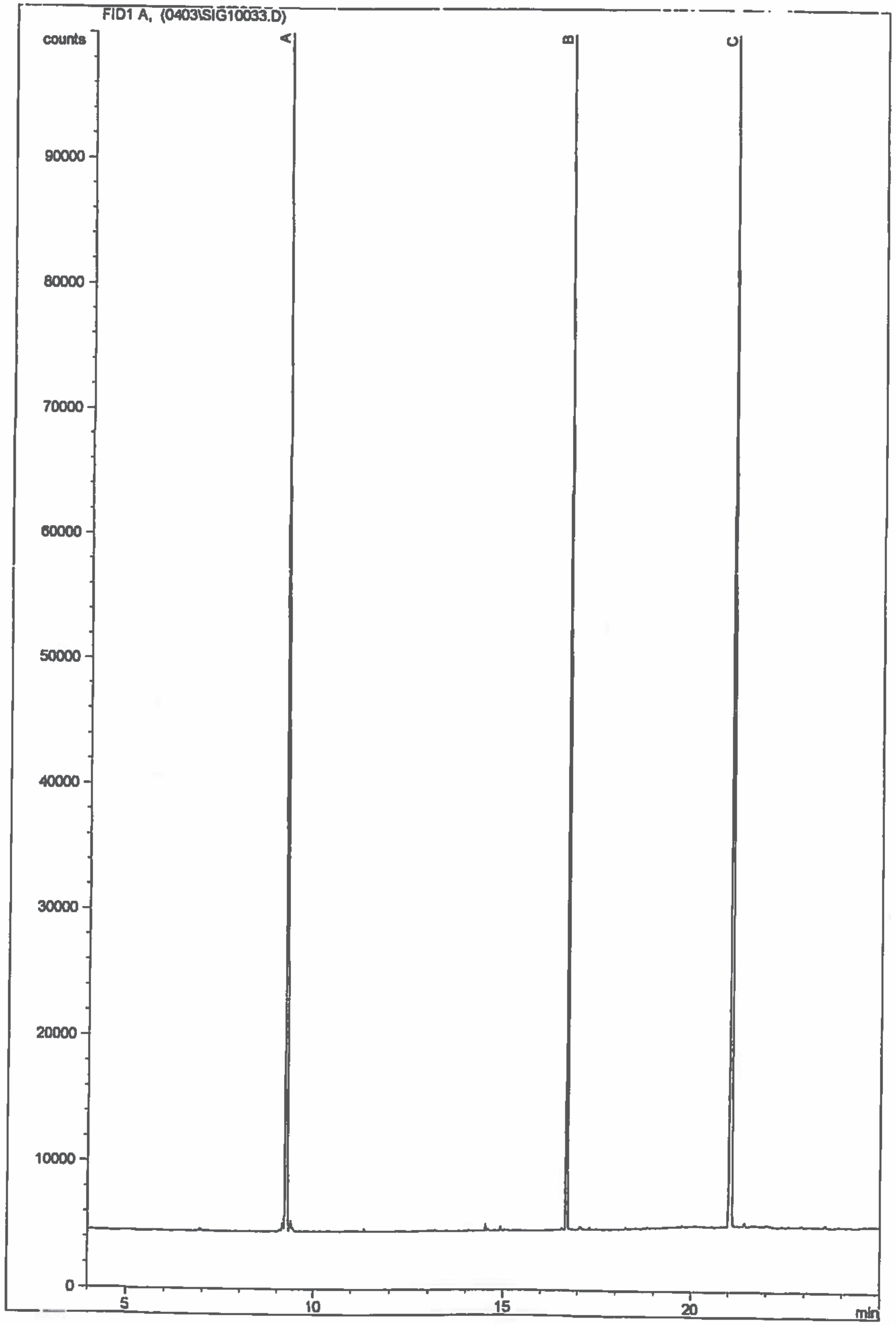
Diesel Range Organics Analysis
By G.C.

2182-39



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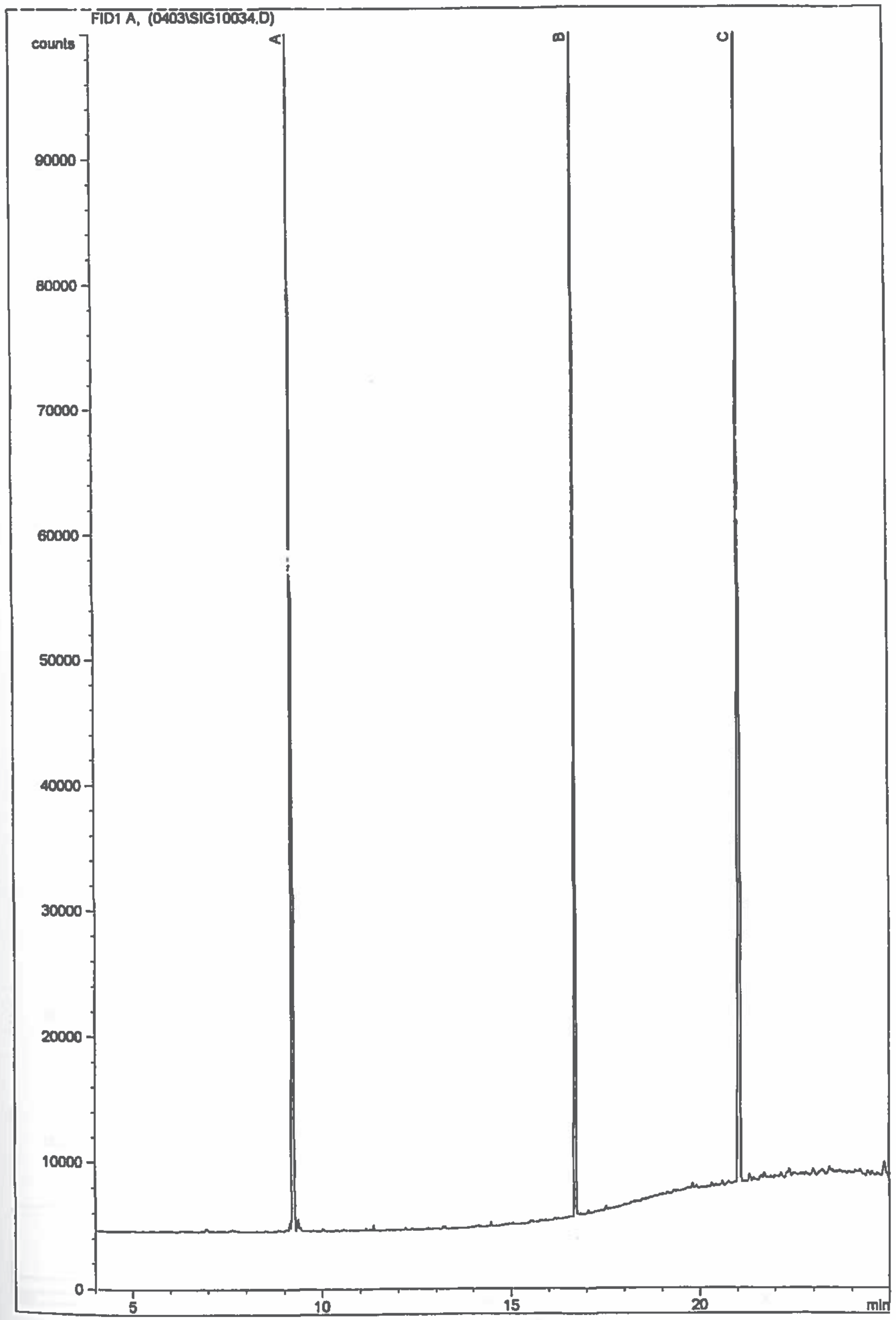
By G.C.

2182-40



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Diesel Range Organics Analysis
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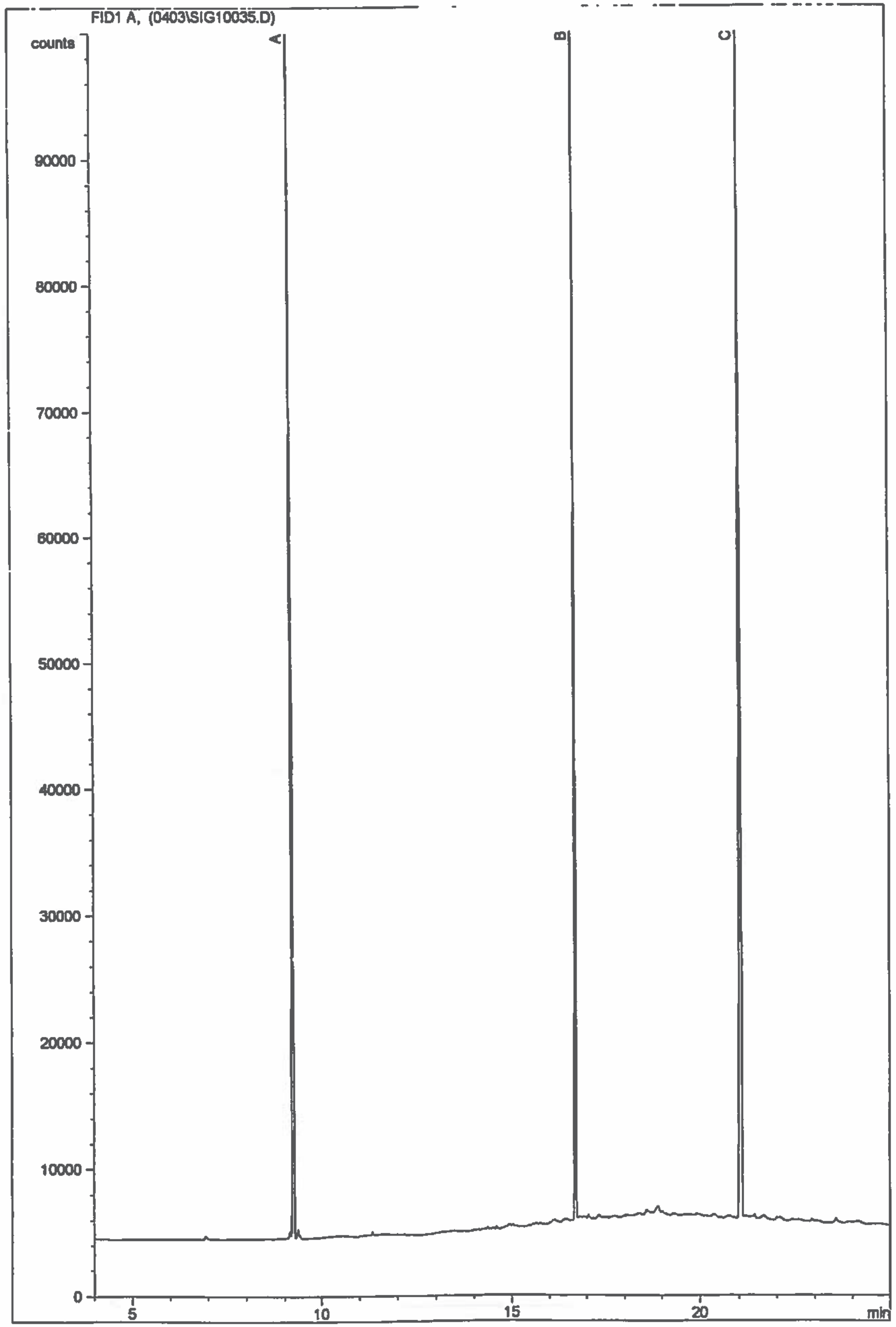
2182-42



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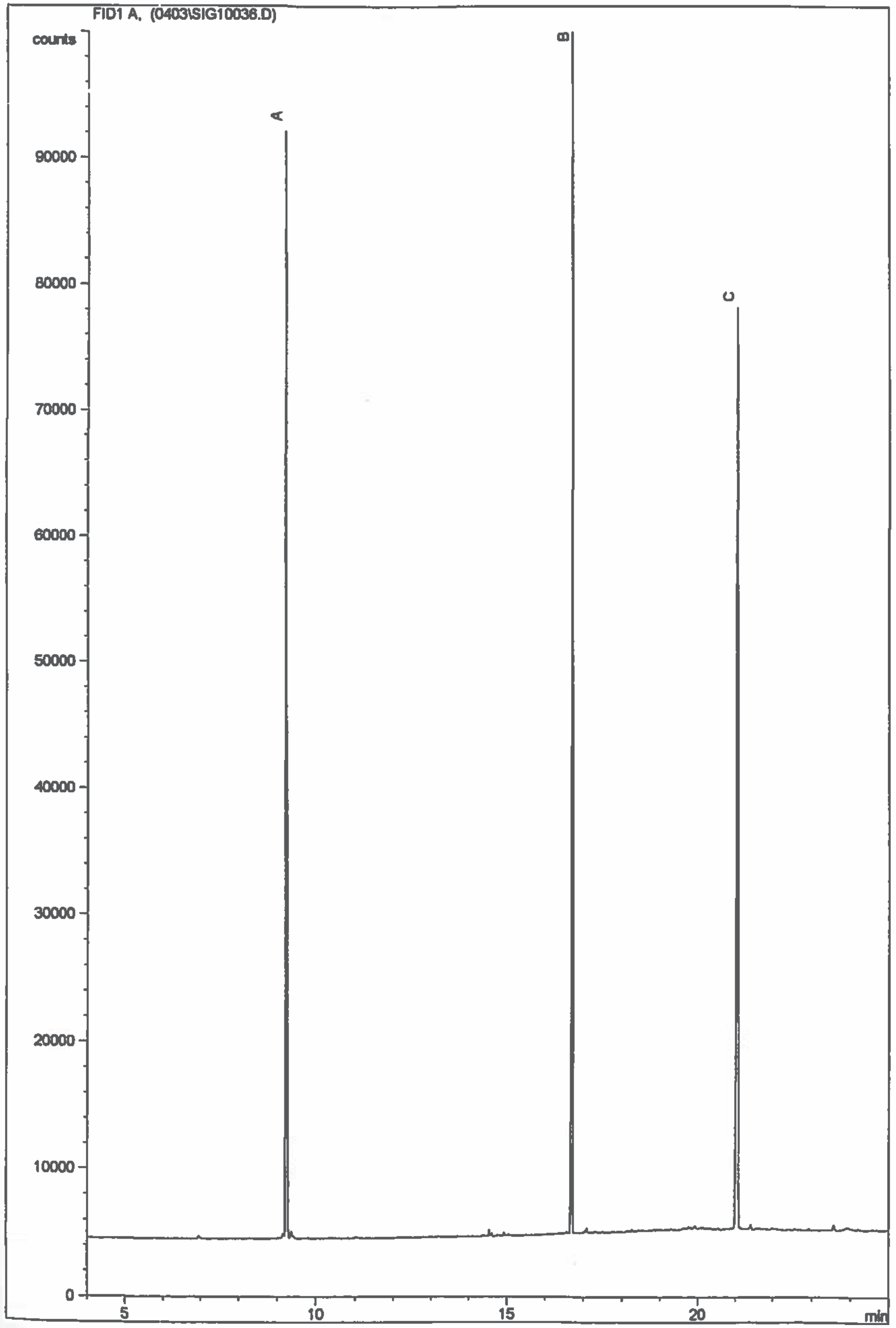

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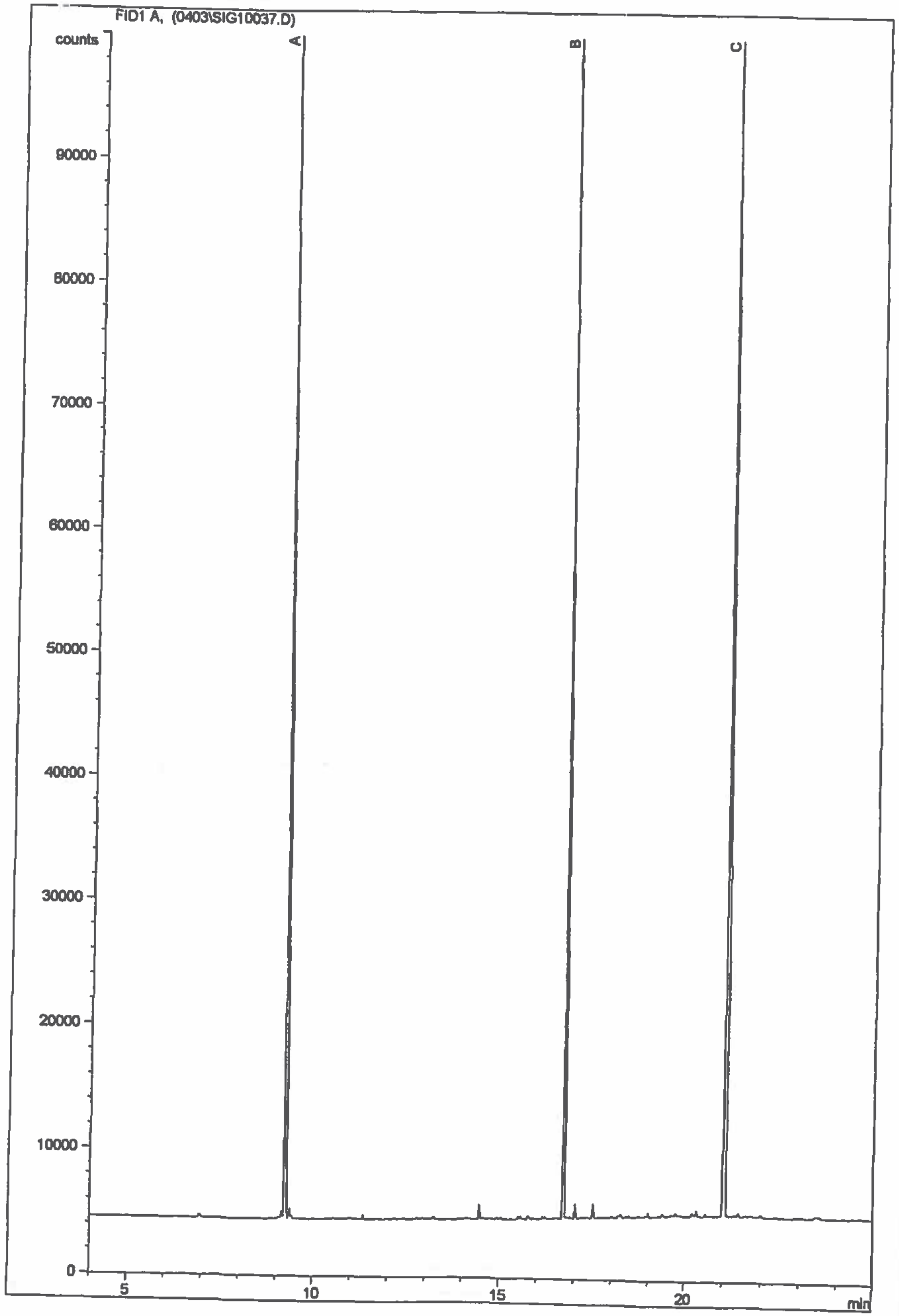
Diesel Range Organics Analysis
By G.C.

2182-45



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Diesel Range Organics Analysis
By G.C.

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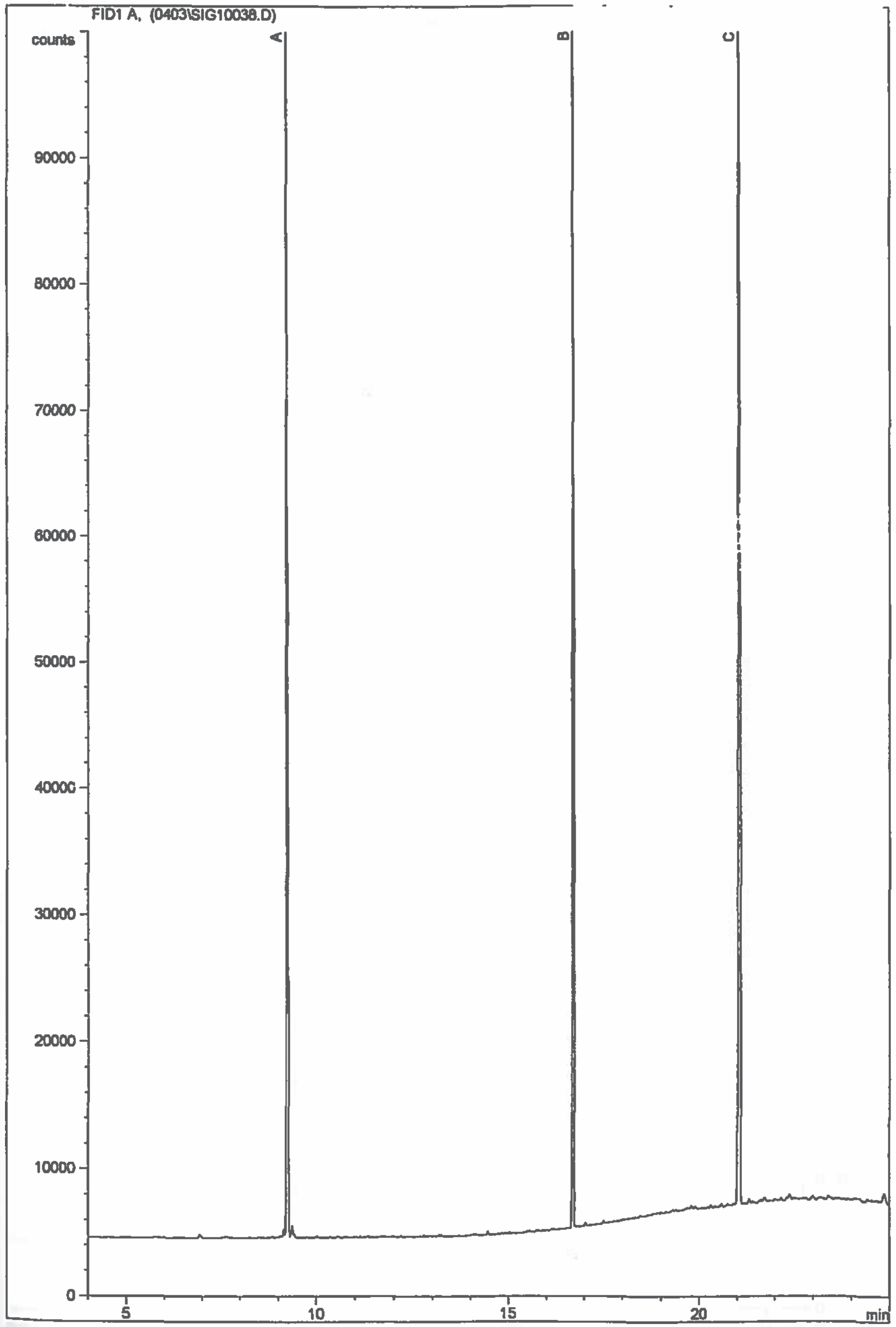

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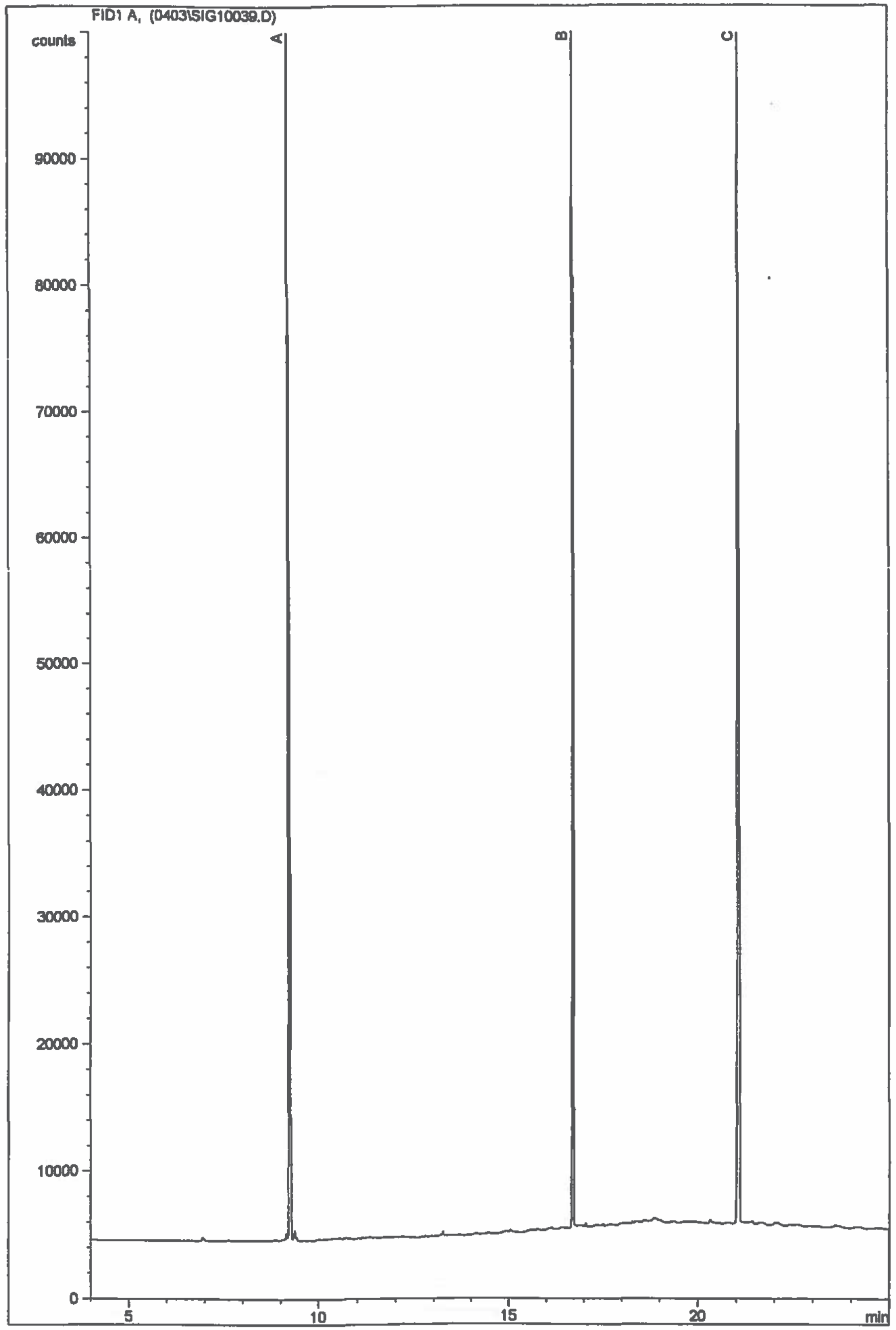
Diesel Range Organics Analysis
By G.C.

2182-50



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Diesel Range Organics Analysis
By G.C.

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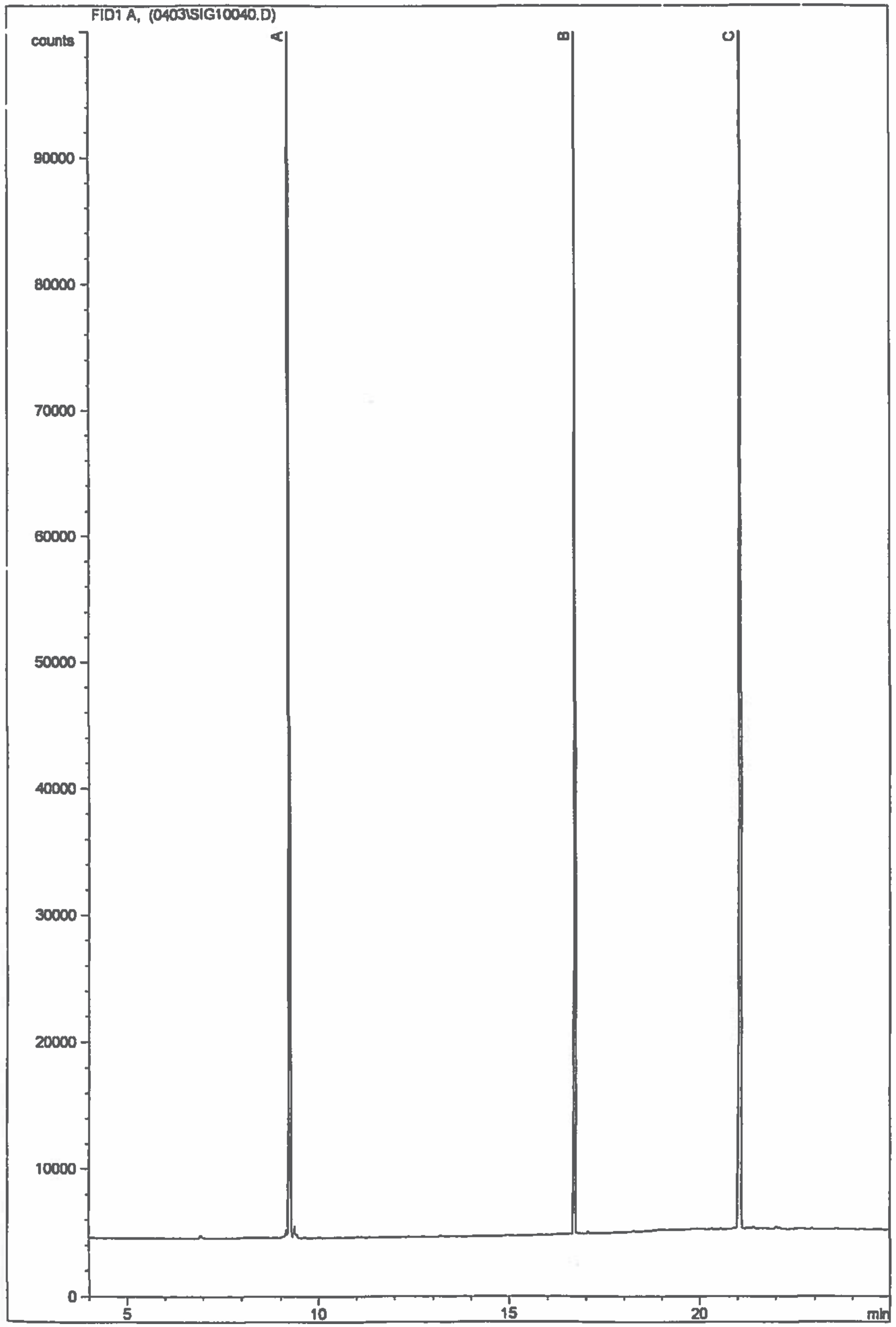

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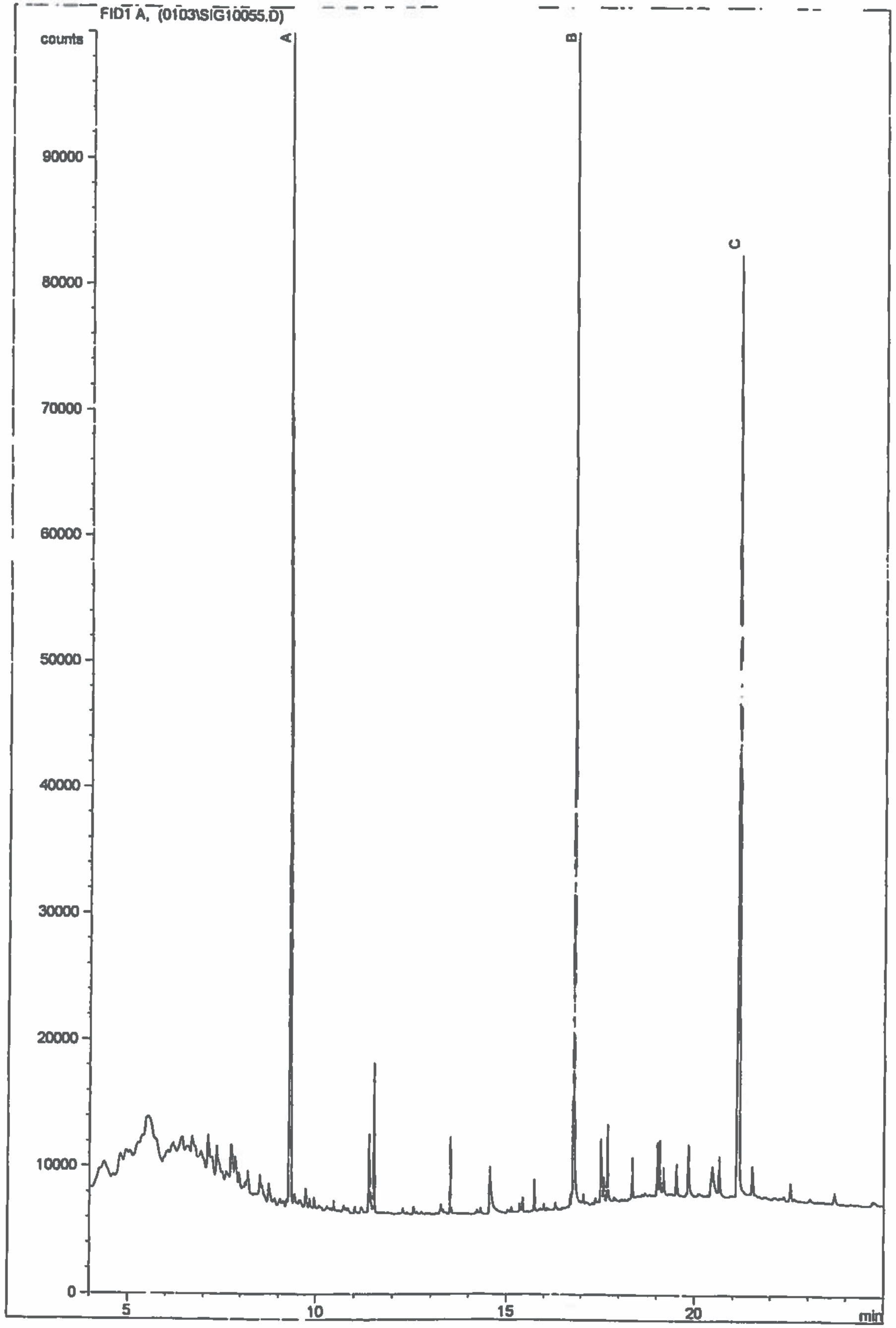
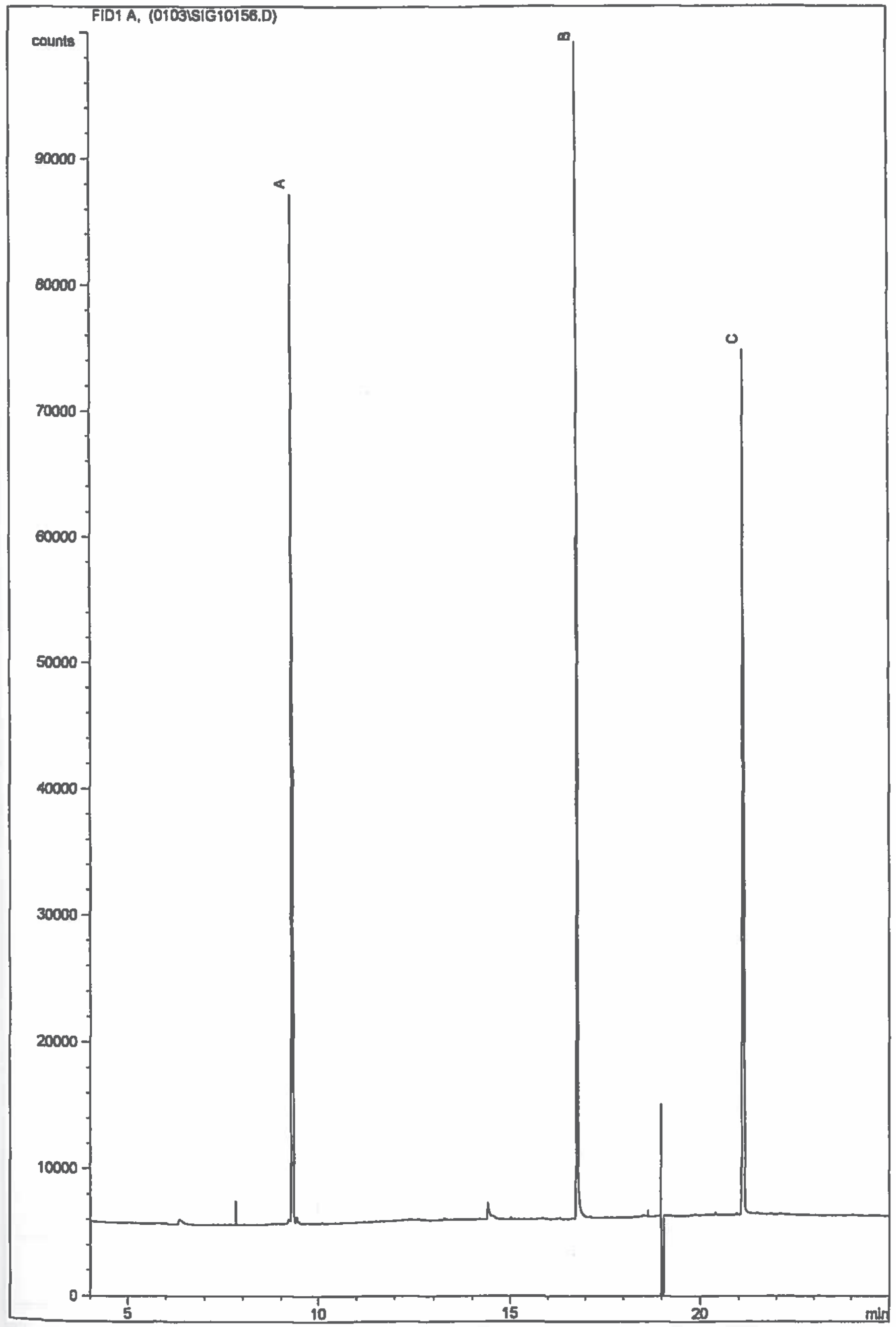
Diesel Range Organics Analysis
By G.C.

2182-6



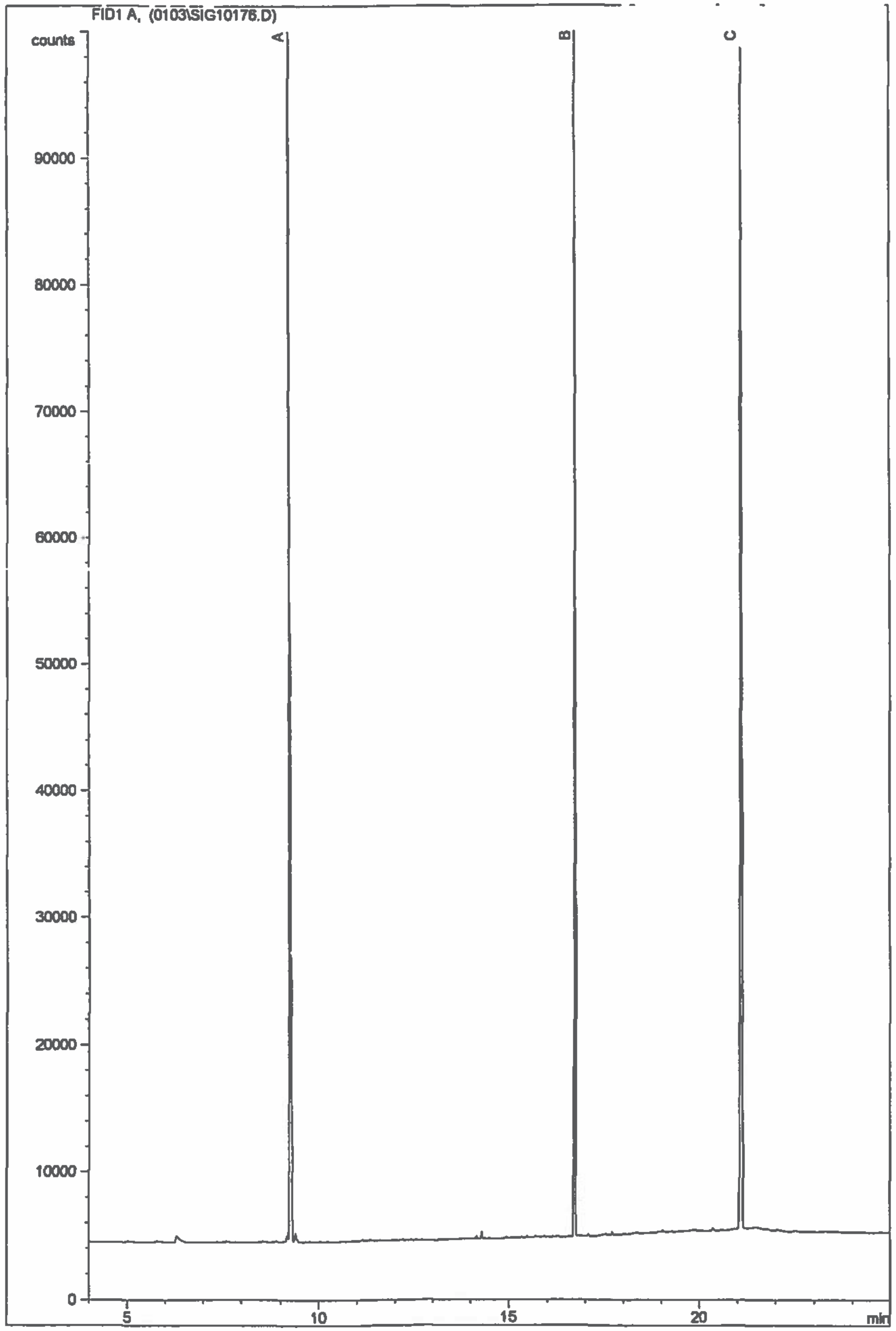
ALcontrol Laboratories Ireland
Diesel Range Organics Analysis
By G.C.

2182-08L



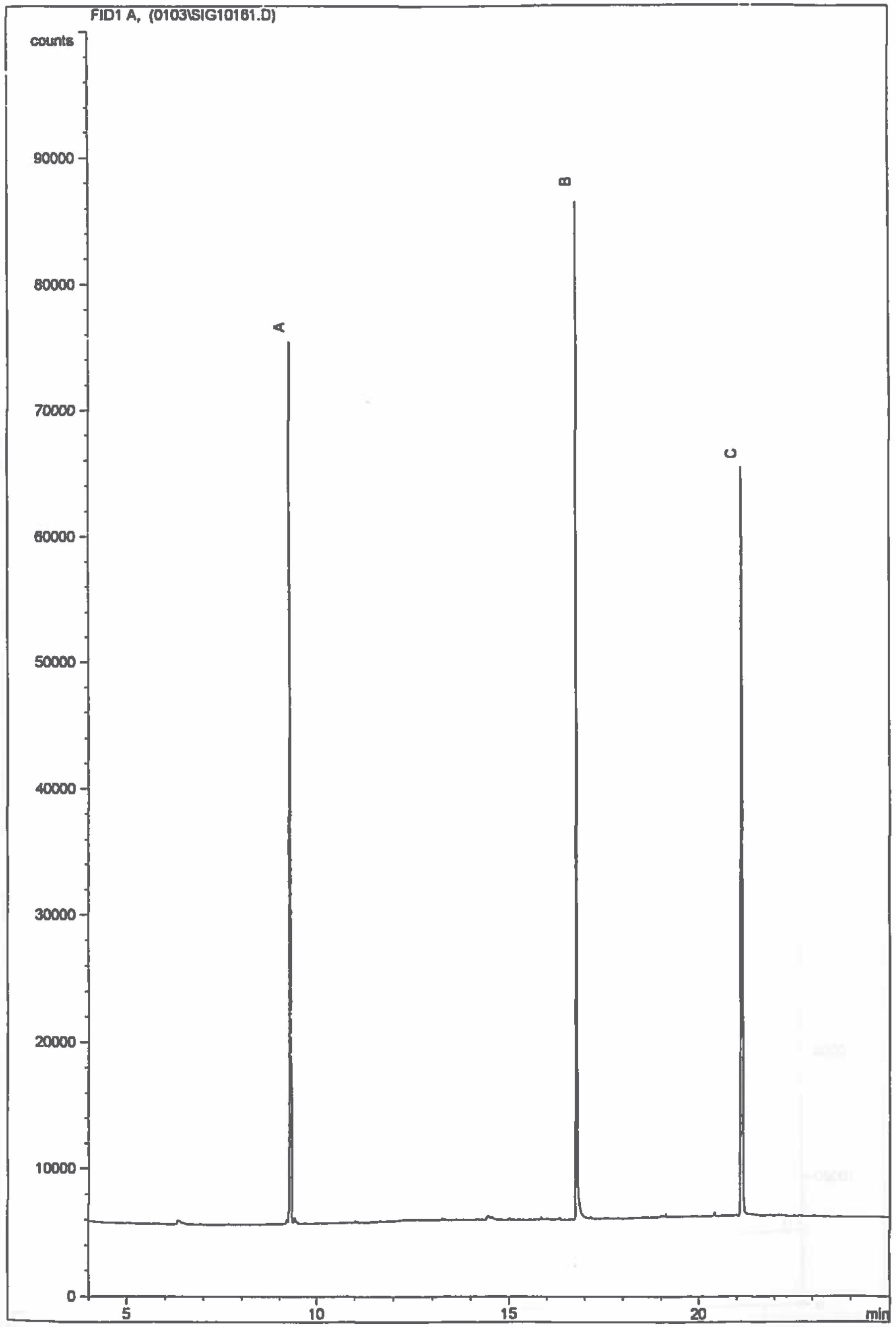
ALcontrol Laboratories Ireland
Diesel Range Organics Analysis
By G.C.

2182-14L



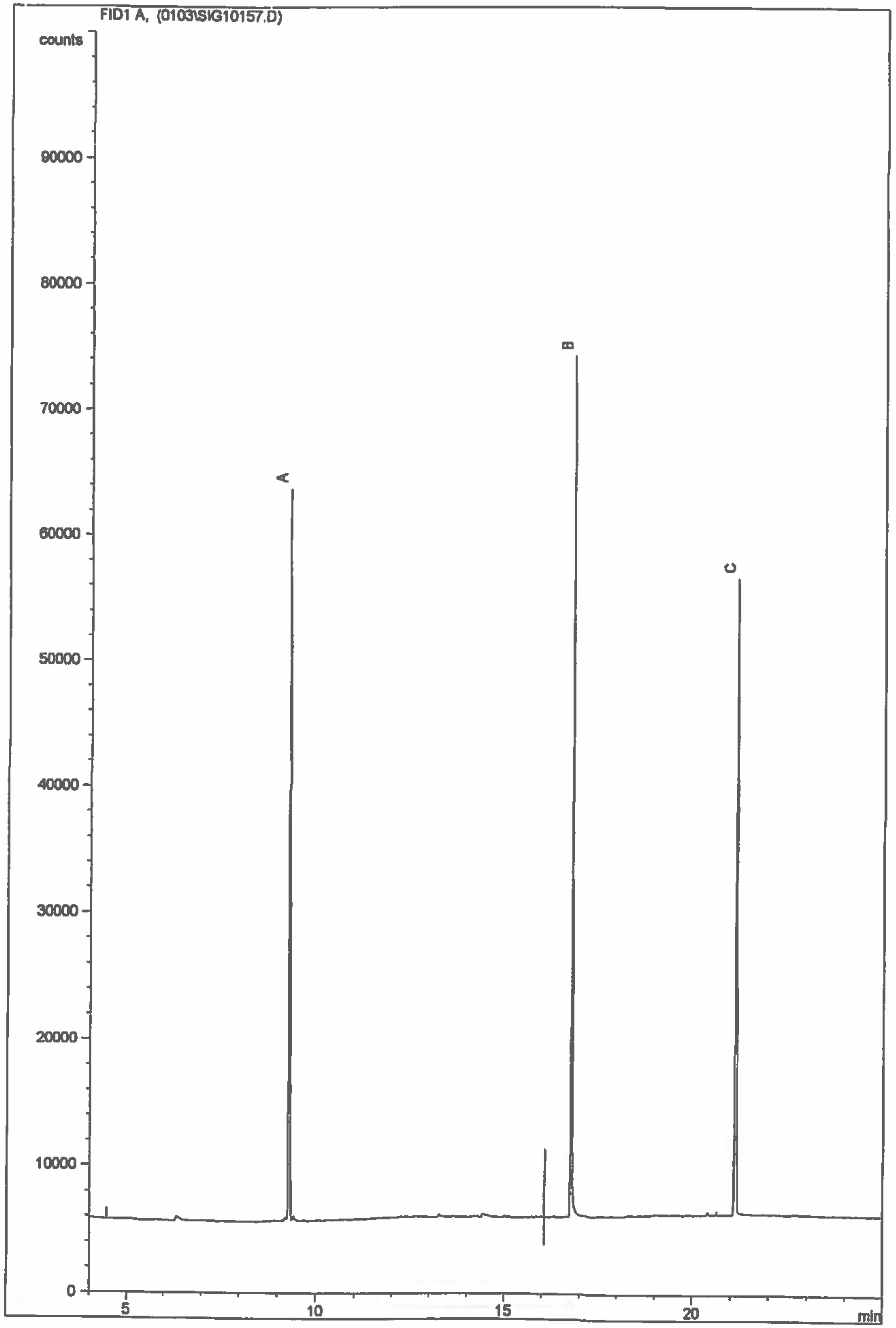
ALcontrol Laboratories Ireland
Diesel Range Organics Analysis
By G.C.

2182-18L



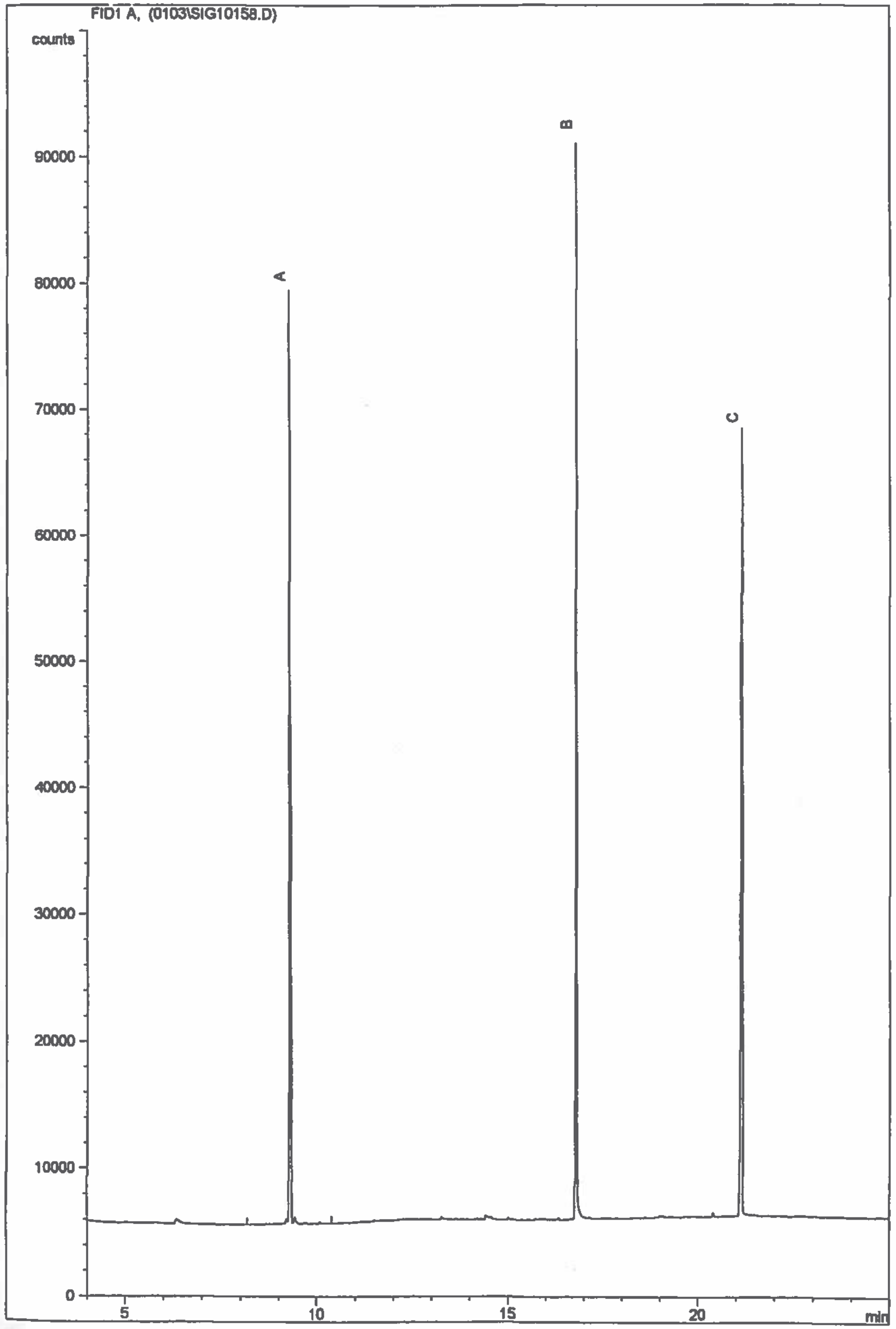
ALcontrol Laboratories Ireland
Diesel Range Organics Analysis
By G.C.

2182-22L



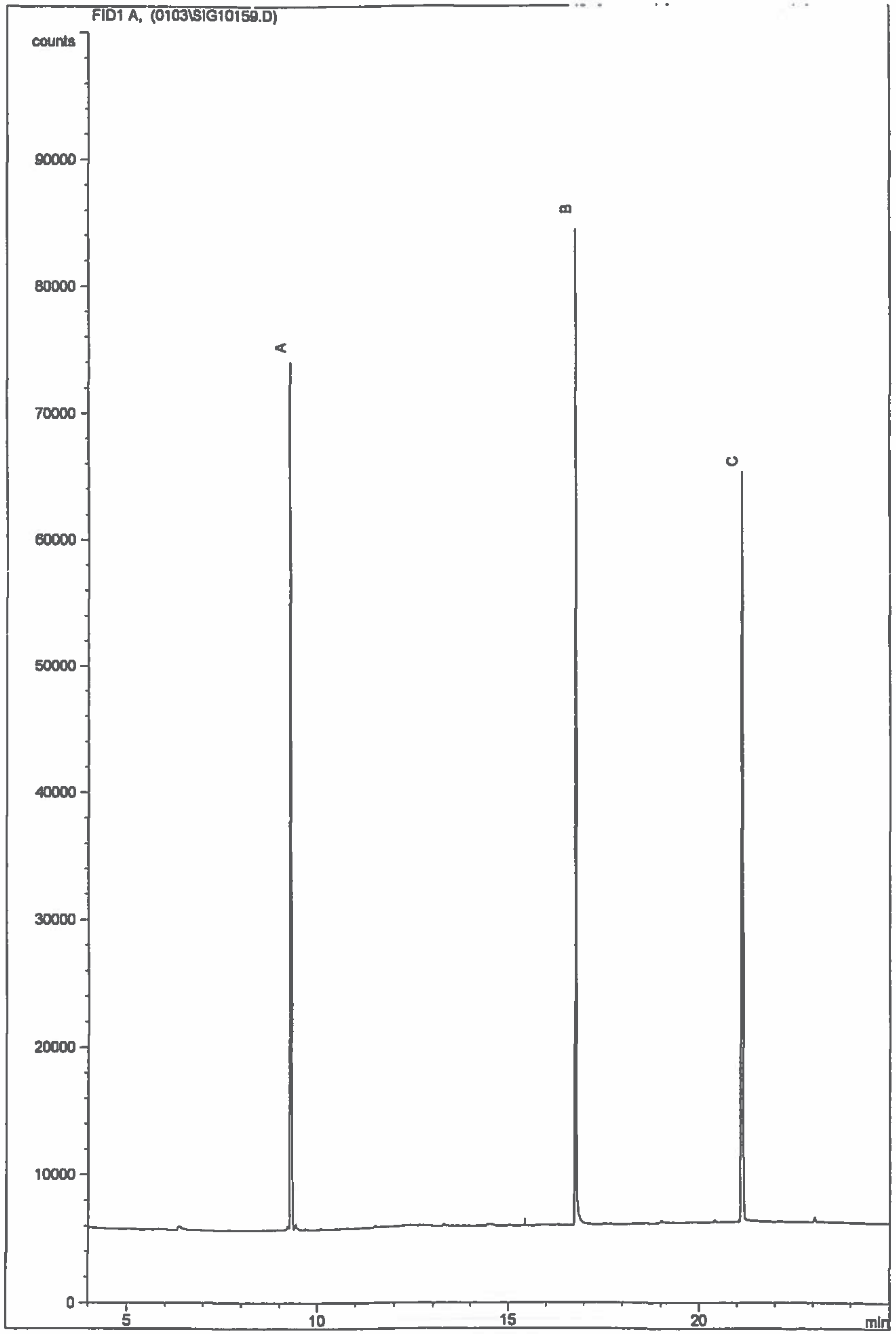
ALcontrol Laboratories Ireland
Diesel Range Organics Analysis
By G.C.

2182-24L



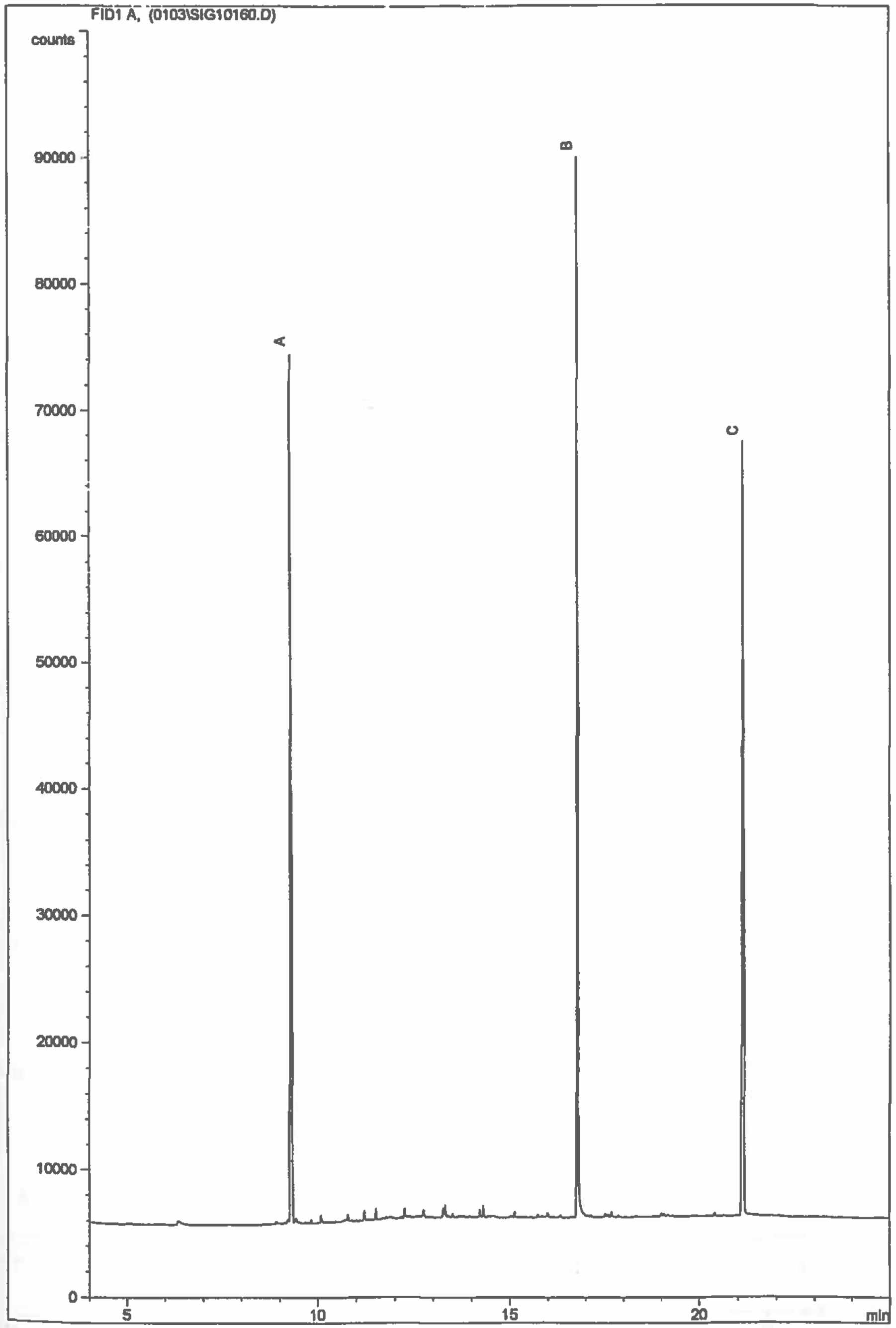
ALcontrol Laboratories Ireland
Diesel Range Organics Analysis
By G.C.

2182-45L



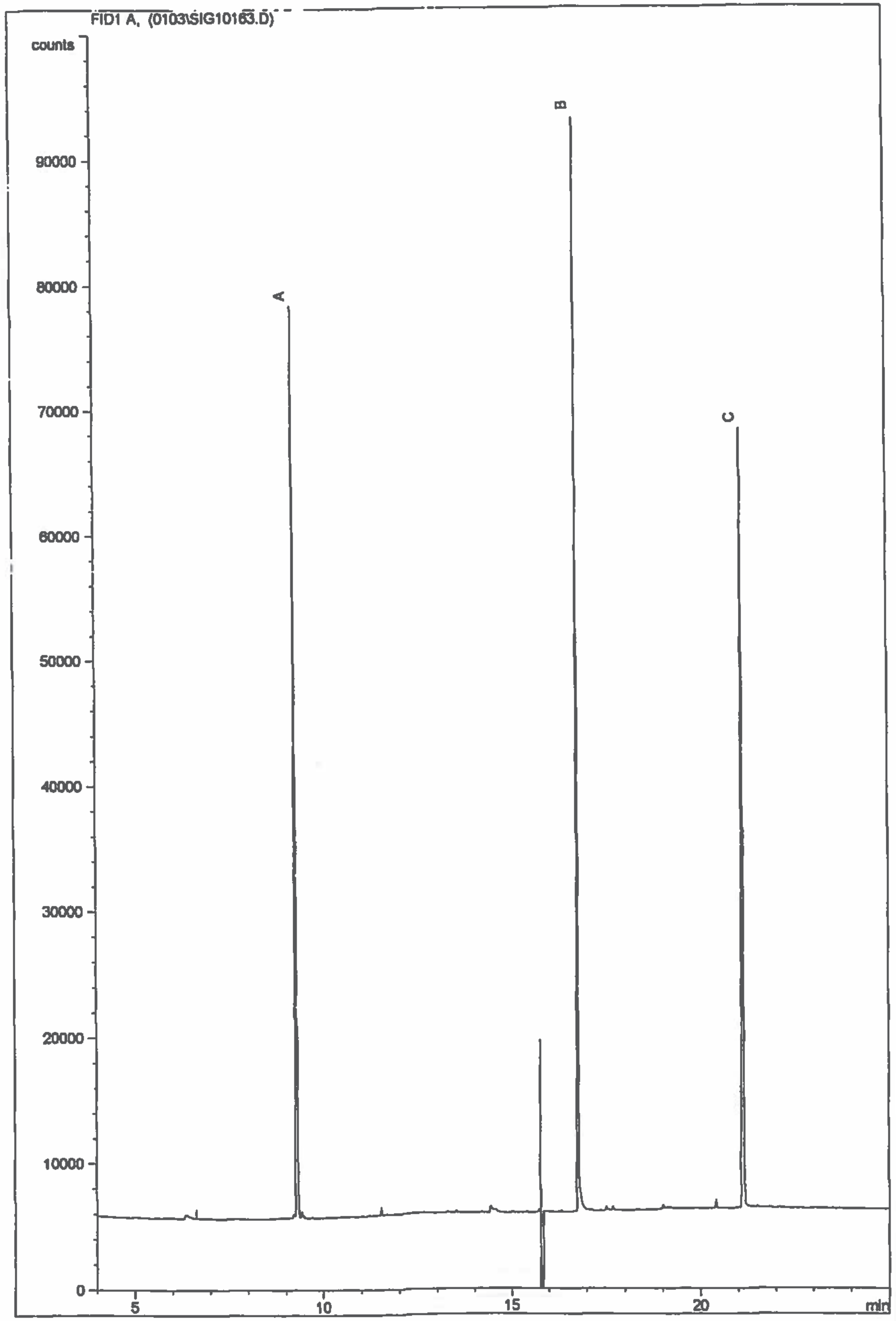
ALcontrol Laboratories Ireland
Diesel Range Organics Analysis
By G.C.

2182-48L



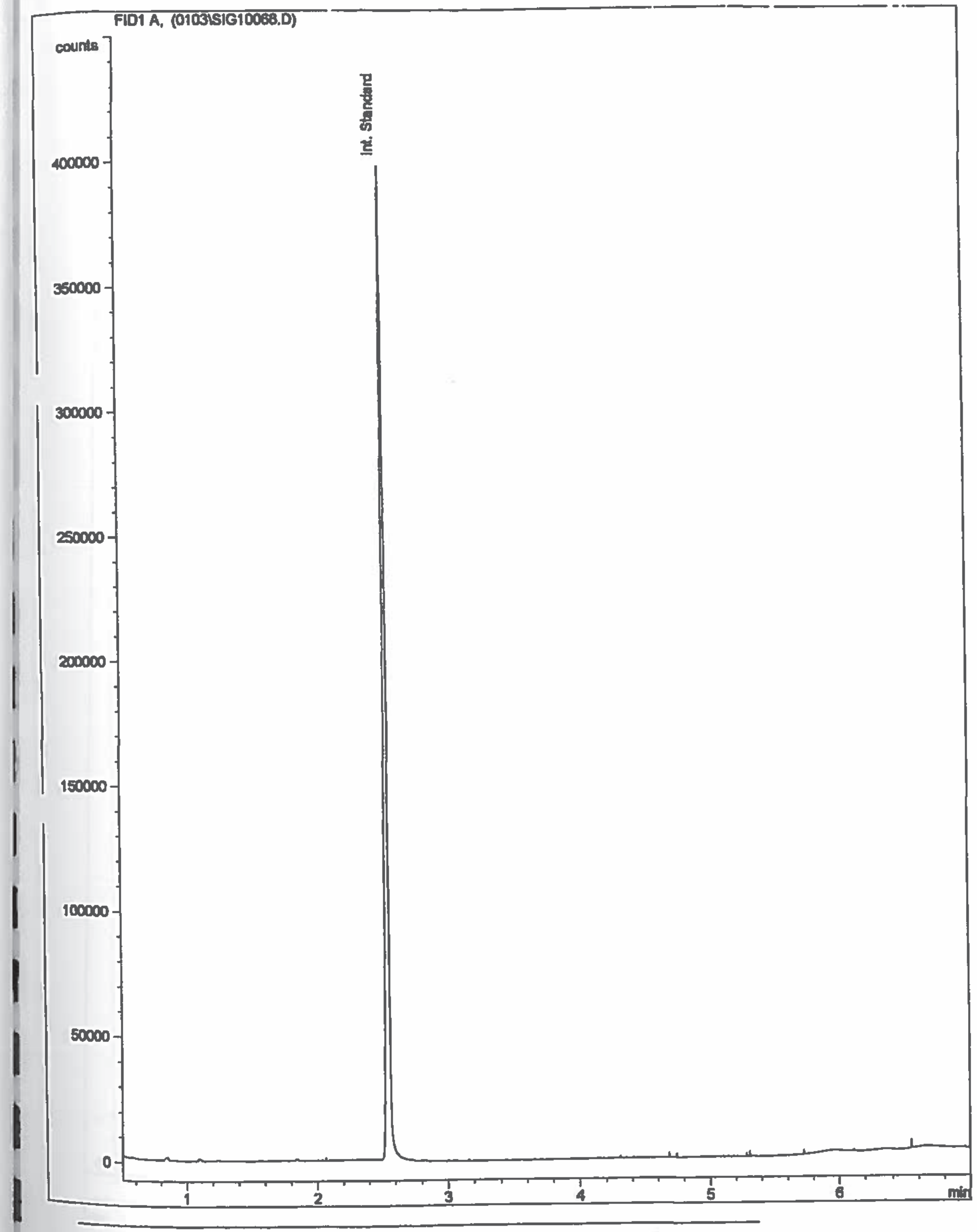
ALcontrol Laboratories Ireland
Diesel Range Organics Analysis
By G.C.

2182-55L



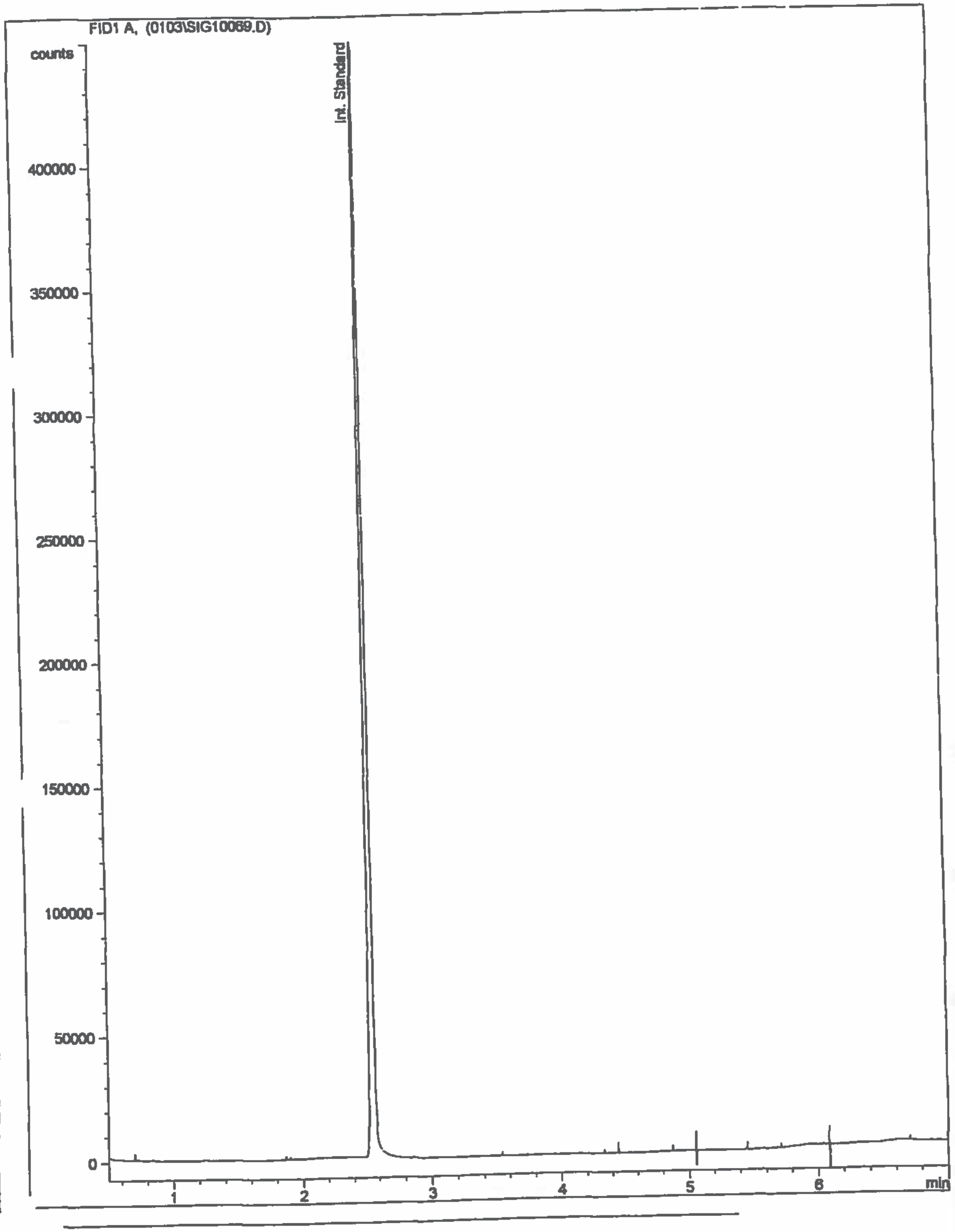
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-7



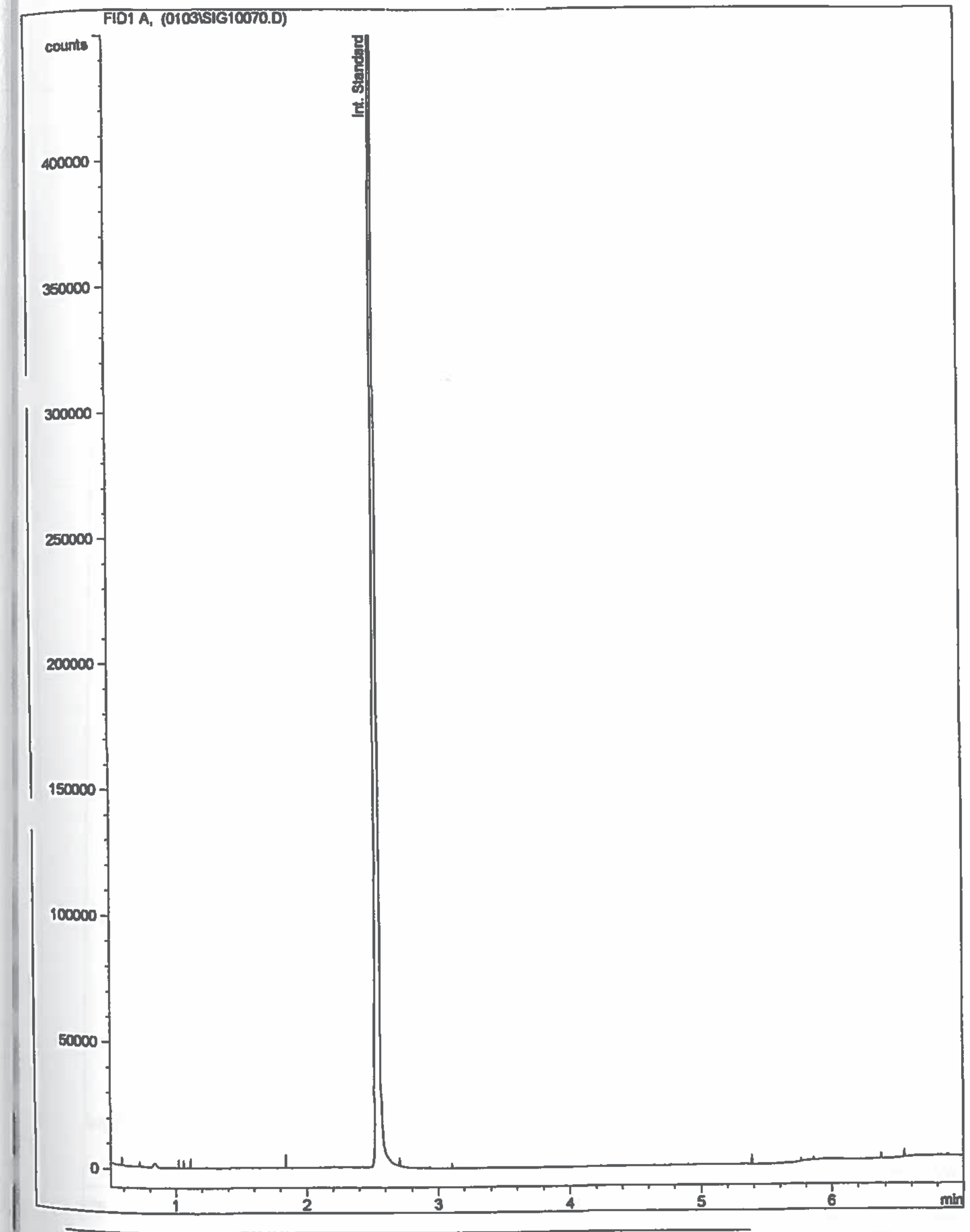
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-9



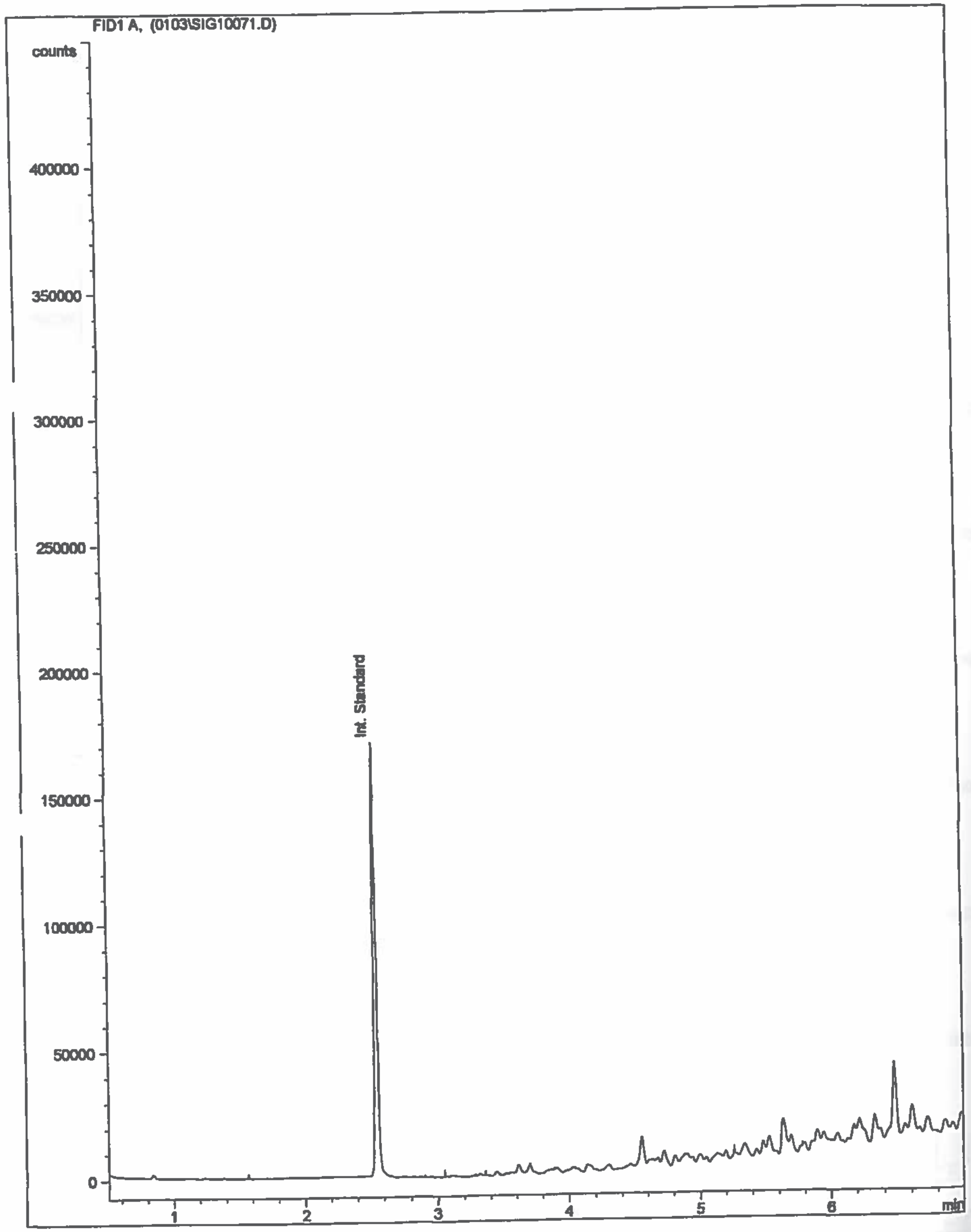
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-10



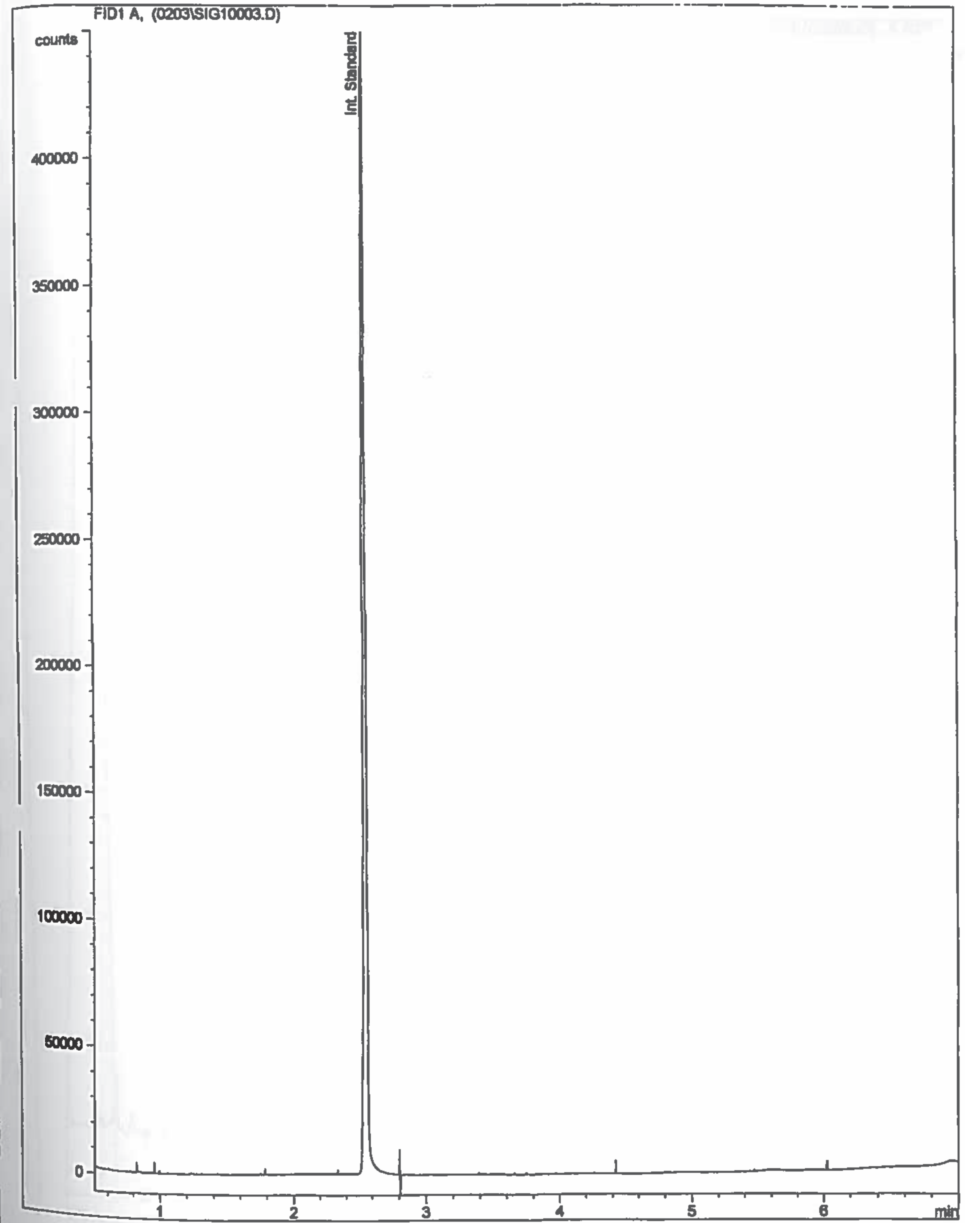
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-11



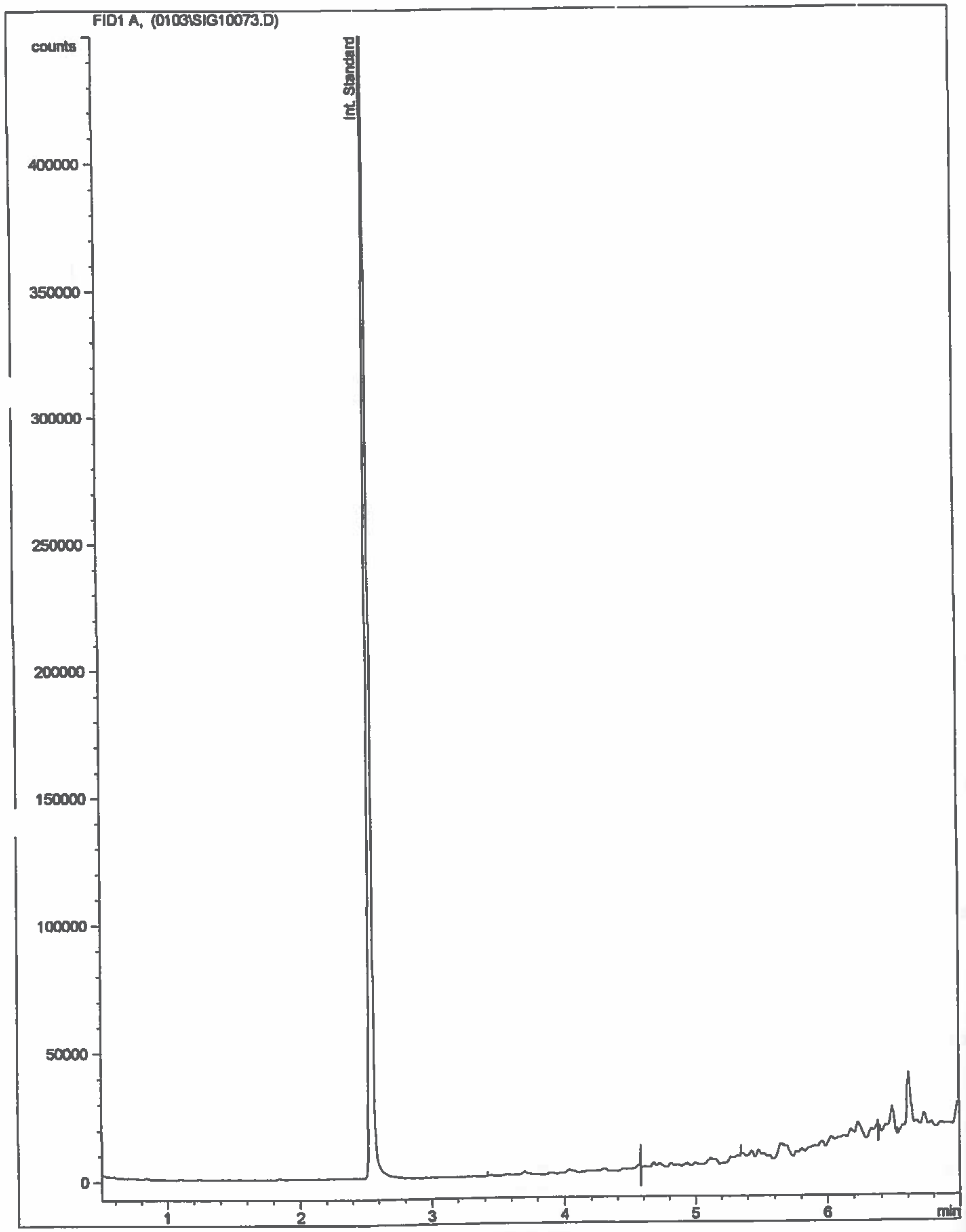
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-13



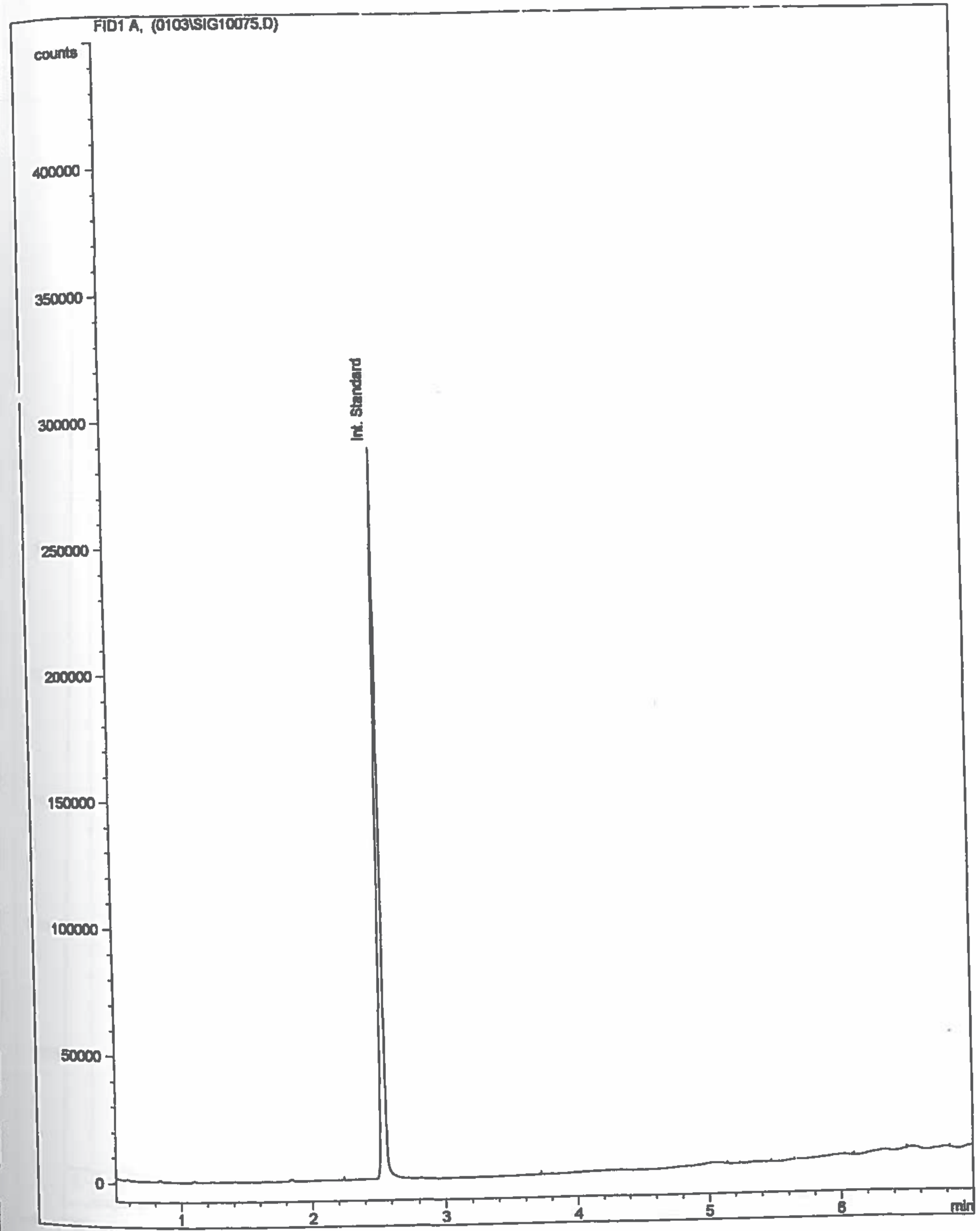
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-15



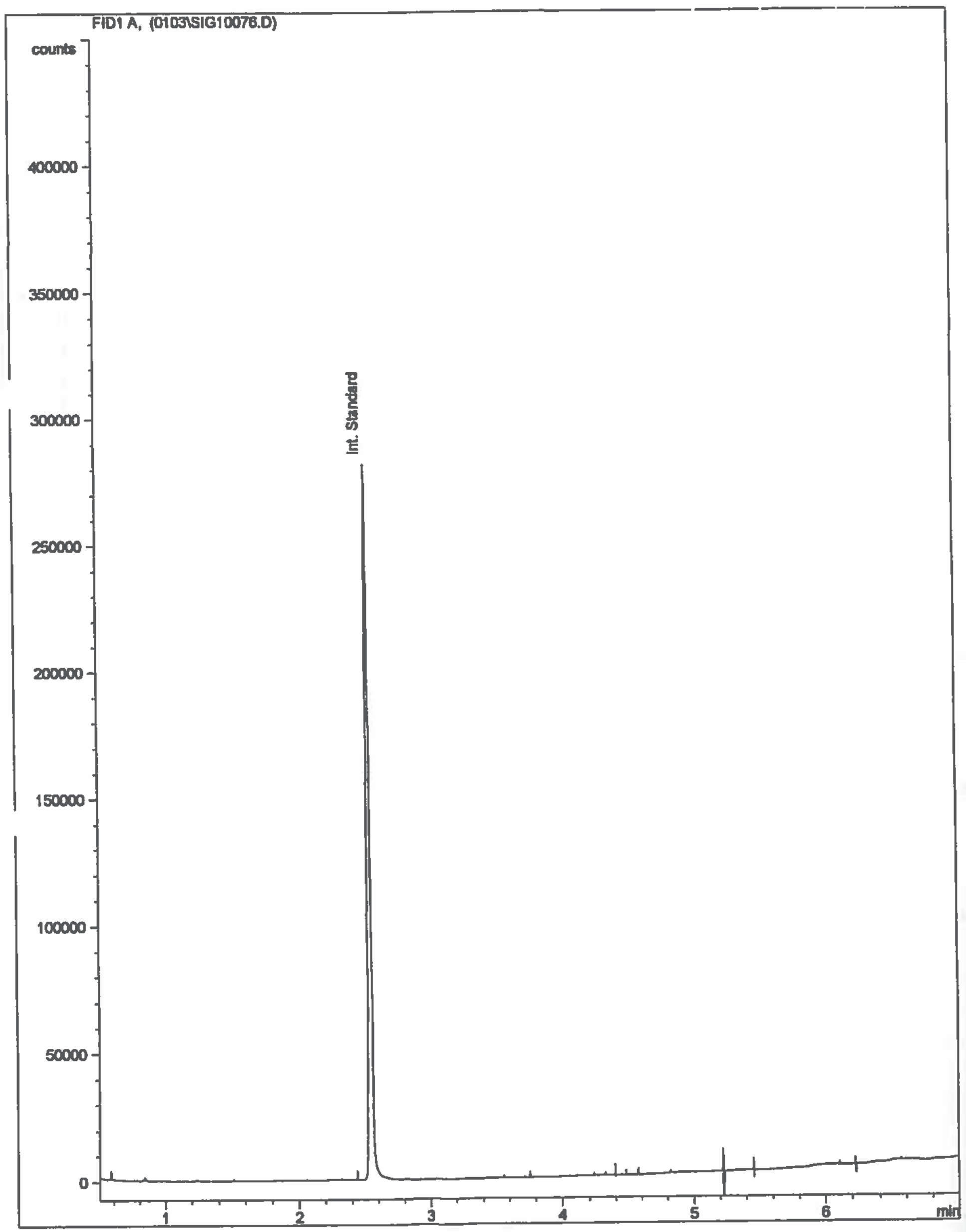
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-16



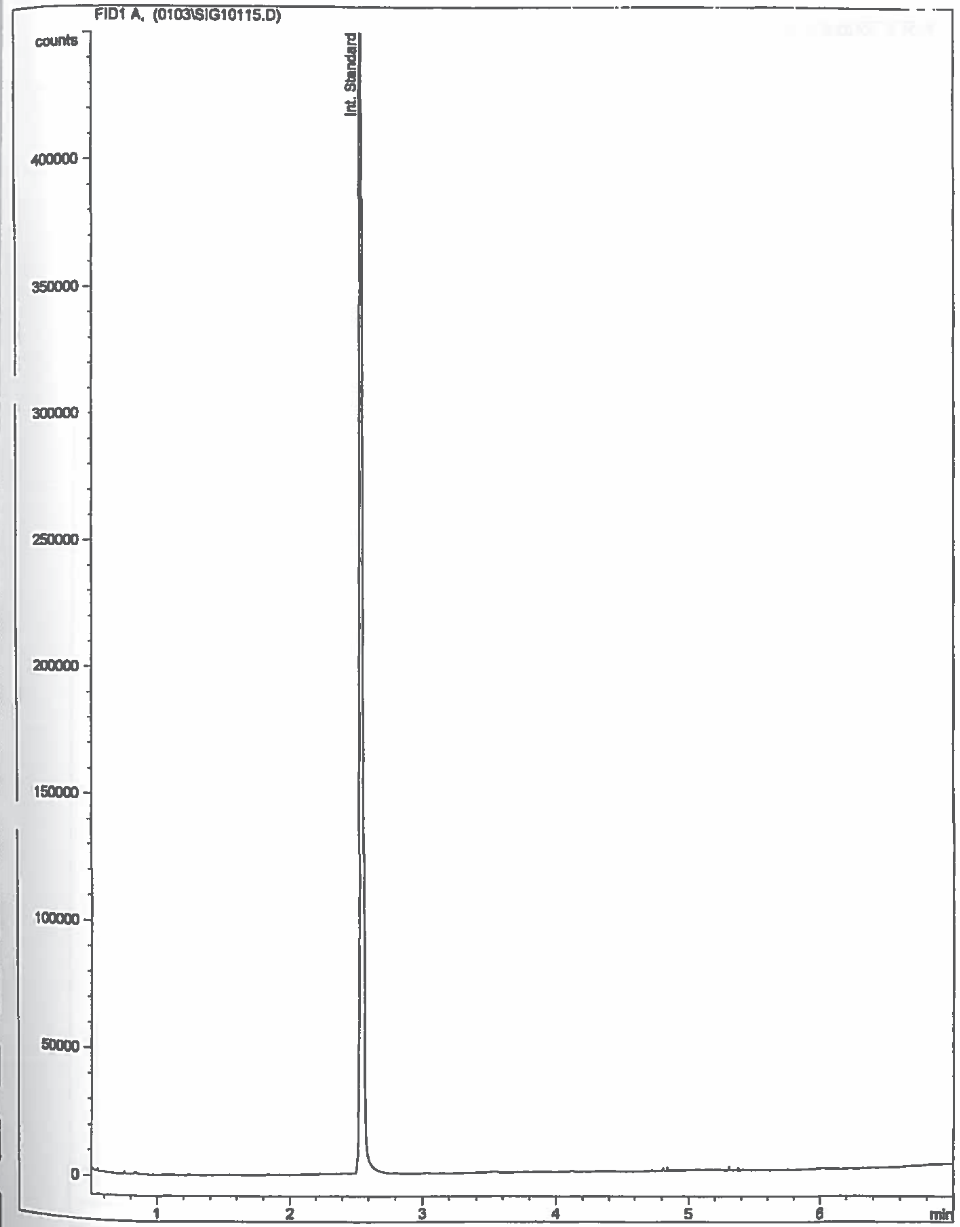
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-19



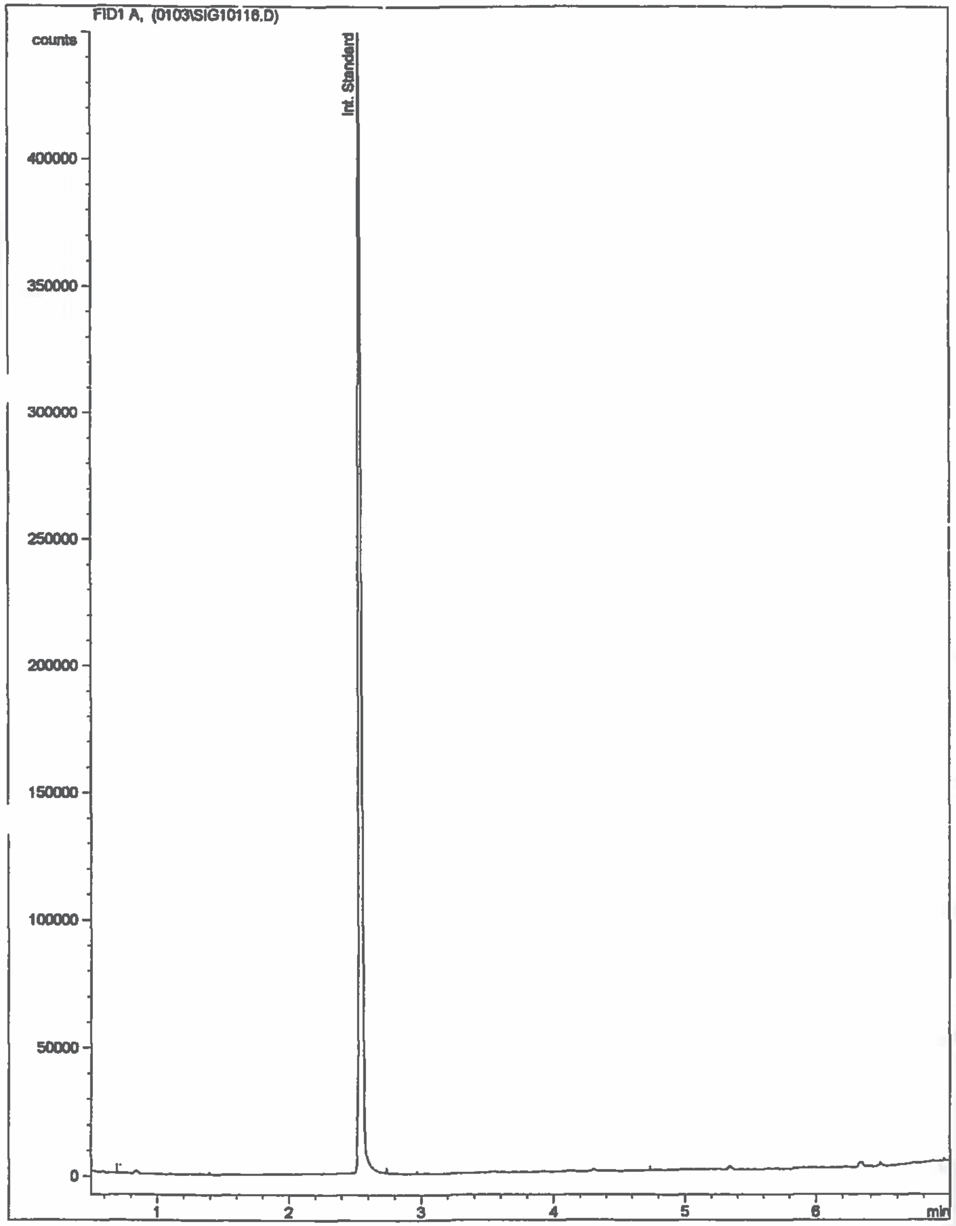
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-23



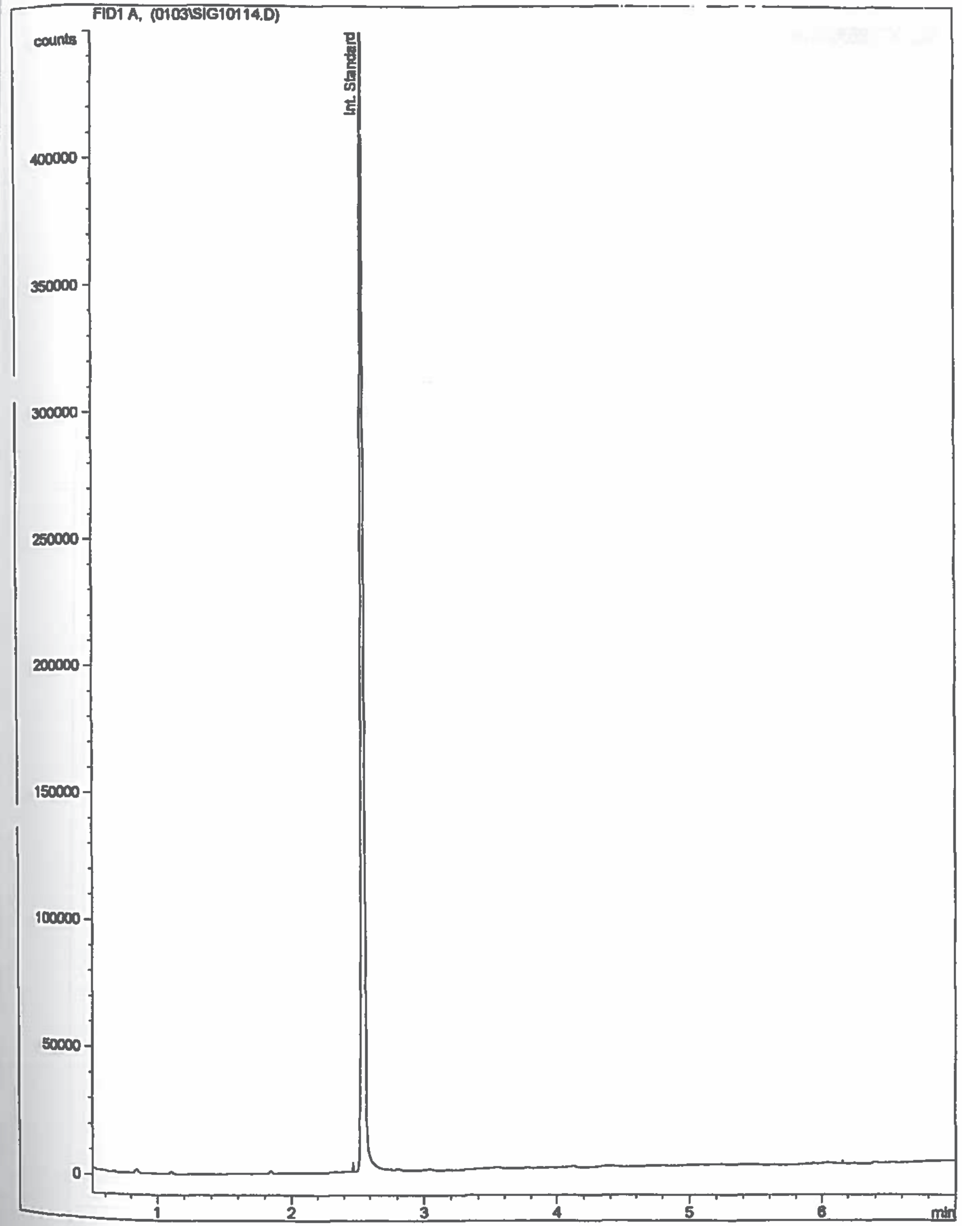
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-25



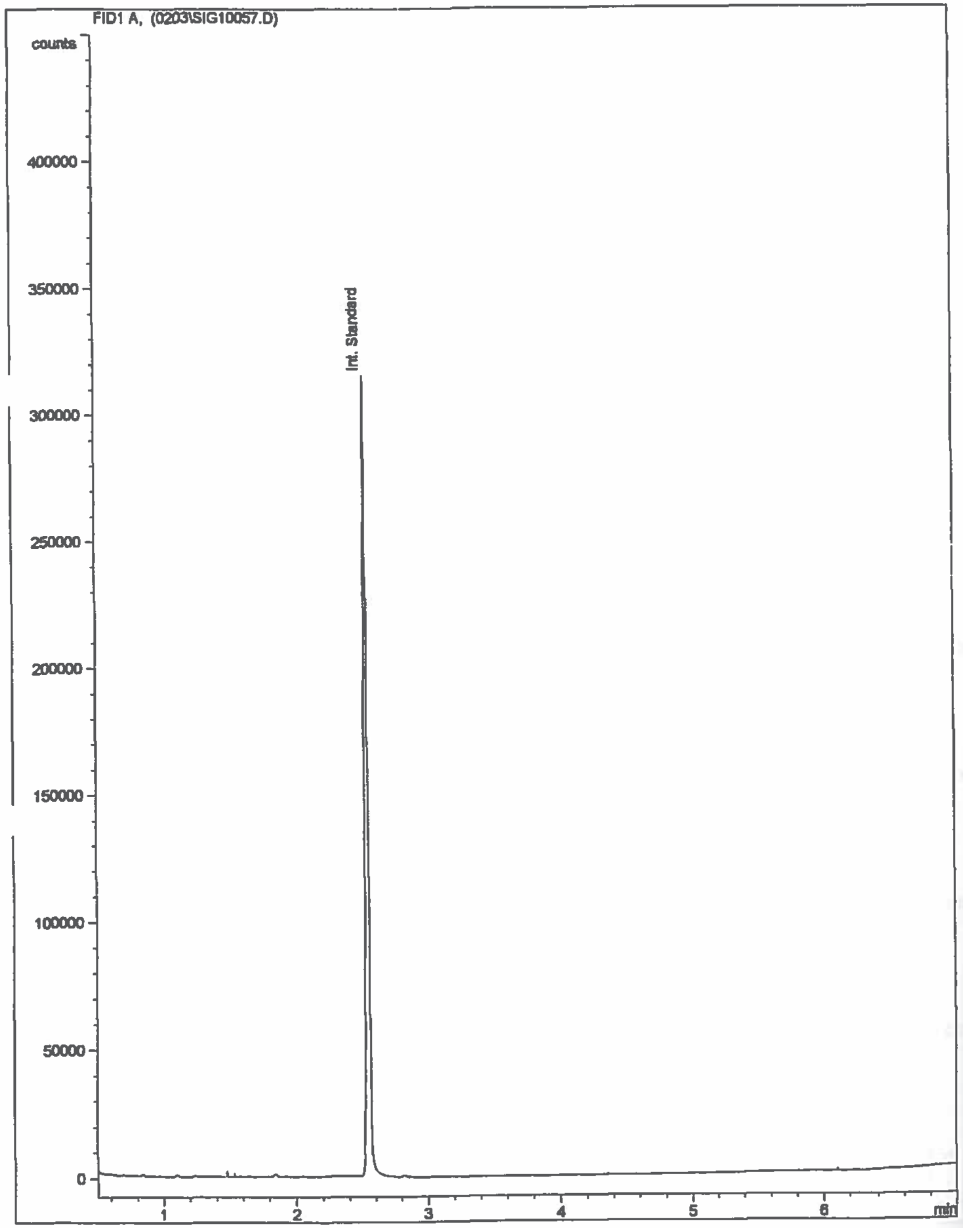
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-28



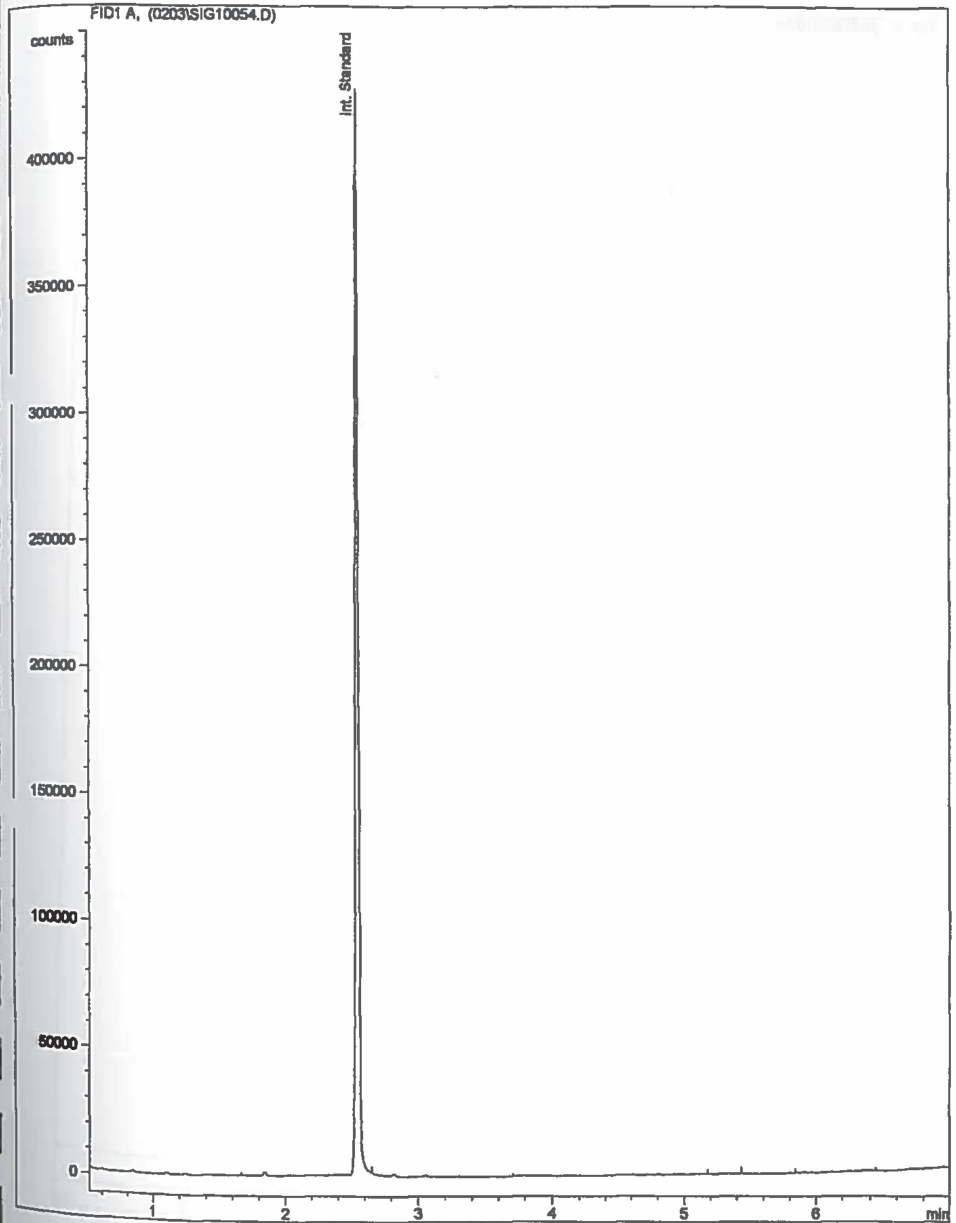
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-32



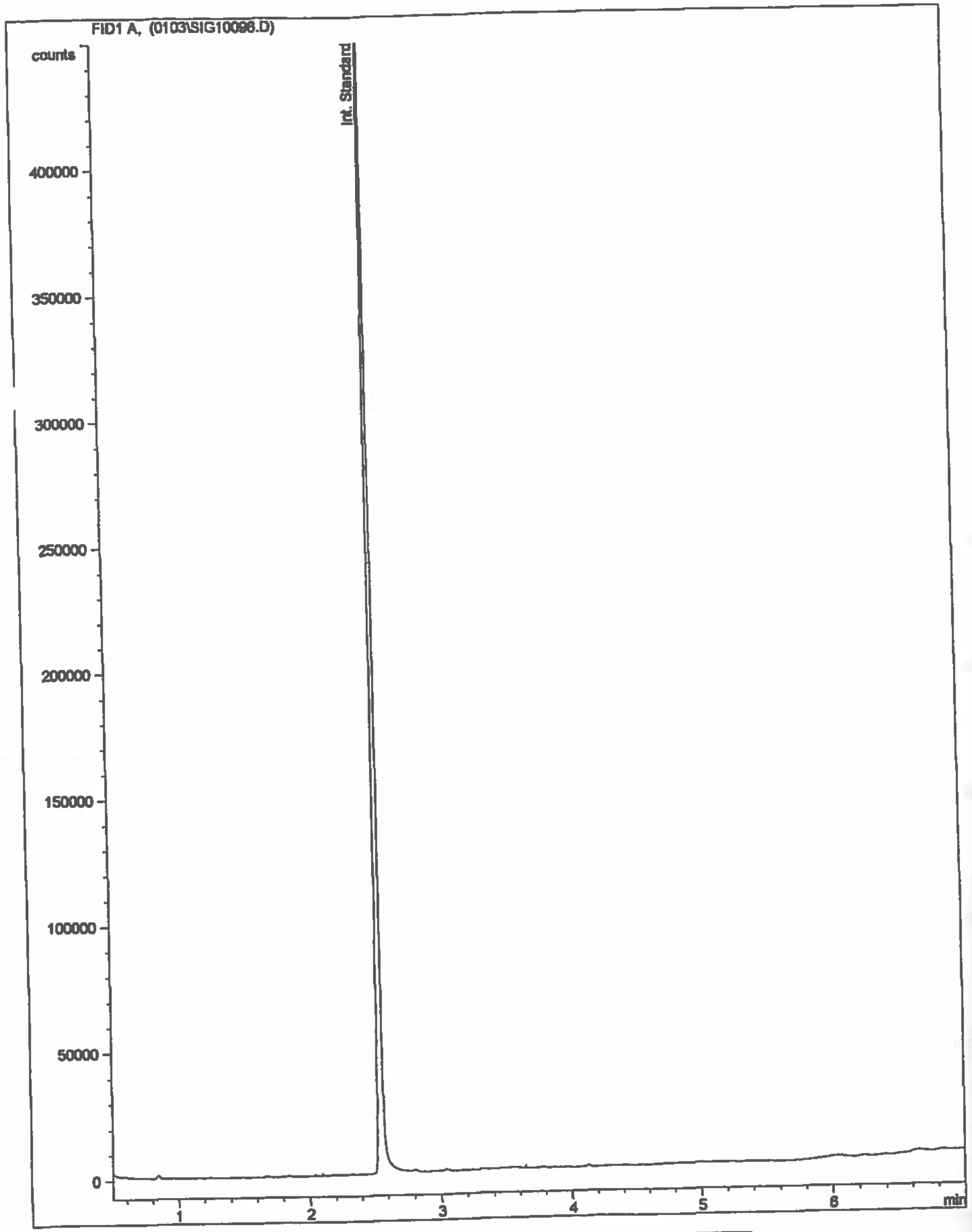
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-38



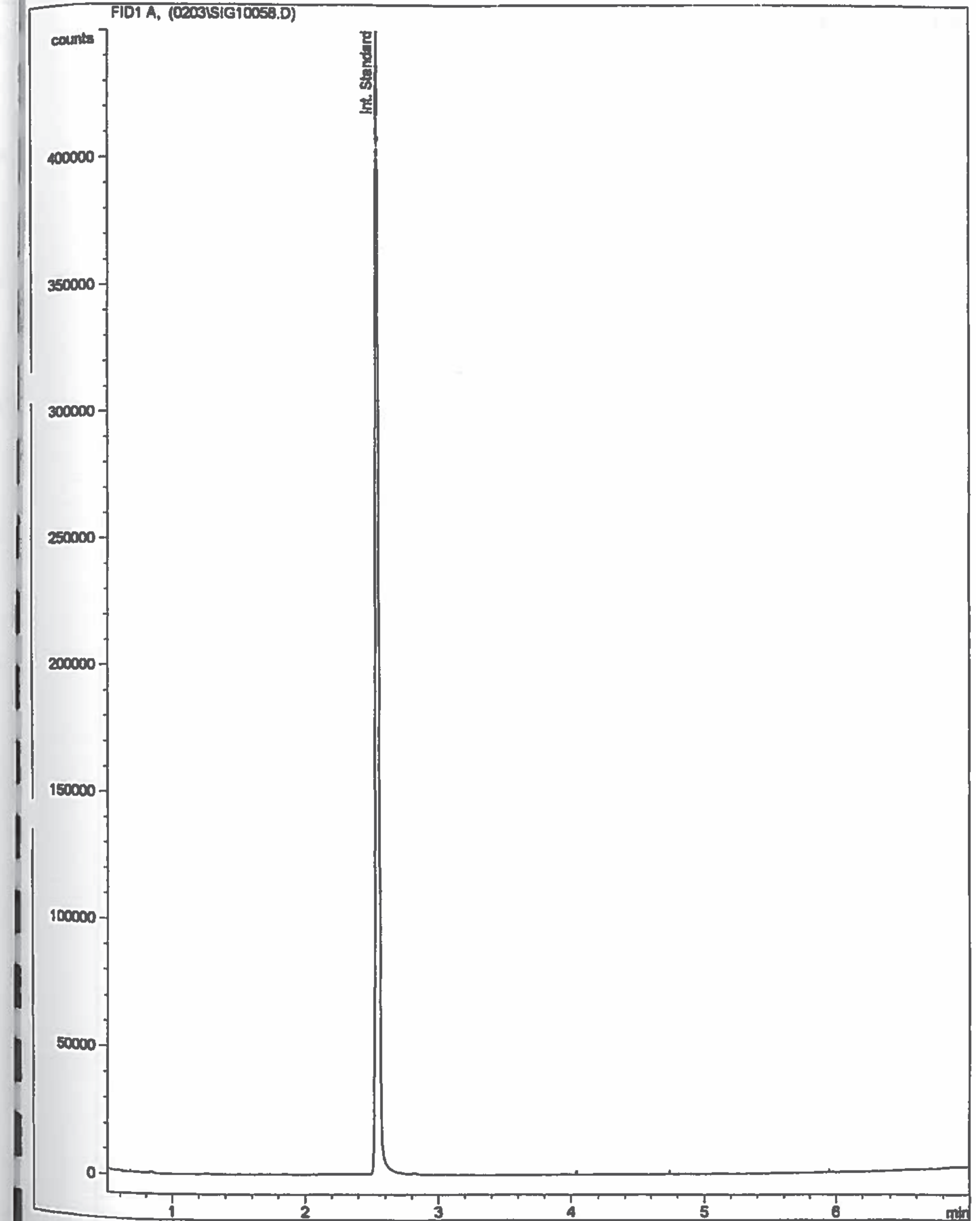
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-44



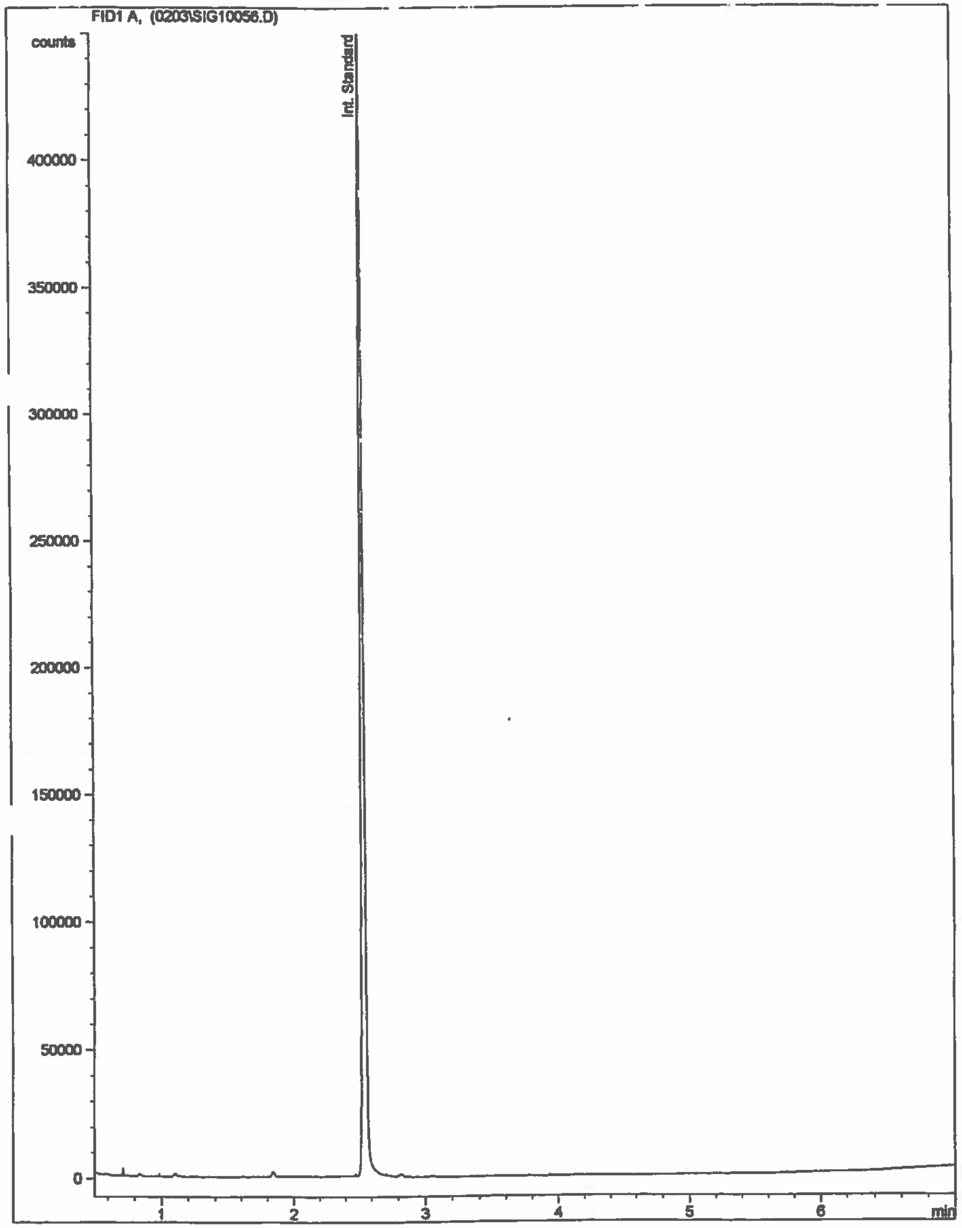
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-49



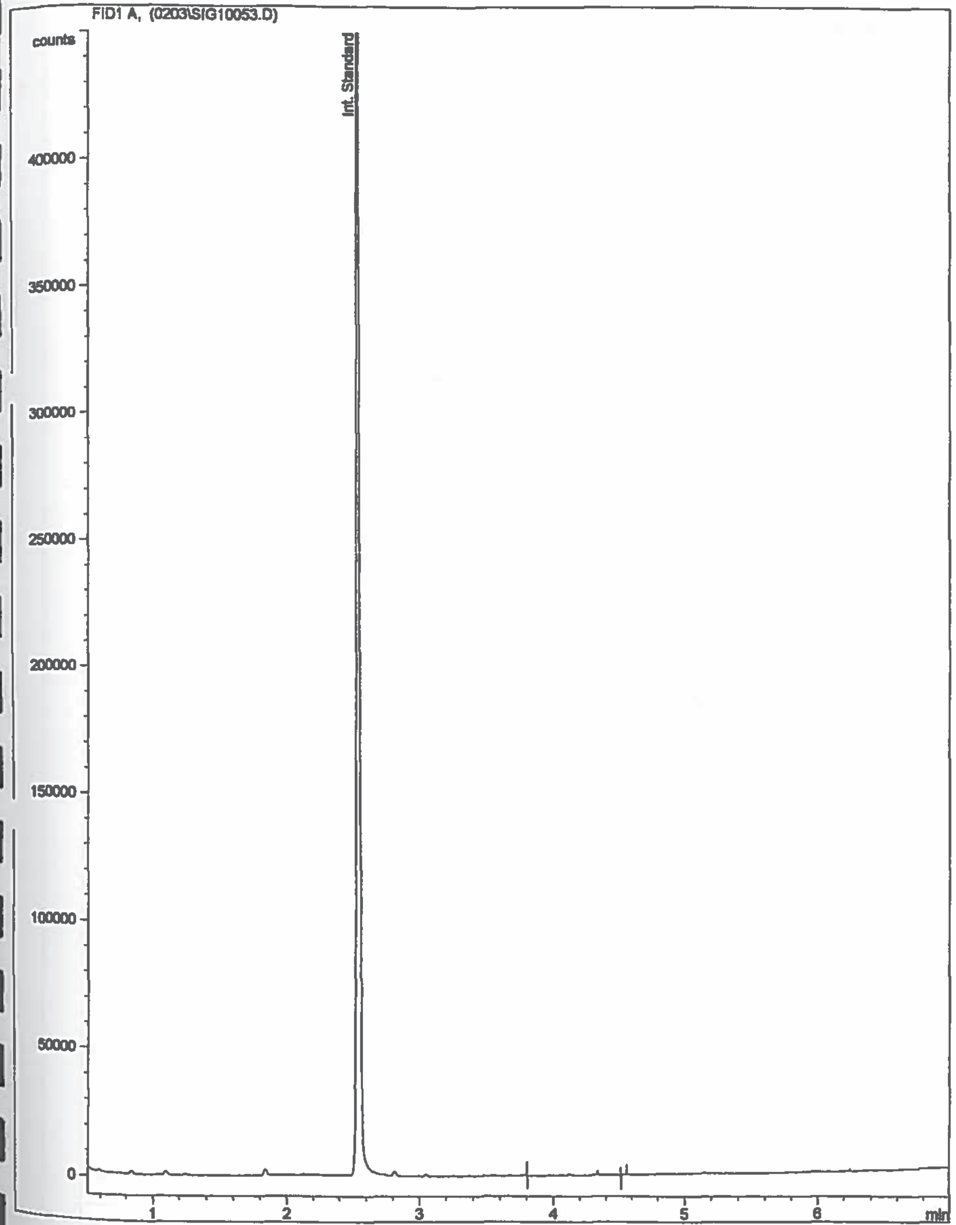
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-51



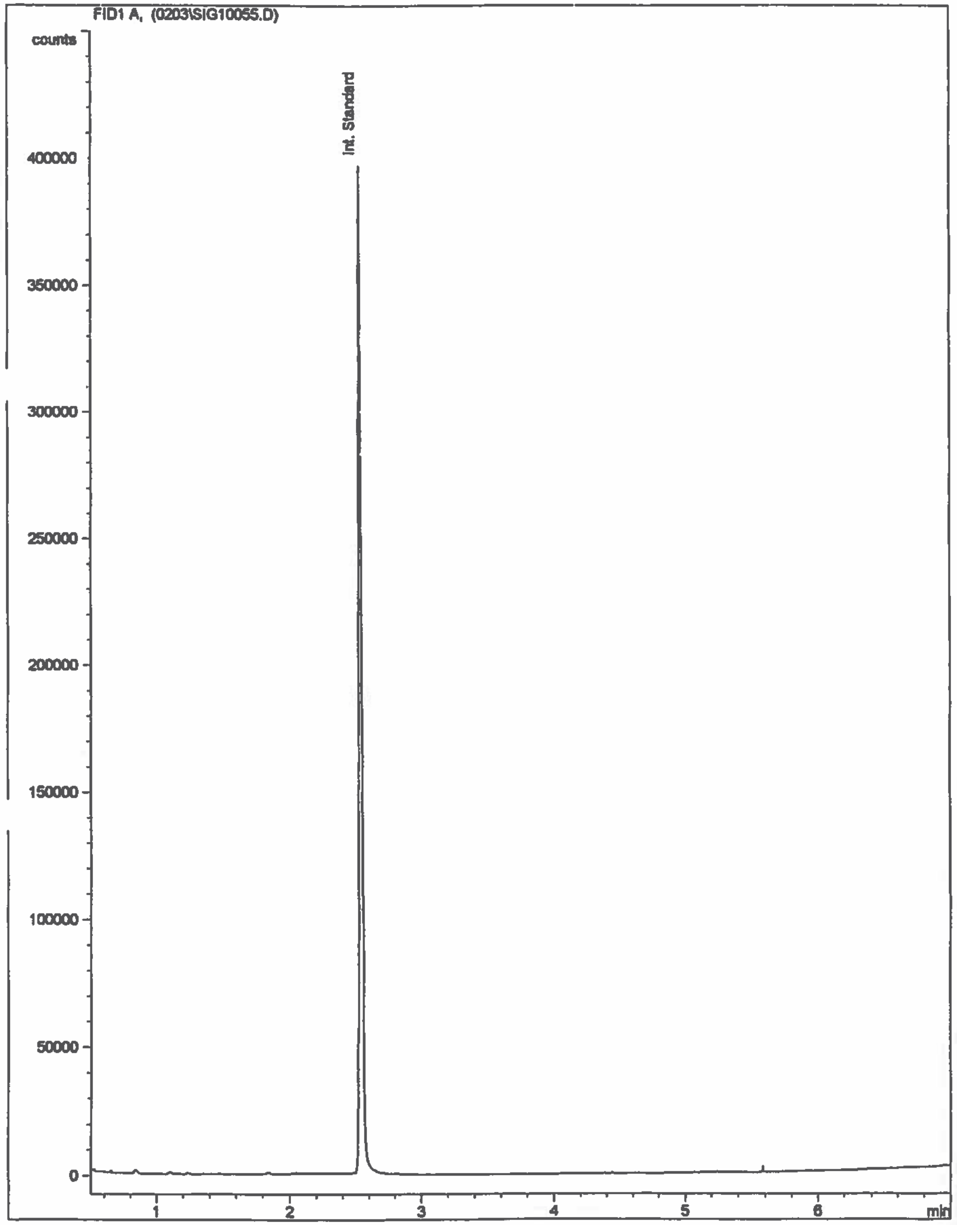
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-54



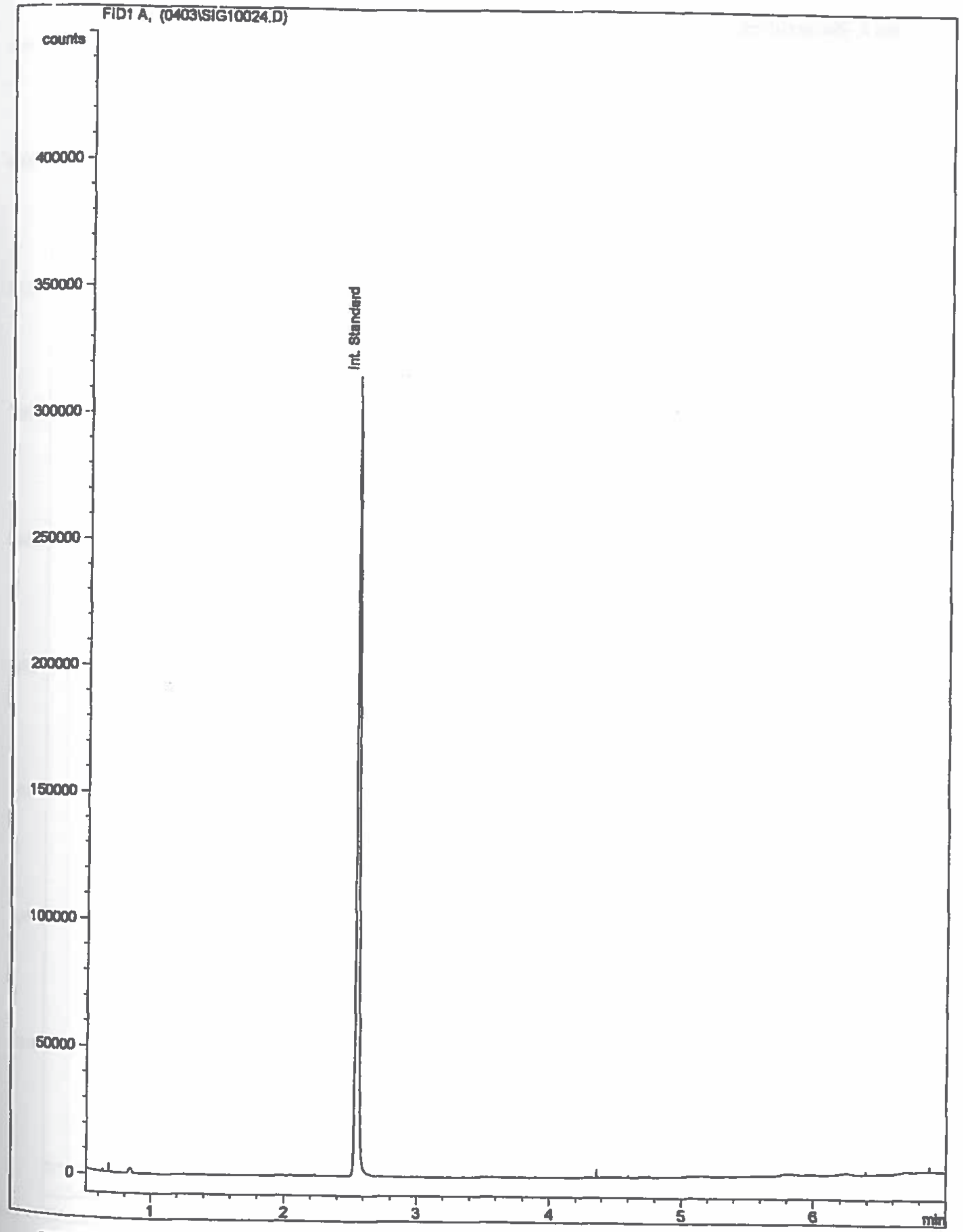
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-57



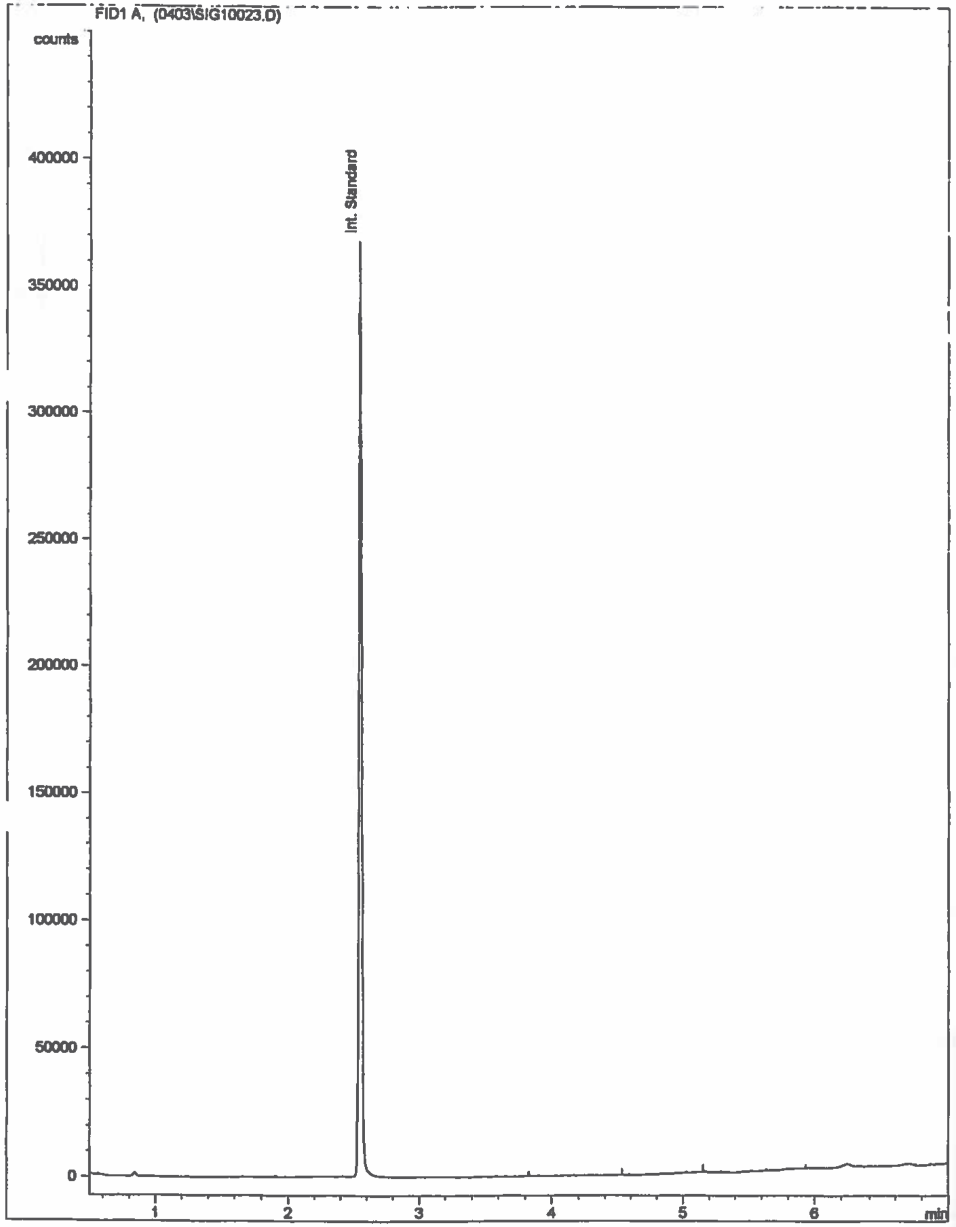
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

02182-17



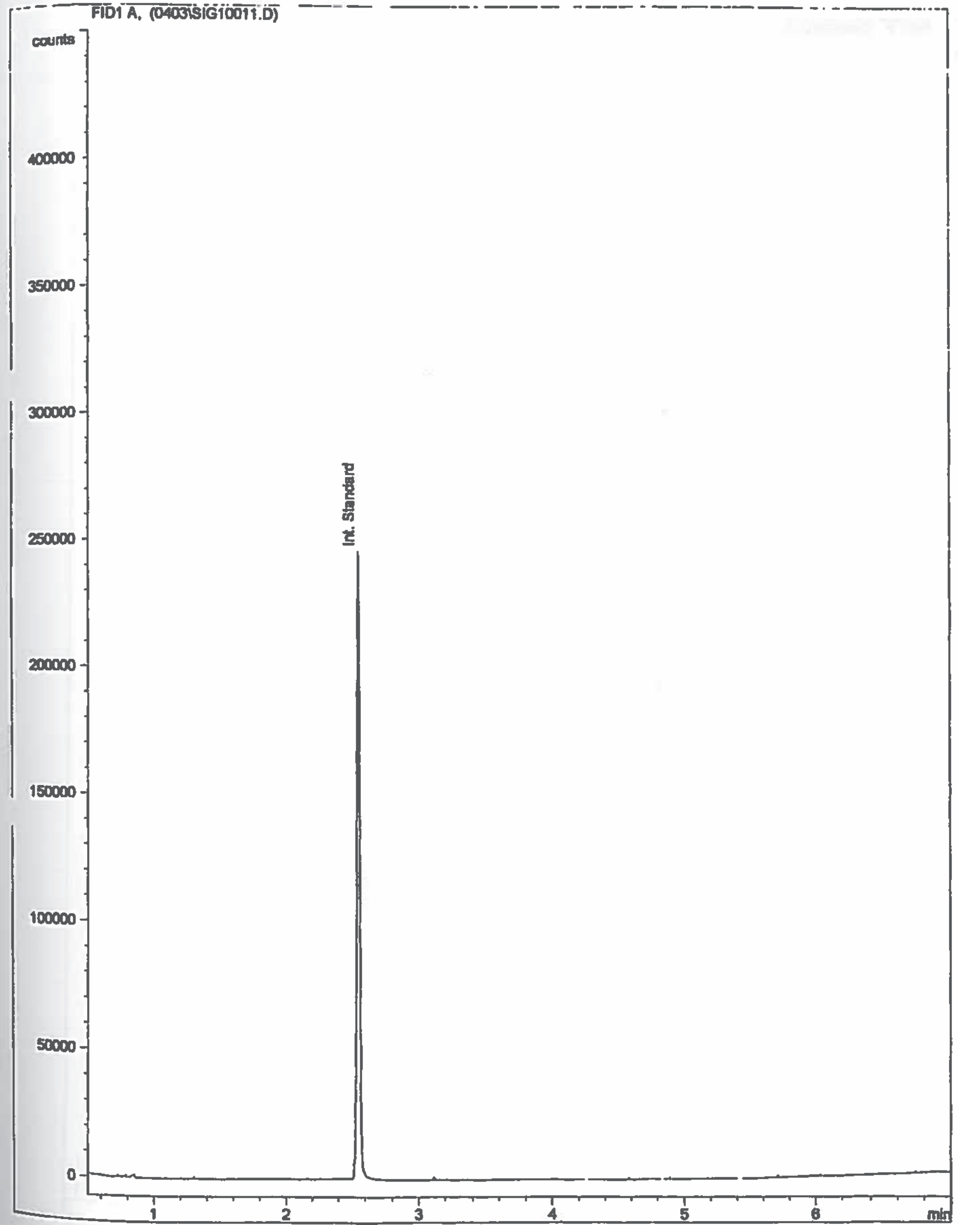
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

02182-34



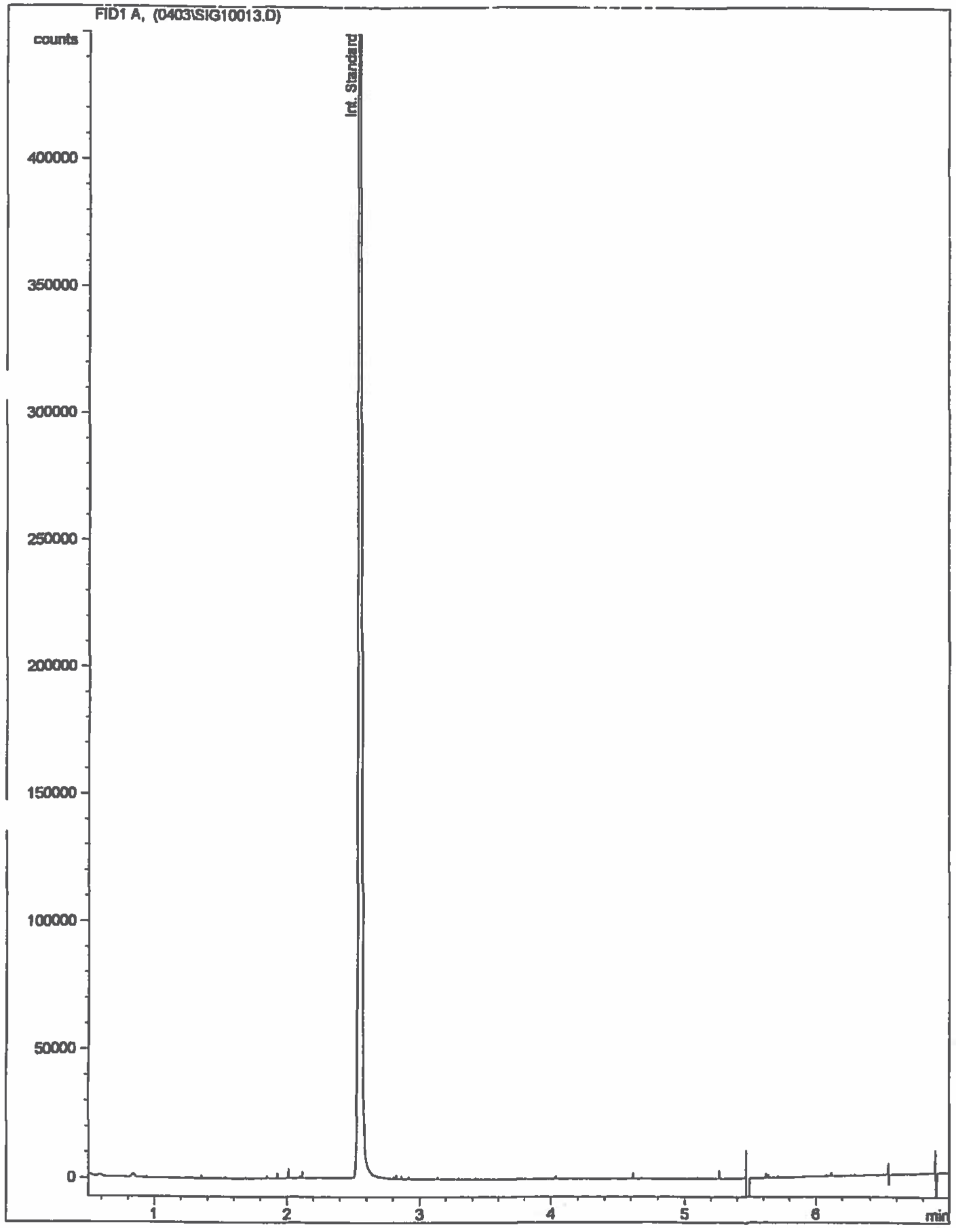
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

02182-36



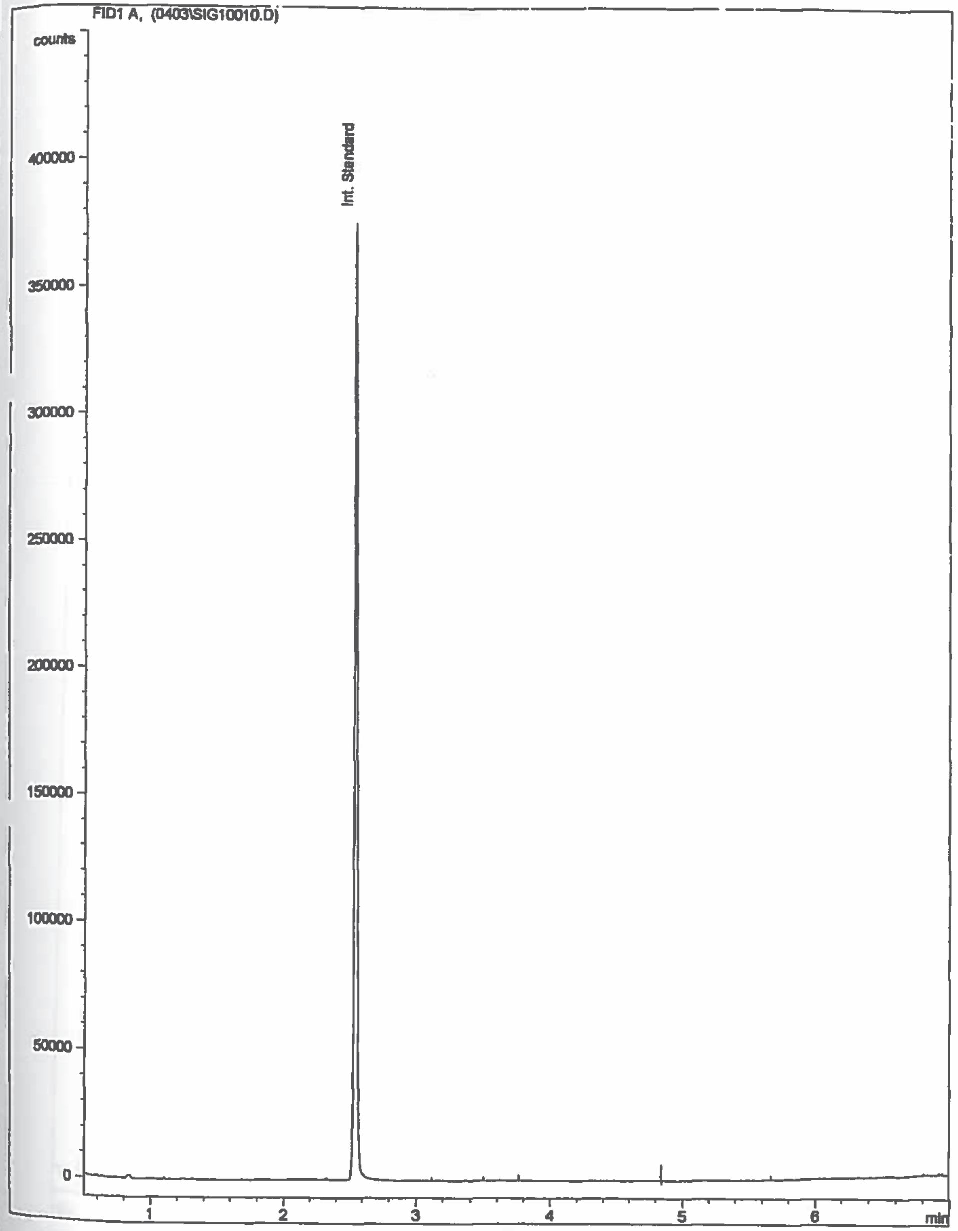
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

02182-39



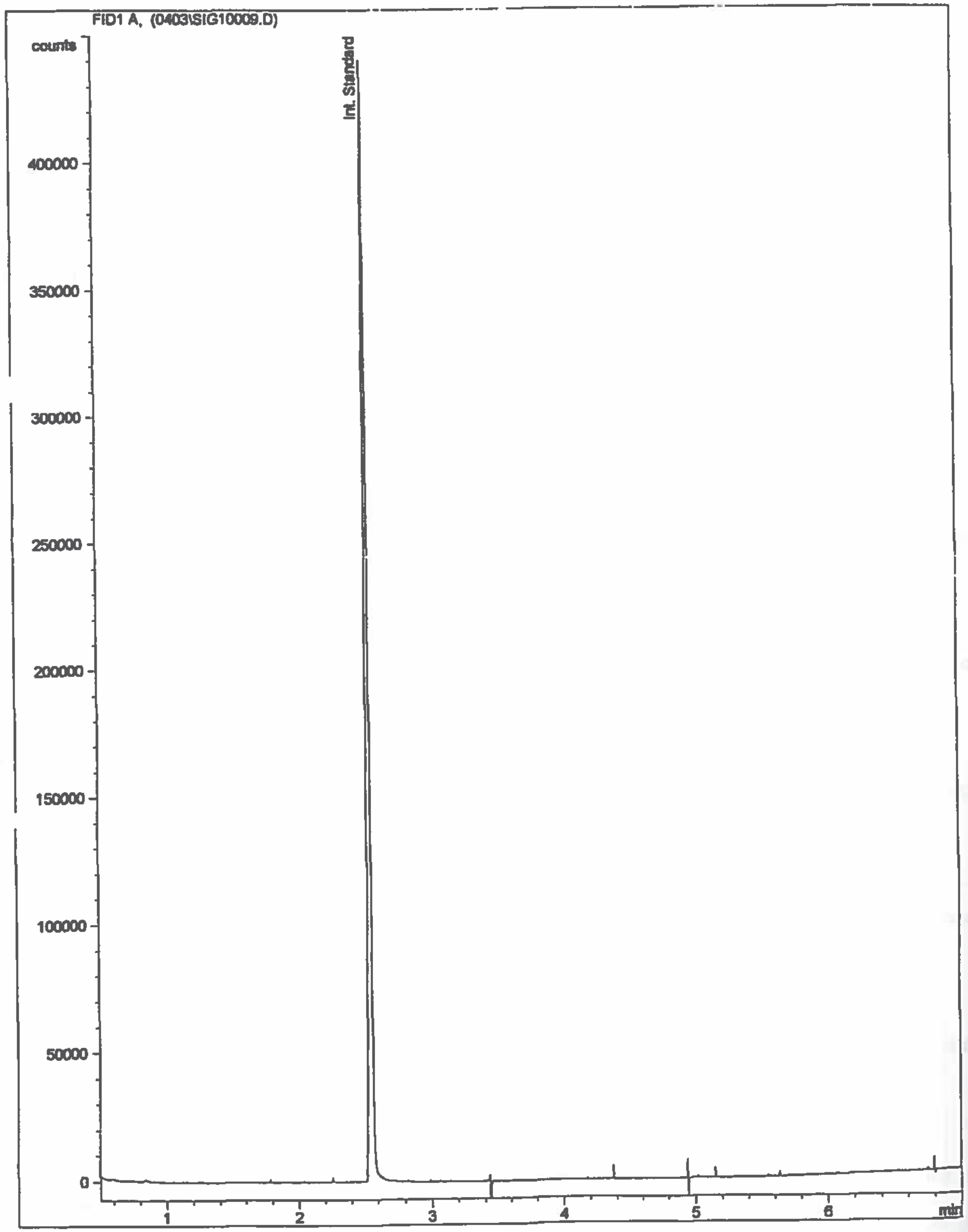
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

02182-40



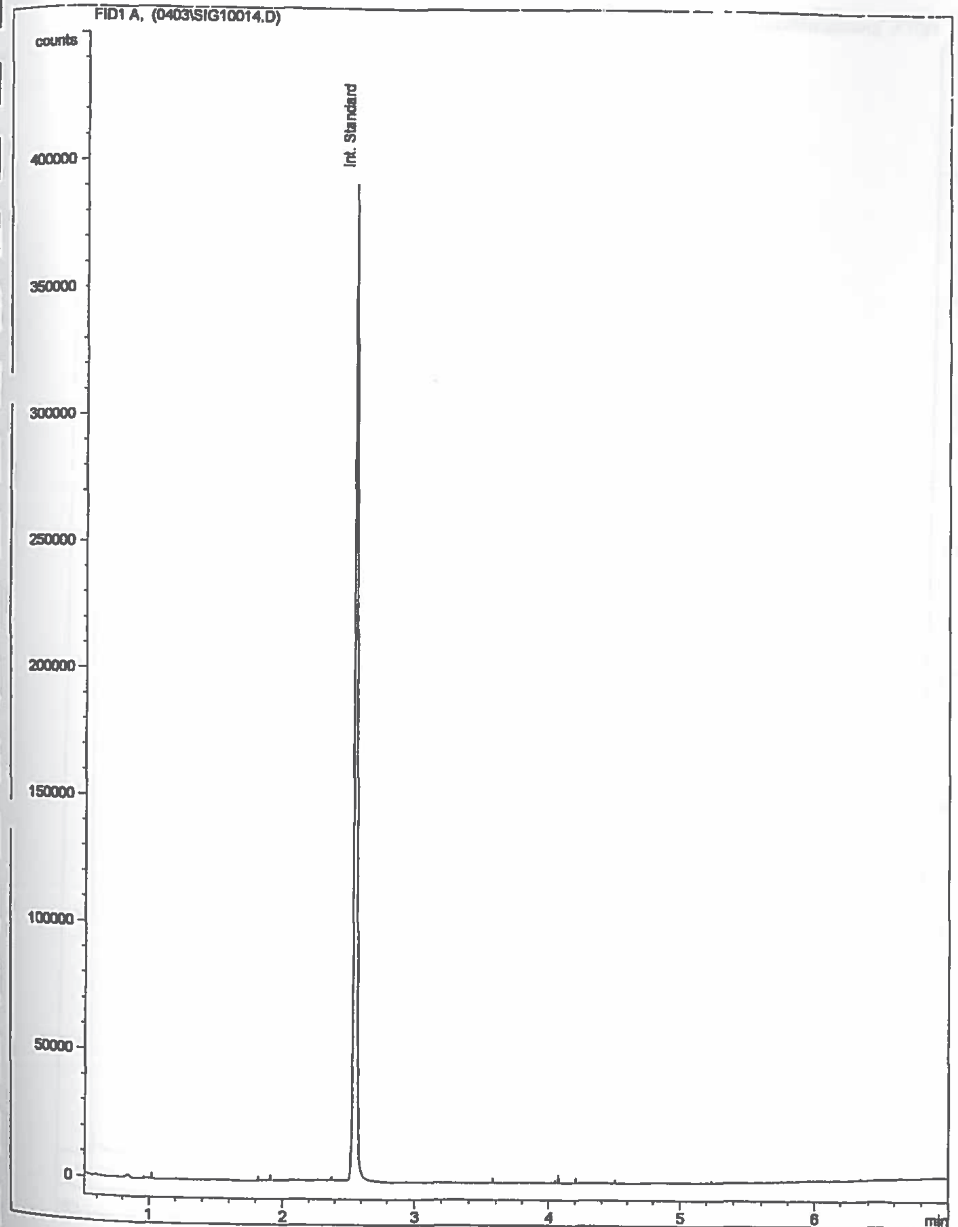
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

02182-42



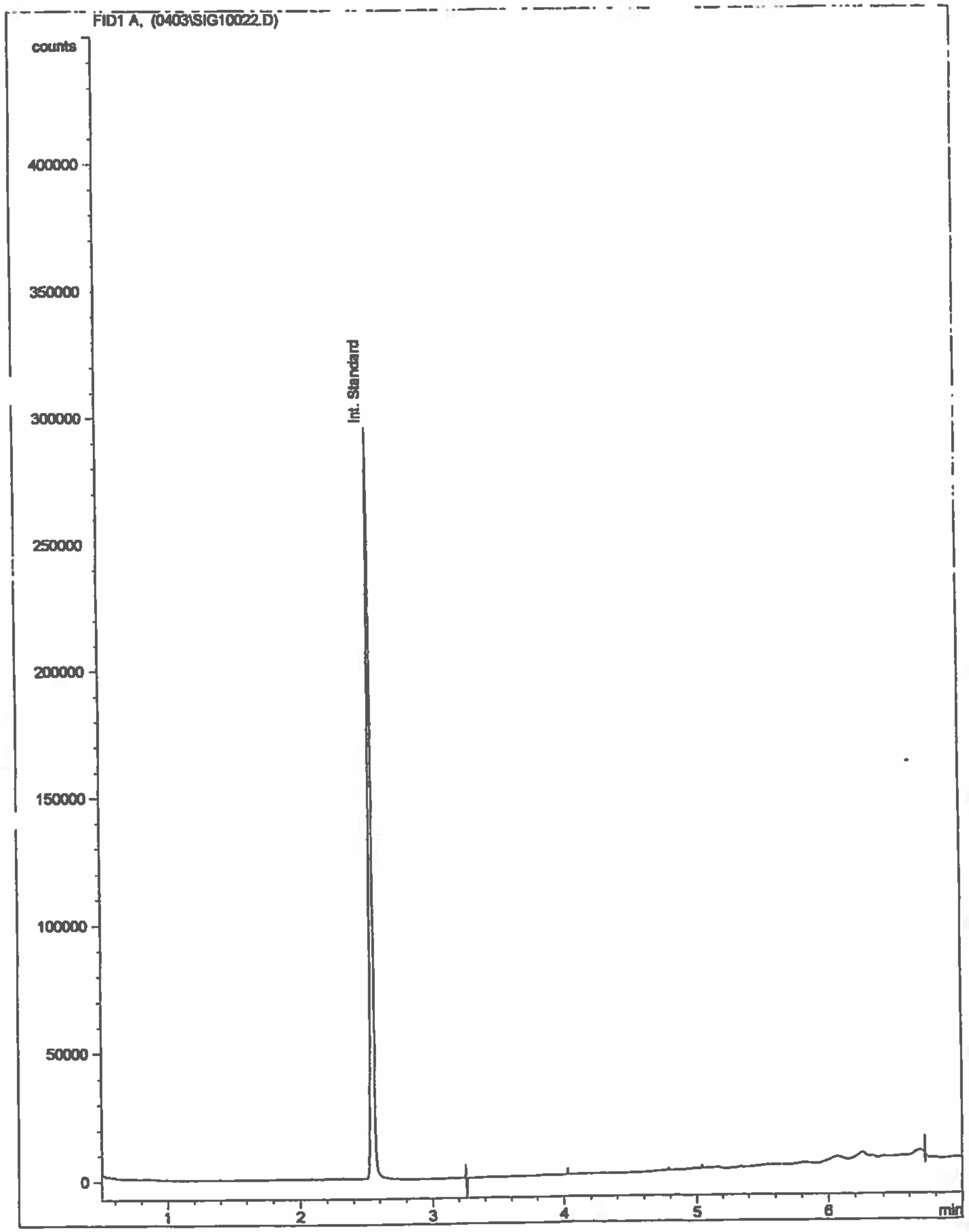
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

02182-43



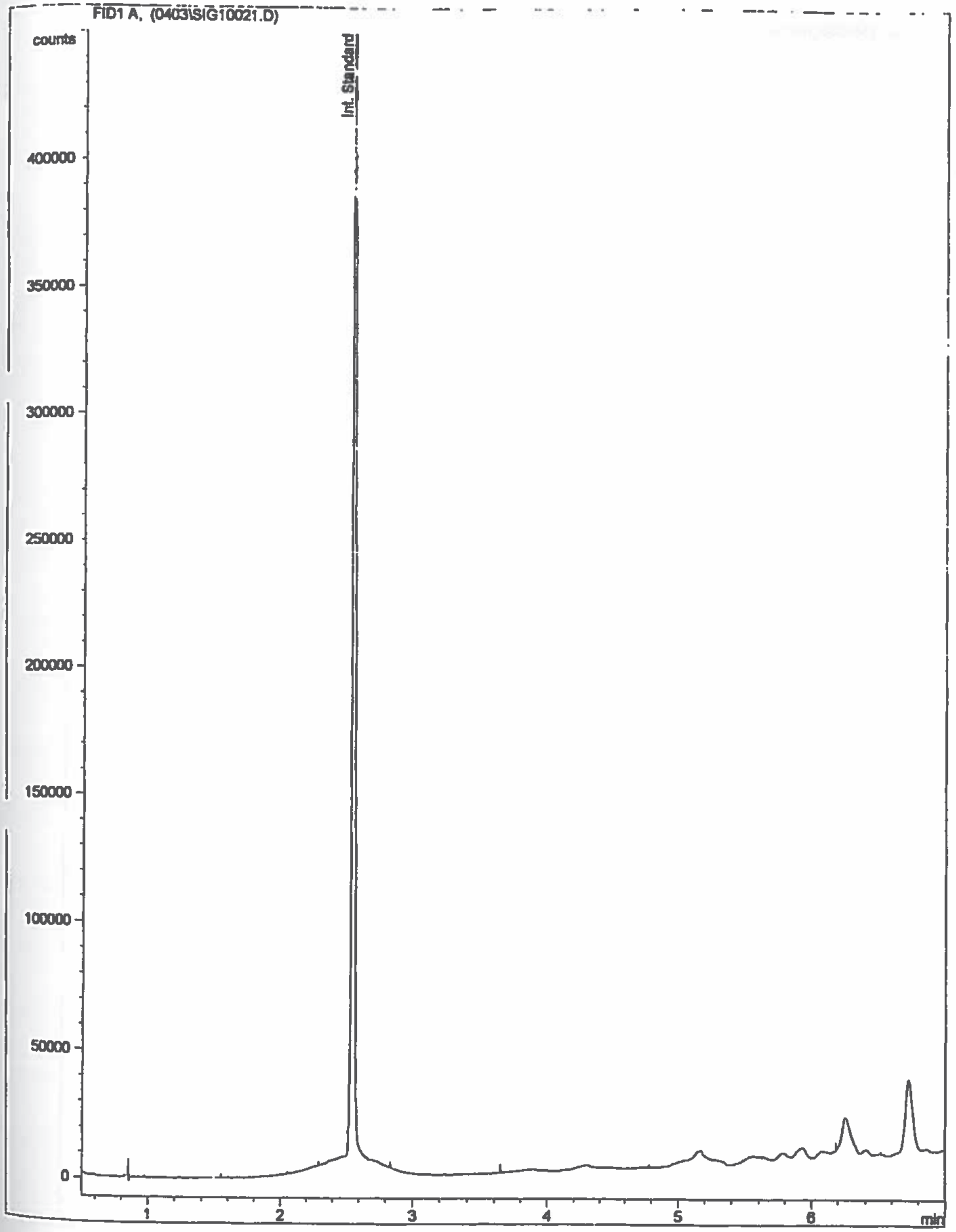
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

02182-45



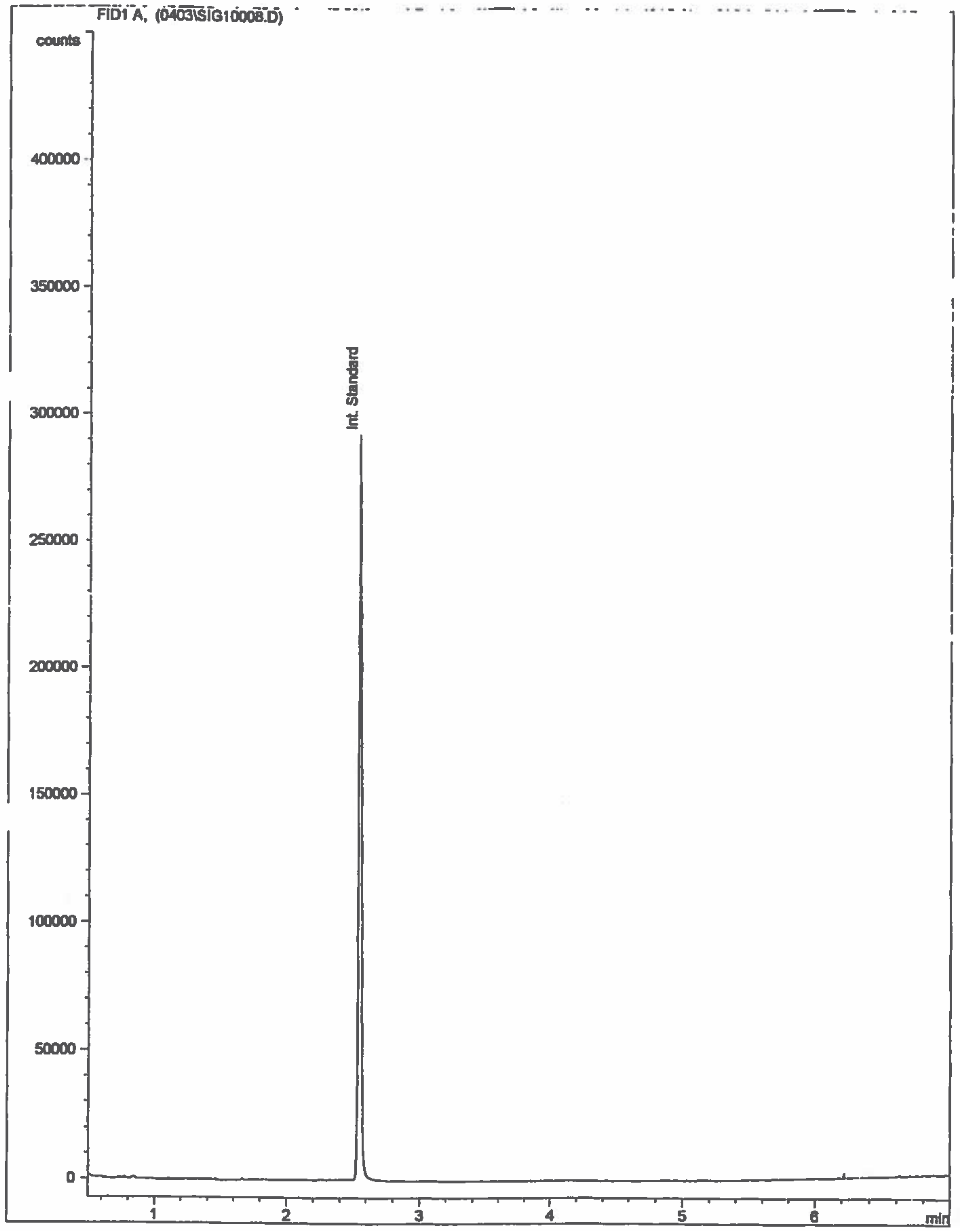
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

02182-47



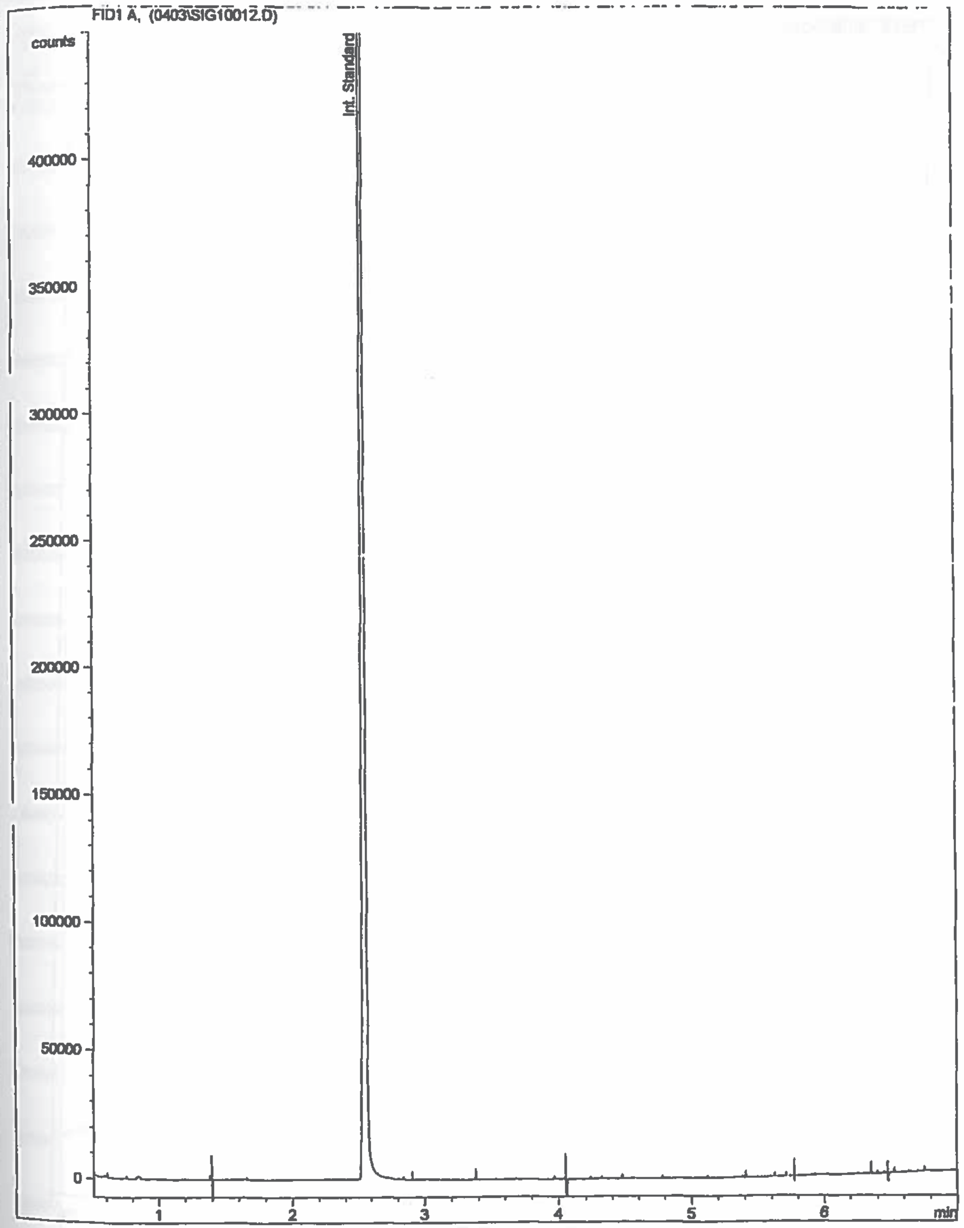
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

02182-50



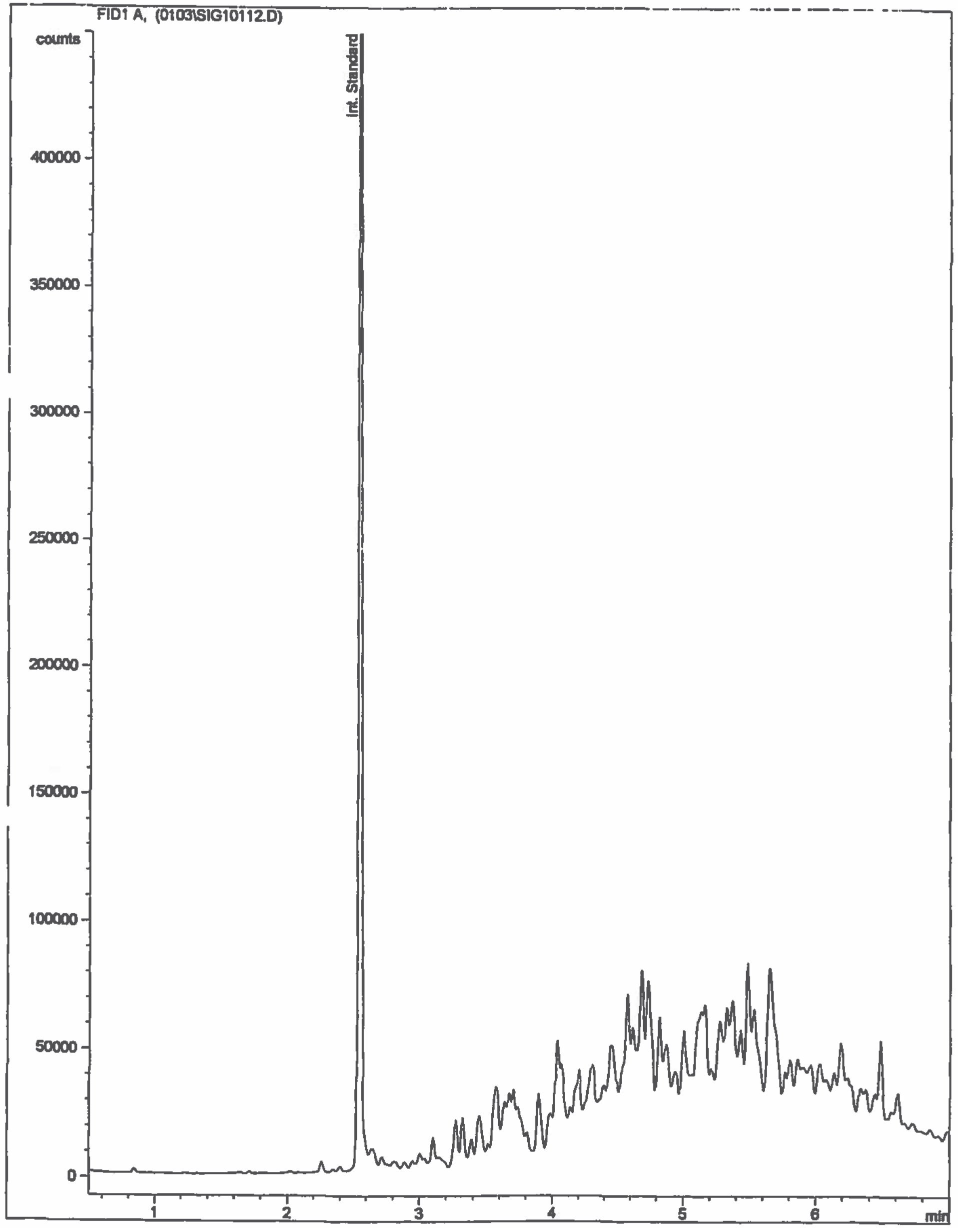
Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

02182-53



Alcontrol Laboratories Ireland
GRO/MTBE Analysis
By G.C.

2182-6

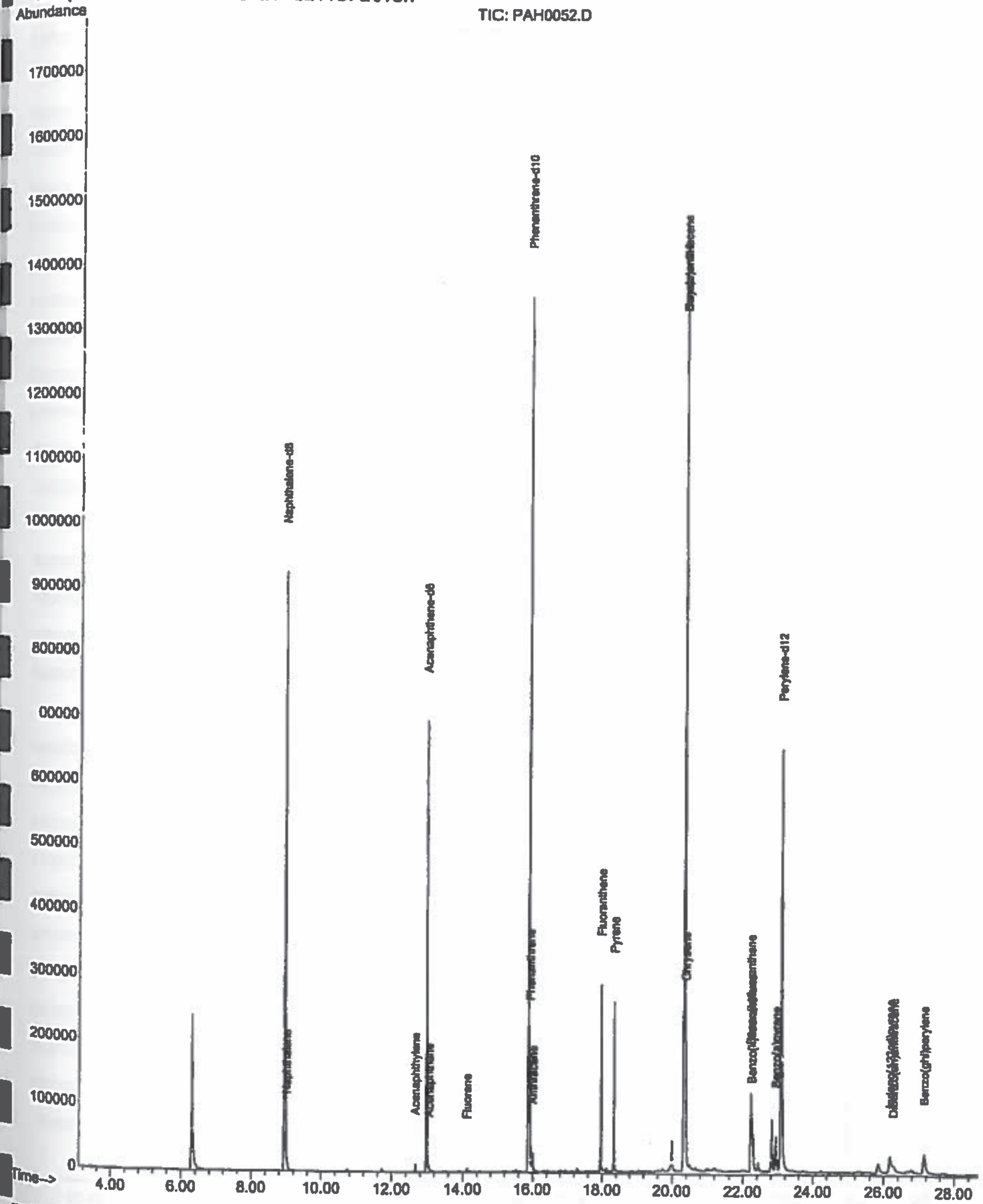


Data File : C:\MSDCHEM\1\DATA\0103\PAH0052.D
Acq On : 7 Jan 2003 13:22
Sample : DUB-02-B02182-S0007WS1 0.5
Misc : Irish Geotechnical Services Ltd/Soil

Vial: 46
Operator: Mathilde Ernoult
Inst : GCMS1
Multiplr: 1.48
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 7 14:47 2003 Quant Results File: DPAH19.RES

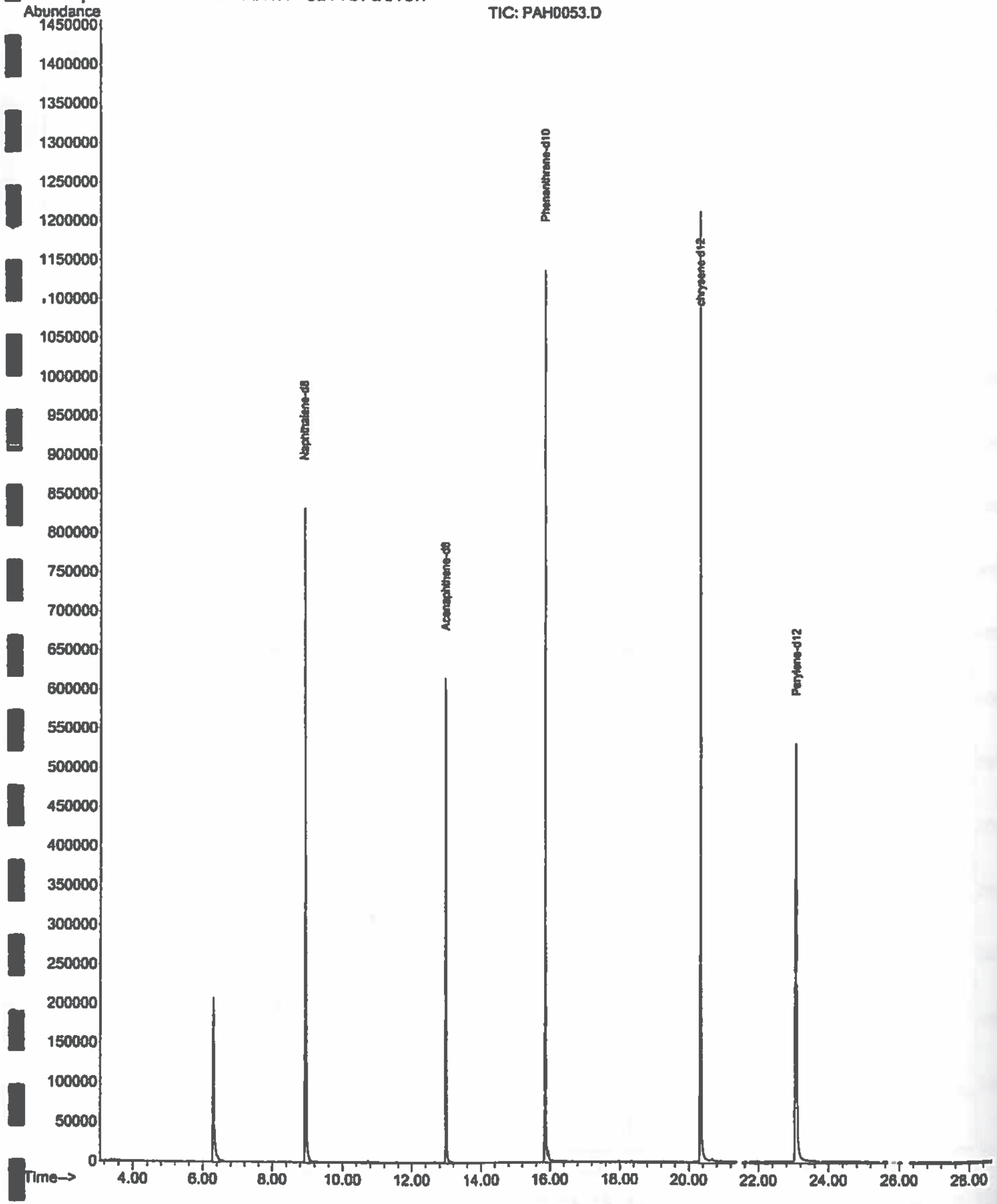
Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\0103\PAH0053.D   Vial: 47
Acq On   : 7 Jan 2003   14:02   Operator: Mathilde Ernoult
Sample   : DUB-02-B02182-S0009 WS1 2.5   Inst   : GCMS1
Misc   : Irish Geotechnical Services Ltd/Soil   Multiplr: 1.66
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 7 14:48 2003   Quant Results File: DPAH19.RES

Method   : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title   : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration

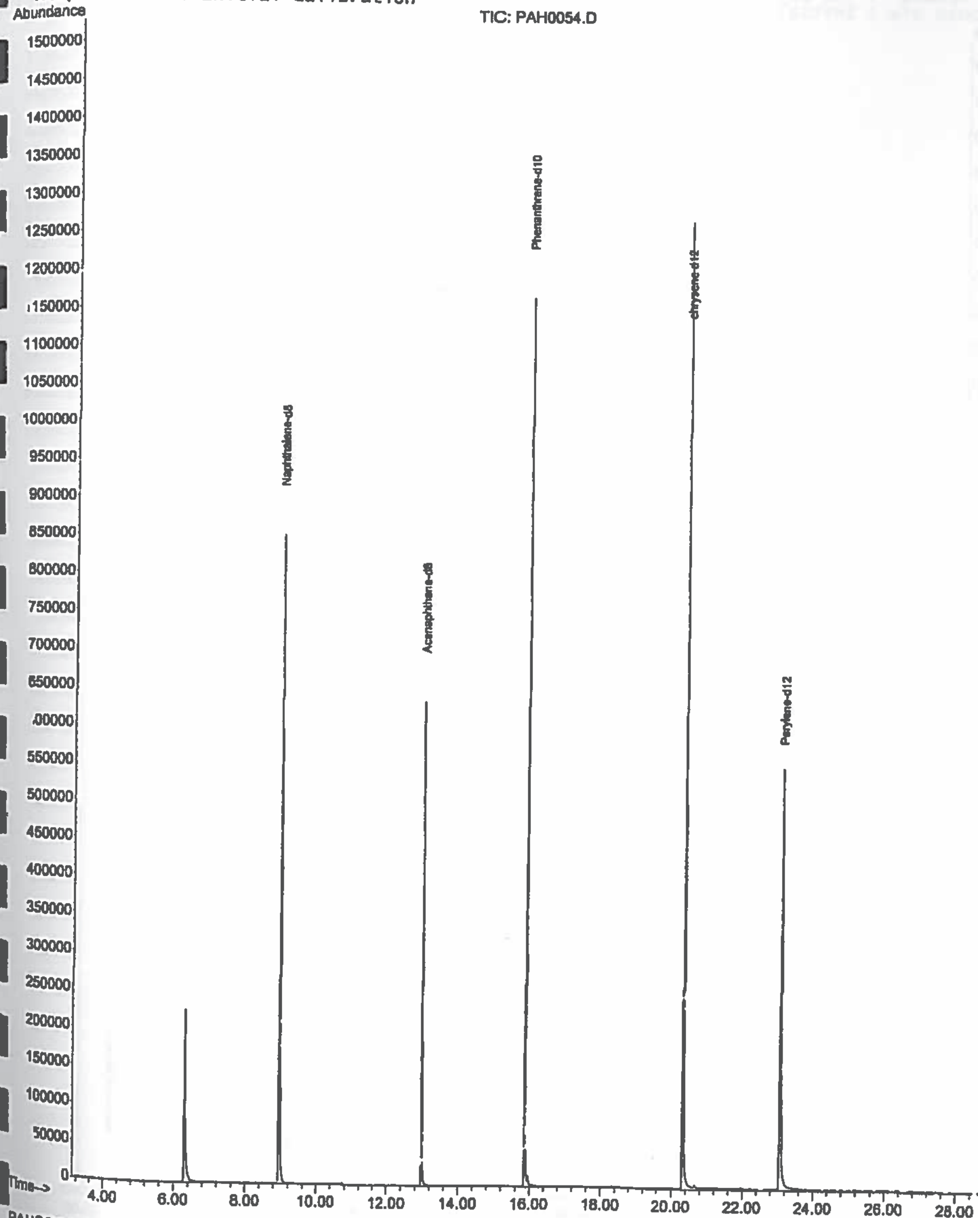


PAH0053.D   DPAH19.M   Tue Jan 07 14:48:55 2003

Data File : C:\MSDCHEM\1\DATA\0103\PAH0054.D   Vial: 48
Acq On   : 7 Jan 2003   14:41   Operator: Mathilde Ernoult
Sample   : DUB-02-B02182-S0010 WS1 3.5   Inst   : GCMS1
Misc   : Irish Geotechnical Services Ltd/Soil   Multiplr: 1.41
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 8 14:38 2003   Quant Results File: DPAH19.RES

Method   : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title   : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration



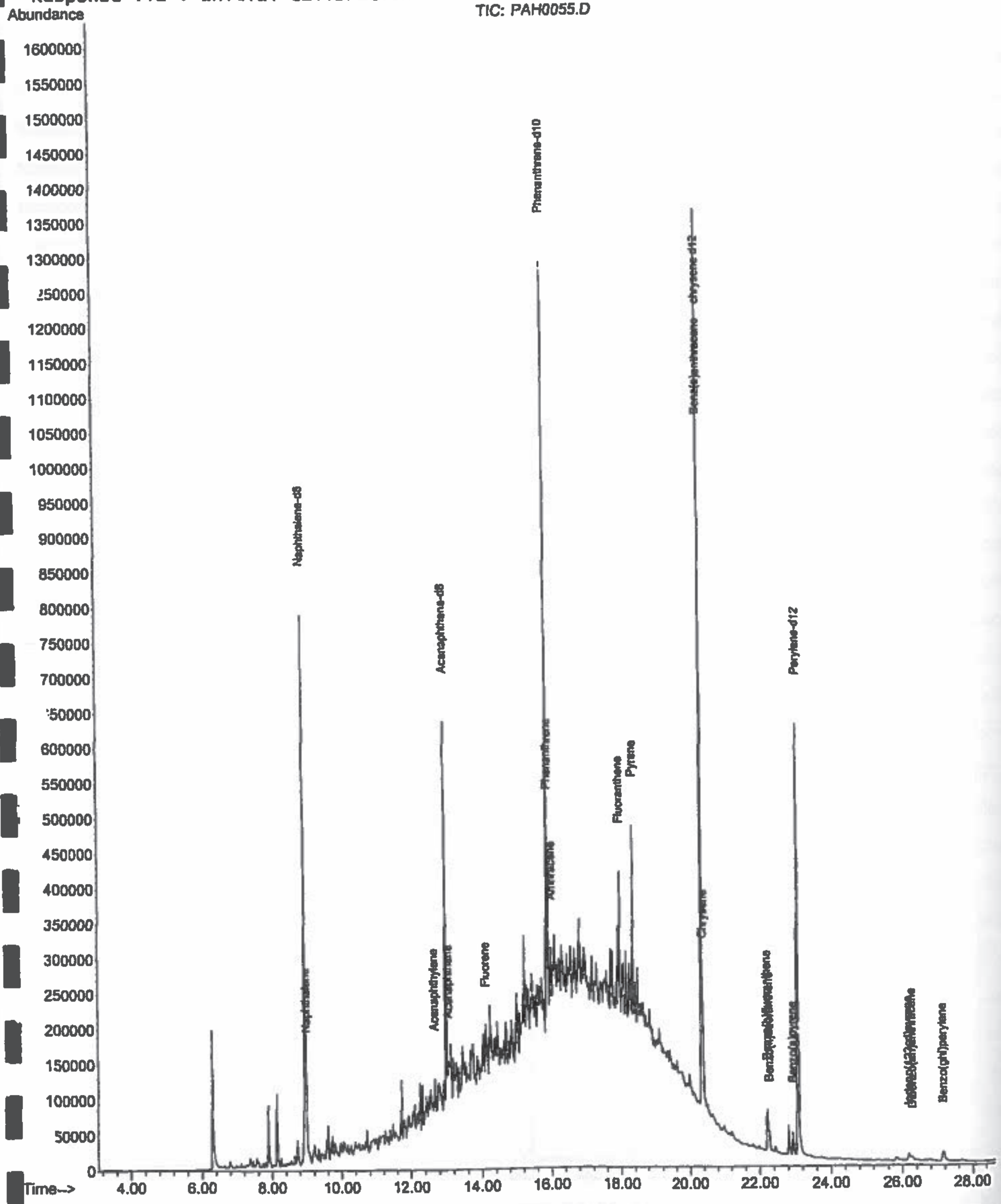
PAH0054.D   DPAH19.M   Wed Jan 08 14:39:06 2003

Data File : C:\MSDCHEM\1\DATA\0103\PAH0055.D
Acq On : 7 Jan 2003 15:20
Sample : DUB-02-B02182-S0011 WS2 0.5-1.0
Misc : Irish Geotechnical Services Ltd/Soil

Vial: 49
Operator: Mathilde Ernoult
Inst : GCMS1
Multiplr: 1.58
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 8 14:39 2003
Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration

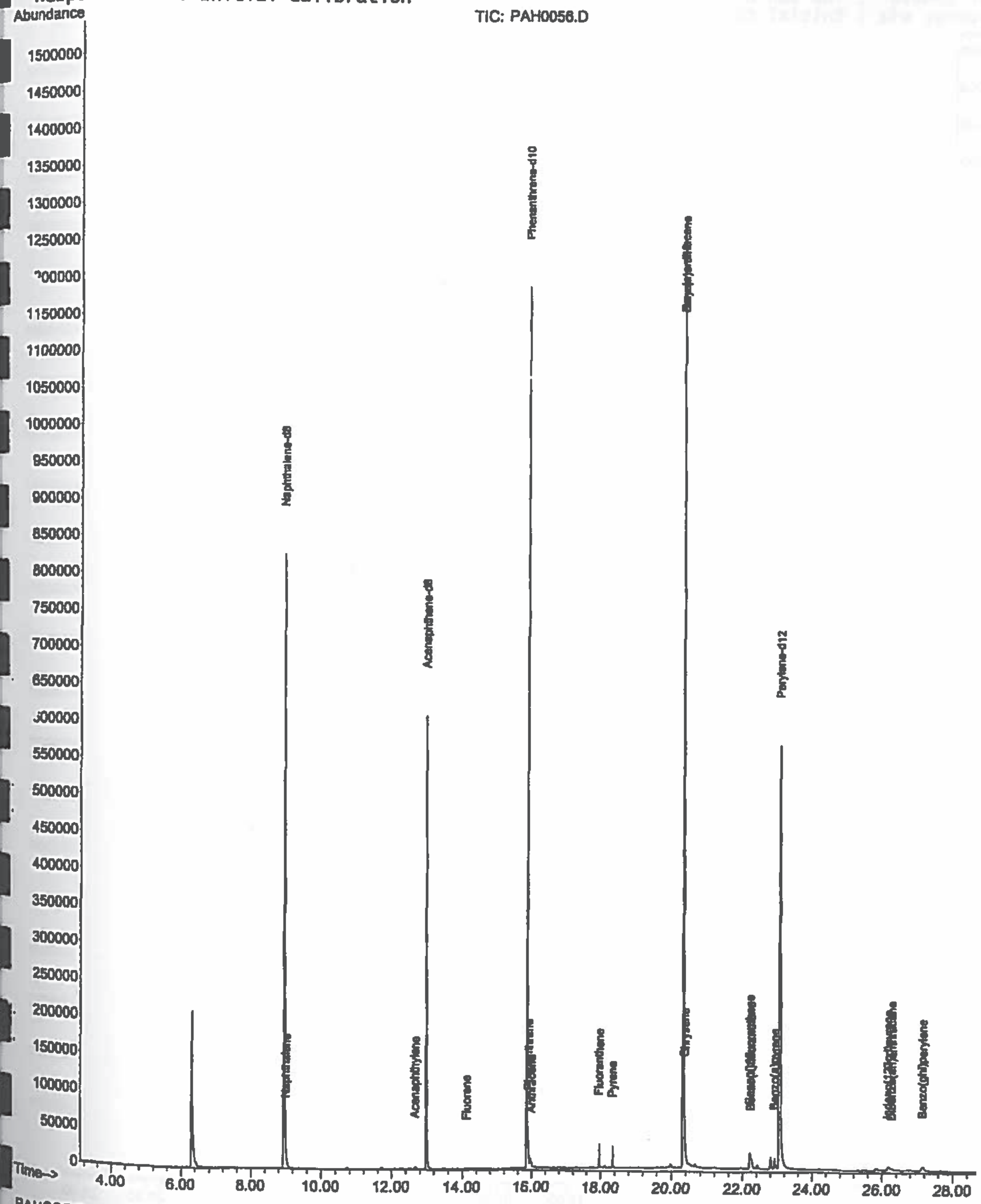


Data File : C:\MSDCHEM\1\DATA\0103\PAH0056.D
Acq On : 7 Jan 2003 16:00
Sample : DUB-02-B02182-S0013 WS2 1.5-2.0
Misc : Irish Geotechnical Services Ltd/Soil

Vial: 50
Operator: Mathilde Ernoult
Inst : GCMS1
Multiplr: 1.47
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 8 14:40 2003
Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration

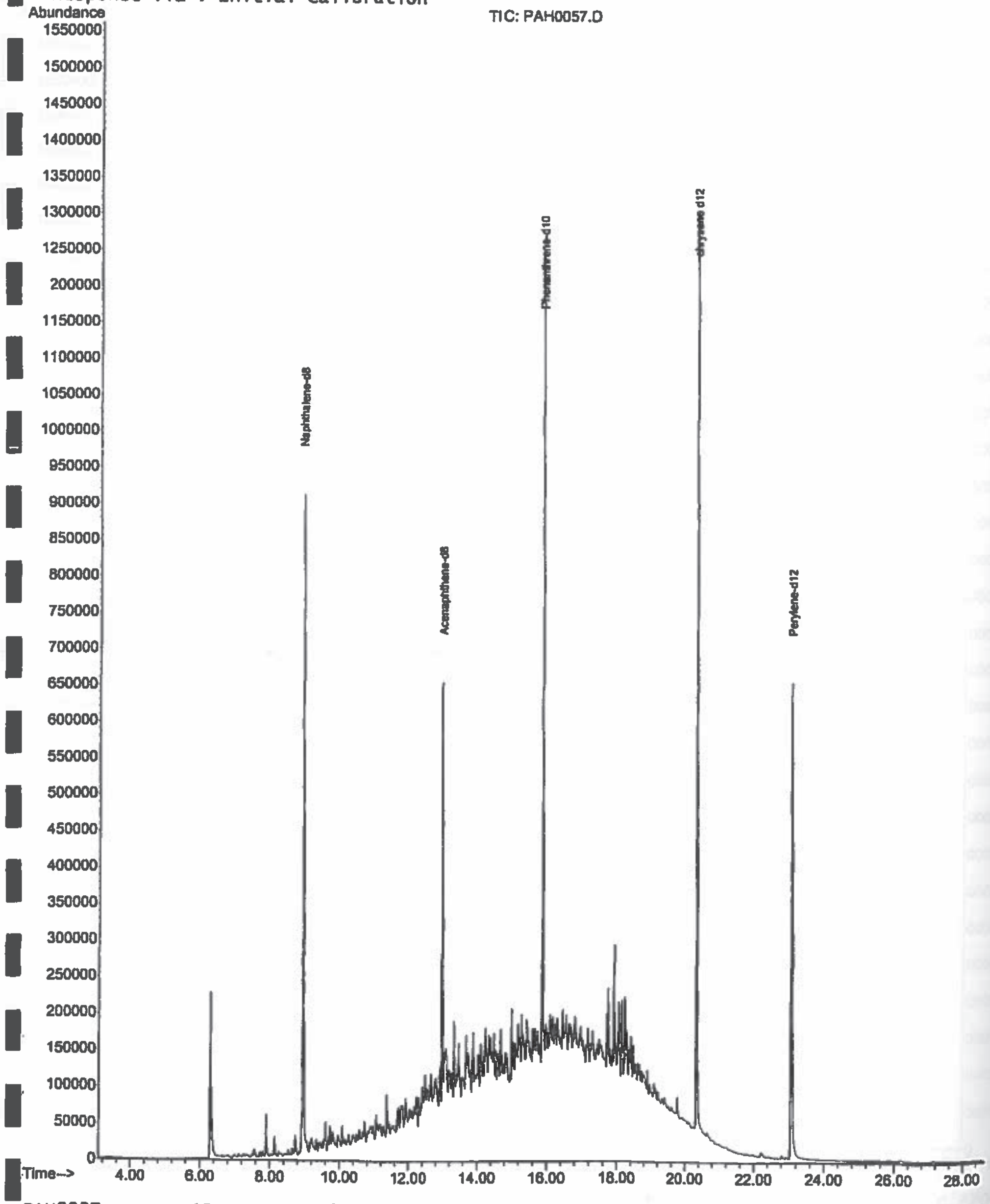


Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\0103\PAH0057.D Vial: 51
Acq On : 7 Jan 2003 16:39 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0015 WS2 4.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.68
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 8 14:41 2003 Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration

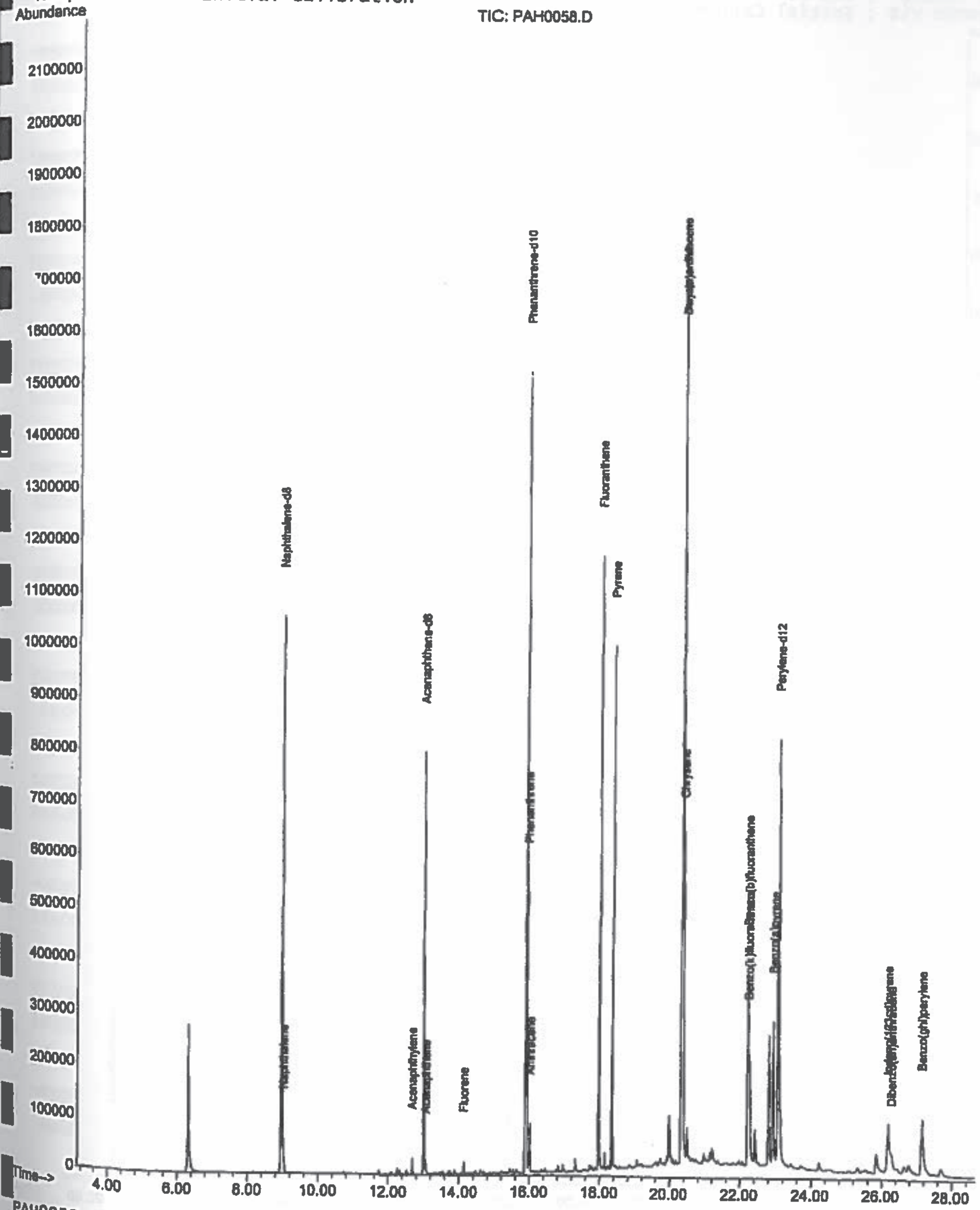


Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\0103\PAH0058.D Vial: 52
Acq On : 7 Jan 2003 17:18 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0016 WS3 0.5 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.63
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 8 14:42 2003 Quant Results File: DPAH19.RES

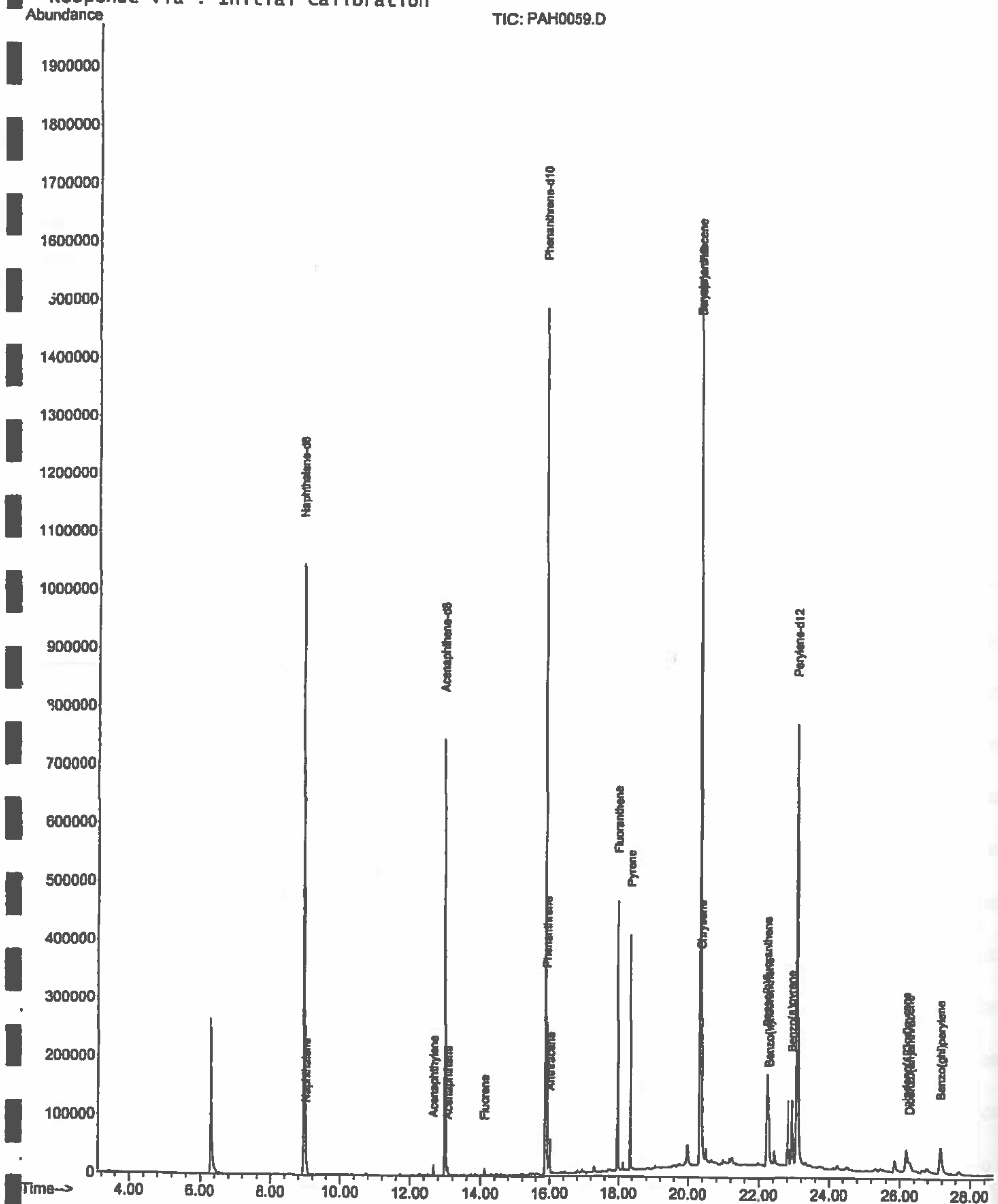
Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\0103\PAH0059.D Vial: 53
Acq On : 7 Jan 2003 17:57 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0019 WS4 1.5-2.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.66
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 8 14:43 2003 Quant Results File: DPAH19.RES

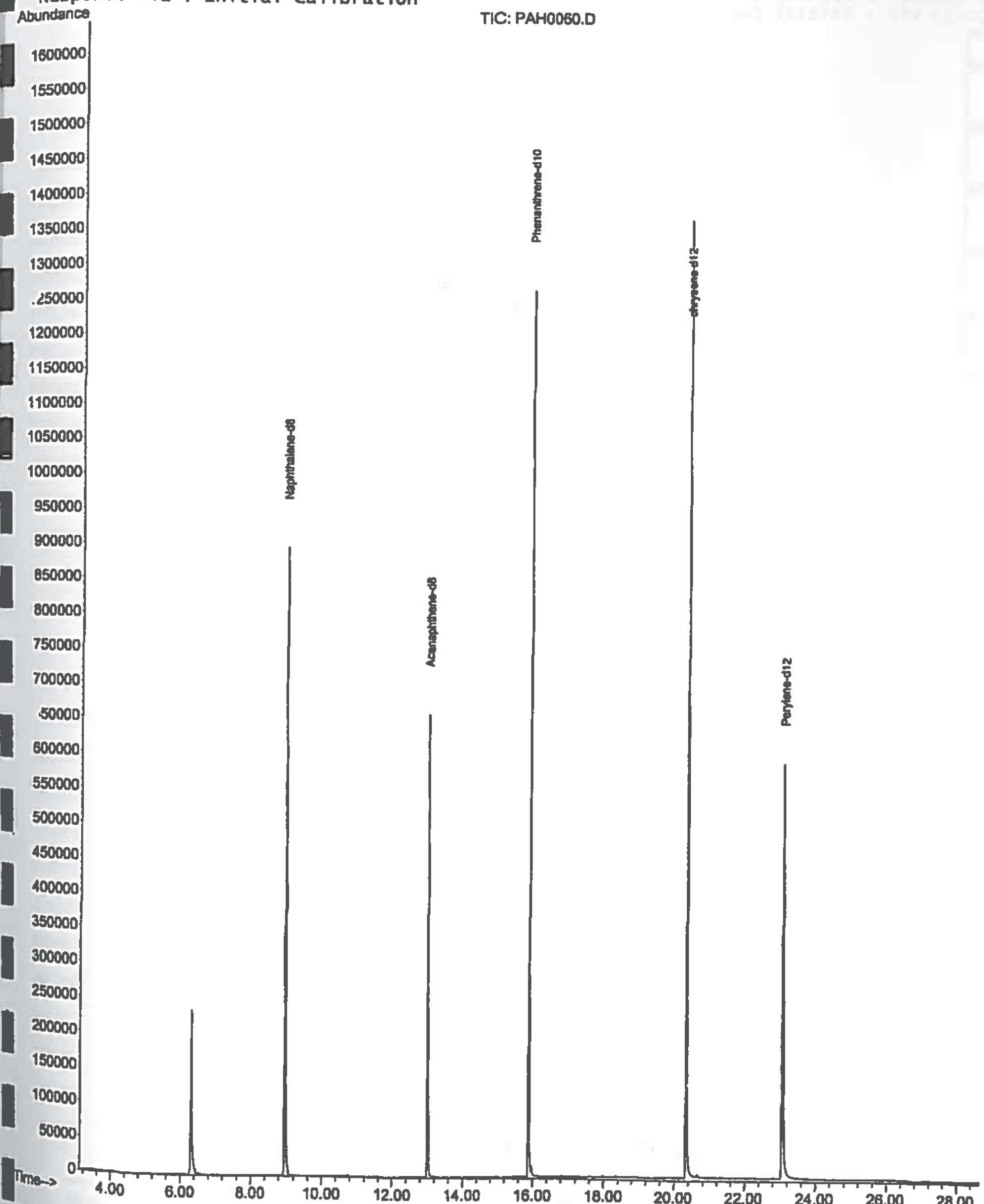
Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\0103\PAH0060.D Vial: 54
Acq On : 7 Jan 2003 18:37 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0023 WS5 2.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.51
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 8 14:44 2003 Quant Results File: DPAH19.RES

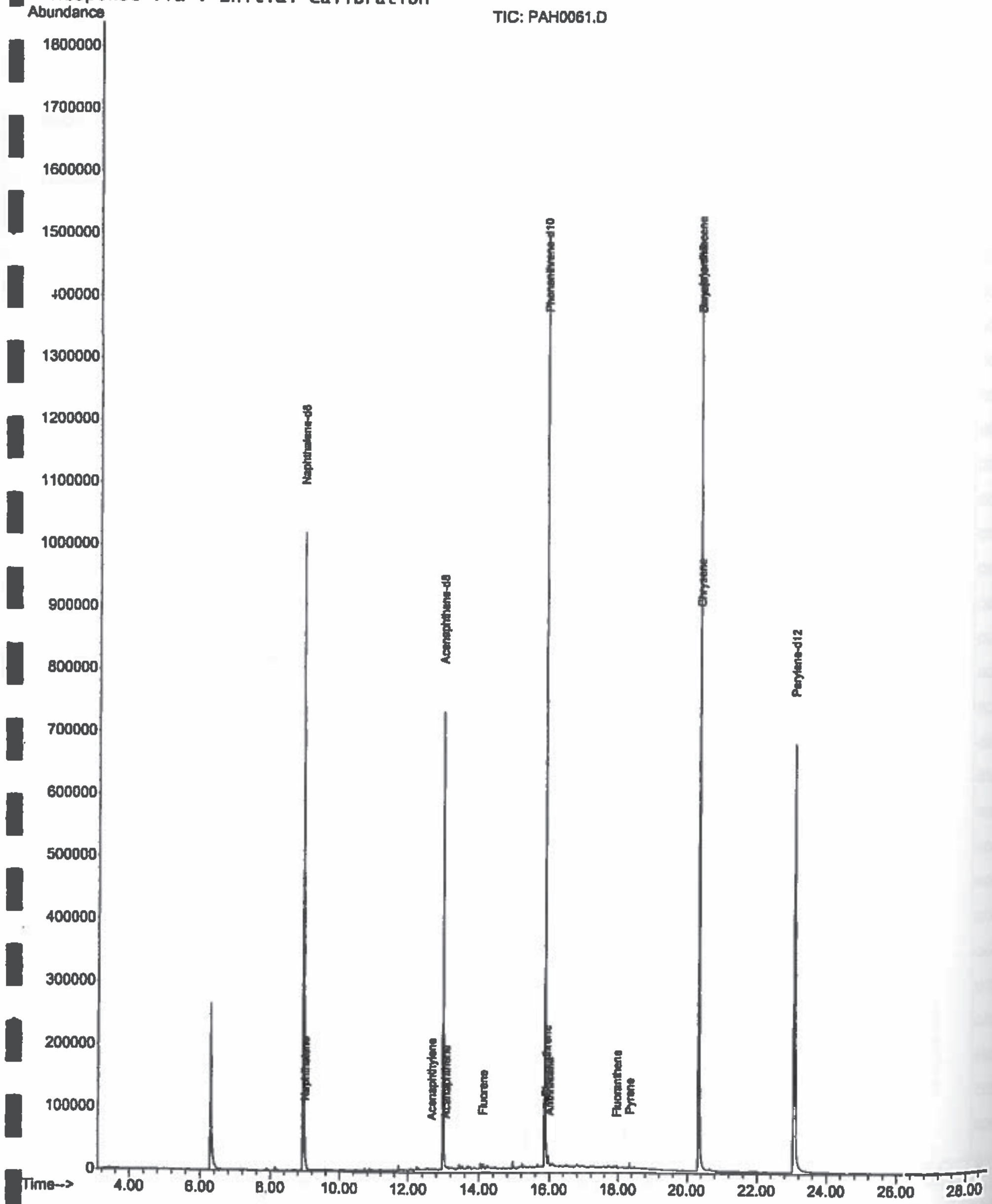
Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\0103\PAH0061.D Vial: 55
Acq On : 7 Jan 2003 19:16 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0025 WS5 4.5-5.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.52
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 8 14:45 2003 Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration

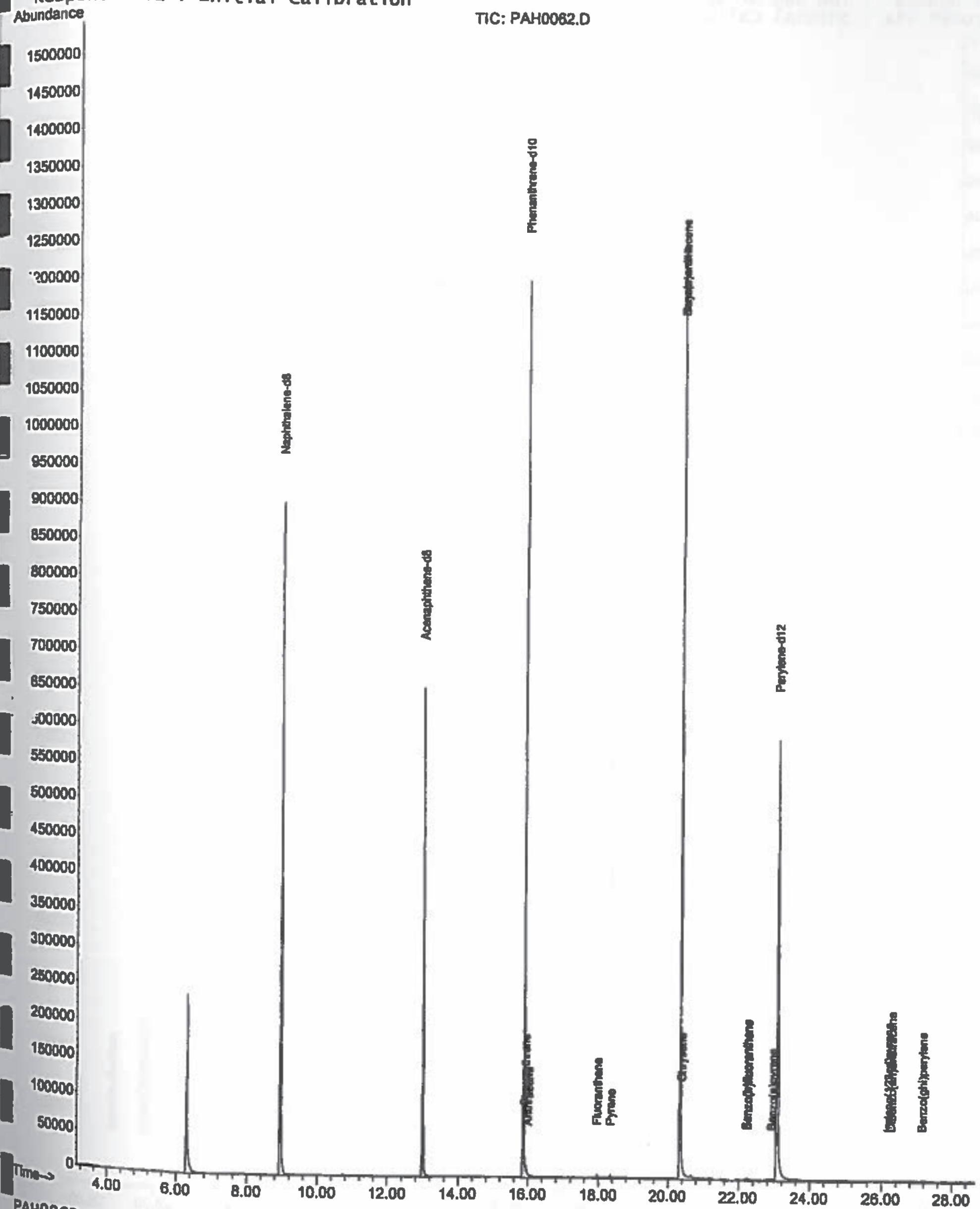


PAH0061.D DPAH19.M Wed Jan 08 14:45:44 2003

Data File : C:\MSDCHEM\1\DATA\0103\PAH0062.D Vial: 56
Acq On : 7 Jan 2003 19:55 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0028 WS7 1.0-1.5 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.47
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 8 14:46 2003 Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration

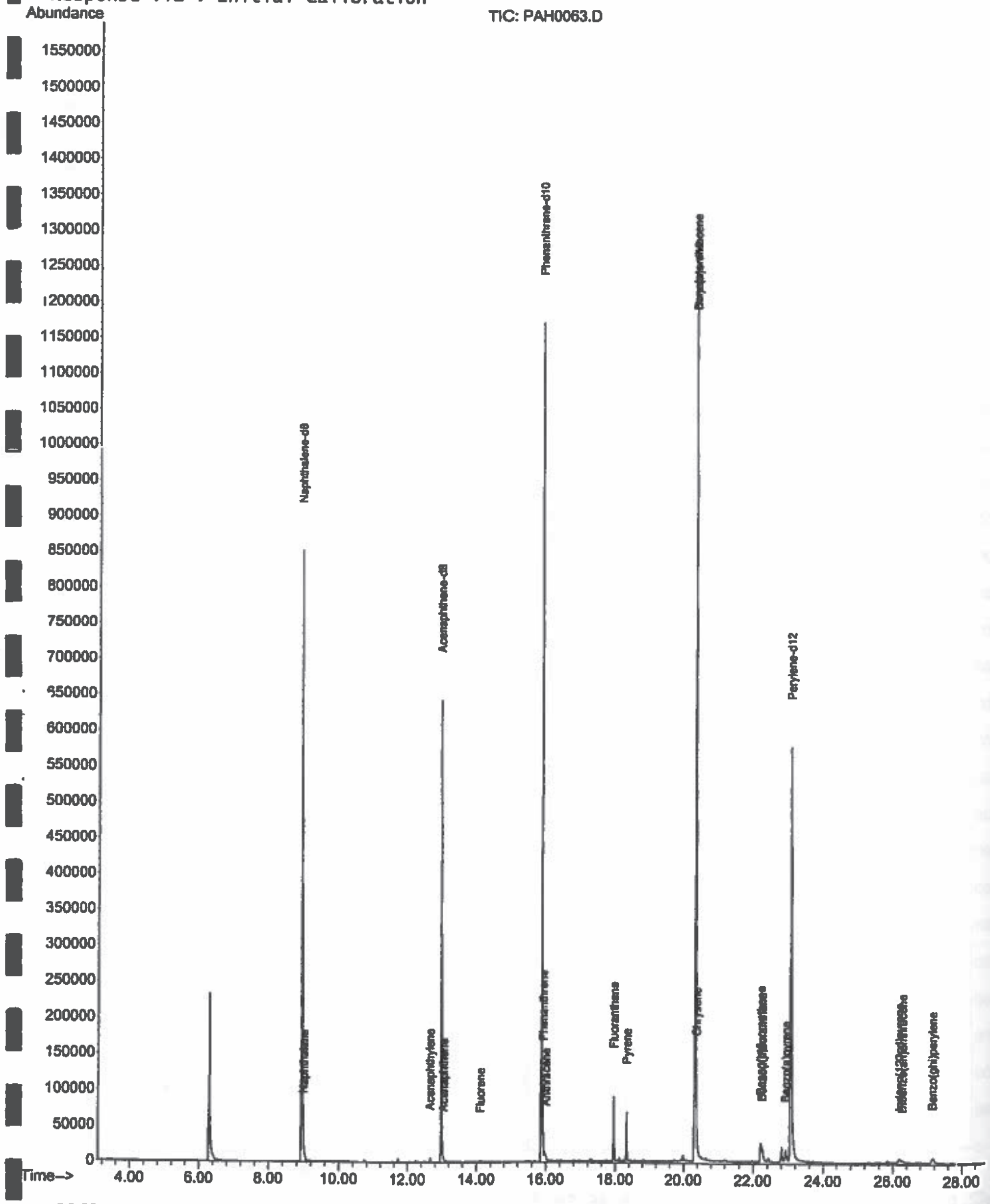


PAH0062.D DPAH19.M Wed Jan 08 14:46:56 2003

Quantitation Report (QT Reviewed)

```
Data File : C:\MSDCHEM\1\DATA\0103\PAH0063.D          Vial: 57
Acq On    :  7 Jan 2003  20:34                     Operator: Mathilde Ernoult
Sample    : DUB-02-B02182-S0032 WS10 0.5-1.0          Inst    : GCMS1
Misc      : Irish Geotechnical Services Ltd/Soil     Multiplr: 1.49
                                             Sample Amount: 0.00
MS Integration Params: AUTOINT1.E
Quant Time: Jan  8 14:47 2003              Quant Results File: DPAH19.RES

Method         : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title          : 19 PAH Analysis
Last Update    : Tue Jan 07 12:15:03 2003
Response via   : Initial Calibration
```

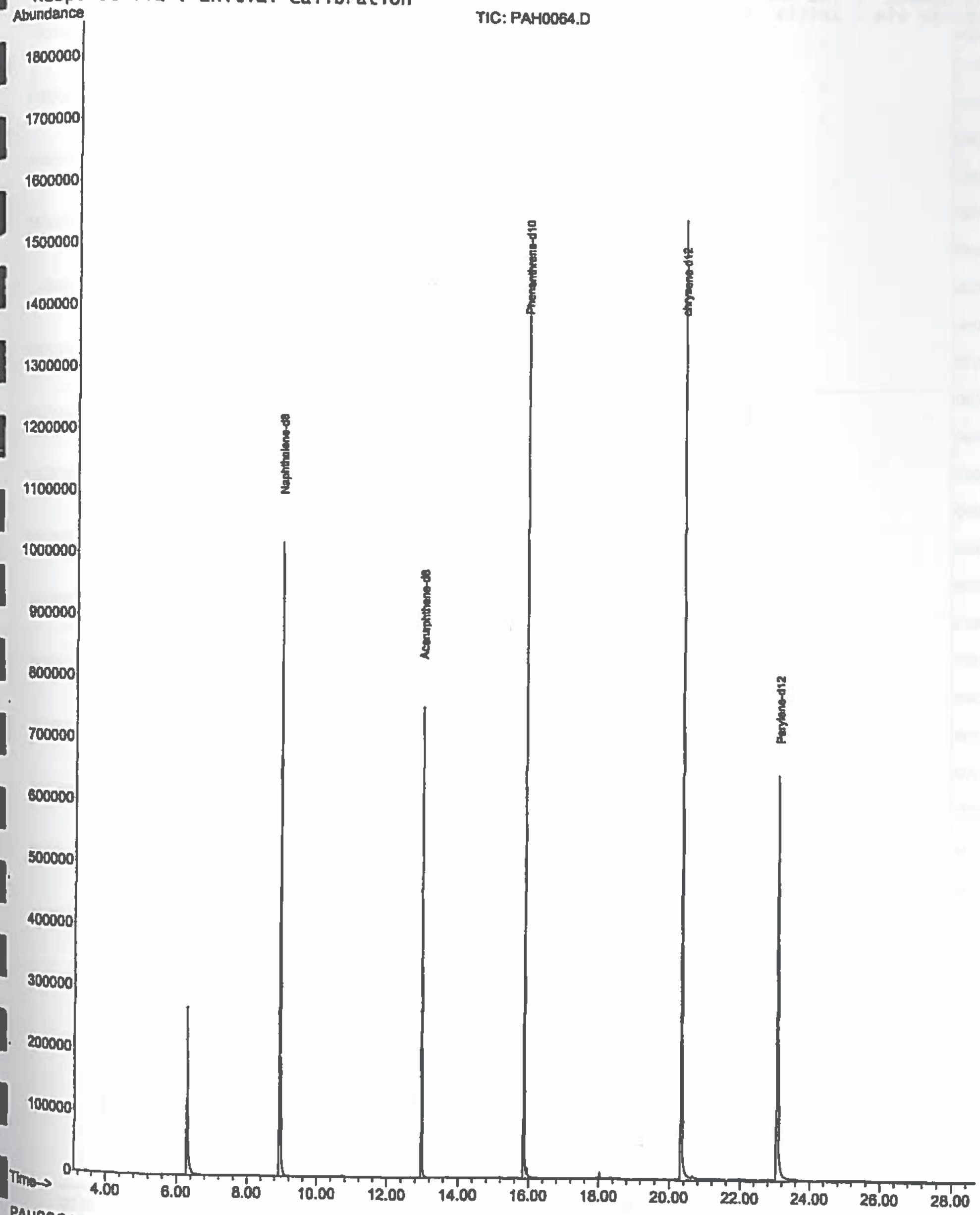


PAH0063.D   DPAH19.M   Wed Jan 08 14:47:42 2003   Page 2

Quantitation Report (QT Reviewed)

```
Data File : C:\MSDCHEM\1\DATA\0103\PAH0064.D          Vial: 58
Acq On    :  7 Jan 2003  21:13                     Operator: Mathilde Ernoult
Sample    : DUB-02-B02182-S0038 WS11 3.5-4.0          Inst    : GCMS1
Misc      : Irish Geotechnical Services Ltd/Soil     Multiplr: 1.84
                                             Sample Amount: 0.00
MS Integration Params: AUTOINT1.E
Quant Time: Jan  8 14:48 2003              Quant Results File: DPAH19.RES

Method         : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title          : 19 PAH Analysis
Last Update    : Tue Jan 07 12:15:03 2003
Response via   : Initial Calibration
```



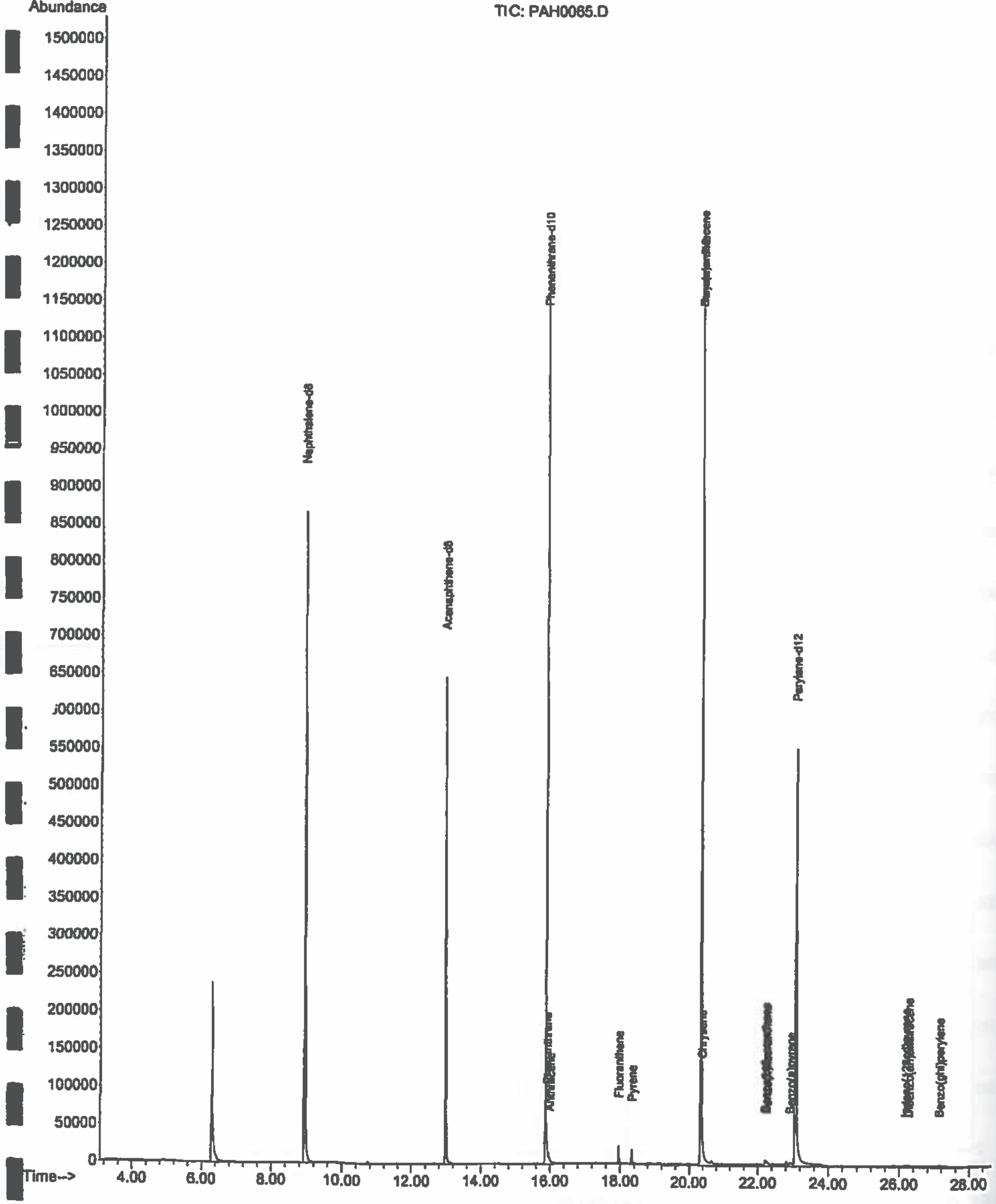
PAH0064.D   DPAH19.M   Wed Jan 08 14:48:21 2003   Page 2

Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\0103\PAH0065.D Vial: 59
Acq On : 7 Jan 2003 21:52 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0044 WS13-0.5-1.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.50
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 8 14:48 2003 Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration

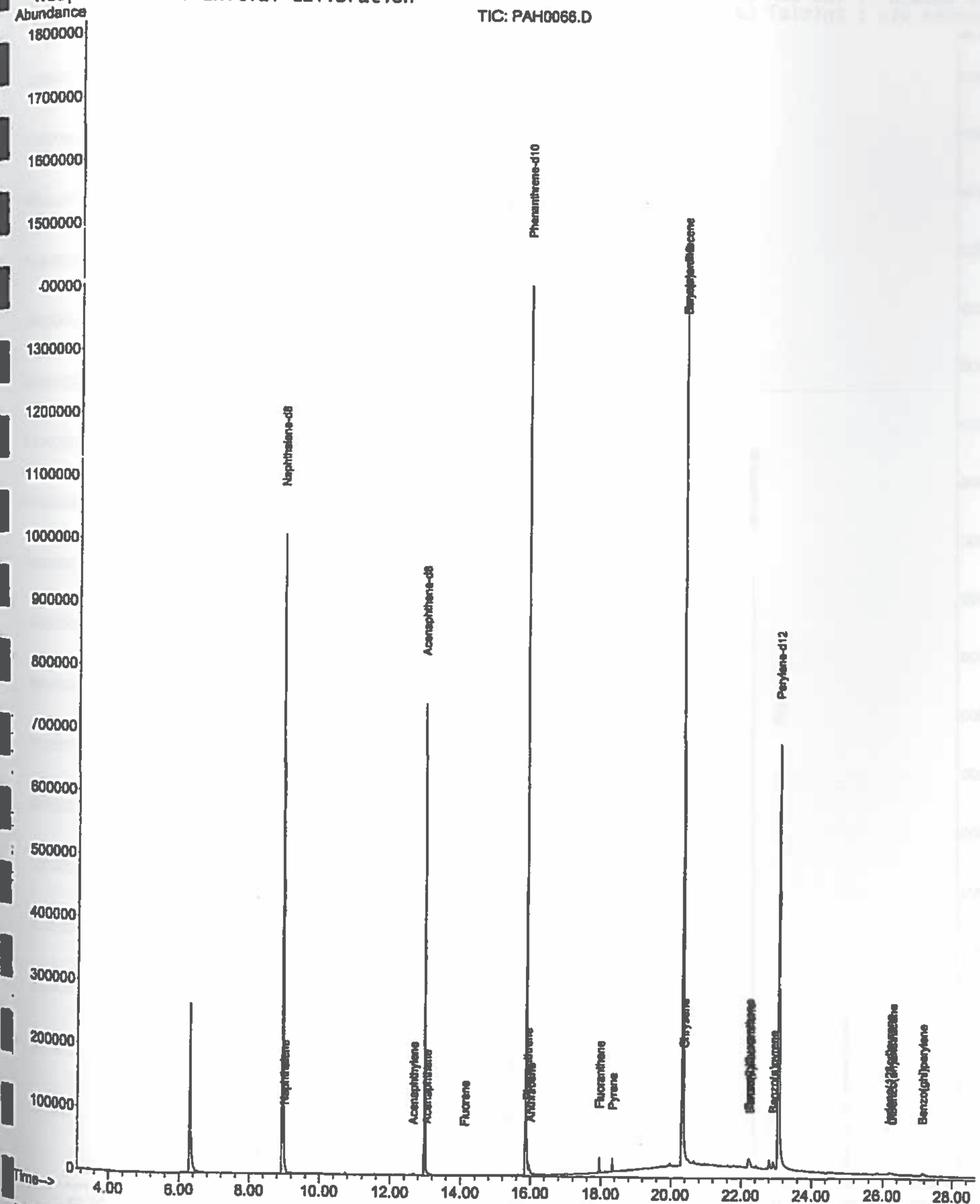


Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\0103\PAH0066.D Vial: 60
Acq On : 7 Jan 2003 22:31 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0049 WS14 0.5-1.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.49
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 8 14:49 2003 Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration

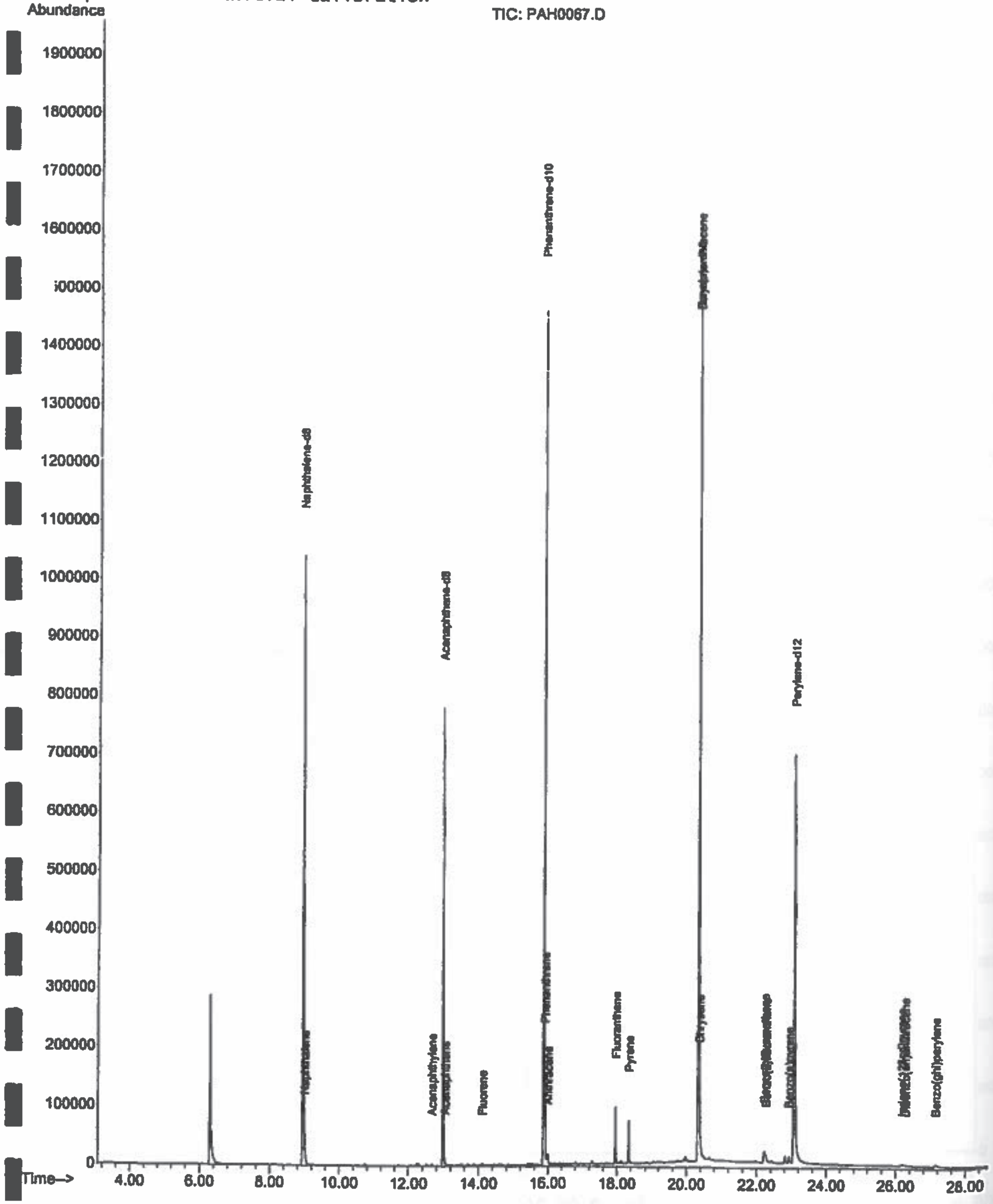


Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\0103\PAH0067.D Vial: 61
Acq On : 7 Jan 2003 23:10 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0051 WS15 0.5-1.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.57
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 8 14:50 2003 Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration

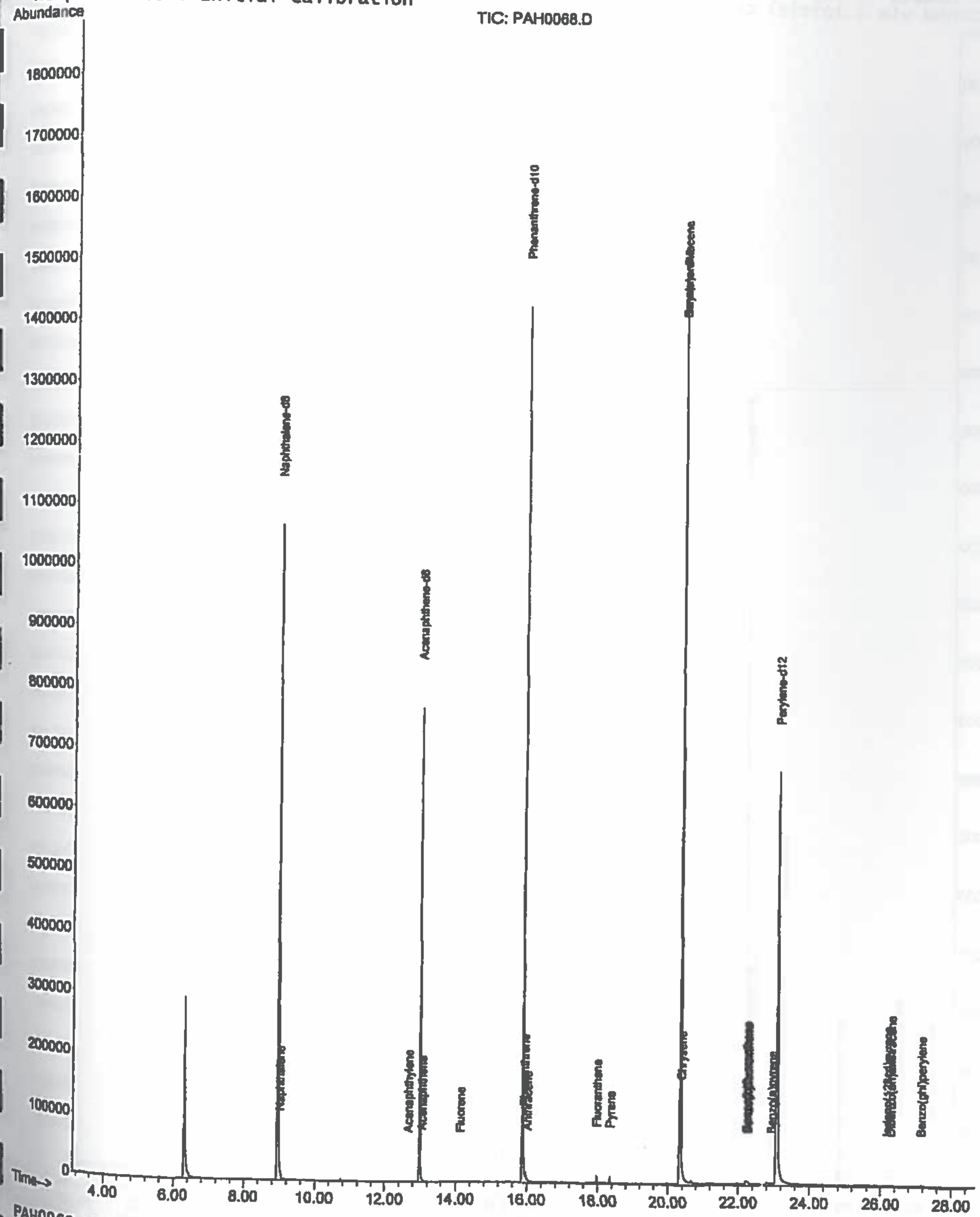


Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\0103\PAH0068.D Vial: 62
Acq On : 7 Jan 2003 23:49 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0054 WS16 0.5-1.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.54
Sample Amount: 0.00

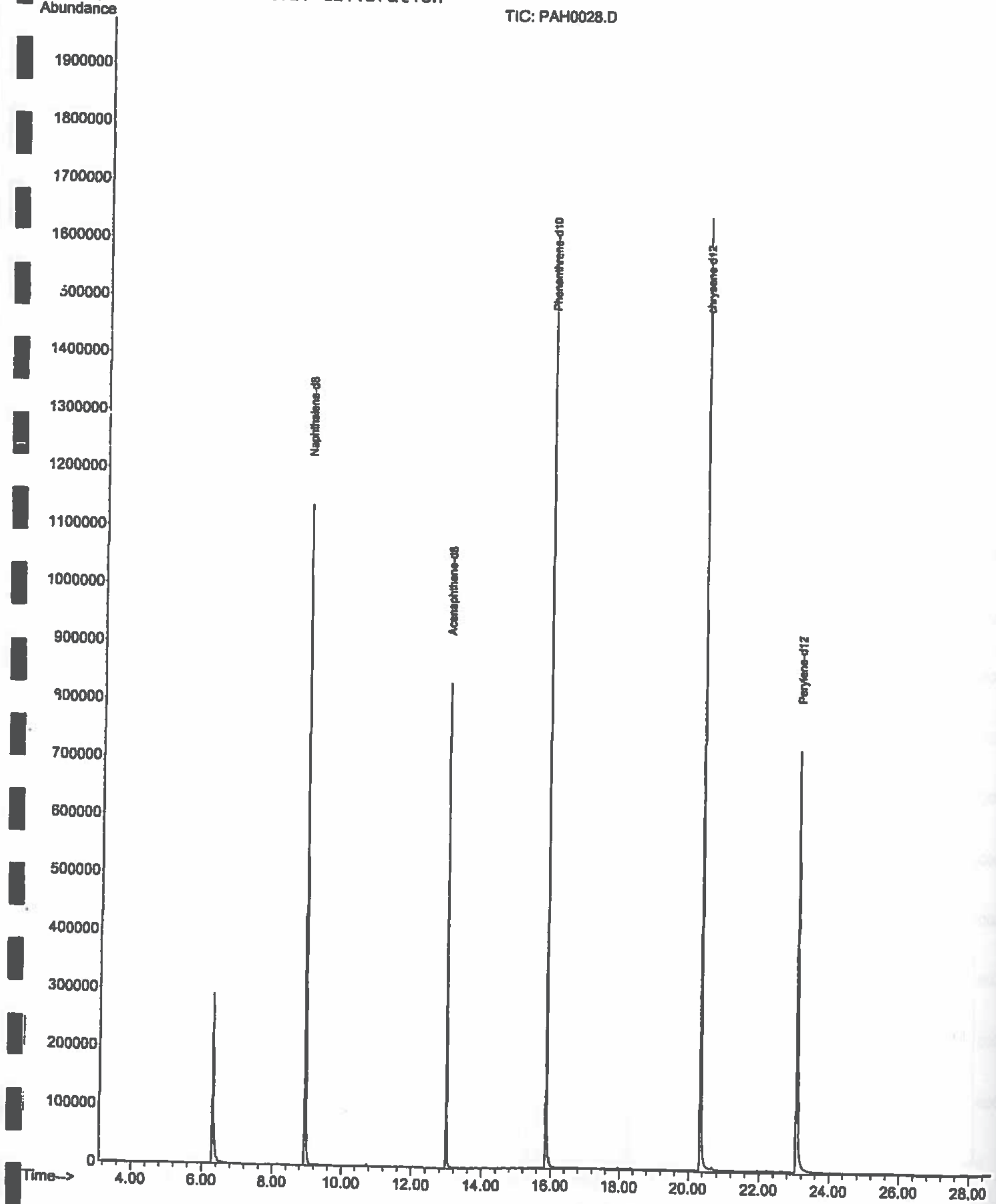
MS Integration Params: AUTOINT1.E
Quant Time: Jan 8 14:51 2003 Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration



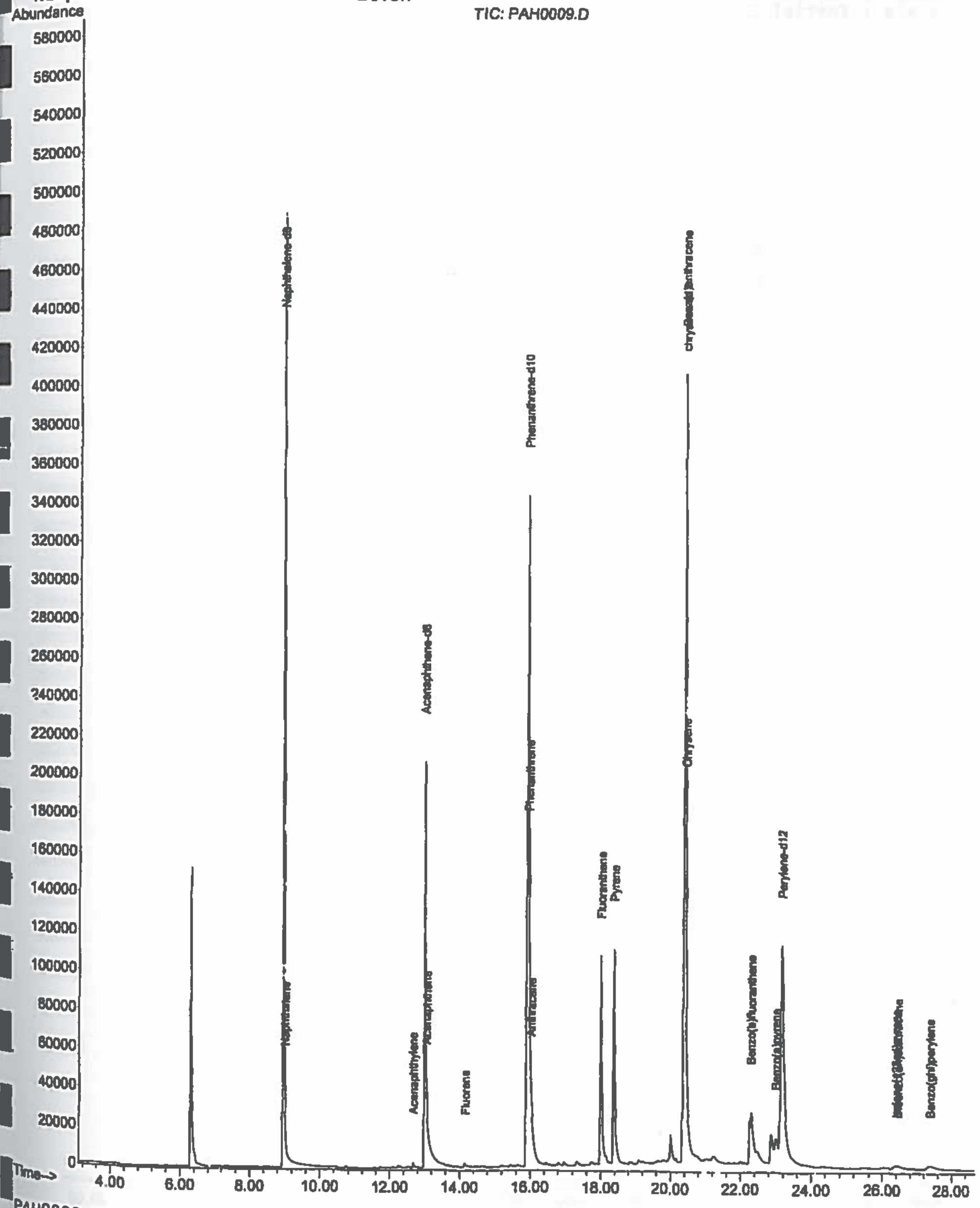
Data File : C:\MSDCHEM\1\DATA\0103\PAH0028.D   Vial: 24
Acq On : 6 Jan 2003 21:44   Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0057 WS8 1.5-2.0   Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil   Multiplr: 1.55
Sample Amount: 0.00
MS Integration Params: AUTOINT1.E
Quant Time: Jan 7 14:28 2003   Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration



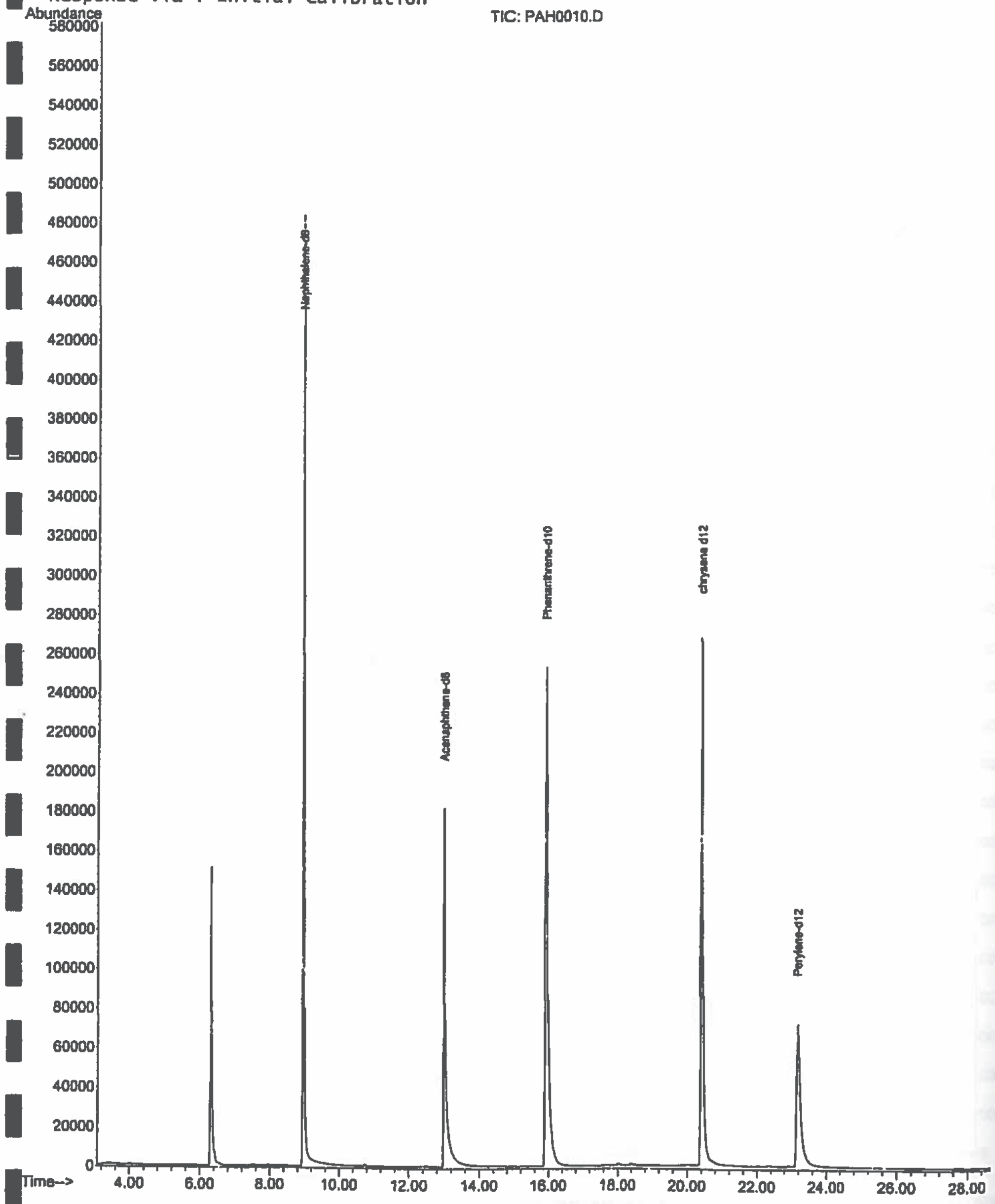
Data File : C:\MSDCHEM\1\DATA\0403\PAH0009.D   Vial: 9
Acq On : 21 Jan 2003 14:41   Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0017 WS3 1.5-2.0   Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil   Multiplr: 1.68
Sample Amount: 0.00
MS Integration Params: AUTOINT1.E
Quant Time: Jan 23 11:02 2003   Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Thu Jan 23 10:19:53 2003
Response via : Initial Calibration



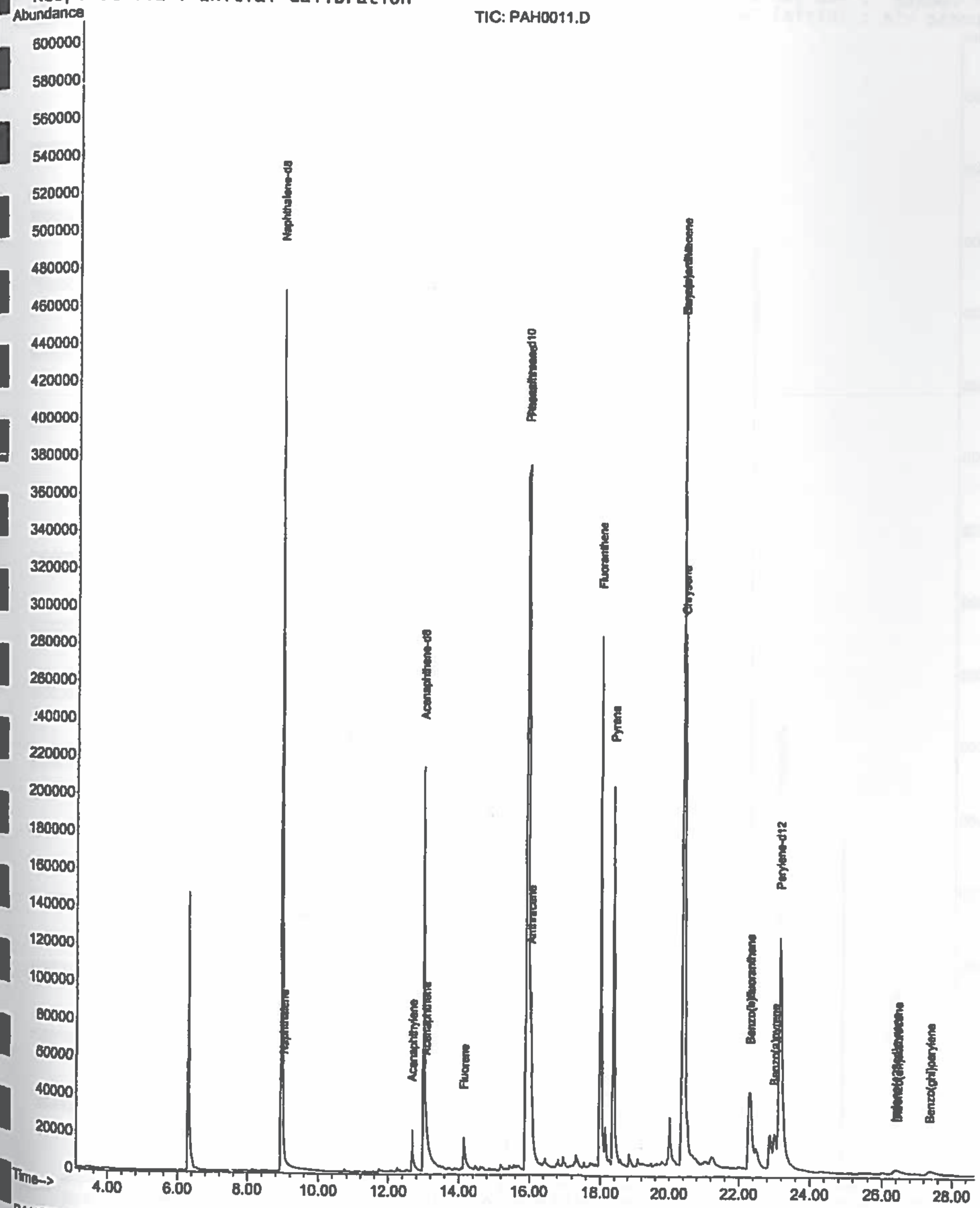
Data File : C:\MSDCHEM\1\DATA\0403\PAH0010.D Vial: 10
Acq On : 21 Jan 2003 15:21 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0034 WS10 3.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.58
Sample Amount: 0.00
MS Integration Params: AUTOINT1.E
Quant Time: Jan 23 11:03 2003 Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Thu Jan 23 10:19:53 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\0403\SNAPSHOT\PAH0011.D Vial: 11
Acq On : 21 Jan 2003 16:02 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0036 WS11 0.5-1.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.53
Sample Amount: 0.00
MS Integration Params: AUTOINT1.E
Quant Time: Jan 23 11:05 2003 Quant Results File: DPAH19.RES

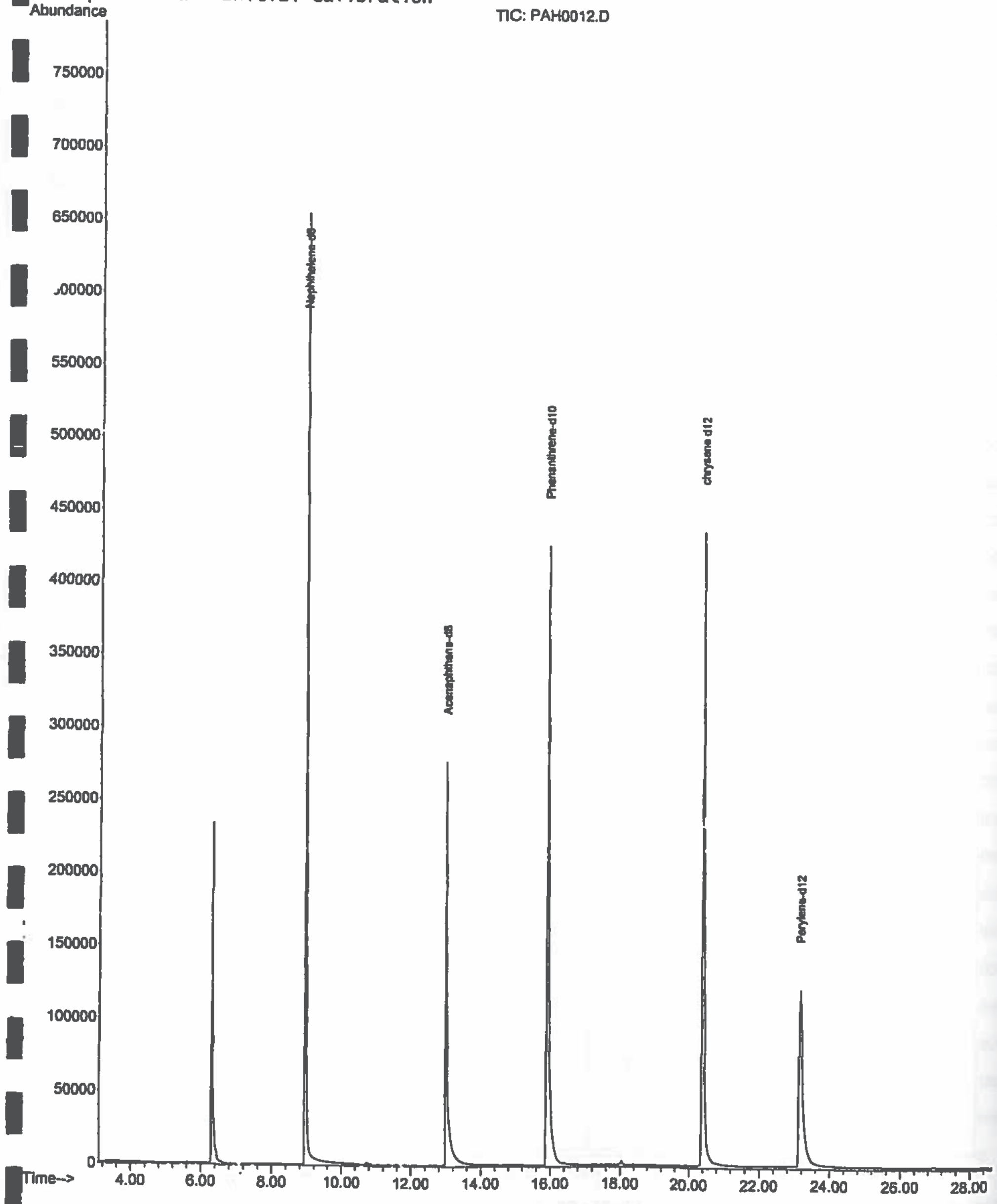
Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Thu Jan 23 10:19:53 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\0403\PAH0012.D Vial: 12
Acq On : 21 Jan 2003 16:42 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0039 WS11 4.5-5.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.82
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 23 11:05 2003 Quant Results File: DPAH19.RES

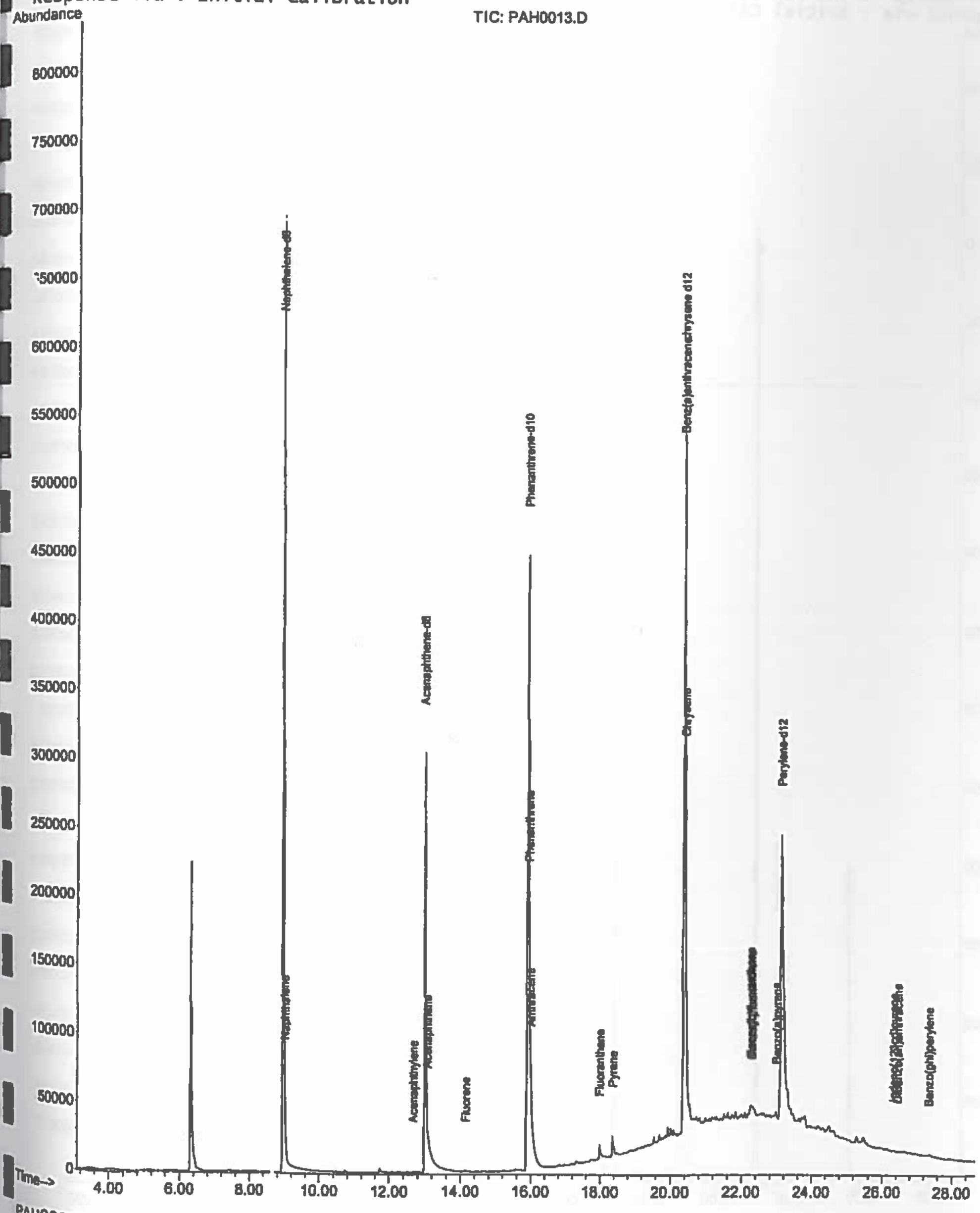
Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Thu Jan 23 10:19:53 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\0403\PAH0013.D Vial: 13
Acq On : 21 Jan 2003 17:22 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0040 WS12 0.5-1.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.58
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 23 11:07 2003 Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Thu Jan 23 10:19:53 2003
Response via : Initial Calibration

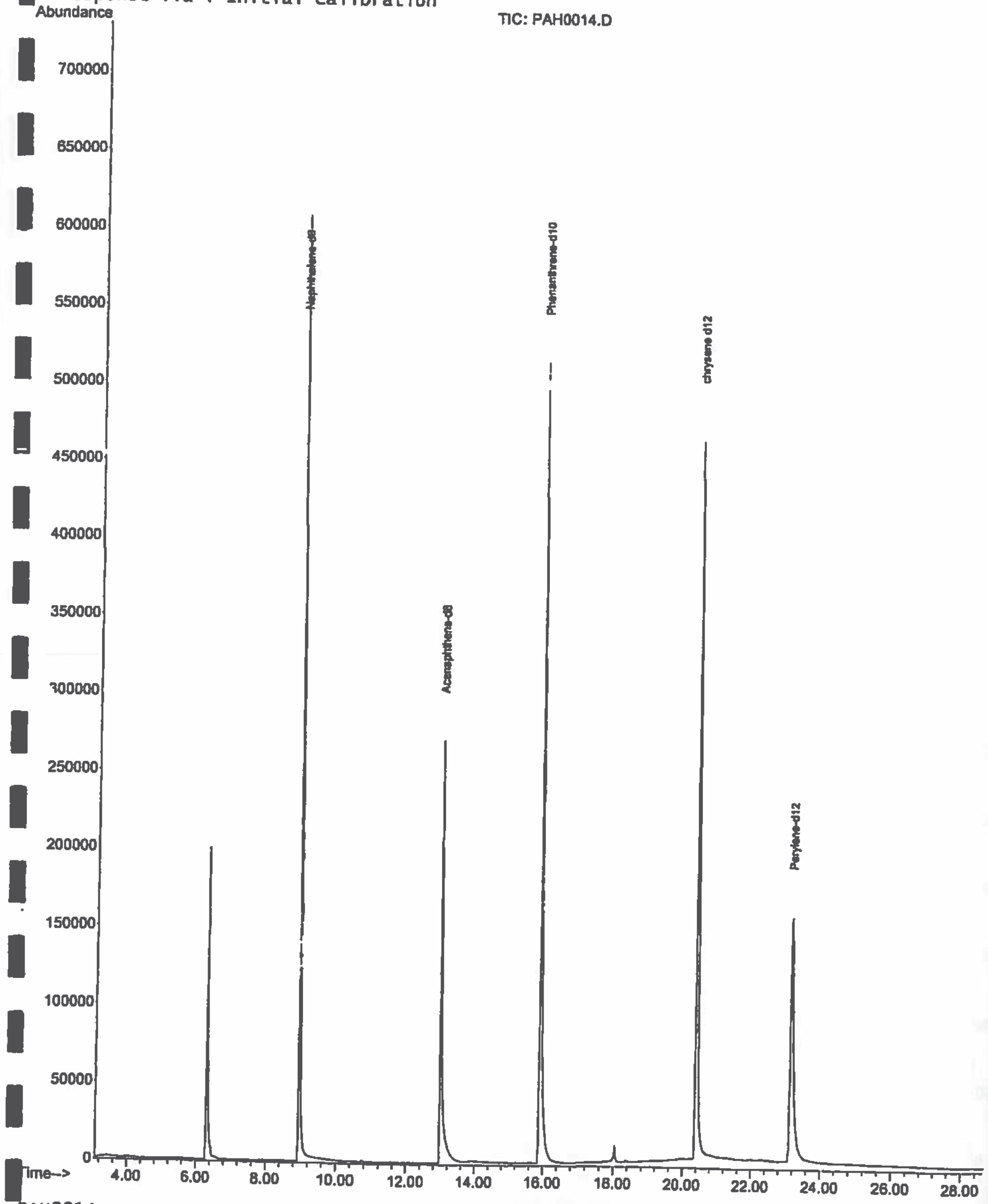


Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\0403\PAH0014.D Vial: 14
Acq On : 21 Jan 2003 18:02 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0042 WS12 3.5-4.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.83
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 23 11:07 2003 Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Thu Jan 23 10:19:53 2003
Response via : Initial Calibration



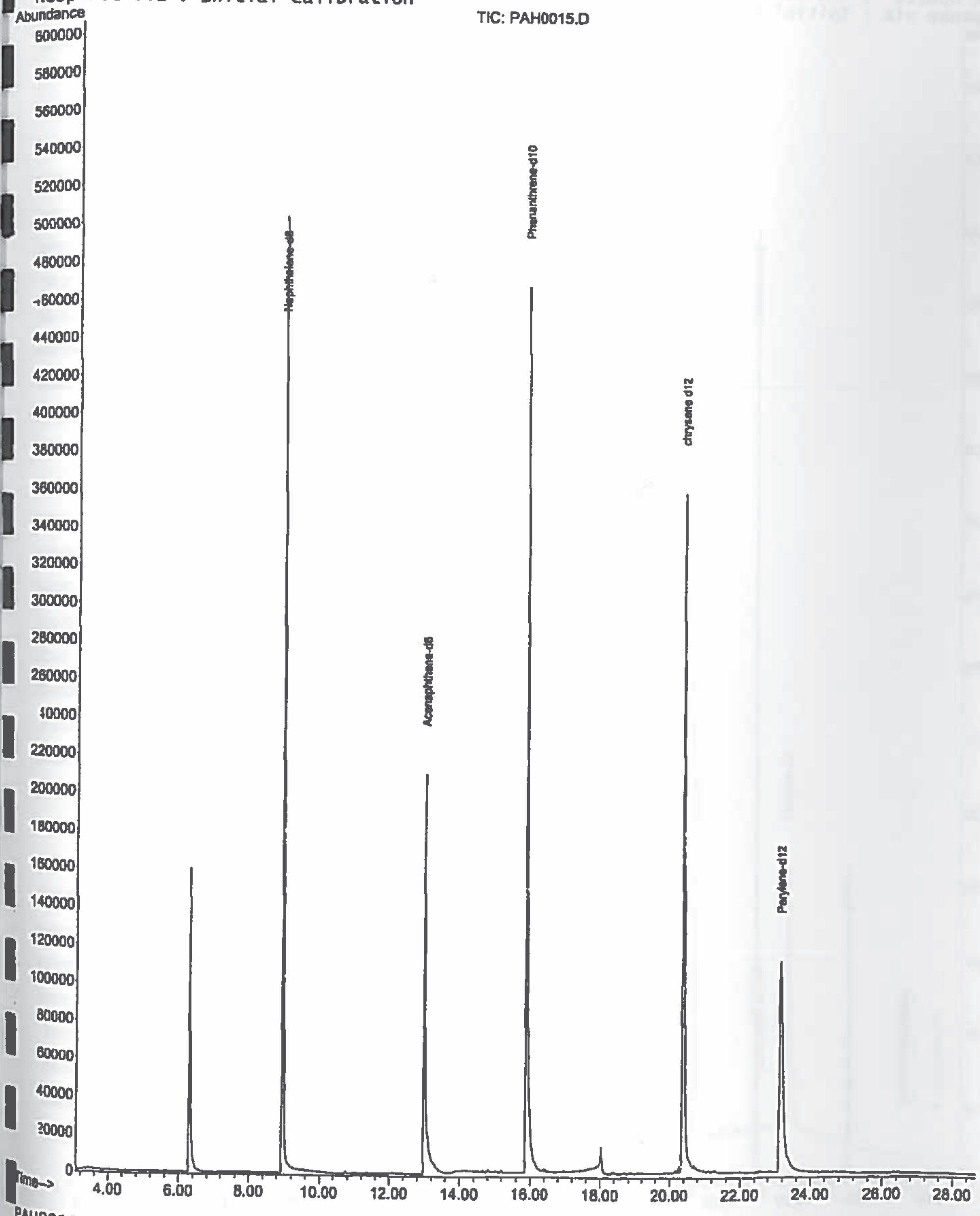
PAH0014.D DPAH19.M Thu Jan 23 11:07:58 2003

Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\0403\PAH0015.D Vial: 15
Acq On : 21 Jan 2003 18:43 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0043 WS12 4.5-5.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.89
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 23 11:08 2003 Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Thu Jan 23 10:19:53 2003
Response via : Initial Calibration

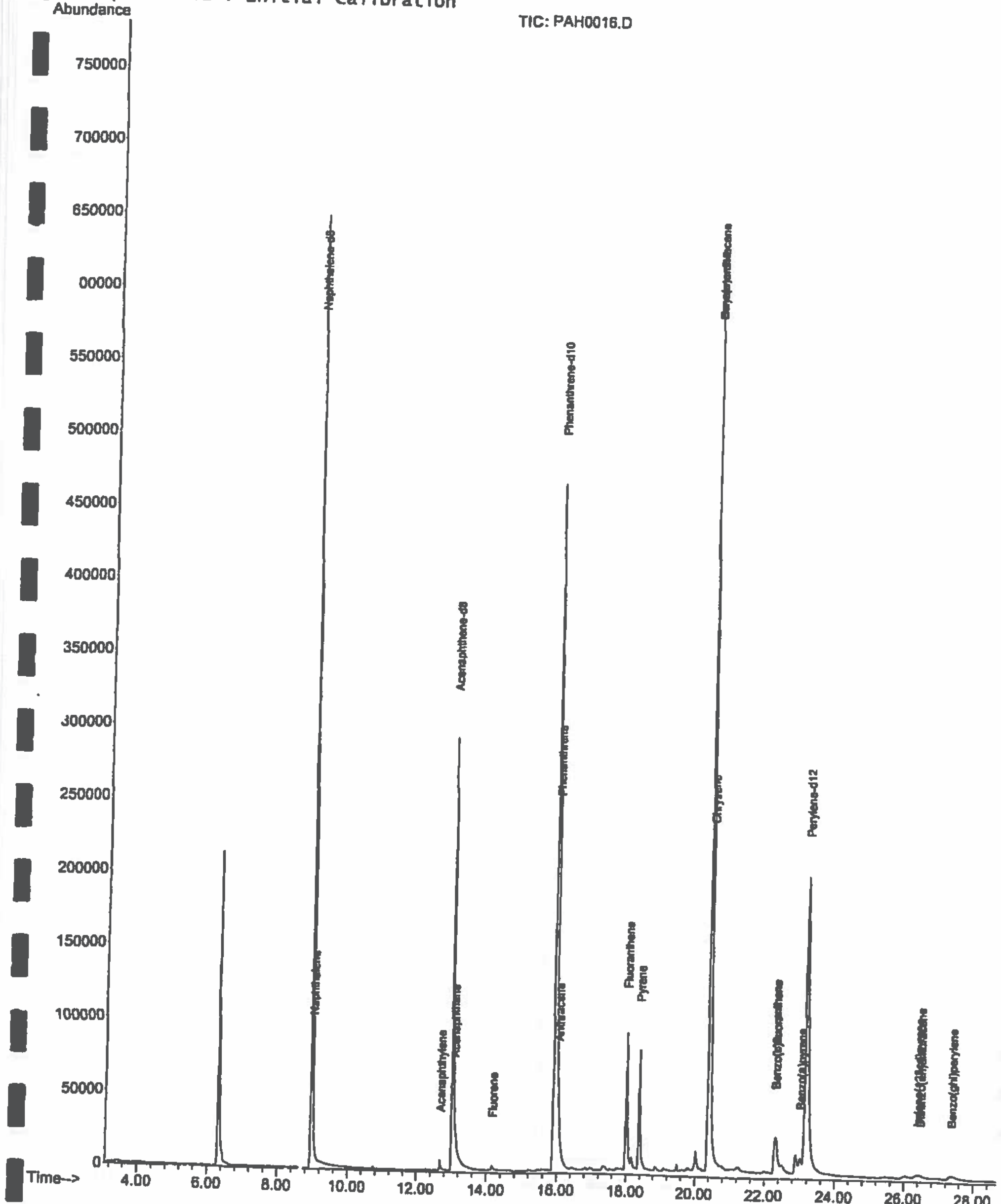


PAH0015.D DPAH19.M Thu Jan 23 11:08:55 2003

Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\0403\PAH0016.D Vial: 16
Acq On : 21 Jan 2003 19:23 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0045 WS13 1.5-2.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.54
Sample Amount: 0.00
MS Integration Params: AUTOINT1.E
Quant Time: Jan 23 11:09 2003 Quant Results File: DPAH19.RES

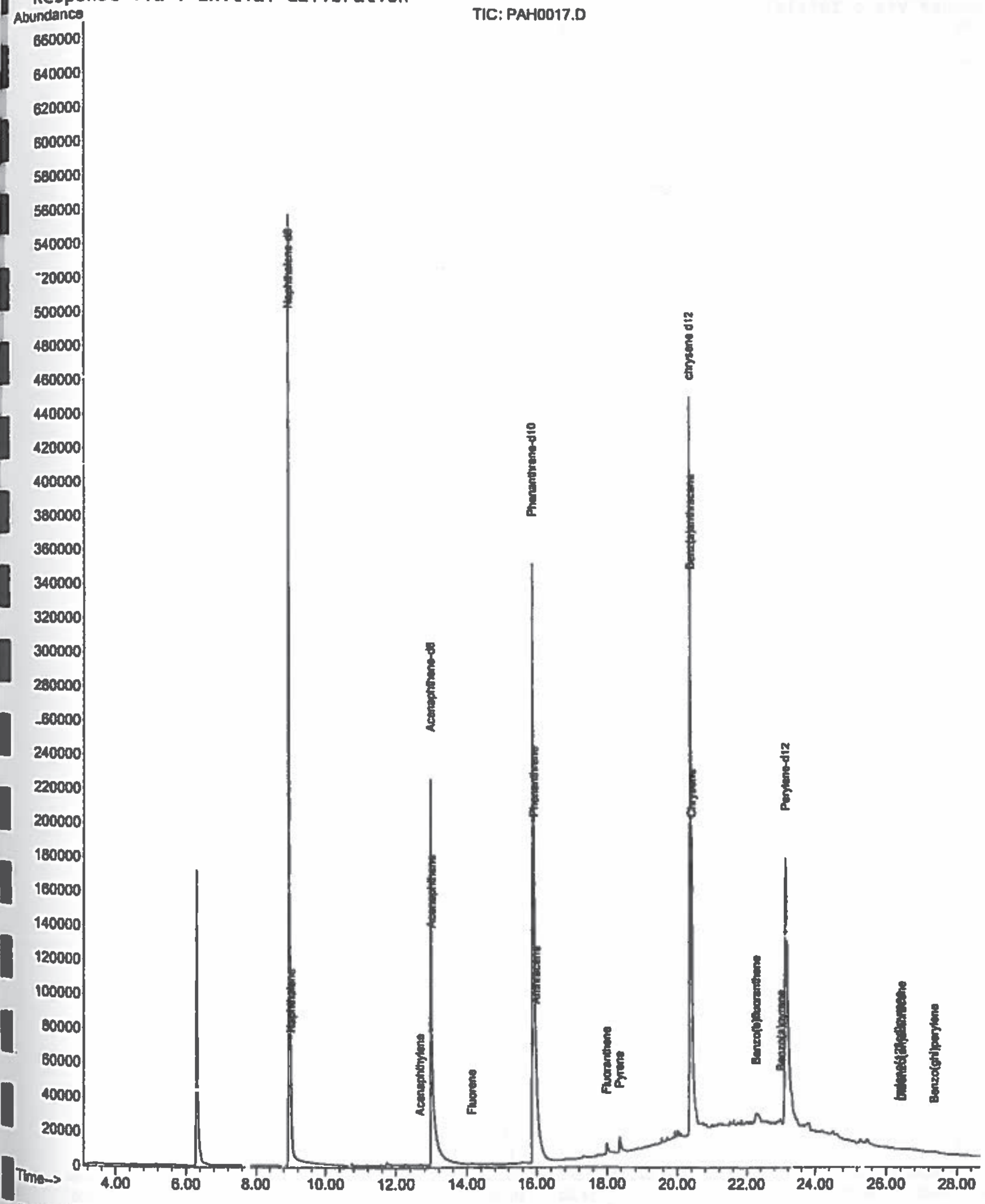
Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Thu Jan 23 10:19:53 2003
Response via : Initial Calibration



Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\0403\PAH0017.D Vial: 17
Acq On : 21 Jan 2003 20:03 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0047 WS13 4.5-5.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.49
Sample Amount: 0.00
MS Integration Params: AUTOINT1.E
Quant Time: Jan 23 11:10 2003 Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Thu Jan 23 10:19:53 2003
Response via : Initial Calibration

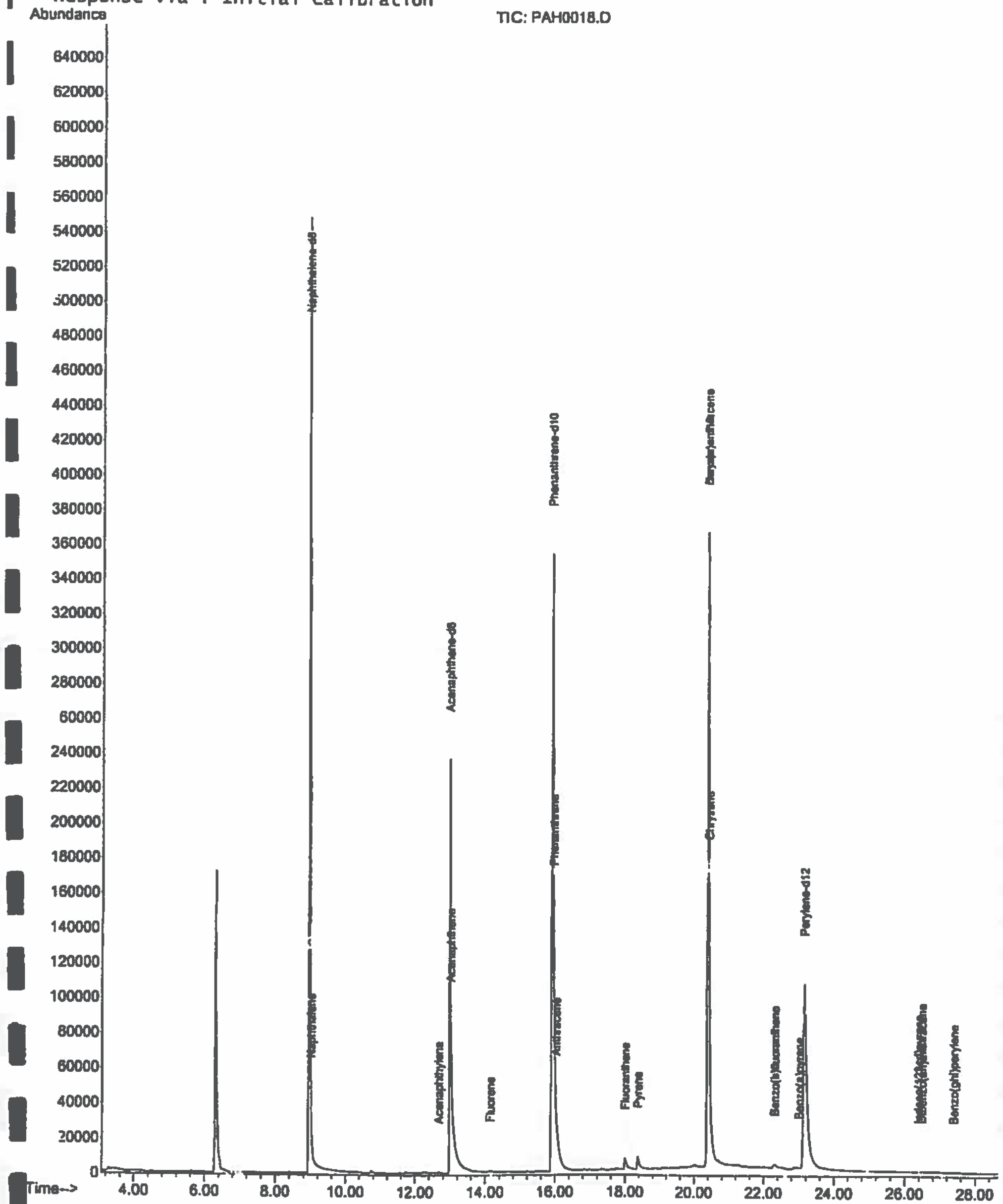


Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\0403\PAH0018.D Vial: 18
Acq On : 22 Jan 2003 9:33 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0050 WS14 2.5-3.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.00
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 23 11:13 2003 Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Thu Jan 23 10:19:53 2003
Response via : Initial Calibration

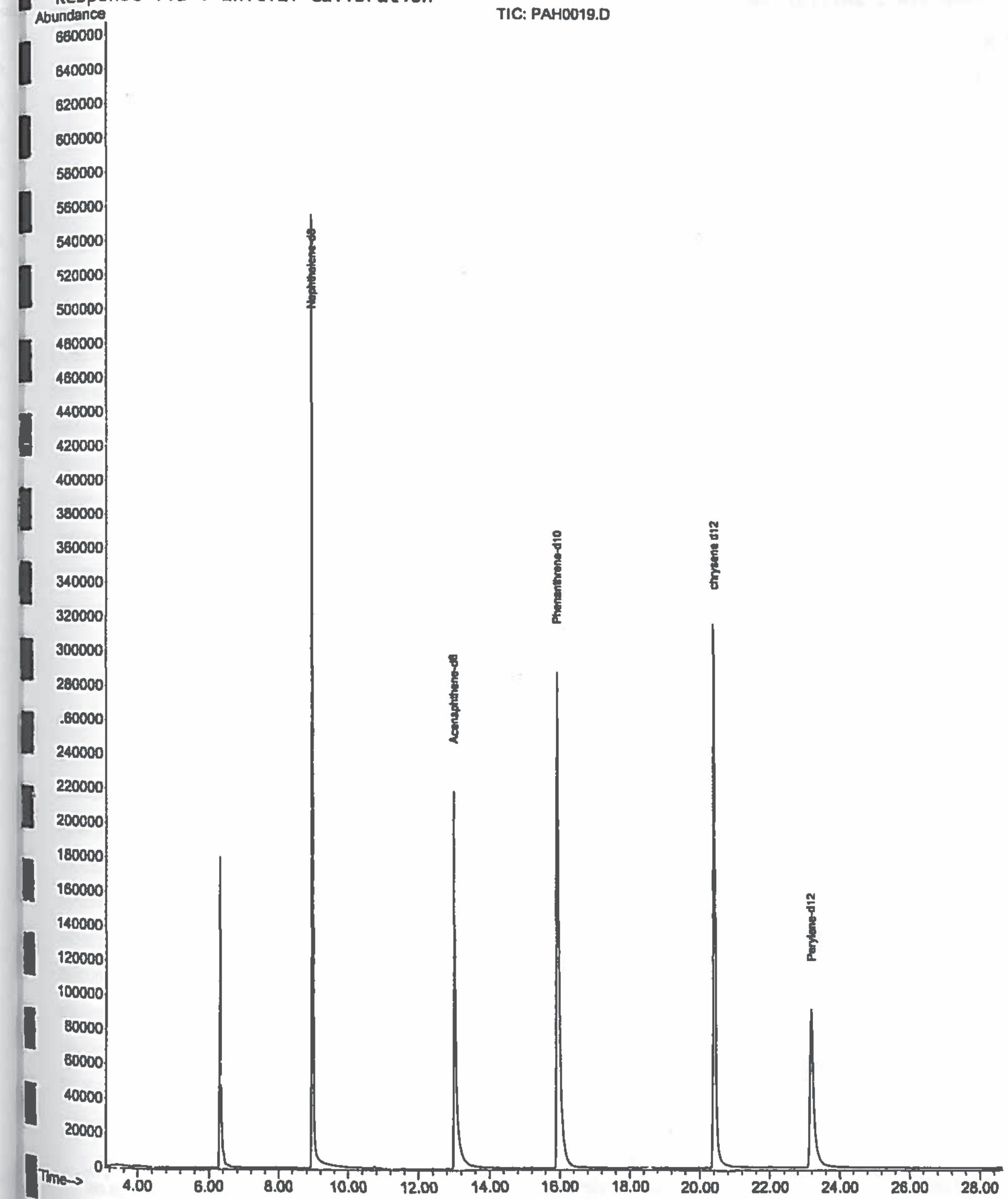


Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\0403\PAH0019.D Vial: 19
Acq On : 22 Jan 2003 10:12 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0053 WS15 3.5-4.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.75
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 23 11:13 2003 Quant Results File: DPAH19.RES

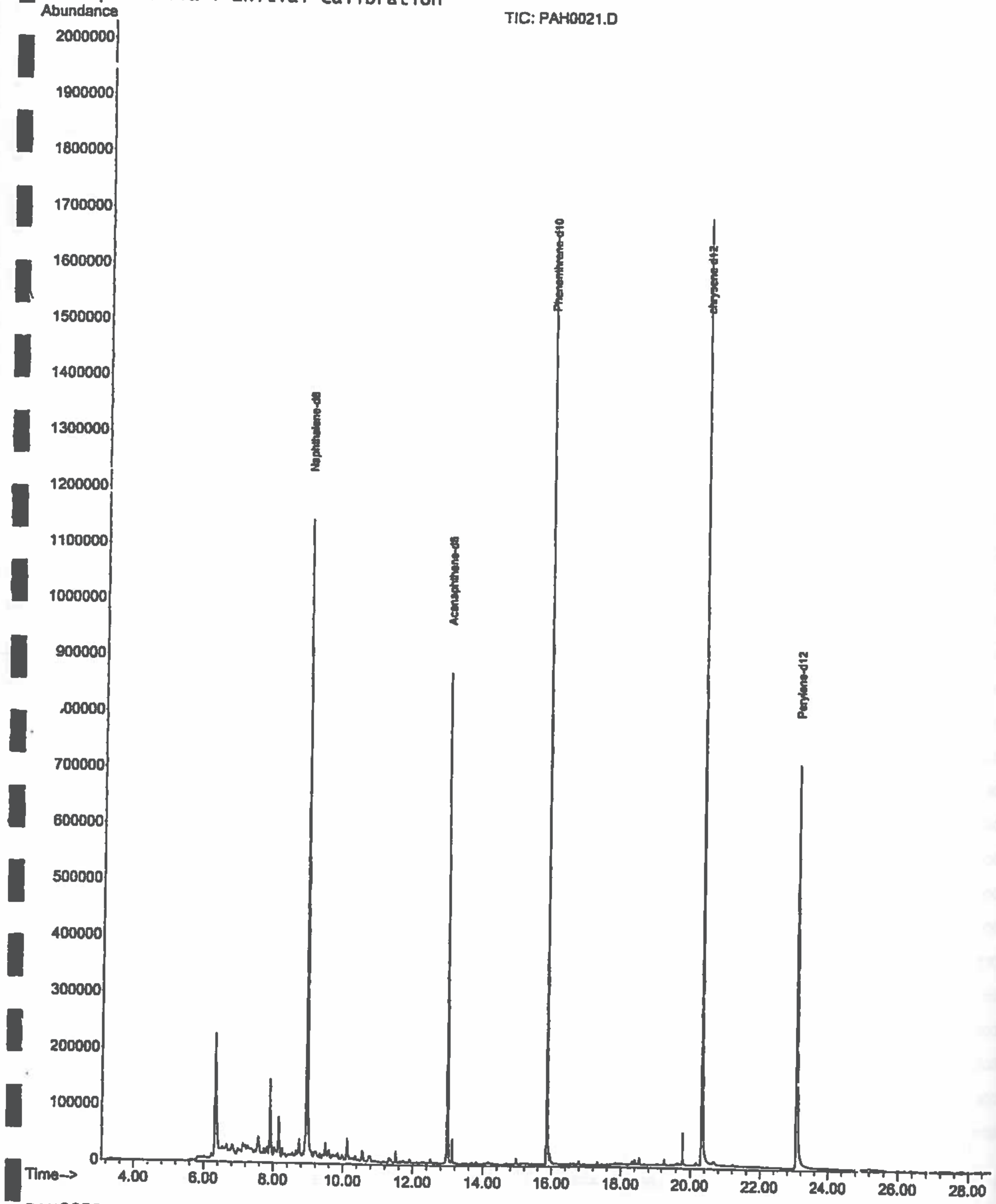
Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Thu Jan 23 10:19:53 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\0103\PAH0021.D Vial: 17
Acq On : 6 Jan 2003 17:09 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0006 BH1 3.5m Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Water Multiplr: 0.01
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 7 14:22 2003 Quant Results File: DPAH19.RES

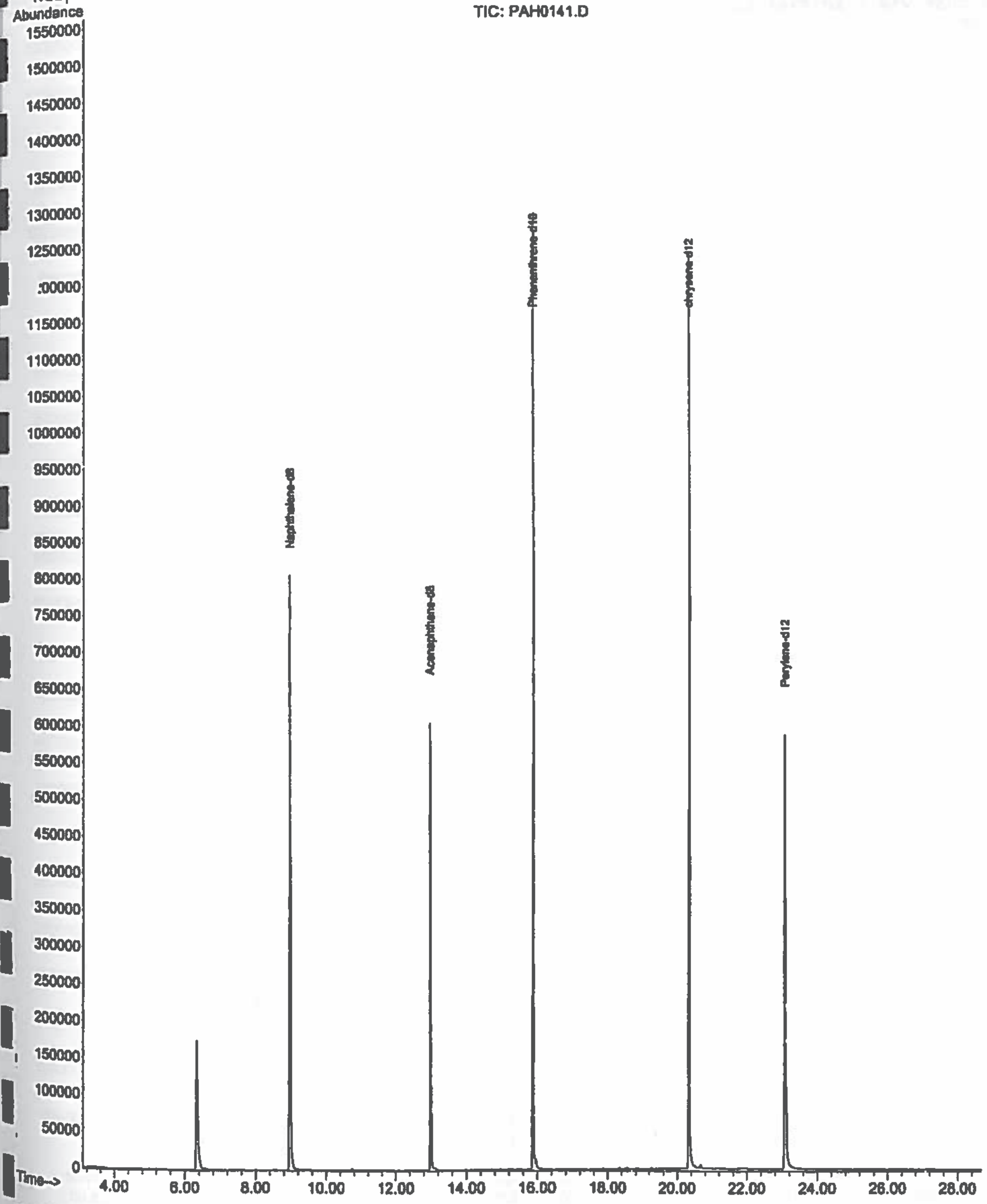
Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\0103\PAH0141.D Vial: 34
Acq On : 9 Jan 2003 23:26 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0008 WS1 1.5 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Leachate Multiplr: 0.01
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 10 11:22 2003 Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration



Quantitation Report (QT Reviewed)

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Data File : C:\MSDCHEM\1\DATA\0103\PAH0122.D          Vial: 16
Acq On    :  9 Jan 2003  10:54                    Operator: Mathilde Ernoult
Sample    : DUB-02-B02182-S0014 WS2 3.0           Inst     : GCMS1
Misc      : Irish Geotechnical Services Ltd/Leachate Multiplr: 0.01
                                             Sample Amount: 0.00
MS Integration Params: AUTOINT1.E
Quant Time: Jan  9 15:00 2003               Quant Results File: DPAH19.RES

Method        : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title         : 19 PAH Analysis
Last Update   : Tue Jan 07 12:15:03 2003
Response via  : Initial Calibration
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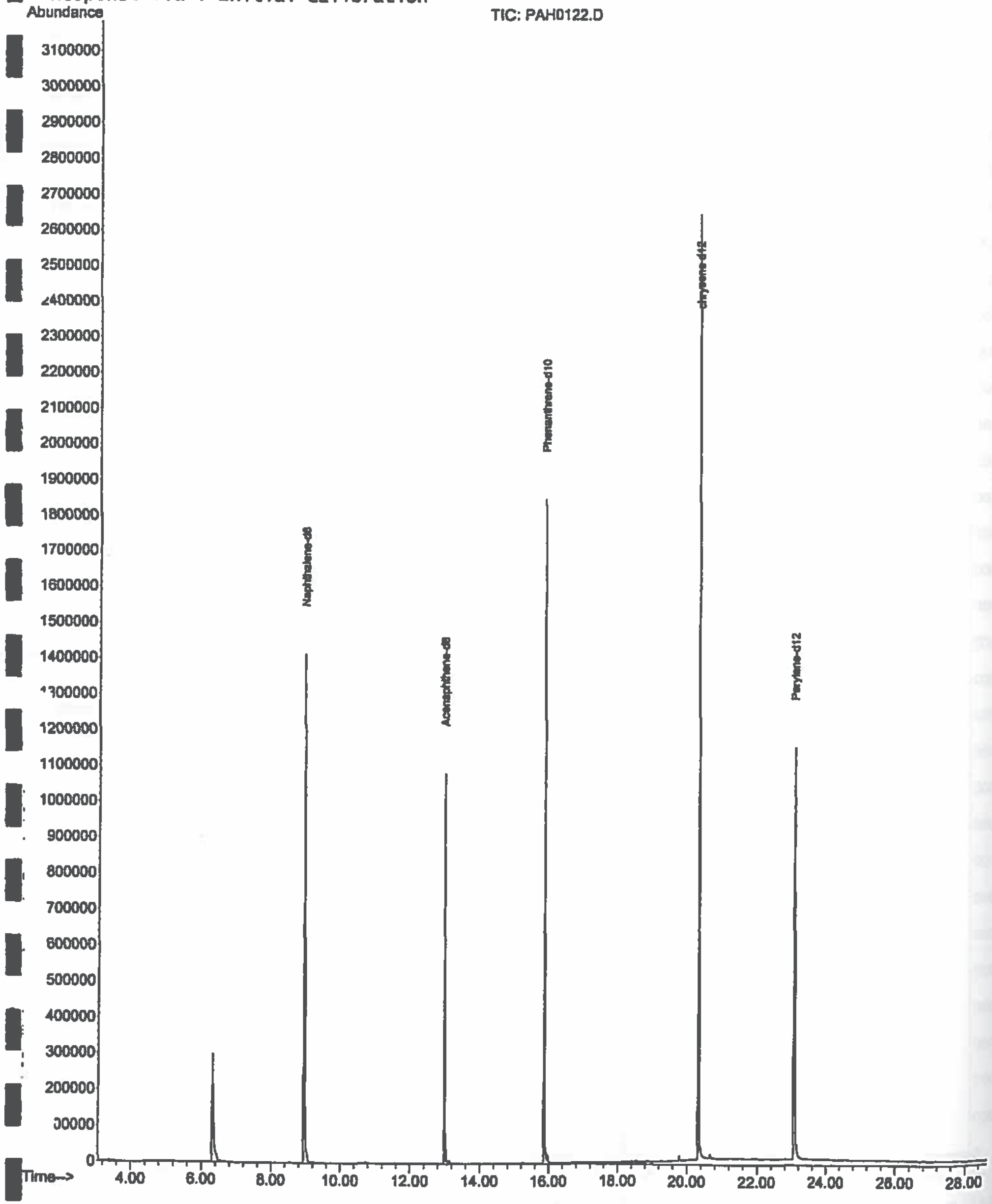

PAH0122.D DPAH19.M Thu Jan 09 15:01:04 2003

Quantitation Report (QT Reviewed)

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Data File : C:\MSDCHEM\1\DATA\0103\PAH0148.D          Vial: 41
Acq On    : 10 Jan 2003   4:00                    Operator: Mathilde Ernoult
Sample    : DUB-02-B02182-S0018 WS3 0.5-1.0       Inst     : GCMS1
Misc      : Irish Geotechnical Services/Leachate  Multiplr: 0.01
                                             Sample Amount: 0.00
MS Integration Params: AUTOINT1.E
Quant Time: Jan 10 11:36 2003               Quant Results File: DPAH19.RES

Method        : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title         : 19 PAH Analysis
Last Update   : Fri Jan 10 11:35:22 2003
Response via  : Initial Calibration
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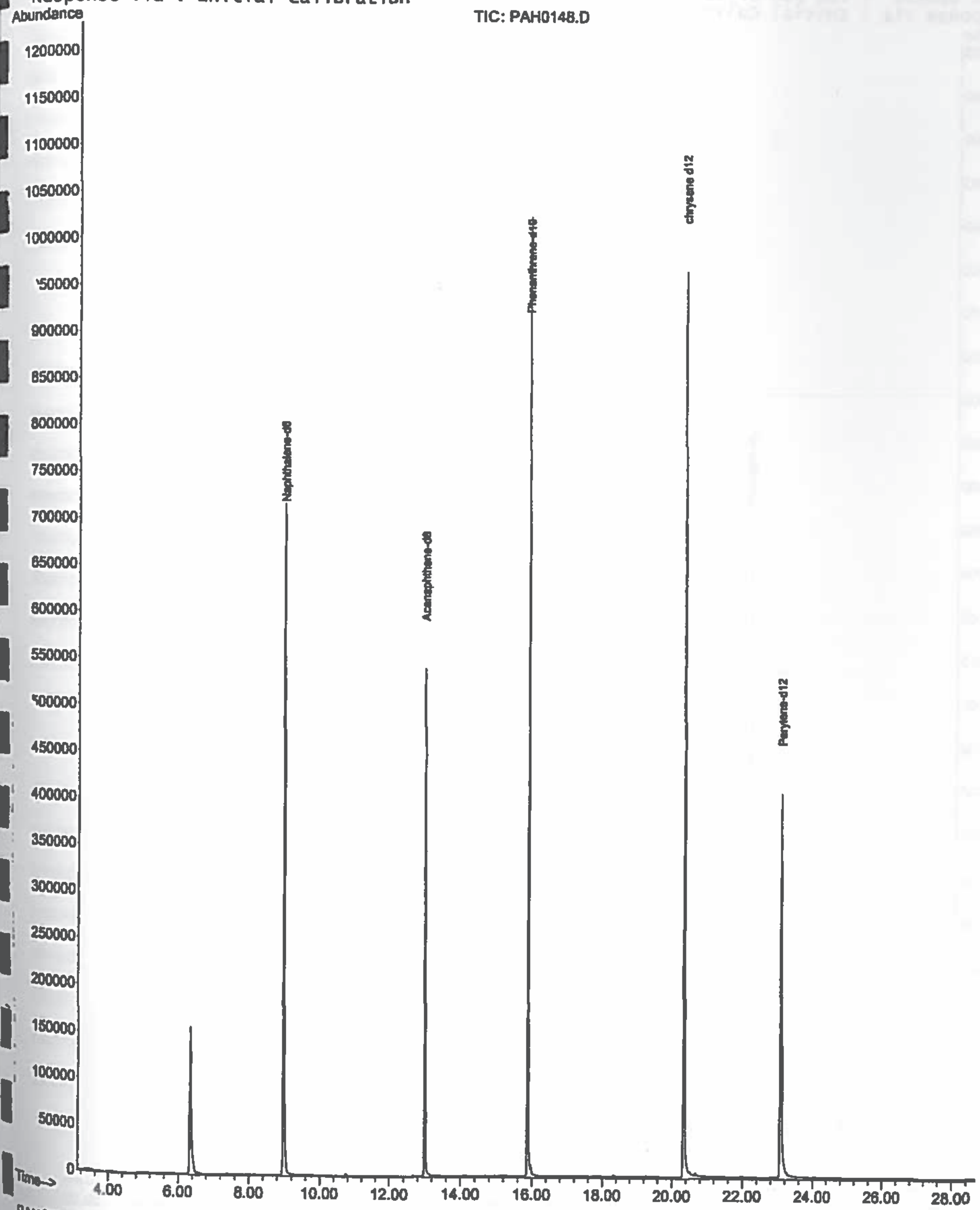
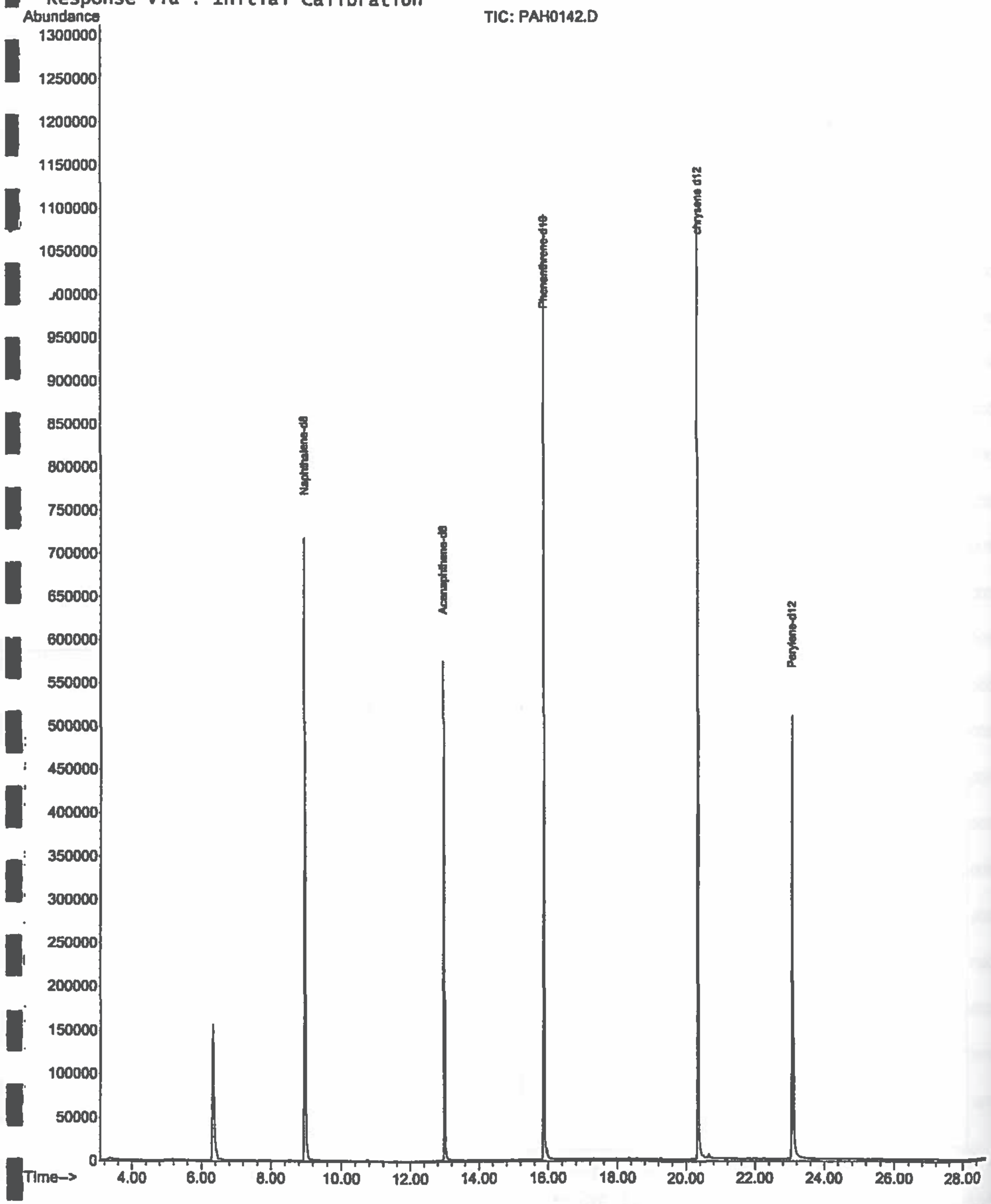


PAH0148.D DPAH19.M Fri Jan 10 11:36:43 2003

Data File : C:\MSDCHEM\1\DATA\0103\PAH0142.D Vial: 35
Acq On : 10 Jan 2003 00:05 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0022 WS5 1.5-2.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Leachate Multiplr: 0.01
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 10 11:28 2003 Quant Results File: DPAH19.RES

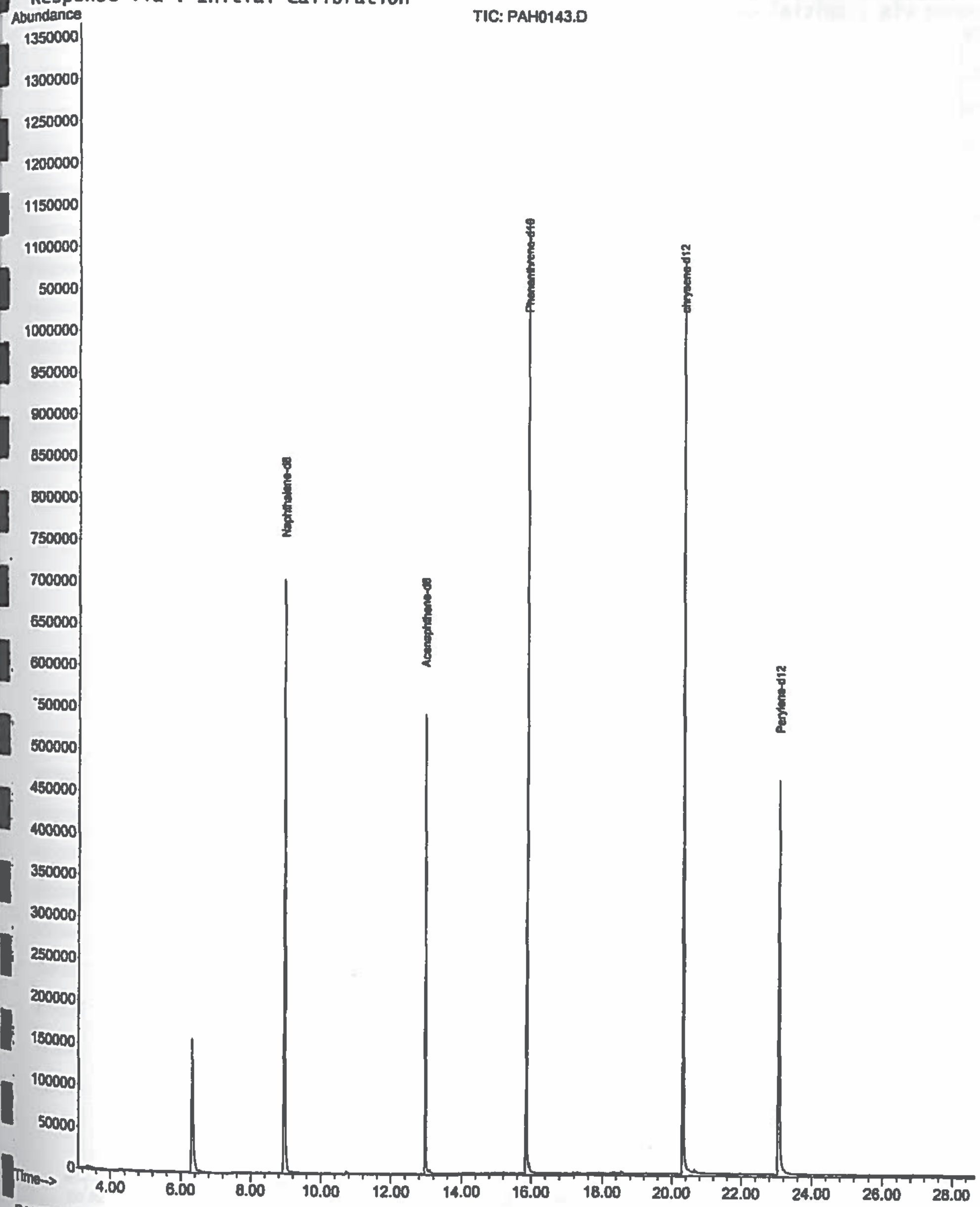
Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\0103\PAH0143.D Vial: 36
Acq On : 10 Jan 2003 00:44 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0024 WS5 4.0-5.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Leachate Multiplr: 0.01
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 10 11:29 2003 Quant Results File: DPAH19.RES

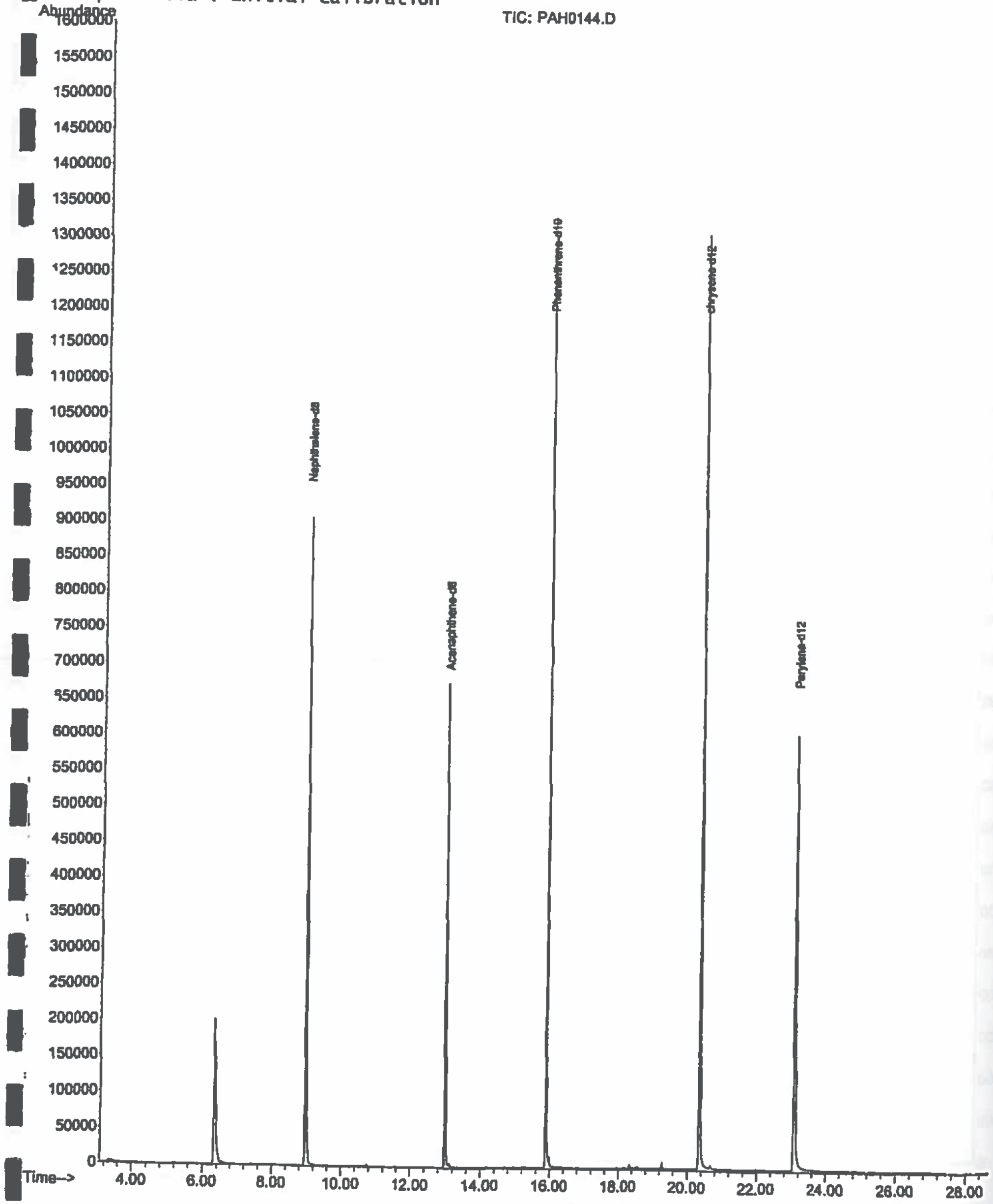
Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\0103\PAH0144.D Vial: 37
Acq On : 10 Jan 2003 1:24 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0045 WS13 1.5-2.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Leachate Multiplr: 0.01
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 10 11:29 2003 Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration

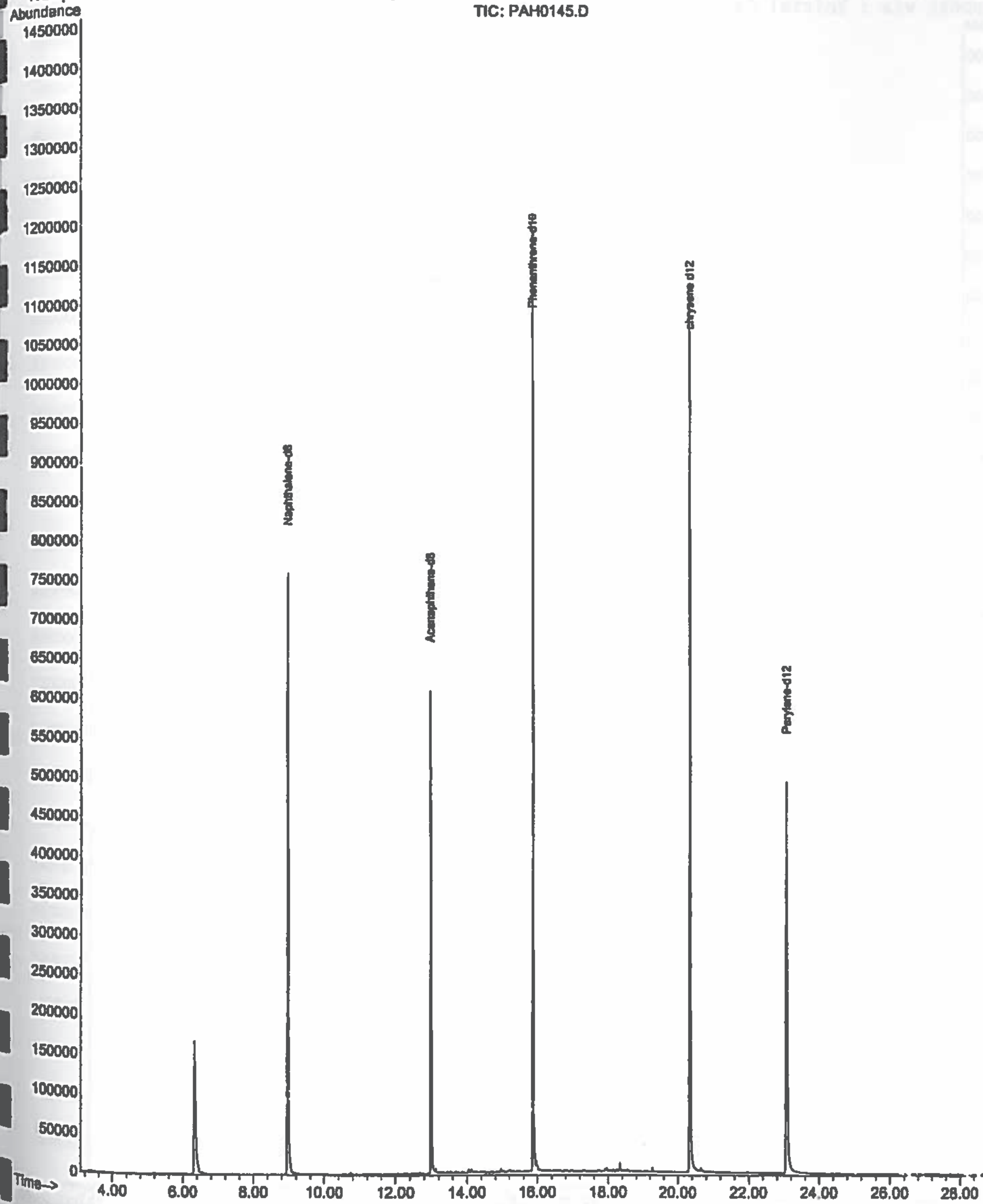


PAH0144.D DPAH19.M Fri Jan 10 11:29:40 2003

Data File : C:\MSDCHEM\1\DATA\0103\PAH0145.D Vial: 38
Acq On : 10 Jan 2003 2:03 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0048 WS14 0.5-1.0 Inst : GCMS1
Misc : Irish Geotechnical Services Ltd/Leachate Multiplr: 0.01
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 10 11:30 2003 Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Tue Jan 07 12:15:03 2003
Response via : Initial Calibration



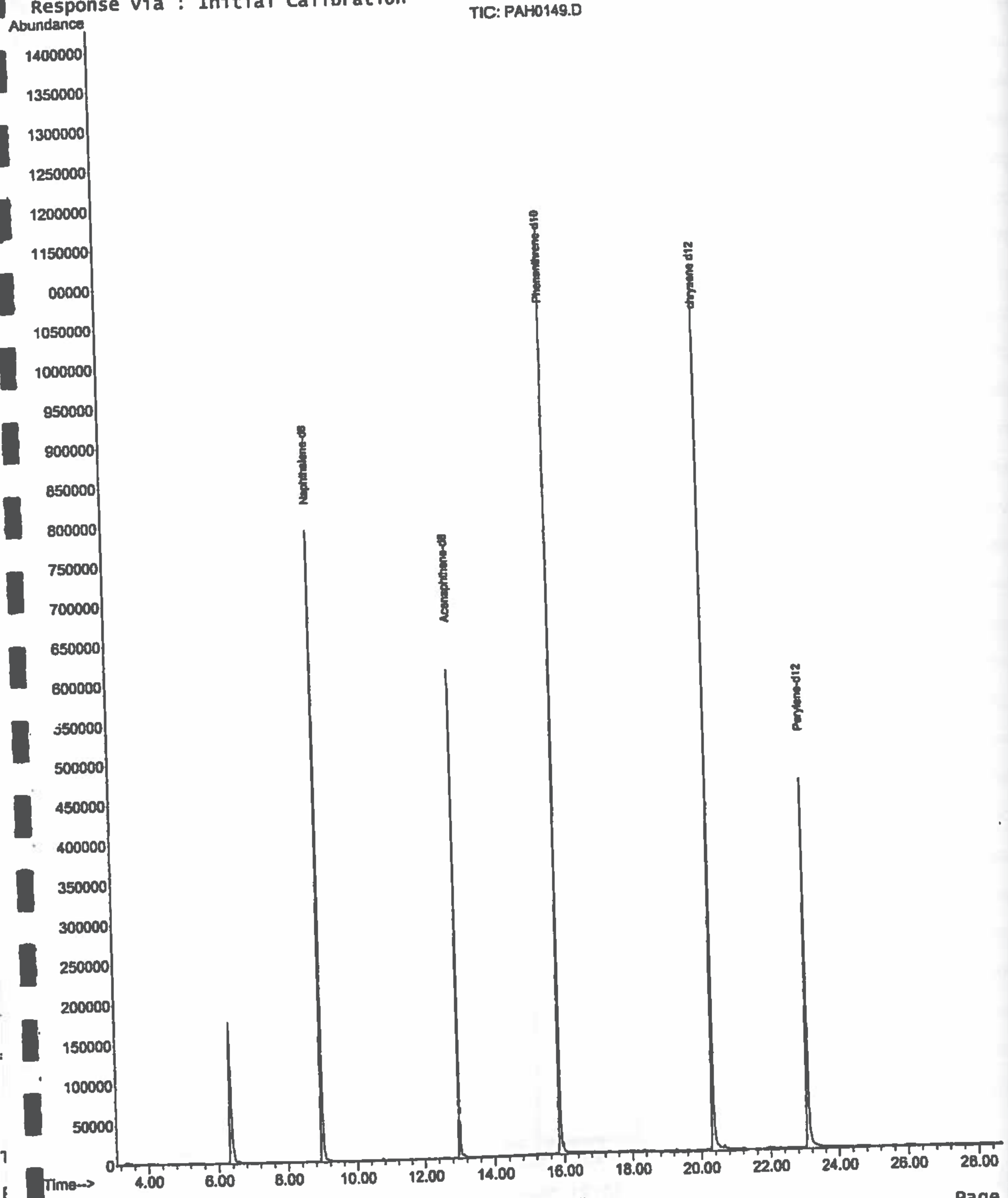
PAH0145.D DPAH19.M Fri Jan 10 11:30:31 2003

Data File : C:\MSDCHEM\1\DATA\0103\PAH0149.D
Acq On : 10 Jan 2003 4:39
Sample : DUB-02-B02182-S0055 WS16 1.5-2.0
Misc : Irish Geotechnical Services/Leachate

Vial: 42
Operator: Mathilde Ernoult
Inst : GCMS1
Multiplr: 0.01
Sample Amount: 0.00

MS Integration Params: AUTOINT1.E
Quant Time: Jan 10 11:37 2003
Quant Results File: DPAH19.RES

Method : C:\MSDCHEM\1\METHODS\DPAH19.M (Chemstation Integrator)
Title : 19 PAH Analysis
Last Update : Fri Jan 10 11:35:22 2003
Response via : Initial Calibration

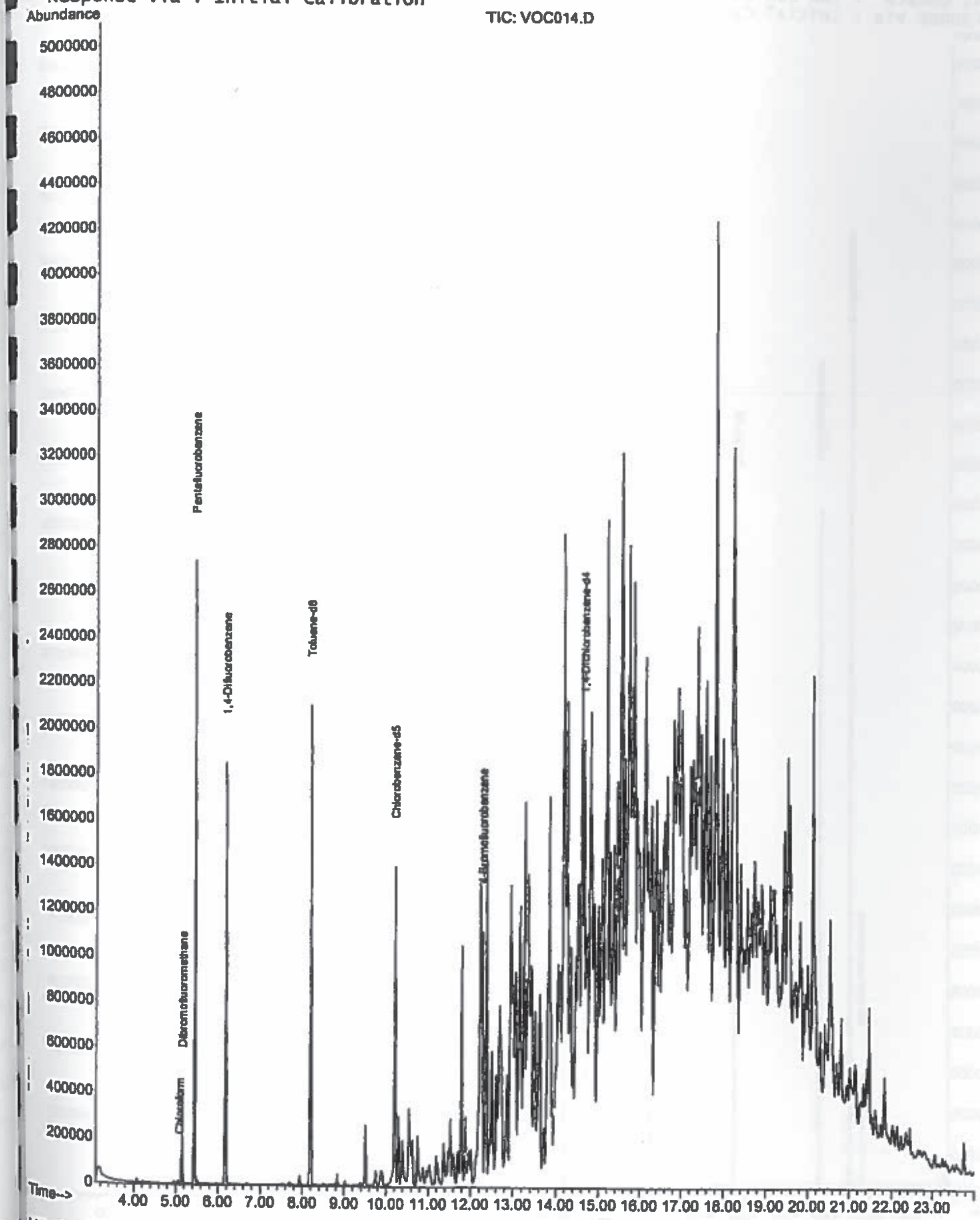


Data File : C:\MSDCHEM\1\DATA\060103\VOC014.D
Acq On : 6 Jan 2003 23:07
Sample : B02182-S0006 BH1 3.5m
Misc : Irish Geotechnical Services Ltd/Soil

Vial: 14
Operator: Mathilde
Inst : Instrumen
Multiplr: 2.00
Sample Amount: 0.00

MS Integration Params: EVENTS.E
Quant Time: Jan 8 9:33 2003
Quant Results File: HS_VOC1.RES

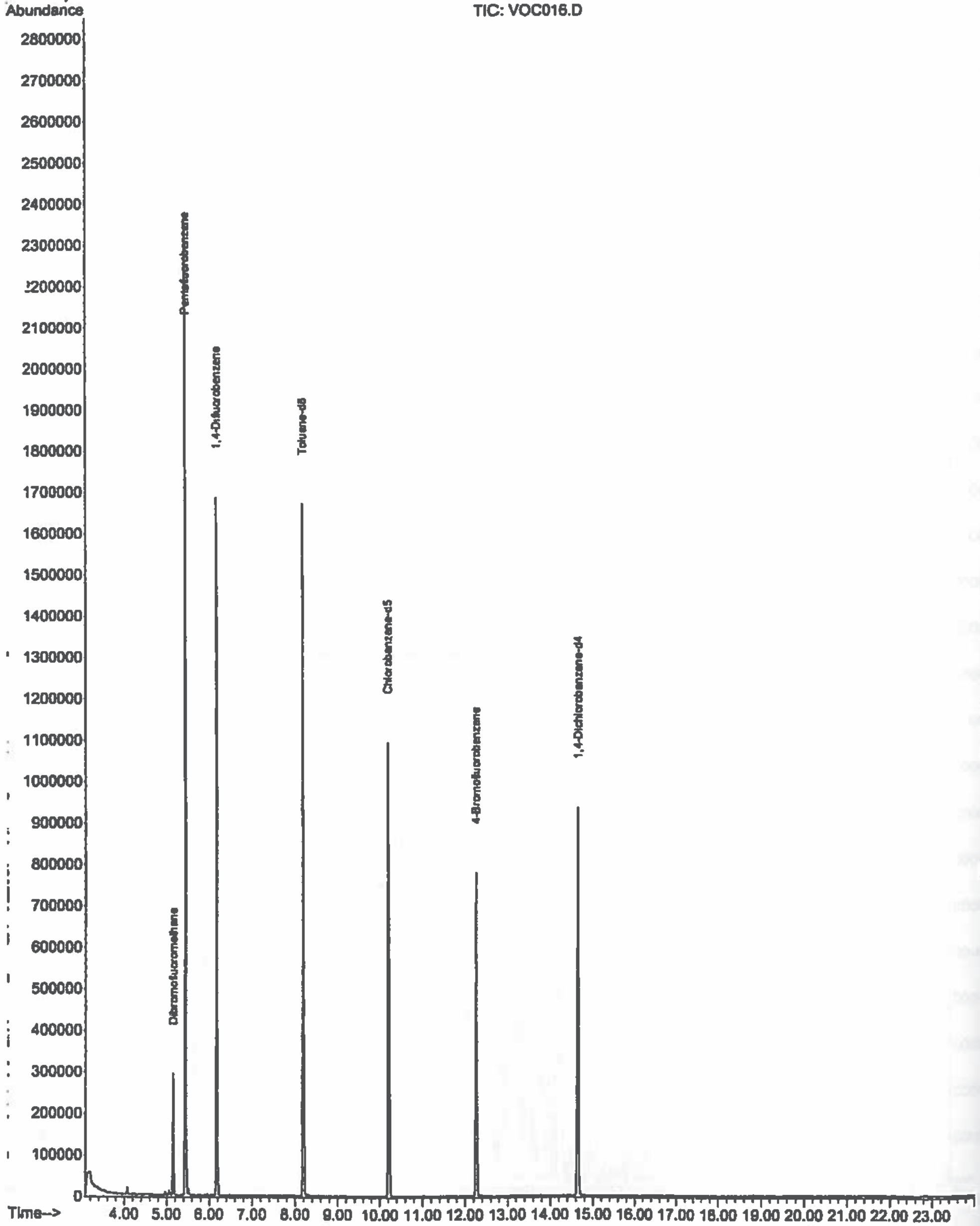
Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\060103\VOC016.D Vial: 16
Acq On : 7 Jan 2003 00:18 Operator: Mathilde
Sample : B02182-S0007 WS1 0.5m Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 2.00
Sample Amount: 0.00

MS Integration Params: EVENTS.E
Quant Time: Jan 8 9:37 2003 Quant Results File: HS_VOC1.RES

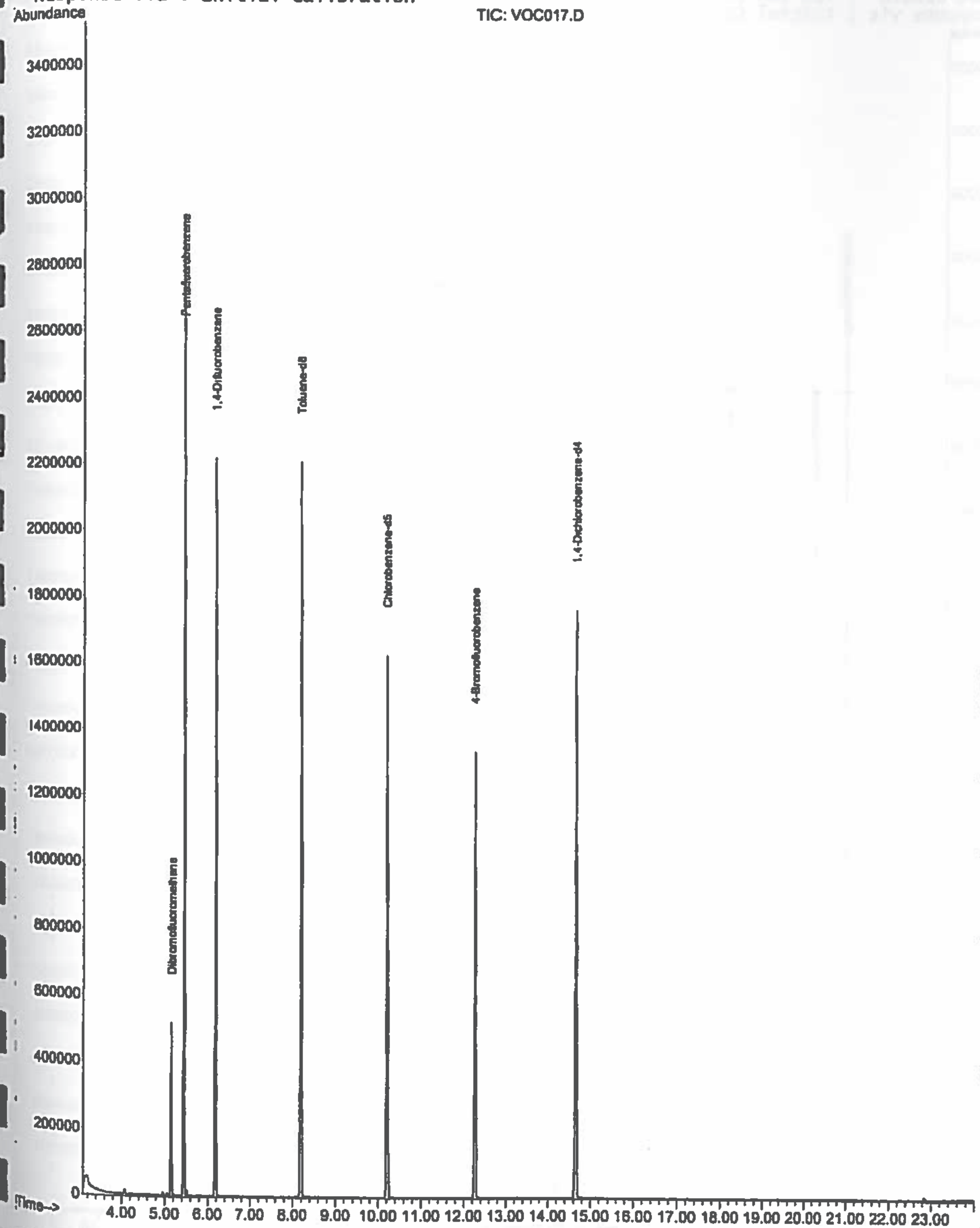
Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\060103\VOC017.D Vial: 17
Acq On : 7 Jan 2003 00:53 Operator: Mathilde
Sample : B02182-S0009 WS1 2.5m Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 2.00
Sample Amount: 0.00

MS Integration Params: EVENTS.E
Quant Time: Jan 8 9:38 2003 Quant Results File: HS_VOC1.RES

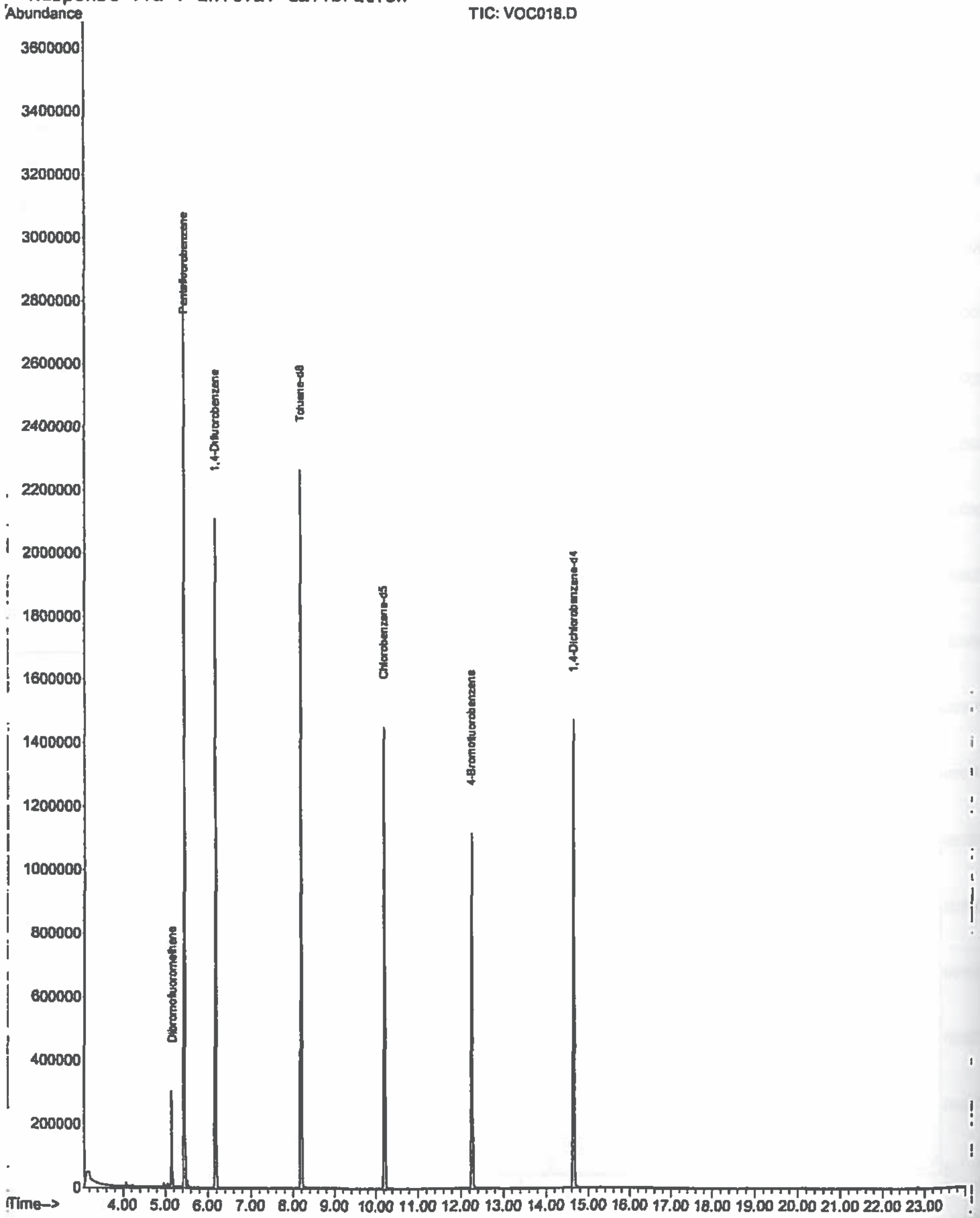
Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\060103\VOC018.D Vial: 18
Acq On : 7 Jan 2003 1:28 Operator: Mathilde
Sample : B02182-S0010 WS1 3.5m Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 2.00
Sample Amount: 0.00

MS Integration Params: EVENTS.E
Quant Time: Jan 8 9:39 2003 Quant Results File: HS_VOC1.RES

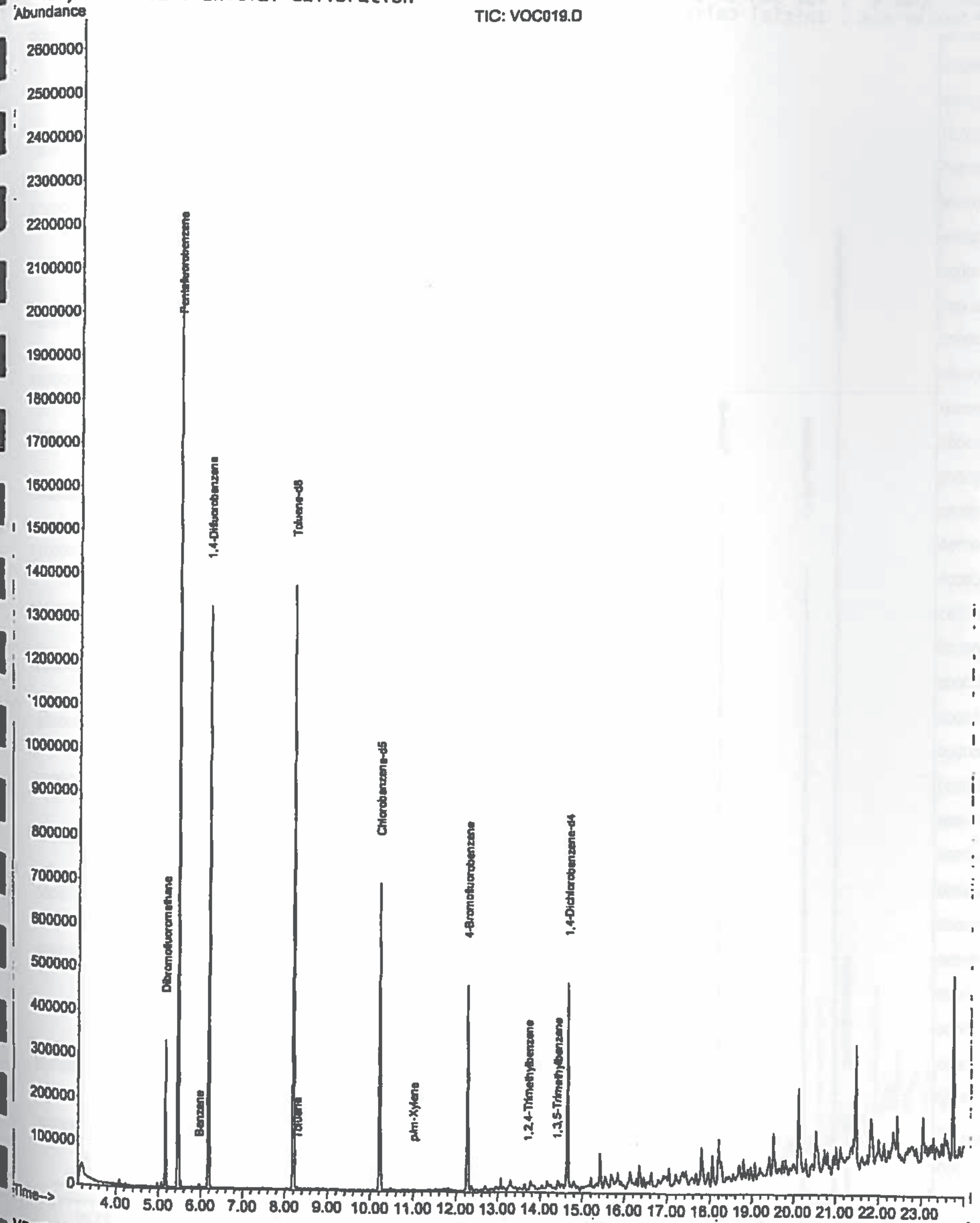
Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\060103\VOC019.D Vial: 19
Acq On : 7 Jan 2003 2:03 Operator: Mathilde
Sample : B02182-S0011 WS2 0.5-1.0m Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 2.00
Sample Amount: 0.00

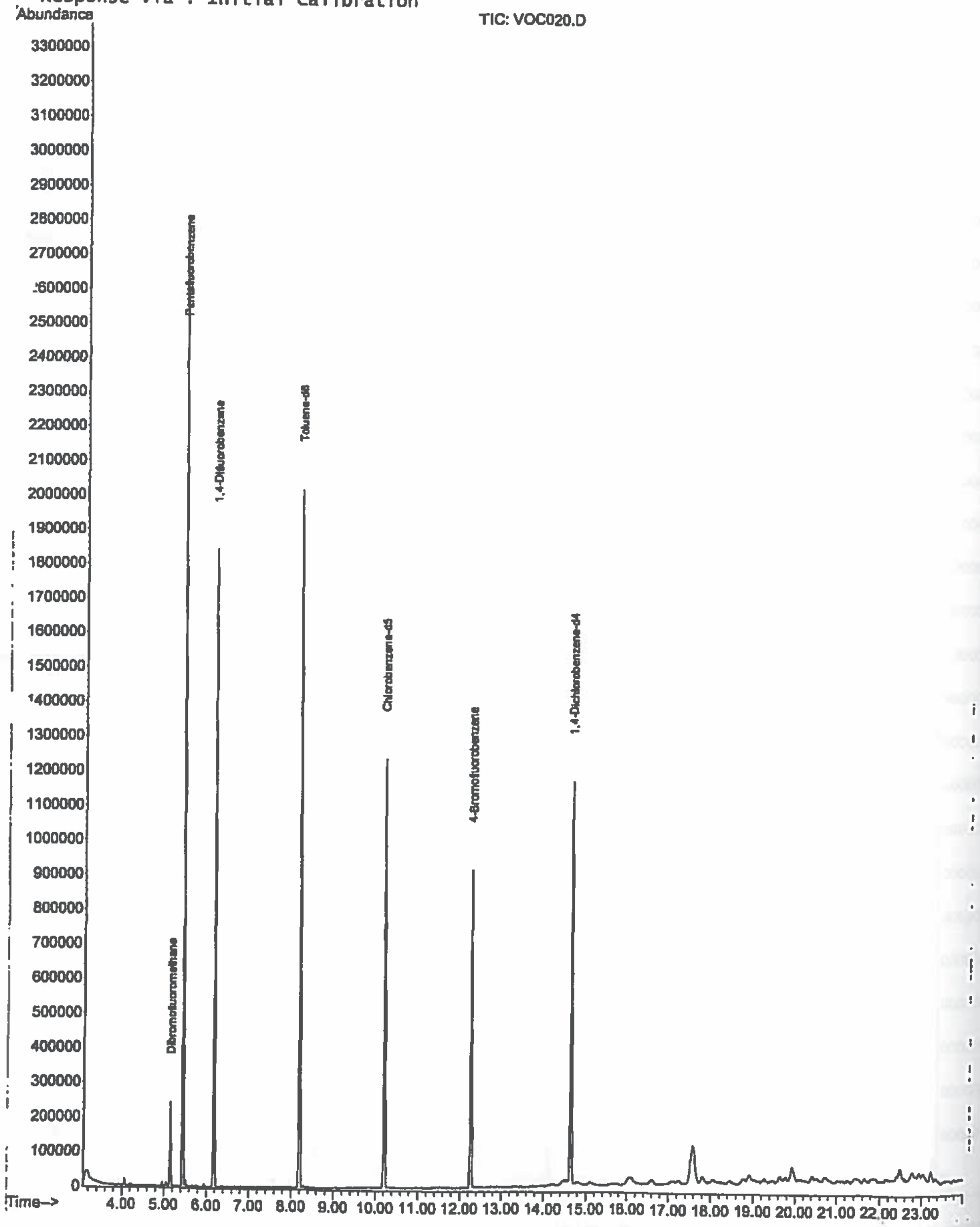
MS Integration Params: EVENTS.E
Quant Time: Jan 8 9:41 2003 Quant Results File: HS_VOC1.RES

Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration



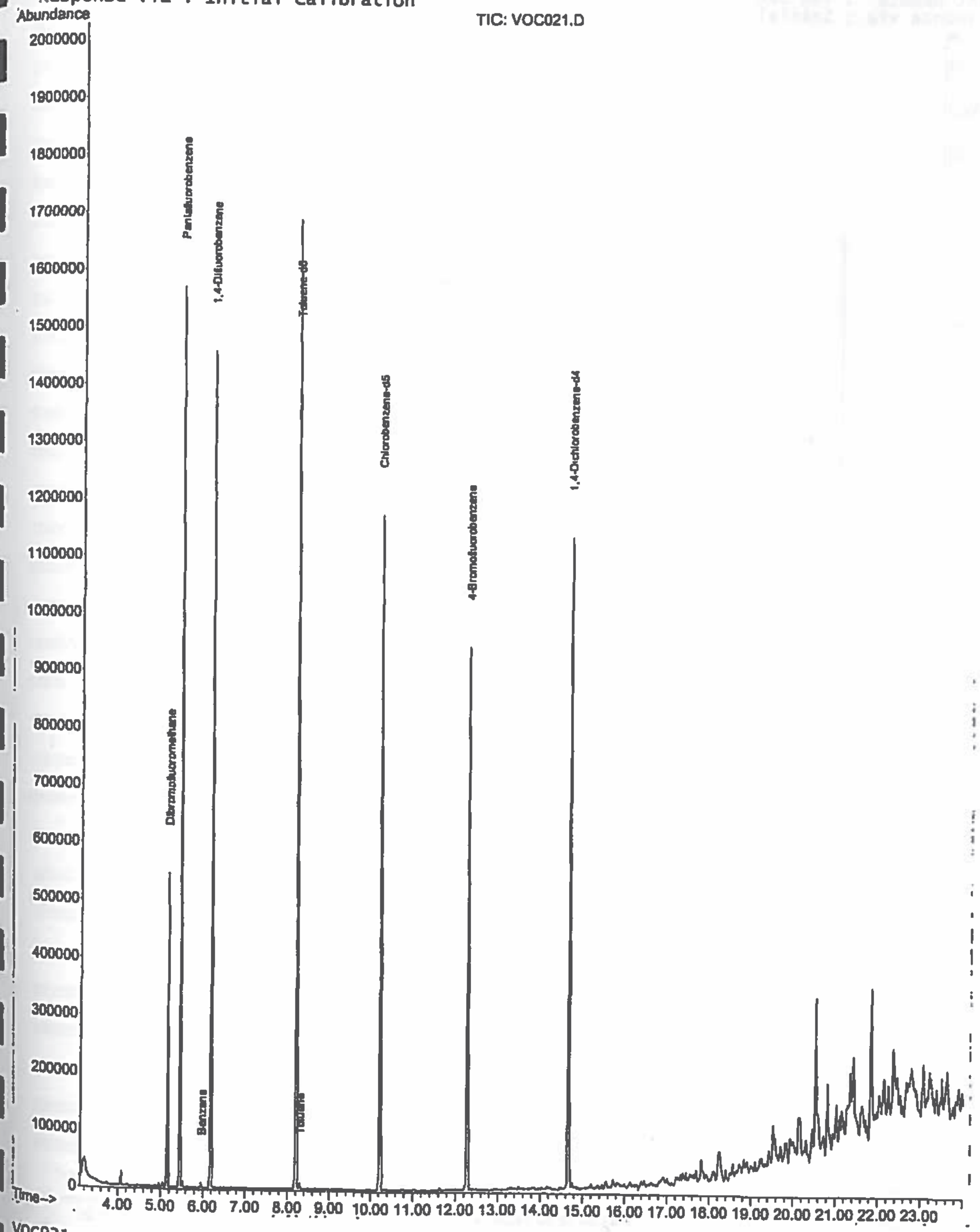
Data File : C:\MSDCHEM\1\DATA\060103\VOC020.D Vial: 20
Acq On : 7 Jan 2003 2:39 Operator: Mathilde
Sample : B02182-S0013 WS2 1.5-2.0m Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 2.00
Sample Amount: 0.00
MS Integration Params: EVENTS.E
Quant Time: Jan 8 9:42 2003 Quant Results File: HS_VOC1.RES

Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration



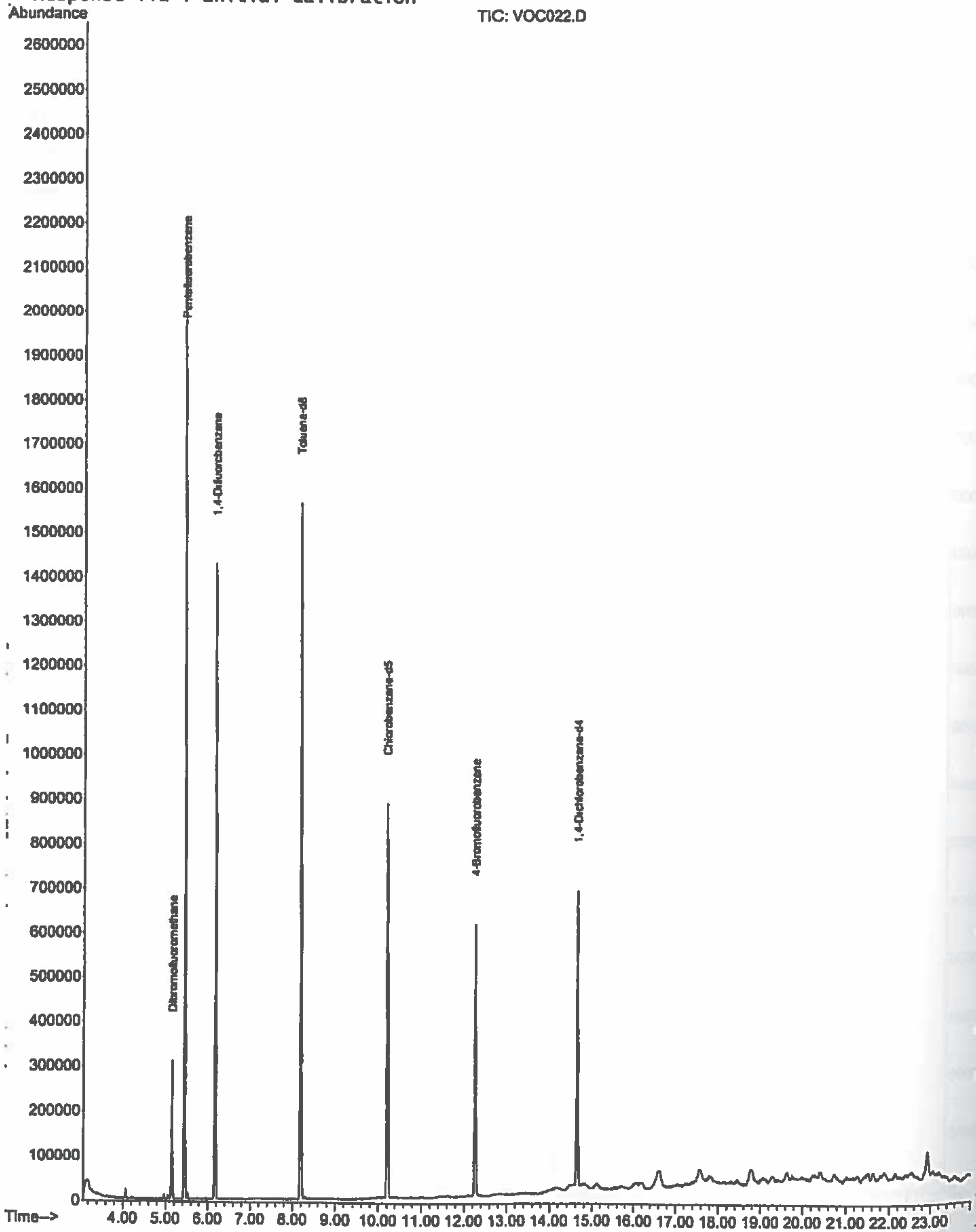
Data File : C:\MSDCHEM\1\DATA\060103\VOC021.D Vial: 21
Acq On : 7 Jan 2003 3:14 Operator: Mathilde
Sample : B02182-S0015 WS2 4.0m Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 2.00
Sample Amount: 0.00
MS Integration Params: EVENTS.E
Quant Time: Jan 8 9:43 2003 Quant Results File: HS_VOC1.RES

Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration



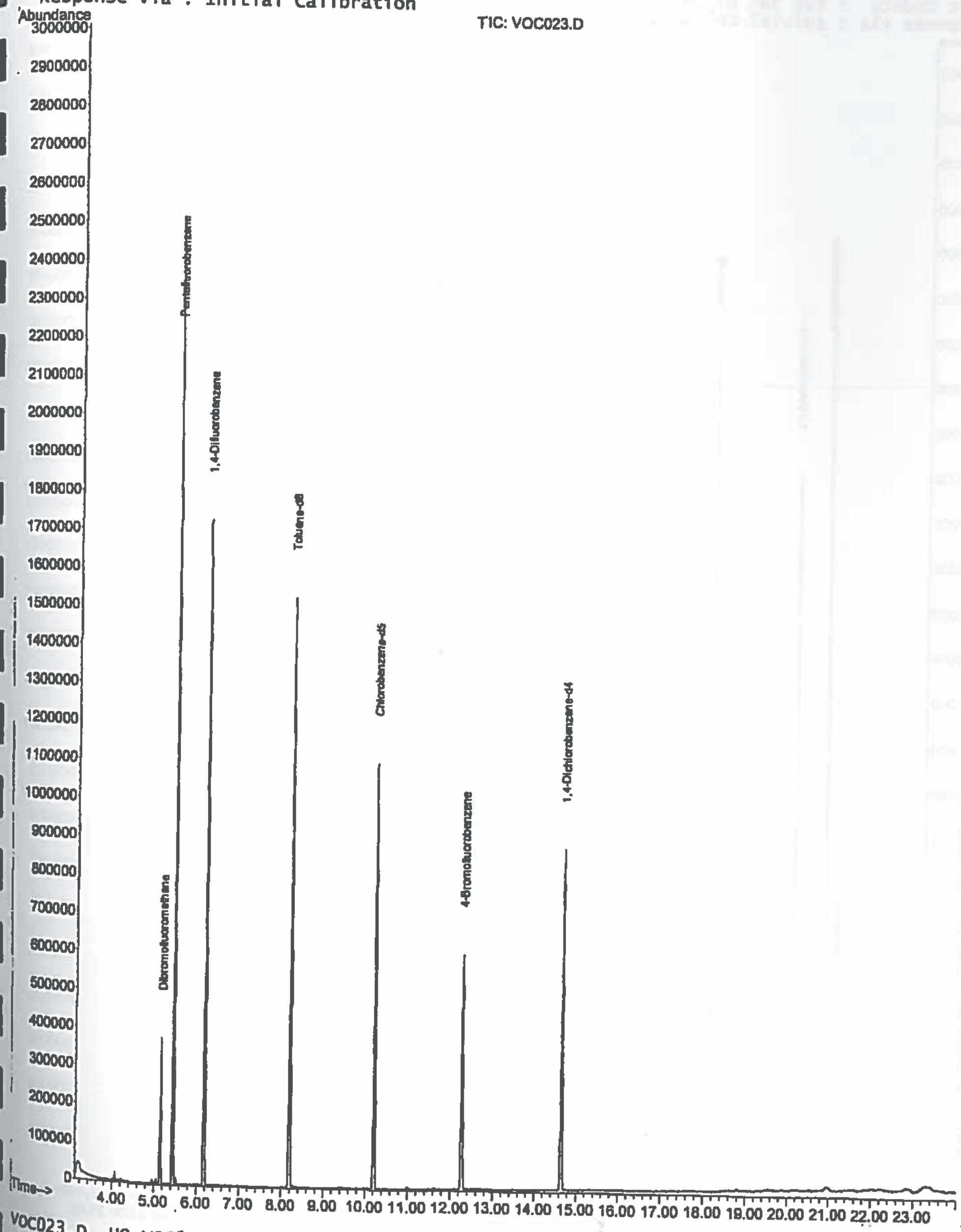
```
Data File : C:\MSDCHEM\1\DATA\060103\VOC022.D          Vial: 22
Acq On    :  7 Jan 2003    3:49                    Operator: Mathilde
Sample    : B02182-S0016  WS3  0.5m                Inst     : Instrumen
Misc      : Irish Geotechnical Services Ltd/Soil   Multiplr: 2.00
                                              Sample Amount: 0.00
MS Integration Params: EVENTS.E
Quant Time: Jan  8  9:45 2003               Quant Results File: HS_VOC1.RES

Method        : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title         : Volatile Organic Compounds (EPA 624/8260)
Last Update   : Tue Jan 07 14:45:55 2003
Response via  : Initial Calibration
```




```
Data File : C:\MSDCHEM\1\DATA\060103\VOC023.D          Vial: 23
Acq On    :  7 Jan 2003    4:24                    Operator: Mathilde
Sample    : B02182-S0019  WS4  1.5-2.0m            Inst     : Instrumen
Misc      : Irish Geotechnical Services Ltd/Soil   Multiplr: 2.00
                                              Sample Amount: 0.00
MS Integration Params: EVENTS.E
Quant Time: Jan  8  9:46 2003               Quant Results File: HS_VOC1.RES

Method        : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title         : Volatile Organic Compounds (EPA 624/8260)
Last Update   : Tue Jan 07 14:45:55 2003
Response via  : Initial Calibration
```



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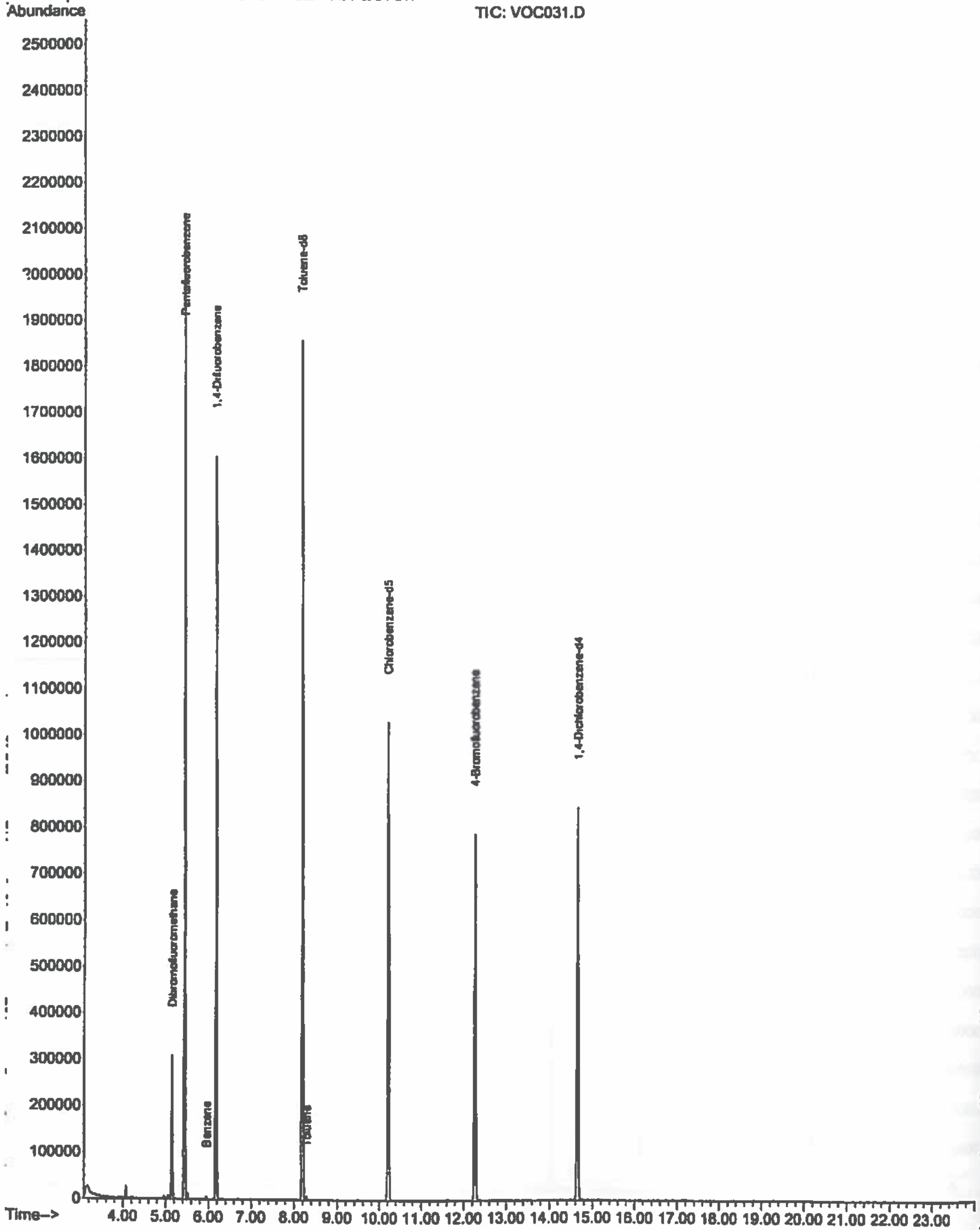
Data File : C:\MSDCHEM\1\DATA\060103\VOC031.D            Vial: 31
Acq On    :  7 Jan 2003    9:06                     Operator: Mathilde
Sample    : B02182-S0023  WS5  2.0m                 Inst     : Instrumen
Misc      : Irish Geotechnical Services Ltd/Soil    Multiplr: 2.00
                                               Sample Amount: 0.00
MS Integration Params: EVENTS.E
Quant Time: Jan  8  9:56 2003              Quant Results File: HS_VOC1.RES

Method         : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title          : Volatile Organic Compounds (EPA 624/8260)
Last Update    : Tue Jan 07 14:45:55 2003
Response via   : Initial Calibration
```

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Data File : C:\MSDCHEM\1\DATA\060103\VOC025.D            Vial: 25
Acq On    :  7 Jan 2003    5:35                     Operator: Mathilde
Sample    : B02182-S0025  WS5  2.5-5.0m             Inst     : Instrumen
Misc      : Irish Geotechnical Services Ltd/Soil    Multiplr: 2.00
                                               Sample Amount: 0.00
MS Integration Params: EVENTS.E
Quant Time: Jan  8  9:48 2003              Quant Results File: HS_VOC1.RES

Method         : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title          : Volatile Organic Compounds (EPA 624/8260)
Last Update    : Tue Jan 07 14:45:55 2003
Response via   : Initial Calibration
```
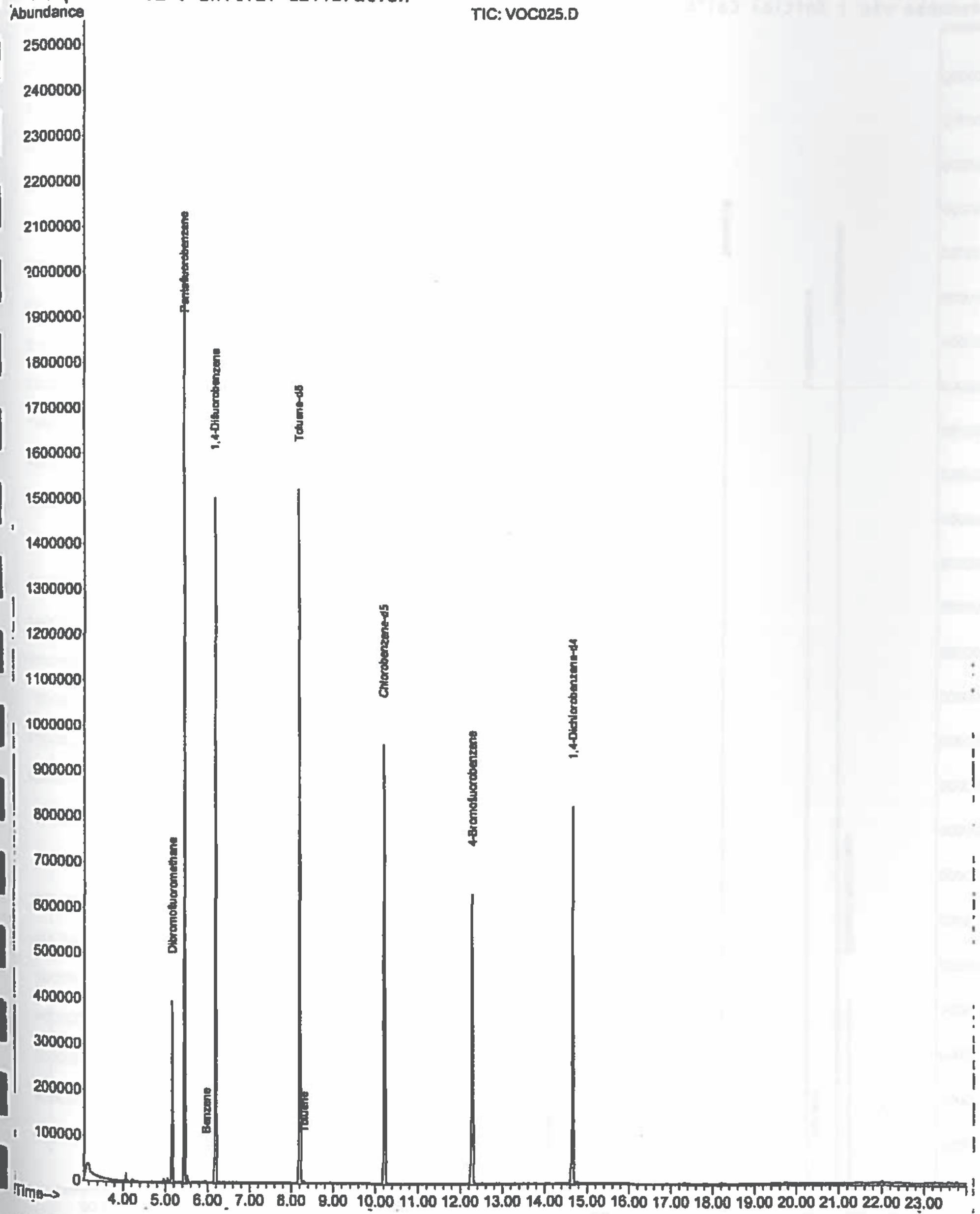
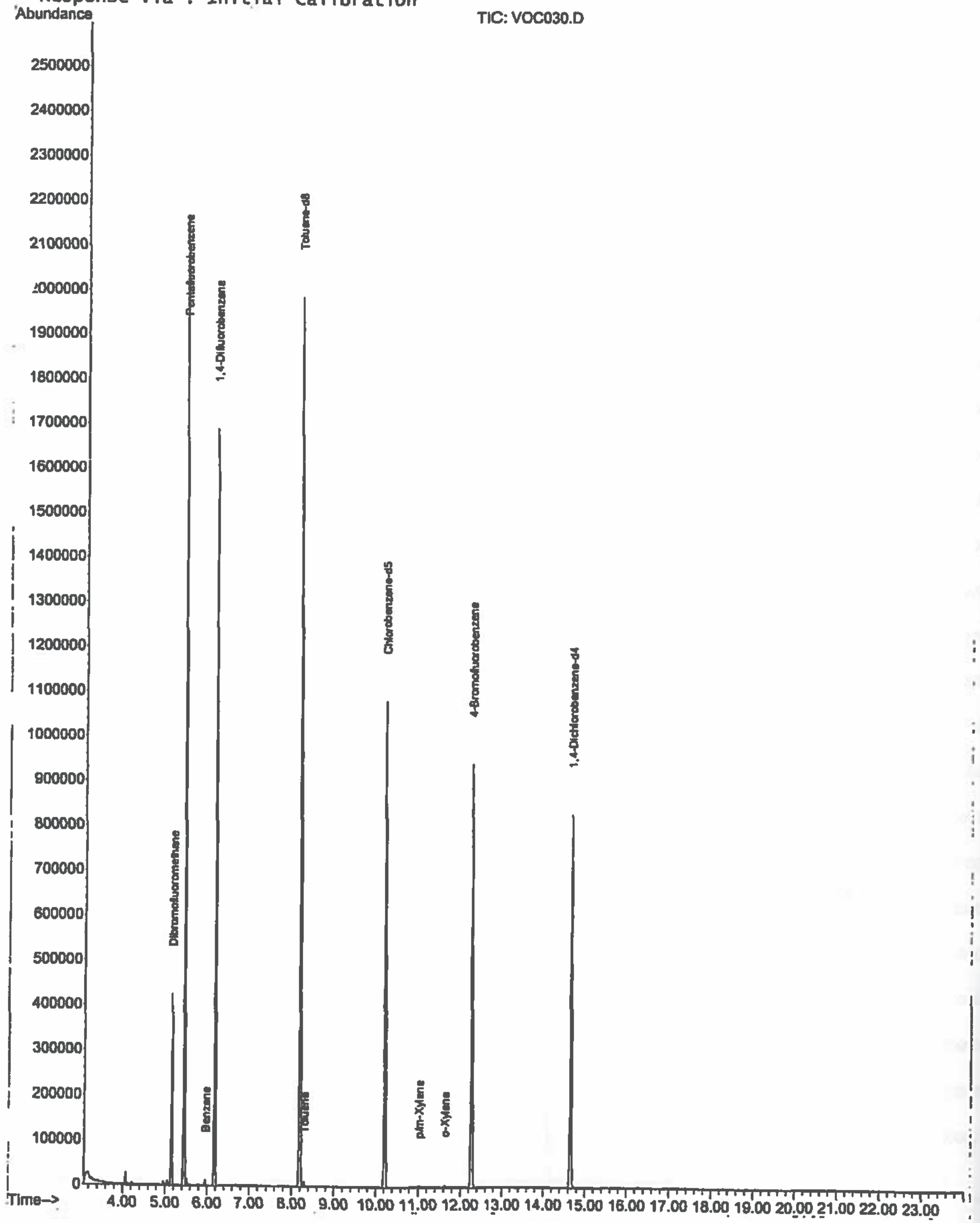



Data File : C:\MSDCHEM\1\DATA\060103\VOC030.D Vial: 30
Acq On : 7 Jan 2003 8:31 Operator: Mathilde
Sample : B02182-S0028 WS7 1.0-1.5m Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 2.00
Sample Amount: 0.00

MS Integration Params: EVENTS.E
Quant Time: Jan 8 9:54 2003 Quant Results File: HS_VOC1.RES

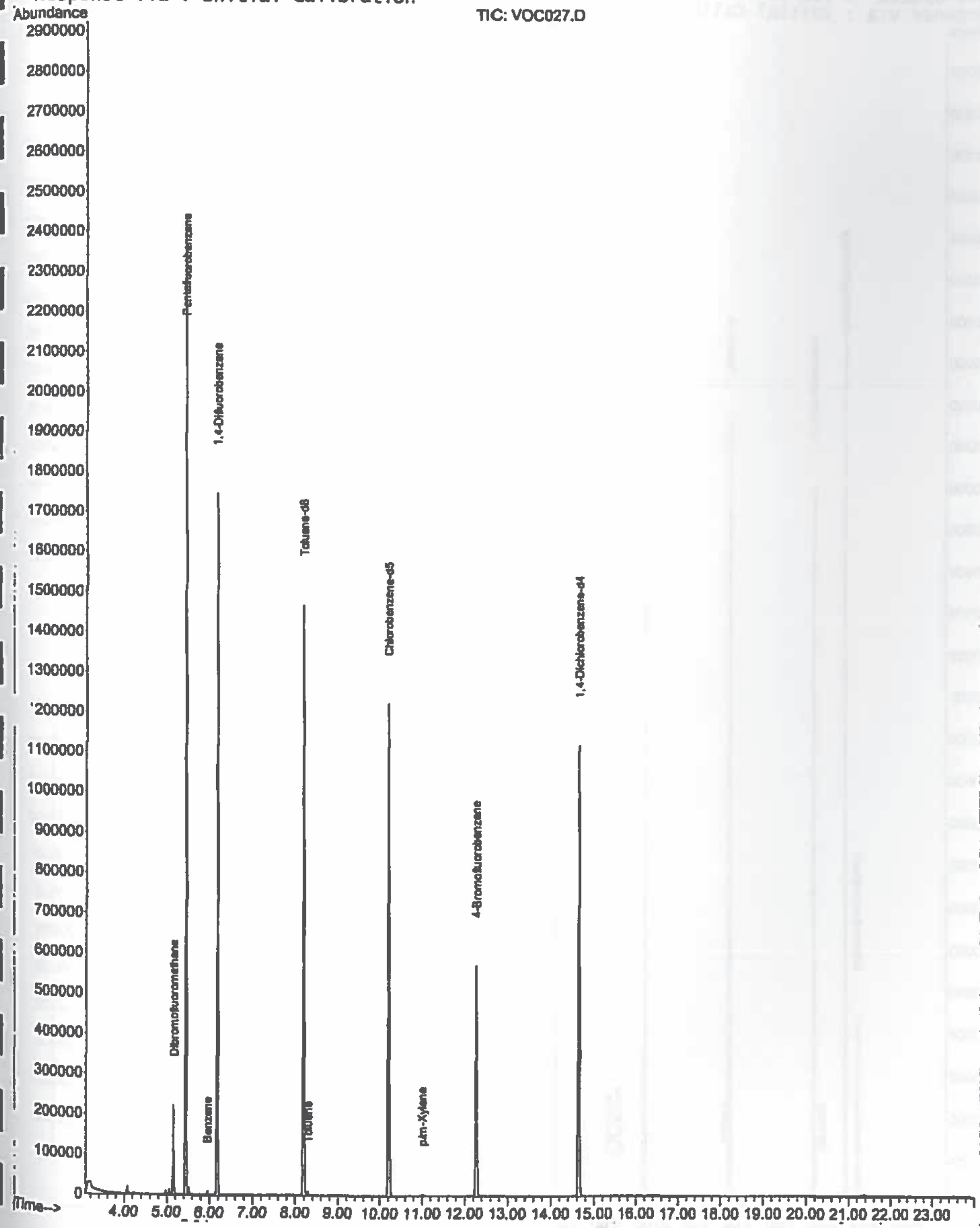
Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\060103\VOC027.D Vial: 27
Acq On : 7 Jan 2003 6:45 Operator: Mathilde
Sample : B02182-S0032 WS10 0.5-1.0m Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 2.00
Sample Amount: 0.00

MS Integration Params: EVENTS.E
Quant Time: Jan 8 9:51 2003 Quant Results File: HS_VOC1.RES

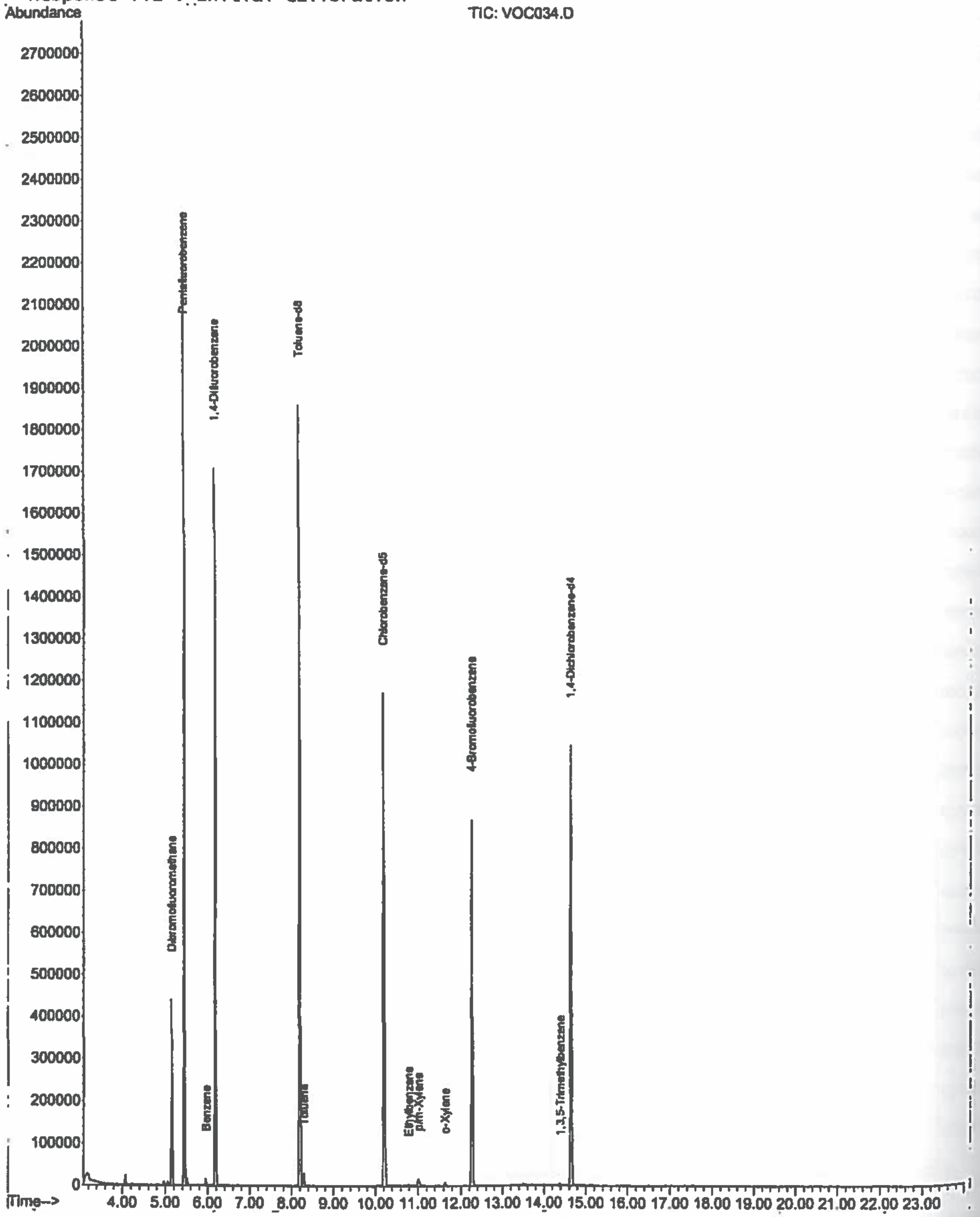
Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\060103\VOC034.D Vial: 34
Acq On : 7 Jan 2003 10:52 Operator: Mathilde
Sample : B02182-S0038 WS11 3.5-4.0m Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 2.00
Sample Amount: 0.00

MS Integration Params: EVENTS.E
Quant Time: Jan 8 10:00 2003 Quant Results File: HS_VOC1.RES

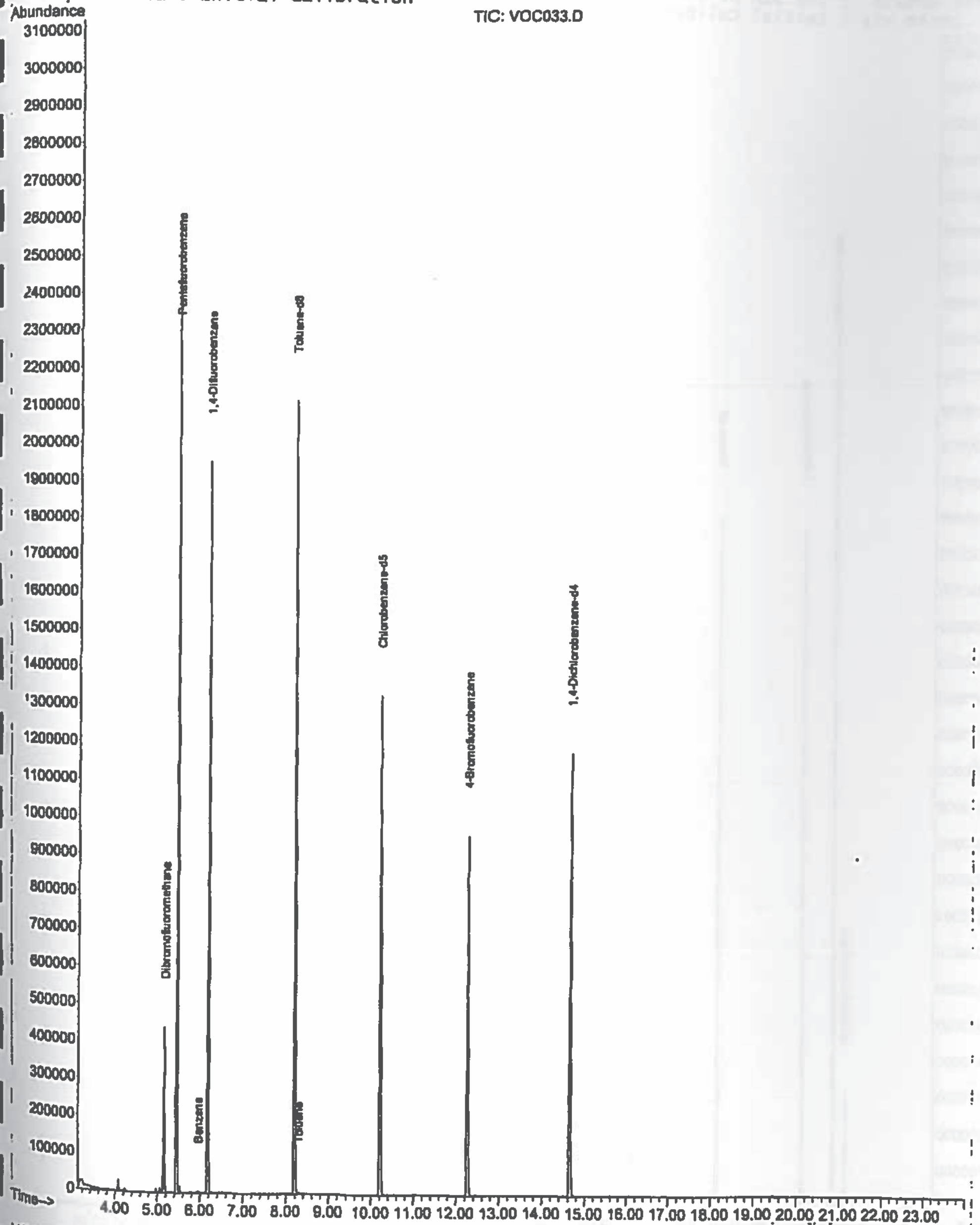
Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\060103\VOC033.D Vial: 33
Acq On : 7 Jan 2003 10:16 Operator: Mathilde
Sample : B02182-S0044 WS13 0.5-1.0m Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 2.00
Sample Amount: 0.00

MS Integration Params: EVENTS.E
Quant Time: Jan 8 9:59 2003 Quant Results File: HS_VOC1.RES

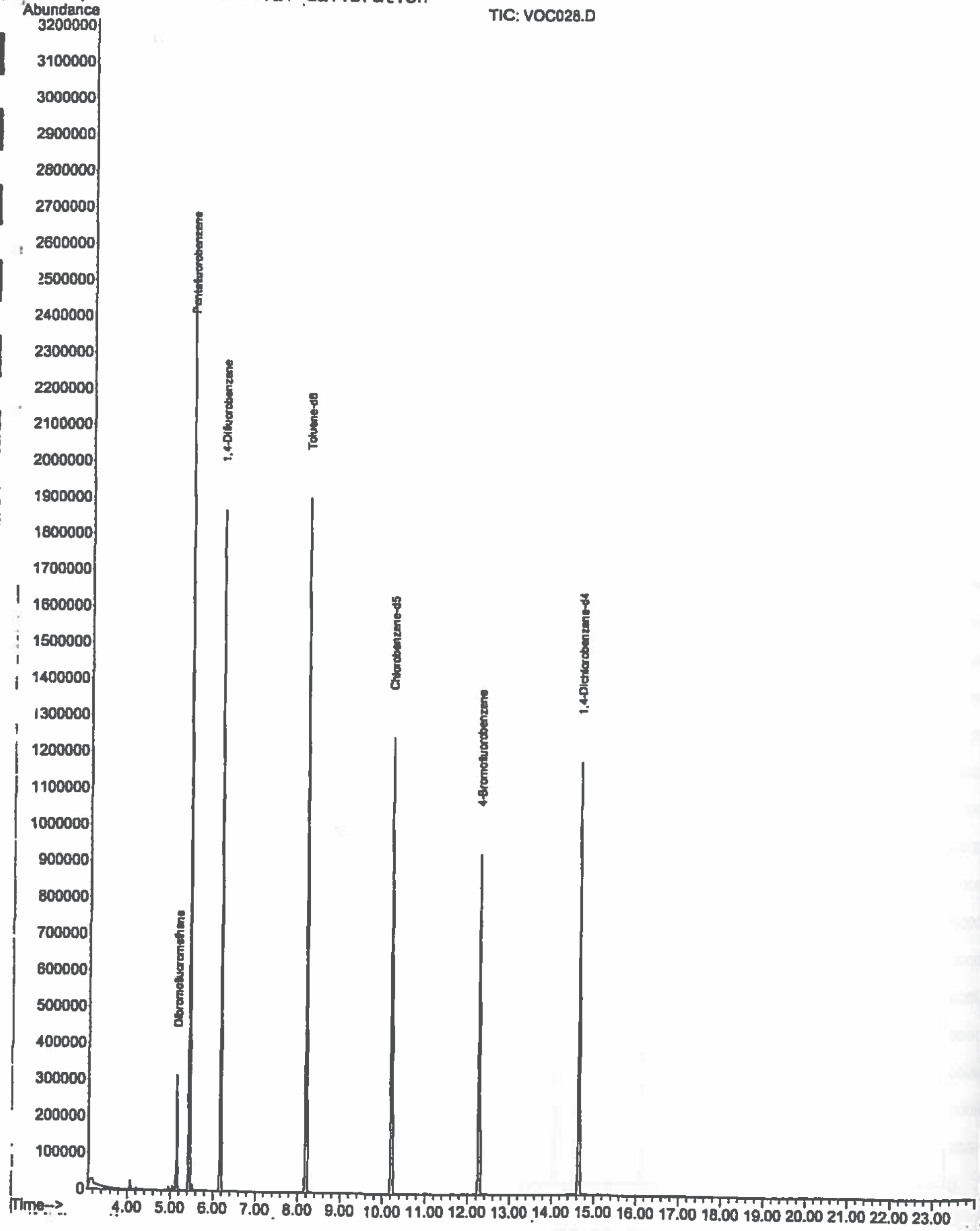
Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\060103\VOC028.D
Acq On : 7 Jan 2003 7:20
Sample : B02182-S0049 WS14 0.5-1.0m
Misc : Irish Geotechnical Services Ltd/Soil
Vial: 28
Operator: Mathilde
Inst : Instrumen
Multiplr: 2.00
Sample Amount: 0.00

MS Integration Params: EVENTS.E
Quant Time: Jan 8 9:52 2003
Quant Results File: HS_VOC1.RES

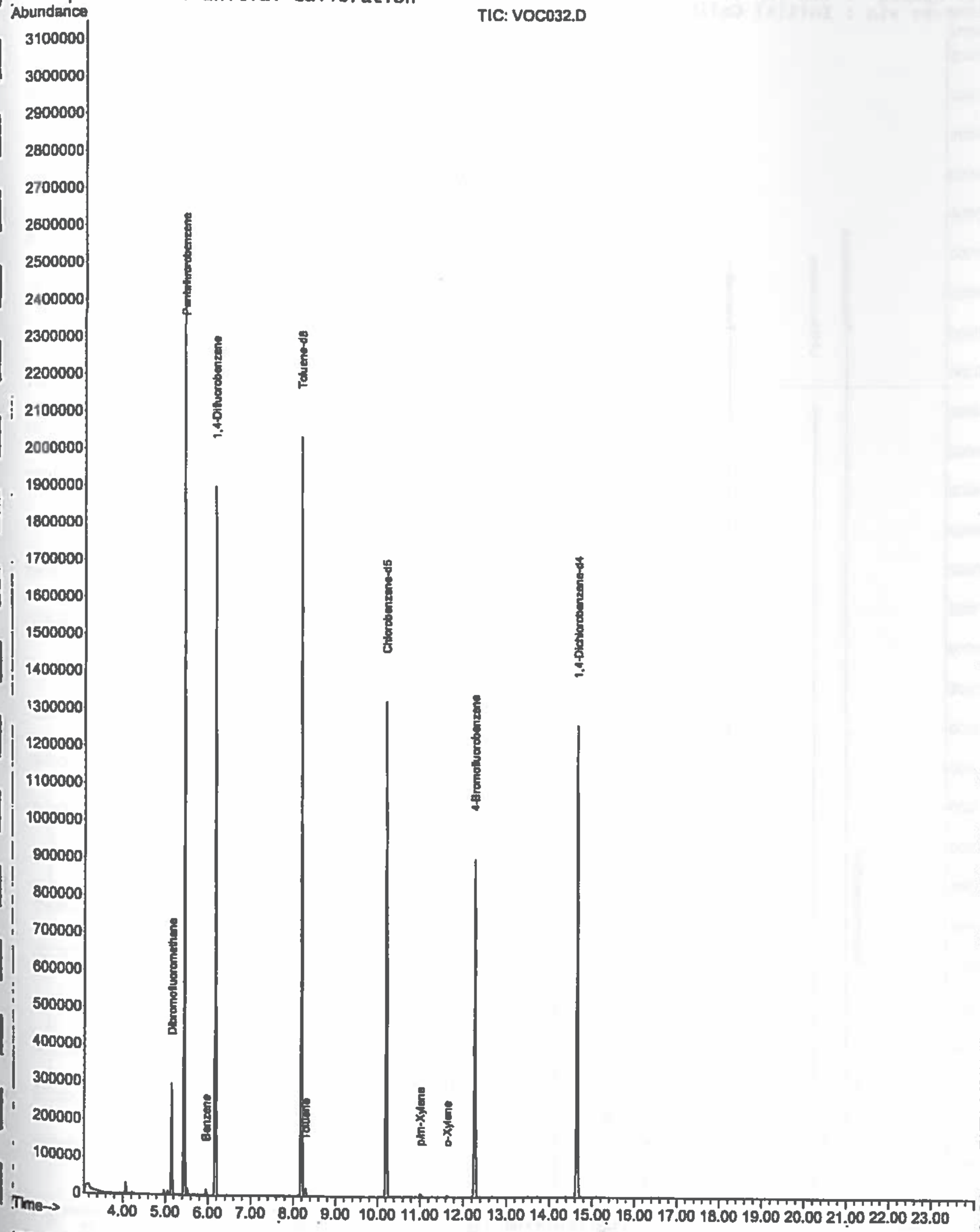
Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\060103\VOC032.D
Acq On : 7 Jan 2003 9:41
Sample : B02182-S0051 WS15 0.5-1.0m
Misc : Irish Geotechnical Services Ltd/Soil
Vial: 32
Operator: Mathilde
Inst : Instrumen
Multiplr: 2.00
Sample Amount: 0.00

MS Integration Params: EVENTS.E
Quant Time: Jan 8 9:57 2003
Quant Results File: HS_VOC1.RES

Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration

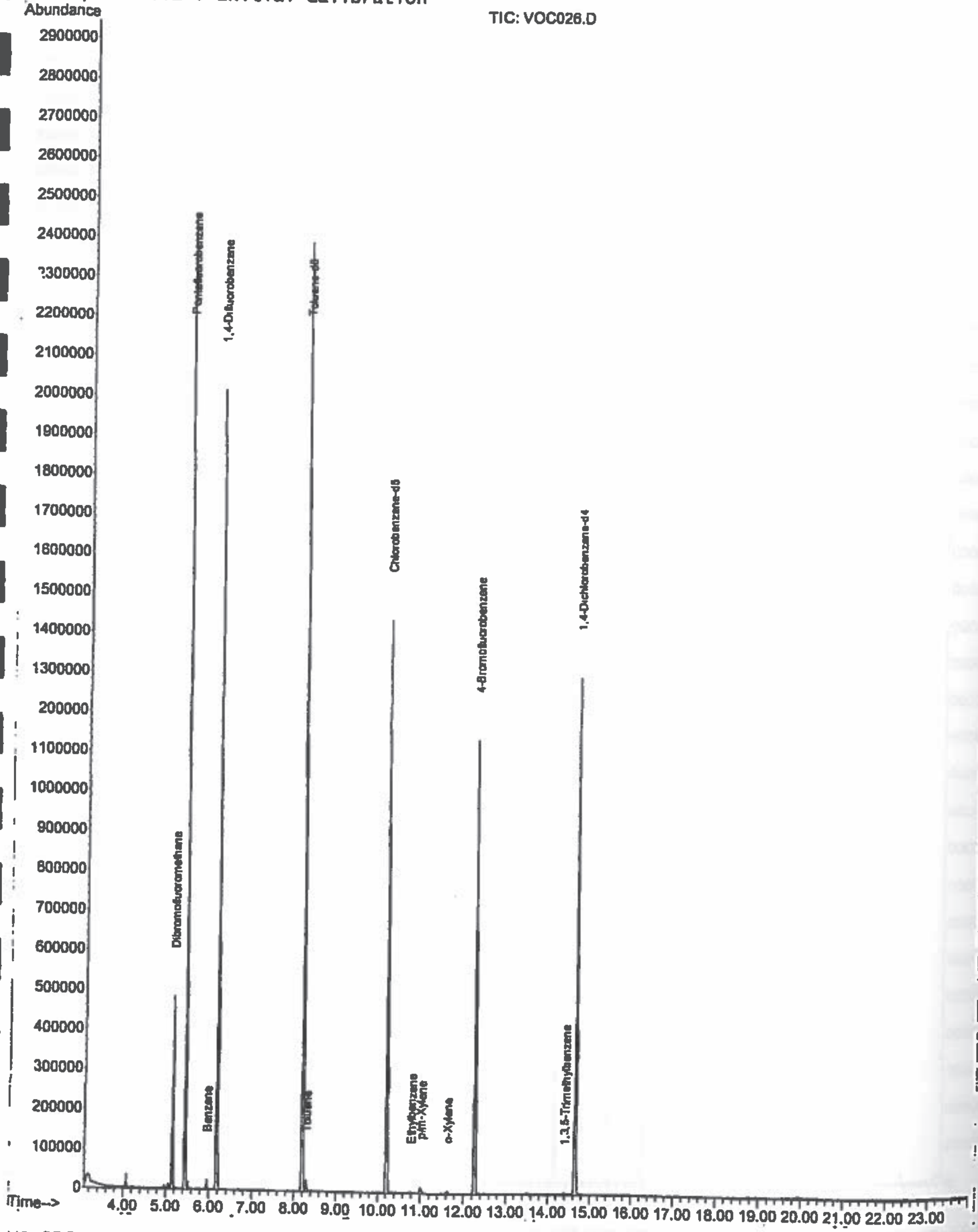


Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\060103\VOC026.D Vial: 26
Acq On : 7 Jan 2003 6:10 Operator: Mathilde
Sample : B02182-S0054 WS16 0.5-1.0m Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 2.00
Sample Amount: 0.00

MS Integration Params: EVENTS.E
Quant Time: Jan 8 9:50 2003 Quant Results File: HS_VOC1.RES

Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration



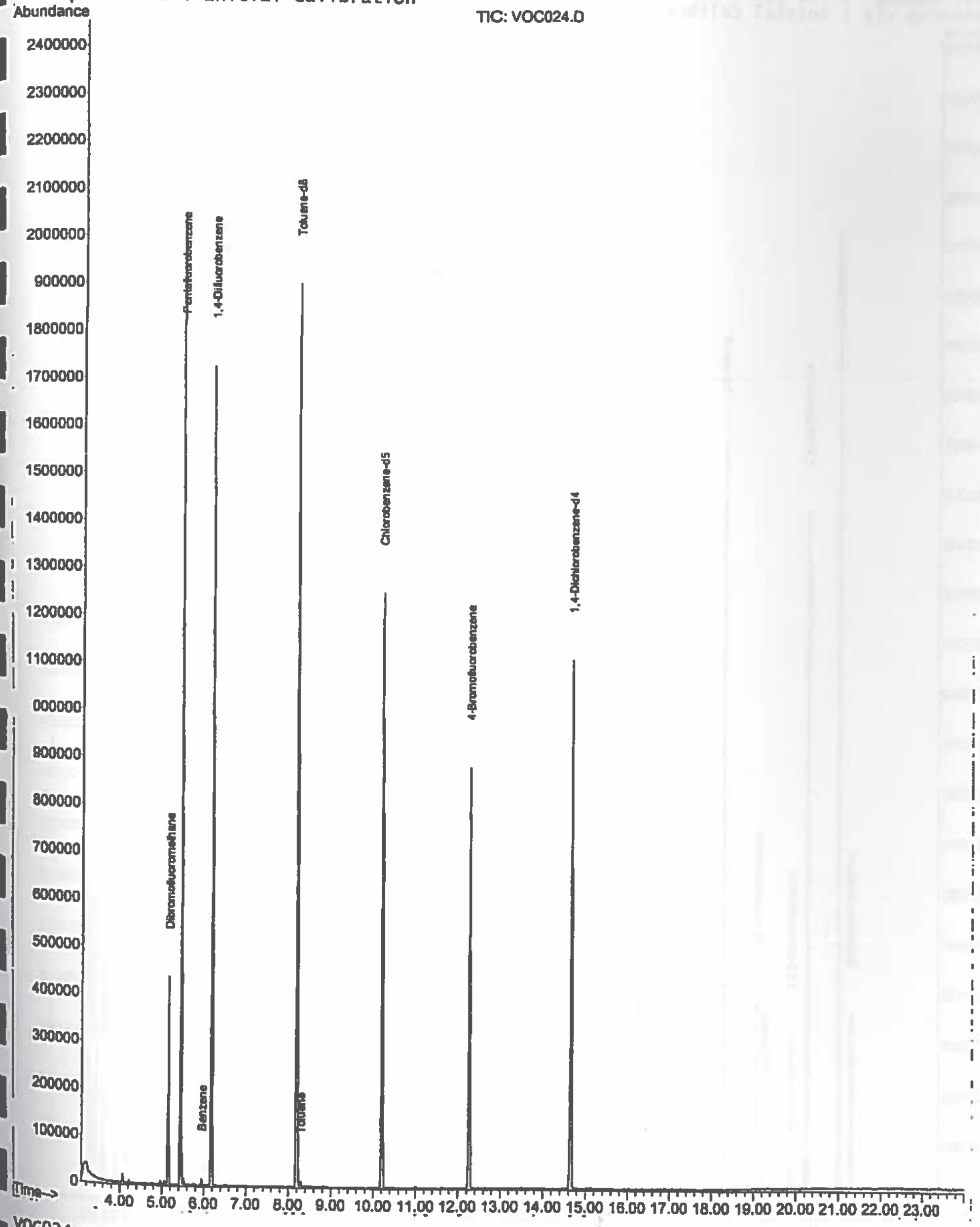
VOC026.D HS_VOC1.M Wed Jan 08 09:50:34 2003

Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\060103\VOC024.D Vial: 24
Acq On : 7 Jan 2003 4:59 Operator: Mathilde
Sample : B02182-S0057 WS8 1.5-2.0m Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 2.00
Sample Amount: 0.00

MS Integration Params: EVENTS.E
Quant Time: Jan 8 9:47 2003 Quant Results File: HS_VOC1.RES

Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration



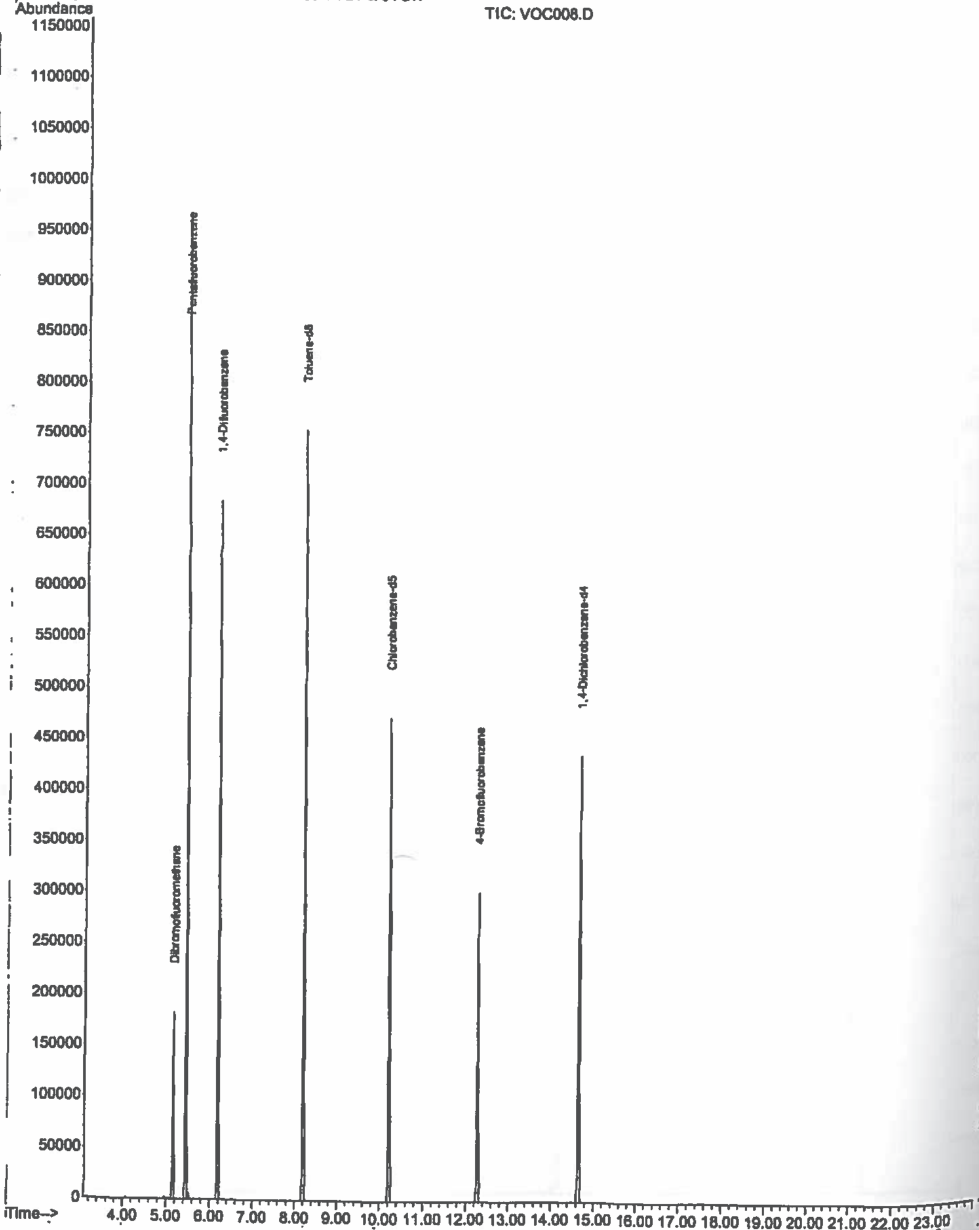
VOC024.D HS_VOC1.M Wed Jan 08 09:47:56 2003

Data File : C:\MSDCHEM\1\DATA\020103\VOC008.D
Acq On : 2 Jan 2003 19:37
Sample : Spiked Blank
Misc : Spiked Blank/Water

Vial: 8
Operator: Mathilde
Inst : Instrumen
Multiplr: 1.00
Sample Amount: 0.00

MS Integration Params: EVENTS.E
Quant Time: Jan 7 14:49 2003
Quant Results File: HS_VOC1.RES

Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration

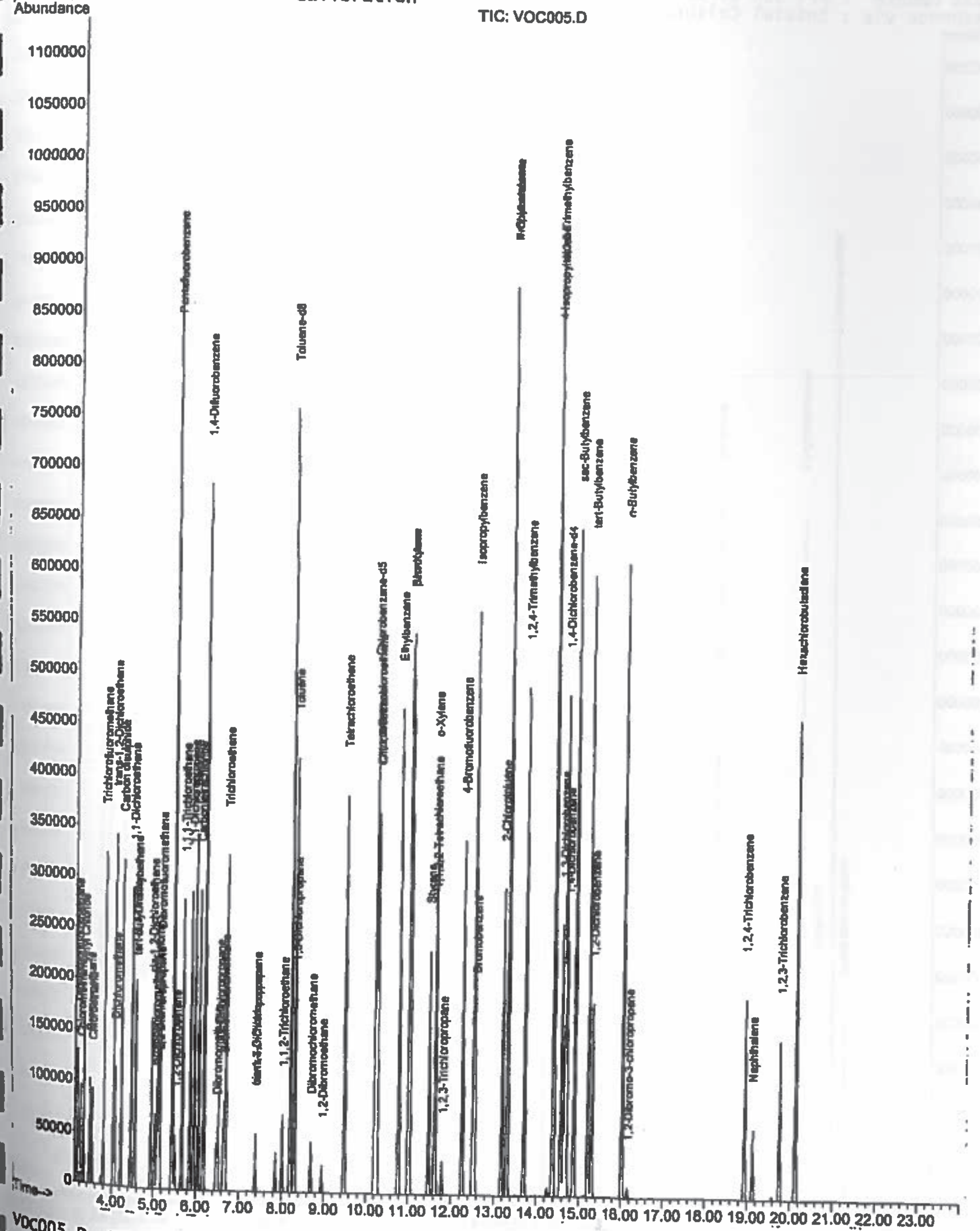


Data File : C:\MSDCHEM\1\DATA\020103\VOC005.D
Acq On : 2 Jan 2003 17:51
Sample : 500ppb VOC
Misc : Calibration Std/Water

Vial: 5
Operator: Mathilde
Inst : Instrumen
Multiplr: 1.00
Sample Amount: 0.00

MS Integration Params: EVENTS.E
Quant Time: Jan 7 14:47 2003
Quant Results File: HS_VOC1.RES

Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Tue Jan 07 14:45:55 2003
Response via : Initial Calibration

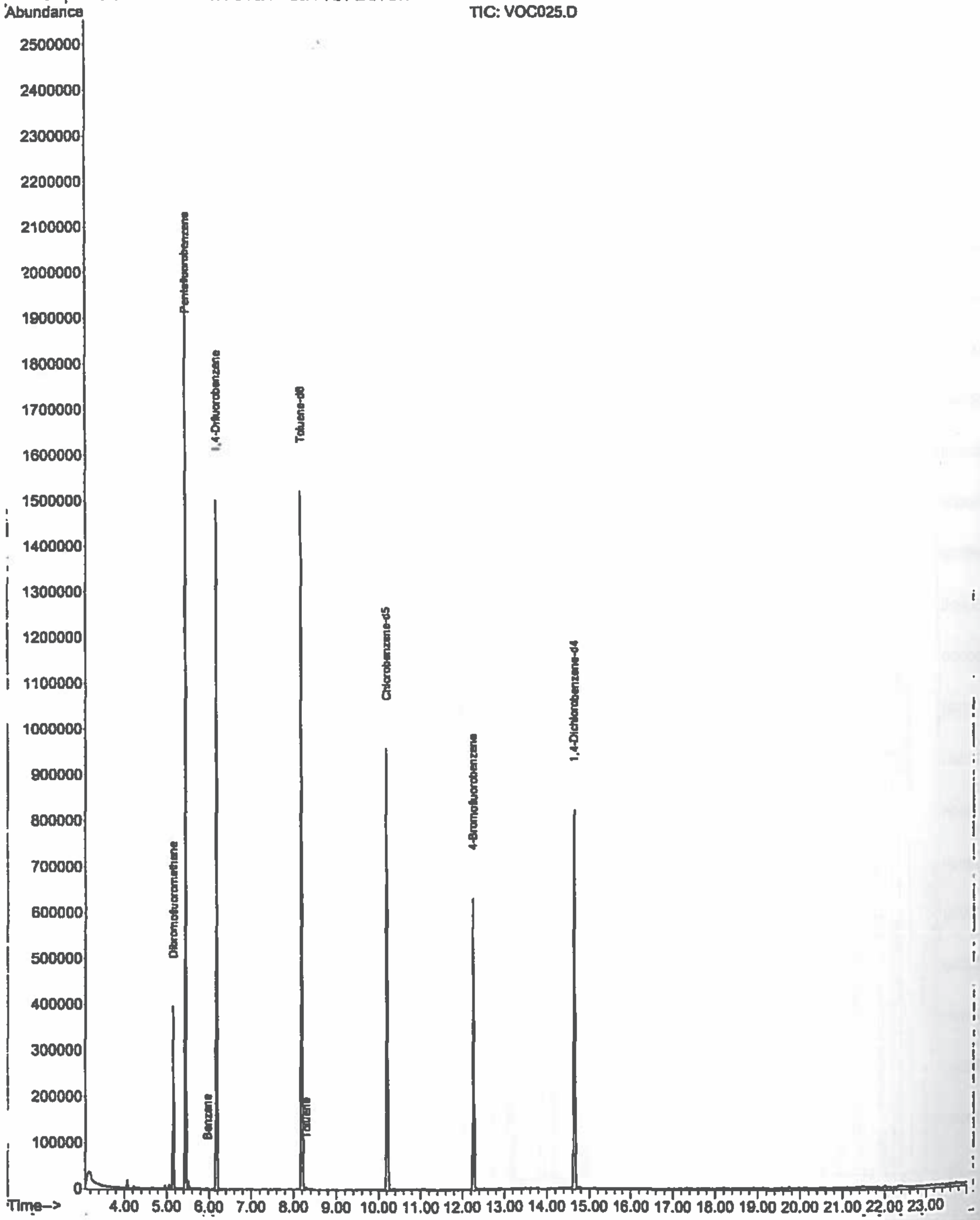


Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\060103\VOC025.D Vial: 25
Acq On : 7 Jan 2003 5:35 Operator: Mathilde
Sample : B02182-S0025 WS5 4.5-5.0m Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 2.00
Sample Amount: 0.00

MS Integration Params: EVENTS.E
Quant Time: Jan 8 9:48 2003 Quant Results File: HS_VOC1.RES

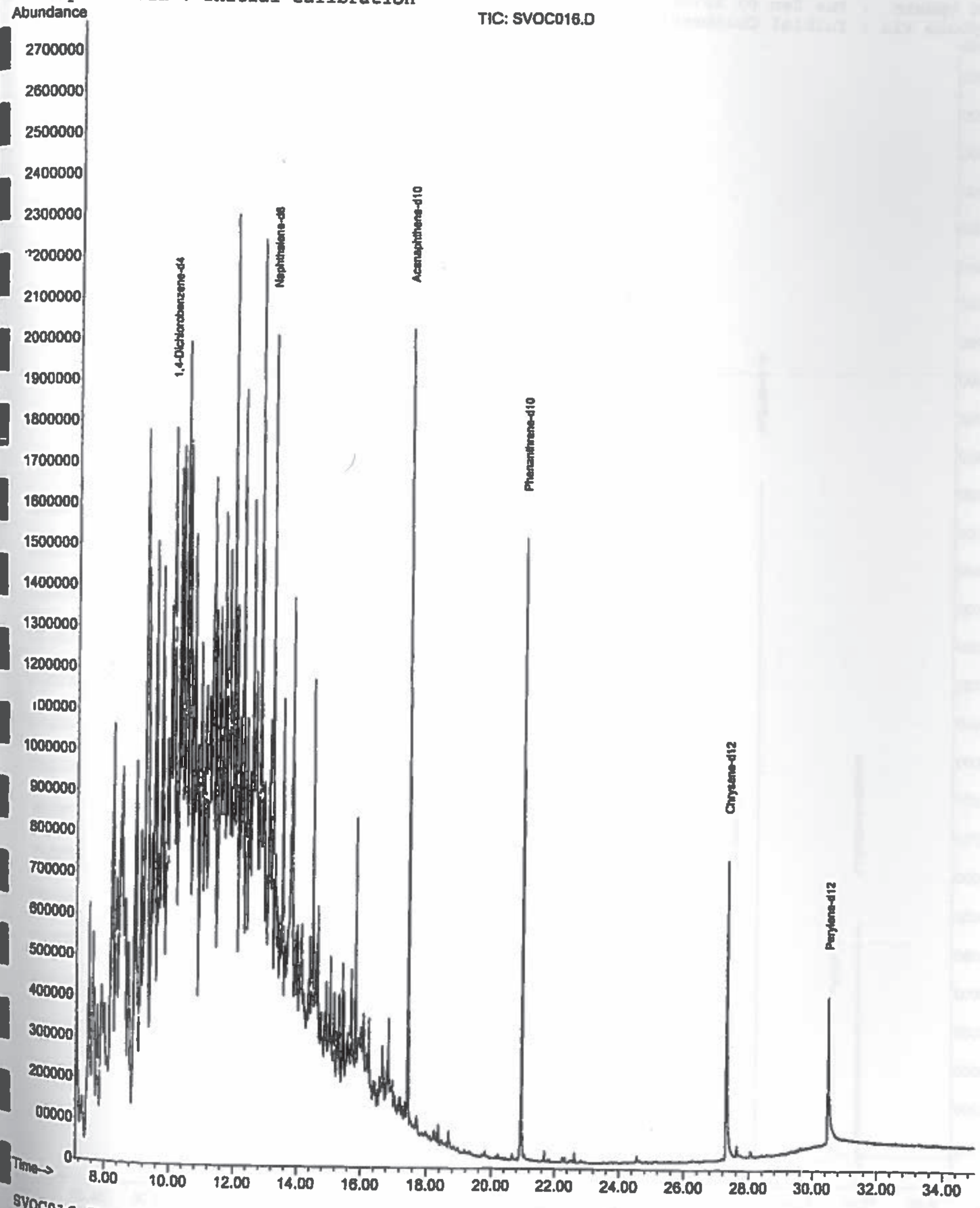
Method : C:\MSDCHEM\1\METHODS\HS_VOC1.M (Chemstation Integrator)
Title : Volatile Organic Compounds (EPA 624/8260)
Last Update : Fri Jan 10 13:09:19 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\0203\SVOC016.D Vial: 14
Acq On : 7 Jan 2003 1:26 Operator: Mathilde Ernoult
Sample : DUB-02 B02182 S0006 BH1 3.5 Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Water Multiplr: 0.01
Sample Amount: 0.00

MS Integration Params: autoint1.e
Quant Time: Jan 8 11:35 2003 Quant Results File: SVOC.RES

Method : C:\MSDCHEM\1\METHODS\SVOC.M (Chemstation Integrator)
Title : Semivolatiles
Last Update : Tue Jan 07 16:03:50 2003
Response via : Initial Calibration

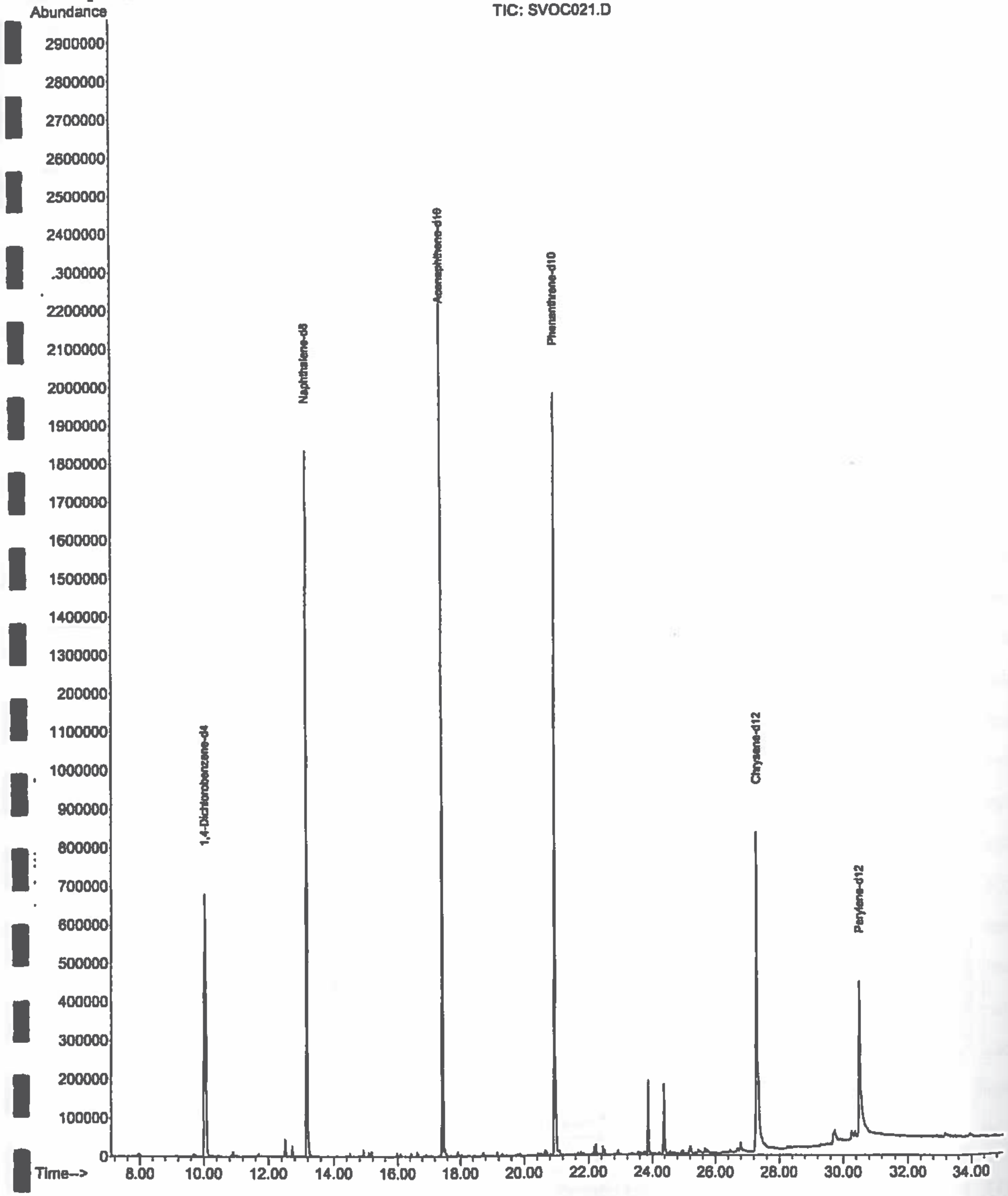


Quantitation Report (QT Reviewed)

Data File : C:\MSDCHEM\1\DATA\0203\SVOC021.D Vial: 19
Acq On : 7 Jan 2003 4:59 Operator: Mathilde Ernoult
Sample : DUB 02 B02182 S0007 WS1 0.5 Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.47
Sample Amount: 0.00

MS Integration Params: autoint1.e
Quant Time: Jan 8 11:38 2003 Quant Results File: SVOC.RES

Method : C:\MSDCHEM\1\METHODS\SVOC.M (Chemstation Integrator)
Title : Semivolatiles
Last Update : Tue Jan 07 16:03:50 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\0203\SVOC022.D Vial: 20
Acq On : 7 Jan 2003 5:42 Operator: Mathilde Ernoult
Sample : DUB 02 B02182 S0009 WS1 2.5 Inst : Instrumen
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Sample Amount: 0.00

MS Integration Params: autoint1.e
Quant Time: Jan 8 11:38 2003 Quant Results File: SVOC.RES

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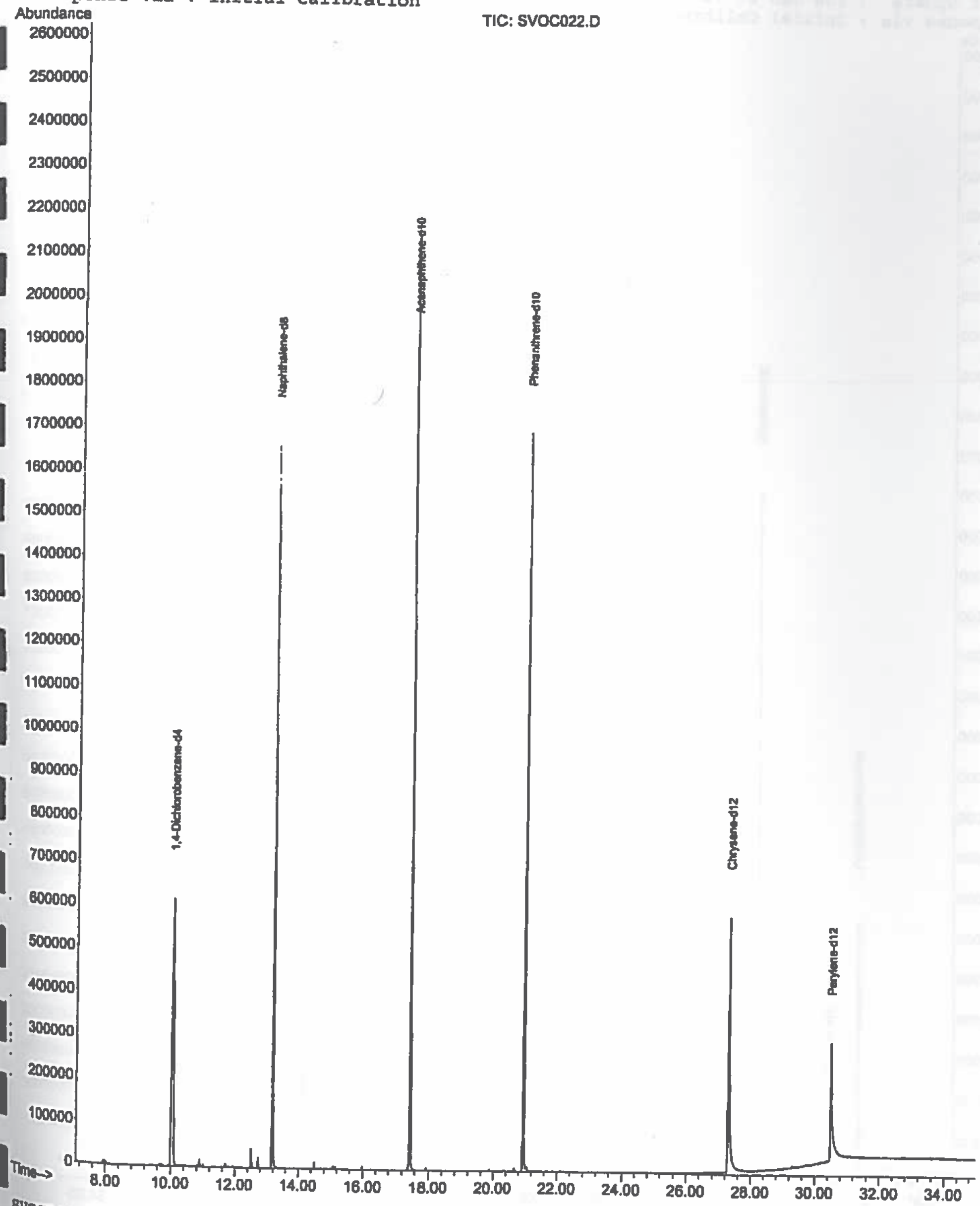

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Acq On : 7 Jan 2003 6:25
Sample : DUB-02-B02182 S0010 WS1 3.5
Misc : Irish Geotechnical Services Ltd/Soil

Vial: 21
Operator: Mathilde Ernoult
Inst : Instrumen
Multiplr: 1.41
Sample Amount: 0.00

MS Integration Params: autoint1.e
Quant Time: Jan 8 11:39 2003
Quant Results File: SVOC.RES

Method : C:\MSDCHEM\1\METHODS\SVOC.M (Chemstation Integrator)
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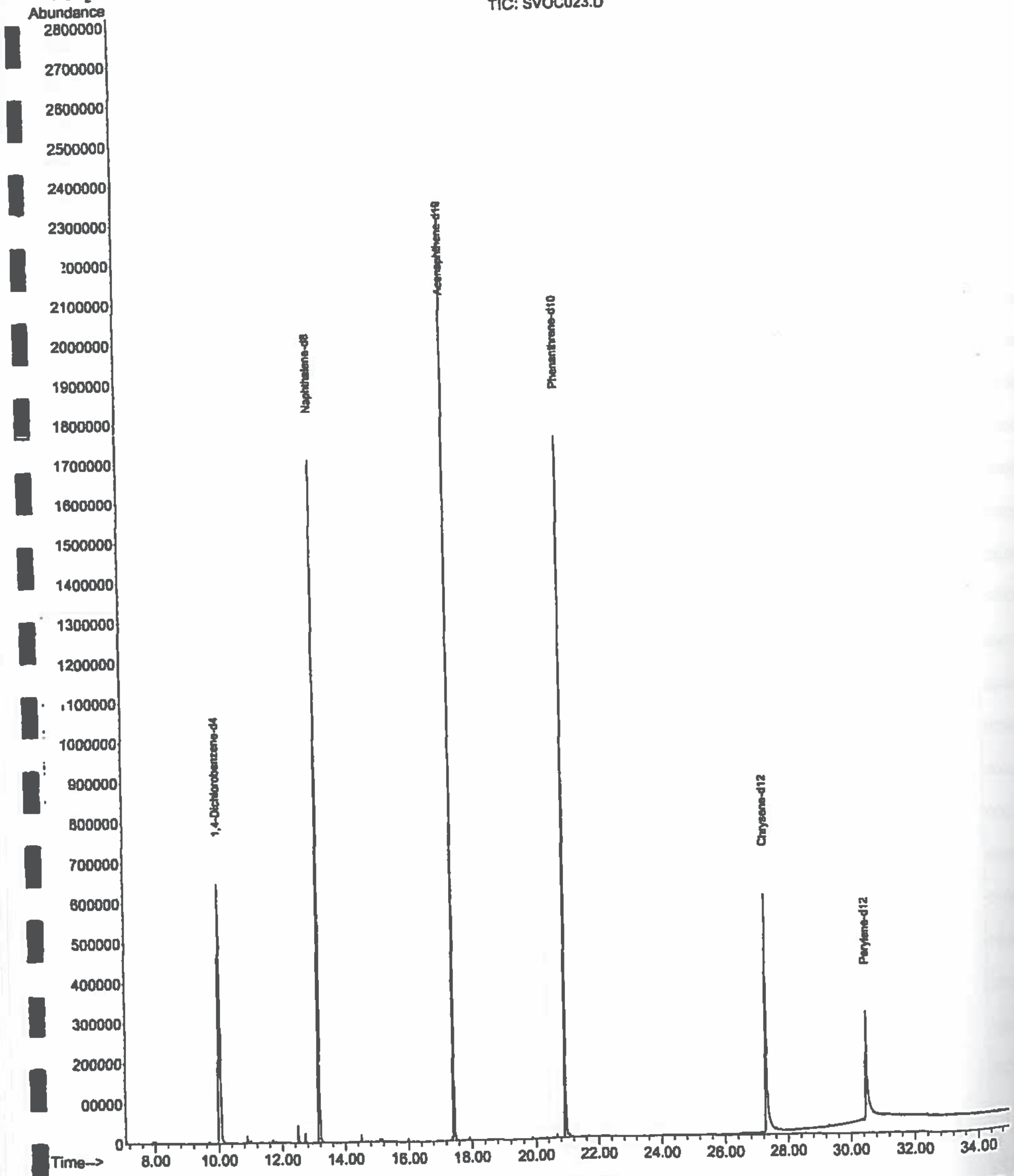
Last Update : Tue Jan 07 16:03:50 2003
Response via : Initial Calibration



SVOC023.D SVOC.M Wed Jan 08 11:39:28 2003

Data File : C:\MSDCHEM\1\DATA\0203\SVOC024.D
Acq On : 7 Jan 2003 7:07
Sample : DUB 02 B02182 S0011 WS2 0.5 1.0
Misc : Irish Geotechnical Services Ltd/Soil

Vial: 22
Operator: Mathilde Ernoult
Inst : Instrumen
Multiplr: 1.58
Sample Amount: 0.00

MS Integration Params: autoint1.e
Quant Time: Jan 8 11:40 2003
Quant Results File: SVOC.RES

Method : C:\MSDCHEM\1\METHODS\SVOC.M (Chemstation Integrator)
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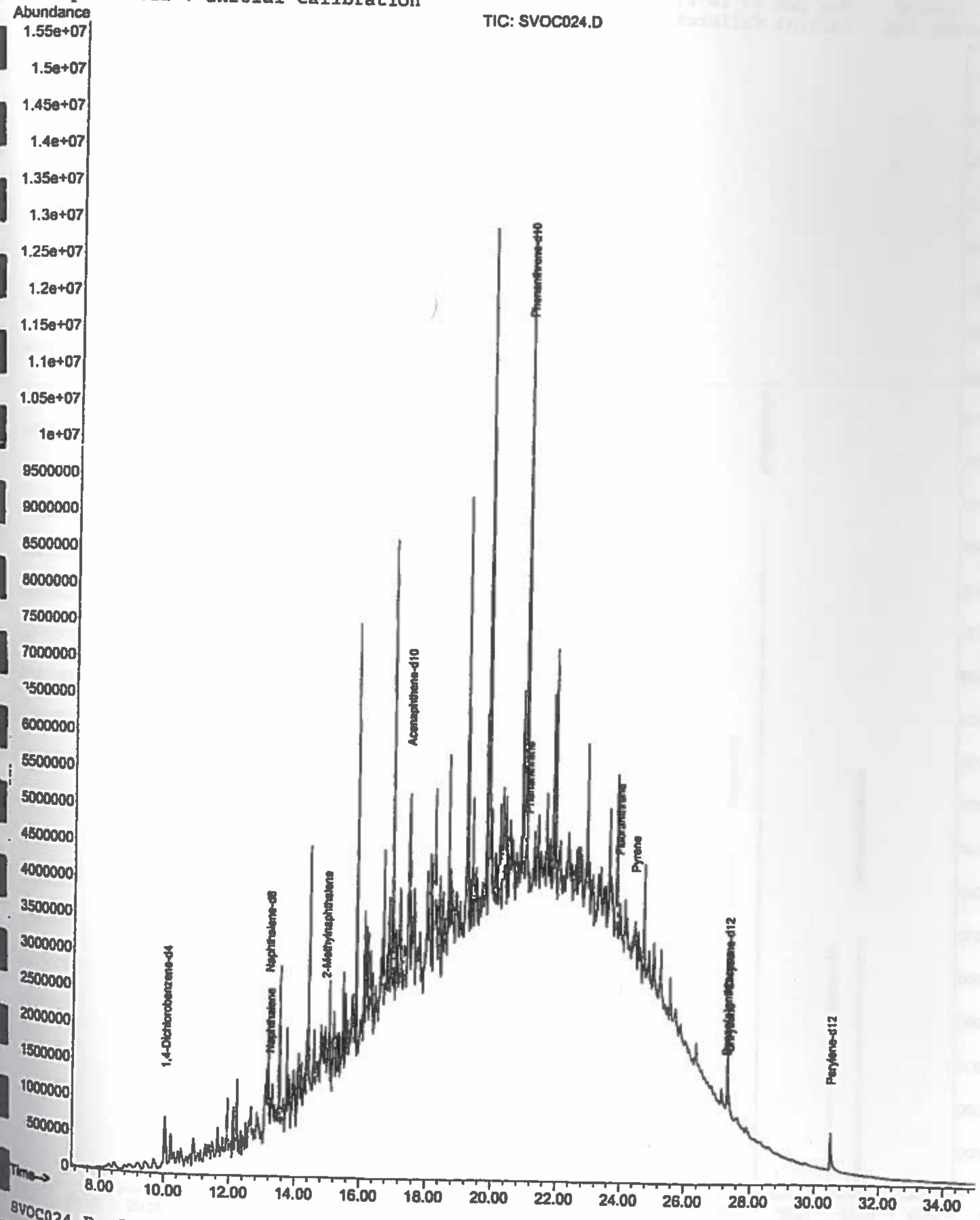
Last Update : Tue Jan 07 16:03:50 2003
Response via : Initial Calibration



SVOC024.D SVOC.M Wed Jan 08 11:41:03 2003

Data File : C:\MSDCHEM\1\DATA\0203\SVOC025.D Vial: 23
Acq On : 7 Jan 2003 7:50 Operator: Mathilde Ernoult
Sample : DUB 02 B02182-S0013 WS2 0.5-1.0 Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.47
Sample Amount: 0.00

MS Integration Params: autoint1.e
Quant Time: Jan 8 11:41 2003 Quant Results File: SVOC.RES

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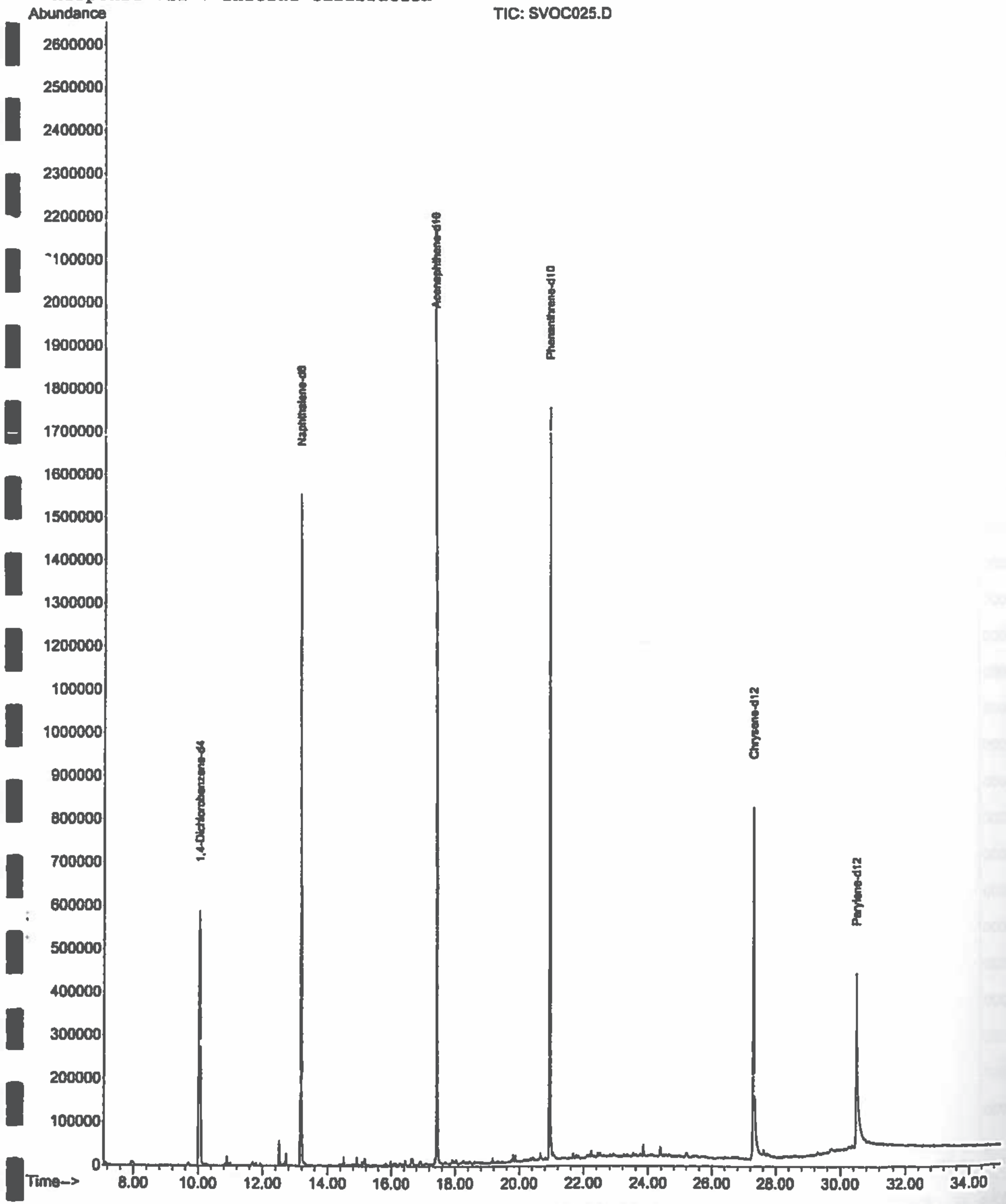
Response via : Initial Calibration



SVOC025.D SVOC.M Wed Jan 08 11:41:46 2003 Page 3

Data File : C:\MSDCHEM\1\DATA\0203\SVOC026.D Vial: 24
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Sample : DUB 02 B02182-S0015 WS2 4.0 Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.68
Sample Amount: 0.00

MS Integration Params: autoint1.e
Quant Time: Jan 8 11:42 2003 Quant Results File: SVOC.RES

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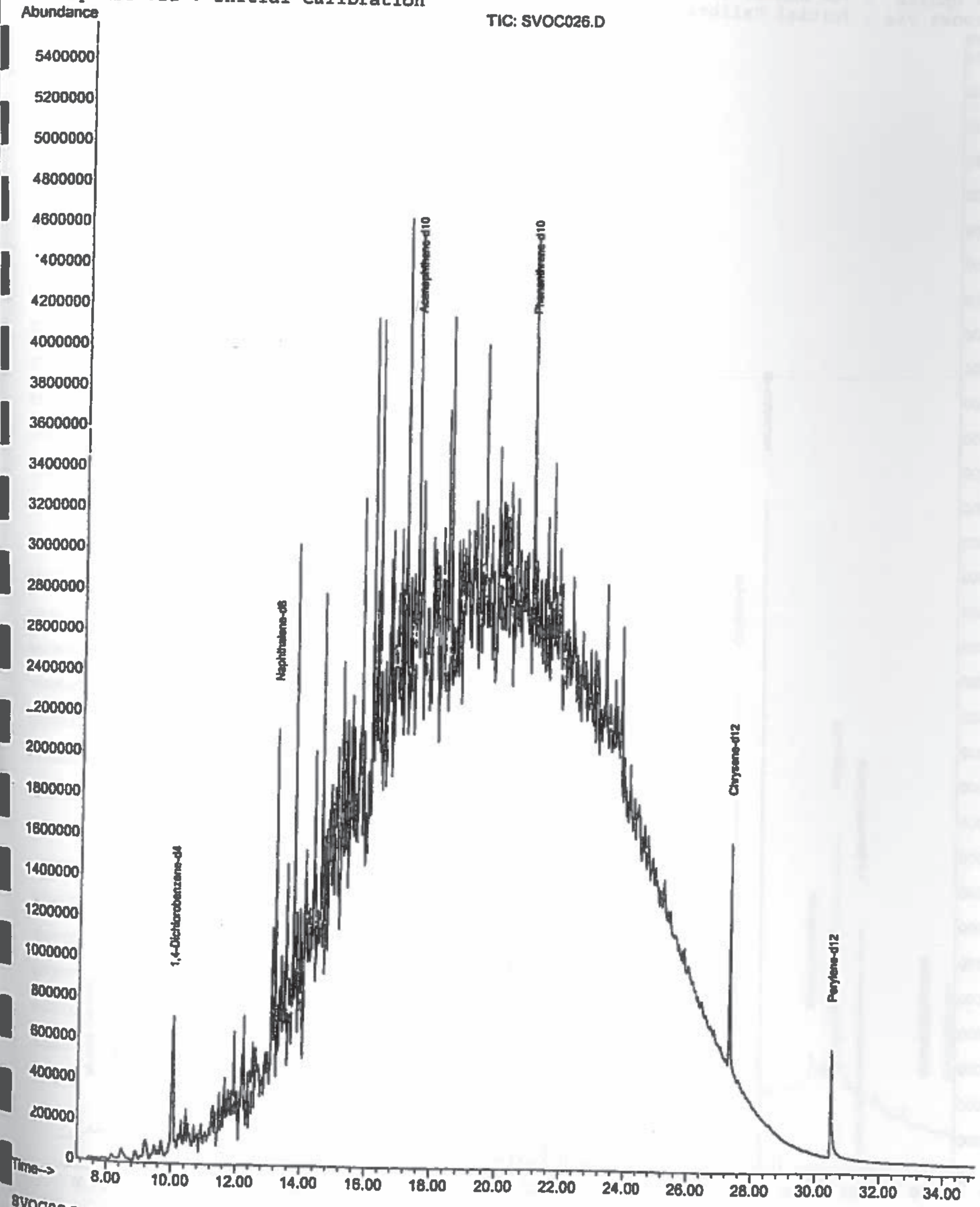

SVOC026.D SVOC.M Wed Jan 08 11:42:42 2003 Page 3

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Sample    : DUB 02 B02182 S0016 WS3 0.5             Inst     : Instrumen
Misc      : Irish Geotechnical Services Ltd/Soil    Multiplr: 1.63
                                                Sample Amount: 0.00
MS Integration Params: autoint1.e
Quant Time: Jan  8 11:43 2003               Quant Results File: SVOC.RES

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Response via   : Initial Calibration
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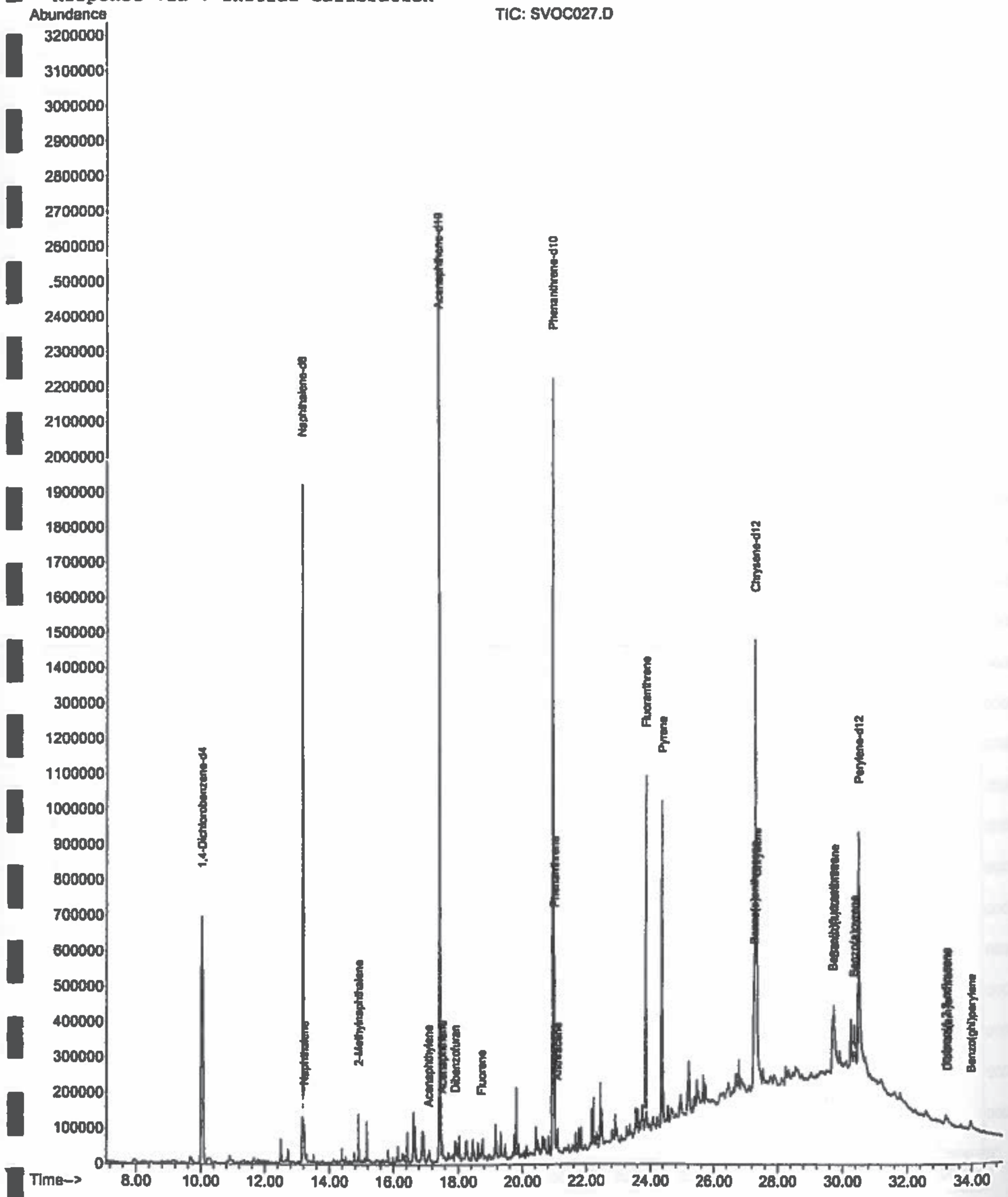

SVOC027.D SVOC.M Wed Jan 08 11:43:49 2003 Page 3

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Data File : C:\MSDCHEM\1\DATA\0203\SVOC028.D            Vial: 26
Acq On    :  7 Jan 2003   9:59                      Operator: Mathilde Ernoult
Sample    : DUB-02-B02182-S0019 WS4 1.5-2.0         Inst     : Instrumen
Misc      : Irish Geotechnical Services Ltd/Soil    Multiplr: 1.66
                                                Sample Amount: 0.00
MS Integration Params: autoint1.e
Quant Time: Jan  8 11:45 2003               Quant Results File: SVOC.RES

Method         : C:\MSDCHEM\1\METHODS\SVOC.M (Chemstation Integrator)
Title          : Semivolatiles
Last Update    : Tue Jan 07 16:03:50 2003
Response via   : Initial Calibration
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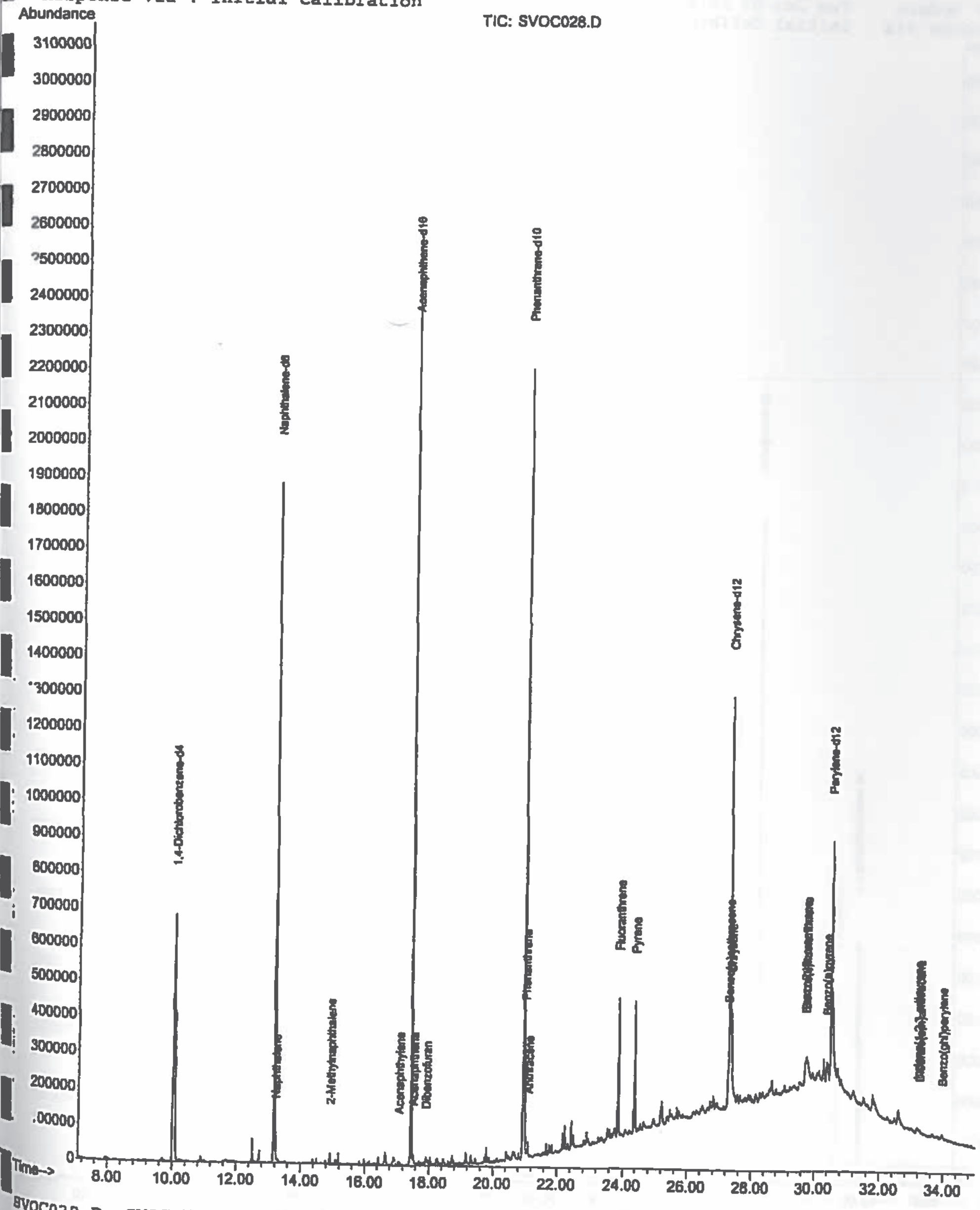

SVOC028.D SVOC.M Wed Jan 08 11:45:12 2003 Page 3

Data File : C:\MSDCHEM\1\DATA\0203\SVOC029.D   Vial: 27
Acq On : 7 Jan 2003 10:41   Operator: Mathilde Ernoult
Sample : DUB 02 B02182-S0023 WS5 2.0   Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil   Multiplr: 1.51
Sample Amount: 0.00

MS Integration Params: autoint1.e
Quant Time: Jan 8 11:45 2003   Quant Results File: SVOC.RES

Method : C:\MSDCHEM\1\METHODS\SVOC.M (Chemstation Integrator)
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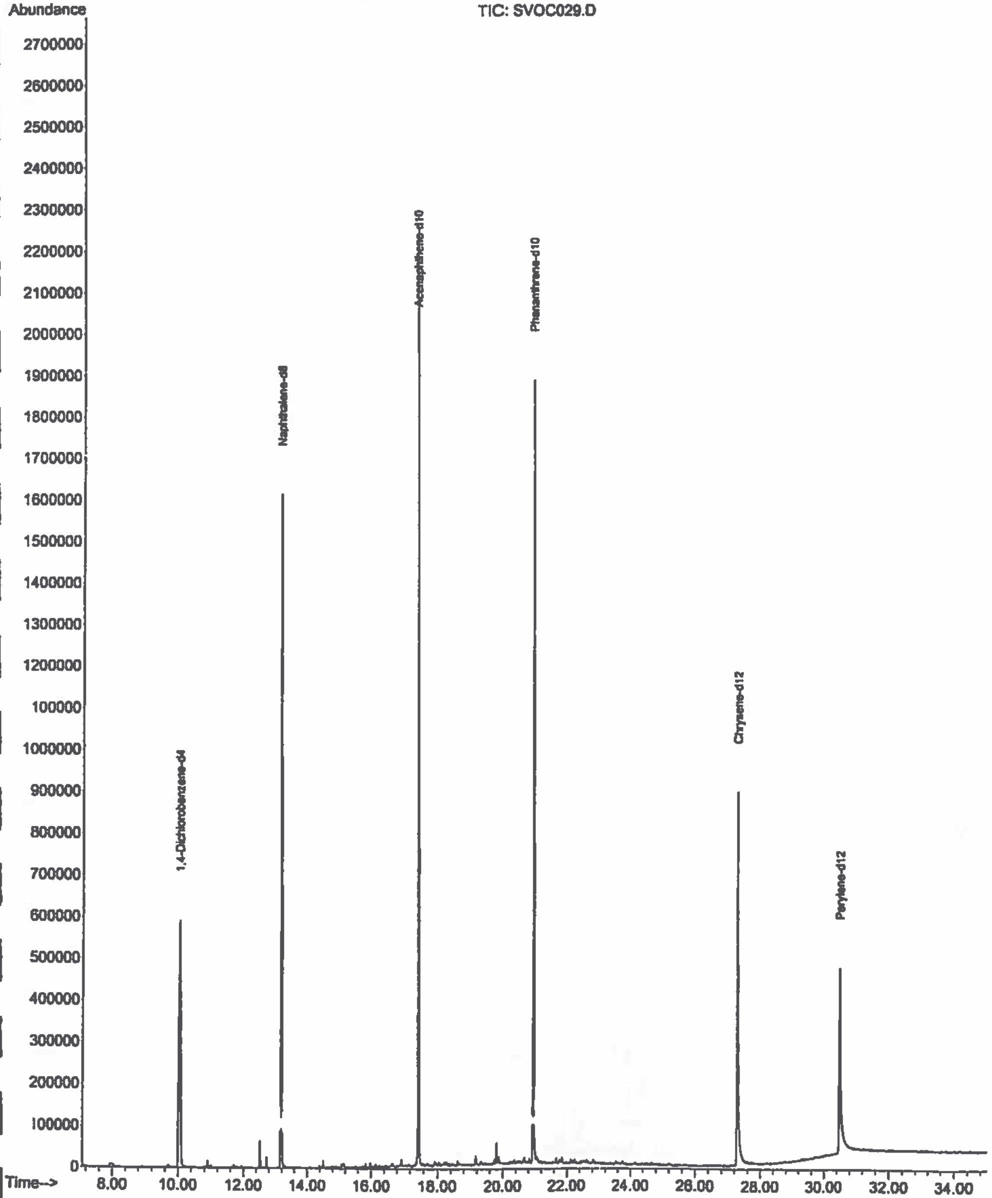
Last Update : Tue Jan 07 16:03:50 2003
Response via : Initial Calibration



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Misc : Irish Geotechnical Services Ltd/Soil   Multiplr: 1.52
Sample Amount: 0.00

MS Integration Params: autoint1.e
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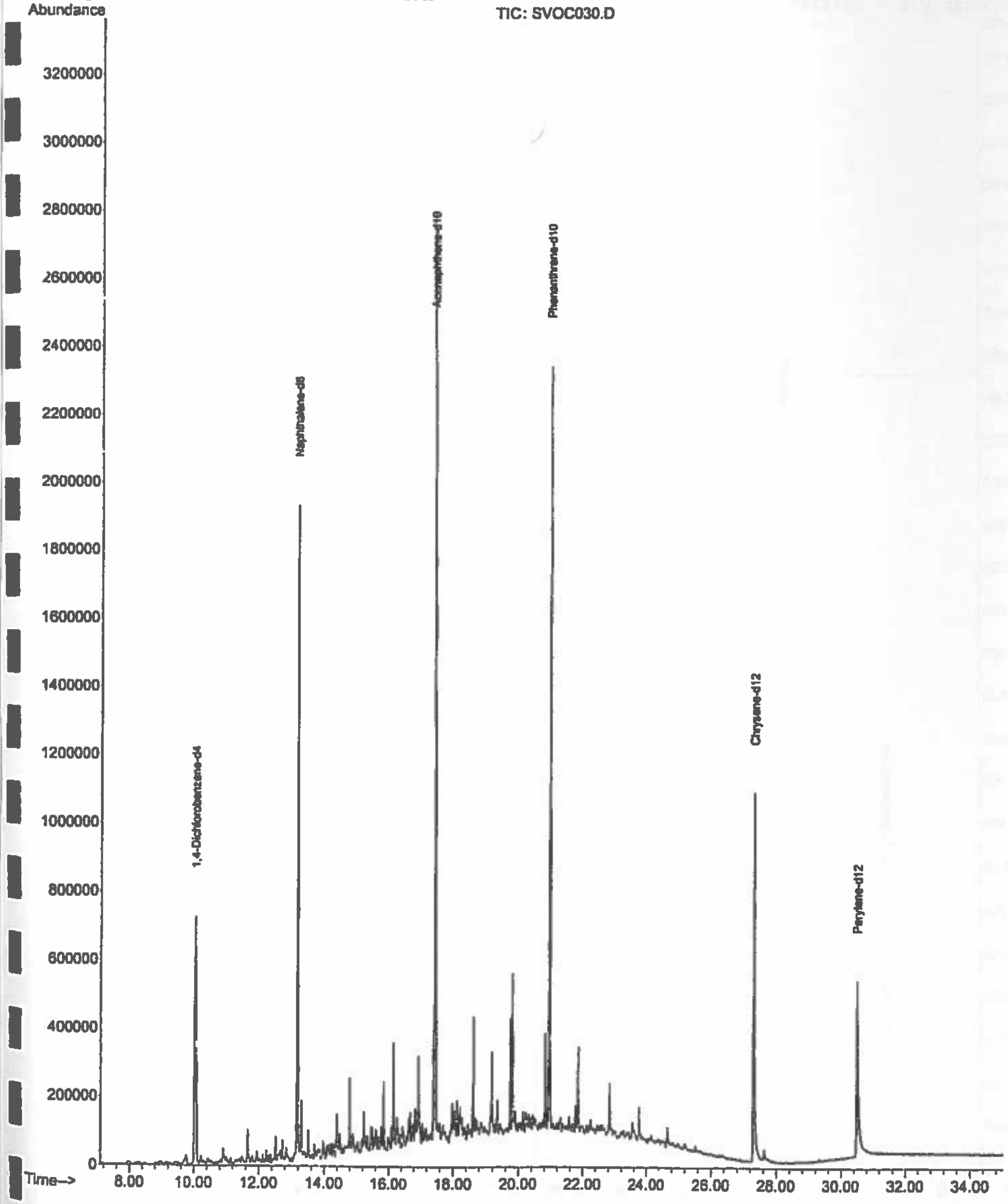

Data File : C:\MSDCHEM\1\DATA\0203\SVOC031.D Vial: 29
Acq On : 7 Jan 2003 12:07 Operator: Mathilde Ernoult
Sample : DUB-02-B02182 S0028 WS7 1.0 1.5 Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.47
Sample Amount: 0.00

MS Integration Params: autoint1.e
Quant Time: Jan 8 11:47 2003 Quant Results File: SVOC.RES

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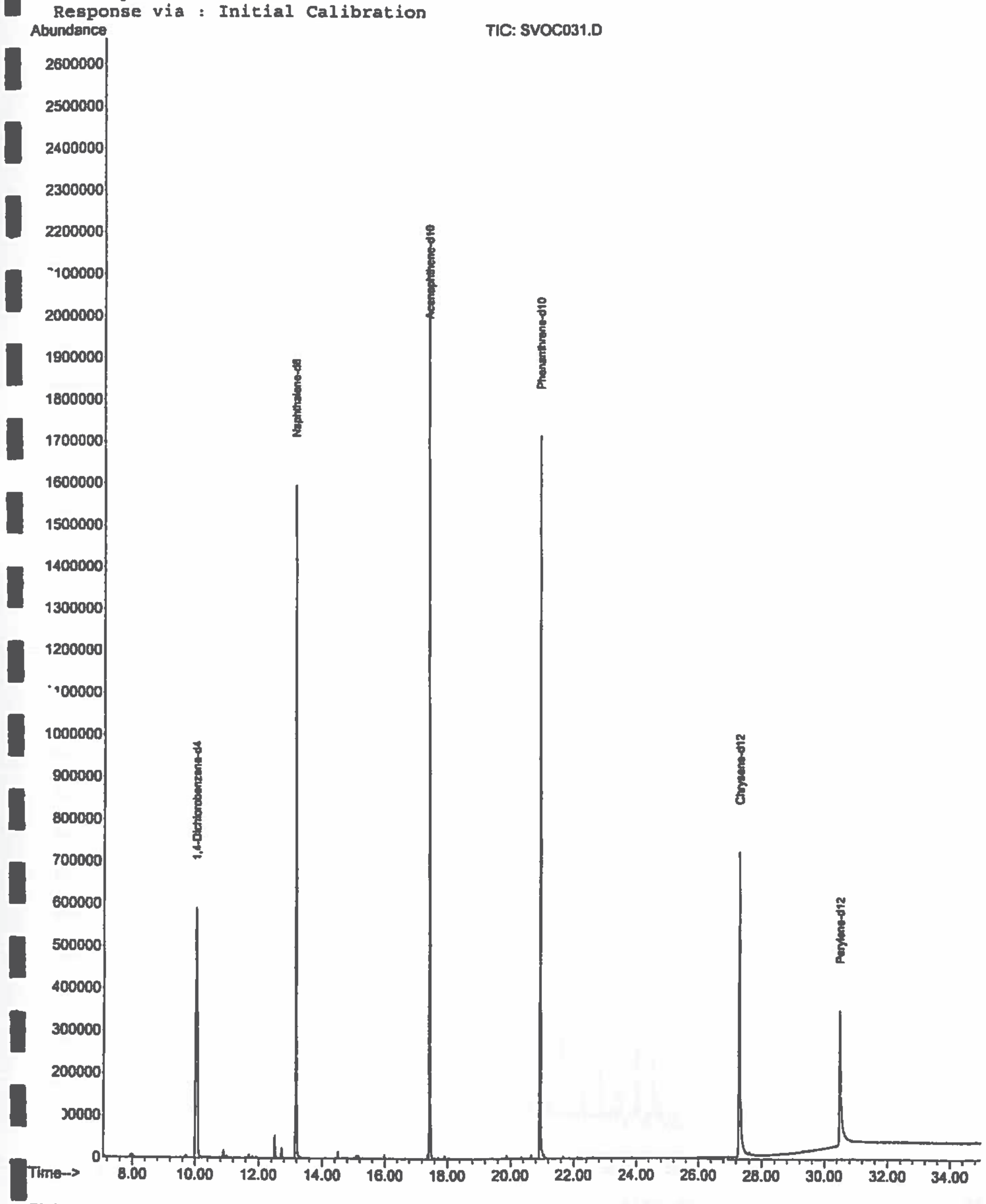
Response via : Initial Calibration



SVOC031.D SVOC.M Wed Jan 08 11:47:10 2003 Page 3

Data File : C:\MSDCHEM\1\DATA\0203\SVOC032.D Vial: 30
Acq On : 7 Jan 2003 12:50 Operator: Mathilde Ernoult
Sample : DUB 02 B02182 S0032 WS10 0.5 1.0 Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.49
Sample Amount: 0.00

MS Integration Params: autoint1.e
Quant Time: Jan 8 11:47 2003 Quant Results File: SVOC.RES

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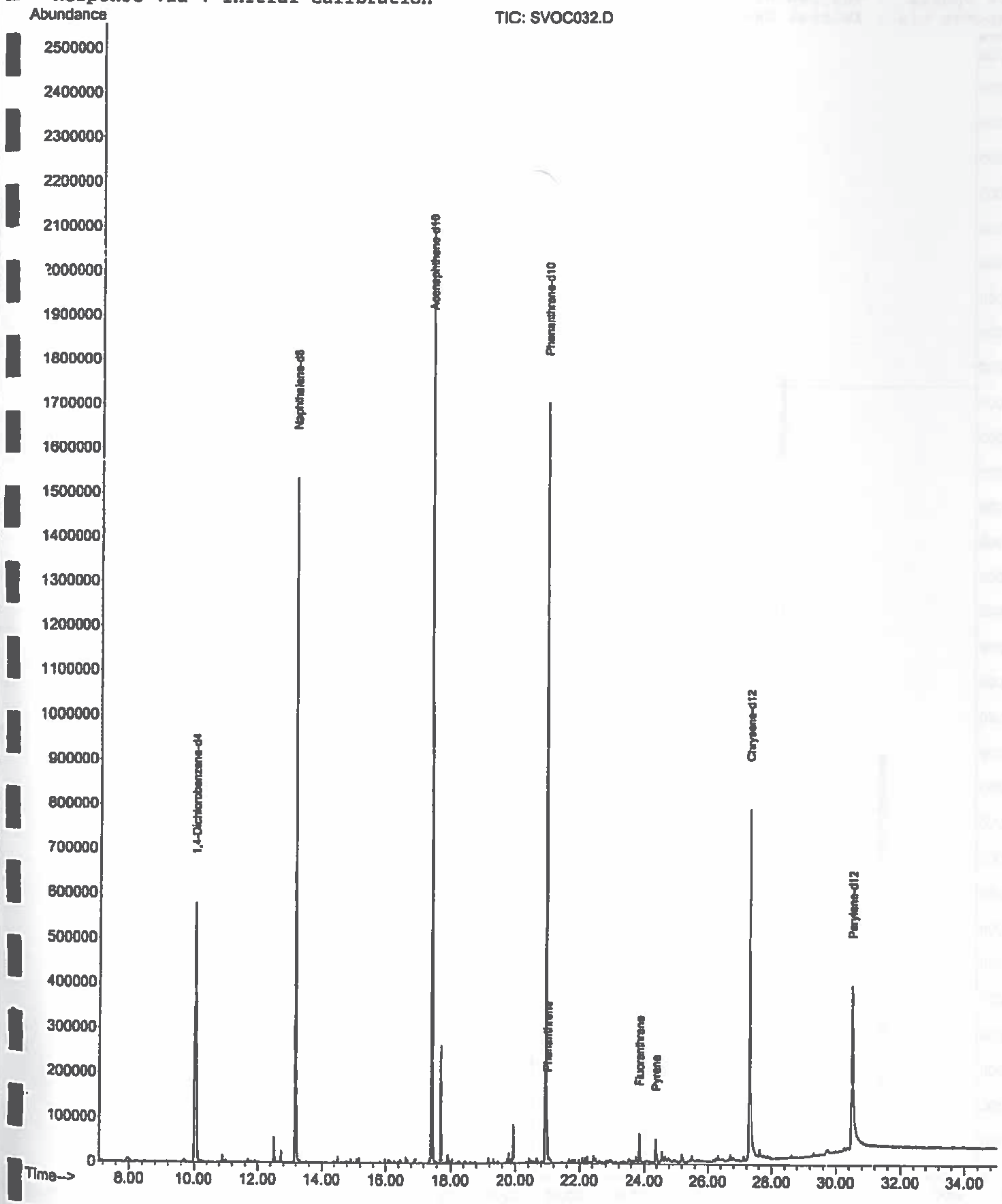
Last Update : Tue Jan 07 16:03:50 2003
Response via : Initial Calibration



SVOC032.D SVOC.M Wed Jan 08 11:48:01 2003 Page 3

Data File : C:\MSDCHEM\1\DATA\0203\SVOC033.D Vial: 31
Acq On : 7 Jan 2003 13:33 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0038 WS11 3.5-4.0 Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.84
Sample Amount: 0.00

MS Integration Params: autoint1.e
Quant Time: Jan 8 11:53 2003 Quant Results File: SVOC.RES

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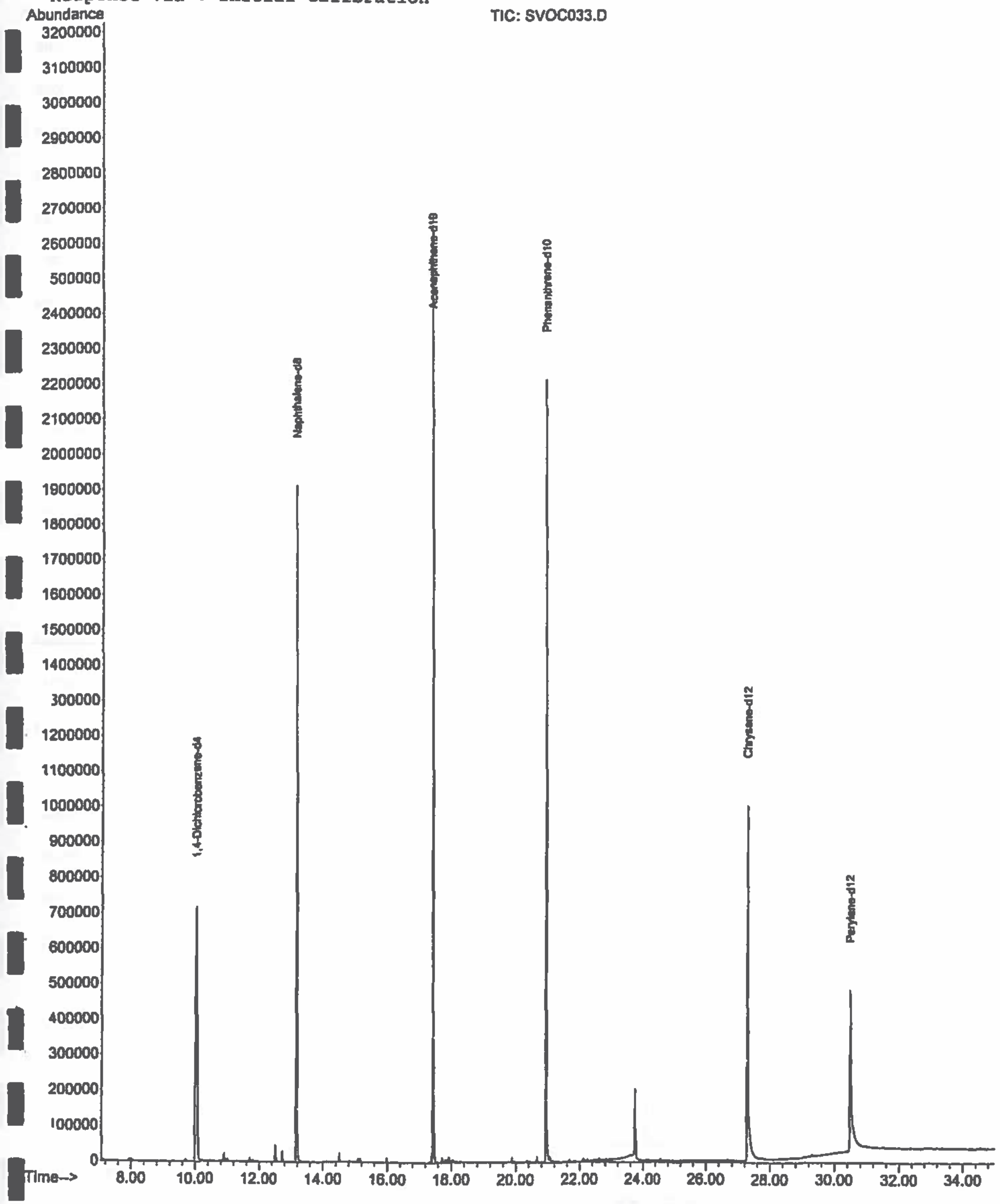

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Sample : DUB-02-B02182-S0044 WS13 0.5-1.0 Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.50
Sample Amount: 0.00

MS Integration Params: autoint1.e
Quant Time: Jan 8 11:54 2003 Quant Results File: SVOC.RES

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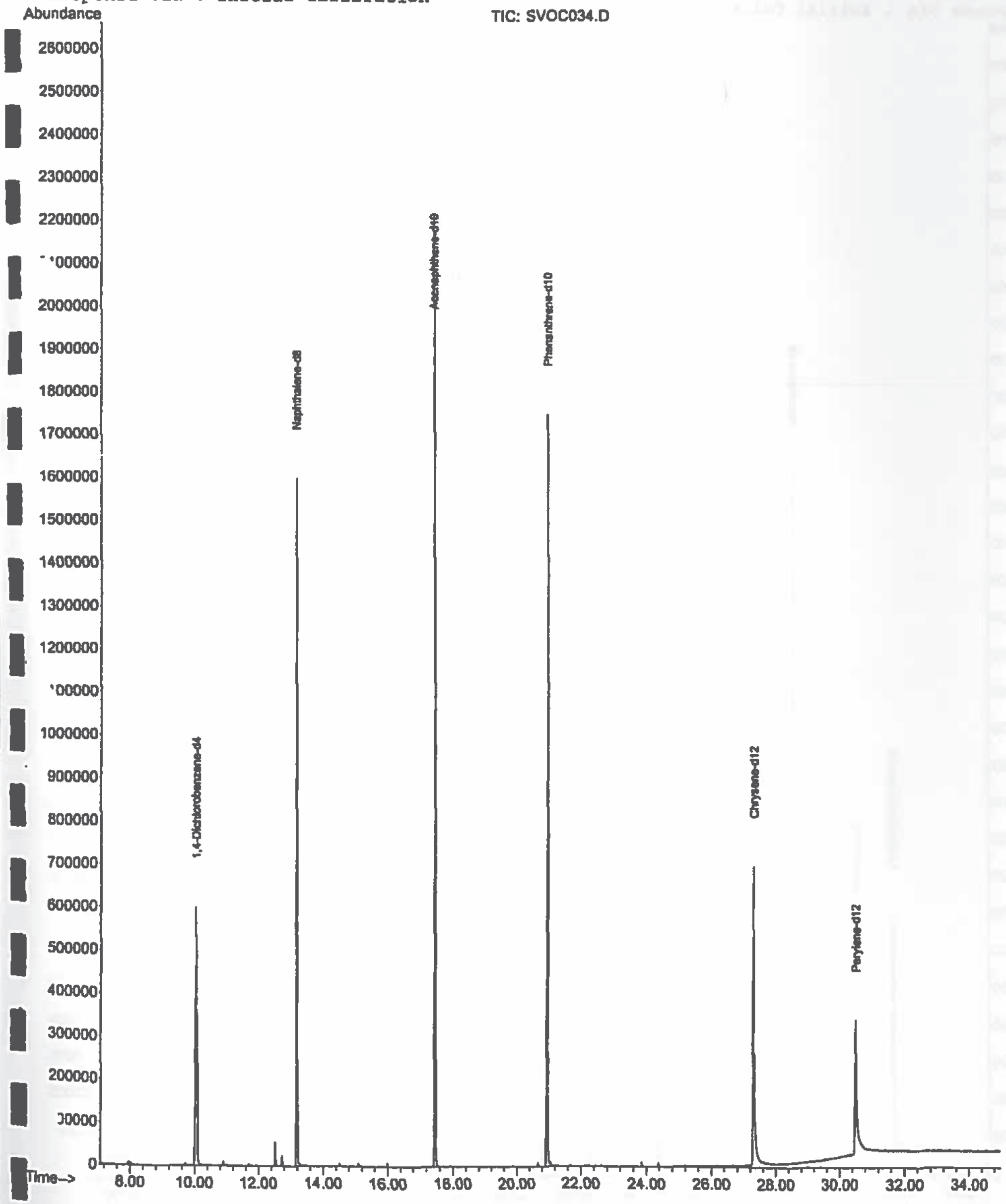
Last Update : Tue Jan 07 16:03:50 2003
Response via : Initial Calibration



Data File : C:\MSDCHEM\1\DATA\0203\SVOC035.D Vial: 33
Acq On : 7 Jan 2003 14:59 Operator: Mathilde Ernoult
Sample : DUB-02-B02182-S0049 WS14 0.5-1.0 Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.49
Sample Amount: 0.00
MS Integration Params: autoint1.e
Quant Time: Jan 8 11:55 2003 Quant Results File: SVOC.RES

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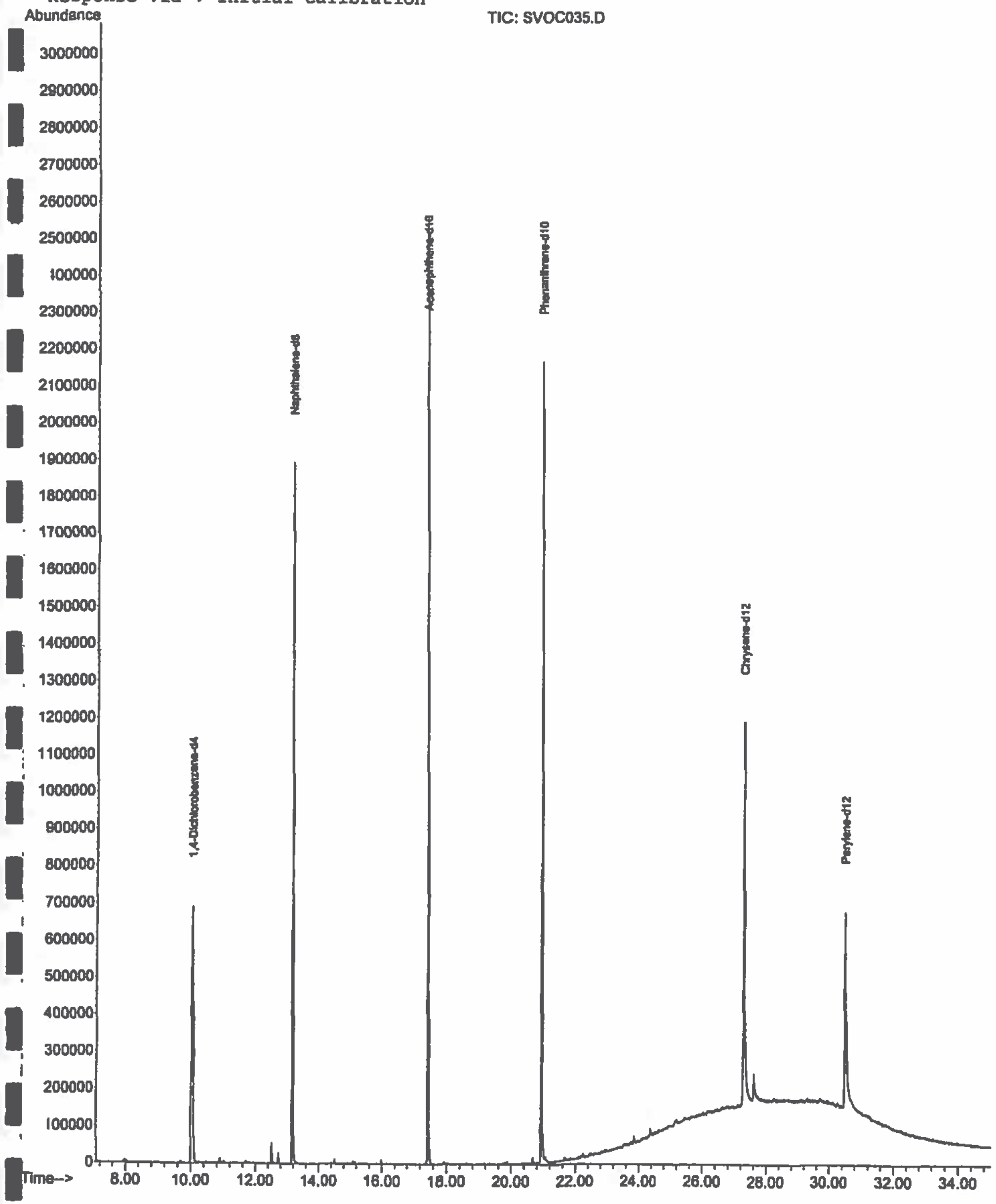
Last Update : Tue Jan 07 16:03:50 2003
Response via : Initial Calibration



SVOC035.D SVOC.M Wed Jan 08 11:55:16 2003

Data File : C:\MSDCHEM\1\DATA\0203\SVOC036.D Vial: 34
Acq On : 7 Jan 2003 15:42 Operator: Mathilde Ernoult
Sample : DUB 02 B02182 S0051WS15 0.5 1.0 Inst : Instrumen
Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.57
Sample Amount: 0.00
MS Integration Params: autoint1.e
Quant Time: Jan 8 11:56 2003 Quant Results File: SVOC.RES

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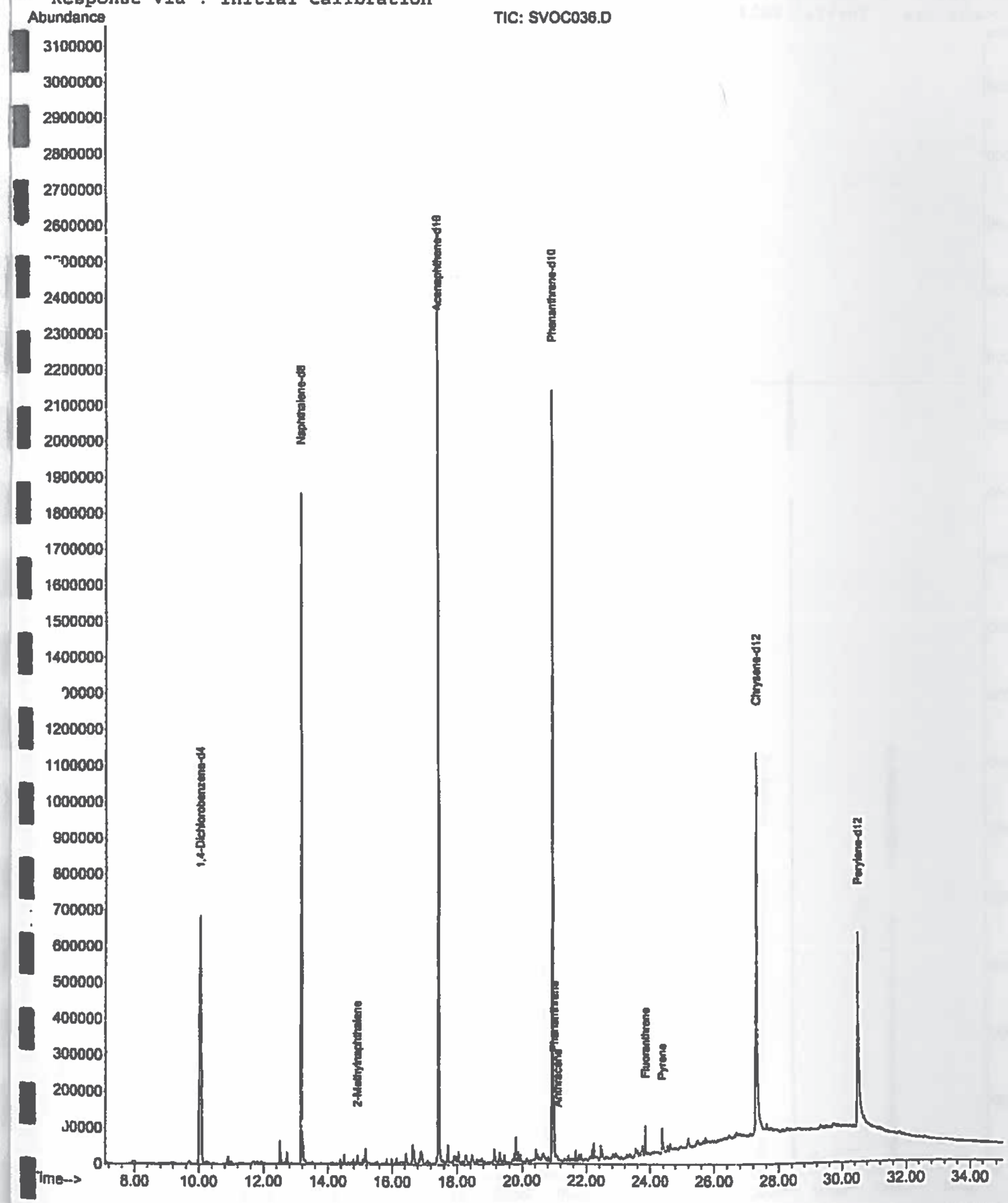
Response via : Initial Calibration



SVOC036.D SVOC.M Wed Jan 08 11:56:13 2003

Data File : C:\MSDCHEM\1\DATA\0203\SVOC037.D Vial: 35
Acq On : 7 Jan 2003 16:25 Operator: Mathilde Ernoult
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Misc : Irish Geotechnical Services Ltd/Soil Multiplr: 1.54
Sample Amount: 0.00
MS Integration Params: autoint1.e
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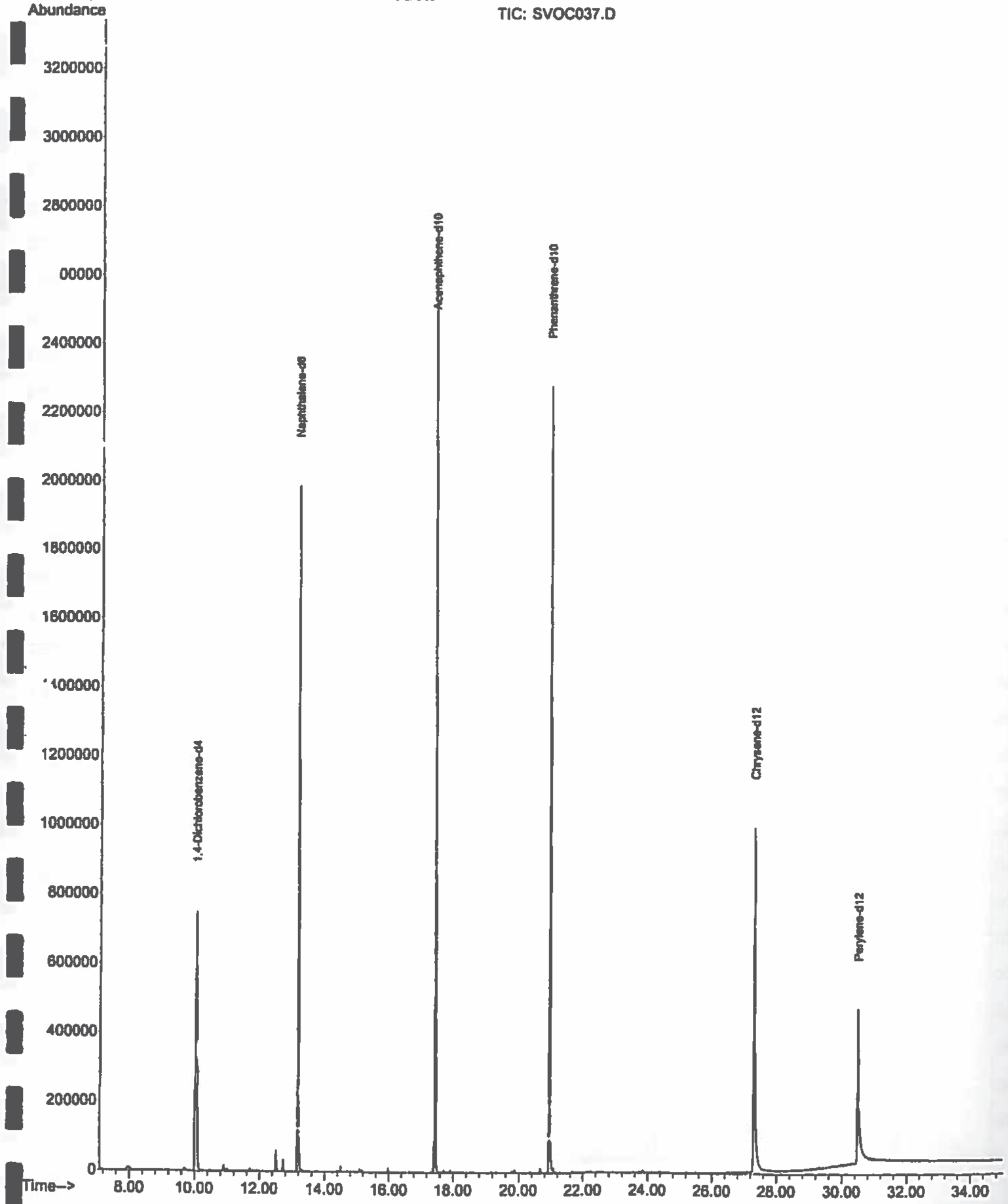
Last Update : Tue Jan 07 16:03:50 2003
Response via : Initial Calibration



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Acq On : 7 Jan 2003 2:51 Operator: Mathilde Ernoult
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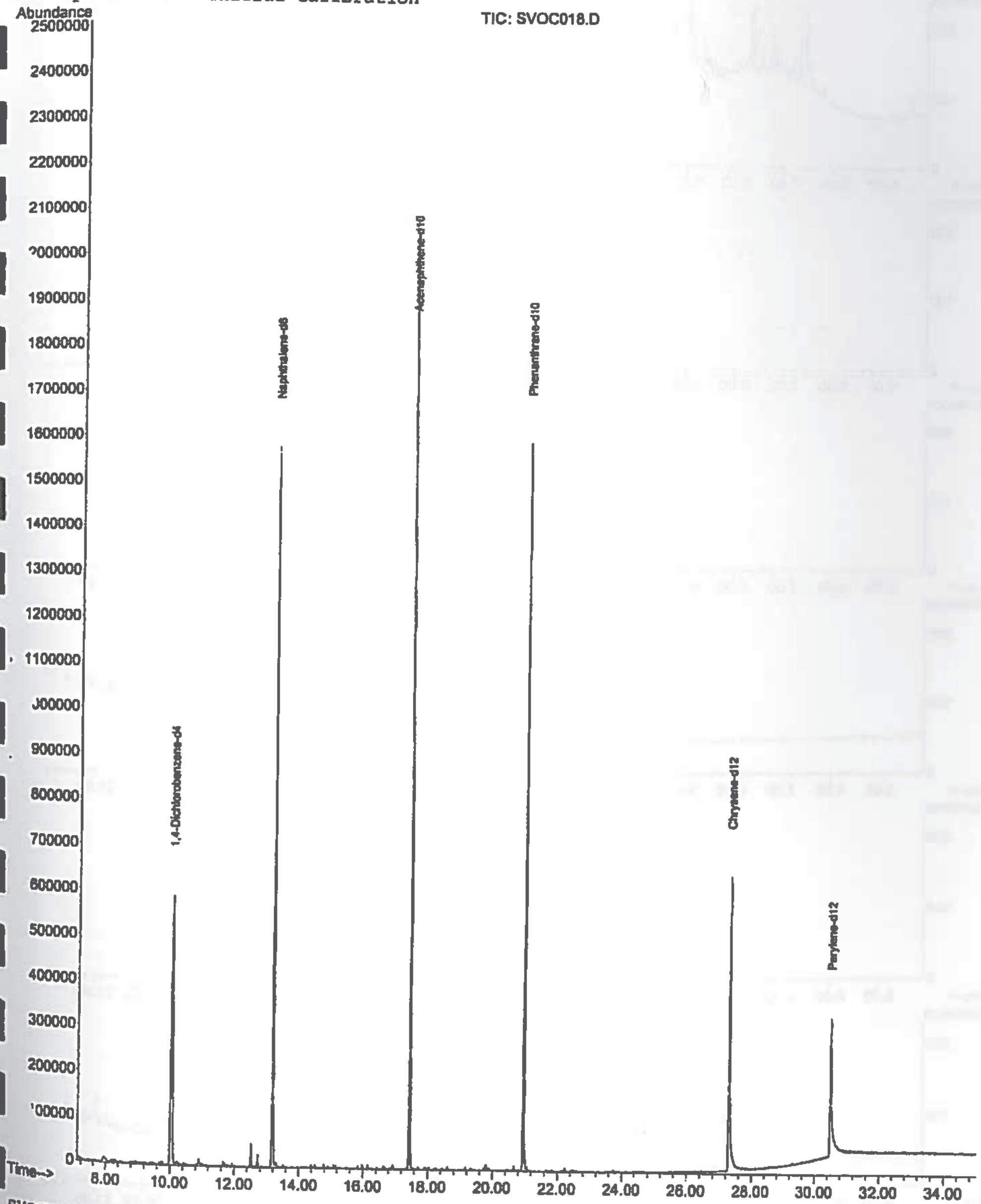
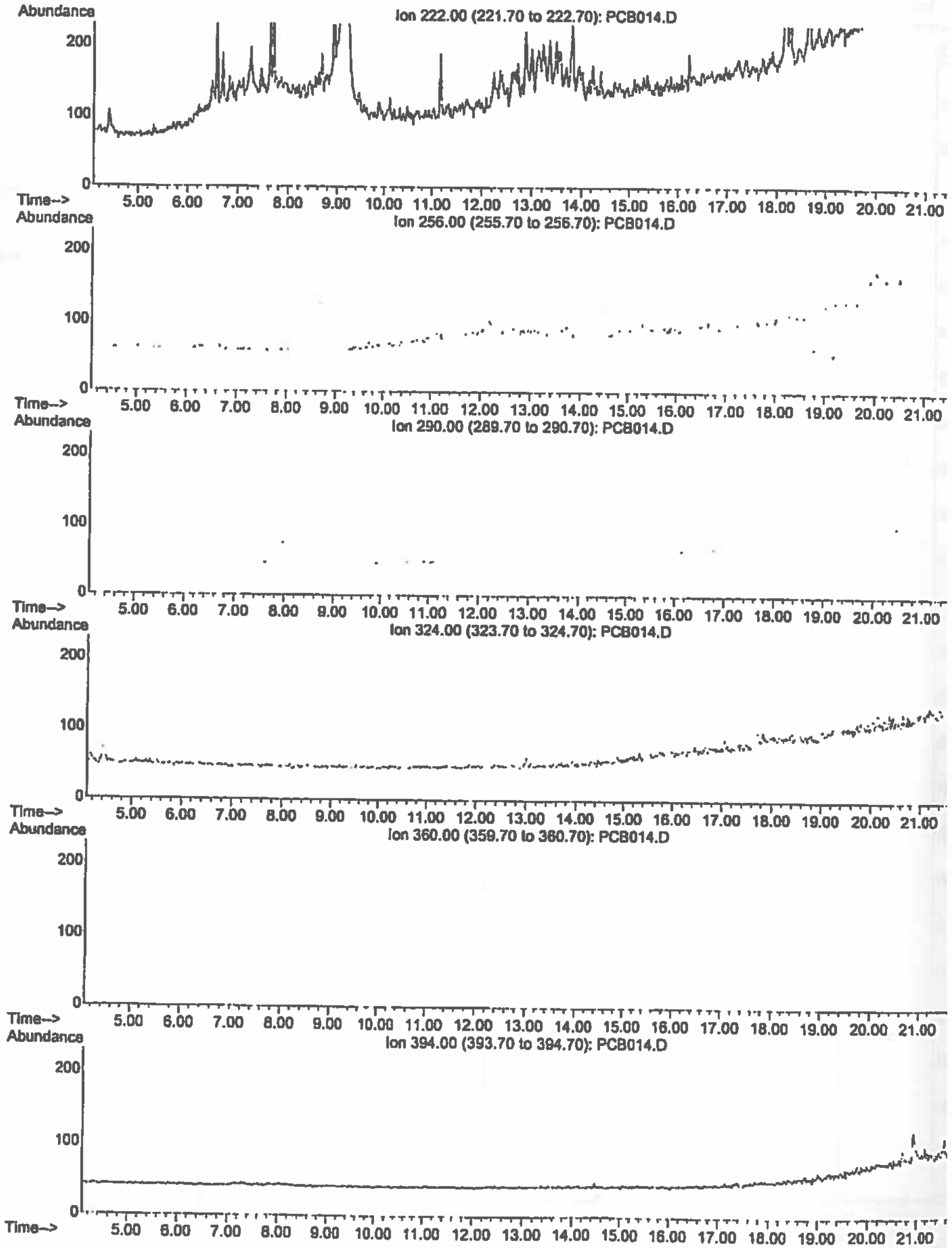
Sample Amount: 0.00
MS Integration Params: autoint1.e
Quant Time: Jan 8 11:37 2003 Quant Results File: SVOC.RES

Method : C:\MSDCHEM\1\METHODS\SVOC.M (Chemstation Integrator)
Title : Semivolatiles
Last Update : Tue Jan 07 16:03:50 2003
Response via : Initial Calibration



File   : C:\MSDCHEM\1\DATA\011003\PCB014.D
Operator   :
Acquired   : 11 Jan 2003   16:28   using AcqMethod PCB
Instrument :   01A MSD59
Sample Name: 14074-002
Misc Info   :
Vial Number: 50



Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Appendix 15.3: Geotechnical & Environmental Assessment Report (2006)

265381-00

ARUP

8.0 Geotechnical and Environmental Assessment

8.1 Introduction

At the request of Hickey Fabrics & Co Ltd, Arup Consulting Engineers have completed a Geotechnical and Environmental Assessment of the Hickey & Co Ltd, Fabrics Wholesale, located at No 43 Parkgate House, Parkgate Street, Dublin 8.

The principal aims of the Site Assessment are to:

(a) Evaluate the Environmental and Geotechnical setting of the site including local geology and hydrogeology.

(b) Investigate the ground conditions of the site including an assessment for subsurface contamination.

(c) Provide information from which likely contaminant pathway-receptor relationships can be identified

(d) Evaluate Environmental and Geotechnical options relating to the site development, in accordance with relevant legislation.

(e) Assess the Geotechnical conditions across the site and provide recommendations for foundations, excavations, gas control measures, dewatering and further investigative work.

The Environmental Assessment is carried out in accordance with BS 10175:2001, Investigation of Potentially Contaminated Sites – Code of Practice.

The Geotechnical Assessment is carried out in accordance with BS 5930: 1999 – Code of Practice for Site Investigations.

8.2 Limitations

The conclusions and recommendations contained in this report are based upon information provided by agencies and individuals outside of Arup Consulting Engineers, taking account of particular limitations and hazards such as asbestos and lead based paint, or of radon levels. Any third parties using this report must satisfy themselves that the information provided is correct and that the recommendations are appropriate in all respects for their particular requirements. Please also note waste and environmental legislation change on a regular basis, and the information given in this report is correct as of March 2006.

8.3 Site Location and Setting

The subject sits is located on the north bank of the River Liffey approximately 7 kilometres east of the Liffey discharge point to the Irish Sea. The Liffey forms the southern site boundary and the Sean Heuston Bridge is located within 20 metres of the east tip of the site (Figure 1, Appendix 8.1). The Frank Sherwin Bridge which permits vehicular access to the southside of the Liffey is located approximately 100 metres further downstream of the site.

Parkgate Street forms the northern site boundary, and numerous commercial properties including a car garage lie on the opposite side of this street. Residential properties comprising apartments adjoin the western boundary of the site.

8.3.1 Existing Environment

The site covers an area of approximately 5,000m^2, of which approximately 3,600m^2 is covered by buildings (Figure 2, Appendix 8.1).

The outer area of the site is used for parking and skip storage and is surfaced with tarmacadam and concrete. Hickey Fabrics Ltd currently occupies the warehouses for storage and dispatch of fabrics and related items.

There are 2 No. underground storage tanks (UST's) located beneath the site and are currently in operation. Pressure tests conducted on both tanks and pipework indicate there are no significant leaks. The location of a third suspected UST is not confirmed. The known tanks are used as petrol storage tanks for delivery vehicles and both tanks are connected to a pump located in the Garage.

Four above ground storage tanks (AST's) are located on the site. Three AST's are currently used to store heating oil for the buildings. The fourth tank is out of use, and there is evidence of a former tank located adjoining the old house / office.

The garage building covers an area of approximately 50m^2 and has a concrete floor. The paint room was used for storage of lubricating oil and paints stored in sealed containers. The fuel pump from UST#1 and #2 is located inside the garage. The roof tiles on this building are comprised of a fibrous material that may be asbestos containing. The garage was not in use at the time of the walkover. Small amounts of oil staining around the fuel pump were observed from outside.

The old generator room covers an area of approximately 80m^2 and has a concrete floor which in partly tiled. It is currently used as a maintenance shop and for storage of miscellaneous items. According to Hickey Fabrics Ltd, the building formerly housed two large generators and an electricity board that was located on the east interior wall. The generator provided electricity to the site and a conduit/channel cut approximately 0.3 metres into the floor runs through the length of the building in an east-west direction. This conduit is covered with wooden slats and a small portion that was accessed for visual observation showed no signs of staining or odours. Behind the wall upon which the electricity board was housed are three small storage rooms that connect to the old storage area.

There are two boiler houses located on the site. One boiler house was inspected and an AST is located approximately 1.5 metres above the inside floor level of this building. This provides temporary storage of oil prior to use by the generators. Visual and olfactory evidence of petroleum / fuel contamination is evident on the interior walls and flooring of this building. In addition staining was observed on an outer portion of the wall to which the AST is attached.

The pipework within this building is covered by a fibrous lagging material that is possibly asbestos containing. The material is corroded in places.

The office building was not accessed during the walkover. According to Hickeys Fabrics the house was previously used as a residence and an office.

The old Storage area covers approximately 760m^2 and comprises between 8 to 10 storage rooms located on ground floor and first floor level. The ground floor is concrete and the upper floors are constructed in timber. The rooms are currently used for storage of furniture and clothes. The new warehouse building covers over one half of the total surface area of the site i.e., approximately 2,500m^2. The Hickey Fabrics offices are located in the northwest corner of this building, adjoining Parkgate Street. The remaining area of the warehouse is open plan with an elevated ceiling and is currently used for the storage and display of fabrics. Access to this warehouse is from the site parking area, through the old storage area and a pedestrian access door at the southeastern tip of the building.

One above ground storage tank is located at the southeastern tip of this building adjacent to the pedestrian access door. A former train track once operated along the south boundary of this building, adjacent to the River Liffey. The track is still visible within the new warehouse, Figure 2, Appendix 8.1.

8.4 Site History

The site lies on the original floodplain of the River Liffey. The site levels in the 18th century would have been significantly lower than present levels. Records show that between 2 and 5 metres of fill (man-made deposits) was placed on the original ground around the flood plain to raise ground levels to present day elevations.

The history of the proposed development site (No 43), its adjoining sites (No 41 and 42), and neighbouring sites was compiled from various documentary sources, including Thom's Dublin Street Directory, Ordnance Survey and historical maps.

The first recorded development on the site was revealed to be an iron works, which was known as both the Phoenix and Royal Phoenix Iron Works, and was in operation from the early 1800s to approximately 1890. Following on from this, a woollen worsted manufacturer, known as The Kingsbridge Mills, is known to have occupied the site for about ten years. From approximately 1900 to 1910, another manufacturer, Phoenix Park Works, was in operation on the site; however, the type of manufacture is unknown. While in the possession of the Phoenix Park Works, the site then lay vacant until about 1920 when it was taken over for use as Government Stores. In about 1930, a printing works was set up on site and this remained in operation until the mid 1970s when the current owners, Hickey's Fabrics, took up residence. Also of note is the presence of an electricity sub-station, which lies just to the east of the existing building at the corner of Parkgate Street and the Sean Heuston Bridge (c. 1969 to present).

Directly to the west of the site lie Nos 41 and 42 where several significant previous developments have been noted, which include Lucan Dairies Limited and various petrol stations and garages including a Maxol Garage. A petrol spill occurred at the Maxol Garage approximately 10 years ago.

Several other garages and depots (bus and electric railway) were recorded, both on Conyngham Road and on the northern side of Parkgate Street. To the west of the site, on Conyngham Road, was the location of a chemical works around the early 1800s; no information on the nature of the factory was found. A chemical factory was also noted on the northern side of Parkgate Street, the use of which was recorded as chemical manufacturing and chemical importing at various times

8.5 Desk study Geology and Hydrogeology

Geological Survey of Ireland (GSI) drift maps for the site indicate limestone bedrock, overlain by over 10m of glacial till (Boulder Clay). However, due to proximity of the site to the River Liffey, there is a strong likelihood of glacial and alluvial gravels also being present. The presence of alluvium in the area, which is associated with the River Liffey, was also noted.

8.5.1 Previous Site Investigation (1973)

GSI records were consulted for previous site investigation reports relating to the site and adjacent sites and the data obtained was used to supplement the present site investigation. A summary of a previous investigation carried out on the Hickey Fabrics site by Site Investigations Limited is given below.

The investigation consisted of 3 No. shell and auger boreholes (BHs 1 to 3) and was undertaken in November 1973. The boreholes were located to the west and northwest of the existing building near the site boundary. The logs reveal the subsurface to consist of 2.4 to 6.1m of FILL overlying natural ground. The underlying soil was found to be quite variable, with layers of silt, sand, gravel and clay (with shells and organics) all encountered.

Presumed rock was found at depths of between about 6.4 and 7.9m below ground level (BGL). Standing water levels in boreholes were found to be between 4.3 and 4.9m BGL approximately.

8.5.2 Present Site Investigation (2002)

A site investigation, consisting of 8 No. shell and auger boreholes (Nos. 1 to 7 and 8B) and 16 No. window samples (Nos. 1 to 8, 9B and 10 to 16), was undertaken by Irish Geotechnical Services Limited in December 2002, under the direction of representatives from Arup Consulting Engineers, Dublin. It should be noted that due to access restrictions no geotechnical investigations were undertaken in the area of the current warehouse. However due to the smaller plant size required for environmental investigation, window samples were undertaken in this area.

The locations of the boreholes and window samples are shown on Figure 2 in Appendix 8.1. The ground conditions were interpreted from the borehole and window sample logs, which are presented in Appendix 8.2.

8.6 Desk Study Hydrogeology

As noted above, the local water body is the River Liffey, which forms the southern boundary of the site and discharges into the sea approximately 7km downstream to the east. Records from a previous investigation for the site immediately to the west of Hickey's Fabrics suggest that approximately half of the site is in the tidal mixing zone.

Boreholes carried out by Site Investigations Limited in November 1973 revealed water strikes at depths of between 4.3 and 4.6m bgl approximately, and standing water levels of between about 4.3 and 4.9m bgl with no tidal information presented. However, water levels may fluctuate on a seasonal basis and may be found at depths deeper or shallower, depending on rainfall and surrounding hydrogeological conditions.

Geological Survey of Ireland records were consulted for information relating to the local aquifer (Ref: The Geology and Hydrogeology of Co Dublin with Particular Reference to the Location of Waste Disposal Sites, JR Creighton, D Daly, TA Reilly, 1979). The rock unit and aquifer protection zone classifications are taken from a protection scheme dating from 1979, and the information is therefore provisional and based on the data available at that time.

The proposed aquifer protection policy for Ireland is based on the division of the country into three zones, depending on the ability of the underlying rocks to yield water. An additional safety zone is designated around each public supply source. The aquifer protection zone for the site is Zone 3b, a minor resource aquifer that may yield locally important quantities of water. Given the urban site setting and the provision of potable water supply, it is unlikely that this aquifer will be used as a future potable resource.

8.7 Other Features and Events

Anecdotal evidence suggests the presence of an underground passageway linking the house to the main building. However, the exact location is not known.

Information procured from Dublin City Council shows that from 1993 to 1997, soil and groundwater investigation and remediation was conducted at the adjoining former Maxol Station at No. 42 Parkgate Street. A report entitled 'Environmental Review and Remediation Proposal' dated June 1997, and subsequent correspondence indicates that on-site sources / events that contributed to soil and groundwater contamination include 'a major petroleum leakage', former packaging operations, leakages from AST's, and heavy lube oil storage. Groundwater samples taken from monitoring wells located within 10 metres of the Hickey site boundary showed values of volatile organic compounds (VOC's) of up to 9,805 ug/l (MW5 located close to the southwest corner of the Hickey site).

8.9 Geotechnical Assessment

8.9.1 Site Investigation

The geotechnical site investigation consisted of:

- 8 No. 'shell and auger' boreholes to depths of between 0.4m and 7.2m bellow ground level (bgl).
- 4 No. follow on rotary coreholes to prove rock by penetrating between 4.5 and 5.1m into bedrock.
- Standpipe installations to monitor groundwater levels.
- Insitu and laboratory testing.

The results of this investigation are presented at Appendix 8.3.

Limited additional geotechnical information was also obtained from the environmental window sampling. It should be noted that all geotechnical site investigation took place in the yard to the western end of the site. The presence of the main building prevented further geotechnical investigation in the remainder of the site. Therefore, it is likely that further geotechnical site investigation will be required in the eastern section of the site to confirm the ground conditions, when access to this area becomes available.

8.10 Stratigraphy

Stratum	Thickness (m)	Maximum depth to top of stratum (mOD Malin) (approximate)
MADE GROUND consisting of clayey sandy gravel with bricks, cobbles and ash.	2.0 – 4.0	Ground Level 3.3 – 4.8mOD
* Sandy CLAY – soft to firm / stiff sandy CLAY	*0.5 – 2.0	*0.8mOD
*SILT – soft grey SILT	1.0 – 4.0	*1.0mOD
GRAVEL – medium dense sandy fine to coarse sub	1.0 – 4.0	-0.16mOD
*SILT – soft grey SILT	*0.3	*-2.4mOD
GRAVEL – medium dense sandy fine to coarse sub rounded GRAVEL	*0.7	*-2.7mOD
LIMESTONE – strong to locally moderately strong thickly to locally thinly bedded, grey TO dark grey fine grained LIMESTONE fresh to locally moderately weathered.	4.5m +	-3.43mOD

* The above sequence represents the general order of occurrence of the strata below ground surface; however, one or more of the units may be absent at specific locations.

8.10.1 Made Ground

The fill is variable in thickness across the site and comprises of bricks, cobbles and ash in a clayey sandy gravel matrix.

8.10.2 Sandy CLAY

This stratum comprises soft to firm / stiff sandy CLAY, which was not encountered in every location, but where present, was located beneath the made ground. Two Standard Penetration Tests (SPT's) were undertaken in this material (in the same borehole), giving 'N' values of 4 and 6, which classifies the material as soft. It is described elsewhere as stiff (drillers / loggers description) with a Cu value of 20kN/m².

8.10.3 SILT

Soft grey SILT was encountered at two locations directly beneath the made ground. No SPT's were undertaken in this material. It would be expected that this material would be soft in consistency.

8.10.4 Gravel

The alluvial gravels were encountered across the site and are described as medium dense sandy fine to coarse sub-rounded GRAVEL. SPT 'N' values in the gravel range from 11 to 26, with an average of 16, classifying the material as medium dense with an angle of friction (Ø) of approximately 32 – 34° (BS 8002).

8.10.5 Silt

In one location, material described as soft grey silt with an SPT 'N' value of 10 (which classifies the material as firm) was encountered 6m below ground level.

8.10.6 Gravel

In one location immediately below the silt layer described in above, a layer of loose fine to coarse sub rounded gravels with shells was encountered immediately above bedrock.

8.10.7 Bedrock

In each location where rotary coring was undertaken, bedrock was encountered, and is generally described as strong to locally moderately strong thickly to locally thinly bedded fine-grained LIMESTONE fresh to locally moderately weathered. Core recovery is typically 100%, except for the first run where poor quality rock is often expected. Rock Quality Designation, which is an indication of the degree of fracturing in the rock, was very poor, in all cases less than 36%, with an average of 15%.

8.10.8 Groundwater

Groundwater monitoring standpipes were installed in six of the eight 'shell and auger' boreholes (see Appendix 8.3). Water was generally encountered in the gravel layer, typically at 3 – 4m bgl, and stabilised at this level. This would indicate the groundwater level to lie at approximately – 0.5 to 1.0mOD (Malin).

8.11 Hydrogeology

There are likely to be two main aquifers in the area around the study site. These are the limestone bedrock and the overlying gravel stratum.

8.11.1 Limestone Bedrock

The site is believed to be underlain by middle Carboniferous Limestone locally referred to as 'Calp'. It is typically interbedded sequence of stronger calcisiltite with weaker dark grey calcilutite limestone / mudstone. The bedrock is considered to have poor potential as an aquifer for water supply and there are no known well abstractions from bedrock within the site vicinity.

It should be noted however, that the bedrock encountered beneath the site was highly fractured in nature to at least 5m into the bedrock, which will have the effect of causing a localised increase in permeability and storativity characteristics.

8.11.2 Gravels

It is unclear from the site investigation to date, whether the gravels encountered across the site are alluvial, glacial or both in origin. The likelihood is that they are a combination of the two, with an alluvial gravel laid down by the River Liffey overlying the glacial gravel, most likely laid down during the retreat of the Dublin glaciation.

In-situ variable head permeability tests were performed in this strata, with the water escaping so quickly that measurements could not be made. This suggests the material to have extremely high permeability, in the region of 10-3 m/s.

The groundwater gradient in the upper gravel aquifer at Low Tide is believed to be south to southeast, towards the River Liffey.

8.12 Environmental Site Investigation

8.12.1 Scope of Investigation

The subsurface investigation is designed to assess the presence, if any, of contamination in soil and groundwater beneath the site, to identify areas where it is suspected, and to show the absence of contamination in other areas of the site. The sampling was conducted in accordance with:

- BS10175 (2001) Investigation of Potentially Contaminated Sites – Code of Practice; and
- BS ISO 5667 – 18: 2001 Water Quality Sampling, Part 18 Guidance on Sampling of Groundwater at Contaminated Sites.

8.12.2 Legislation

Where material is to be removed to facilitate a basement, the recovered material is classified as a waste and falls under the Waste Management Act 1996. Disposal of these soils is governed by Directive 1999/31/EC (The Landfill Directive) which sets out typical limits for specific types of landfill. It should be noted that individual landfills have their own specific acceptance criteria but generally these fall under the guidelines presented in this directive. These guidelines provide eluate and total organic content limit values for inert landfills. The Landfill Directive values are applied to all licensed landfills in Ireland.

In this report, consideration is given to the application of leaching limit values calculated at a liquid to solid ratio of 10l/kg, and to the total organic content parameters. However these analyses were carried out before the finalising of the Landfill Directive which specifies a sample preparation of leachates as according to the CEN method. The method used here was that of the NRA method. This means that the values obtained are indicative only. Leachates are formed by passing a defined volume of water through a soil sample and testing the water which comes out the other side to see what contaminants have been removed from the soil and into the water. The main difference between the two methods is that the CEN approach involves drying the soil initially, while the NRA method involves passing water through the soil at it's natural moisture content.

There is no legal framework or official guidelines regulating levels of environmental components of soils or groundwater in Ireland. However, the Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to the Landfill Directive 1999/31/EC took effect in all member states on 16 July 2004 and the waste acceptance criteria set out in it were implemented in all member states on 16 July 2005. It sets limit values for each landfill type based on total contents and leachate concentrations.

However landfills are permitted to apply for a derogation of up to three times the inert limits for some of the acceptance criteria to the EPA. For example, from previous dealings with inert landfills such as Murphy's Environmental they have confirmed that their acceptance criteria are the following.

- PAH (Sum of 6) – 6mg/kg
- Antimony – 0.18mg/kg
- TDS (Total Dissolved Solids) – 12000mg/kg
- TOC (Total Organic Carbon) – 6%
- Zinc – 12.0mg/kg
- Sulphate – 3000mg/kg

8.12.3 Chemical Results

A total of thirty two (32) samples including four (4) groundwater samples and twenty eight (28) soil samples were retrieved from both window samples and boreholes. Window sample boreholes provide a continuous column of soil which can be logged and sampled. These samples were dispatched to a United Kingdom Accreditation Service (UKAS) accredited laboratory, Alcontrol Laboratories for analysis. The soil and groundwater samples were analysed for contaminants commonly found in fill materials, and for those linked to the historical activities of the site, including:

- PAHs.
- Heavy Metals
- Petrol range organics (PROs), benzene, toluene, ethylbenzene, and xylene (BTEX), MTBE, diesel range organics (DRO's) and mineral oil.
- SVOC's.
- VOC's.
- PCBs in groundwater only.

Ten of the soil samples were also subjected to leachate testing and analysed for:

- Heavy metals.
- PAHs.
- Petrol range organics (PROs), BTEX, diesel range organics (DRO's) and mineral oil.

The samples were retrieved from the MADE GROUND / FILL materials found in the upper 2 to 3 metres below ground level, and from the underlying natural ground described as brown slightly gravely CLAY, and sandy fine to coarse GRAVEL. The results of these analyses are included in Appendix 8.2.

The laboratory analysis indicated that a number of samples exhibited elevated levels in each of the following parameters.

Mineral Oil – These are typically associated with diesel, turpentine and fuel oil spills, and found in or around fuel tanks and car parks. They may build up over time or be part of larger spill. Elevated levels were noted in samples from two of the boreholes.

PAH's – Polynuclear Aromatic Hydrocarbons – These are typically the breakdown products of the combustion of fossil fuels, such as coal and also form a component of petrol. These were found at varying levels across the site, in samples taken from five of the boreholes.

Other contaminants which were analysed for, such as total metal content of soils and leachates were all found to be below the levels for acceptance into an inert landfill.

From the analysis, to allow a simple visual representation, the following soils categorisation is proposed*:

Category	PAH	Mineral Oils
A	<2ppm	<500ppm
B	>2ppm, <6ppm	
C	>6ppm, <40ppm	
D	>40ppm	>1000ppm

*Please note that the categorisation may be effected by other results from different parameters such as TOC, leachates and VOC's.

A number of interpretive drawings showing the breakdown of categories across the site are presented in Appendix 1. These categories are based on correspondence with Murphy's Landfill and prior experience dealing with other licenced landfills around Ireland. It is proposed that Category A materials may be disposed of to a permitted site, Category B materials to a facility such as Murphy's Landfill, The Naul, Co. Dublin, Category C materials to a facility such as KTK Landfill, and Category D would have to be disposed of to export or a waste recovery facility. It should be stressed however that it is at the discretion of the receiving facility and on each facilities licence, as to whether or not they will accept the material for disposal.

8.13 Conclusions and Recommendations

8.13.1 Geotechnical Recommendations

8.13.1.1 Foundations

Based on the architect's drawings (see Scott Tallon Walker Drawing, 00031-PLA-003, Rev. P1), the development will include a basement which will have a maximum finished floor level of 1.8mOD, with an additional 0.5m excavation to allow for blinding, services and drainage layers. The inclusion of this basement will require the removal of the majority of the fill (made ground) across the site.

It is also likely that the water table will exist at or below the base of the basement works which may require localised dewatering during construction. Assuming at least 0.5m penetration into the gravel stratum, an allowable bearing capacity of 150kN/m^2 would be applicable using spread foundations.

Any uplift pressures will need to be counteracted by the dead weight of the structure, or a number of other methods such as drainage or anchoring.

It is likely that sheet piling will be required to support the edges of the basement excavation during construction, which is discussed further in section 8.13.1.2.

8.13.1.2 Dewatering and Excavation Support

The groundwater was encountered in the upper gravel layer across the site, generally at levels of between -0.5 and 1.0mOD Malin, (approximately 3 – 4m BGL) and is likely to be seasonally influenced. It is therefore not anticipated that significant dewatering is will be required, but may be required locally or during specific climatic events.

There may be issues associated with the driving of the sheet piles, particularly close to adjacent structures and the quay wall, where vibrations may be high, and may cause damage. Further examination of the quay wall will be required to determine its overall quality and to see if it 'keys' into the site prior to sheet pile driving and / or excavation.

8.13.1.3 Gas Precautionary Measures

CIRIA 149 (protecting development from methane) suggests the highest measured gas parameter should be used as the determining factor in recommending gas precautionary measures. The highest measured parameters for CO_2 and CH_4 (methane) were 2.3% and 3.9% respectively.

Based on Table 2.8, page 144, CIRIA 149, a characteristic situation 3 should be utilised. However, it should be noted that Irish legislation has stricter guidelines ("Protection of New Buildings and Occupants from Landfill Gas", Construction Research Section, DOE, 1994) on CO_2 levels than the United Kingdom (UK = 5%, Ireland = 0.5%).

The recommended precautionary measures for a characteristic situation 3 are:-

- Ventilation of confined spaces.
- Well constructed ground slab.
- Low permeability gas membrane.
- Minimum penetration of the ground slab by services.
- #Passive venting the building, granular filled void
- *Possible passive venting to building under slab void.

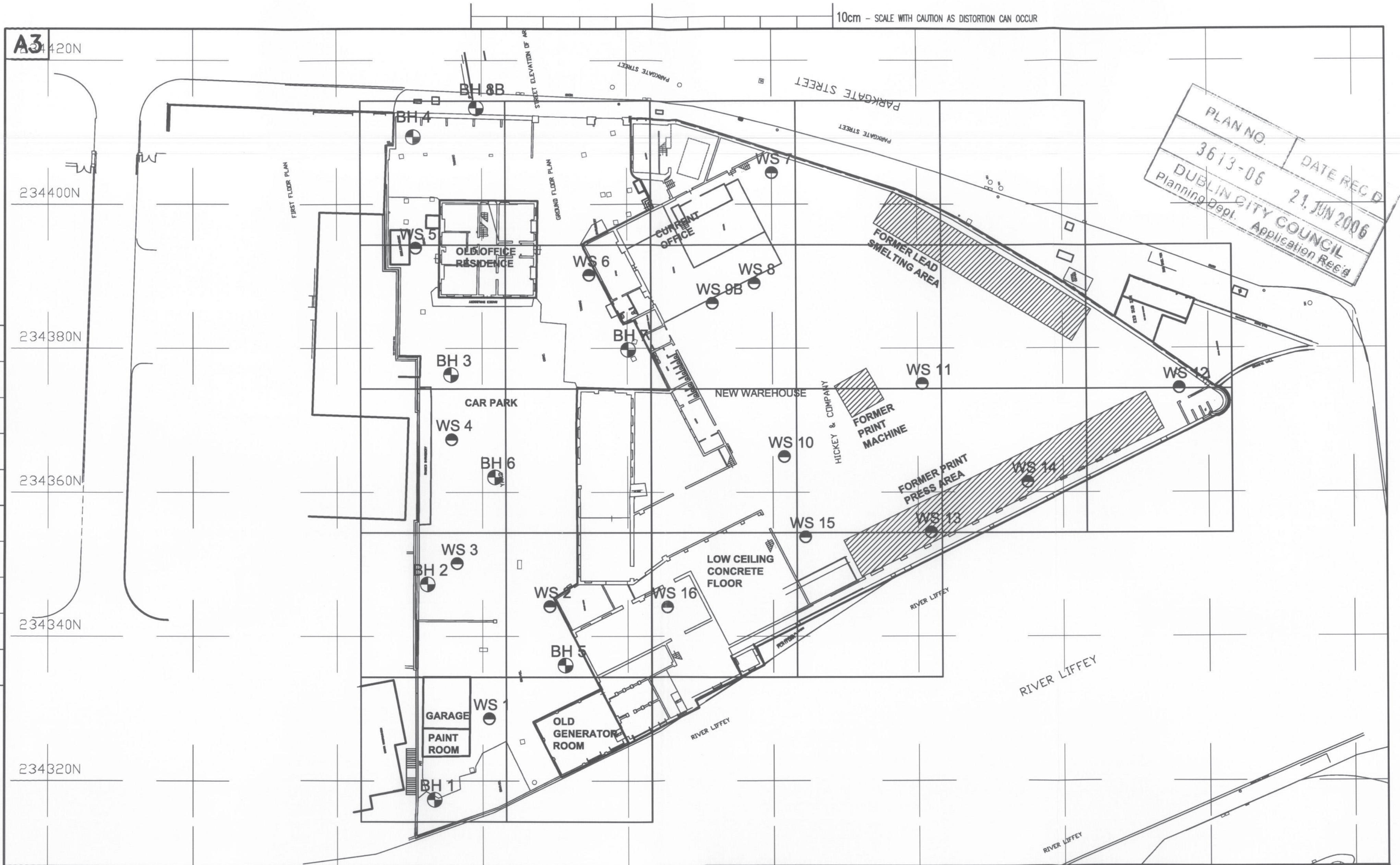
Both office and residential
* Residential only

8.14 Environmental Recommendations

With regard to the proposed residential and commercial development at Parkgate Street, a preliminary evaluation of the site development is outlined below.

Based on an estimated site area of 7,000m^2, this option will involve the removal of approximately 15,000m^3 of soil, comprising mainly of fill materials. The primary contaminants i.e. metals, petroleum hydrocarbons and PAHs are shown to occur at concentrations above the criteria for inert landfill within localised 'hotspots' in the fill materials. It is estimated, based upon the current soil quality data, that approximately 5,000m^3 of material may be unsuitable for disposal as inert material under the Landfill Directive guidelines. However of this 5,000m^3, 3,750m^3 may be acceptable at an engineered (i.e. lined) inert landfill (i.e. Murphy's Environmental). Of the remaining 1,250m^3, 600m^3 could be disposed of at a non-hazardous landfill such as KTK, with the remaining 650m^3 requiring overseas treatment / disposal. It must be stressed that it is at the discretion of the receiving facility and on the facilities licence as to whether or not they will accept the material for disposal.

Appendix 8.1: Figures



LEGEND

WS 4 – WINDOW SAMPLE

BH 6 – BOREHOLE

Rev.	Date	By	Description	Chd By

Job Title
HICKEYS FABRIC & CO. LTD.
NO 43 PARKGATE HOUSE
PARKGATE STREET
DUBLIN 8

Drawing Title
BOREHOLE/WINDOW SAMPLE
LOCATIONS AND EXTENT
OF HISTORICAL OPERATIONS

Drawing Status
FOR INFORMATION ONLY

ARUP ©
10 Wellington Road Dublin 4
Tel 01-6144200 Fax 01-6683169
EMail dublin@arup.com
DUBLIN CORK LIMERICK

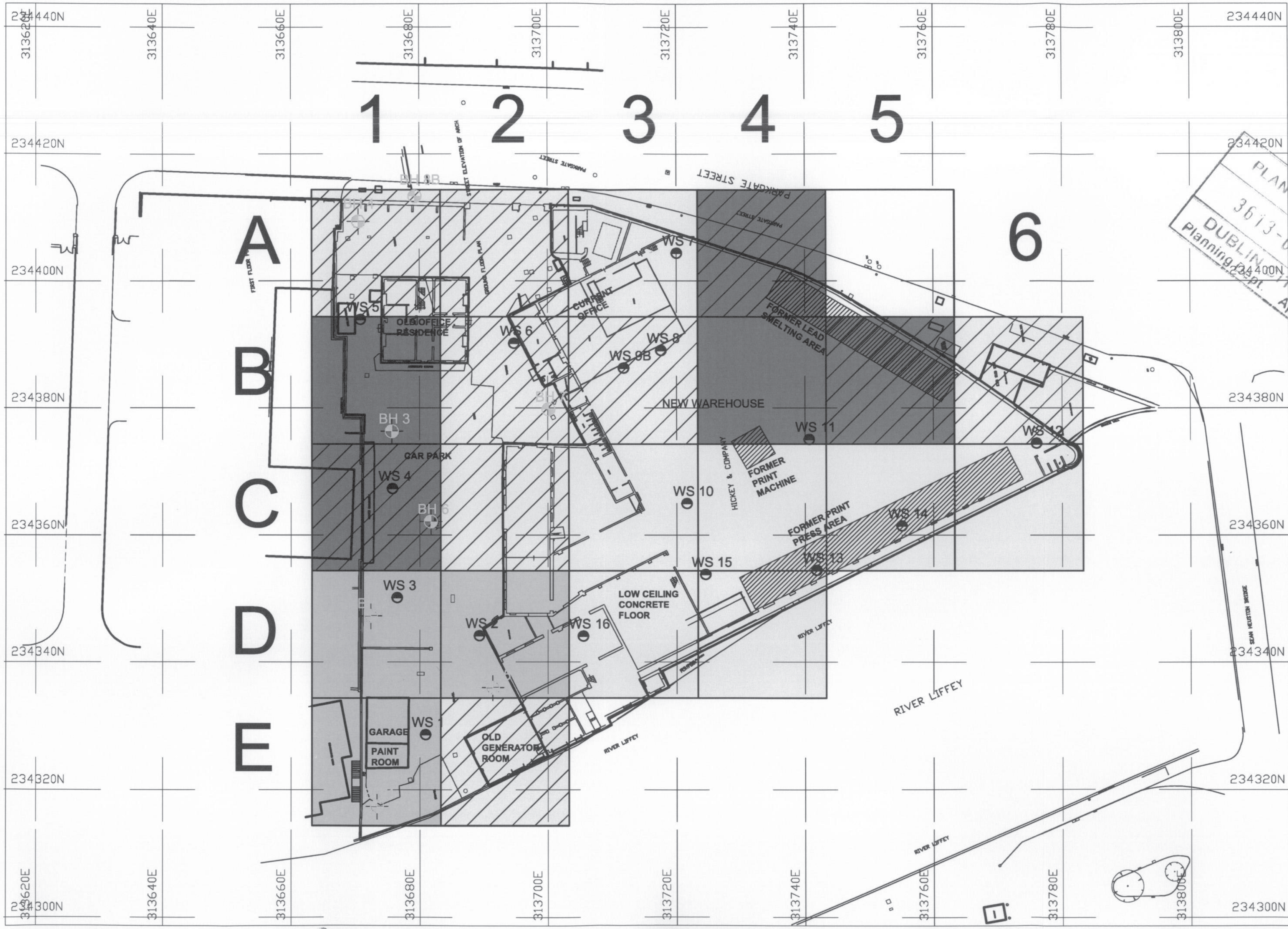
Scales NTS | Originator
Checked | Approved | Date

Job No.	Drawing No.	Rev.
D3586.11	FIGURE 2	

J:\D3500–D3599\D3586\3) Drawings\(e) Geotechnical\10\Figure 2.dwg 20 Mar 2006 12:30:13

10cm – SCALE WITH CAUTION AS DISTORTION CAN OCCUR

A3



A – INERT NATURAL GROUND

A* – INERT MADE GROUND

B – SOILS PAH SUM OF 6 >2ppm <6ppm

C – SOILS PAH SUM OF 6 >6ppm DRO <1000ppm

D – SOILS DRO >1000ppm

– CELL NOT TESTED

Rev.	Date	By	Description	Chd By

Job Title: HICKEYS FABRICS & CO. LTD. NO 43 PARKGATE HOUSE PARKGATE STREET DUBLIN 8

Drawing Title: CATEGORIES FOR EXCAVATION GL – 3.0mOD

Drawing Status: FOR INFORMATION ONLY

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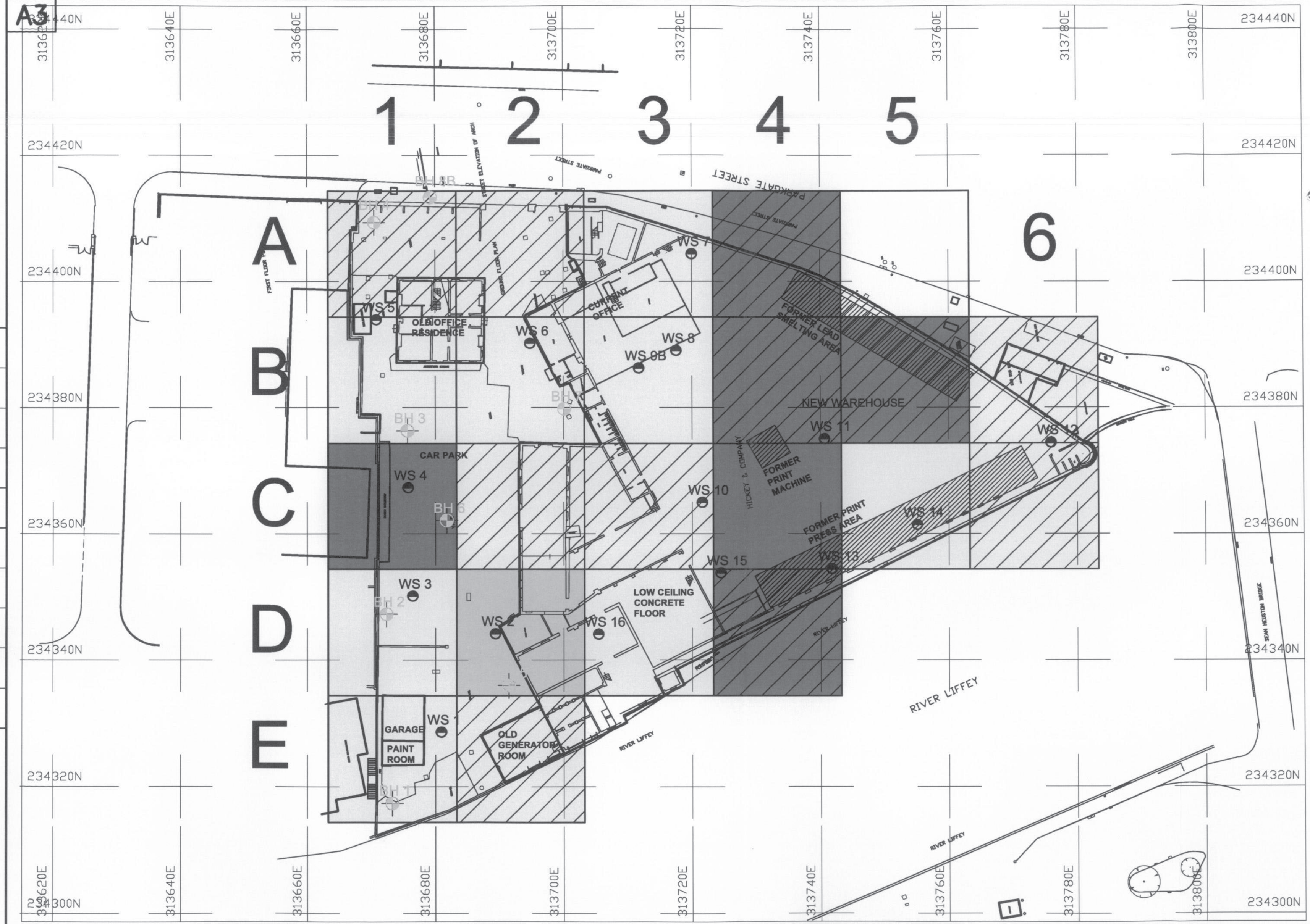
Scales NTS | Originator | Checked | Approved | Date

Job No. D3586.11 | Drawing No. FIGURE 3 | Rev.

J:\D3500-D3599\D3586\3) Drawings\(e) Geotechnical\10\Figure 3.dwg 20 Mar 2006 12:30:50

10cm - SCALE WITH CAUTION AS DISTORTION CAN OCCUR

A3



CELL	CATEGORY
D2	CAT. D TO 2.25M OD,CAT A* TO 1.75M OD
D1	CAT. A* TO 2.11M OD,CAT B TO 1.61M OD

A - INERT NATURAL GROUND

A* - INERT MADE GROUND

B - SOILS PAH SUM OF 6 >2ppm <6ppm

C - SOILS PAH SUM OF 6 >6ppm DRO <1000ppm

D - SOILS DRO >1000ppm

CELL NOT TESTED

Rev.	Date	By	Description	Chd By

Job Title
HICKEYS FABRICS & CO. LTD.
NO 43 PARKGATE HOUSE
PARKGATE STREET
DUBLIN 8

Drawing Title
CATEGORIES FOR EXCAVATION
3.0mOD - FORMATION LEVEL

Drawing Status
FOR INFORMATION ONLY

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Date

Job No. D3586.11
Drawing No. FIGURE 4
Rev.

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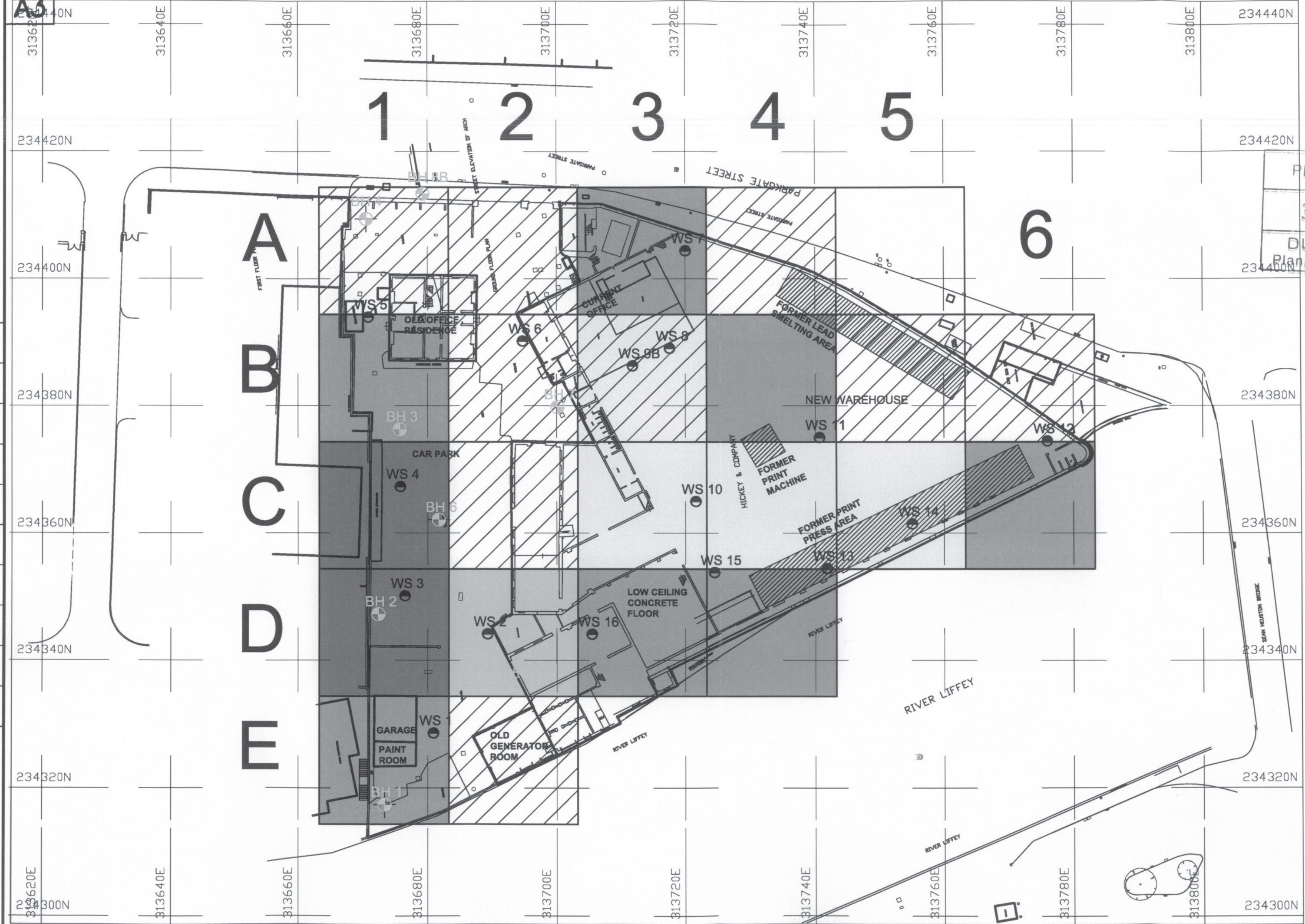

CELL	CATEGORY
C3	CAT. A* TO 0.21M OD,CAT A TO BASE
D2	CAT. A* TO 1.75M OD,CAT A TO 0.75M OD, CAT D TO −0.25M OD

A – INERT NATURAL GROUND

A* – INERT MADE GROUND

B – SOILS PAH SUM OF 6 >2ppm <6ppm

C – SOILS PAH SUM OF 6 >6ppm DRO <1000ppm

D – SOILS DRO >1000ppm

– CELL NOT TESTED

Rev.	Date	By	Description	Chd By

Job Title: HICKEYS FABRIC & CO. LTD. NO 43 PARKGATE HOUSE PARKGATE STREET DUBLIN 8

Drawing Title: BELOW FORMATION LEVEL

Drawing Status: FOR INFORMATION ONLY

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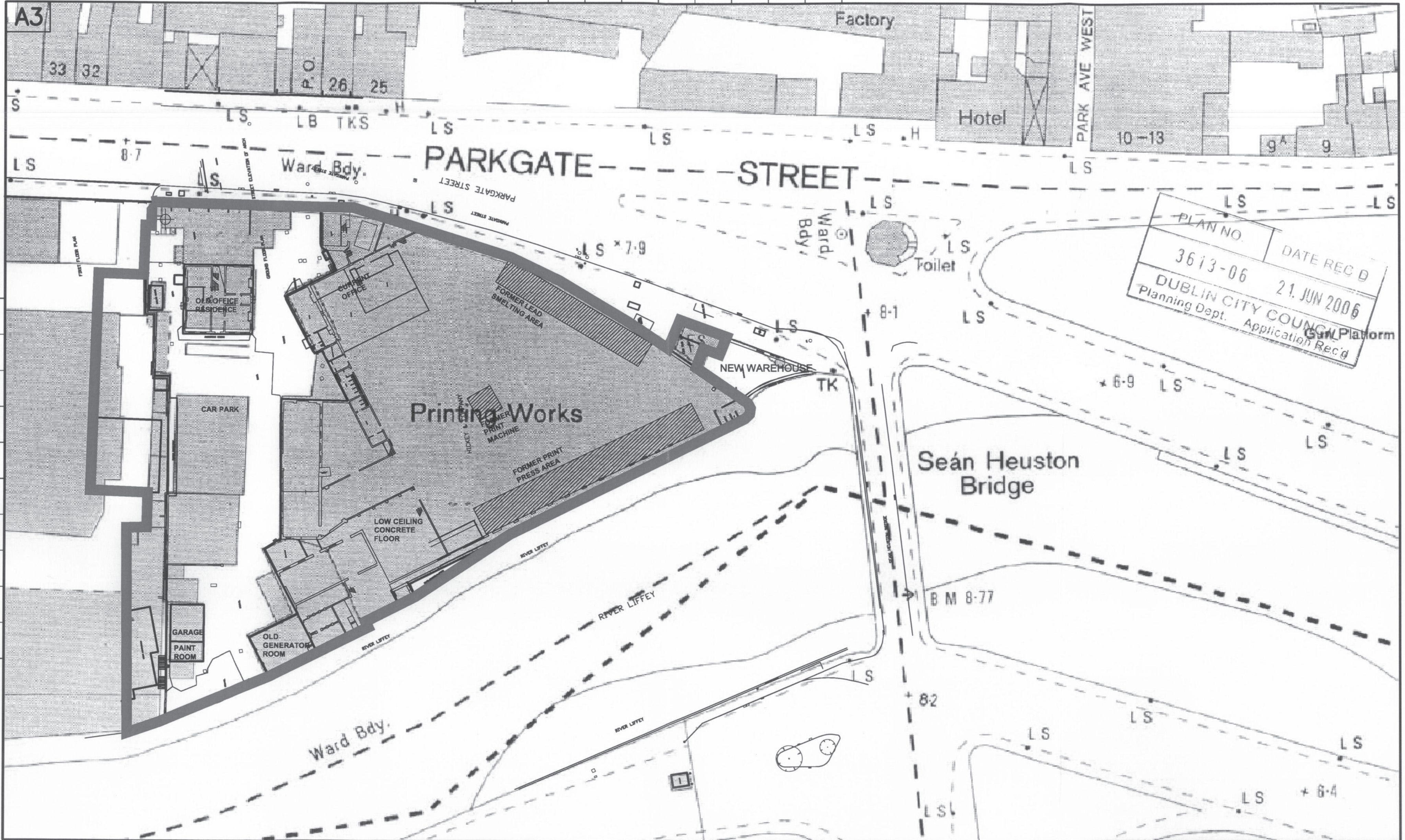
Scales NTS | Originator | Checked | Approved | Date

Job No. D3586.11 | Drawing No. FIGURE 5 | Rev.

J:\D3500-D3599\D3586\3) Drawings\(e) Geotechnical\10\Figure 5.dwg 20 Mar 2006 12:31:40

10cm - SCALE WITH CAUTION AS DISTORTION CAN OCCUR



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Rev.	Date	By	Description	Chd By

Job Title	Drawing Title	
HICKEYS FABRIC & CO. LTD. NO 43 PARKGATE HOUSE PARKGATE STREET DUBLIN 8	SITE LOCATION PLAN	ARUP 10 Wellington Road Dublin 4 Tel 01-6144200 Fax 01-6683169 EMail dublin@arup.com DUBLIN CORK LIMERICK
		Scales NTS · Originator
		Checked · Approved · Date
	Drawing Status FOR INFORMATION ONLY	Job No. D3586.11 · Drawing No. FIGURE 1 · Rev.

J:\D3500-D3599\D3586\3) Drawings\(e) Geotechnical\10\Figure 1.dwg 20 Mar 2006 12:29:17

42A Parkgate Street, Dublin 8

Appendix 15.4: GII Ground Investigation Report

ARUP

Ground Investigations Ireland Ltd.,
Catherinestown House,
Hazelhatch Road,
Newcastle, Co Dublin.
Tel: 01 601 5175 / 5176 | Fax: 01 601 5173
Email: info@gii.ie | Web: gii.ie

Ground Investigations Ireland

Hickeys 43 Parkgate Place

Ground Investigation Report

DOCUMENT CONTROL SHEET

Project Title	Hickeys 43 Parkgate Place
Engineer	ARUP
Client	Ruirside Developments Ltd
Project No	8507-02-19
Document Title	Ground Investigation Report

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
F	Final	S Kealy	C Finnerty	F McNamara	Dublin	14th January 2020

Ground Investigations Ireland Ltd.,
Catherinestown House,
Hazelhatch Road,
Newcastle, Co Dublin.
Tel: 01 601 5175 / 5176 | Fax: 01 601 5173
Email: info@gii.ie | Web: gii.ie

CONTENTS

APPENDICES

1.0 Preamble

On the instructions of ARUP Consulting Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd., between March and June 2019 at the site of the residential and commercial development at 43 Parkgate Place, Dublin 8.

2.0 Overview

2.1. Background

It is proposed to construct a new mixed purpose development with associated services, access roads and car parking at the proposed site. The site is currently occupied by a commercial building and is situated in at No. 43 Parkgate Place. The proposed construction is envisaged to consist of piled foundations and conventional pavement make up with some local excavations for services and plant.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out Asbestos Tile removal at all internal exploratory hole locations
- Carry out 5 No. Foundation Inspection Pits to determine existing foundation details
- Carry out 1 No. Slit Trench to expose existing services and determine a suitable location for a borehole
- Carry out 18 No. Window Sample Boreholes to recover soil samples
- Carry out 4 No. Cable Percussion boreholes to a maximum depth of 7.6m BGL
- Carry out 4 No. Rotary Core follow on Boreholes to a maximum depth of 15.60m BGL
- Carry out 3 No. Rotary Core Boreholes to a maximum depth of 17.0m BGL
- Installation of 10 No. Groundwater monitoring wells
- Carry out 2 No. Permeability tests
- Installation of 3 No. Gas monitoring caps
- Geophysical Survey
- Geotechnical & Environmental Laboratory testing
- Issue of AGS Data
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.
The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

3.2. Foundation Pits

The foundation inspection pits were excavated at the locations shown in the exploratory hole location plan in Appendix 1. The exposed foundations were logged and sketched prior to backfilling and reinstatement. The logs and sketches are provided in Appendix 2 of this Report.

3.3. Slit Trenches

The slit trench were excavated using a 3.5 tonne tracked excavator at the location shown in the exploratory hole location plan in Appendix 1. The trench was excavated to locate any buried services and to determine a suitable location to carry out a borehole. The logs and sketches are provided in Appendix 3 of this Report.

3.4. Window Sampling

The window sampling was carried out at the locations shown in the location plan in Appendix 1 using a Tecop Tec 10 percussion drilling rig. At the location of WS116 the window sample was not carried out due to encountering an underground chamber. The window sampling consists of a 1m long steel tube with a cutting edge and an internal plastic liner which is mechanically driven into the ground utilising a 50kg weight falling a height of 500mm. Upon completion of the 1m sample, the tube is withdrawn and the plastic liner removed and sealed for logging and sub sampling by an Engineering Geologist. The tube is replaced in the borehole and a subsequent 1m sample can be recovered. Occasionally outer casing or a reduced diameter tube is utilised to enable the window sample to progress in difficult drilling conditions. Geotechnical or environmental soil samples can be recovered from each of the liners following logging. The window sample records are provided in Appendix 4 of this Report.

3.5. Cable Percussion Boreholes

The Cable Percussion Boreholes were drilled using a Dando 2000 drilling rig with regular in-situ testing and sampling undertaken to facilitate the production of geotechnical logs and laboratory testing.
The standard method of boring in soil for site investigation is known as the Cable Percussion method. It consists of using a Shell in non cohesive soils and a clay cutter in cohesive soils, both operated on a wire cable. Very hard soils, boulders and other hard obstructions are broken up by chiselling and the fragments

removed with the Shell. Where ground conditions made it necessary, the borehole was lined with 200mm diameter steel casing. While the use of the Cable Percussion method of boring gives the maximum data on soil conditions, some mixing of laminated soil is inevitable. For this reason, thin lenses of granular material may not be noticed. Disturbed samples were taken from the boring tools at suitable depths, so that there is a representative sample at the top of each change in stratum and thereafter at regular intervals down the borehole until the next stratum was encountered. The disturbed samples were then sealed and sent to the laboratory where they were visually examined to confirm the description of the relevant strata.
Standard Penetration Tests were carried out in the boreholes. The results of these tests, together with the depths at which the tests were taken are shown on the accompanying borehole records. The test consists of a thick wall sampler tube, 50mm external diameter, being driven into the soil by a monkey weighing 63.5kg and with a free drop of 760mm. For gravels and glacial till the driving shoe was replaced by a solid 60º cone. The Standard Penetration Test number referred to as the ‘N’ value is the number of blows required to drive the tube 300mm, after an initial penetration of 150mm. The number gives a guide to the consistency of the soil and can also be used to estimate the relative strength/density at the depth of the test and also to estimate the bearing capacity and compressibility of the soil. The cable percussion borehole logs are provided in Appendix 5 of this Report.

3.6. Rotary Boreholes

The rotary coring was carried out by a track mounted T44 Beretta rig at the locations shown on the location plan in Appendix 1. The rotary boreholes were completed from the ground surface or alternatively, where noted on the individual borehole log, from the base of the cable percussion borehole where a temporary liner was installed to facilitate follow-on rotary coring. During the sequence of rotary coring two different core diameters were used. BH101, BH104, BH106 and BH107 were cored using a 146mm bit producing cores of 102mm diameter. BH102, BH103 and BH105 were cored using a 95.76mm bit producing cores of 64mm diameter.
The T44 Beretta is equipped with rubber tracks which allow for short travel on pavement surfaces avoiding any damage to the surface. The T44 Beretta utilises a triple tube core barrel system operated using a wireline drilling process. The outer barrel is rotated by the drill rods and at its lower end, carries the coring bit. The inner barrel is mounted on a swivel so that it does not rotate during the process. The third barrel or liner is placed within the second one to retain the core intact and to preserve as much as possible the fabric of the drilling stratum. The core is cut by the coring bit and passes to the inner liner. The core is brought up to the surface within the inner barrel on a small diameter wire rope or line attached to the “overshoot” recovery tool which is then placed into a core box in order of recovery. A drilling fluid, typically air mist or water flush is passed from the surface through hollow drill rods to the drill bit, and is used to cool the drill bit. Temporary casing is used in some situations to support unstable ground or to seal off fissures or voids.
It should be noted that the rotary coring can only achieve limited recovery in overburden, particularly granular or weakly cemented strata due to the flushing medium washing away the cohesive fraction during coring. The recovery achieved, where required is noted on the borehole logs and core photographs are

provided to allow assessment of the core recovered. The rotary borehole logs are provided in Appendix 5 of this Report.

3.7. Permeability Testing

Permeability tests were carried out in the borehole. This consisted of a rising head test, which were carried out in BH101 and BH106. The rising head test was carried out in borehole as specified by the Consulting engineer and requires the pumping out of the groundwater encountered in the borehole. The initial groundwater levels are recorded, and pumping begins, with the volume of groundwater removed recorded. Once the borehole is emptied, the rise in water level with time in the borehole was recorded over a 2 hour test period, allowing for the calculation of the rate of groundwater ingress. The results of the permeability tests are provided in Appendix 8 of the Report.

3.8. Surveying

The exploratory hole locations have been recorded using a Geomax Zenith System which records the coordinates and elevation of the locations to either ITM or Irish National Grid as required by the project specification. It was not possible to establish by GPS an easting, northing and elevation for the internal exploratory holes. The easting and northing have been determined using the location plan in GIS format. The elevation of the exploratory holes were estimated at 4.25mOD. This was based on elevation levels taken outside of the building and a measurement taken to the top of the finished floor level. The coordinates and elevations are provided on the exploratory hole logs in the appendices of this Report.

3.9. Geophysical Survey

A geophysical survey was carried out be APEX Geoservices to aid in the identification of the underlying strata. The survey consisted of seismic refraction and MASW S – wave velocity profiling. The results of this survey are provided in Appendix 9 of this report.

3.10. Groundwater and Gas Monitoring Installations

Groundwater Installations were installed upon the completion of all the boreholes to enable sampling and the determination of the equilibrium groundwater level. Gas monitoring installations were installed in WS110, WS114, and WS117 level. The typical groundwater monitoring installation consists of a 50mm HDPE slotted pipe with a pea gravel response zone and bentonite seal installed to the Engineers specification. Where required the standpipe is sealed with a gas tap and finished with a durable steel cover fixed in place with a concrete surround. The installation details are provided on the exploratory hole logs in the appendices of this Report.

3.11. Laboratory Testing

Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design.
Environmental testing, including Waste Acceptance Criteria (WAC) was carried out by Jones Environmental Laboratory in the UK.
Chemical testing including Organic Matter Content, Chloride content, pH and Sulphate was carried out by Derwentside Environmental Testing Services Limited in the UK.
Geotechnical testing consisting of Moisture Content, Atterberg limits and Particle Size Distribution (PSD) was carried out by Prosoils Geotechnical Laboratory in the UK.
Rock strength testing including Point Load (Is_{50}) and Unconfined Compressive Strength (UCS) testing was carried out in Trinity College Dublin's Geotechnical Laboratory
The results of the laboratory testing are included in Appendix 6 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to insitu and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered were consistent across the site and are generally comprised;

- Surfacing
- Made Ground
- Cohesive Deposits
- Granular Deposits
- Residual Rock
- Weathered Rock
- Bedrock

SURFACING: Concrete surfacing was present in the majority of the exploratory holes to a max depth of 0.25m BGL with the exception of BH105 and WS113 were the concrete was encountered to 1.30m BGL and 1.10m BGL respectively. Tarmac was encountered in BH102 and BH103 to a max depth of 0.3m BGL.

MADE GROUND: Made Ground deposits were encountered beneath the Surfacing. The depth of Made Ground varied across the site and was encountered to depths of 1.20m to 5.0m BGL. These deposits were described generally as *brown sandy slightly gravelly CLAY with frequent cobbles and boulders or a brown clayey angular to sub-angular fine to coarse Gravel. These deposits contained occasional to frequent fragments of concrete, red brick, ceramic, mortar, slag and plastic.*

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Made Ground and were described typically as *soft* or *firm brown sandy gravelly CLAY with occasional cobbles and boulders* or a *firm grey slightly gravelly silty CLAY*. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the cohesive matrix. These deposits had some, occasional or frequent cobble and boulder content where noted on the exploratory hole logs. A lower cohesive deposit was encountered in BH102, BH103 and BH106 and was typically described as a *dark grey slightly sandy slightly gravelly silty CLAY*.

GRANULAR DEPOSITS: The granular deposits were encountered the base of the cohesive deposits and were typically described as G*rey brown clayey sandy sub rounded to sub angular fine to coarse GRAVEL with occasional cobbles and rare boulders.* The secondary sand/gravel and silt/clay constituents varied across the site and with depth while occasional or frequent cobble and boulder content also present where noted on the exploratory hole logs. At the location of WS101, WS102A, WS103, WS104, WS106 and WS107 a SAND deposit was encountered beneath the cohesive deposit and was typically described as a brown slightly clayey gravelly fine to coarse SAND with occasional cobbles.
Based on the SPT N values the deposits are typically loose and medium dense. A significant groundwater strike was noted in the boreholes on encountering the granular deposits.

RESIDUAL ROCK: Residual Rock was encountered in BH105 as a significant layer within the competent rock between the depths of 10.30m to 11.40m BGL. The Residual rock was recovered as a *hard very gravelly CLAY with relic bedding.*

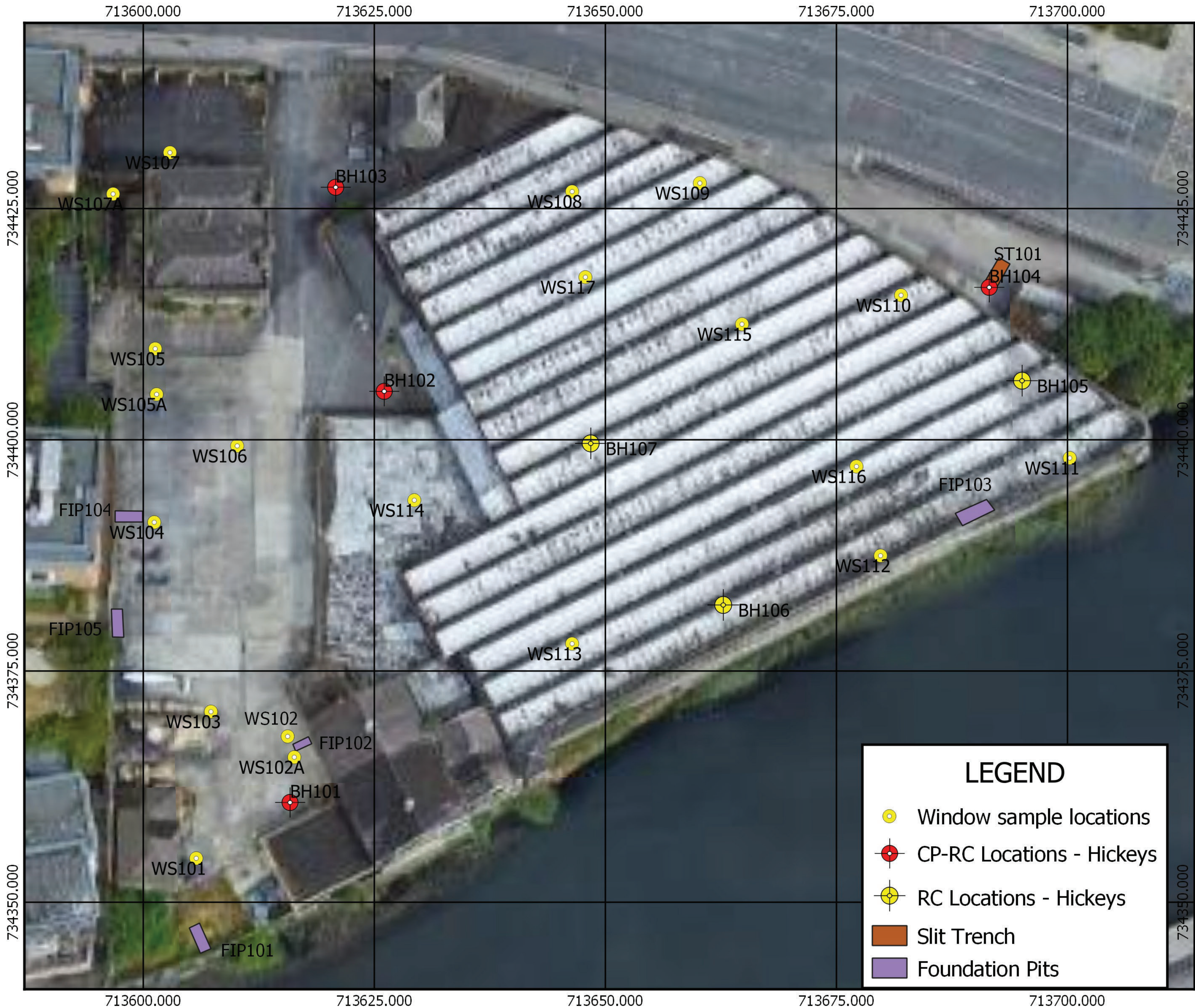
WEATHERED BEDROCK: Weathered Rock was encountered in BH101. This material was recovered typically as *cobbles of Limestone/Mudstone* some clay and sand were also present with the rock mass either from weathering or as infilling to fractures.

BEDROCK: The rotary core boreholes recovered *Medium strong to strong grey/dark grey fine to medium grained laminated LIMESTONE interbedded with weak black fine grained laminated calcareous MUDSTONE.* This is typical of the Calp Formation. Rare visible pyrite veins were noted during logging which are typically present within the Calp Limestone.
The depth to rock varies across the site from 6.40m BGL in BH102 to 8.50m BGL in BH105. The total core recovery is good, typically 100% with some of the uppermost runs dropping to 80 or 90%. The SCR and RQD both are relatively poor in the upper weathered zone, often recovered as non-intact, however both indices show an increase with depth in each of the boreholes.

4.2. Groundwater

Groundwater strikes are noted on the exploratory hole logs where they occurred and where possible drilling was suspended for twenty minutes to allow the subsequent rise in groundwater to be recorded. We would point out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the tide, time of year, rainfall, nearby construction and other factors. For this reason, standpipes were installed in all of the Boreholes and in WS110, WS117 and WS114 to allow the equilibrium groundwater level to be determined. Gas caps were also installed in the window sample installations. The groundwater monitoring is included in Appendix 7 of this Report.

APPENDIX 1 - Site Location Plan



Client:

ARUP

Project Code:

8507-02-19

Project Title:

Hickeys 43 Pargate Place
Rev C

Drawing Title:

Figure 1:
As Built Site Location Plan

GROUND INVESTIGATIONS IRELAND

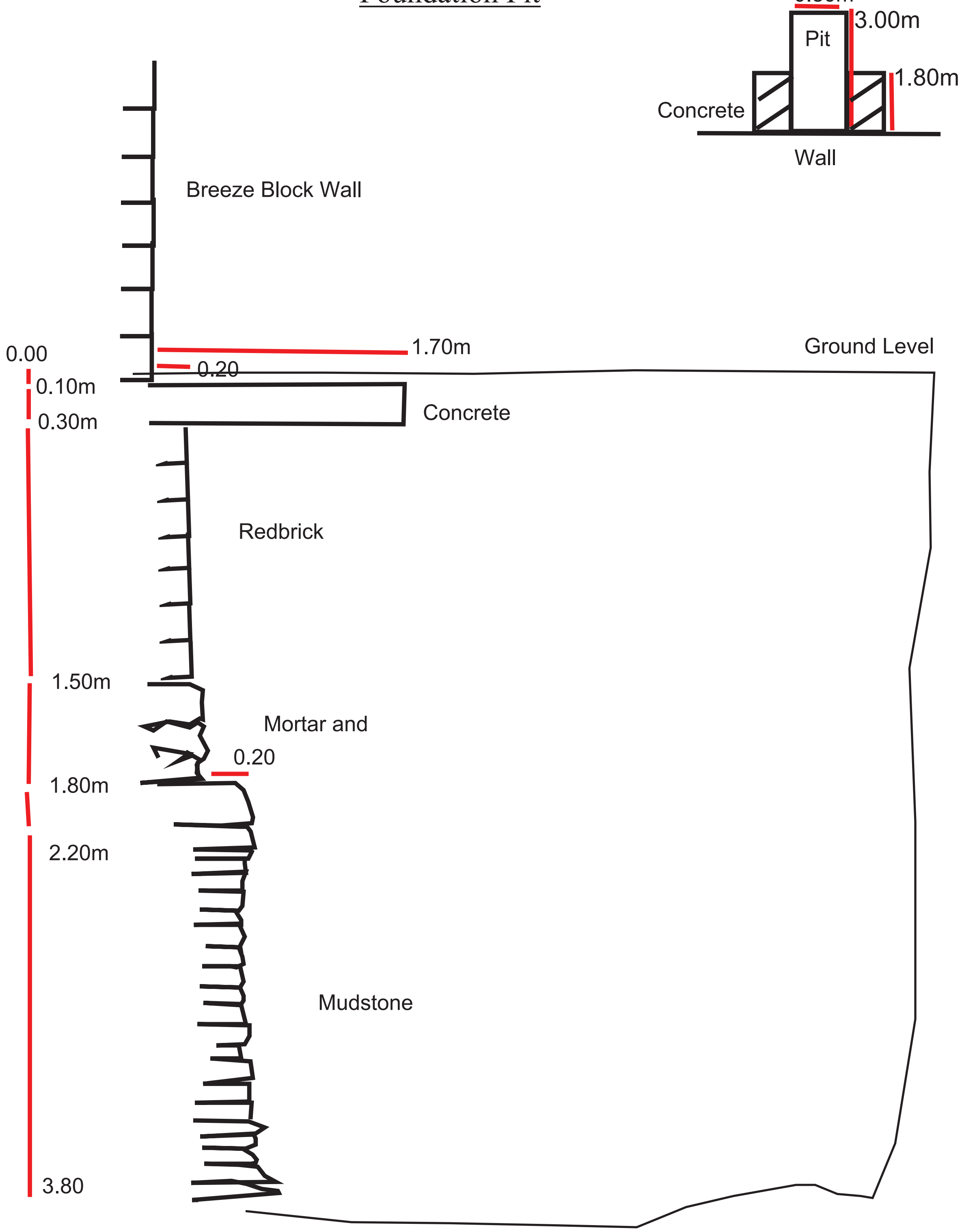
Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

0 20 40 60 m

Drawn By:	Date:
SK	24/06/2019

APPENDIX 2 – Foundation Pit Records

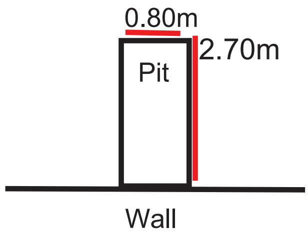
Foundation Pit

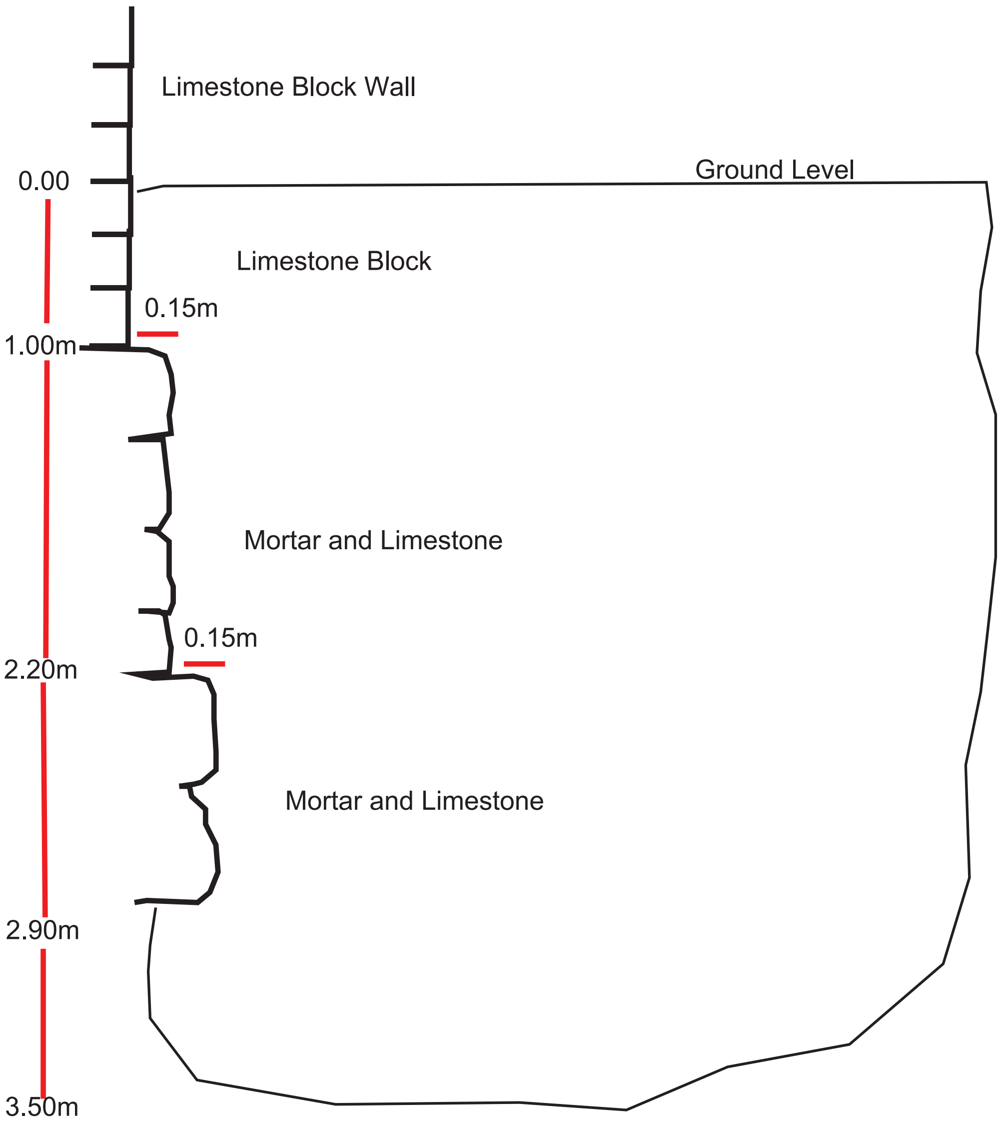


Stratigraphy - See Trial Pit Log

Project	Hickeys Warehouse 43 Parkgate Place	FIP101	
Client	ARUP		
Contractor	Ground Investigations Ireland Ltd	Date	11/04/19

Foundation Pit



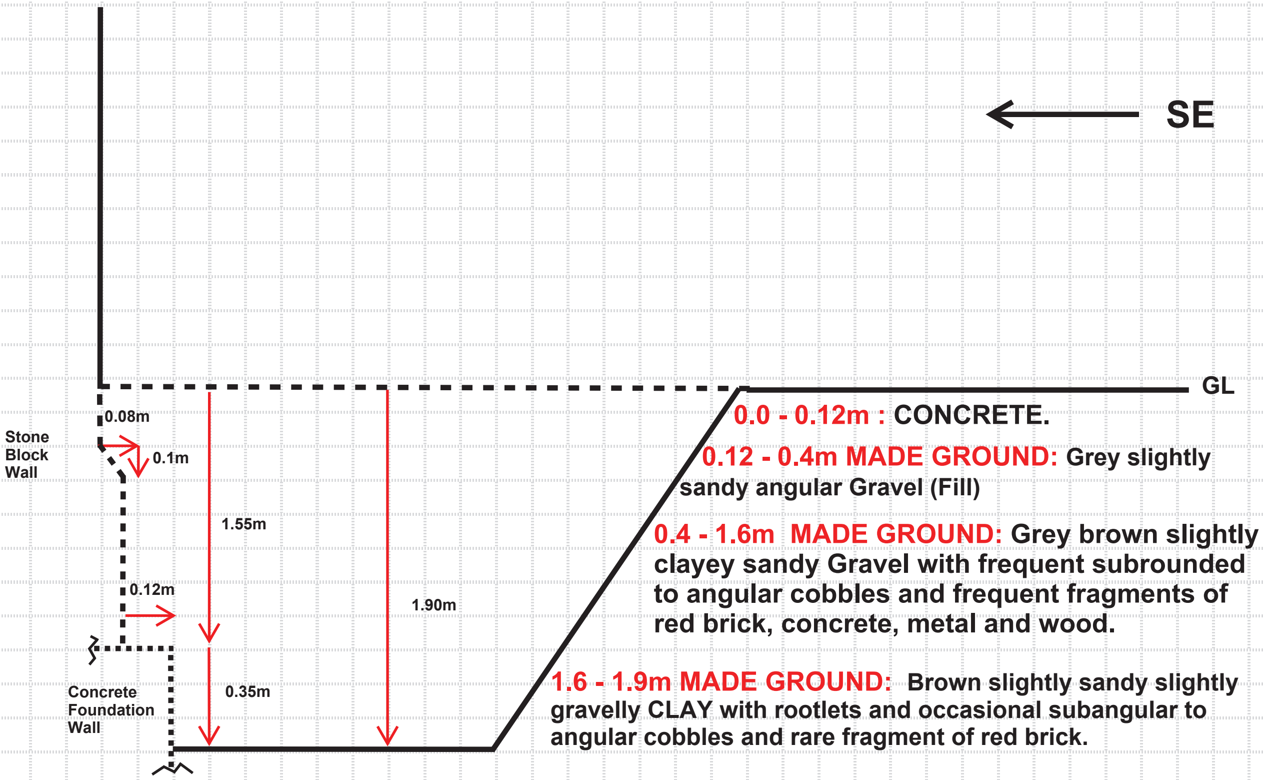


Stratigraphy - See Trial Pit Log

Project	Hickeys Warehouse 43 Parkgate Place	FIP102
Client	ARUP	
Contractor	Ground Investigations Ireland Ltd	Date 11/04/19

GROUND INVESTIGATIONS IRELAND

Ground Investigations Ireland Ltd.,
Catherinestown House,
Hazelhatch Road,
Newcastle, Co Dublin.
Tel: 01 601 5175 / 5176 | Fax: 01 601 5173
Email: info@gii.ie | Web: gii.ie



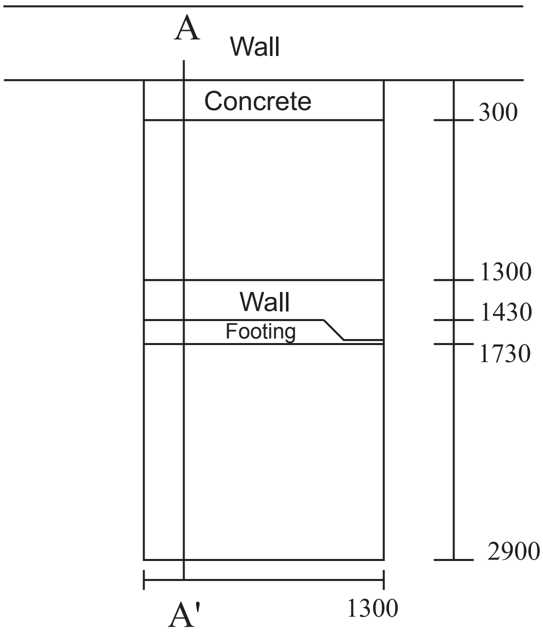
No groundwater encountered in Trial Pit.
Trial Pit sidewalls are unstable.
Trial Pit backfilled upon completion.

Samples: B - 1.0m
B - 1.9m

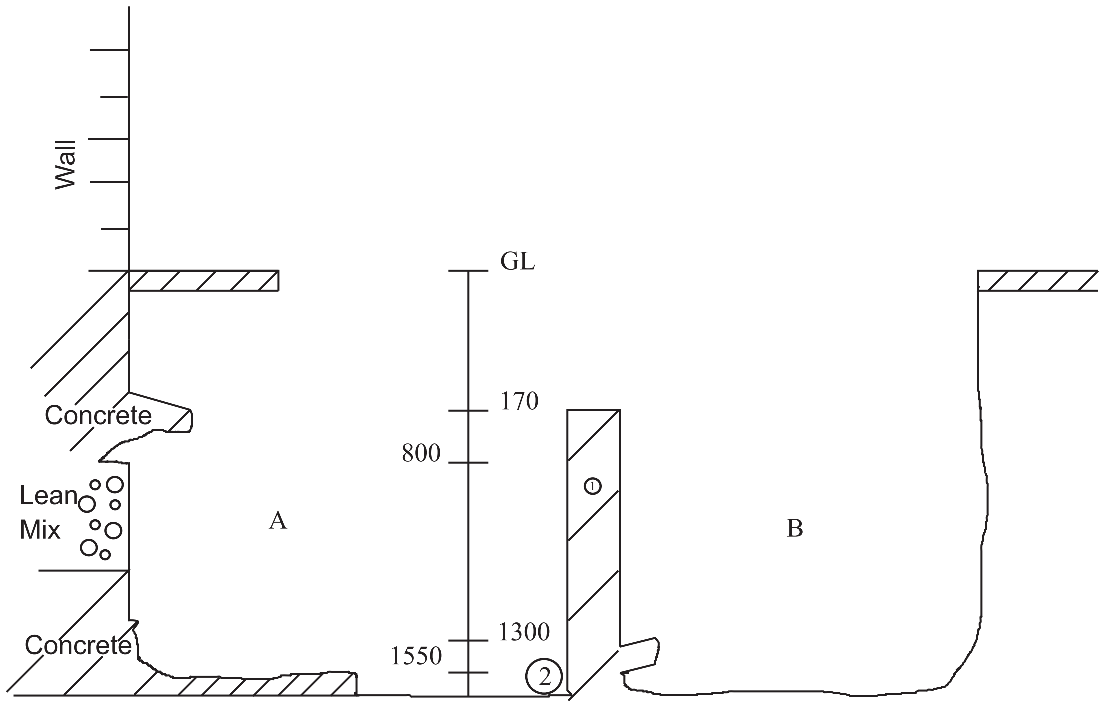
Project	Hickeys 43 Parkgate Place	FIP103	
Client	ARUP		
Contractor	Ground Investigations Ireland Ltd	Date	11/05/2019

FOUNDATION SKETCH

PLAN



CROSS-SECTION A -A'



See associated log for strata details

No Groundwater Encountered

1. 60mm pipe encountered in wall
2. 200mm lead pipe

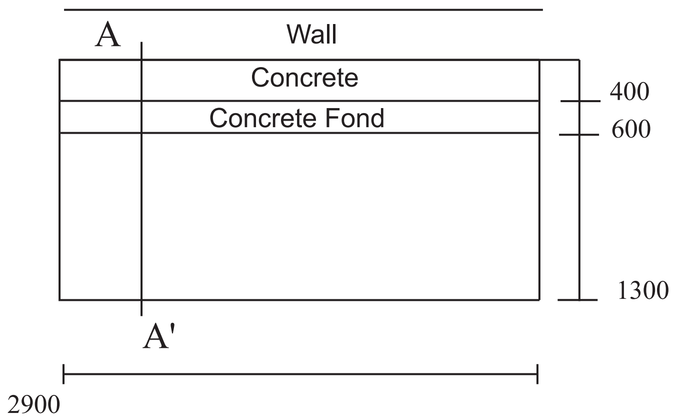
Not to Scale

All measurements in mm

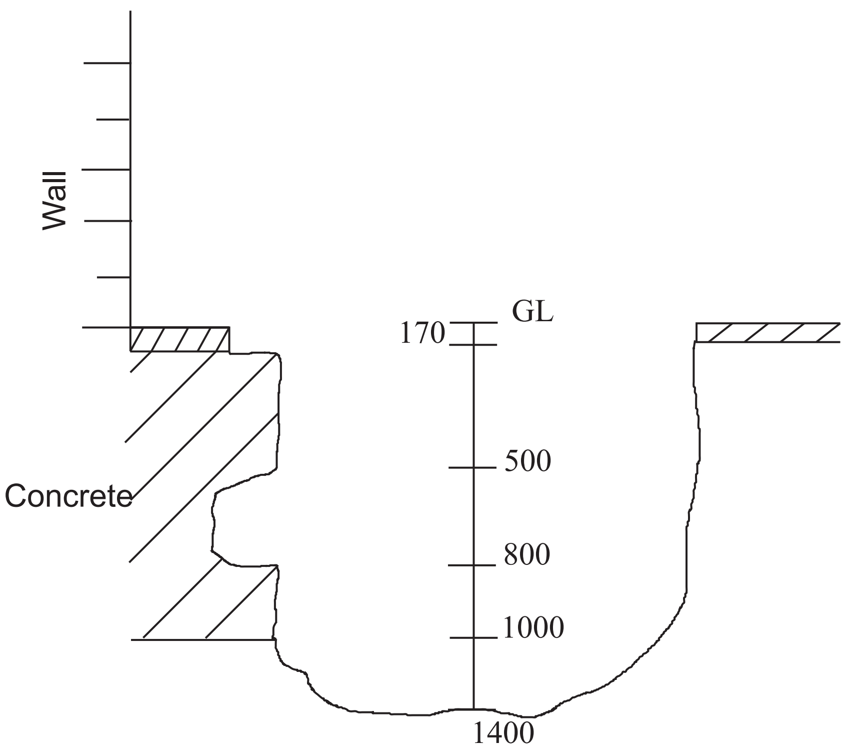
Project:	Hickeys 43 Parkgate Street	FIP104	
Engineer:	ARUP		
Contractor	Ground Investigations Ireland Ltd	**Date**	10/06/2019

FOUNDATION SKETCH

PLAN



CROSS-SECTION A -A'



See associated log for strata details
No Groundwater Encountered

Not to Scale

All measurements in mm

Project:	Hickeys 43 Parkgate Street	FIP105	
Engineer:	ARUP		
Contractor	Ground Investigations Ireland Ltd	**Date**	10/06/2019

Ground Investigations Ireland Ltd www.gii.ie	Site Hickeys 43 Parkgate Place	Trial Pit Number **FIP101**

Machine : JCB 3CX Method : Trial Pit	Dimensions 3.00m x 1.80m	Ground Level (mOD) 3.62	Client ARUP	Job Number 8507-02-19
	Location 713608.9 E 734345.8 N	Dates 11/04/2019	Project Contractor Ground Investigations Ireland	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				3.52	(0.10) 0.10	MADE GROUND: Dark brown slightly sandy slightly gravelly Topsoil with grass rootlets		
				3.32	(0.20) 0.30	MADE GROUND: Concrete and wood		
0.50	EN			2.82	(0.50) 0.80	MADE GROUND: Dark brown slightly sandy very gravelly Clay with rootlets and some redbrick and mortar fragments		
1.00 1.50	B EN			1.82	(1.00) 1.80	MADE GROUND: Dark brown mottled light grey slightly sandy very clayey angular to subangular fine to coarse Gravel with many slag, redbrick and mortar fragments and some glass and ash fragments		
2.00	B			1.32	(0.50) 2.30	MADE GROUND: Brown slightly sandy slightly gravelly Clay with some charcoal and redbrick fragments and old rootlets and shell fragments		
2.50	EN			0.82	(0.50) 2.80	Soft brown very sandy CLAY		▼1
3.50 3.50	B EN			-0.18	(1.00) 3.80	Brown very sandy slightly clayey silty GRAVEL		∇1
			slow ingress(1) at 3.80m, rose to 2.50m in 20 mins.			Complete at 3.80m		

Plan

Remarks

Trial carried out to expose foundation
Groundwater encountered at 3.80m BGL
Side wall collapse
Trial plt backfilled on completion

Scale (approx)	Logged By	Figure No.
1:25	DML	8507-02-19.FP101

Ground Investigations Ireland Ltd
www.gii.ie

Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 2.70m x 0.80m	**Ground Level (mOD)** 3.95	**Client** ARUP	**Job Number** 8507-02-19
	Location 713616.4 E 734366.6 N	**Dates** 11/04/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Site: Hickeys 43 Parkgate Place

Trial Pit Number: FIP102

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				3.85	(0.10) 0.10	Reinforced Concrete		
0.50	EN					MADE GROUND: Dark brown slightly sandy very clayey angular to subangular fine to coarse Gravel with limestone boulders, redbrick, granite block and mortar fragments		
1.50	EN			2.15	(1.70) 1.80			
2.50 2.50	B EN			0.95	(1.20) 3.00	Soft brown slightly gravelly sandy CLAY with shell and rootlet fragments		
			slow ingress(1) at 3.20m.	0.45	(0.50) 3.50	Brown very clayey gravelly fine to coarse SAND		∇1
3.50	EN					Complete at 3.50m		

Plan

Remarks

Trial pit carried out to expose foundation
Groundwater encountered at 3.80m BGL
Side wall collapse
Trial pit backfilled and reinstated on completion

Scale (approx)	Logged By	Figure No.
1:25	DML	8507-02-19.FIP102

Ground Investigations Ireland Ltd www.gii.ie	Site: Hickeys 43 Parkgate Place	Trial Pit Number: FIP103

Machine : JCB 3CX Method : Trial Pit	Dimensions: 2.70m x 0.80m	Ground Level (mOD): 4.25	Client: ARUP	Job Number: 8507-02-19
	Location: 713690.6 E 734391.9 N	Dates: 11/05/2019	Project Contractor: Ground Investigations Ireland	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				4.13	(0.12) 0.12	Concrete		
				3.85	(0.28) 0.40	MADE GROUND: Grey slightly sandy angular Gravel		
1.00-1.00	B			2.65	(1.20) 1.60	MADE GROUND: Grey brown slightly clayey sandy Gravel with frequent sub-rounded to angular cobbles and frequent fragments of red brick, concrete, metal and wood		
1.90-1.90	B			2.35	(0.30) 1.90	MADE GROUND: Brown slightly clayey sandy gravelly Clay with rootlets and occasional sub-angular to angular cobbles and rare fragments of red brick		
						Complete at 1.90m		

Plan

Remarks

Trial pit carried out to expose foundation
No groundwater encountered
Side wall collapse
Trial pit backfilled and reinstated on completion

Scale (approx)	Logged By	Figure No.
1:25	DML	8507-02-19.FIP103

Ground Investigations Ireland Ltd www.gii.ie	Site Hickeys 43 Parkgate Place	Trial Pit Number FIP104A

Machine : JCB 3CX Method : Trial Pit	Dimensions 2.90m x 1.30m	Ground Level (mOD) 3.67	Client ARUP	Job Number 8507-02-19
	Location 713596.9 E 734391.8 N	Dates 11/05/2019	Project Contractor Ground Investigations Ireland	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				3.50	(0.17) 0.17	Concrete		
0.50-0.50	T					MADE GROUND: Dark brown sandy gravelly Clay with occasional red brick and mortar fragments		
1.00-1.00	T			2.37	(1.13) 1.30			
						Complete at 1.30m		

Plan

Remarks

Trial pit carried out to expose foundation
No groundwater encountered
Trial pit stable
Trial pit backfilled and reinstated on completion

Scale (approx)	Logged By	Figure No.
1:25	DML	8507-02-19.FIP104A

Ground Investigations Ireland Ltd www.gii.ie	Site: Hickeys 43 Parkgate Place	Trial Pit Number: FIP104B

Machine : JCB 3CX Method : Trial Pit	Dimensions: 2.90m x 1.55m	Ground Level (mOD): 3.67	Client: ARUP	Job Number: 8507-02-19
	Location: 713596.9 E 734391.8 N	Dates: 11/05/2019	Project Contractor: Ground Investigations Ireland	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				3.50	(0.17) 0.17	Concrete		
0.50-0.50	T					MADE GROUND: Dark brown/black slightly sandy very clayey angular to sub-angular fine to medium Gravel with frequent slag fragments, red brick, ropes and wire		
1.00-1.00	T				(1.38)			
				2.12	1.55	Complete at 1.55m		

Plan

Remarks

Trial pit is a continuation of FIP104 - See associated Foundation Pit log
No groundwater encountered
Trial pit stable
Trial pit backfilled and reinstated on completion

Scale (approx)	Logged By	Figure No.
1:25	DML	8507-02-19.FIP104B

Ground Investigations Ireland Ltd
www.gii.ie

Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** 2.30m x 0.90m	**Ground Level (mOD)** 3.65	**Site** Hickeys 43 Parkgate Place **Client** ARUP	**Trial Pit Number** FIP105 **Job Number** 8507-02-19
	Location 713596.6 E 734379.8 N	**Dates** 11/05/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				3.48	(0.17) 0.17	Concrete		
1.20-1.20	T			2.25	(1.23) 1.40	MADE GROUND: dark reddish brpwn sandy very clayey fine to coarse angular to sub-rounded Gravel with frequent redbrick, slag, plastic and glass fragments		
						Complete at 1.55m		

Plan

Remarks

Trial pit carried out to expose foundation
No groundwater encountered
Trial pit stable
Trial pit backfilled and reinstated on completion

Scale (approx)	Logged By	Figure No.
1:25	DML	8507-02-19.FIP105

8507-02-19 Hickeys – Trial Pit Photographs

FIP101

FIP101

FIP101

FIP101

FIP101

FIP101

FIP101

FIP102

FIP102

FIP102

FIP102

FIP102

FIP102

FIP102

FIP103

FIP103

FIP103

FIP104

FIP104A

FIP104A

FIP104A

FIP104B

FIP104B

FIP105

FIP105

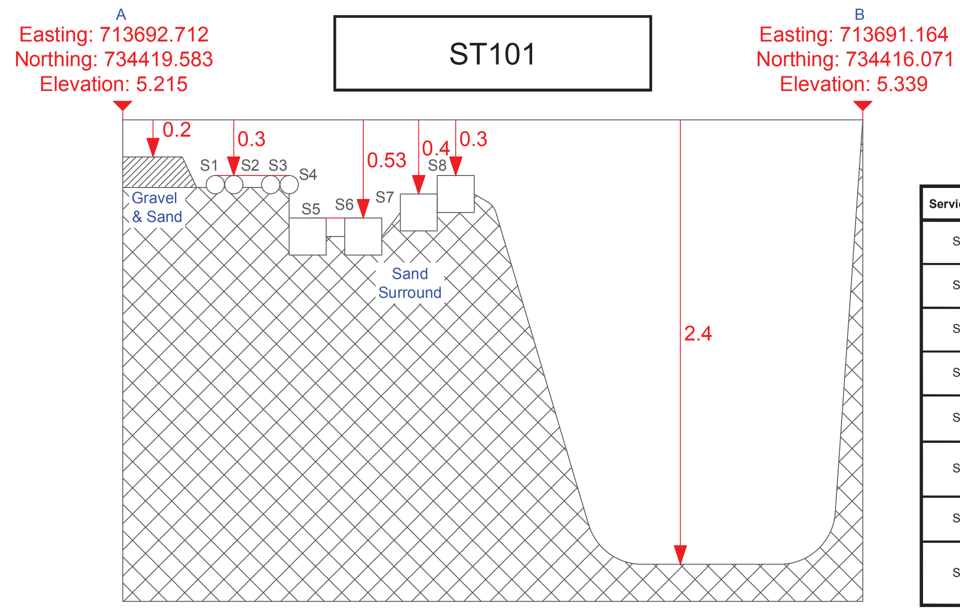
FIP105

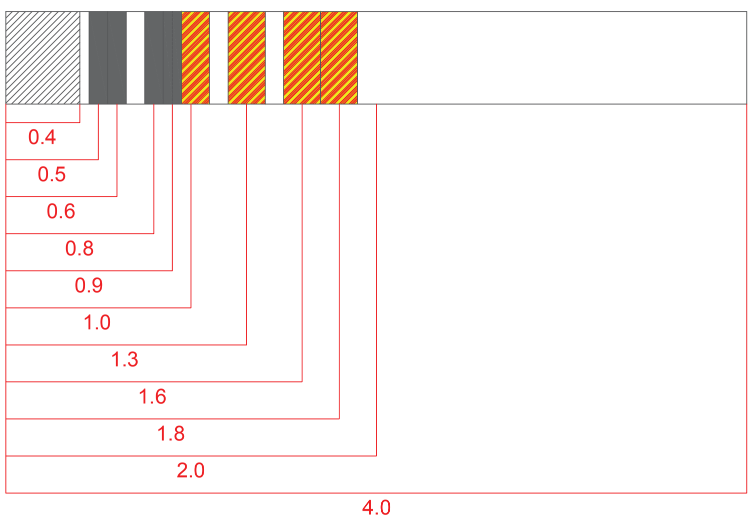
FIP105

FIP105

APPENDIX 3 – Slit Trench Records

ST101





Service No	ø (m)	Colour- Material	Utility	Angle to trench	Co-ordinates	Elevation
S1	0.100	Black Plastic	Eircom	85	713692.712 734419.583	4.94
S2	0.100	Black Plastic	Eircom	85	713692.727 734418.989	4.942
S3	0.100	Black Plastic	Eircom	85	713692.717 713692.717	4.94
S4	0.100	Black Plastic	Eircom	85	713692.623 734418.779	4.893
S5	0.200	Yellow and Red Tiles	ESB	90	713692.544 734418.52	4.794
S6	0.200	Yellow and Red Tiles	ESB	90	713692.475 734418.223	4.784
S7	0.200	Yellow and Red Tiles	Eircom	85	713692.368 734418.004	4.858
S8	0.200	Yellow and Red Tiles	Eircom	85	734417.813 713692.285	4.937

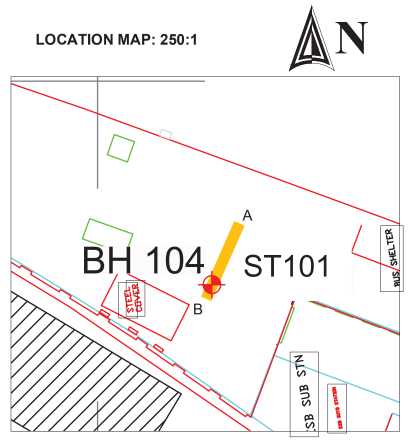
From (m)	To (m)	Description
0.00	0.08	Concrete
0.08	0.40	MADE GROUND: Grey brown slightly sandy clayey angular to sub-rounded fine to coarse Gravel
0.40	0.80	MADE GROUND: Brown mottled black slightly sandy gravelly Clay with many redbrick, mortar, ash and ceramic fragments
0.80	2.50	MADE GROUND: Dark grey brown slightly sandy gravelly Clay with ash, redbrick and mortar fargments

Groundwater	Y/N	Depth

Surface from/to		Surface type
0.00	4.00	Concrete

Sample Type	Sample Depth
Env	0.50
Env	1.00
Env	1.80
Env	2.50

LOCATION MAP: 250:1



Legend

Slit Trench

Borehole

NB: ALL m OD LEVELS ARE TO GROUND LEVEL ABOVE SERVICES

DATE OF EXCAVATION : 10/04/19

Ground Investigations Ireland Ltd.
Catherinestown
Hazelhatch Road,
Newcastle,
Co Dublin
Tel: +353-(0)1 6015175/6
Fax: +353-(0)1 601 5173
Email: info@gii.ie
Web: www.gii.ie

PROJECT:	Hickeys 43 Parkgate Place
DRAWING No.:	ST101
DATE:	April 2019
CLIENT:	ARUP
SCALE:	0.0347 @ A3

Version:	Date:	Drawn By:	Checked By:
Draft 2	30/04/2019	G.S.	S.C.

8507-02-19 Hickeys –Slit Trench Photographs

ST101

ST101

ST101

ST101


ST101


ST101

ST101

ST101

APPENDIX 4 – Window Sample Records

Ground Investigations Ireland Ltd www.gii.ie	Site: Hickeys 43 Parkgate Place	Number: WS101

Machine : TEC OP 10	Dimensions	Ground Level (mOD)	Client	Job Number
Method : Drive-in Windowless Sampler		3.66	ARUP	8507-02-19
	Location	Dates	Project Contractor	Sheet
	713606.9 E 734356.4 N	03/04/2019	Ground Investigations Ireland	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				3.56	(0.10) 0.10	CONCRETE		
					(0.45)	MADE GROUND: Reddish brown slightly sandy clayey angular to subangular fine to medium Gravel with redbrick and mortar fragments 0.00-0.55m - Hand Pit 0.55-1.00m - 75% Recovery		
0.50 0.50-1.00	EN B			3.11	0.55			
1.00 1.00-2.00	EN B				(1.05)	MADE GROUND: Grey brown sandy very gravelly Clay with some old redbrick, mortar, slag and charcoal fragments 1.00-2.00m - 65% Recovery		
				2.06	1.60			
					(0.40)	MADE GROUND: Light brown slightly sandy silty Clay with occasional charcoal and mortar fragments		
2.00 2.00-3.00	EN B			1.66	2.00			
					(0.90)	Soft light brown slightly sandy silty CLAY 2.00-3.00m - 45% Recovery		
				0.76	2.90			
3.00 3.00-4.00	EN B				(1.10)	Brown slightly clayey gravelly fine to coarse SAND with occasional cobbles 3.00-4.00m - 55% Recovery		
4.00	EN			-0.34	4.00	Complete at 4.00m		

Remarks
Concrete coring carried out prior to hand pit
0.00-0.55m BGL - Hand Pit
Window sample terminated at scheduled depth
Window Sample hole backfilled and re-instated upon completion

Scale (approx)	Logged By
1:25	DML

Figure No. 8507-02-19.WS101

Ground Investigations Ireland Ltd www.gii.ie			**Site** Hickeys 43 Parkgate Place	**Number** **WS102**
Machine : TEC OP 10 **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)** 3.90	**Client** ARUP	**Job Number** 8507-02-19
	Location 713615.6 E 734368 N	**Dates** 04/04/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.04-1.20	B			3.81	(0.09) 0.09	CONCRETE		
				3.50	(0.31) 0.40	MADE GROUND:Brown sandy very clayey angular to subrounded fine to coarse Gravel with some angular to subangular cobbles and boulders 0.00-0.40m - Hand Pit		
0.60	EN					MADE GROUND: Dark grey mottled slightly sandy very gravelly Clay with redbrick, ash and slag fragments 0.40-1.00m - 100% Recovery		
				2.70	(0.80) 1.20	1.00-1.20m -100% Recovery		
1.20	EN					Obstruction due to Cobble or Boulder		
						Complete at 1.20m		

Remarks
Concrete coring carried out prior to hand pit
0.00-0.40m BGL - Hand Pit
Window Sample terminated at 1.20m BGL due to Obstruction of cobble or boulder
Window Sample hole backfilled and re-instated upon completion

Scale (approx)	Logged By
1:25	DML

Figure No.
8507-02-19.WS102

Ground Investigations Ireland Ltd www.gii.ie	Site: Hickeys 43 Parkgate Place	Number: WS102A

Machine : TEC OP 10 Method : Drive-in Windowless Sampler	Dimensions	Ground Level (mOD): 3.88	Client: ARUP	Job Number: 8507-02-19
	Location: 713616.3 E 734365.8 N	Dates: 06/04/2019	Project Contractor: Ground Investigations Ireland	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.60	B			3.78	(0.10) 0.10	CONCRETE		
						MADE GROUND: Black slightly sandy very clayey fine to medium angular to sub-rounded Gravel with some slag and mortar fragments		
						0.00-0.60m - Handpit		
0.50-0.50	EN							
0.60-1.90	B							
						0.60-1.00m - 40% Recovery		
0.90-0.90	EN				(1.80)			
1.50-1.50	EN					1.00-2.00m - 65% Recovery		
1.90-2.90	B			1.98	1.90	Soft brown silty CLAY with occasional shell fragments.		
					(1.00)			
2.50-2.50	EN					2.00-3.00m - 85% Recovery		
2.90-4.00	B			0.98	2.90	Brown slightly clayey gravelly fine to coarse SAND		
					(1.10)			
3.50-3.50	EN					3.00-4.00m - 65% Recovery		
				-0.12	4.00	Complete at 4.00m		

Remarks
Concrete coring coring carried out prior to hand pit
0.00-0.60m - Hand pit
Window Sample terminated at scheduled depth
Window Sample hole backfilled and re-instated upon completion

Scale (approx)	Logged By
1:25	NM

Figure No. 8507-02-19.WS102A

Ground Investigations Ireland Ltd www.gii.ie	Site: Hickeys 43 Parkgate Place	Number: WS103

Machine : TEC OP 10 Method : Drive-in Windowless Sampler	Dimensions	Ground Level (mOD) 3.69	Client ARUP	Job Number 8507-02-19
	Location 713607.3 E 734370.7 N	Dates 03/04/2019	Project Contractor Ground Investigations Ireland	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-3.50	B				(0.24)	CONCRETE		
				3.45	0.24	MADE GROUND: Brown slightly sandy very gravelly Clay		
					(0.36)	0.00-1.00m - 75% Recovery		
0.60	EN			3.09	0.60	MADE GROUND: Dark brown black mottled orange sandy clayey angular to subrounded fine to medium Gravel with redbrick, mortar and slag fragments		
					(0.40)			
				2.69	1.00	MADE GROUND: Dark grey brown slightly sandy gravelly Clay with ceramic and mortar fragments		
					(0.60)	1.00-2.00m - 80% Recovery		
1.60	EN			2.09	1.60	MADE GROUND: Dark grey brown sandy very clayey angular to subrounded fine to coarse Gravel with many slag fragments		
					(1.70)	2.00-3.00m - 50% Recovery		
2.60	EN							
				0.39	3.30	Soft to firm brown slightly sandy silty CLAY		
					(0.30)	3.00-4.00m - 75% Recovery		
3.50 3.50-4.00	EN B			0.09	3.60	Brown gravelly subangular to subrounded fine to coarse SAND		
3.80	EN				(0.40)			
				-0.31	4.00	Complete at 4.00m		

Remarks
Concrete caring carried out prior to hand
Hand pit carried out to 0.50m BGL
Window Sample terminated at scheduled depth
Window Sample hole backfilled and re-instated upon completion

Scale (approx)	Logged By
1:25	DML

Figure No. 8507-02-19.WS103

Ground Investigations Ireland Ltd
www.gii.ie

Site Hickeys 43 Parkgate Place				**Number** **WS104**
Machine : TEC OP 10 **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)** 3.71	**Client** ARUP	**Job Number** 8507-02-19
	Location 713601.2 E 734391.1 N	**Dates** 30/03/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.14)	CONCRETE		
0.14-2.00	B			3.57	0.14	MADE GROUND: Dark brown sandy clayey angular to subangular fine to coarse Gravel with many redbrick, mortar, slag and charcoal fragments		
0.50	EN					0.00-1.00m - 62% Recovery		
					(1.66)			
1.50	EN					1.00-2.00m - 100% Recovery		
				1.91	1.80	MADE GROUND: Brown slightly sandy slightly gravelly silty Clay with occasional mortar and charcoal fragments		
					(0.20)			
2.00-2.80	B			1.71	2.00	Soft brown SILT/CLAY		
					(0.60)			
2.50	EN					2.00-3.00m - 100% Recovery		
				1.11	2.60	Light brown slightly clayey slightly gravelly fine to coarse SAND		
					(0.20)			
				0.91	2.80	Obstruction due to Cobble or Boulder		
						Complete at 2.80m		

Remarks
Concrete Coring carried out prior to hand pit
Hand pit carried out to 0.50m BGL
Window Sample terminated at 2.80m BGL due to obstruction of cobble or boulder
Window Sample hole backfilled and re-instated upon completion

Scale (approx)	Logged By
1:25	DML

Figure No. 8507-02-19.WS104

Ground Investigations Ireland Ltd www.gii.ie		**Site** Hickeys 43 Parkgate Place	**Number** **WS105**
Machine : TEC OP 10 **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)** 4.00	**Client** ARUP	**Job Number** 8507-02-19
	Location 713601.3 E 734409.9 N	**Dates** 04/04/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				3.87	(0.13) 0.13	CONCRETE		
				3.50	(0.37) 0.50	MADE GROUND: Brown concrete Cobbles and Boulders with some slightly clayey sandy angular to subangular fine to coarse Gravel		
						Obstruction due to Asbestos and boulders		
						Complete at 0.50m		

Remarks
0.00-0.50m BGL - Hand Pit
Window Sample terminated at 0.50m BGL on encountering asbestos and the obstruction of a boulder
Window Sample hole backfilled and re-instated upon completion

Scale (approx)	**Logged By**
1:25	DML

Figure No.
8507-02-19.WS105

Ground Investigations Ireland Ltd www.gii.ie			Site Hickeys 43 Parkgate Place	Number **WS105A**
Machine : TEC OP 10 **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)** 3.97	**Client** ARUP	**Job Number** 8507-02-19
	Location 713601.4 E 734405 N	**Dates** 04/04/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.16)	CONCRETE		
				3.81	0.16	MADE GROUND: Dark grey brown slightly clayey angular to subrounded fine to medium Gravel with many old redbrick, tarmacadam, mortar and slag fragments		
0.40-1.00	B							
0.50	EN				(0.84)	0.00-1.00m BGL - 71% Recovery		
1.00-1.30	B			2.97	1.00	MADE GROUND: Brown slightly sandy very clayey angular to subangular fine to coarse Gravel with occasional redbrick, mortar and slag fragments		
					(0.30)	1.00-1.30m BGL 100% Recovery		
1.30	EN			2.67	1.30	Obstruction due to Cobble or Boulder		
						Complete at 1.30m		

Remarks	Scale (approx)	Logged By
Concrete coring carried out prior to hand pit Hand pit carried out to 0.50m BGL Window Sample terminated at 1.30m BGL due to obstruction of cobble or boulder Window Sample hole backfilled and re-instated upon completion	1:25	DML
	Figure No. 8507-02-19.WS105A	

Ground Investigations Ireland Ltd www.gii.ie	Site: Hickeys 43 Parkgate Place	Number: WS106

Machine : TEC OP 10 Method : Drive-in Windowless Sampler	Dimensions	Ground Level (mOD): 3.61	Client: ARUP	Job Number: 8507-02-19
	Location: 713610.2 E 734399.4 N	Dates: 30/03/2019	Project Contractor: Ground Investigations Ireland	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.14)	CONCRETE		
0.14-2.50	B			3.47	0.14	MADE GROUND: Brown slightly sandy gravelly Clay with many mortar and red brick fragments		
0.50	EN					0.00-1.00m - 100% Recovery		
					(1.26)			
1.00	EN							
				2.21	1.40	MADE GROUND: Dark brown black slightly sandy slightly gravelly silty Clay with some slag and redbrick fragments 1.00-2.00m - 80% Recovery		
					(0.70)			
				1.51	2.10	MADE GROUND: Dark brown slightly sandy very gravelly Clay with some slag and redbrick fragments		
2.20	EN				(0.40)			
2.50-3.00	B			1.11	2.50	Soft brown SILT/CLAY 2.00-3.00m - 90% Recovery		
					(0.50)			
2.80	EN							
3.00-4.00	B			0.61	3.00	Light brown slightly clayey slightly gravelly fine to coarse SAND		
					(1.00)	3.00-4.00m - 70% Recovery		
				-0.39	4.00	Complete at 4.00m		

Remarks
Concrete Coring carried out prior to hand pit
Hand pit carried out to 0.50m BGL
Window Sample terminated at scheduled depth
Window Sample hole backfilled and re-instated upon completion

Scale (approx)	Logged By
1:25	DML

Figure No. 8507-02-19.WS106

Ground Investigations Ireland Ltd www.gii.ie			Site: Hickeys 43 Parkgate Place	Number: **WS107**
Machine : TEC OP 10 **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)** 4.64	**Client** ARUP	**Job Number** 8507-02-19
	Location 713602.9 E 734431.1 N	**Dates** 30/03/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.70)	Tarmac with cobbles throughout		
				3.94	0.70	Concrete and boulders		
				3.89	0.75	Complete at 0.75m		

Remarks
Tarmac cut and broken out using consaw and kango
Window Sample refused due to obstruction of concrete and boulders
Window Sample hole backfilled and re-instated upon completion

Scale (approx)	Logged By
1:25	DML

Figure No. 8507-02-19.WS107

Ground Investigations Ireland Ltd www.gii.ie	Site Hickeys 43 Parkgate Place	Number **WS107A**

Machine : TEC OP 10 **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)** 4.25	**Client** ARUP	**Job Number** 8507-02-19
	Location 713596.8 E 734426.6 N	**Dates** 30/04/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						MADE GROUND: Grey brown slightly sandy very gravelly CLAY with some redbrick fragments		
0.50 0.50	B EN							
					(1.60)			
				2.65	1.60	MADE GROUND: Brown slightly sandy slightly gravelly CLAY with some redbrick fragments		
1.70 1.70	B EN							
					(0.50)			
				2.15	2.10	Soft grey slightly gravelly SILT/CLAY with occasional shell fragments		
2.50 2.50	B EN							
					(1.00)			
				1.15	3.10	Grey brown sandy very clayey angular to subrounded fine to medium GRAVEL		
					(0.60)			
3.50 3.50	B EN							
				0.55	3.70	Obstruction due to cobble or boulder		
						Complete at 3.70m		

Remarks	**Scale (approx)**	**Logged By**
Concrete coring carried out prior to hand pit Hand pit carried out to 0.50m BGL Window Sample terminated at 3.70m BGL due to obstruction of cobble or boulder Window Sample hole backfilled and re-instated upon completion	1:25	DML
	Figure No. 8507-02-19.WS107	

Ground Investigations Ireland Ltd www.gii.ie	Site: Hickeys 43 Parkgate Place	Number: WS108

Machine : TEC OP 10 **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)** 4.25	**Client** ARUP	**Job Number** 8507-02-19
	Location 713646.4 E 734426.9 N	**Dates** 30/03/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				4.13	(0.12) 0.12	CONCRETE 0.00-0.70m - Hand Pit		
0.12-0.70	B							
					(0.58)	MADE GROUND: Grey brown sandy clayey angular to subrounded fine to coarse Gravel with many redbrick and concrete fragments 0.70-1.00m - 100% Recovery		
0.50 0.50-2.60	EN B							
				3.55	0.70	MADE GROUND: Brown slightly sandy gravelly Clay with some charcoal and mortar fragments 1.00-2.00m - 80% Recovery 2.00-3.00m - 80% Recovery		
1.50	EN				(1.90)			
2.00	EN							
				1.65	2.60	Soft to firm brown slightly sandy gravelly CLAY		
2.60-3.50	B				(0.40)			
				1.25	3.00	Soft grey brown CLAY		
					(0.50)			
3.50	EN			0.75	3.50	3.00-4.00m - 20% Recovery Complete at 3.58m		

Remarks
Concrete Coring carrid out prior to hand pit
Hand pit carried out to 0.70m BGL
Window Sample terminated at 3.50m BGL due to obstruction of cobble or boulder
Window Sample hole backfilled and re-instated upon completion
Not possible to establish by GPS the locations of internal exploratory holes
The coordinates have been determined using the location plan drawing
The elevation is estimated at 4.25 mOD based on levels taken outside and a measurement taken to the top of finished floor level

Scale (approx)	Logged By
1:25	DML

Figure No. 8507-02-19.WS108

Ground Investigations Ireland Ltd www.gii.ie		Site: Hickeys 43 Parkgate Place	Number: **WS109**
Machine: TEC OP 10 Method: Drive-in Windowless Sampler	Dimensions:	Ground Level (mOD): 4.25	Client: ARUP	Job Number: 8507-02-19
	Location: 713660.2 E 734427.8 N	Dates: 06/04/2019	Project Contractor: Ground Investigations Ireland	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				4.17	(0.08) 0.08	CONCRETE		
0.08-1.00	B					MADE GROUND: Brown slightly sandy slightly gravelly Clay with some redbrick mortar charcoal and ceramic fragments		
						0.08-1.00m - 100% Recovery		
0.90	EN							
1.00-2.00	B							
						1.00-2.00m - 80% Recovery		
1.90	EN							
2.00-3.00	B				(3.92)			
						2.00-3.00m - 50% Recovery		
2.90	EN							
3.00-3.90	B							
						3.00-4.00m - 10% Recovery		
3.90	EN							
				0.25	4.00	Complete at 4.00m		

Remarks
Concrete Coring carried out prior to hand pit
Hand pit carried out to 0.50m BGL
Window sample terminated at required depth
Window Sample hole backfilled and re-instated upon completion
Not possible to establish by GPS the locations of internal exploratory holes
The coordinates have been determined using the location plan drawing
The elevation is estimated at 4.25 mOD based on levels taken outside and a measurement taken to the top of finished floor level

Scale (approx): 1:25
Logged By: NM
Figure No.: 8507-02-19.WS109

Ground Investigations Ireland Ltd www.gii.ie	Site Hickeys 43 Parkgate Place	Number **WS110**
Machine : TEC OP 10 **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)** 4.25
	Client ARUP	**Job Number** 8507-02-19
Location 713682 E 734415.7 N	**Dates** 06/04/2019	
Project Contractor Ground Investigations Ireland	**Sheet** 1/1	

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	B			4.17	(0.08) 0.08	CONCRETE		
					(0.92)	MADE GROUND: Dark brown mottled orange slightly sandy very clayey fine to medium Gravel with redbrick and mortar fragments 0.00-1.00m - 22% Recovery		
0.90	EN							
1.00-2.00	B			3.25	1.00	MADE GROUND: Brown slightly sandy gravelly Clay with occasional redbrick mortar shell and bone fragments 1.00-2.00m - 70% Recovery		
1.80	EN							
2.00-3.00	B				(2.30)	2.00-3.00m - 100% Recovery		
2.90	EN							
3.00-4.00	B							
				0.95	3.30	Soft to firm dark grey CLAY with occasional shell fragments 3.00-4.00m - 80% Recovery		
3.50	EN				(0.50)			
				0.45	3.80 (0.20)	Dark grey slightly sandy very clayey fine to coarse sub-angular to sub-rounded GRAVEL		
				0.25	4.00	Complete at 4.00m		

Remarks
Concrete coring carried out prior to hand pit
Hand pit carried out to 0.50m BGL
Window Sample terminated at required depth
Window Sample hole backfilled and re-instated upon completion
Not possible to establish by GPS the locations of internal exploratory holes
The coordinates have been determined using the location plan drawing
The elevation is estimated at 4.25 mOD based on levels taken outside and a measurement taken to the top of finished floor level

Scale (approx)	Logged By
1:25	NM

Figure No.
8507-02-19.WS110

Ground Investigations Ireland Ltd www.gii.ie	Site: Hickeys 43 Parkgate Place	Number: WS111

Machine : TEC OP 10 / Method : Drive-in Windowless Sampler	Dimensions	Ground Level (mOD): 4.25	Client: ARUP	Job Number: 8507-02-19
	Location: 713700.3 E 734398.1 N	Dates: 06/04/2019	Project Contractor: Ground Investigations Ireland	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				4.14	(0.11) 0.11	CONCRETE		
					(0.44)	MADE GROUND: Grey brown mottled yellow slightly sandy clayey fine to coarse angular to sub-rounded Gravel with some yellow brick fragments Handpit to 0.55m		
0.50	EN			3.70	0.55	Complete at 0.55m		

Remarks
Concrete carried out prior to hand pit
0.00-0.55m BGL Hand pit
Window Sample terminated at 0.55m BGL due to obstruction of old wall.
Window Sample hole backfilled and re-instated upon completion
Not possible to establish by GPS the locations of internal exploratory holes
The coordinates have been determined using the location plan drawing
The elevation is estimated at 4.25 mOD based on levels taken outside and a measurement taken to the top of finished floor level

Scale (approx)	Logged By
1:25	NM

Figure No. 8507-02-19.WS111

Ground Investigations Ireland Ltd www.gii.ie		Site: Hickeys 43 Parkgate Place	Number: WS112
Machine: TEC OP 10 Method: Drive-in Windowless Sampler	Dimensions:	Ground Level (mOD): 4.25	Client: ARUP	Job Number: 8507-02-19
	Location: 713679.8 E 734387.6 N	Dates: 06/04/2019	Project Contractor: Ground Investigations Ireland	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-1.00	B			4.15	(0.10) 0.10	CONCRETE		
					(0.50)	MADE GROUND: Light brown slightly sandy clayey fine to coarse angular to sub-angular Gravel with redbrick and mortar fragments 0.00-1.00m - 50% Recovery		
0.70	EN			3.65	0.60	MADE GROUND: Brown mottled dark brown slightly sandy very gravelly Clay with many charcoal mortar and redbrick and some slag fragments		
1.00-2.00	B					1.00-2.00m - 65% Revovery		
1.70	EN				(2.20)			
2.00-2.80	B					2.00-3.00m - 50% Recovery		
2.70	EN			1.45	2.80	Complete at 2.80m		

Remarks
Concrete coring carried out prior to hand pit
Hand pit carried out to 0.55m BGL
Window Sample terminated at 2.80m BGL due to obsruction of cobble or boulder
Window Sample hole backfilled and re-instated upon completion
Not possible to establish by GPS the locations of internal exploratory holes
The coordinates have been determined using the location plan drawing
The elevation is estimated at 4.25 mOD based on levels taken outside and a measurement taken to the top of finished floor level

Scale (approx)	Logged By
1:25	NM

Figure No. 8507-02-19.WS112

Ground Investigations Ireland Ltd www.gii.ie			Site: Hickeys 43 Parkgate Place	Number: WS113
Machine : TEC OP 10 Method : Drive-in Windowless Sampler	Dimensions	Ground Level (mOD): 4.25	Client: ARUP	Job Number: 8507-02-19
	Location: 713646.4 E 734378 N	Dates: 30/03/2019	Project Contractor: Ground Investigations Ireland	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.70	B				(1.10)	CONCRETE 0.00-1.00m - 100% Recovery		
1.10-2.50 1.20	B EN			3.15	1.10 (0.30)	MADE GROUND: Brown grey slightly clayey angular to subangular fine to coarse Gravel with redbrick and mortar fragments		
1.70	EN			2.85	1.40 (0.50)	MADE GROUND: Dark brown black slightly sandy Silt 1.00-2.00m - 100% Recovery		
2.30	EN			2.35	1.90 (0.60)	MADE GROUND: Brown slightly sandy slightly gravelly Silt/Clay with some mortar, charcoal and redbrick fragments		
2.50-3.00 2.60	B EN			1.75	2.50 (0.50)	Soft brown SILT/CLAY 2.00-3.00m - 100% Recovery		
				1.25	3.00	Complete at 3.00m		

Remarks
Concrete Coring carried out prior to hand pit
Hand pit carried out to 0.50m BGL
Window Sample terminated at 3.0m BGL due to obstruction of cobble or boulder
Window Sample hole backfilled and re-instated upon completion
Not possible to establish by GPS the locations of internal exploratory holes
The coordinates have been determined using the location plan drawing
The elevation is estimated at 4.25 mOD based on levels taken outside and a measurement taken to the top of finished floor level

Scale (approx)	Logged By
1:25	DML

Figure No. 8507-02-19.WS113

Ground Investigations Ireland Ltd www.gii.ie	Site: Hickeys 43 Parkgate Place	Number: WS114

Machine : TEC OP 10 Method : Drive-in Windowless Sampler	Dimensions	Ground Level (mOD): 4.25	Client: ARUP	Job Number: 8507-02-19
	Location: 713629.3 E 734393.5 N	Dates: 30/03/2019	Project Contractor: Ground Investigations Ireland	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.70	B			4.16	(0.09) 0.09	CONCRETE		
					(0.51)	MADE GROUND: Grey slightly sandy clayey angular to rounded fine to coarse Gravel with some concrete fragments		
0.50	EN			3.65	0.60	0.70-1.00m - 100% Recovery		
				3.55	(0.10) 0.70	CONCRETE		
0.70-2.50	B				(0.60)	MADE GROUND: Light brown gravelly Clay with some charcoal wood and red brick fragments		
				2.95	1.30	MADE GROUND: Dark brown slightly sandy very gravelly Clay with many yellow and red brick, charcoal and mortar fragments		
1.50	EN				(1.30)	1.00-2.00m - 90% Recovery		
2.50 2.50-3.00 2.60	EN B EN			1.65	2.60	2.00-3.00m - 100% Recovery		
					(0.40)	Soft brown SILT/CLAY		
				1.25	3.00	Complete at 3.00m		

Remarks
Concrete coring carried out prior to hand pit
Hand pit carried out to 0.50m BGL
Window Sample terminated at 3.0m BGL due to obstruction of cobble or boulder
50mm slotted standpipe installed from 3.00m to 1.50m with pea gravel surround, plain pipe installed from 1.50m to ground level with bentonite seal with gas tap and flush cover.
Not possible to establish by GPS the locations of internal exploratory holes
The coordinates have been determined using the location plan drawing
The elevation is estimated at 4.25 mOD based on levels taken outside and a measurement taken to the top of finished floor level

Scale (approx)	Logged By
1:25	DML

Figure No. 8507-02-19.WS114

Ground Investigations Ireland Ltd
www.gii.ie

Machine : TEC OP 10 **Method :** Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)** 4.25	**Site** Hickeys 43 Parkgate Place **Client** ARUP	**Number** WS115 **Job Number** 8507-02-19
	Location 713664.8 E 734412.6 N	**Dates** 30/03/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				4.17	(0.08) 0.08	CONCRETE		
				3.95	(0.22) 0.30	MADE GROUND: Grey slightly sandy slightly clayey angular to subangular fine to coarse Gravel with redbrick and concrete fragments		
0.30-1.80	B					MADE GROUND: Brown slightly sandy very gravelly Clay with mortar and redbrick fragments		
0.50	EN					0.00-1.00m - 65% Recovery		
					(1.50)			
1.50	EN					1.00-2.00m - 70% Recovery		
				2.45	1.80			
1.80-3.30	B					MADE GROUND: Brown slightly sandy gravelly Clay with occasional charcoal and mortar fragments		
2.50	EN				(1.50)	2.00-3.00m - 80% Recovery		
						3.00-3.30m - 100% Recovery		
						Hydrocarbon Odour		
				0.95	3.30	Obstruction due to Cobble		
						Complete at 3.30m		

Remarks
Concrete coring carried out prior to hand pit
Hand pit carried out to 0.60m BGL
Window Sample terminated at 3.30m BGL due to obstruction of cobble or boulder
Window Sample hole backfilled and re-instated upon completion
Not possible to establish by GPS the locations of internal exploratory holes
The coordinates have been determined using the location plan drawing
The elevation is estimated at 4.25 mOD based on levels taken outside and a measurement taken to the top of finished floor level

Scale (approx)	Logged By
1:25	DML

Figure No. 8507-02-19.WS117

Ground Investigations Ireland Ltd www.gii.ie		Site: Hickeys 43 Parkgate Place	Number: WS116
Machine: TEC OP 10; Method: Drive-in Windowless Sampler	Dimensions:	Ground Level (mOD): 4.25	Client: ARUP	Job Number: 8507-02-19
	Location: 713677.2 E 734397.2 N	Dates: 30/03/2019	Project Contractor: Ground Investigations Ireland	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				4.17	(0.08) 0.08	CONCRETE		
					(0.62)	MADE GROUND: Grey slightly sandy slightly clayey angular to subangular fine to coarse Gravel with redbrick and concrete fragments		
				3.55	0.70	Complete at 0.70m		

Remarks
Concrete coring carried out prior to hand pit
Hand pit carried out to 0.70m BGL
Window Sample terminated on encountering an underground chanmber
Window Sample hole backfilled and re-instated upon completion
Elevation is an Estimation based on levels taken outside and a measurement taken to the top of finished floor level
Not possible to establish by GPS the locations of internal exploratory holes
The coordinates have been determined using the location plan drawing
The elevation is estimated at 4.25 mOD based on levels taken outside and a measurement taken to the top of finished floor level

Scale (approx)	Logged By
1:25	DML

Figure No. 8507-02-19.WS116

Ground Investigations Ireland Ltd www.gii.ie	Site Hickeys 43 Parkgate Place	Number **WS117**

Machine : TEC OP 10 Method : Drive-in Windowless Sampler	Dimensions	Ground Level (mOD) 4.25	Client ARUP	Job Number 8507-02-19
	Location 713647.8 E 734417.6 N	Dates 30/03/2019	Project Contractor Ground Investigations Ireland	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
				4.21	0.04	CONCRETE
0.04-0.70	B				(0.66)	MADE GROUND: Brown slightly sandy very gravelly Clay with some redbrick and mortar fragments
0.50	EN					0.00-1.00m - 100% Recovery
0.70-1.80	B			3.55	0.70	MADE GROUND: Brown slightly sandy slightly gravelly Clay with redbrick and mortar fragments
					(1.20)	
1.50	EN					1.00-2.00m - 100% Recovery
1.80-2.90	B					
				2.35	1.90	MADE GROUND: Brown slightly sandy very gravelly Clay with mortar, redbrick, charcoal and slag fragments
					(1.00)	
2.50	EN					2.00-3.00m - 80% Recovery
2.90-4.00	B			1.35	2.90	Soft grey SILT/CLAY with occasional shell fragments
					(1.00)	
3.50	EN					3.00-4.00m - 70% Recovery
				0.35	3.90 (0.10)	Grey slightly sandy very clayey fine to medium angular to sub-rounded GRAVEL
4.00	EN			0.25	4.00	Complete at 4.00m

Remarks
Concrete coring carried out prior to window sample
Window sample terminated at required depth
50mm slotted standpipe installed from 4.00m to 1.50m with pea gravel surround, plain pipe installed from 1.50m to ground level with bentonite seal with gas tap and flush cover.
Elevation is an Estimation based on levels taken outside and a measurement taken to the top of finished floor level
Not possible to establish by GPS the locations of internal exploratory holes
The coordinates have been determined using the location plan drawing
The elevation is estimated at 4.25 mOD based on levels taken outside and a measurement taken to the top of finished floor level

Scale (approx)	Logged By
1:25	DML

Figure No.
8507-02-19.WS117

8507-02-19 Hickeys Warehouse – Window Sample Photographs

WS101

WS102

WS102A

WS103

WS104

GROUND INVESTIGATIONS IRELAND
Client: ARUP
Job Ref: 8507-02-19
Site: HICKEYS WAREHOUSE 43 PARKGATE PLACE
Date: 30/03/19
Borehole ref: WS104
Depth: From 0.00 to 2.80
Box No: 1 of 1

WS105

WS105

WS105

WS105

WS105A

WS106

WS107


Client:
ARUP
Job Ref:
8507-02-19
Site:
KEYS WAREHOUSE
Date:
30.04.19
Borehole ref:
WS107A
Depth: From
0.00
to
3.70
Box No:
1
of
1
cm
10 20 30 40 50 60 70 80 90 100
1.00
2.00

WS108


GROUND
INVESTIGATIONS
IRELAND
Colour Chart #14
Grey Scale #14
Client:
ARUP
Job Ref:
8507-02-19
Site:
HICKEYS WAREHOUSE 43 PARKGATE PLACE
Date:
31/03/19
Borehole ref:
WS108
Depth: From
0.00
to
3.50
Box No:
1
of
1
cm
10 20 30 40 50 60 70 80 90 100
0.00
1.00
2.00

WS109


GROUND
INVESTIGATIONS
IRELAND
Client:
ARUP
Job Ref:
8507-02-19
Site:
HICKEY'S WAREHOUSE 47 PARK GATE PLACE
Date:
06/04/19
Borehole ref:
WS109
Depth: From
0.00
to
4.00
Box No:
1
of
1

WS110


GROUND
INVESTIGATIONS
IRELAND
Client:
ARUP
Job Ref:
8507-02-19
Site:
HICKEY'S WAREHOUSE 47 PARK GATE PLACE
Date:
06/04/19
Borehole ref:
WS110
Depth: From
0.00
to
4.00
Box No:
1
of
1

WS111

WS111

WS111

WS112


GROUND INVESTIGATIONS IRELAND
Client: ARUP
Job Ref: 8507-02-19
Site: HICKEY'S WAREHOUSE 43 PARKGATE PLACE
Date: 06/04/19
Borehole ref: WS112
Depth: From 0.00 to 2.80
Box No: 1 of 1

WS113


GROUND INVESTIGATIONS IRELAND
Client: ARUP
Job Ref: 8507-02-19
Site: HICKEYS WAREHOUSE 43 PARKGATE PLACE
Date: 30/03/19
Borehole ref: WS 113
Depth: From 0.00 to 3.00
Box No: 1 of 1

WS114


GROUND INVESTIGATIONS IRELAND
Client: ARUP
Job Ref: 8507-02-19
Site: HICKETS WAREHOUSE 43 PARKGATE PLACE
Date: 30/03/19
Borehole ref: WS114
Depth: From 0.00 to 3.00
Box No: 1 of 1

WS115


GROUND INVESTIGATIONS IRELAND
Client: ARUP
Job Ref: 8507-02-19
Site: HICKETS WAREHOUSE 43 PARKGATE PLACE
Borehole ref: WS115
Box No: 1 of 1

WS117


GROUND
INVESTIGATIONS
IRELAND
Client:
ARUP
Site:
HICKEYS WAREHOUSE 43 PARKGATE PLACE
Borehole ref:
WS117
Box No:
1
of
1
Job Ref:
8507-02-19
Date:
31/03/19
to
1.20

WS117


GROUND
INVESTIGATIONS
IRELAND
Client:
ARUP
Site:
HICKEYS WAREHOUSE 43 PARKGATE PLACE
Borehole ref:
WS117
Box No:
1
of
1
Job Ref:
8507-02-19
Date:
31/03/19
Depth: From
to
4.00

APPENDIX 5 – Borehole Records

Ground Investigations Ireland Ltd www.gii.ie	Site: Hickeys 43 Parkgate Place	Borehole Number: BH101

Machine : Dando 2000, Beretta T44 Method : Cable Percussion, Rotary Core	Casing Diameter: 200mm cased to 7.10m 100mm cased to 12.60m	Ground Level (mOD): 3.91	Client: ARUP	Job Number: 8507-02-19
	Location: 713615.9 E 734360.3 N	Dates: 03/04/2019-29/04/2019	Project Contractor: Ground Investigations Ireland	Sheet: 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
					3.81	0.10	Concrete.
0.50 0.50	B EN				3.31	(0.50) 0.60	MADE GROUND: Brown slightly sandy slightly clayey fine to coarse angular to sub-angular Gravel with angular to sub-angular cobbles and boulders.
1.00 1.00 1.20-1.65	B EN SPT(C) N=8			5,4/3,1,2,2	2.41	(0.90) 1.50	MADE GROUND: Black slightly sandy slightly clayey fine to coarse angular to sub-angular Gravel with angular to sub-angular cobbles and boulders and slag fragments
2.00 2.00-2.45 2.00	B SPT(C) N=3 EN			1,0/1,0,1,1	1.41	(1.00) 2.50	MADE GROUND: Brown slightly sandy silty Clay with occasional mortar charcoal and redbrick fragments
					0.91	(0.50) 3.00	Soft light brown sandy very silty CLAY
3.00 3.00-3.45 3.00	B SPT(C) N=27 EN			2,5/7,7,6,7	0.51	(0.40) 3.40	Stiff light brown sandy very silty CLAY
				Water strike(1) at 3.80m.	-0.09	(0.60) 4.00	Medium dense brown sandy slightly clayey sub-angular to rounded fine to medium GRAVEL
4.00 4.00-4.45 4.00	B SPT(C) N=6 EN			1,2/1,1,1,3	-0.59	(0.50) 4.50	Loose brown very sandy sub-angular to rounded fine to medium GRAVEL
					-1.09	(0.50) 5.00	Loose brown very sandy sub-angular to rounded fine to medium GRAVEL with sub-angular to rounded cobbles
5.00 5.00-5.45 5.00	B SPT(C) N=12 EN			2,2/2,3,3,4	-1.59	(0.50) 5.50	Medium dense brown sandy slightly clayey sub-angular to rounded fine to medium GRAVEL with sub-angular to rounded cobbles
					-2.09	(0.50) 6.00	Medium dense grey slightly clayey sandy fine to medium angular to sub-rounded GRAVEL.
6.00 6.00-6.42 6.00 7.00-7.08	B SPT(C) 50/270 EN			2,3/14,26,10 25/50 SPT(C) 25*/75	-3.19	(1.10) 7.10	Very dense grey very sandy fine to medium angular to sub-rounded GRAVEL.

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
6.90 7.00					B			
7.00-7.70	100	18	0	NI		-4.69	(1.50) 8.60	WEATHERED ROCK: Recovered as angular cobbles of weak thinly laminated dark grey black fine grained calcareous MUDSTONE and weak thinly bedded grey fine to medium LIMESTONE Obstruction due to rock or boulder.
7.70-8.60	95	21	11					
8.80-9.70	100	50	13	15			(1.40)	Strong dark grey fine grained LIMESTONE with some bands of weak thinly laminated dark grey black fine grained calcareous mudstone and some calcite veining. Distinctly weathered. Non Intact. 8.60-9.70m. Two Fracture sets. F1: very close to closely spaced, 30-50 degrees, undulating smooth, tight to open, clay staining. F2: closely spaced, 50-70 degrees, undulating smooth, tight to open, clay smearing.
9.70-10.00				NI				

Remarks
Concrete coring carried out prior to hand pit
Hand Pit to 1.20m BGL
Groundwater encountered at 3.80 BGL
Obstruction due to rock or boulder at 7.10m BGL.
Cable Percussion to 7.10m BGL and Rotary Core follow on to 12.60m BGL.
50mm slotted standpipe installed from 6.50m to 5.00m with pea gravel surround, plain pipe installed from 5.0m to ground level with bentonite seal and flush cover

Scale (approx): 1:50 | Logged By: NM | Figure No.: 8507-02-19.BH101

Ground Investigations Ireland Ltd www.gii.ie	Site: Hickeys 43 Parkgate Place	Borehole Number: BH101

Machine : Dando 2000, Beretta T44 Flush : Water Core Dia : HQ mm Method : Cable Percussion, Rotary Core	Casing Diameter: 200mm cased to 7.10m 100mm cased to 12.60m	Ground Level (mOD): 3.91	Client: ARUP	Job Number: 8507-02-19
	Location: 713615.9 E 734360.3 N	Dates: 03/04/2019-29/04/2019	Project Contractor: Ground Investigations Ireland	Sheet: 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	100	34	0	9		-6.09	10.00 (1.10)	Weak to medium strong dark grey thinly bedded fine grained LIMESTONE interbedded with weak thinly laminated grey black fine grained calcareous mudstone and rare calcite veining. Partially weathered. 10.00-10.65m. One Fracture set. F1: closely spaced, 50-70 degrees, undulating smooth, tight to open, clay smearing.			
10.65				NI							
11.10	100	71	45	9		-7.19	11.10 (1.50)	Very strong to medium strong dark grey thinly bedded fine grained LIMESTONE with calcaerous mudstone bands and calcite veining. Partially weathered. 11.10-12.60m. Two Fracture sets. F1: close to medium spaced, 20-40 degrees, undulating smooth, tight to open, clay smearing. F2: close to medium spaced, 40-60 degrees, undulating smooth, tight to open, clay smearing.			
12.60						-8.69	12.60	Complete at 12.60m			

Remarks	Scale (approx): 1:50	Logged By: NM
	Figure No.: 8507-02-19.BH101	

Ground Investigations Ireland Ltd www.gii.ie	Site: Hickeys 43 Parkgate Place	Borehole Number: BH102

Machine	Casing Diameter	Ground Level (mOD)	Client	Job Number
Dando 2000 & Beretta T44	200mm to 6.40m 98mm to 15.50m	4.10	ARUP	8507-02-19
Method: Cable Percussion with Rotary Core follow on	**Location**: 713624.7 E 734403.6 N	**Dates**: 13/04/2019-07/05/2019	**Project Contractor**: Ground Investigations Ireland	**Sheet**: 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					4.05	0.05 (0.25)	TARMACADAM			
					3.80	0.30 (0.70)	MADE GROUND: Grey brown slightly clayey sandy fine to coarse sub-angular to sub-rounded Gravel with cement fragments.			
0.50 0.50	B EN									
					3.10	1.00	MADE GROUND: Brown sandy very clayey fine to coarse angular to sub-rounded Gravel.			
1.00 1.00 1.20-1.65	B EN SPT(C) N=11			10,5/2,2,4,3		(1.10)	MADE GROUND: Light brown mottled dark brown slightly sandy gravelly Clay with mortar and redbrick fragments			
2.00 2.00-2.45 2.00	B SPT(C) N=4 EN			1,1/1,1,1,1	2.00	2.10 (0.90)	Soft dark grey very sandy very gravelly very silty CLAY.			
3.00 3.00-3.45 3.00	B SPT(C) N=11 EN			2,3/3,3,2,3	1.10	3.00 (0.50)	Firm dark grey very sandy slightly gravelly very silty CLAY.			
					0.60	3.50 (1.75)	Loose becoming medium dense brown very gravelly fine to coarse SAND with occasional sub-rounded cobbles			
4.00 4.00-4.45 4.00	B SPT(C) N=9 EN			1,2/2,2,2,3					1	
5.00 5.00 5.00-5.45 5.30	EN B SPT(C) N=12 B			Water strike(1) at 4.70m, rose to 4.00m in 20 mins. 1,2/2,3,3,4					1	
					-1.15	5.25 (0.75)	Medium dense brown slightly clayey sandy sub-angular to sub-rounded fine to medium GRAVEL with wood fragments			
6.40 6.00 6.00-6.28 6.00	B SPT(C) 35/125 EN			EN 25/50 7,7/10,25 SPT(C) 25*/0	-1.90	6.00 (0.40)	Firm dark grey sandy gravelly very silty CLAY			

Depth (m)	TCR	SCR	RQD	FI	Level (mOD)	Depth (m) (Thickness)	Description
6.40-6.40 6.40					-2.30	6.40 (0.40)	OVERBURDEN: Recovery consists of greyish brown slightly sandy gravelly CLAY with occasional cobble fragments of Limestone. Gravel is fine to medium angular of Limestone. Drillers notes: CLAY Obstruction due to rock at 6.40 BGL. Rotary Core follow on from 6.40m BGL
6.80	96	49	45	4	-2.70	6.80	Medium strong to strong fine grained thinly laminated grey/dark grey LIMESTONE. partially weathered with occasional calcite veining, oxide staining and brown Clay staining interbedded with a weak fine grained thinly laminated black MUDSTONE. Distinctly weathered with occasional calcite veining, Clay bands, pyritic laminae and oxide staining
7.65				14			
8.00	100	43	21	5			
8.20							
8.55				13			
9.30							
9.70							

Remarks
Concrete coring carried out prior to hand pit
Hand Pit to 1.20m BGL
Obstruction at 6.40m BGL due to rock.
Groundwater encountered at 4.70m BGL
Rotary Core follow on from 6.40m BGL
Chiselling from 6.40m to 6.40m for 1 hour.

Scale (approx)	Logged By
1:50	NM & EB

Figure No. 8507-02-19.BH102

Ground Investigations Ireland Ltd
www.gii.ie

Site: Hickeys 43 Parkgate Place				**Borehole Number**: BH102	
Machine: Dando 2000 & Beretta T44 **Flush**: Water **Core Dia**: 68 mm **Method**: Cable Percussion with Rotary Core follow on	**Casing Diameter**: 200mm to 6.40m 98mm to 15.50m	**Ground Level (mOD)**: 4.10	**Client**: ARUP	**Job Number**: 8507-02-19	
	Location: 713624.7 E 734403.6 N	**Dates**: 13/04/2019-07/05/2019	**Project Contractor**: Ground Investigations Ireland	**Sheet**: 2/2	

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	100	65	38					Fracture set 1: Very closely to closely spaced, dipping 0 - 25 degrees, rough planar to smooth planar with some oxide staining Fracture set 2: Very closely to medium spaced, dipping 30 - 50 degrees, rough planar to smooth planar with some oxide staining Fracture set 3: Medium spaced, dipping 70 - 85 degrees, rough undulose to rough planar with occasional Clay staining			
11.05	100	80	43	11			(8.70)				
11.95	100	55	46								
12.55	100	72	56								
14.05	100	80	63	14							
15.50						-11.40	15.50	Complete at 15.50m			

Remarks

Scale (approx)	Logged By
1:50	NM & EB

Figure No.
8507-02-19.BH102

Ground Investigations Ireland Ltd www.gii.ie		Site: Hickeys 43 Parkgate Place	Borehole Number: BH103
Machine : Dando 2000, Beretta T44 Method : Cable Percussion, Rotary Core	Casing Diameter: 200mm cased to 5.70m, 100mm cased to 15.10m	Ground Level (mOD): 4.66	Client: ARUP	Job Number: 8507-02-19
	Location: 713620.8 E 734427.3 N	Dates: 14/04/2019-08/05/2019	Project Contractor: Ground Investigations Ireland	Sheet: 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
					4.36	(0.30) 0.30	TARMACADAM
0.50 0.50	B EN				3.66	(0.70) 1.00	MADE GROUND: Brown slightly sandy very clayey fine to coarse angular to sub-rounded Gravel with concrete tarmacadam and redbrick.
1.00 1.00 1.20-1.65	B EN SPT(C) N=13			5,3/3,4,2,4			
2.00 2.00-2.45 2.00	B SPT(C) N=7 EN			1,1/2,2,1,2	2.26	(1.40) 2.40	MADE GROUND: Brown gravelly very sandy very silty Clay with mortar and charcoal fragments.
3.00 3.00-3.45 3.00	B SPT(C) N=10 EN			2,3/2,2,3,3	1.06	(1.20) 3.60	Firm grey sandy very gravelly very silty CLAY.
					0.76	(0.30) 3.90	Loose grey slightly sandy very clayey fine to coarse sub-angular to sub-rounded GRAVEL
4.00 4.00-4.45 4.00	B SPT(C) N=7 EN			1,1/1,2,2,2	-0.34	(1.10) 5.00	Loose brown sandy GRAVEL
5.00 5.00-5.41 5.00	B SPT(C) 47/260 EN			4,2/1,3,18,25			
5.70	B				-1.74	(1.40) 6.40	Very dense dark brown sandy silty GRAVEL with occasional sub-rounded cobbles Obstruction due to rock at 5.70m BGL.

Depth (m)	TCR	SCR	RQD	FI	Level (mOD)	Depth (m) (Thickness)	Description
6.40	100	0	0		-2.04	(0.30) 6.70	Diller notes: Clay with boulders. Recovery consists of strong dark grey fine grained LIMESTONE with calcite veining. Partially weathered.
6.70	85	47	17	14	-3.54	(1.50) 8.20	Medium strong to strong dark grey thinly bedded fine grained LIMESTONE with some bands of weak thinly laminated dark grey black fine grained calcareous mudstone and occasional calcite veining. Patially weathered 6.70-8.60m. Two Fracture sets. F1: very close to closely spaced, 0-20 degrees, undulating smooth, clay staining. F2: very close to closely spaced, 600-70 degrees, undulating smooth, clay staining.
8.20 8.60	83	57	43			(3.05)	Strong dark grey thinly bedded fine grained LIMESTONE with some bands of weak thinly laminated dark grey black fine grained calcareous mudstone and occasional calcite veining. Patially weathered Non Intact.
9.70				8			

Remarks
Concrete coring carried out prior to hand pit
Hand Pit to 1.20m BGL
Obstruction at 5.70m BGL due to rock.
No groundwater encountered.
Cable percussion to 5.70m BGL and Rotary Core follow on to 15.10m BGL.
50mm slotted standpipe installed from 4.50m to 3.20m with pea gravel surround, plain pipe installed from 3.20m to ground level with bentonite seal and flush cover
Chiselling from 6.40m to 6.40m for 1 hour.

Scale (approx): 1:50 | Logged By: NM
Figure No. 8507-02-19.BH103

Ground Investigations Ireland Ltd
www.gii.ie

Machine : Dando 2000, Beretta T44 **Flush :** Water **Core Dia :** HQ mm **Method :** Cable Percussion, Rotary Core	**Casing Diameter** 200mm cased to 5.70m 100mm cased to 15.10m	**Ground Level (mOD)** 4.66	**Site** Hickeys 43 Parkgate Place	**Borehole Number** **BH103**
	Location 713620.8 E 734427.3 N	**Dates** 14/04/2019-08/05/2019	**Client** ARUP	**Job Number** 8507-02-19
			Project Contractor Ground Investigations Ireland	**Sheet** 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	100	59	46					8.60-11.25m. Two Fracture sets. F1: very close to closely spaced, 30-45 degrees, undulating smooth, tight to open, clay smearing. F2: medium spaced, 50-70 degrees, undulating smooth, tight to open, clay smearing.			
11.25	100	71	48	10		-6.59	11.25 (1.50)	Medium strong to strong dark grey tinly bedded fine grained LIMESTONE with some bands of weak thinly laminated dark grey black fine grained calcareous mudstone and occasional calcite veining. Patially weathered 11.25-12.75m. One Fracture set. F1: close to medium spaced, 30-50 degrees, undulating smooth, tight to open, clay smearing.			
12.40 12.75	100	75	44	14		-8.09	12.75 (2.35)	Strong dark grey thinly bedded fine grained LIMESTONE with some bands of weak thinly laminated dark grey black fine grained calcareous mudstone and occasional calcite veining. Patially weathered 12.75-14.10m. One Fracture set. F1: very close to closely spaced, 30-50 degrees, undulating smooth, tight to open, clay smearing.			
13.85 14.10	100	88	74	5				14.10-15.10m. One Fracture set. F1: close to widely spaced, 30-45 degrees, undulating smooth, tight to open, clay smearing.			
15.10						-10.44	15.10	Complete at 15.10m			

Remarks	**Scale (approx)** 1:50	**Logged By** NM
	Figure No. 8507-02-19.BH103	

Ground Investigations Ireland Ltd
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Site Hickeys 43 Parkgate Place				**Borehole Number** BH104
Machine : Dando 2000, Beretta T44 **Method :** Cable Percussion, Rotary Core	**Casing Diameter** 200mm to 7.60m, 100mm to 15.60m	**Ground Level (mOD)** 5.29	**Client** ARUP	**Job Number** 8507-02-19
	Location 713691.5 E 734416.5 N	**Dates** 15/04/2019-02/05/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/2

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
						(3.00)	MADE GROUND: Greyish brown slightly sandy gravelly Clay with occasional subrounded cobbles and some ceramic, concrete and red brick fragments
3.00 3.00-3.45 3.00 3.00	B SPT(C) N=5 J T			1,2/1,1,2,1	2.29	3.00 (1.00)	MADE GROUND: Dark grey very gravelly silty Sand
4.00 4.00 4.00	B J T				1.29	4.00 (1.00)	MADE GROUND: Dark grey very gravelly slightly clayey Sand
5.00 5.00-5.45 5.00 5.00	B SPT(C) N=26 J T			4,7/11,8,5,2	0.29	5.00 (1.20)	Stiff greyish brown sandy very gravelly very silty CLAY. Gravel is angular to subrounded ......Lense of soft grey mottled black gravelly CLAY with spongy Pseudofibrous Peat occurs between 5.80m to 6.20m BGL
6.00 6.00 6.00-6.45 6.00	J B SPT(C) N=21 T			Water strike(1) at 5.80m, rose to 5.50m in 20 mins. 2,2/3,4,7,7	-0.91	6.20 (1.20)	Dense grey very sandy GRAVEL with occasional sub-rounded cobbles. Sand is predominately coarse and Gravel is subangular to rounded
7.00 7.00-7.45 7.00 7.00	B SPT(C) N=33 J T			4,6/7,7,9,10			
7.50				B	-2.11	7.40 (0.20)	Brown subangular COBBLES and BOULDERS (Presumed weathered rock)

Depth (m)	TCR	SCR	RQD	FI	Level (mOD)	Depth (m) (Thickness)	Description
7.60	90	0	0	6	-2.31	7.60 (0.50)	Strong dark grey thinly bedded fine grained LIMESTONE with frequent calcite veining. Partially weathered. Two Fracture sets. F1: closely spaced, 10-30 degrees, undulating smooth, open, clay infill. F2: closely spaced, 80-90 degrees, undulating smooth, tight to open, clay infill.
8.10	100	60	44	NI	-2.81	8.10 (1.60)	Strong dark greythinly bedded fine grained LIMESTONE with frequent calcite veining and some bands of weak thinly laminated dark grey black fine grained calcareous mudstone. Partially weathered. Two Fracture sets. F1: closely spaced, 10-30 degrees, undulating smooth, tight to open, clay staining. F2: medium spaced, 40-50 degrees, undulating smooth, open, clay smearing.
8.50				4			
9.60					-4.41	9.70	

Legend | Water | Instr

Remarks
Borehle located in slit trench
No groundwater encountered.
Cable percussion to 7.60m BGL and Rotary Core follow on to 15.60m BGL.
Core loss occurred between 13.10m to 14.10m BGL due to the inner barrel not locking in correctly with the outer barrel at the begining of the 12.60m run. The core was lost when the run was returning to the surface
50mm slotted standpipe installed from 12.30m to 8.60m with pea gravel surround, plain pipe installed from 8.60m to ground level with bentonite seal and flush cover
Chiselling from 7.50m to 7.50m for 1 hour.

Scale (approx)	Logged By
1:50	NM

Figure No. 8507-02-19.BH104

Ground Investigations Ireland Ltd www.gii.ie		Site: Hickeys 43 Parkgate Place	Borehole Number: BH104
Machine : Dando 2000, Beretta T44 Flush : Core Dia : mm Method : Cable Percussion, Rotary Core	Casing Diameter: 200mm to 7.60m, 100mm to 15.60m	Ground Level (mOD): 5.29	Client: ARUP	Job Number: 8507-02-19
	Location: 713691.5 E 734416.5 N	Dates: 15/04/2019-02/05/2019	Project Contractor: Ground Investigations Ireland	Sheet: 2/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
10.32	93	30	10	27		-5.81	(1.40) 11.10	Medium strong to weak dark grey fine grained calcareous MUDSTONE and interbedded limestone with a pyrite lamination and very rare calcite grains. Partially weathered. Two Fracture sets. F1: closely spaced, 0-20 degrees, undulating smooth, tight to open, clay staining. F2: very closely spaced, 40-50 degrees, undulating smooth, tight to open, clay smearing			
11.10	80	61	39	8		-7.81	(2.00) 13.10	Very strong dark grey thinly bedded fine grained LIMESTONE with a band of weak thinly laminated dark grey black fine grained calcareous mudstone and rare calcite veining. Partially weathered. Two Fracture sets. F1: closely spaced, 10-30 degrees, undulating smooth, tight to open, clay staining and sand infill. F2: closely spaced, 30-45 degrees, undulating smooth, open, clay staining.			
12.60	47	27	21								
13.10						-8.81	(1.00) 14.10	Core Loss. Core Loss between 13.10-14.10m BGL. - See Remarks Section.			
14.10	100	75	56	7		-10.31	(1.50) 15.60	Very strong dark grey thinly bedded fine grained LIMESTONE with some bands of weak thinly laminated dark grey black fine grained calcareous mudstone and thick calcite veining. Partially weathered. Two Fracture sets. F1: medium spaced, 10-30 degrees, undulating smooth, tight to open, clay staining and smearing. F2: closely spaced, 40-60 degrees, undulating smooth, tight to open, calcite infill and clay staining.			
15.60								Complete at 15.60m			

Remarks	Scale (approx): 1:50	Logged By: NM
	Figure No.: 8507-02-19.BH104	

Ground Investigations Ireland Ltd www.gii.ie	Site Hickeys 43 Parkgate Place	Borehole Number BH105

Machine : Beretta T44 Flush : Water Core Dia : 68 mm Method : Rotary Cored	Casing Diameter 98mm to 17.00m	Ground Level (mOD) 4.25	Client ARUP	Job Number 8507-02-19
	Location 713695.1 E 734406.3 N	Dates 11/05/2019- 12/05/2019	Project Contractor Ground Investigations Ireland	Sheet 1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	0						(1.30)	CONCRETE			
1.30	10					2.95	1.30	OVERBURDEN: Poor recovery - recovery consists of brown slightly sandy slightly gravelly SILT. Gravel is fine subrounded and sand is predominately fine. Drillers notes: Sandy SILT (Soft)			
2.00 2.00-2.45 2.00	6				1,1/1,2,1,1 SPT(C) N=5 T						
3.50 3.50-3.95 3.50	21				1,2/1,1,2,3 SPT(C) N=7 T		(5.20)				
5.00 5.00-5.45 5.00	18				2,3/3,1,2,3 SPT(C) N=9 T						
6.50 6.50-6.95	29				3,2/2,1,3,2 SPT(C) N=8	-2.25	6.50 (1.50)	OVERBURDEN: Poor recovery - recovery consists of grey sandy fine to coarse angular to subrounded GRAVEL of variable lithology. Drillers notes: Sand - Gravel (Loose)			
8.00 8.00-8.45	81	12	12		5,6/6,8,7,11 SPT(C) N=32	-3.75	8.00 (0.50)	OVERBURDEN: Poor recovery - recovery consists of grey clayey sandy fine to coarse subrounded GRAVEL of Limestone. Drillers notes: Gravel (Dense)			
8.50						-4.25	8.50 (1.80)	Weak fine grained thinly laminated grey LIMESTONE. Distinctly weathered with pyritic concretions, some calcite veining and residually weathered Mudstone bands			
9.50				NI							

Remarks
Concrete coring carried out prior to drilling
Bentonite seal from 17.00m BGL to 13.00m BGL, Slotted standpipe installed from 13.00m BGL to 11.50m BGL with a pea gravel surround and a plain standpipe was installed from 11.50m BGL to GL with a bentonite seal and a flush cover
Not possible to establish by GPS the locations of internal exploratory holes
The coordinates have been determined using the location plan drawing
The elevation is estimated at 4.25 mOD based on levels taken outside and a measurement taken to the top of finished floor level

Scale (approx)	Logged By
1:50	EB

Figure No.
8507-02-19.BH105

Ground Investigations Ireland Ltd
www.gii.ie

Machine : Beretta T44 **Flush :** Water **Core Dia :** 68 mm **Method :** Rotary Cored	**Casing Diameter** 98mm to 17.00m	**Ground Level (mOD)** 4.25	**Client** ARUP	**Job Number** 8507-02-19
	Location 713695.1 E 734406.3 N	**Dates** 11/05/2019-12/05/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 2/2

Site: Hickeys 43 Parkgate Place

Borehole Number: BH105

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	79	0	0			-6.05	10.30	Black residual MUDSTONE with Limestone lithic fragments			
11.00							(1.10)				
11.40	100	32	23			-7.15	11.40	Medium strong to strong fine grained thinly laminated grey LIMESTONE. Partially weathered with some residual Mudstone bands, pyritic laminae, pink and white calcite veining			
							(1.60)				
12.50	94	48	48	13		-8.75	13.00	Medium strong fine grained thinly laminated grey/dark grey LIMESTONE. Partially weathered with some pink and white calcite veining interbedded with a weak fine grained thinly laminated black MUDSTONE. Distinctly weathered to residual with pink calcite veining, pyrite specks throughout and occasional residual bands 14.70m to 14.95m BGL Residual Mudstone band Fracture set 1: Closely to medium spaced, dipping 0 - 25 degrees, rough planar to rough undulose with occasional Clay staining Fracture set 2: Very closely to closely spaced, dipping 30 - 50 degrees, rough planar with occasional Clay staining Fracture set 3: Closely to medium spaced, 70 - 85 degrees, rough planar to rough undulose			
14.00	100	52	36				(4.00)				
15.50											
16.00	100	65	38	11							
17.00						-12.75	17.00	Complete at 17.00m			

Remarks

Scale (approx)	Logged By
1:50	EB

Figure No. 8507-02-19.BH105

Ground Investigations Ireland Ltd www.gii.ie	Site: Hickeys 43 Parkgate Place	Borehole Number: BH106
Machine: Beretta T44; Flush: Water; Core Dia: 102 mm; Method: Rotary Cored	Casing Diameter: 102mm cased to 12.70m	Ground Level (mOD): 4.25
Client: ARUP	Job Number: 8507-02-19	
Location: 713662.8 E 734382 N	Dates: 13/04/2019	Project Contractor: Ground Investigations Ireland
Sheet: 1/2		

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00						4.15	0.10	CONCRETE			
	0	0	0				(2.10)	Open hole techniques carried out - Driller notes Clay and Gravel			
2.20 2.20-2.65					2,2/2,1,1,1 SPT(C) N=5	2.05	2.20	Open hole techniques carried out. Sample recovery indicates probable natural brown sandy gravelly CLAY (Soft)			
	0	0	0				(1.50)				
3.70 3.70-4.15					1,0/0,1,2,4 SPT(C) N=7	0.55	3.70	Open hole techniques carried out. Sample recovery indicates brown slightly sandy silty CLAY (Soft to firm)			
	0	0	0				(1.00)				
						-0.45	4.70	Open hole techniques carried out. Sample recovery indicates Loose to medium dense brown sandy clayey fine to coarse sub-angular to sub-rounded GRAVEL			
5.20 5.20-5.65					2,9/5,4,3,2 SPT(C) N=14		(2.00)				
	0	0	0		Water strike(1) at 6.40m.					∇1	
6.70 6.70-7.15					1,0/0,1,0,2 SPT(C) N=3	-2.45	6.70	Driller Notes: Grey sand and gravel. Recovery consists of grey slightly sandy slightly clayey fine to coarse sub-angular to sub-rounded GRAVEL (Loose) with occasional cobbles.SPT recovery consists of grey brown slightly sandy SILT (Soft).			
	40	3	0				(1.30)	6.70-8.00m 40% recovery			
8.00				NI		-3.75	8.00	Weak to medium strong dark grey fine grained LIMESTONE with weak calcareous Mudstone bands some calcite veining. Distinctly weathered. 8.00-8.40m - Non Intact.			
8.20 8.40	97	73	13	19			(1.70)	8.40-9.70m - One fracture set. F1:Very close to closely spaced, 50-60 degrees, undulating smooth, tight to open with clay smearing and staining.			
9.70						-5.45	9.70	Strong dark grey fine grained LIMESTONE with occasional calcite veining.			

Remarks
Concrete coring carried out prior to hand pit
Hand pit carried out to 1.20m BGL
Groundwater encountered at 6.40m BGL.
Borehole backfilled on completion.
Not possible to establish by GPS the locations of internal exploratory holes
The coordinates have been determined using the location plan drawing
The elevation is estimated at 4.25 mOD based on levels taken outside and a measurement taken to the top of finished floor level

Scale (approx)	Logged By
1:50	NM

Figure No. 8507-02-19.BH106

Ground Investigations Ireland Ltd
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Machine : Beretta T44 **Flush** : Water **Core Dia** : 102 mm **Method** : Rotary Cored	**Casing Diameter** 102mm cased to 12.70m	**Ground Level (mOD)** 4.25	**Client** ARUP	**Job Number** 8507-02-19
	Location 713662.8 E 734382 N	**Dates** 13/04/2019	**Project Contractor** Ground Investigations Ireland	**Sheet** 2/2

Site: Hickeys 43 Parkgate Place

Borehole Number: BH106

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
	100	90	60	11			(1.50)	9.70-11.20m - Two fracture sets. F1: Very close to medium spaced, 60 degrees, undulating smooth, tight to open with some clay smearing. F2: Medium to widely spaced, 70 degrees, undulating smooth, tight to open, with some clay staining.			
11.20	93	48	20	21		-6.95	11.20 (1.50)	Medium strong to strong dark grey fine grained LIMESTONE weak calcareous Mudstone bands and occasional calcite veining. 11.20-12.70m - Two fracture sets. F1: Very close to closely spaced, 30-40 degrees, undulating smooth, tight to open with some clay smearing. F2: Medium spaced, 70-80 degrees, undulating smooth, tight to open, with some clay staining.			
12.70						-8.45	12.70	Complete at 12.70m			

Remarks

Scale (approx)	Logged By
1:50	NM

Figure No.
8507-02-19.BH106

Ground Investigations Ireland Ltd www.gii.ie	Site: Hickeys 43 Parkgate Place	Borehole Number: BH107

Machine : Beretta T44	Casing Diameter	Ground Level (mOD)	Client	Job Number
Flush : Water	102mm cased to 12.00m	4.25	ARUP	8507-02-19
Core Dia : 150 mm	**Location**	**Dates**	**Project Contractor**	**Sheet**
Method : Rotary Cored	713648.4 E 734399.5 N	06/04/2019-07/04/2019	Ground Investigations Ireland	1/2

Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
0.00						4.15	0.10	CONCRETE			
	2	0	0		Water strike(1) at 1.20m.		(2.10)	Poor recovery. Driller notes: brown sandy clay 0.00-2.20m - 2% recovery.		∇1	
2.20 2.20-2.65	0	0	0		3,4/3,2,2,2 SPT(C) N=9	2.05	2.20 (1.50)	No recovery. Driller notes: brown sandy clay (firm) 2.20-3.70m - 0% recovery.			
3.70 3.70-4.15	0	0	0		1,1/1,1,1,1 Water strike(2) at 3.70m. SPT(C) N=4	0.55	3.70 (1.00)	No recovery. Driller notes: sandy gravel (Loose) 3.70-5.20m - 0% recovery.		∇2	
						-0.45	4.70 (2.00)	No recovery. Driller notes: sandy gravel (Loose to medium dense)			
5.20 5.20-5.65	0	0	0		3,2/3,2,3,2 SPT(C) N=10			5.20-6.70m - 0% recovery.			
6.70 6.70-7.15	46	43	33		3,4/4,3,4,5 SPT(C) N=16	-2.45	6.70 (0.80)	No recovery. Driller notes: sandy gravel (Medium dense)			
7.50				3		-3.25	7.50 (1.50)	Strong dark grey fine grained LIMESTONE with calcite veining and occasional clay bands (8.00m BGL - 0.05m band). 7.50-8.20m - Two fracture sets. F1:Closely spaced, 40 degrees, undulating smooth, tight to open with clay infill. F2: Closely spaced, 50 degrees, undulating smooth, tight to open with clay infill. 8.20-8.50m - Non Intact. 8.50-9.00m - Two fracture sets. F1: Very close to medium spaced, 30-40 degrees, undulating smooth, tight to open with some clay smearing. F2: Medium spaced, 50 degrees, undulating smooth, tight to open, with some clay smearing.			
8.20	93	50	20	NI							
8.50				7							
9.00				NI		-4.75	9.00 (0.20)				
9.20				5		-4.95	9.20 (0.60)	Residual weathering with calcareous MUDSTONE. 9.00-9.20m - Non Intact.			
9.70 9.80											

Remarks
Concrete coring carried out prior to hand pit
Hand pit carried out to 1.20m BGL
Groundwater encountered at 3.70m BGL and 1.20m BGL at the start of the following day.
50mm slotted standpipe installed from 12.00m to 4.00m with pea gravel surround, plain pipe installed from 4.00m to ground level with bentonite seal and flush cover.
Not possible to establish by GPS the locations of internal exploratory holes
The coordinates have been determined using the location plan drawing
The elevation is estimated at 4.25 mOD based on levels taken outside and a measurement taken to the top of finished floor level

Scale (approx)	Logged By
1:50	NM

Figure No. 8507-02-19.BH107

Ground Investigations Ireland Ltd www.gii.ie	Site: Hickeys 43 Parkgate Place	Borehole Number: BH107

Machine: Beretta T44; Flush: Water; Core Dia: 150 mm; Method: Rotary Cored	Casing Diameter: 102mm cased to 12.00m	Ground Level (mOD): 4.25	Client: ARUP	Job Number: 8507-02-19
	Location: 713648.4 E 734399.5 N	Dates: 06/04/2019-07/04/2019	Project Contractor: Ground Investigations Ireland	Sheet: 2/2

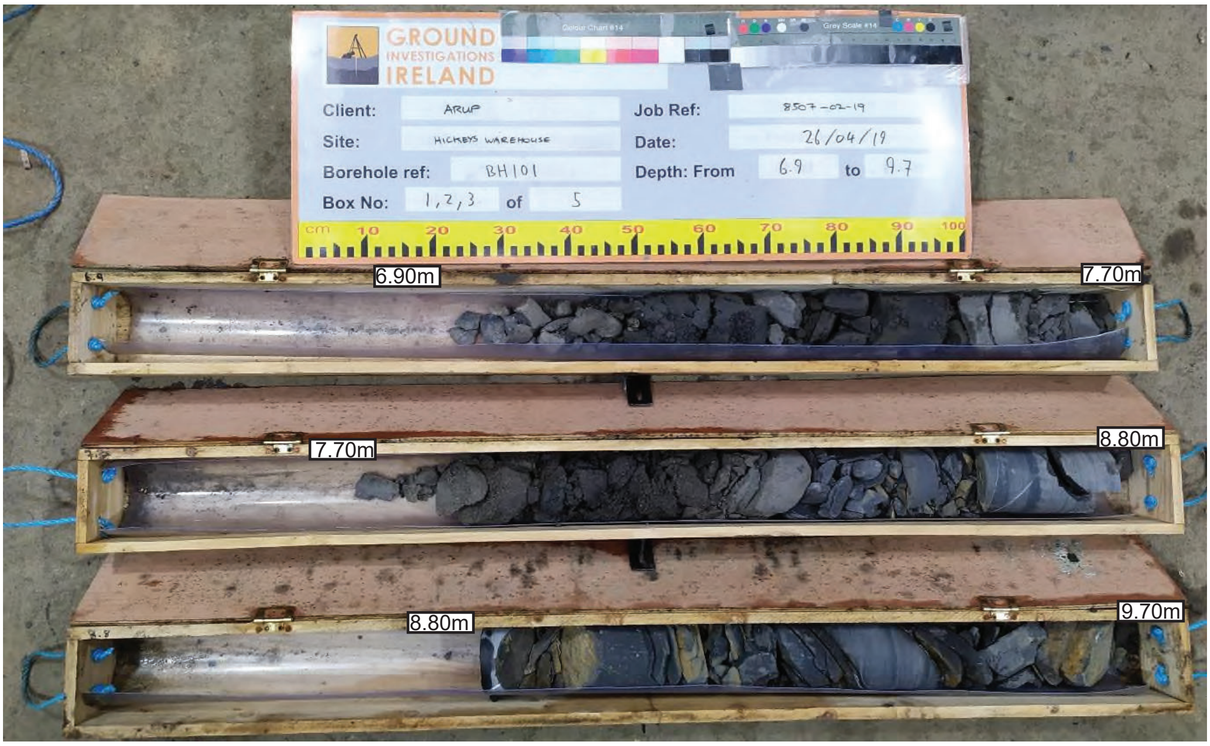
Depth (m)	TCR	SCR	RQD	FI	Field Records	Level (mOD)	Depth (m) (Thickness)	Description
	100	73	33	24		-5.55	9.80 (0.80)	Strong dark grey fine grained LIMESTONE with calcite veining and occasional clay bands. 9.20-9.80 - Two fracture sets. F1: Very close to medium spaced, 30-40 degrees, undulating smooth, tight to open with some clay smearing. F2: Medium spaced, 50 degrees, undulating smooth, tight to open, with some clay smearing.
11.20	100	75	31			-6.35	10.60 (1.40)	Weak to medium strong dark grey fine grained LIMESTONE with some calcite veining. Distinctly weathered.
12.00						-7.75	12.00	Medium strong to strong dark grey fine grained LIMESTONE with some calcite veining. Partially weathered. 9.80-12.00m - Two fracture sets. F1: Very close to medium spaced, 30-40 degrees, undulating smooth, tight to open with some clay staining. F2: Close to medium spaced, 60-80 degrees, undulating smooth, tight to open with some clay staining.
								Complete at 12.00m

Remarks

Scale (approx)	Logged By
1:50	NM

Figure No. 8507-02-19.BH107

Hickeys 43 Parkgate Place – Rotary Core Photographs



BH101

BH101


GROUND INVESTIGATIONS IRELAND
Colour Chart #14
Grey Scale #14
Client: ARUP
Job Ref: 8507-02-19
Site: Hickeys 43 Parkgate Place
Date: 8-12/05/19
Borehole ref: BH102
Depth: From 6.40 to 9.30m
Box No: 1 of 4
8.20m
9.30m

BH102


GROUND INVESTIGATIONS IRELAND
Colour Chart #14
Grey Scale #14
Client: ARUP
Job Ref: 8507-02-19
Site: Hickeys 43 Parkgate Place
Date: 8-12/05/19
Borehole ref: BH102
Depth: From 9.30 to 11.95m
Box No: 2 of 4
9.30m
11.05m
11.95m

BH102


GROUND
INVESTIGATIONS
IRELAND
Colour Chart #14
Grey Scale #14
Client: ARUP
Job Ref: 8507-02-19
Site: Hickeys 43 Parkgate Place
Date: 8-12/05/19
Borehole ref: BH102
Depth: From 11.85 to 14.60 m
Box No: 3 of 4
11.85m
12.55m
14.05m
14.60m

BH102


GROUND
INVESTIGATIONS
IRELAND
Colour Chart #14
Grey Scale #14
Client: ARUP
Job Ref: 8507-02-19
Site: Hickeys 43 Parkgate Place
Date: 8-12/05/19
Borehole ref: BH102
Depth: From 14.60 to 15.50 m
Box No: 4 of 4
14.60m
15.50m

BH102


GROUND INVESTIGATIONS IRELAND
Client: ARUP
Job Ref: 8507-02-19
Site: Hickeys 43 Parkgate Place
Date: 03/05/19
Borehole ref: BH103
Depth: From 6.40 to 9.70
Box No: 1 of 3
6.40m
6.70m
8.20m
9.70m

BH103


GROUND INVESTIGATIONS IRELAND
Client: ARUP
Job Ref: 8507-02-19
Site: Hickeys 43 Parkgate Place
Date: 07/05/19
Borehole ref: BH103
Depth: From 9.70 to 12.40
Box No: 2 of 3
9.70m
11.25m
12.40m

BH103


GROUND INVESTIGATIONS IRELAND
Client: ARUP
Job Ref: 8507-02-19
Site: Hickeys 43 Parkgate Place
Date: 08/05/19
Borehole ref: BH103
Depth: From 12.40 to 15.10
Box No: 3 of 3
12.40m
12.75m
13.85m
15.10m

BH103


GROUND INVESTIGATIONS IRELAND
Client: ARUP
Job Ref: 8507-02-19
Site: HICKEYS WAREHOUSE
Date: 30-04-19
Borehole ref: BH104
Depth: From 7.60 to 11.10
Box No: 1,2,3 of 6
7.60m
8.10m
8.10m
9.70m
9.70m
11.10m

BH104


GROUND INVESTIGATIONS IRELAND
Client: ARUP
Job Ref: 8507-02-19
Site: HICKEYS WAREHOUSE
Date: 01/05/19 – 02/05/19
Borehole ref: BH104
Depth: From 11.10 to 15.60
Box No: 4,5,6 of 6
11.10m
12.60m
12.60m
13.10m
14.10m
Core loss between 13.10m to 14.10m BGL due to inner barrel not locking in with outer barrel
14.10m
15.60m

BH104


GROUND INVESTIGATIONS IRELAND
Colour Chart #14
Grey Scale #14
Client: ARUP
Job Ref: 8507-02-19
Site: Hickeys 43 Parkgate Place
Date: 10-11/05/19
Borehole ref: BH105
Depth: From 0.00 to 10.10m
Box No: 1 of 4
0.00m
3.50m
5.00m
6.50m
8.00m
9.50m
10.10m

BH105

GROUND INVESTIGATIONS IRELAND
Colour Chart #14
Grey Scale #14
Client: ARUP
Job Ref: 8507-02-19
Site: Hickeys 43 Parkgate Place
Date: 10-11/05/19
Borehole ref: BH105
Depth: From 10.10 to 13.30m
Box No: 2 of 4
10.10m
11.00m
12.50m
13.30m

BH105

GROUND INVESTIGATIONS IRELAND
Colour Chart #14
Grey Scale #14
Client: ARUP
Job Ref: 8507-02-19
Site: Hickeys 43 Parkgate Place
Date: 10-11/05/19
Borehole ref: BH105
Depth: From 13.30 to 16.05m
Box No: 3 of 4
14.00m
15.50m
16.05m

BH105


GROUND INVESTIGATIONS IRELAND
Colour Chart #14
Grey Scale #14
Client: ARUP
Job Ref: 8507-02-19
Site: Hickeys 43 Parkgate Place
Date: 10-11/05/19
Borehole ref: BH105
Depth: From 16.05 to 17.00m
Box No: 4 of 4
16.05m
17.00m

BH105


GROUND INVESTIGATIONS IRELAND
Client: ARUP
Site: HICKEYS 43 PARKGATE PLACE
Borehole ref: BH106
Box No: 1,2,3,4 of 4
Job Ref:
Date: 13/04/17
Depth: From 6.70 to 12.70
6.70m
8.20m
8.20m
9.70m
9.70m
11.20m
11.20m
12.70m

BH106


GROUND INVESTIGATIONS IRELAND
Client: ARUP
Site: HICKEYS 43 PARKGATE PLACE
Borehole ref: BH107
Box No: 1,2,3,4 of 4
Job Ref:
Date:
Depth: From 6.70 to 12.00
6.70m
8.20m
8.20m
9.70m
9.70m
11.20m
11.20m
12.0m

BH107

APPENDIX 6 – Laboratory Test Records

LABORATORY REPORT

4043

Contract Number: PSL19/2698

Report Date: 20 May 2019

Client's Reference: 2413208

Client Name: Ground Investigations Ireland Ltd
Catherinestown House
Hazelhatch Road
Newcastle
Co Durham

For the attention of: Stephen Kealy

Contract Title: Hickeys 43 Parkgate Place

Date Received: 1/5/2019
Date Commenced: 1/5/2019
Date Completed: 20/5/2019

Notes: **Opinions and Interpretations are outside the UKAS Accreditation**

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
S Royle (Laboratory Manager)	S Eyre (Senior Technician)	L Knight (Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH101		B	2.00		Brown slightly gravelly sandy very silty CLAY.
BH101		B	3.00		Brown very sandy very silty CLAY.
BH101		B	4.00		Brown very sandy GRAVEL.
BH101		B	5.00		Brown sandy GRAVEL.
BH101		B	7.00		Brown very sandy GRAVEL.
BH102		B	2.00		Brown very gravelly very sandy very silty CLAY.
BH102		B	3.00		Dark brown slightly gravelly very sandy very silty CLAY with some organic material.
BH102		B	4.00		Brown very sandy GRAVEL.
BH102		B	5.30		Brown very gravelly SAND.
BH102		B	6.00		Dark brown gravelly sandy very silty CLAY.
BH103		B	1.00		Brown very gravelly very sandy very silty CLAY.
BH103		B	3.00		Brown very gravelly sandy very silty CLAY.
BH103		B	4.00		Brown sandy GRAVEL.
BH103		B	5.00		Dark brown sandy silty GRAVEL with cobbles.

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hickleys 43 Parkgate Place	Contract No: PSL19/2698
			Client Ref: 8507-02-19

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
BH101		B	2.00		36							
BH101		B	3.00		28			38	22	16	100	Intermediate plasticity CI.
BH102		B	2.00		17							
BH102		B	3.00		44							
BH102		B	6.00		45			69	29	40	75	High plasticity CH.
BH103		B	1.00		14							
BH103		B	3.00		38			67	28	39	71	High plasticity CH.
BH103		B	4.00		3.0				NP			
BH103		B	5.00		10				NP			

SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.

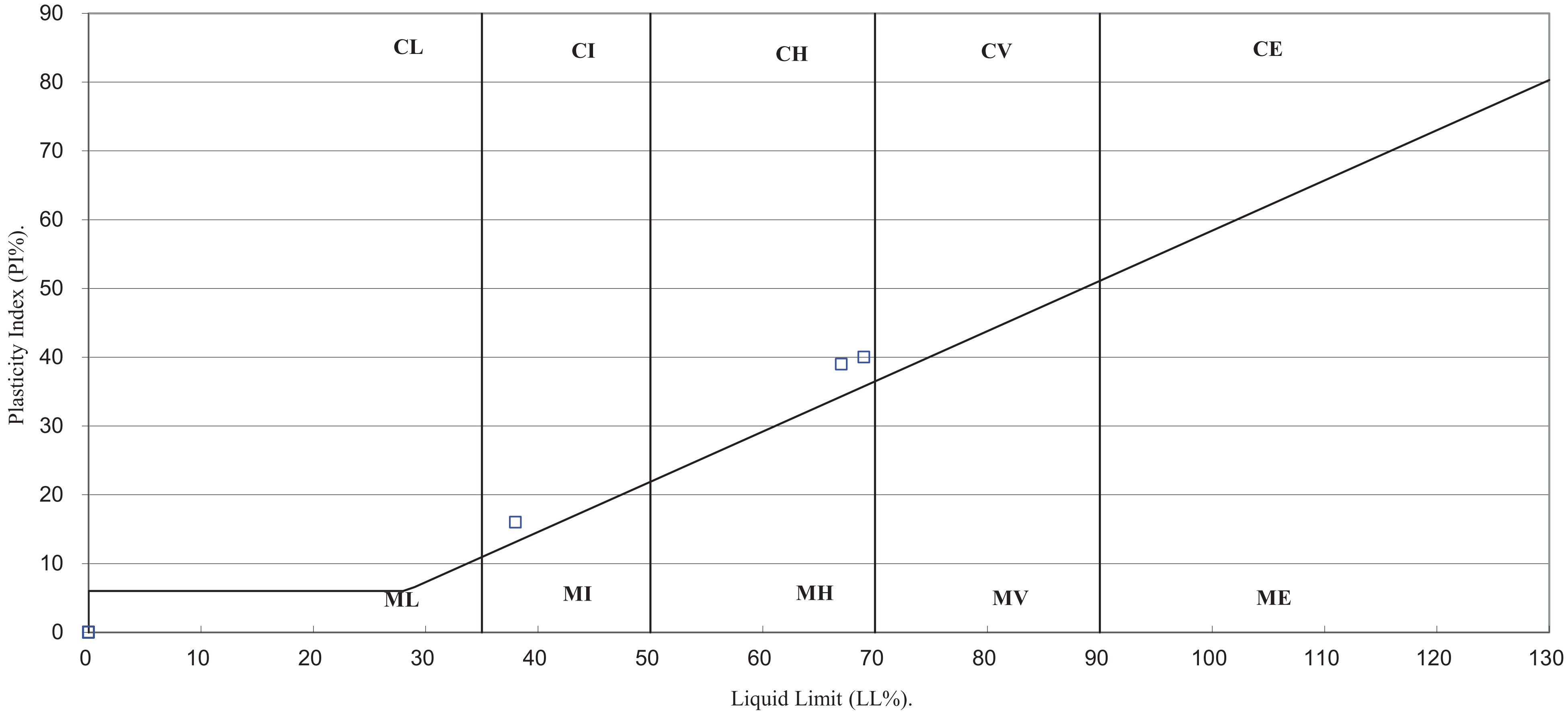
UKAS TESTING 4043

PSL Professional Soils Laboratory

Hickleys 43 Parkgate Place

Contract No:
PSL19/2698
Client Ref:
8507-02-19

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



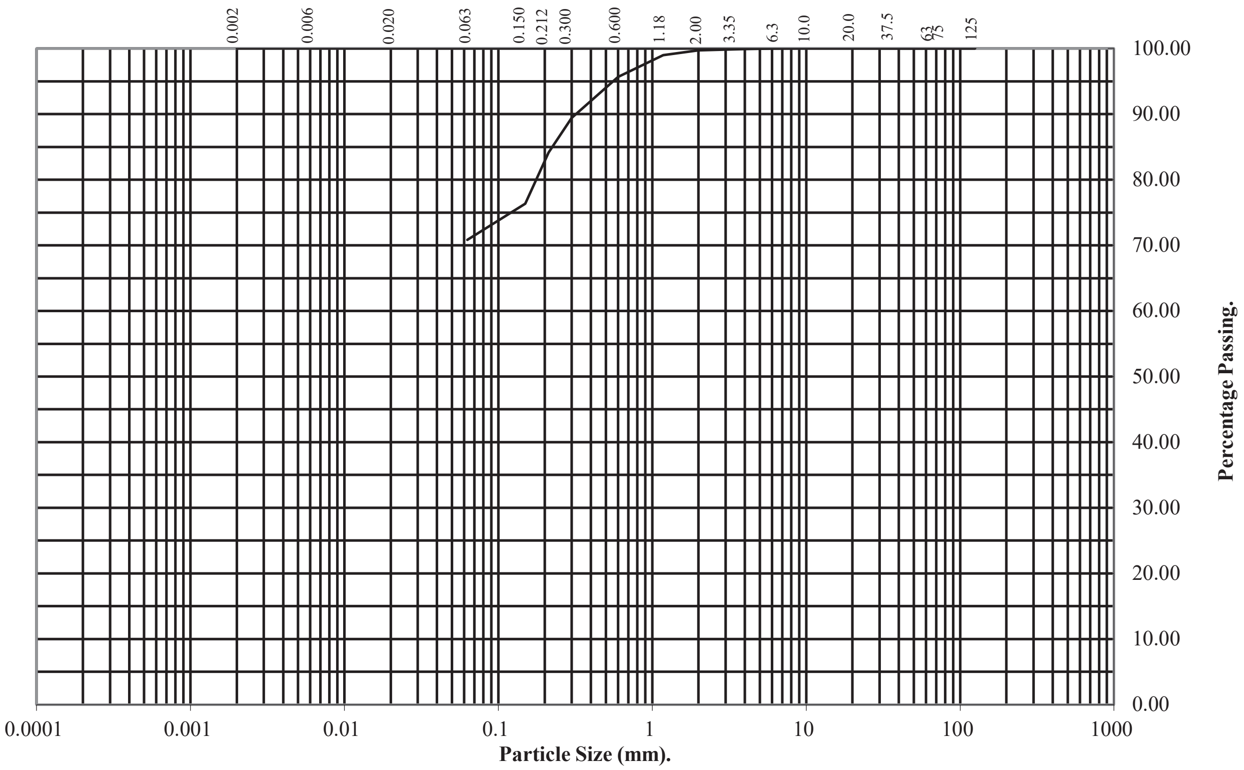
UKAS TESTING 4043	PSL Professional Soils Laboratory	Hickleys 43 Parkgate Place	Contract No:
			PSL19/2698
			Client Ref:
			8507-02-19

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH101**	**Top Depth (m):**	**3.00**
Sample Number:		**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	100
2	100
1.18	99
0.6	96
0.3	89
0.212	84
0.15	76
0.063	71

Soil Fraction	Total Percentage
Cobbles	0
Gravel	0
Sand	29
Silt/Clay	71

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Hickleys 43 Parkgate Place**	**Contract No:** **PSL19/2698** **Client Ref:** **8507-02-19**

PARTICLE SIZE DISTRIBUTION TEST

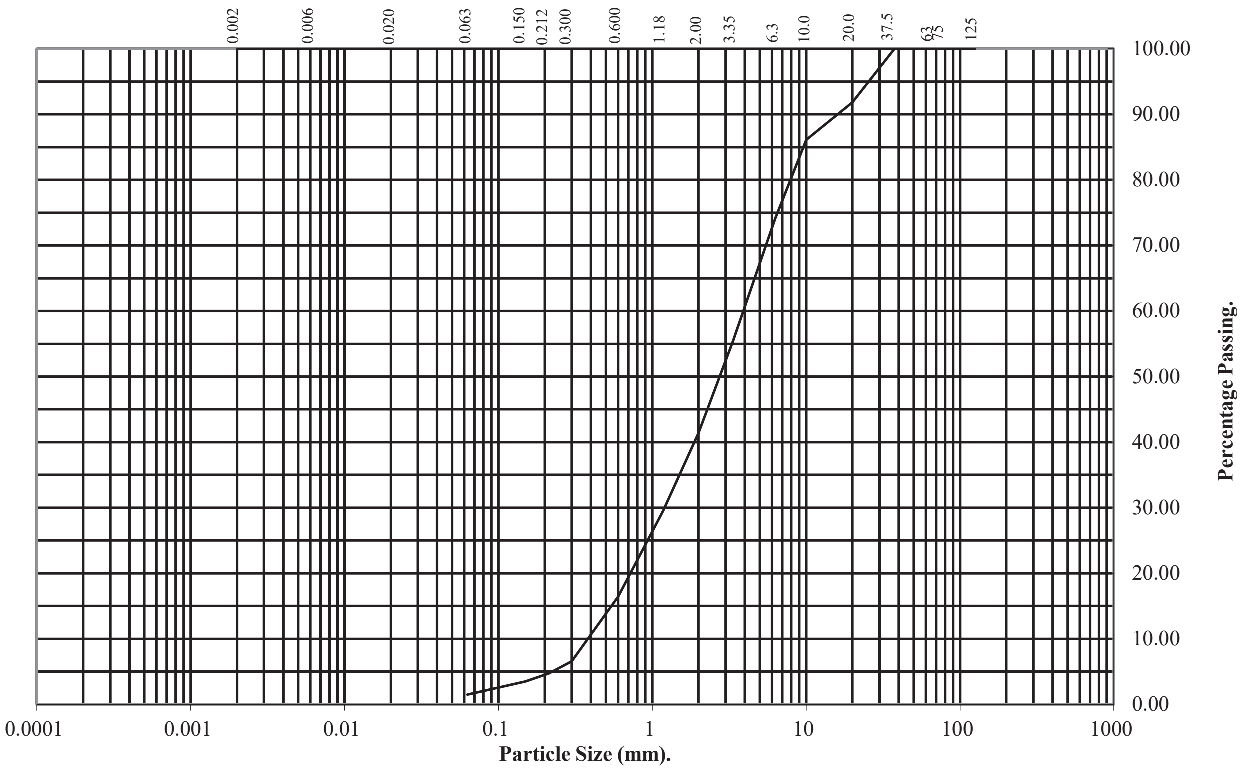
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH101 **Top Depth (m):** 4.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	92
10	86
6.3	74
3.35	55
2	41
1.18	30
0.6	16
0.3	7
0.212	5
0.15	3
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	59
Sand	40
Silt/Clay	1

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Hickleys 43 Parkgate Place**	**Contract No:** **PSL19/2698** **Client Ref:** **8507-02-19**

PARTICLE SIZE DISTRIBUTION TEST

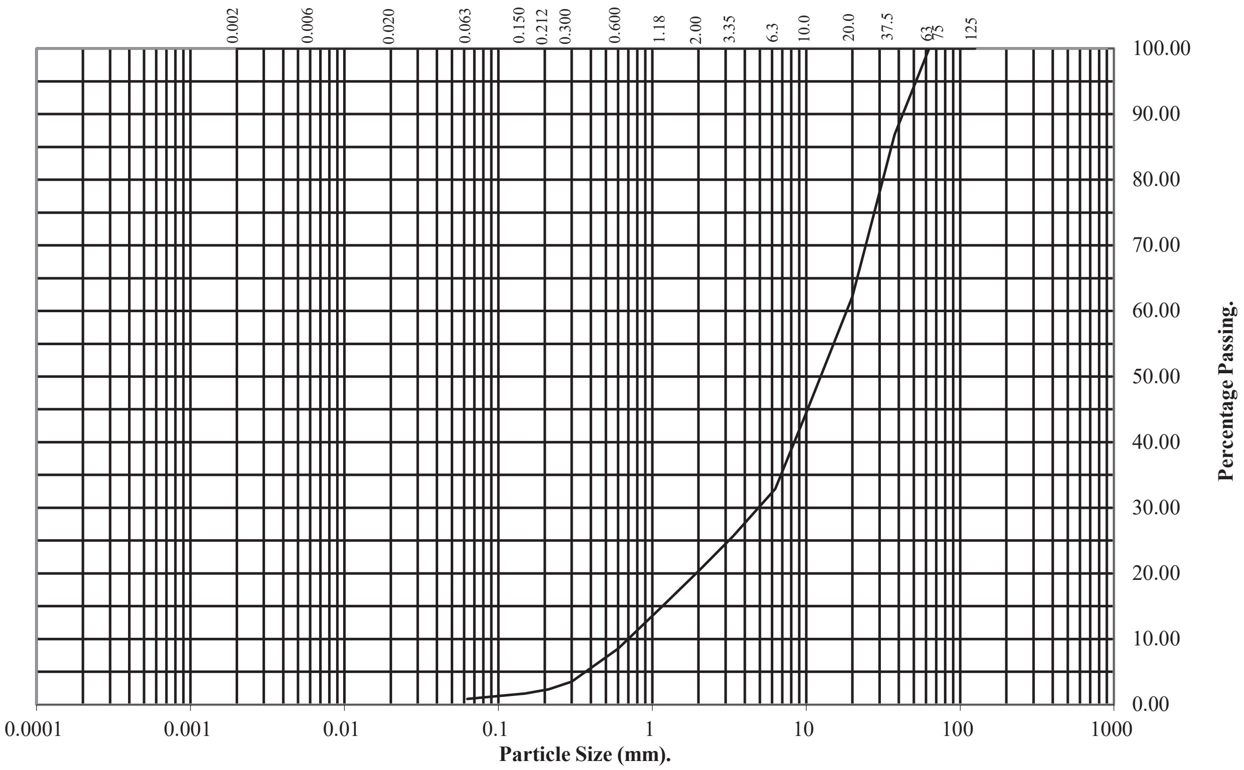
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH101 **Top Depth (m):** 5.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	87
20	62
10	45
6.3	33
3.35	26
2	20
1.18	15
0.6	9
0.3	4
0.212	2
0.15	2
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	80
Sand	19
Silt/Clay	1

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

Professional Soils Laboratory

Hickleys 43 Parkgate Place

Contract No: PSL19/2698

Client Ref: 8507-02-19

PARTICLE SIZE DISTRIBUTION TEST

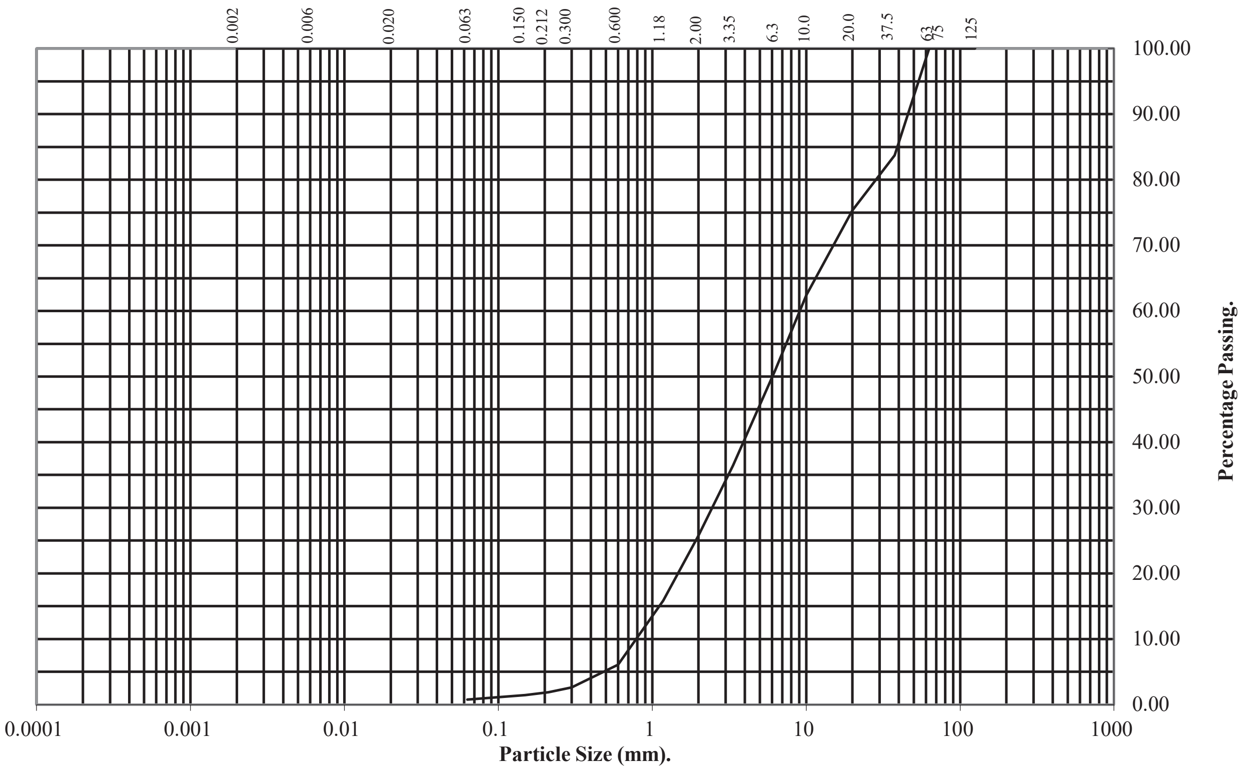
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH101 **Top Depth (m):** 7.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	84
20	75
10	62
6.3	51
3.35	36
2	26
1.18	16
0.6	6
0.3	3
0.212	2
0.15	1
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	74
Sand	25
Silt/Clay	1

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hickleys 43 Parkgate Place	Contract No: PSL19/2698 Client Ref: 8507-02-19

PARTICLE SIZE DISTRIBUTION TEST

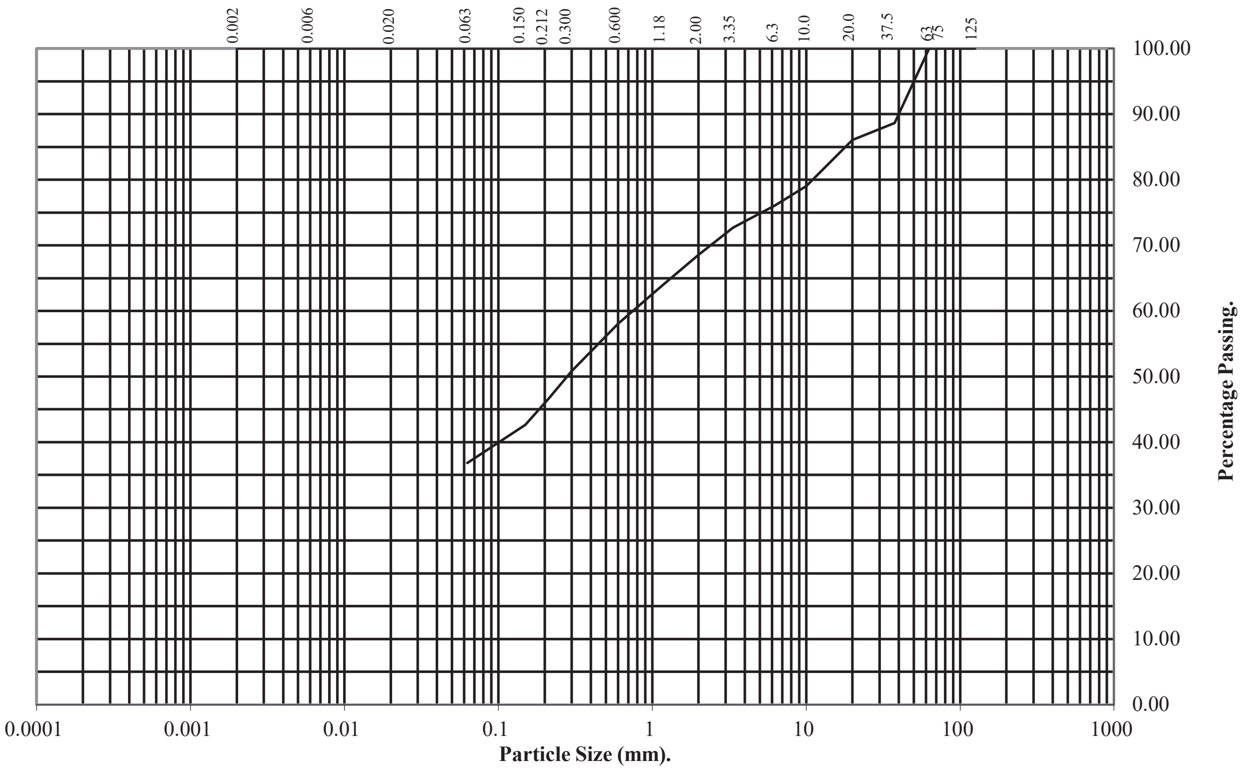
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH102 **Top Depth (m):** 2.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	89
20	86
10	79
6.3	76
3.35	73
2	69
1.18	64
0.6	58
0.3	51
0.212	47
0.15	43
0.063	37

Soil Fraction	Total Percentage
Cobbles	0
Gravel	31
Sand	32
Silt/Clay	37

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

PSL Professional Soils Laboratory

Hickleys 43 Parkgate Place

Contract No: PSL19/2698

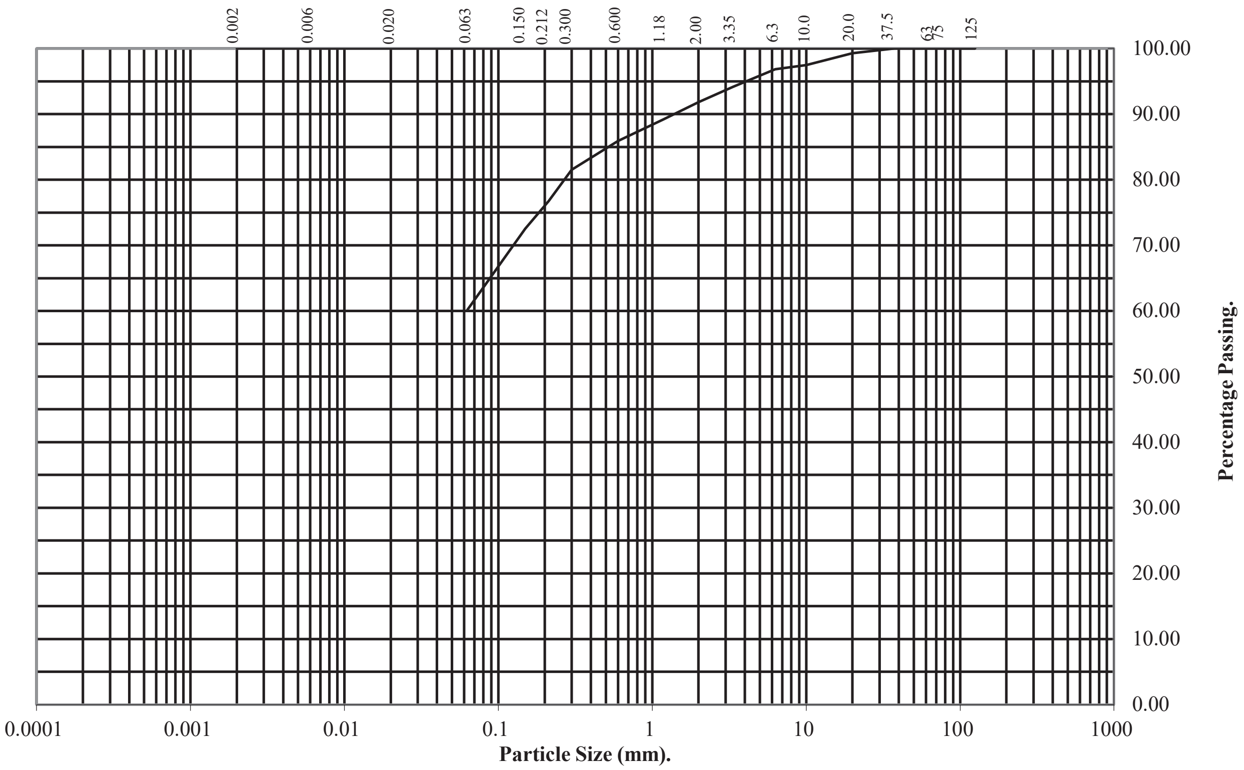
Client Ref: 8507-02-19

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**BH102**	**Top Depth (m):**	**3.00**
Sample Number:		**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	99
10	97
6.3	97
3.35	94
2	92
1.18	89
0.6	86
0.3	82
0.212	77
0.15	73
0.063	60

Soil Fraction	Total Percentage
Cobbles	0
Gravel	8
Sand	32
Silt/Clay	60

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Hickleys 43 Parkgate Place**	**Contract No:** **PSL19/2698** **Client Ref:** **8507-02-19**

PARTICLE SIZE DISTRIBUTION TEST

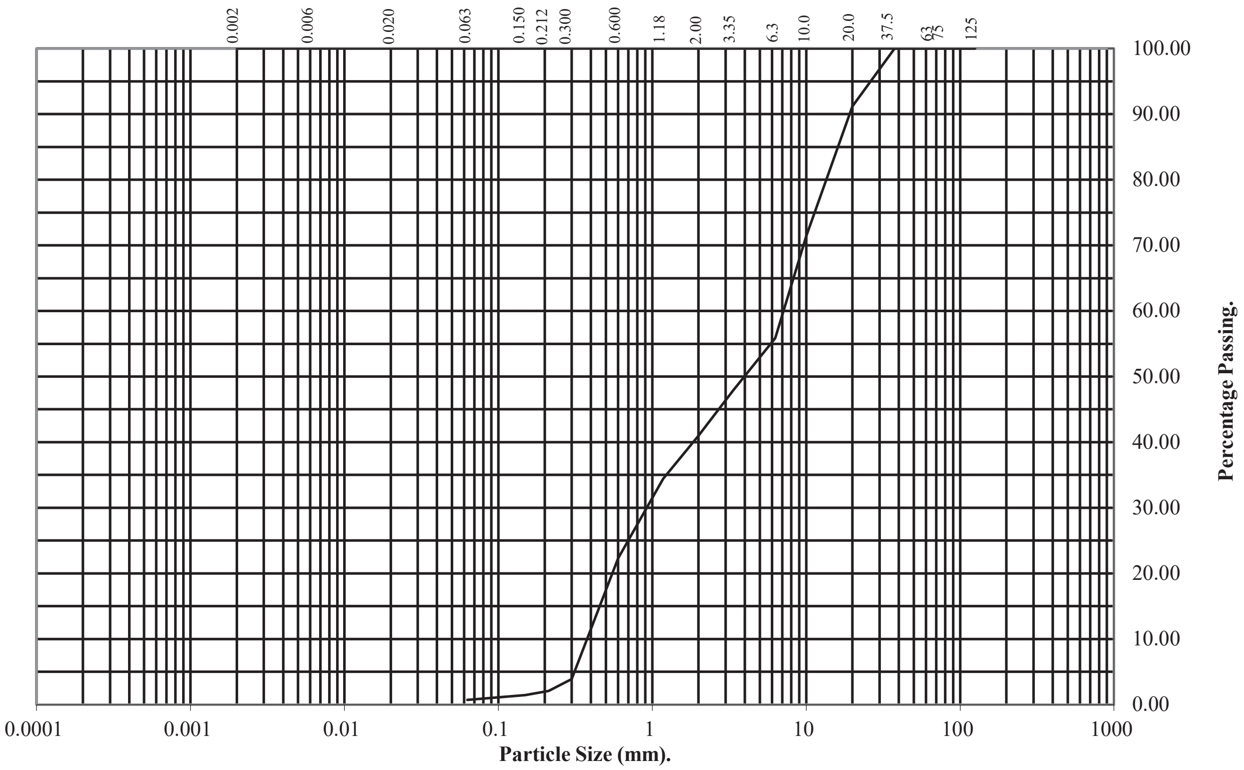
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH102 **Top Depth (m):** 4.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	91
10	71
6.3	56
3.35	48
2	41
1.18	34
0.6	22
0.3	4
0.212	2
0.15	1
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	59
Sand	40
Silt/Clay	1

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hickleys 43 Parkgate Place	Contract No: PSL19/2698 Client Ref: 8507-02-19

PARTICLE SIZE DISTRIBUTION TEST

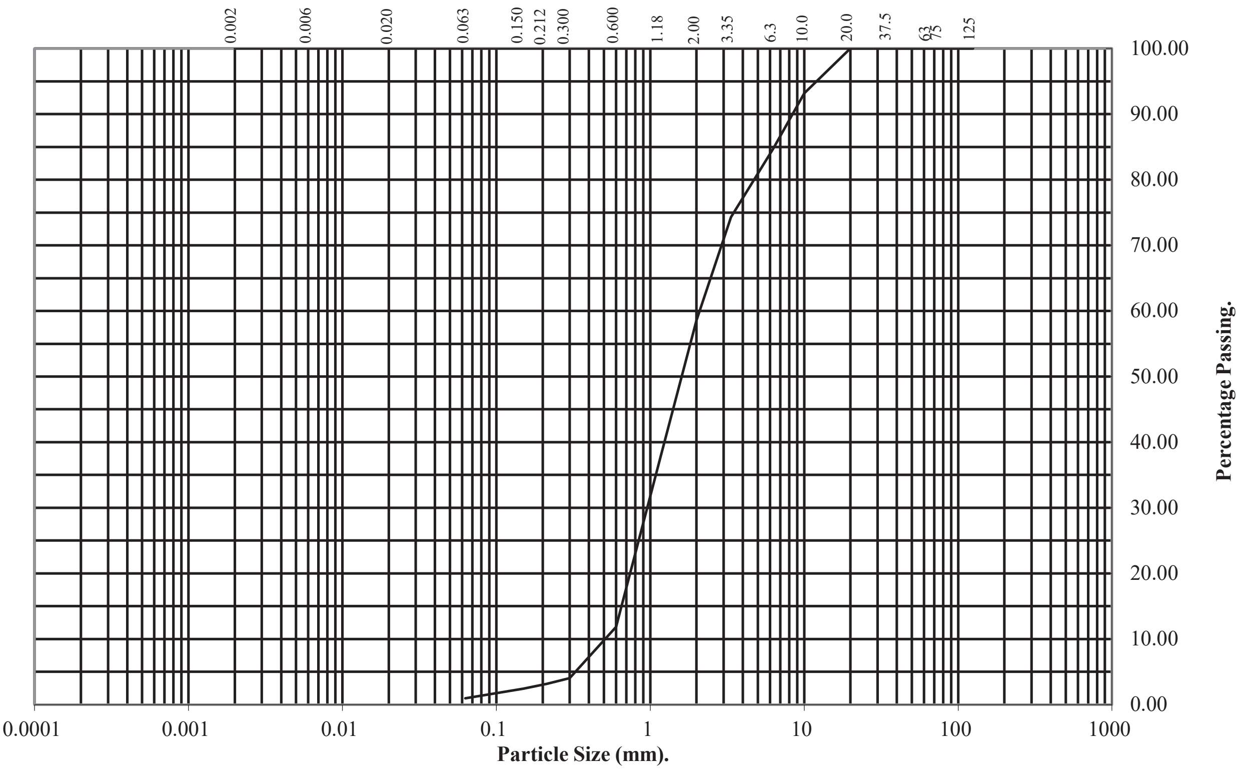
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH102 **Top Depth (m):** 5.30

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	93
6.3	85
3.35	74
2	59
1.18	38
0.6	12
0.3	4
0.212	3
0.15	2
0.063	1

Soil Fraction	Total Percentage
Cobbles	0
Gravel	41
Sand	58
Silt/Clay	1

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hickleys 43 Parkgate Place	Contract No: PSL19/2698 Client Ref: 8507-02-19

PARTICLE SIZE DISTRIBUTION TEST

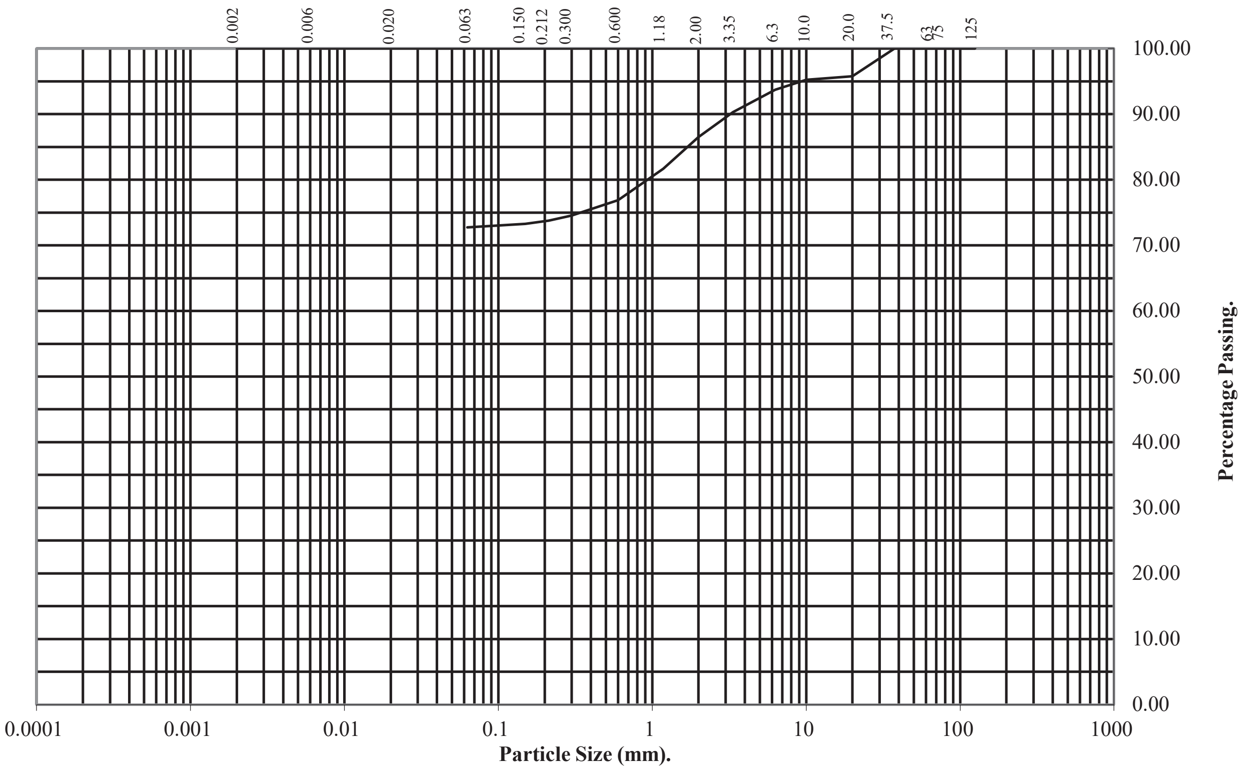
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH102 **Top Depth (m):** 6.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	96
10	95
6.3	94
3.35	90
2	86
1.18	82
0.6	77
0.3	75
0.212	74
0.15	73
0.063	73

Soil Fraction	Total Percentage
Cobbles	0
Gravel	14
Sand	13
Silt/Clay	73

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Hickleys 43 Parkgate Place**	**Contract No:** **PSL19/2698** **Client Ref:** **8507-02-19**

PARTICLE SIZE DISTRIBUTION TEST

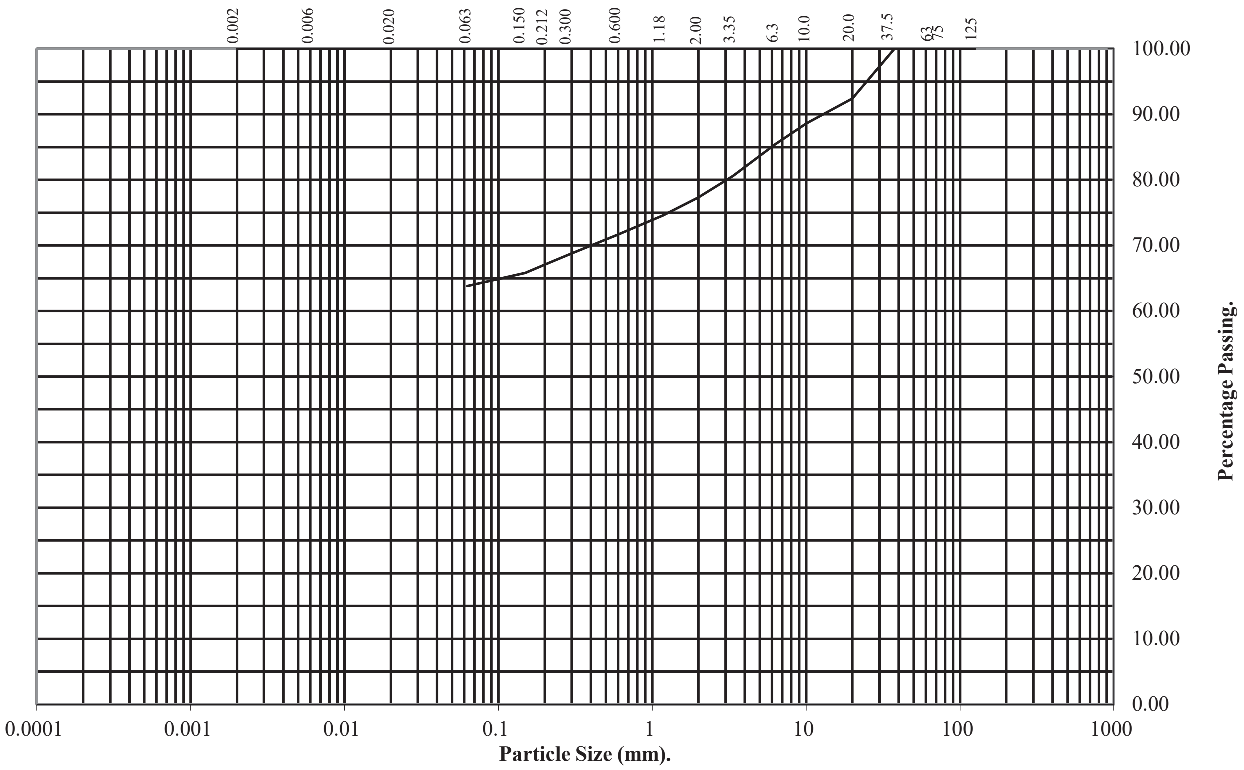
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH103 **Top Depth (m):** 3.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	92
10	89
6.3	85
3.35	81
2	77
1.18	75
0.6	72
0.3	69
0.212	67
0.15	66
0.063	64

Soil Fraction	Total Percentage
Cobbles	0
Gravel	23
Sand	13
Silt/Clay	64

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hickleys 43 Parkgate Place	Contract No: PSL19/2698 Client Ref: 8507-02-19

PARTICLE SIZE DISTRIBUTION TEST

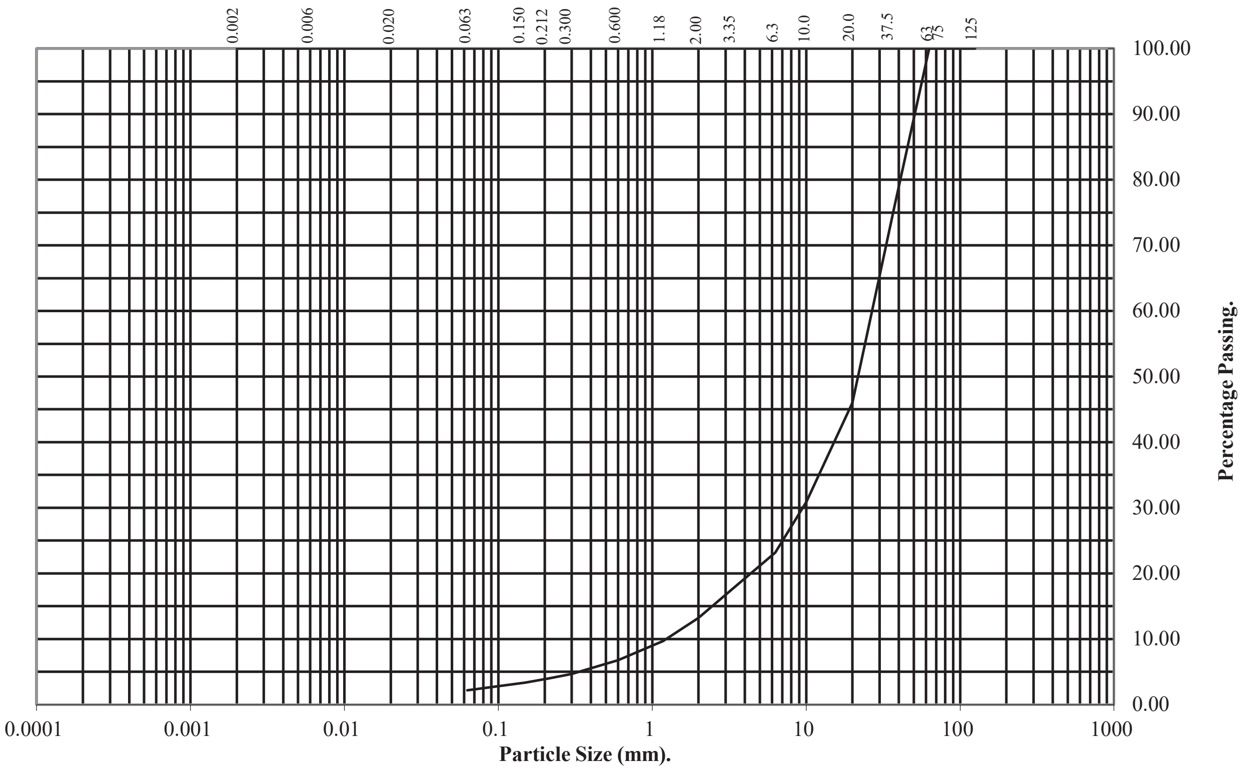
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH103 **Top Depth (m):** 4.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	76
20	46
10	31
6.3	23
3.35	18
2	13
1.18	10
0.6	7
0.3	5
0.212	4
0.15	3
0.063	2

Soil Fraction	Total Percentage
Cobbles	0
Gravel	87
Sand	11
Silt/Clay	2

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Hickleys 43 Parkgate Place**	**Contract No:** **PSL19/2698** **Client Ref:** **8507-02-19**

PARTICLE SIZE DISTRIBUTION TEST

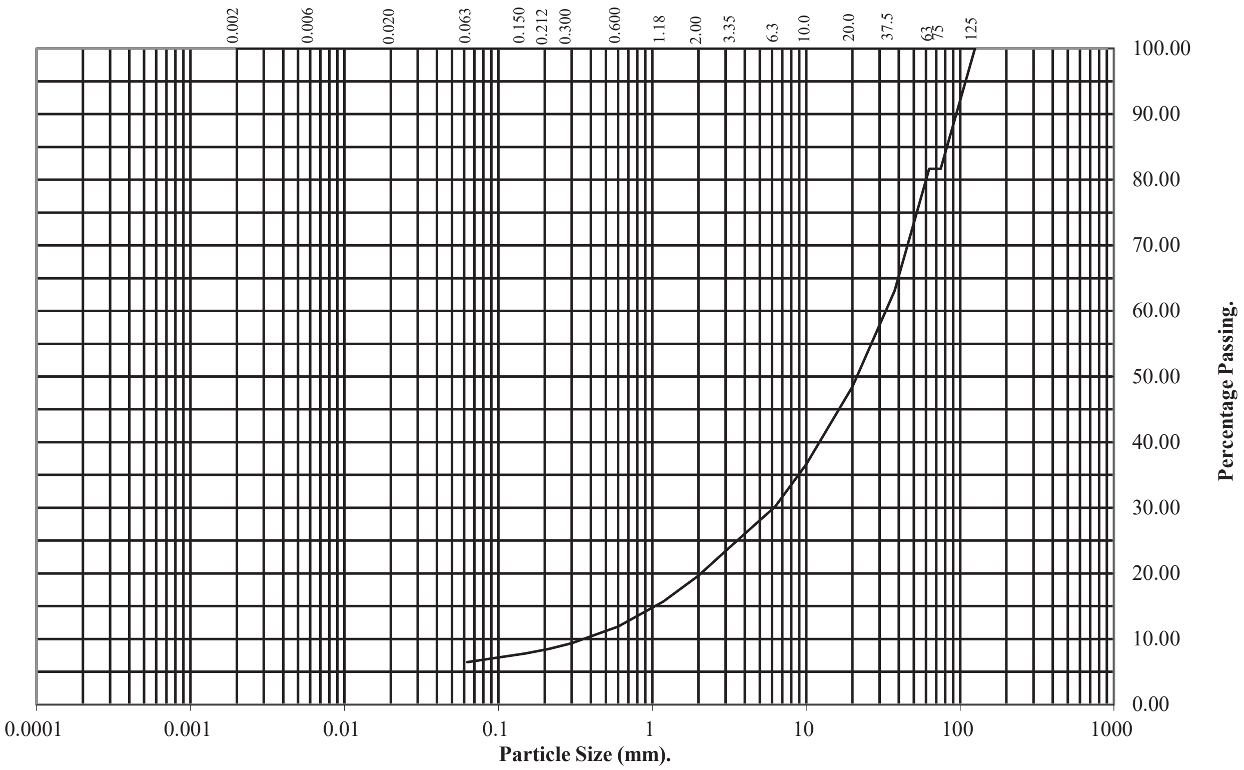
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH103 **Top Depth (m):** 5.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	82
63	82
37.5	63
20	48
10	37
6.3	30
3.35	24
2	20
1.18	16
0.6	12
0.3	9
0.212	8
0.15	8
0.063	6

Soil Fraction	Total Percentage
Cobbles	18
Gravel	62
Sand	14
Silt/Clay	6

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

Professional Soils Laboratory

Hickleys 43 Parkgate Place

Contract No:
PSL19/2698
Client Ref:
8507-02-19

Certificate of Analysis

Certificate Number	19-08733	16-May-19
Client	Professional Soils Laboratory Ltd 5/7 Hexthorpe Road Hexthorpe DN4 0AR	

Our Reference	19-08733
Client Reference	PSL19/2698
Order No	(not supplied)
Contract Title	Hickeys 43 Parkgate Place
Description	6 Soil samples.
Date Received	10-May-19
Date Started	10-May-19
Date Completed	16-May-19
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Derwentside Environmental Testing Services Limited
Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • email: info@dets.co.uk • www.dets.co.uk

Summary of Chemical Analysis
Soil Samples

Our Ref 19-08733
Client Ref PSL19/2698
Contract Title Hickeys 43 Parkgate Place

			Lab No	1499609	1499610	1499611	1499612	1499613	1499614
			Sample ID	BH101	BH102	BH102	BH103	BH103	BH103
			Depth	3.00	2.00	6.00	1.00	3.00	5.00
			Other ID						
			Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Sampling Date	n/s	n/s	n/s	n/s	n/s	n/s
			Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**						
Inorganics									
pH	DETSC 2008#					9.0	8.8		8.0
Organic matter	DETSC 2002#	0.1	%				0.5		
Chloride Aqueous Extract	DETSC 2055	1	mg/l	6.3	47	19	6.7	5.3	8.0
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	16	30	360	28	340	390

Key: # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 19-08733
Client Ref PSL19/2698
Contract Hickeys 43 Parkgate Place

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1499609	BH101 3.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days)	
1499610	BH102 2.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days)	
1499611	BH102 6.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	
1499612	BH103 1.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), Organic Matter (Manual) (28 days), pH + Conductivity (7 days)	
1499613	BH103 3.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days)	
1499614	BH103 5.00 SOIL		PT 500ml	Sample date not supplied, Anions 2:1 (365 days), pH + Conductivity (7 days)	

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.
Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

LABORATORY REPORT

4043

Contract Number: PSL19/2699

Report Date: 22 May 2019

Client's Reference: 19/02/8507

Client Name: Ground Investigations Ireland Ltd
Catherinestown House
Hazelhatch Road
Newcastle
Co Durham

For the attention of: Stephen Kealy

Contract Title: Hickeys 43 Parkgate Place

Date Received: 1/5/2019
Date Commenced: 1/5/2019
Date Completed: 22/5/2019

Notes: **Opinions and Interpretations are outside the UKAS Accreditation**

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
L Knight (Senior Technician)	S Eyre (Senior Technician)	S Royle (Laboratory Manager)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP101		B	1.00		Brown sandy clayey GRAVEL.
TP101		B	2.00		Brown gravelly very sandy CLAY.
TP101		B	2.50		Brown gravelly slightly clayey very silty SAND.
TP101		B	3.50		Brown very sandy slightly clayey silty GRAVEL.
TP102		B	2.50		Brown slightly gravelly sandy CLAY.

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hickeys 43 Parkgate Place	Contract No: PSL19/2699
			Client Ref: 8507-02-19

SUMMARY OF SOIL CLASSIFICATION TESTS

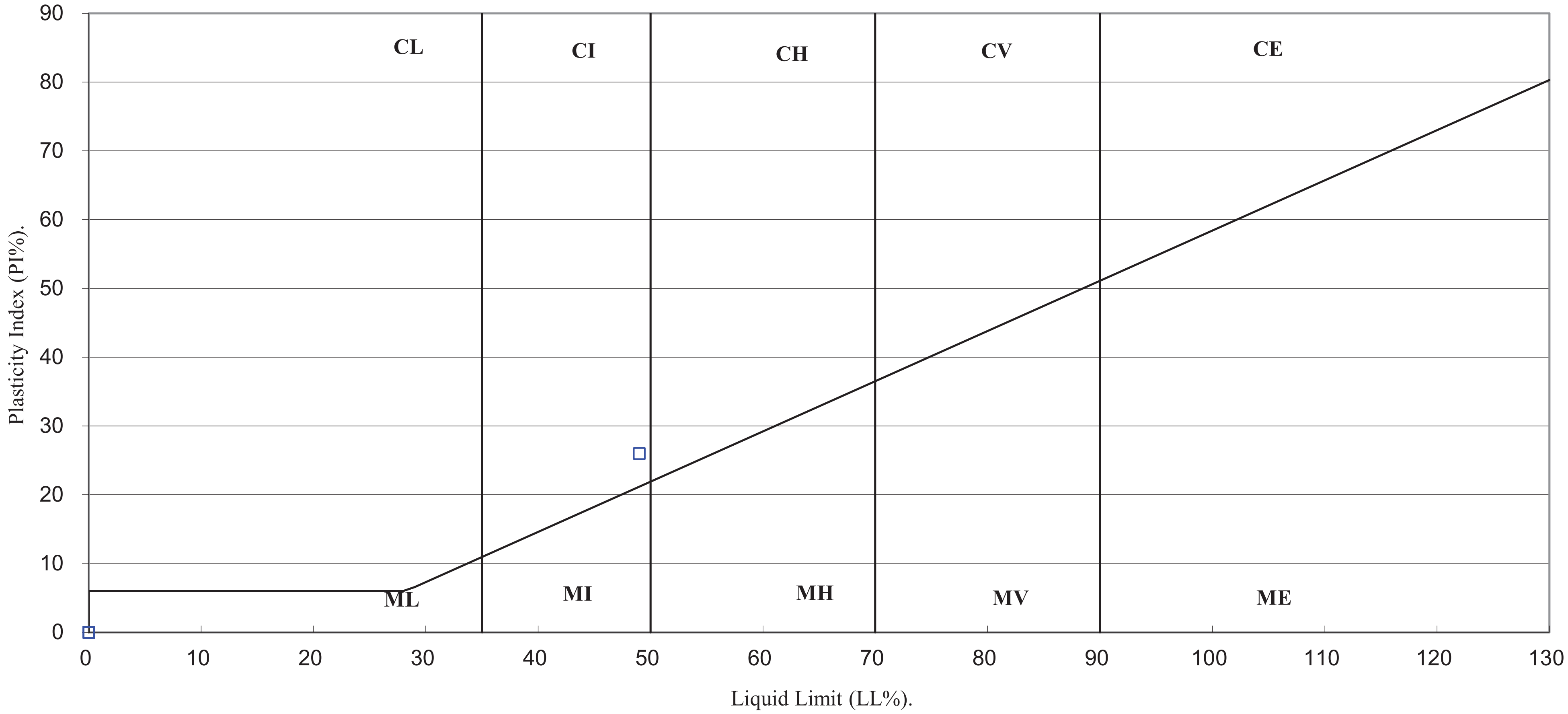
(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
TP101		B	1.00		17							
TP101		B	2.00		28							
TP101		B	2.50		25				NP			
TP102		B	2.50		32			49	23	26	96	Intermediate plasticity CI.

SYMBOLS : NP : Non Plastic * : Liquid Limit and Plastic Limit Wet Sieved.

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hickeys 43 Parkgate Place	Contract No:
			PSL19/2699
			Client Ref:
			8507-02-19

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043	PSL Professional Soils Laboratory	Hickeys 43 Parkgate Place

Contract No:
PSL19/2699
Client Ref:
8507-02-19

PARTICLE SIZE DISTRIBUTION TEST

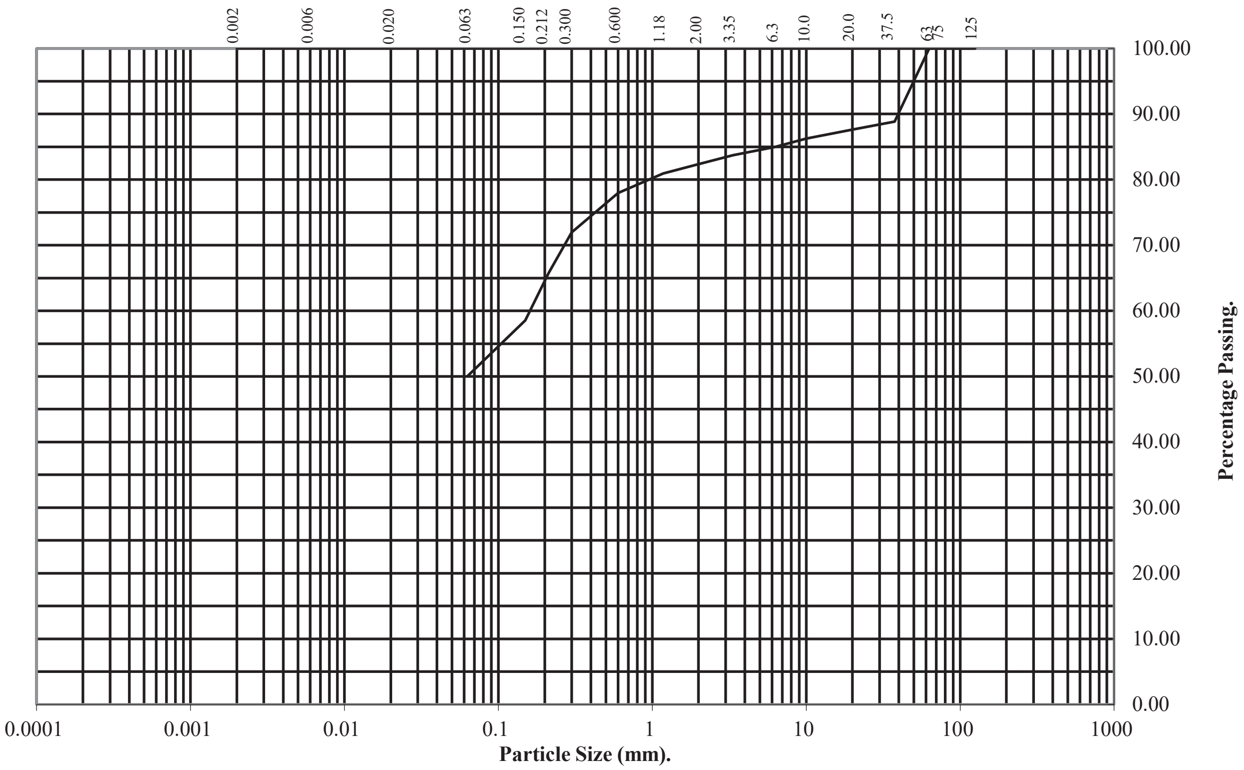
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: TP101 **Top Depth (m):** 2.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	89
20	88
10	86
6.3	85
3.35	84
2	82
1.18	81
0.6	78
0.3	72
0.212	66
0.15	59
0.063	50

Soil Fraction	Total Percentage
Cobbles	0
Gravel	18
Sand	32
Silt/Clay	50

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

Professional Soils Laboratory

Hickeys 43 Parkgate Place

Contract No:
PSL19/2699
Client Ref:
8507-02-19

PARTICLE SIZE DISTRIBUTION TEST

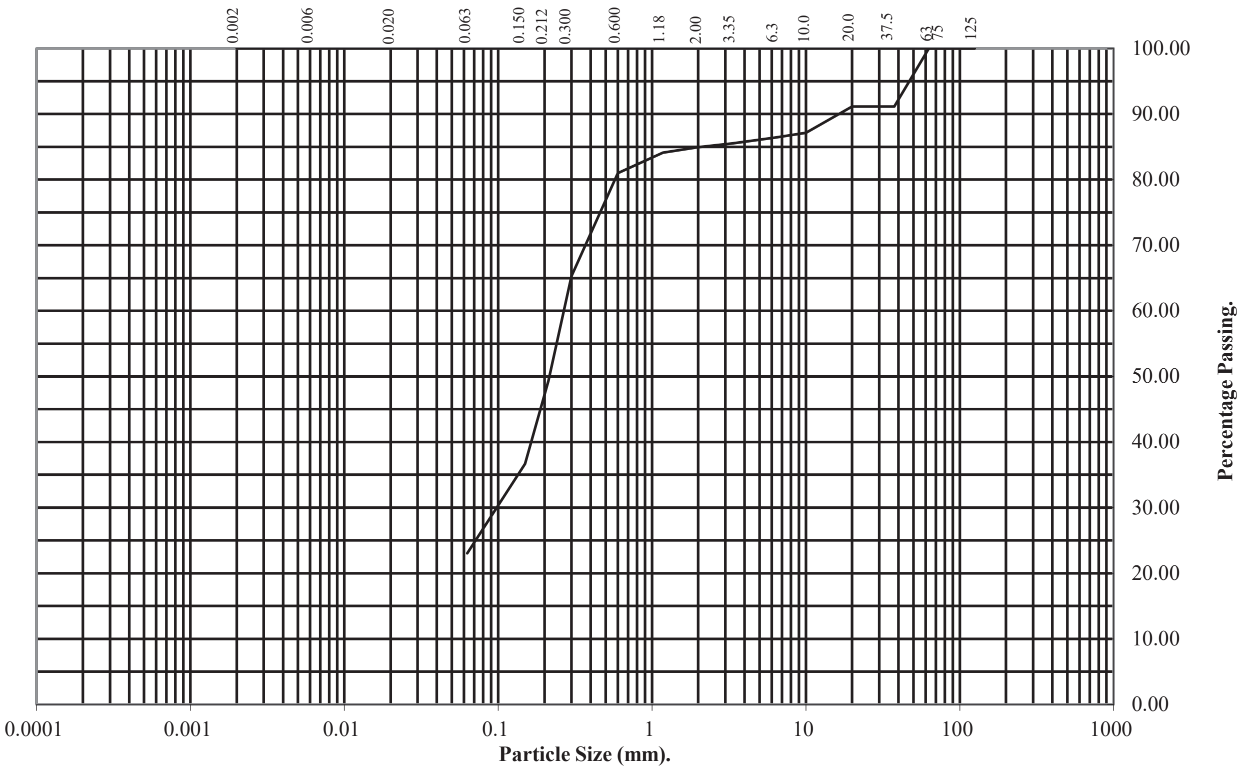
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: **TP101** **Top Depth (m):** **2.50**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	91
20	91
10	87
6.3	86
3.35	86
2	85
1.18	84
0.6	81
0.3	65
0.212	49
0.15	37
0.063	23

Soil Fraction	Total Percentage
Cobbles	0
Gravel	15
Sand	62
Silt/Clay	23

Remarks:
See Summary of Soil Descriptions

PARTICLE SIZE DISTRIBUTION TEST

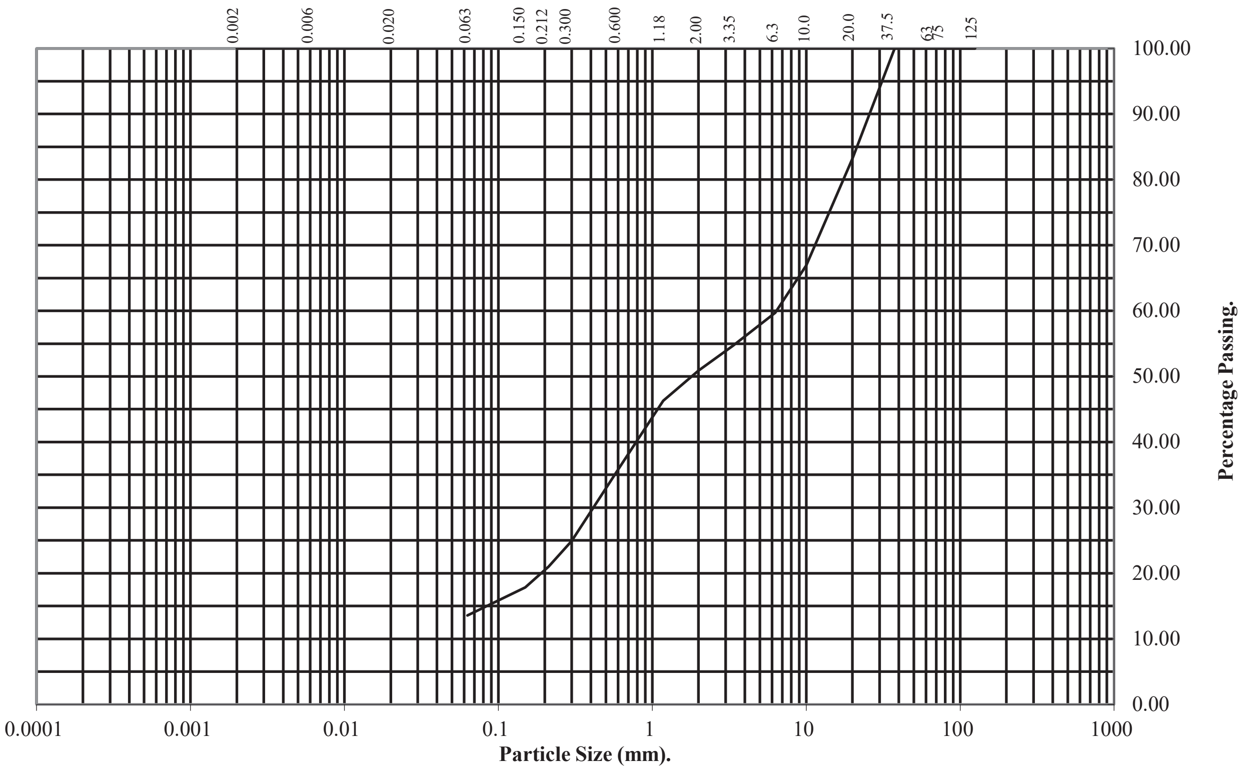
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: TP101 **Top Depth (m):** 3.50

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	83
10	67
6.3	60
3.35	55
2	51
1.18	46
0.6	36
0.3	25
0.212	21
0.15	18
0.063	14

Soil Fraction	Total Percentage
Cobbles	0
Gravel	49
Sand	37
Silt/Clay	14

Remarks:
See Summary of Soil Descriptions

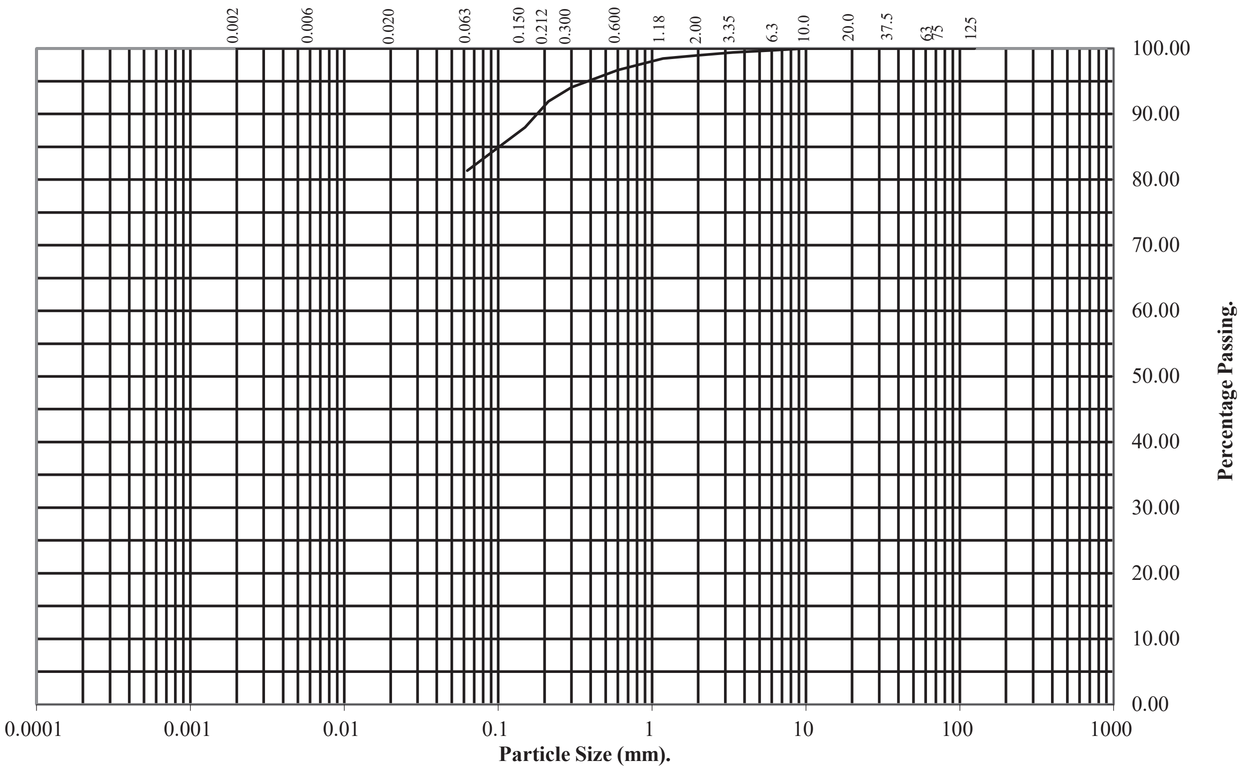
UKAS TESTING 4043	PSL Professional Soils Laboratory	**Hickeys 43 Parkgate Place**	**Contract No:** **PSL19/2699** **Client Ref:** **8507-02-19**

PARTICLE SIZE DISTRIBUTION TEST

BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number:	**TP102**	**Top Depth (m):**	**2.50**
Sample Number:		**Base Depth(m):**	
Sample Type:	**B**		



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	100
20	100
10	100
6.3	100
3.35	99
2	99
1.18	98
0.6	97
0.3	94
0.212	92
0.15	88
0.063	81

Soil Fraction	Total Percentage
Cobbles	0
Gravel	1
Sand	18
Silt/Clay	81

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	**Hickeys 43 Parkgate Place**	**Contract No:** **PSL19/2699** **Client Ref:** **8507-02-19**

Certificate of Analysis

Certificate Number	19-08343	10-May-19
Client	Professional Soils Laboratory Ltd 5/7 Hexthorpe Road Hexthorpe DN4 0AR	

Our Reference	19-08343
Client Reference	PSL19/2699
Order No	(not supplied)
Contract Title	Hickeys 43 Parkgate Place
Description	3 Soil samples.
Date Received	07-May-19
Date Started	07-May-19
Date Completed	10-May-19
Test Procedures	Identified by prefix DETSn (details on request).
Notes	Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

Approved By

Adam Fenwick
Contracts Manager

UKAS TESTING
2139

Derwentside Environmental Testing Services Limited
Unit 2, Park Road Industrial Estate South, Consett, Co Durham, DH8 5PY
Tel: 01207 582333 • email: info@dets.co.uk • www.dets.co.uk

Summary of Chemical Analysis
Soil Samples

Our Ref 19-08343
Client Ref PSL19/2699
Contract Title Hickeys 43 Parkgate Place

			Lab No	1497114	1497115	1497116
			Sample ID	TP101	TP101	TP102
			Depth	2.00	2.50	2.50
			Other ID			
			Sample Type	B	B	B
			Sampling Date	02/05/19	02/05/19	02/05/19
			Sampling Time	n/s	n/s	n/s
Test	**Method**	**LOD**	**Units**			
Inorganics						
pH	DETSC 2008#			8.5	8.3	8.1
Organic matter	DETSC 2002#	0.1	%			1.6
Chloride Aqueous Extract	DETSC 2055	1	mg/l	77	15	55
Sulphate Aqueous Extract as SO4	DETSC 2076#	10	mg/l	29	23	22

Key: # -MCERTS (accreditation only applies if report carries the MCERTS logo). n/s -not supplied.

Information in Support of the Analytical Results

Our Ref 19-08343
Client Ref PSL19/2699
Contract Hickeys 43 Parkgate Place

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1497114	TP101 2.00 SOIL	02/05/19	PT 500ml		
1497115	TP101 2.50 SOIL	02/05/19	PT 500ml		
1497116	TP102 2.50 SOIL	02/05/19	PT 500ml		

Key: P-Plastic T-Tub

DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

LABORATORY REPORT

4043

Contract Number: PSL19/2860

Report Date: 24 May 2019

Client's Reference: 19/02/8507

Client Name: Ground Investigations Ireland Ltd
Catherinestown House
Hazelhatch Road
Newcastle
Co Durham

For the attention of: Stephen Kealy

Contract Title: Hickeys 43 Parkgate Place

Date Received: 9/5/2019
Date Commenced: 9/5/2019
Date Completed: 24/5/2019

Notes: **Opinions and Interpretations are outside the UKAS Accreditation**

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)	A Watkins (Director)	R Berriman (Quality Manager)
S Royle (Laboratory Manager)	S Eyre (Senior Technician)	L Knight (Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
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tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
BH104		B	3.00		Dark grey very gravelly silty SAND.
BH104		B	4.00		Dark grey very gravelly slightly clayey SAND.
BH104		B	5.00		Grey very gravelly sandy very silty CLAY.
BH104		B	6.00		Grey gravelly sandy very silty CLAY.
BH104		B	7.00		Brownish grey very sandy GRAVEL with cobbles.

UKAS TESTING 4043

PSL Professional Soils Laboratory

Hickeys 43 Parkgate Place

Contract No:
PSL19/2860
Client Ref:
8507-02-19

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
BH104		B	3.00		20							
BH104		B	4.00		17							
BH104		B	5.00		19							
BH104		B	6.00		35			54	27	27	1	High plasticity CH.

SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.

UKAS TESTING 4043

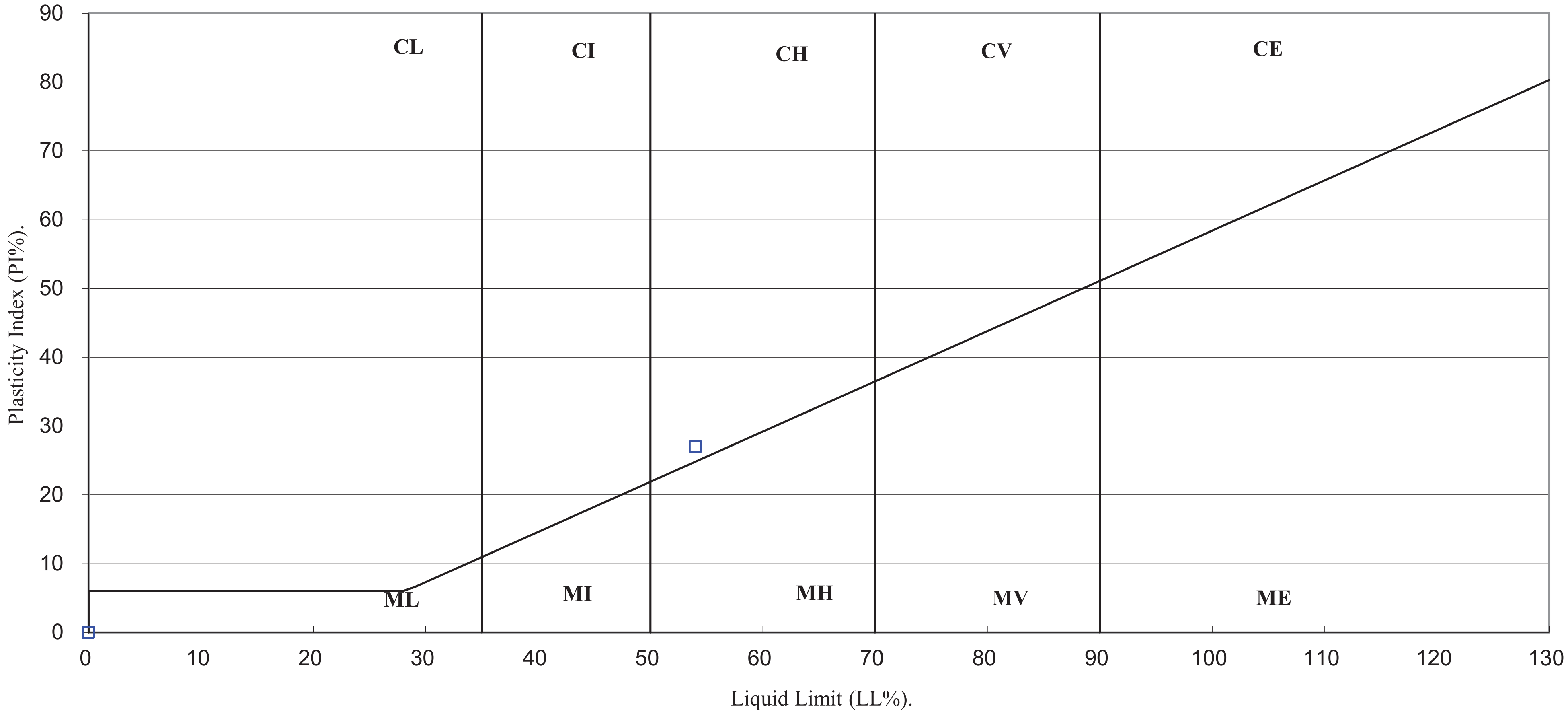
PSL Professional Soils Laboratory

Hickeys 43 Parkgate Place

Contract No: PSL19/2860

Client Ref: 8507-02-19

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



UKAS TESTING 4043 — PSL Professional Soils Laboratory	Hickeys 43 Parkgate Place	Contract No:
		PSL19/2860
		Client Ref:
		8507-02-19

PARTICLE SIZE DISTRIBUTION TEST

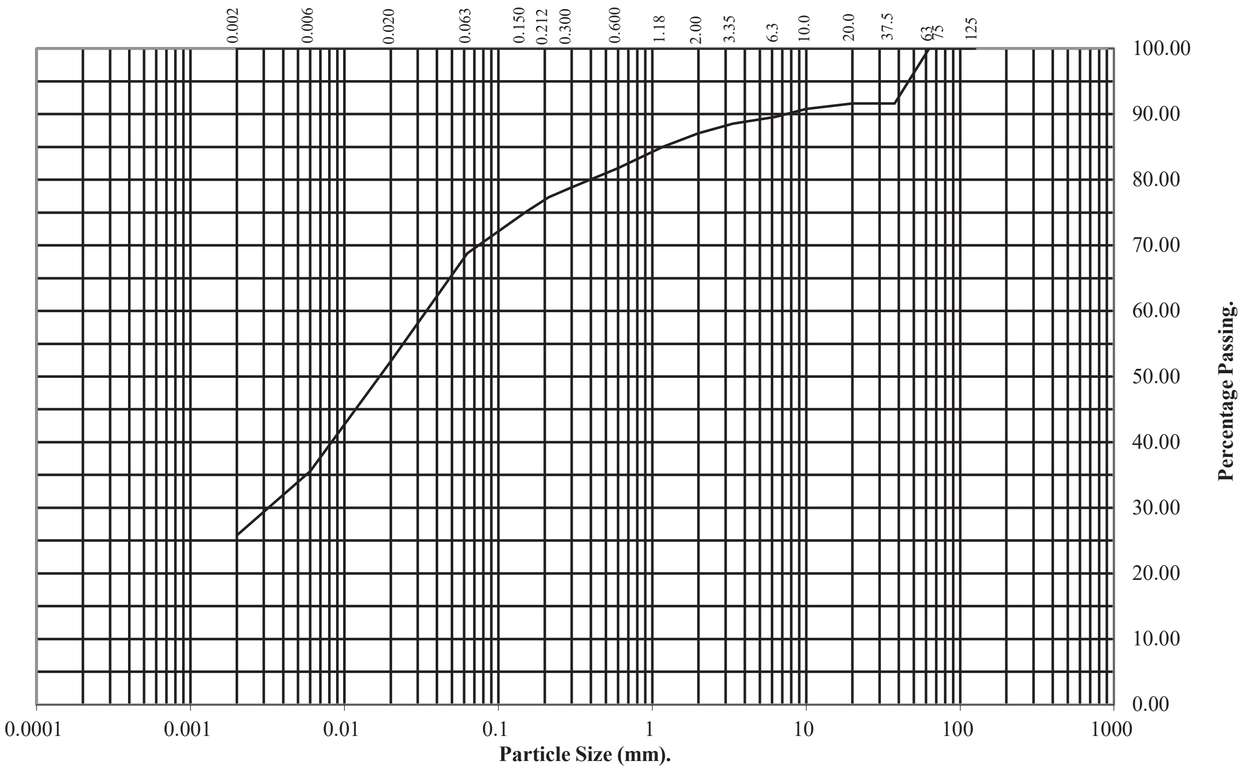
BS1377 : Part 2 : 1990

Wet Sieve & Pipette Analysis, Clause 9.2 & 9.4

Hole Number: **BH104** **Top Depth (m):** **6.00**

Sample Number: **Base Depth(m):**

Sample Type: **B**



BS Test Sieve (mm)	Percentage Passing
125	100
75	100
63	100
37.5	92
20	92
10	91
6.3	90
3.35	89
2	87
1.18	85
0.6	82
0.3	79
0.212	77
0.15	75
0.063	69

Particle Diameter	Percentage Passing
0.02	52
0.006	36
0.002	26

Soil Fraction	Total Percentage
Cobbles	0
Gravel	13
Sand	18
Silt	43
Clay	26

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043

Professional Soils Laboratory

Hickeys 43 Parkgate Place

Contract No:	**PSL19/2860**
Client Ref:	**8507-02-19**

PARTICLE SIZE DISTRIBUTION TEST

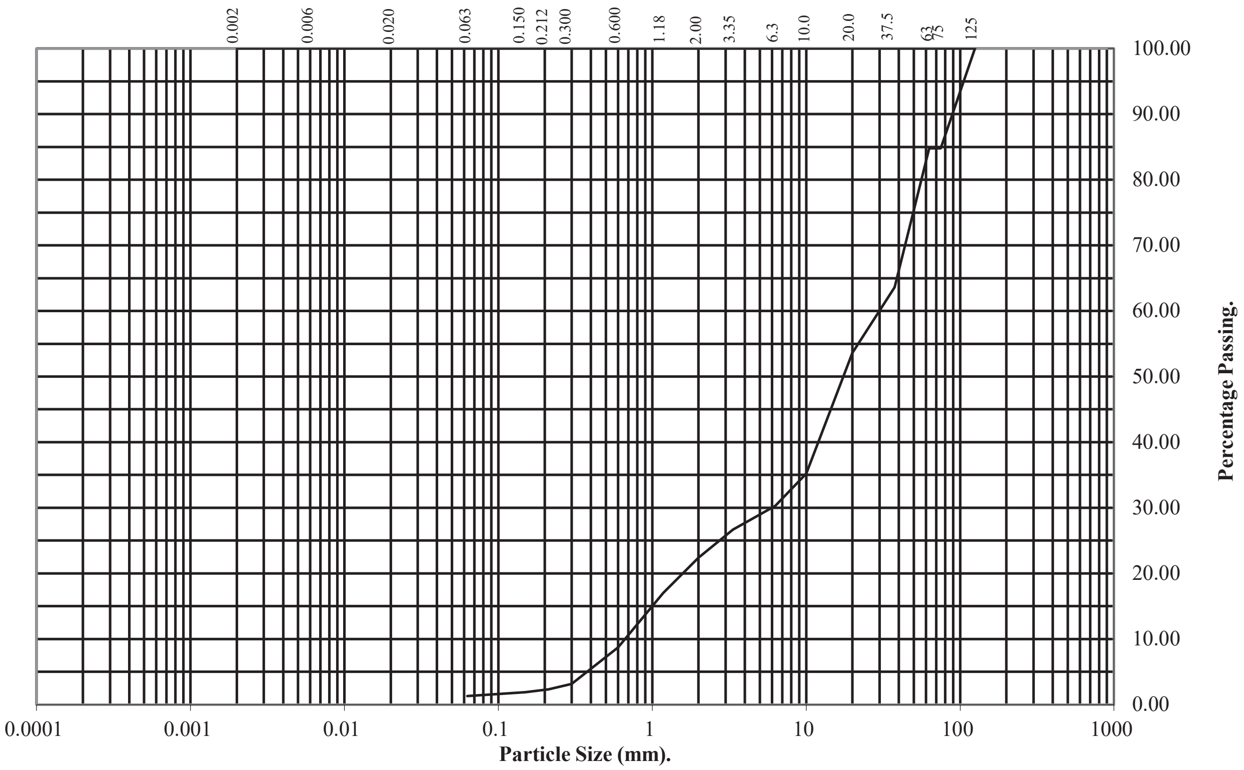
BS1377 : Part 2 : 1990

Wet Sieve, Clause 9.2

Hole Number: BH104 **Top Depth (m):** 7.00

Sample Number: **Base Depth(m):**

Sample Type: B



BS Test Sieve (mm)	Percentage Passing
125	100
75	85
63	85
37.5	64
20	54
10	35
6.3	30
3.35	27
2	22
1.18	17
0.6	9
0.3	3
0.212	2
0.15	2
0.063	1

Soil Fraction	Total Percentage
Cobbles	15
Gravel	63
Sand	21
Silt/Clay	1

Remarks:
See Summary of Soil Descriptions

UKAS TESTING 4043	PSL Professional Soils Laboratory	Hickeys 43 Parkgate Place	Contract No: PSL19/2860 Client Ref: 8507-02-19

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

Geotechnical Laboratory,
Civil, Structural & Environmental Engineering
& Environmental Engineering
Trinity College,
Dublin.2.

+353 1 8961009
edunne@tcd.ie

Ground Investigations Ireland Ltd,
Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin

Unconfined Compression Tests On Rock Cores

Project: Hickeys, 43 Parkgate Place

Project No: 8507 - 02 - 19

Delivery Date: 14.05.2019

Test Date: 16.05.2019

Borehole Number	*Depth (m)*	*Average Diameter (mm)*	*Height (mm)*	*Length/Dia. (Ratio)*	*Unconfined Compressive Strength (Mpa)*	*Density (Mg/m^3)*
BH - 101	11.18 - 11.52	101.1	251.0	2.48	53.8	26.76
BH - 103	7.53 - 7.68	63.0	117.9	1.87	108.5	2.69
BH - 103	8.98 - 9.17	63.1	147.7	2.34	92.2	2.69
BH - 103	10.21 - 10.41	63.0	144.5	2.29	135.7	2.77
BH - 103	11.48 - 11.65	63.1	151.2	2.40	145.1	2.70
BH - 103	13.25 - 13.37	63.1	78.4	1.24	55.5	2.66
BH - 103	13.95 - 14.15	63.1	112.3	1.78	28.6	2.63
BH - 104	9.20 - 9.58	101.2	252.0	2.49	74.0	2.70
BH - 104	15.25 - 15.60	101.3	250.0	2.47	63.5	2.69

Prof. B. O'Kelly

Specimens prepared and tested in accordance with suggested method from
International Society for Rock Mechanics (ISRM), 1985

Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

Geotechnical Laboratory,
Civil, Structural & Environmental Engineering
& Environmental Engineering
Trinity College,
Dublin.2.

+353 1 8961009
edunne@tcd.ie

Ground Investigations Ireland Ltd,
Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin

Unconfined Compression Tests On Rock Cores

Project: Hickeys, 43 Parkgate Place

Project No: 8507 - 02 - 19

Delivery Date: 23.05.2019

Test Date: 27.05.2019

Borehole Number	*Depth (m)*	*Average Diameter (mm)*	*Height (mm)*	*Length/Dia. (Ratio)*	*Unconfined Compressive Strength (Mpa)*	*Density (Mg/m^3)*
BH - 102	6.92 - 7.05	63.1	120.0	1.90	154.5	2.70
BH - 102	9.46 - 9.58	63.1	87.2	1.38	87.0	2.69
BH - 102	9.75 - 9.85	63.1	107.3	1.70	68.3	2.72
BH - 102	12.25 - 12.45	63.1	153.9	2.44	40.4	2.66
BH - 102	13.35 - 13.50	63.0	129.9	2.06	153.2	2.77
BH - 102	15.00 - 15.33	63.0	153.9	2.44	143.2	2.69
BH - 105	12.66 - 12.98	63.1	78.4	1.24	55.5	2.66
BH - 105	15.00 - 15.26	63.1	112.3	1.78	28.6	2.63
BH - 105	16.07 - 16.39	101.2	252.0	2.49	74.0	2.70

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Trinity College,
Dublin.2.

+353 1 8961009
edunne@tcd.ie

Ground Investigations Ireland Ltd,
Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin

Unconfined Compression Tests On Rock Cores

Project: Hickeys, 43 Parkgate Place

Project No: 8507 - 02 - 19

Delivery Date: 03.05.2019

Test Date: 10.05.2019

Borehole Number	Depth (m)	Average Diameter (mm)	Height (mm)	Length/Dia. (Ratio)	Unconfined Compressive Strength (Mpa)	Density (Mg/m^3)
BH - 106	9.53 - 9.70	101.3	144.8	1.43	94.5	2.67
BH - 106	10.30 - 10.60	101.3	247.0	2.44	67.9	2.71
BH - 107	7.50 - 7.90	101.2	136.6	1.35	120.4	2.67
BH - 107	9.30 - 9.50	101.2	146.2	1.45	62.9	2.76
BH - 107	11.30 - 11.50	101.3	189.0	1.87	68.3	2.71

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Trinity College,
Dublin.2.

+353 1 8961009
edunne@tcd.ie

Ground Investigations Ireland Ltd,
Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin

Point Load Index Tests (single diametral determination)

Project: Hickeys, 43 Parkgate Place

Project No: 8507 - 02 - 19

Delivery date: 14.05.2019

Test Date: 17.05.2019

Diametric samples

Borehole No.	Depth (m)	Is(50) (Mpa)
BH - 101	8.67 - 8.80	2.13
BH - 101	9.30 - 9.40	1.06
BH - 101	10.39 - 10.48	0.78
BH - 101	11.52 - 11.66	3.16
BH - 103	6.54 - 6.70	4.98
BH - 103	7.68 - 7.73	6.14
BH - 103	7.80 - 7.90	1.67
BH - 103	8.20 - 8.30	3.24
BH - 103	8.37 - 8.48	2.20
BH - 103	8.77 - 8.98	4.85
BH - 103	9.25 - 9.32	1.03
BH - 103	10.08 - 10.21	4.74
BH - 103	10.75 - 10.92	5.12
BH - 103	11.70 - 11.78	2.51
BH - 103	12.75 - 12.82	0.33
BH - 103	13.69 - 13.81	1.20
BH - 104	8.48 - 8.59	2.37
BH - 104	9.00 - 9.12	3.62
BH - 104	10.45 - 10.52	1.62
BH - 104	11.43 - 11.59	1.42
BH - 104	12.50 - 12.60	1.14
BH - 104	12.65 - 12.80	3.38
BH - 104	14.87 - 15.10	4.32

Prof. Brendan O'Kelly

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Co. Dublin

Point Load Index Tests (single diametral determination)

Project: Hickeys, 43 Parkgate Place

Project No: 8507 - 02 - 19

Delivery date: 23.05.2019

Test Date: 29.05.2019

Diametric samples

Borehole No.	Depth (m)	Is(50) (Mpa)
BH - 102	6.80 - 6.92	5.04
BH - 102	7.30 - 7.35	5.17
BH - 102	8.02 - 8.20	3.37
BH - 102	8.30 - 8.38	3.90
BH - 102	9.39 - 9.46	3.82
BH - 102	10.00 - 10.13	3.67
BH - 102	11.25 - 11.38	4.21
BH - 102	11.72 - 11.95	4.22
BH - 102	12.45 - 12.53	2.39
BH - 102	12.73 - 12.80	0.58
BH - 102	13.95 - 14.05	2.43
BH - 102	14.90 - 15.00	2.96
BH - 105	11.83 - 11.94	3.81
BH - 105	13.10 - 13.24	3.30
BH - 105	14.05 - 14.13	5.66
BH - 105	14.23 - 14.50	5.02
BH - 105	15.93 - 16.05	3.66

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Newcastle,
Co. Dublin

Point Load Index Tests (single diametral determination)

Project: Hickeys, 43 Parkgate Place

Project No: 8507 - 02 - 19

Delivery date: 03.05.2019

Test Date: 10.05.2019

Diametric samples

Borehole No.	Depth (m)	Is(50) (Mpa)
BH - 106	10.75 - 10.80	1.97
BH - 106	11.10 - 11.20	3.20
BH - 106	11.80 - 11.90	2.88
BH - 106	12.60 - 12.70	2.64
BH - 107	8.10 - 8.20	4.75
BH - 107	9.63 - 9.70	2.74
BH - 107	10.50 - 10.60	2.40
BH - 107	11.00 - 11.15	6.45

Prof. Brendan O'Kelly

Specimens prepared and tested in accordance with suggested method from International Society for Rock Mechanics (ISRM), 1985

Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower Grosvenor Place, London, SW1W 0EN. Reg No. 11371415

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

4225

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	Stephen Kealy
Date :	16th April, 2019
Your reference :	8507-02-19
Our reference :	Test Report 19/5381 Batch 1
Location :	Hickeys 43 Parkgate Place
Date samples received :	2nd April, 2019
Status :	Final report
Issue :	1

Twenty nine samples were received for analysis on 2nd April, 2019 of which twenty nine were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Where Waste Acceptance Criteria Suite (EC Decision of 19 December 2002 (2003/33/EC)) has been requested, all analyses have been performed using the relevant EN methods where they exist.

Compiled By:

Phil Sommerton
Project Manager

Client Name:	Ground Investigations Ireland	**Report :**	**Solid**
Reference:	8507-02-19		
Location:	Hickeys 43 Parkgate Place	**Solids:**	V=60g VOC jar, J=250g glass jar, T=plastic tub
Contact:	Stephen Kealy		
JE Job No.:	19/5381		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30			
Sample ID	BH101	BH101	WS104	WS104	WS104	WS106	WS106	WS106	WS106	WS108			
Depth	0.50	1.00	0.50	1.50	2.50	0.50	1.00	2.20	2.80	0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	30/03/2019	30/03/2019	31/03/2019	31/03/2019	31/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	31/03/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019			
Antimony	44 AA	-	5	4	2	3	4	3	2	-	<1	mg/kg	TM30/PM15
Arsenic #	24.1	-	20.3	22.7	21.1	15.1	21.3	13.0	17.6	-	<0.5	mg/kg	TM30/PM15
Barium #	119	-	150	131	88	169	183	68	57	-	<1	mg/kg	TM30/PM15
Cadmium #	0.8	-	0.4	0.5	1.9	0.9	0.9	0.7	0.6	-	<0.1	mg/kg	TM30/PM15
Chromium #	47.9	-	62.2	57.5	71.2	51.4	45.8	70.5	51.7	-	<0.5	mg/kg	TM30/PM15
Copper #	188	-	31	37	11	82	72	43	10	-	<1	mg/kg	TM30/PM15
Lead #	301	-	197	211	31	366	414	58	28	-	<5	mg/kg	TM30/PM15
Mercury #	<0.1	-	<0.1	0.2	<0.1	0.4	0.9	<0.1	<0.1	-	<0.1	mg/kg	TM30/PM15
Molybdenum #	1.7	-	6.4	5.2	3.4	3.9	4.4	4.1	0.7	-	<0.1	mg/kg	TM30/PM15
Nickel #	26.5	-	53.9	48.3	41.8	32.1	45.1	35.0	30.0	-	<0.7	mg/kg	TM30/PM15
Selenium #	1	-	2	2	2	1	1	1	<1	-	<1	mg/kg	TM30/PM15
Zinc #	136	-	102	98	136	198	251	76	140	-	<5	mg/kg	TM30/PM15
Antimony	-	17	-	-	-	-	-	-	-	2	<1	mg/kg	TM30/PM62
Arsenic	-	43.1	-	-	-	-	-	-	-	14.2	<0.5	mg/kg	TM30/PM62
Barium	-	514	-	-	-	-	-	-	-	160	<1	mg/kg	TM30/PM62
Cadmium	-	0.2	-	-	-	-	-	-	-	0.9	<0.1	mg/kg	TM30/PM62
Chromium	-	58.4	-	-	-	-	-	-	-	13.1	<0.5	mg/kg	TM30/PM62
Copper	-	101	-	-	-	-	-	-	-	60	<1	mg/kg	TM30/PM62
Lead	-	290	-	-	-	-	-	-	-	83	<5	mg/kg	TM30/PM62
Mercury	-	0.7	-	-	-	-	-	-	-	<0.1	<0.1	mg/kg	TM30/PM62
Molybdenum	-	8.1	-	-	-	-	-	-	-	2.0	<0.1	mg/kg	TM30/PM62
Nickel	-	75.3	-	-	-	-	-	-	-	29.8	<0.7	mg/kg	TM30/PM62
Selenium	-	2	-	-	-	-	-	-	-	1	<1	mg/kg	TM30/PM62
Zinc	-	156	-	-	-	-	-	-	-	86	<5	mg/kg	TM30/PM62

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name:	Ground Investigations Ireland	**Report :**	**Solid**
Reference:	8507-02-19		
Location:	Hickeys 43 Parkgate Place	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Stephen Kealy		
JE Job No.:	19/5381		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30			
Sample ID	BH101	BH101	WS104	WS104	WS104	WS106	WS106	WS106	WS106	WS108			
Depth	0.50	1.00	0.50	1.50	2.50	0.50	1.00	2.20	2.80	0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	30/03/2019	30/03/2019	31/03/2019	31/03/2019	31/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	31/03/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019			
PAH MS													
Naphthalene #	0.08	<0.40$_{AB}$	0.25	0.08	<0.04	5.30	0.31	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.13	<0.30$_{AB}$	<0.03	<0.03	<0.03	2.28	0.20	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene #	0.09	<0.50$_{AB}$	<0.05	<0.05	<0.05	8.10	0.40	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene #	0.13	<0.40$_{AB}$	<0.04	<0.04	<0.04	7.40	0.37	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene #	1.33	2.03$_{AB}$	0.37	0.31	<0.03	42.47	3.21	<0.03	<0.03	0.16	<0.03	mg/kg	TM4/PM8
Anthracene #	0.44	<0.40$_{AB}$	<0.04	<0.04	<0.04	8.10	0.64	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene #	1.77	1.90$_{AB}$	0.13	0.10	<0.03	42.24	4.87	<0.03	<0.03	0.11	<0.03	mg/kg	TM4/PM8
Pyrene #	1.55	1.72$_{AB}$	0.13	0.10	<0.03	36.57	4.42	<0.03	<0.03	0.08	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.84	1.48$_{AB}$	0.15	0.13	<0.06	19.01	2.19	<0.06	<0.06	0.07	<0.06	mg/kg	TM4/PM8
Chrysene #	0.88	1.17$_{AB}$	0.14	0.12	<0.02	20.94	2.98	<0.02	<0.02	0.06	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	1.54	1.84$_{AB}$	0.21	0.18	<0.07	34.10	5.11	<0.07	<0.07	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.86	0.72$_{AB}$	0.08	0.09	<0.04	17.27	2.65	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.48	0.56$_{AB}$	0.09	0.07	<0.04	11.58	1.60	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.23	<0.40$_{AB}$	<0.04	<0.04	<0.04	4.81	0.64	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.57	0.63$_{AB}$	0.11	0.09	<0.04	11.62	1.70	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Coronene	0.11	<0.40$_{AB}$	<0.04	<0.04	<0.04	2.33	0.29	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 17 Total	11.03	12.05$_{AB}$	1.66	1.27	<0.64	274.12	31.58	<0.64	<0.64	<0.64	<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	1.11	1.32$_{AB}$	0.15	0.13	<0.05	24.55	3.68	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.43	0.52$_{AB}$	0.06	0.05	<0.02	9.55	1.43	<0.02	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	95	96$_{AB}$	96	95	96	106	97	92	92	97	<0	%	TM4/PM8
Mineral Oil (C10-C40)	146	33	<30	<30	<30	<30	<30	<30	<30	<30	<30	mg/kg	TM5/PM8/PM16
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1^{SV}	<0.1^{SV}	<0.1^{SV}	<0.1	<0.1	<0.1^{SV}	<0.1^{SV}	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1^{SV}	<0.1^{SV}	<0.1^{SV}	<0.1	<0.1	<0.1^{SV}	<0.1^{SV}	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1^{SV}	<0.1^{SV}	<0.1^{SV}	<0.1	0.1	0.4^{SV}	<0.1^{SV}	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	15	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	123	33	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	138	33	<19	<19	<19	<19	<19	<19	<19	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM16

Client Name:	Ground Investigations Ireland	**Report :**	**Solid**
Reference:	8507-02-19		
Location:	Hickeys 43 Parkgate Place	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Stephen Kealy		
JE Job No.:	19/5381		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30			
Sample ID	BH101	BH101	WS104	WS104	WS104	WS106	WS106	WS106	WS106	WS108			
Depth	0.50	1.00	0.50	1.50	2.50	0.50	1.00	2.20	2.80	0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	30/03/2019	30/03/2019	31/03/2019	31/03/2019	31/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	31/03/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019			
TPH CWG													
Aromatics													
>C5-EC7[#]	<0.1	<0.1[SV]	<0.1[SV]	<0.1[SV]	<0.1	<0.1	<0.1[SV]	<0.1[SV]	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8[#]	<0.1	<0.1[SV]	<0.1[SV]	<0.1[SV]	<0.1	<0.1	<0.1[SV]	<0.1[SV]	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10[#]	<0.1	<0.1[SV]	<0.1[SV]	<0.1[SV]	<0.1	<0.1	<0.1[SV]	<0.1[SV]	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12[#]	<0.2	<0.2	<0.2	<0.2	<0.2	3.7	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16[#]	<4	9	<4	<4	<4	37	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21[#]	<7	27	<7	<7	<7	136	23	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35[#]	86	115	<7	<7	<7	358	114	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35[#]	86	151	<19	<19	<19	535	137	<19	<19	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	224	184	<38	<38	<38	535	137	<38	<38	<38	<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE[#]	<5	<5[SV]	<5[SV]	<5[SV]	<5	<5	<5[SV]	<5[SV]	<5	<5	<5	ug/kg	TM31/PM12
Benzene[#]	<5	<5[SV]	<5[SV]	<5[SV]	<5	<5	<5[SV]	<5[SV]	<5	<5	<5	ug/kg	TM31/PM12
Toluene[#]	<5	<5[SV]	<5[SV]	<5[SV]	<5	<5	<5[SV]	<5[SV]	<5	<5	<5	ug/kg	TM31/PM12
Ethylbenzene[#]	<5	<5[SV]	<5[SV]	<5[SV]	<5	<5	<5[SV]	<5[SV]	<5	<5	<5	ug/kg	TM31/PM12
m/p-Xylene[#]	<5	<5[SV]	<5[SV]	<5[SV]	<5	<5	<5[SV]	<5[SV]	<5	<5	<5	ug/kg	TM31/PM12
o-Xylene[#]	<5	<5[SV]	<5[SV]	<5[SV]	<5	10	<5[SV]	<5[SV]	<5	<5	<5	ug/kg	TM31/PM12
PCB 28[#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 52[#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 101[#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 118[#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 138[#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 153[#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 180[#]	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
Total 7 PCBs[#]	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	ug/kg	TM17/PM8
Natural Moisture Content	14.8	22.0	18.6	15.4	34.1	19.4	27.8	25.1	31.5	17.4	<0.1	%	PM4/PM0
% Dry Matter 105°C	89.5	83.1	81.6	82.4	75.0	81.4	68.3	78.1	79.3	84.3	<0.1	%	NONE/PM4
Hexavalent Chromium[#]	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Chromium III	47.9	-	62.2	57.5	71.2	51.4	45.8	70.5	51.7	-	<0.5	mg/kg	NONE/NONE
Chromium III	-	58.4	-	-	-	-	-	-	-	13.1	<0.5	mg/kg	NONE/NONE
Total Organic Carbon[#]	1.26	NDP	10.83	13.27	1.03	4.43	11.12	4.68	0.52	NDP	<0.02	%	TM21/PM24
Loss on Ignition[#]	4.3	NDP	8.3	9.2	4.2	4.4	7.0	4.3	2.9	NDP	<1.0	%	TM22/PM0
pH[#]	10.44	8.67	8.33	8.28	8.08	8.57	8.37	8.50	8.26	9.43	<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1011	0.1083	0.1102	0.1095	0.1202	0.1103	0.1316	0.1151	0.1138	0.1071		kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09		kg	NONE/PM17

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name:	Ground Investigations Ireland	**Report :**	**Solid**
Reference:	8507-02-19		
Location:	Hickeys 43 Parkgate Place	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Stephen Kealy		
JE Job No.:	19/5381		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60			
Sample ID	WS108	WS108	WS108	WS113	WS113	WS113	WS113	WS114	WS114	WS114			
Depth	1.50	2.50	3.50	1.20	1.70	2.30	2.60	0.50	1.50	2.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	31/03/2019	31/03/2019	31/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019			
Antimony	3	2	2	2	2	3	2	-	4	3	<1	mg/kg	TM30/PM15
Arsenic #	15.2	10.5	19.2	11.8	7.3	13.9	19.2	-	13.8	14.8	<0.5	mg/kg	TM30/PM15
Barium #	104	88	111	85	64	87	107	-	121	93	<1	mg/kg	TM30/PM15
Cadmium #	2.2	1.7	1.8	0.5	0.3	2.4	1.8	-	0.6	1.7	<0.1	mg/kg	TM30/PM15
Chromium #	55.9	42.8	63.0	111.8	113.4	51.4	75.3	-	90.0	57.3	<0.5	mg/kg	TM30/PM15
Copper #	36	22	27	21	43	35	10	-	534 AA	43	<1	mg/kg	TM30/PM15
Lead #	47	27	61	131	54	47	27	-	385	64	<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	<0.1	0.2	<0.1	mg/kg	TM30/PM15
Molybdenum #	7.3	4.6	4.7	5.3	7.3	6.8	5.0	-	7.8	5.5	<0.1	mg/kg	TM30/PM15
Nickel #	47.9	35.2	43.5	28.3	21.1	48.1	37.8	-	47.8	44.8	<0.7	mg/kg	TM30/PM15
Selenium #	2	1	2	<1	<1	2	1	-	1	2	<1	mg/kg	TM30/PM15
Zinc #	104	84	142	56	111	104	134	-	153	103	<5	mg/kg	TM30/PM15
Antimony	-	-	-	-	-	-	-	11	-	-	<1	mg/kg	TM30/PM62
Arsenic	-	-	-	-	-	-	-	9.3	-	-	<0.5	mg/kg	TM30/PM62
Barium	-	-	-	-	-	-	-	186	-	-	<1	mg/kg	TM30/PM62
Cadmium	-	-	-	-	-	-	-	0.6	-	-	<0.1	mg/kg	TM30/PM62
Chromium	-	-	-	-	-	-	-	36.1	-	-	<0.5	mg/kg	TM30/PM62
Copper	-	-	-	-	-	-	-	25	-	-	<1	mg/kg	TM30/PM62
Lead	-	-	-	-	-	-	-	111	-	-	<5	mg/kg	TM30/PM62
Mercury	-	-	-	-	-	-	-	<0.1	-	-	<0.1	mg/kg	TM30/PM62
Molybdenum	-	-	-	-	-	-	-	1.2	-	-	<0.1	mg/kg	TM30/PM62
Nickel	-	-	-	-	-	-	-	36.3	-	-	<0.7	mg/kg	TM30/PM62
Selenium	-	-	-	-	-	-	-	<1	-	-	<1	mg/kg	TM30/PM62
Zinc	-	-	-	-	-	-	-	101	-	-	<5	mg/kg	TM30/PM62

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name:	Ground Investigations Ireland	**Report :**	**Solid**
Reference:	8507-02-19		
Location:	Hickeys 43 Parkgate Place	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Stephen Kealy		
JE Job No.:	19/5381		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60			
Sample ID	WS108	WS108	WS108	WS113	WS113	WS113	WS113	WS114	WS114	WS114			
Depth	1.50	2.50	3.50	1.20	1.70	2.30	2.60	0.50	1.50	2.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	31/03/2019	31/03/2019	31/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019			
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	0.24	<0.04	<0.04	0.05	0.07	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.07	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.16	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.19	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03	0.13	<0.03	0.38	0.25	<0.03	1.95	0.18	<0.03	<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.53	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03	<0.03	<0.03	0.06	<0.03	<0.03	2.79	0.07	<0.03	<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03	<0.03	<0.03	0.04	<0.03	<0.03	1.97	0.09	<0.03	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	<0.06	<0.06	0.08	<0.06	<0.06	1.33	0.14	<0.06	<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02	0.06	<0.02	0.08	<0.02	<0.02	1.31	0.14	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	2.20	0.22	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	1.00	0.07	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.64	0.09	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.27	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.64	0.10	<0.04	<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.09	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 17 Total	<0.64	<0.64	<0.64	<0.64	0.88	<0.64	<0.64	15.19	1.17	<0.64	<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1.58	0.16	<0.05	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.62	0.06	<0.02	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	96	87	91	94	95	97	96	93	94	104	<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30	<30	<30	<30	<30	<30	283	<30	<30	<30	mg/kg	TM5/PM8/PM16
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1 SV	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1 SV	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1 SV	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	<4	<4	<4	<4	5	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7	<7	<7	<7	<7	36	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	<7	<7	<7	<7	<7	<7	203	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	<19	<19	<19	<19	<19	<19	<19	244	<19	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM16

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name:	Ground Investigations Ireland	**Report :**	**Solid**
Reference:	8507-02-19		
Location:	Hickeys 43 Parkgate Place	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Stephen Kealy		
JE Job No.:	19/5381		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60			
Sample ID	WS108	WS108	WS108	WS113	WS113	WS113	WS113	WS114	WS114	WS114			
Depth	1.50	2.50	3.50	1.20	1.70	2.30	2.60	0.50	1.50	2.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	31/03/2019	31/03/2019	31/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019			
TPH CWG													
Aromatics													
>C5-EC7 #	<0.1	<0.1	<0.1 SV	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1 SV	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1 SV	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1 SV	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	<7	<7	<7	<7	<7	<7	<7	68	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	<19	<19	<19	<19	<19	<19	<19	68	<19	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	<38	<38	<38	<38	<38	<38	<38	312	<38	<38	<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE #	<5	<5	<5 SV	<5	<5 SV	<5	<5	<5	<5 SV	<5	<5	ug/kg	TM31/PM12
Benzene #	<5	<5	<5 SV	<5	<5 SV	<5	<5	<5	<5 SV	<5	<5	ug/kg	TM31/PM12
Toluene #	<5	<5	<5 SV	15	<5 SV	<5	<5	<5	<5 SV	<5	<5	ug/kg	TM31/PM12
Ethylbenzene #	<5	<5	<5 SV	<5	<5 SV	<5	<5	<5	<5 SV	<5	<5	ug/kg	TM31/PM12
m/p-Xylene #	<5	<5	<5 SV	25	<5 SV	<5	<5	<5	<5 SV	<5	<5	ug/kg	TM31/PM12
o-Xylene #	<5	<5	<5 SV	15	<5 SV	<5	<5	<5	<5 SV	<5	<5	ug/kg	TM31/PM12
PCB 28 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	ug/kg	TM17/PM8
Natural Moisture Content	15.8	14.5	48.7	21.1	12.3	18.9	36.0	5.3	23.1	26.2	<0.1	%	PM4/PM0
% Dry Matter 105°C	84.9	85.4	75.6	82.1	89.9	84.1	77.3	94.7	82.2	79.6	<0.1	%	NONE/PM4
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Chromium III	55.9	42.8	63.0	111.8	113.4	51.4	75.3	-	90.0	57.3	<0.5	mg/kg	NONE/NONE
Chromium III	-	-	-	-	-	-	-	36.1	-	-	<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	1.54	0.62	3.59	0.51	3.09	1.06	0.65	NDP	9.57	2.39	<0.02	%	TM21/PM24
Loss on Ignition #	3.8	2.2	9.4	3.9	4.9	3.1	3.3	NDP	8.9	4.9	<1.0	%	TM22/PM0
pH #	8.35	8.77	7.92	9.42	7.76	8.76	8.62	9.67	8.38	8.62	<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1057	0.1055	0.1186	0.1101	0.1005	0.1068	0.1162	0.0953	0.1097	0.1131		kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09		kg	NONE/PM17

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Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/5381

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87				
Sample ID	WS114	WS115	WS115	WS115	WS117	WS117	WS117	WS117	WS117				
Depth	2.60	0.50	1.50	2.50	0.50	1.50	2.50	3.50	4.00				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	30/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1		LOD/LOR	Units	Method No.
Date of Receipt	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019				
Antimony	3	2	2	-	-	2	3	2	2		<1	mg/kg	TM30/PM15
Arsenic #	23.8	11.8	12.1	-	-	8.2	10.6	20.8	12.9		<0.5	mg/kg	TM30/PM15
Barium #	122	89	140	-	-	64	61	148	28		<1	mg/kg	TM30/PM15
Cadmium #	2.1	1.9	2.4	-	-	1.1	1.9	2.2	0.8		<0.1	mg/kg	TM30/PM15
Chromium #	85.1	47.7	42.1	-	-	58.0	49.7	65.1	85.0		<0.5	mg/kg	TM30/PM15
Copper #	19	28	31	-	-	15	27	17	8		<1	mg/kg	TM30/PM15
Lead #	51	24	21	-	-	31	25	43	14		<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	-	-	<0.1	<0.1	<0.1	<0.1		<0.1	mg/kg	TM30/PM15
Molybdenum #	6.4	6.5	6.7	-	-	5.2	5.7	5.0	6.2		<0.1	mg/kg	TM30/PM15
Nickel #	45.1	41.1	50.0	-	-	24.7	38.8	54.4	21.1		<0.7	mg/kg	TM30/PM15
Selenium #	2	9	4	-	-	1	3	2	1		<1	mg/kg	TM30/PM15
Zinc #	159	90	98	-	-	62	76	178	60		<5	mg/kg	TM30/PM15
Antimony	-	-	-	2	2	-	-	-	-		<1	mg/kg	TM30/PM62
Arsenic	-	-	-	11.5	8.3	-	-	-	-		<0.5	mg/kg	TM30/PM62
Barium	-	-	-	91	56	-	-	-	-		<1	mg/kg	TM30/PM62
Cadmium	-	-	-	2.0	1.1	-	-	-	-		<0.1	mg/kg	TM30/PM62
Chromium	-	-	-	18.0	10.8	-	-	-	-		<0.5	mg/kg	TM30/PM62
Copper	-	-	-	29	29	-	-	-	-		<1	mg/kg	TM30/PM62
Lead	-	-	-	22	34	-	-	-	-		<5	mg/kg	TM30/PM62
Mercury	-	-	-	<0.1	<0.1	-	-	-	-		<0.1	mg/kg	TM30/PM62
Molybdenum	-	-	-	2.9	1.9	-	-	-	-		<0.1	mg/kg	TM30/PM62
Nickel	-	-	-	40.6	23.8	-	-	-	-		<0.7	mg/kg	TM30/PM62
Selenium	-	-	-	2	<1	-	-	-	-		<1	mg/kg	TM30/PM62
Zinc	-	-	-	106	61	-	-	-	-		<5	mg/kg	TM30/PM62

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Exova Jones Environmental

Client Name:	Ground Investigations Ireland	**Report :**	**Solid**
Reference:	8507-02-19		
Location:	Hickeys 43 Parkgate Place	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Stephen Kealy		
JE Job No.:	19/5381		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87				
Sample ID	WS114	WS115	WS115	WS115	WS117	WS117	WS117	WS117	WS117				
Depth	2.60	0.50	1.50	2.50	0.50	1.50	2.50	3.50	4.00				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	30/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1		LOD/LOR	Units	Method No.
Date of Receipt	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019				
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06		<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07		<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04		<0.04	mg/kg	TM4/PM8
PAH 17 Total	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64		<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	92	96	94	89	97	94	94	94	92		<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30	<30	<30	<30	<30	<30	<30	<30		<30	mg/kg	TM5/PM8/PM16
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.2		<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.6		<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.1		<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	<4	<4	<4	<4	<4	<4		<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7	<7	<7	<7	<7	<7	<7		<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	<7	<7	<7	<7	<7	<7	<7	<7		<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	<19	<19	<19	<19	<19	<19	<19	<19	<19		<19	mg/kg	TM5/TM36/PM8/PM12/PM16

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Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/5381

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87		LOD/LOR	Units	Method No.
Sample ID	WS114	WS115	WS115	WS115	WS117	WS117	WS117	WS117	WS117				
Depth	2.60	0.50	1.50	2.50	0.50	1.50	2.50	3.50	4.00				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	30/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1				
Date of Receipt	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019				
TPH CWG													
Aromatics													
>C5-EC7 #	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1 SV	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2		<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4	<4	<4	<4	<4	<4	<4		<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7	<7	<7	<7	<7	<7	<7	<7		<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	<7	<7	<7	<7	<7	<7	<7	<7	<7		<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	<19	<19	<19	<19	<19	<19	<19	<19	<19		<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	<38	<38	<38	<38	<38	<38	<38	<38	<38		<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE #	<5	<5 SV	<5	<5	<5	<5	<5	<5	77		<5	ug/kg	TM31/PM12
Benzene #	<5	<5 SV	<5	<5	<5	<5	<5	16	<5		<5	ug/kg	TM31/PM12
Toluene #	<5	<5 SV	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM31/PM12
Ethylbenzene #	<5	<5 SV	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM31/PM12
m/p-Xylene #	<5	<5 SV	<5	<5	<5	<5	<5	<5	7		<5	ug/kg	TM31/PM12
o-Xylene #	<5	<5 SV	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM31/PM12
PCB 28 #	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5	<5	<5	<5	<5		<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35	<35	<35	<35	<35		<35	ug/kg	TM17/PM8
Natural Moisture Content	43.3	12.7	12.1	15.7	18.9	20.7	14.2	45.1	19.9		<0.1	%	PM4/PM0
% Dry Matter 105°C	77.0	88.0	91.6	76.5	85.4	81.1	85.6	69.6	86.6		<0.1	%	NONE/PM4
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3		<0.3	mg/kg	TM38/PM20
Chromium III	85.1	47.7	42.1	-	-	58.0	49.7	65.1	85.0		<0.5	mg/kg	NONE/NONE
Chromium III	-	-	-	18.0	10.8	-	-	-	-		<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	1.55	0.78	0.55	NDP	NDP	0.69	1.00	1.67	0.52		<0.02	%	TM21/PM24
Loss on Ignition #	5.6	2.6	2.4	NDP	NDP	2.1	2.3	6.6	1.6		<1.0	%	TM22/PM0
pH #	8.42	8.17	8.37	8.67	8.30	8.30	8.46	7.48	8.22		<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1171	0.1024	0.0987	0.1171	0.1054	0.1107	0.1051	0.129	0.1039			kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09			kg	NONE/PM17

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Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/5381

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30			
Sample ID	BH101	BH101	WS104	WS104	WS104	WS106	WS106	WS106	WS106	WS108			
Depth	0.50	1.00	0.50	1.50	2.50	0.50	1.00	2.20	2.80	0.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	30/03/2019	30/03/2019	31/03/2019	31/03/2019	31/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	31/03/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019			
Dissolved Antimony (A10) #	0.49	0.32	0.03	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	mg/kg	TM30/PM17
Dissolved Arsenic (A10) #	0.202	0.031	0.094	<0.025	<0.025	0.030	<0.025	<0.025	<0.025	0.052	<0.025	mg/kg	TM30/PM17
Dissolved Barium (A10) #	<0.03	0.18	<0.03	0.10	0.06	0.16	0.45	<0.03	<0.03	0.18	<0.03	mg/kg	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM30/PM17
Dissolved Chromium (A10) #	<0.015	0.024	0.049	<0.015	<0.015	0.083	0.445	<0.015	<0.015	0.018	<0.015	mg/kg	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM30/PM17
Dissolved Mercury (A10) #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM30/PM17
Dissolved Molybdenum (A10) #	0.04	0.17	0.08	0.05	0.03	<0.02	0.06	0.18	0.03	0.30	<0.02	mg/kg	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.06	<0.03	mg/kg	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.05	<0.03	0.03	<0.03	<0.03	mg/kg	TM30/PM17
Total Phenols HPLC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	TM26/PM0
Fluoride	<3	4	<3	7	<3	<3	7	5	3	<3	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	95	63	129	285	280	20	52	40	6	287	<5	mg/kg	TM38/PM0
Chloride #	<3	<3	<3	<3	5	<3	5	<3	5	6	<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	<2	<2	<2	<2	<2	<2	3	2	2	2	<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	<20	<20	<20	<20	<20	30	20	20	<20	<20	mg/kg	TM60/PM0
Total Dissolved Solids #	770	960	1000	1270	840	860	950	570	<350	2909	<350	mg/kg	TM20/PM0

Client Name:	Ground Investigations Ireland	**Report :**	**CEN 10:1 1 Batch**
Reference:	8507-02-19		
Location:	Hickeys 43 Parkgate Place	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Stephen Kealy		
JE Job No.:	19/5381		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60			
Sample ID	WS108	WS108	WS108	WS113	WS113	WS113	WS113	WS114	WS114	WS114			
Depth	1.50	2.50	3.50	1.20	1.70	2.30	2.60	0.50	1.50	2.50			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	31/03/2019	31/03/2019	31/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019			
Dissolved Antimony (A10) #	<0.02	<0.02	0.04	<0.02	<0.02	<0.02	<0.02	0.71	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Arsenic (A10) #	0.030	<0.025	0.043	0.027	0.051	0.069	<0.025	<0.025	<0.025	0.047	<0.025	mg/kg	TM30/PM17
Dissolved Barium (A10) #	0.09	0.03	0.38	0.08	<0.03	0.04	0.04	0.10	0.11	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	0.172	0.026	<0.015	0.028	0.346	<0.015	<0.015	<0.015	mg/kg	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM30/PM17
Dissolved Mercury (A10) #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM30/PM17
Dissolved Molybdenum (A10) #	0.21	0.19	0.43	0.12	<0.02	0.18	0.07	0.03	0.04	0.14	<0.02	mg/kg	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	<0.02	0.03	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Selenium (A10) #	0.06	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	<0.03	<0.03	0.05	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Total Phenols HPLC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	TM26/PM0
Fluoride	<3	3	<3	6	6	4	4	<3	9	<3	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	950	55	9	2654	228	119	135	653	434	66	<5	mg/kg	TM38/PM0
Chloride #	29	<3	19	1827	405	143	244	164	9	<3	<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	<2	<2	8	3	3	<2	<2	10	<2	<2	<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	<20	80	30	30	<20	<20	100	<20	<20	<20	mg/kg	TM60/PM0
Total Dissolved Solids #	1510	490	1280	7408	1340	1090	1391	3210	1361	980	<350	mg/kg	TM20/PM0

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Client Name:	Ground Investigations Ireland	**Report :**	**CEN 10:1 1 Batch**
Reference:	8507-02-19		
Location:	Hickeys 43 Parkgate Place	**Solids:**	V=60g VOC jar, J=250g glass jar, T=plastic tub
Contact:	Stephen Kealy		
JE Job No.:	19/5381		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87				
Sample ID	WS114	WS115	WS115	WS115	WS117	WS117	WS117	WS117	WS117				
Depth	2.60	0.50	1.50	2.50	0.50	1.50	2.50	3.50	4.00				
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T				
Sample Date	30/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019				
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
Batch Number	1	1	1	1	1	1	1	1	1		LOD/LOR	Units	Method No.
Date of Receipt	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019				
Dissolved Antimony (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.06		<0.02	mg/kg	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025	<0.025	0.028	<0.025	<0.025	<0.025	0.066	0.060		<0.025	mg/kg	TM30/PM17
Dissolved Barium (A10) #	0.05	0.14	0.08	<0.03	0.17	0.20	0.22	0.20	0.06		<0.03	mg/kg	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	mg/kg	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015		<0.015	mg/kg	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07		<0.07	mg/kg	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	mg/kg	TM30/PM17
Dissolved Mercury (A10) #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	mg/kg	TM30/PM17
Dissolved Molybdenum (A10) #	0.07	0.15	0.10	0.15	0.36	0.29	0.21	0.35	0.27		<0.02	mg/kg	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.05	<0.02		<0.02	mg/kg	TM30/PM17
Dissolved Selenium (A10) #	<0.03	0.20	0.20	0.09	0.05	0.05	0.06	<0.03	<0.03		<0.03	mg/kg	TM30/PM17
Dissolved Zinc (A10) #	0.04	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03		<0.03	mg/kg	TM30/PM17
Total Phenols HPLC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	mg/l	TM26/PM0
Fluoride	<3	<3	<3	<3	<3	<3	<3	<3	<3		<3	mg/kg	TM173/PM0
Sulphate as SO4 #	69	14129	29516	12245	29554	14524	13207	14375	8161		<5	mg/kg	TM38/PM0
Chloride #	16	153	34	23	5	13	<3	9	46		<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	3	<2	<2	<2	<2	<2	<2	14	3		<2	mg/l	TM60/PM0
Dissolved Organic Carbon	30	<20	<20	<20	<20	<20	<20	140	30		<20	mg/kg	TM60/PM0
Total Dissolved Solids #	980	21216	20914	1130	1581	1870	970	780	1030		<350	mg/kg	TM20/PM0

Exova Jones Environmental

Client Name:	Ground Investigations Ireland	**Report :**	**EN12457_2**
Reference:	8507-02-19		
Location:	Hickeys 43 Parkgate Place	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Stephen Kealy		
JE Job No.:	19/5381		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	10-12	13-15	16-18	19-21	22-24	25-27	28-30						
Sample ID	BH101	BH101	WS104	WS104	WS104	WS106	WS106	WS106	WS106	WS108						
Depth	0.50	1.00	0.50	1.50	2.50	0.50	1.00	2.20	2.80	0.50						
COC No / misc																
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T						
Sample Date	30/03/2019	30/03/2019	31/03/2019	31/03/2019	31/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	31/03/2019						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1	1	1	1	Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Date of Receipt	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019						
Solid Waste Analysis																
Total Organic Carbon #	1.26	NDP	10.83	13.27	1.03	4.43	11.12	4.68	0.52	NDP	3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025 SV	<0.025 SV	<0.025 SV	<0.025	<0.025	<0.025 SV	<0.025 SV	<0.025	<0.025	6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	146	33	<30	<30	<30	<30	<30	<30	<30	<30	500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	11.03	12.05 BA	1.66	1.27	<0.64	274.12	31.58	<0.64	<0.64	<0.64	100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Mass of raw test portion	0.1011	0.1083	0.1102	0.1095	0.1202	0.1103	0.1316	0.1151	0.1138	0.1071	-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	89.5	83.1	81.6	82.4	75.0	81.4	68.3	78.1	79.3	84.3	-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.889	0.882	0.88	0.881	0.87	0.879	0.858	0.875	0.877	0.883	-	-	-		l	NONE/PM17
Eluate Volume	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	-	-	-		l	NONE/PM17

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Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/5381

Report : EN12457_2

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	31-33	34-36	37-39	40-42	43-45	46-48	49-51	52-54	55-57	58-60						
Sample ID	WS108	WS108	WS108	WS113	WS113	WS113	WS113	WS114	WS114	WS114						
Depth	1.50	2.50	3.50	1.20	1.70	2.30	2.60	0.50	1.50	2.50						
COC No / misc																
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T						
Sample Date	31/03/2019	31/03/2019	31/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019	30/03/2019						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1	1	1	1	Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Date of Receipt	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019						
Solid Waste Analysis																
Total Organic Carbon #	1.54	0.62	3.59	0.51	3.09	1.06	0.65	NDP	9.57	2.39	3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025 SV	0.055	<0.025 SV	<0.025	<0.025	<0.025	<0.025 SV	<0.025	6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	<30	<30	<30	<30	283	<30	<30	500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	<0.64	<0.64	<0.64	<0.64	0.88	<0.64	<0.64	15.19	1.17	<0.64	100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Mass of raw test portion	0.1057	0.1055	0.1186	0.1101	0.1005	0.1068	0.1162	0.0953	0.1097	0.1131	-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	84.9	85.4	75.6	82.1	89.9	84.1	77.3	94.7	82.2	79.6	-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.884	0.885	0.871	0.88	0.89	0.883	0.874	0.895	0.881	0.877	-	-	-		l	NONE/PM17
Eluate Volume	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	-	-	-		l	NONE/PM17

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Client Name:	Ground Investigations Ireland	**Report :**	**EN12457_2**
Reference:	8507-02-19		
Location:	Hickeys 43 Parkgate Place	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Stephen Kealy		
JE Job No.:	19/5381		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	61-63	64-66	67-69	70-72	73-75	76-78	79-81	82-84	85-87							
Sample ID	WS114	WS115	WS115	WS115	WS117	WS117	WS117	WS117	WS117							
Depth	2.60	0.50	1.50	2.50	0.50	1.50	2.50	3.50	4.00							
COC No / misc																
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T							
Sample Date	30/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019	31/03/2019							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1	1	1	1		Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Date of Receipt	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019	02/04/2019							
Solid Waste Analysis																
Total Organic Carbon #	1.55	0.78	0.55	NDP	NDP	0.69	1.00	1.67	0.52		3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025 SV	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025		6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035		1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	<30	<30	<30	<30	<30	<30		500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64		100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Mass of raw test portion	0.1171	0.1024	0.0987	0.1171	0.1054	0.1107	0.1051	0.129	0.1039		-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	77.0	88.0	91.6	76.5	85.4	81.1	85.6	69.6	86.6		-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.873	0.888	0.892	0.872	0.885	0.879	0.885	0.861	0.886		-	-	-		l	NONE/PM17
Eluate Volume	0.8	0.8	0.79	0.76	0.79	0.78	0.78	0.75	0.8		-	-	-		l	NONE/PM17

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Client Name: Ground Investigations Ireland
Reference: 19/02/8507
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/5381	1	BH101	0.50	2	04/04/2019	**General Description (Bulk Analysis)**	soil.stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	BH101	1.00	5	04/04/2019	**General Description (Bulk Analysis)**	soil.stones
					04/04/2019	**Asbestos Fibres**	Fibre Bundles
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	Chrysotile
					04/04/2019	**Asbestos Level Screen**	less than 0.1%
					13/04/2019	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					13/04/2019	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					13/04/2019	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					15/04/2019	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					15/04/2019	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
19/5381	1	WS104	0.50	8	04/04/2019	**General Description (Bulk Analysis)**	soil-stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS104	1.50	11	04/04/2019	**General Description (Bulk Analysis)**	soil-stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS104	2.50	14	04/04/2019	**General Description (Bulk Analysis)**	soil-stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS106	0.50	17	04/04/2019	**General Description (Bulk Analysis)**	soil-stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD

Client Name: Ground Investigations Ireland
Reference: 19/02/8507
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/5381	1	WS106	0.50	17	04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS106	1.00	20	04/04/2019	**General Description (Bulk Analysis)**	soil-stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS106	2.20	23	04/04/2019	**General Description (Bulk Analysis)**	soil-stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS106	2.80	26	04/04/2019	**General Description (Bulk Analysis)**	soil/stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS108	0.50	29	04/04/2019	**General Description (Bulk Analysis)**	Soil/Stones
					04/04/2019	**Asbestos Fibres**	Fibre Bundles
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	Chrysotile
					04/04/2019	**Asbestos Level Screen**	less than 0.1%
					13/04/2019	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					13/04/2019	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					13/04/2019	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					15/04/2019	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					15/04/2019	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
19/5381	1	WS108	1.50	32	04/04/2019	**General Description (Bulk Analysis)**	soil.stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS108	2.50	35	04/04/2019	**General Description (Bulk Analysis)**	soil-satones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS108	3.50	38	04/04/2019	**General Description (Bulk Analysis)**	Soil/Stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS113	1.20	41	04/04/2019	**General Description (Bulk Analysis)**	soil/stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD

Client Name: Ground Investigations Ireland
Reference: 19/02/8507
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/5381	1	WS113	1.20	41	04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS113	1.70	44	04/04/2019	**General Description (Bulk Analysis)**	soil-stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS113	2.30	47	04/04/2019	**General Description (Bulk Analysis)**	Soil/Stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS113	2.60	50	04/04/2019	**General Description (Bulk Analysis)**	soil/stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS114	0.50	53	04/04/2019	**General Description (Bulk Analysis)**	Soil/Stones
					04/04/2019	**Asbestos Fibres**	Fibre Bundles
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	Chrysotile
					04/04/2019	**Asbestos Level Screen**	less than 0.1%
					13/04/2019	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					13/04/2019	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					13/04/2019	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					15/04/2019	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					15/04/2019	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
19/5381	1	WS114	1.50	56	04/04/2019	**General Description (Bulk Analysis)**	Soil/Stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS114	2.50	59	04/04/2019	**General Description (Bulk Analysis)**	soil.stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS114	2.60	62	04/04/2019	**General Description (Bulk Analysis)**	Soil/Stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS115	0.50	65	04/04/2019	**General Description (Bulk Analysis)**	soil.stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD

Client Name: Ground Investigations Ireland
Reference: 19/02/8507
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/5381	1	WS115	0.50	65	04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS115	1.50	68	04/04/2019	**General Description (Bulk Analysis)**	soil/stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS115	2.50	71	04/04/2019	**General Description (Bulk Analysis)**	soil-stones
					04/04/2019	**Asbestos Fibres**	Fibre Bundles
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	Chrysotile
					04/04/2019	**Asbestos Level Screen**	less than 0.1%
					13/04/2019	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					13/04/2019	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					13/04/2019	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					15/04/2019	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					15/04/2019	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
19/5381	1	WS117	0.50	74	04/04/2019	**General Description (Bulk Analysis)**	soil-stones
					04/04/2019	**Asbestos Fibres**	Fibre Bundles
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	Chrysotile
					04/04/2019	**Asbestos Level Screen**	less than 0.1%
					13/04/2019	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					13/04/2019	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					13/04/2019	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					15/04/2019	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					15/04/2019	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
19/5381	1	WS117	1.50	77	04/04/2019	**General Description (Bulk Analysis)**	soil-stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS117	2.50	80	04/04/2019	**General Description (Bulk Analysis)**	soil/stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS117	3.50	83	04/04/2019	**General Description (Bulk Analysis)**	soil/stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD
19/5381	1	WS117	4.00	86	04/04/2019	**General Description (Bulk Analysis)**	soil.stones
					04/04/2019	**Asbestos Fibres**	NAD
					04/04/2019	**Asbestos ACM**	NAD
					04/04/2019	**Asbestos Type**	NAD
					04/04/2019	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy

Matrix : Solid

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Method No.	NDP Reason
19/5381	1	BH101	1.00	4-6	TM21/PM24	Asbestos detected in sample
19/5381	1	BH101	1.00	4-6	TM22/PM0	Asbestos detected in sample
19/5381	1	WS108	0.50	28-30	TM21/PM24	Asbestos detected in sample
19/5381	1	WS108	0.50	28-30	TM22/PM0	Asbestos detected in sample
19/5381	1	WS114	0.50	52-54	TM21/PM24	Asbestos detected in sample
19/5381	1	WS114	0.50	52-54	TM22/PM0	Asbestos detected in sample
19/5381	1	WS115	2.50	70-72	TM21/PM24	Asbestos detected in sample
19/5381	1	WS115	2.50	70-72	TM22/PM0	Asbestos detected in sample
19/5381	1	WS117	0.50	73-75	TM21/PM24	Asbestos detected in sample
19/5381	1	WS117	0.50	73-75	TM22/PM0	Asbestos detected in sample

Notification of Deviating Samples

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 19/5381						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

JE Job No.: 19/5381

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution
AB	x10 Dilution
BA	x10 Dilution

Appendix - Methods used for WAC (2003/33/EC)

JE Job No.: 19/5381

Leachate tests	
10l/kg; 4mm	I.S. EN 12457-2:2002 Specified particle size; water added to L/S ratio; capped; agitated for 24 ± 0.5 hours; eluate settled and filtered over 0.45 µm membrane filter.
Eluate analysis	
As	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ba	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cd	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cr total	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cu	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Hg	I.S. EN 13370 rec. EN 1483 (CVAAS)
Mo	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ni	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Pb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Sb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Se	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Zn	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Chloride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Fluoride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Sulphate	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Phenol index	I.S. EN 13370 rec. ISO 6439 (4-Aminoantipyrine spectrometic methods after distillation)* (BY HPLC - Jones Env)
DOC	I.S. EN 1484
TDS	I.S. EN 15216
Compositional analysis	
TOC	I.S. EN 13137 Method B: carbonates removed with acid; TOC by combustion.
BTEX	GC-FID
PCB7**	I.S. EN 15308 analysis by GC-ECD.
Mineral oil	I.S. EN 14039 C10 to C40 analysis by GC-FID.
PAH17***	I.S. EN 15527 PAH17 analysis by GC-MS
Metals	I.S. EN 13657 - Aqua regia digestion: EN ISO 11885 (ICP-OES)
Other	
Dry matter	I.S. EN 14346 sample is dried to a constant mass in an oven at 105 ± 3 °C; Method B Water content by direct Karl-Fischer-titration and either volumetric or coulometric detection.
LOI	I.S. EN 15169 Difference in mass after heating in a furnace up to 550 ± 25 °C.
ANC	CEN/TS 15364 Determined by amouns of acid or base needed to cover the pH range

Notes:

*If not suitable due to LOD, precision, etc., any other suitable method can be used, e.g. AFS, ICP-MS
**PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180

***Naphthalene, Acenaphthylene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Chrysene, Coronene, Dibenzo(a,h)anthracene, Fluorene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene.

JE Job No: 19/5381

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

JE Job No: 19/5381

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM62	Acid digestion of as received solid samples using Aqua Regia refluxed at 112.5 °C.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes

JE Job No: 19/5381

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM131	Quantification of Asbestos Fibres and ACM, based on HSG248 and SCA method.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	Yes
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	NONE	No Method Code			AR	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				

JE Job No: 19/5381

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower Grosvenor Place, London, SW1W 0EN. Reg No. 11371415

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

4225

Attention :	Stephen Kealy
Date :	26th April, 2019
Your reference :	8507-02-19
Our reference :	Test Report 19/5621 Batch 1
Location :	Hickeys 43 Pargate Place
Date samples received :	5th April, 2019
Status :	Final report
Issue :	2

Sixteen samples were received for analysis on 5th April, 2019 of which twelve were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Where Waste Acceptance Criteria Suite (EC Decision of 19 December 2002 (2003/33/EC)) has been requested, all analyses have been performed using the relevant EN methods where they exist.

Compiled By:

Phil Sommerton BSc
Project Manager

Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Pargate Place
Contact: Stephen Kealy
JE Job No.: 19/5621

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	10-12	16-18	19-21	22-24	25-27	28-30	31-33			
Sample ID	WS103	WS103	WS103	WS103	WS101	WS101	WS101	WS101	WS101	BH101			
Depth	0.60	1.60	2.60	3.50	0.50	1.00	2.00	3.00	4.00	2.00			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019			
Antimony	-	4	7	2	5	-	2	1	1	2	<1	mg/kg	TM30/PM15
Arsenic#	-	6.9	13.4	16.0	11.0	-	21.9	11.5	10.1	19.9	<0.5	mg/kg	TM30/PM15
Barium#	-	142	156	103	51	-	97	59	56	97	<1	mg/kg	TM30/PM15
Cadmium#	-	<0.1	<0.1	1.2	0.5	-	1.7	0.9	0.3	1.6	<0.1	mg/kg	TM30/PM15
Chromium#	-	93.7	88.7	82.2	68.9	-	69.2	80.7	100.7	78.5	<0.5	mg/kg	TM30/PM15
Copper#	-	61	263$_{AA}$	48	30	-	26	11	6	27	<1	mg/kg	TM30/PM15
Lead#	-	145	521	84	31	-	33	16	7	37	<5	mg/kg	TM30/PM15
Mercury#	-	<0.1	<0.1	<0.1	<0.1	-	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Molybdenum#	-	7.0	6.5	6.1	5.5	-	5.9	6.0	7.5	7.0	<0.1	mg/kg	TM30/PM15
Nickel#	-	36.5	49.2	41.8	20.5	-	38.4	21.8	10.3	38.3	<0.7	mg/kg	TM30/PM15
Selenium#	-	3	3	1	<1	-	1	<1	<1	<1	<1	mg/kg	TM30/PM15
Zinc#	-	55	75	118	59	-	133	72	31	137	<5	mg/kg	TM30/PM15
Antimony	5	-	-	-	-	5	-	-	-	-	<1	mg/kg	TM30/PM62
Arsenic	28.5	-	-	-	-	23.1	-	-	-	-	<0.5	mg/kg	TM30/PM62
Barium	238	-	-	-	-	300	-	-	-	-	<1	mg/kg	TM30/PM62
Cadmium	0.2	-	-	-	-	1.6	-	-	-	-	<0.1	mg/kg	TM30/PM62
Chromium	20.5	-	-	-	-	25.2	-	-	-	-	<0.5	mg/kg	TM30/PM62
Copper	187	-	-	-	-	134	-	-	-	-	<1	mg/kg	TM30/PM62
Lead	155	-	-	-	-	312	-	-	-	-	<5	mg/kg	TM30/PM62
Mercury	0.1	-	-	-	-	1.1	-	-	-	-	<0.1	mg/kg	TM30/PM62
Molybdenum	5.7	-	-	-	-	10.2	-	-	-	-	<0.1	mg/kg	TM30/PM62
Nickel	59.1	-	-	-	-	58.1	-	-	-	-	<0.7	mg/kg	TM30/PM62
Selenium	2	-	-	-	-	6	-	-	-	-	<1	mg/kg	TM30/PM62
Zinc	194	-	-	-	-	158	-	-	-	-	<5	mg/kg	TM30/PM62

Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Pargate Place
Contact: Stephen Kealy
JE Job No.: 19/5621

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	10-12	16-18	19-21	22-24	25-27	28-30	31-33			
Sample ID	WS103	WS103	WS103	WS103	WS101	WS101	WS101	WS101	WS101	BH101			
Depth	0.60	1.60	2.60	3.50	0.50	1.00	2.00	3.00	4.00	2.00			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019			
PAH MS													
Naphthalene #	0.64	<0.04	0.07	<0.04	<0.04	0.07	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.72	0.13	0.23	<0.03	0.12	0.24	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.37	0.06	0.05	<0.03	0.11	0.23	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Pyrene #	0.36	0.06	0.06	<0.03	0.11	0.22	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.32	0.09	0.08	<0.06	0.09	0.22	<0.06	<0.06	<0.06	<0.06	<0.06	mg/kg	TM4/PM8
Chrysene #	0.35	0.07	0.10	<0.02	0.10	0.19	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.41	0.09	0.20	<0.07	0.13	0.31	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.15	<0.04	0.10	<0.04	0.05	0.14	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.11	<0.04	0.11	<0.04	<0.04	0.12	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.13	<0.04	0.11	<0.04	<0.04	0.13	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 17 Total	3.56	<0.64	1.11	<0.64	0.71	1.87	<0.64	<0.64	<0.64	<0.64	<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.30	0.06	0.14	<0.05	0.09	0.22	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.11	0.03	0.06	<0.02	0.04	0.09	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	92	90	91	88	91	89	91	92	90	83	<0	%	TM4/PM8
Mineral Oil (C10-C40)	129	<30	<30	<30	141	<30	<30	<30	<30	<30	<30	mg/kg	TM5/PM8/PM16
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1 [SV]	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1 [SV]	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1 [SV]	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	24	<7	<7	<7	30	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	105	<7	<7	<7	111	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	129	<19	<19	<19	141	<19	<19	<19	<19	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM16

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Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Pargate Place
Contact: Stephen Kealy
JE Job No.: 19/5621

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	10-12	16-18	19-21	22-24	25-27	28-30	31-33			
Sample ID	WS103	WS103	WS103	WS103	WS101	WS101	WS101	WS101	WS101	BH101			
Depth	0.60	1.60	2.60	3.50	0.50	1.00	2.00	3.00	4.00	2.00			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019			
TPH CWG													
Aromatics													
>C5-EC7#	<0.1^{SV}	<0.1^{SV}	<0.1^{SV}	<0.1	<0.1^{SV}	<0.1^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8#	<0.1^{SV}	<0.1^{SV}	<0.1^{SV}	<0.1	<0.1^{SV}	<0.1^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10#	<0.1^{SV}	<0.1^{SV}	<0.1^{SV}	<0.1	<0.1^{SV}	<0.1^{SV}	<0.1	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12#	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16#	8	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21#	24	10	<7	<7	9	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35#	114	<7	<7	<7	72	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35#	146	<19	<19	<19	81	<19	<19	<19	<19	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	275	<38	<38	<38	222	<38	<38	<38	<38	<38	<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE#	<5^{SV}	<5^{SV}	<5^{SV}	<5	<5^{SV}	<5^{SV}	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
Benzene#	<5^{SV}	<5^{SV}	<5^{SV}	<5	9^{SV}	<5^{SV}	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
Toluene#	<5^{SV}	<5^{SV}	<5^{SV}	<5	<5^{SV}	<5^{SV}	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
Ethylbenzene#	<5^{SV}	<5^{SV}	<5^{SV}	<5	<5^{SV}	<5^{SV}	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
m/p-Xylene#	<5^{SV}	<5^{SV}	<5^{SV}	<5	<5^{SV}	<5^{SV}	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
o-Xylene#	<5^{SV}	<5^{SV}	<5^{SV}	<5	<5^{SV}	<5^{SV}	<5	<5	<5	<5	<5	ug/kg	TM31/PM12
PCB 28#	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 52#	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 101#	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 118#	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 138#	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 153#	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 180#	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
Total 7 PCBs#	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	ug/kg	TM17/PM8
Natural Moisture Content	19.2	14.3	20.4	30.0	8.8	19.5	28.9	19.7	15.4	33.4	<0.1	%	PM4/PM0
% Dry Matter 105°C	84.3	87.2	81.4	76.5	93.3	83.1	79.4	83.4	88.2	79.1	<0.1	%	NONE/PM4
Hexavalent Chromium#	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Chromium III	NDP	93.7	88.7	82.2	68.9	NDP	69.2	80.7	100.7	78.5	<0.5	mg/kg	NONE/NONE
Chromium III	20.5	-	-	-	-	25.2	-	-	-	-	<0.5	mg/kg	NONE/NONE
Total Organic Carbon#	NDP	9.50	11.89	2.05	1.00	NDP	0.87	0.29	0.13	0.86	<0.02	%	TM21/PM24
Loss on Ignition#	NDP	6.0	9.6	3.8	1.8	NDP	4.1	1.6	<1.0	3.9	<1.0	%	TM22/PM0
pH#	8.50	8.39	8.53	8.53	8.39	8.64	8.47	8.66	9.08	8.55	<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1063	0.1034	0.1111	0.1179	0.097	0.1088	0.1139	0.1082	0.1019	0.1138		kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09		kg	NONE/PM17

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Pargate Place
Contact: Stephen Kealy
JE Job No.: 19/5621

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	34-36	37-39	LOD/LOR	Units	Method No.
Sample ID	BH101	BH101			
Depth	3.00	4.00			
COC No / misc					
Containers	V J T	V J T			
Sample Date	03/04/2019	03/04/2019			
Sample Type	Soil	Soil			
Batch Number	1	1			
Date of Receipt	05/04/2019	05/04/2019			
Antimony	2	1	<1	mg/kg	TM30/PM15
Arsenic #	13.9	8.4	<0.5	mg/kg	TM30/PM15
Barium #	73	32	<1	mg/kg	TM30/PM15
Cadmium #	1.3	0.2	<0.1	mg/kg	TM30/PM15
Chromium #	85.4	90.4	<0.5	mg/kg	TM30/PM15
Copper #	14	5	<1	mg/kg	TM30/PM15
Lead #	19	7	<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	mg/kg	TM30/PM15
Molybdenum #	5.8	6.8	<0.1	mg/kg	TM30/PM15
Nickel #	28.6	7.6	<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	mg/kg	TM30/PM15
Zinc #	97	22	<5	mg/kg	TM30/PM15
Antimony	-	-	<1	mg/kg	TM30/PM62
Arsenic	-	-	<0.5	mg/kg	TM30/PM62
Barium	-	-	<1	mg/kg	TM30/PM62
Cadmium	-	-	<0.1	mg/kg	TM30/PM62
Chromium	-	-	<0.5	mg/kg	TM30/PM62
Copper	-	-	<1	mg/kg	TM30/PM62
Lead	-	-	<5	mg/kg	TM30/PM62
Mercury	-	-	<0.1	mg/kg	TM30/PM62
Molybdenum	-	-	<0.1	mg/kg	TM30/PM62
Nickel	-	-	<0.7	mg/kg	TM30/PM62
Selenium	-	-	<1	mg/kg	TM30/PM62
Zinc	-	-	<5	mg/kg	TM30/PM62

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Client Name:	Ground Investigations Ireland
Reference:	8507-02-19
Location:	Hickeys 43 Pargate Place
Contact:	Stephen Kealy
JE Job No.:	19/5621

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	34-36	37-39			
Sample ID	BH101	BH101			
Depth	3.00	4.00			
COC No / misc					
Containers	V J T	V J T			
Sample Date	03/04/2019	03/04/2019			
Sample Type	Soil	Soil			
Batch Number	1	1			
Date of Receipt	05/04/2019	05/04/2019	LOD/LOR	Units	Method No.
PAH MS					
Naphthalene #	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 17 Total	<0.64	<0.64	<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	90	78	<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30	<30	mg/kg	TM5/PM8/PM16
TPH CWG					
Aliphatics					
>C5-C6 #	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	<19	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM16

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Pargate Place
Contact: Stephen Kealy
JE Job No.: 19/5621

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	34-36	37-39	LOD/LOR	Units	Method No.
Sample ID	BH101	BH101			
Depth	3.00	4.00			
COC No / misc					
Containers	V J T	V J T			
Sample Date	03/04/2019	03/04/2019			
Sample Type	Soil	Soil			
Batch Number	1	1			
Date of Receipt	05/04/2019	05/04/2019			
TPH CWG					
Aromatics					
>C5-EC7 #	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	<19	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	<38	<38	<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE #	<5	<5	<5	ug/kg	TM31/PM12
Benzene #	<5	<5	<5	ug/kg	TM31/PM12
Toluene #	<5	<5	<5	ug/kg	TM31/PM12
Ethylbenzene #	<5	<5	<5	ug/kg	TM31/PM12
m/p-Xylene #	<5	<5	<5	ug/kg	TM31/PM12
o-Xylene #	<5	<5	<5	ug/kg	TM31/PM12
PCB 28 #	<5	<5	<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	ug/kg	TM17/PM8
Natural Moisture Content	27.2	5.5	<0.1	%	PM4/PM0
% Dry Matter 105°C	80.0	93.9	<0.1	%	NONE/PM4
Hexavalent Chromium #	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Chromium III	85.4	90.4	<0.5	mg/kg	NONE/NONE
Chromium III	-	-	<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.45	0.12	<0.02	%	TM21/PM24
Loss on Ignition #	2.2	<1.0	<1.0	%	TM22/PM0
pH #	8.72	9.26	<0.01	pH units	TM73/PM11
Mass of raw test portion	0.112	0.0954		kg	NONE/PM17
Mass of dried test portion	0.09	0.09		kg	NONE/PM17

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Pargate Place
Contact: Stephen Kealy
JE Job No.: 19/5621

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	10-12	16-18	19-21	22-24	25-27	28-30	31-33			
Sample ID	WS103	WS103	WS103	WS103	WS101	WS101	WS101	WS101	WS101	BH101			
Depth	0.60	1.60	2.60	3.50	0.50	1.00	2.00	3.00	4.00	2.00			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019			
Dissolved Antimony (A10) #	<0.02	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025	<0.025	<0.025	<0.025	0.082	<0.025	<0.025	<0.025	0.035	<0.025	mg/kg	TM30/PM17
Dissolved Barium (A10) #	0.12	0.06	0.05	<0.03	0.17	0.04	0.05	0.04	<0.03	0.04	<0.03	mg/kg	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	mg/kg	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM30/PM17
Dissolved Mercury (A10) #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM30/PM17
Dissolved Molybdenum (A10) #	0.12	0.04	<0.02	0.09	0.04	0.09	0.24	0.05	<0.02	0.25	<0.02	mg/kg	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Total Phenols HPLC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	TM26/PM0
Fluoride	8	<3	<3	<3	<3	4	<3	<3	<3	<3	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	77	453	616	118	797	53	48	22	39	20	<5	mg/kg	TM38/PM0
Chloride #	4	21	14	384	106	4	7	6	118	<3	<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	<2	<2	<2	2	<2	<2	2	<2	<2	3	<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	<20	<20	<20	<20	<20	20	<20	<20	30	<20	mg/kg	TM60/PM0
Total Dissolved Solids #	1180	1750	2818	1609	2371	880	930	720	660	1070	<350	mg/kg	TM20/PM0

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name:	Ground Investigations Ireland	**Report :**	**CEN 10:1 1 Batch**
Reference:	8507-02-19		
Location:	Hickeys 43 Pargate Place	**Solids:**	V=60g VOC jar, J=250g glass jar, T=plastic tub
Contact:	Stephen Kealy		
JE Job No.:	19/5621		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	34-36	37-39	LOD/LOR	Units	Method No.
Sample ID	BH101	BH101			
Depth	3.00	4.00			
COC No / misc					
Containers	V J T	V J T			
Sample Date	03/04/2019	03/04/2019			
Sample Type	Soil	Soil			
Batch Number	1	1			
Date of Receipt	05/04/2019	05/04/2019			
Dissolved Antimony (A10) #	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	0.030	<0.025	mg/kg	TM30/PM17
Dissolved Barium (A10) #	0.05	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	mg/kg	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	mg/kg	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	mg/kg	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	mg/kg	TM30/PM17
Dissolved Mercury (A10) #	<0.01	<0.01	<0.01	mg/kg	TM30/PM17
Dissolved Molybdenum (A10) #	0.04	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Total Phenols HPLC	<0.05	<0.05	<0.05	mg/l	TM26/PM0
Fluoride	<3	<3	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	24	9	<5	mg/kg	TM38/PM0
Chloride #	5	24	<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	<2	<2	<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	<20	<20	mg/kg	TM60/PM0
Total Dissolved Solids #	1070	530	<350	mg/kg	TM20/PM0

All solid results are expressed on a dry weight basis unless stated otherwise.

Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Pargate Place
Contact: Stephen Kealy
JE Job No.: 19/5621

Report : **EN12457_2**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	10-12	16-18	19-21	22-24	25-27	28-30	31-33	Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Sample ID	WS103	WS103	WS103	WS103	WS101	WS101	WS101	WS101	WS101	BH101						
Depth	0.60	1.60	2.60	3.50	0.50	1.00	2.00	3.00	4.00	2.00						
COC No / misc																
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T						
Sample Date	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019	03/04/2019						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1	1	1	1						
Date of Receipt	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019	05/04/2019						
Solid Waste Analysis																
Total Organic Carbon [#]	NDP	9.50	11.89	2.05	1.00	NDP	0.87	0.29	0.13	0.86	3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025[SV]	<0.025[SV]	<0.025[SV]	<0.025	<0.025[SV]	<0.025[SV]	<0.025	<0.025	<0.025	<0.025	6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs [#]	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	129	<30	<30	<30	141	<30	<30	<30	<30	<30	500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	3.56	<0.64	1.11	<0.64	0.71	1.87	<0.64	<0.64	<0.64	<0.64	100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Mass of raw test portion	0.1063	0.1034	0.1111	0.1179	0.097	0.1088	0.1139	0.1082	0.1019	0.1138	-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	84.3	87.2	81.4	76.5	93.3	83.1	79.4	83.4	88.2	79.1	-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.883	0.887	0.879	0.872	0.894	0.882	0.877	0.882	0.888	0.876	-	-	-		l	NONE/PM17
Eluate Volume	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	-	-	-		l	NONE/PM17

Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Pargate Place
Contact: Stephen Kealy
JE Job No.: 19/5621

Report : EN12457_2

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	34-36	37-39									Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Sample ID	BH101	BH101														
Depth	3.00	4.00														
COC No / misc																
Containers	V J T	V J T														
Sample Date	03/04/2019	03/04/2019														
Sample Type	Soil	Soil														
Batch Number	1	1														
Date of Receipt	05/04/2019	05/04/2019														
Solid Waste Analysis																
Total Organic Carbon #	0.45	0.12									3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025									6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs #	<0.035	<0.035									1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30									500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	<0.64	<0.64									100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Mass of raw test portion	0.112	0.0954									-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	80.0	93.9									-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.877	0.894									-	-	-		l	NONE/PM17
Eluate Volume	0.8	0.85									-	-	-		l	NONE/PM17

Client Name: Ground Investigations Ireland
Reference: 19/02/8507
Location: Hickeys 43 Pargate Place
Contact: Stephen Kealy

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/5621	1	WS103	0.60	2	09/04/2019	**General Description (Bulk Analysis)**	soil.stones
					09/04/2019	**Asbestos Fibres**	Fibre Bundles
					09/04/2019	**Asbestos ACM**	NAD
					09/04/2019	**Asbestos Type**	Chrysotile
					09/04/2019	**Asbestos Level Screen**	less than 0.1%
					17/04/2019	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					17/04/2019	**Total Detailed Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					17/04/2019	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	<0.001 (mass %)
					17/04/2019	**Asbestos PCOM Quantification (Fibres)**	<0.001 (mass %)
					17/04/2019	**Asbestos Gravimetric & PCOM Total**	<0.001 (mass %)
19/5621	1	WS103	1.60	5	09/04/2019	**General Description (Bulk Analysis)**	soil-stones
					09/04/2019	**Asbestos Fibres**	NAD
					09/04/2019	**Asbestos ACM**	NAD
					09/04/2019	**Asbestos Type**	NAD
					09/04/2019	**Asbestos Level Screen**	NAD
19/5621	1	WS103	2.60	8	09/04/2019	**General Description (Bulk Analysis)**	soil-stones
					09/04/2019	**Asbestos Fibres**	NAD
					09/04/2019	**Asbestos ACM**	NAD
					09/04/2019	**Asbestos Type**	NAD
					09/04/2019	**Asbestos Level Screen**	NAD
19/5621	1	WS103	3.50	11	09/04/2019	**General Description (Bulk Analysis)**	soil.stones
					09/04/2019	**Asbestos Fibres**	NAD
					09/04/2019	**Asbestos ACM**	NAD
					09/04/2019	**Asbestos Type**	NAD
					09/04/2019	**Asbestos Level Screen**	NAD
19/5621	1	WS101	0.50	17	09/04/2019	**General Description (Bulk Analysis)**	soil.stones
					09/04/2019	**Asbestos Fibres**	NAD
					09/04/2019	**Asbestos ACM**	NAD
					09/04/2019	**Asbestos Type**	NAD
					09/04/2019	**Asbestos Level Screen**	NAD
19/5621	1	WS101	1.00	20	09/04/2019	**General Description (Bulk Analysis)**	soil.stones
					09/04/2019	**Asbestos Fibres**	Fibre Bundles
					09/04/2019	**Asbestos ACM**	NAD
					09/04/2019	**Asbestos Type**	Chrysotile

Client Name: Ground Investigations Ireland
Reference: 19/02/8507
Location: Hickeys 43 Pargate Place
Contact: Stephen Kealy

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/5621	1	WS101	1.00	20	09/04/2019	**Asbestos Level Screen**	less than 0.1%
19/5621	1	WS101	2.00	23	09/04/2019	**General Description (Bulk Analysis)**	soil/stones
					09/04/2019	**Asbestos Fibres**	NAD
					09/04/2019	**Asbestos ACM**	NAD
					09/04/2019	**Asbestos Type**	NAD
					09/04/2019	**Asbestos Level Screen**	NAD
19/5621	1	WS101	3.00	26	09/04/2019	**General Description (Bulk Analysis)**	soil/stones
					09/04/2019	**Asbestos Fibres**	NAD
					09/04/2019	**Asbestos ACM**	NAD
					09/04/2019	**Asbestos Type**	NAD
					09/04/2019	**Asbestos Level Screen**	NAD
19/5621	1	WS101	4.00	29	09/04/2019	**General Description (Bulk Analysis)**	soil/stones
					09/04/2019	**Asbestos Fibres**	NAD
					09/04/2019	**Asbestos ACM**	NAD
					09/04/2019	**Asbestos Type**	NAD
					09/04/2019	**Asbestos Level Screen**	NAD
19/5621	1	BH101	2.00	32	09/04/2019	**General Description (Bulk Analysis)**	soil.stones
					09/04/2019	**Asbestos Fibres**	NAD
					09/04/2019	**Asbestos ACM**	NAD
					09/04/2019	**Asbestos Type**	NAD
					09/04/2019	**Asbestos Level Screen**	NAD
19/5621	1	BH101	3.00	35	09/04/2019	**General Description (Bulk Analysis)**	soil.stones
					09/04/2019	**Asbestos Fibres**	NAD
					09/04/2019	**Asbestos ACM**	NAD
					09/04/2019	**Asbestos Type**	NAD
					09/04/2019	**Asbestos Level Screen**	NAD
19/5621	1	BH101	4.00	38	09/04/2019	**General Description (Bulk Analysis)**	soil.stones
					09/04/2019	**Asbestos Fibres**	NAD
					09/04/2019	**Asbestos ACM**	NAD
					09/04/2019	**Asbestos Type**	NAD
					09/04/2019	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland

Reference: 8507-02-19

Location: Hickeys 43 Pargate Place

Contact: Stephen Kealy

Matrix : Solid

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Method No.	NDP Reason
19/5621	1	WS103	0.60	1-3	NONE/NONE	Asbestos detected in sample
19/5621	1	WS103	0.60	1-3	TM21/PM24	Asbestos detected in sample
19/5621	1	WS103	0.60	1-3	TM22/PM0	Asbestos detected in sample
19/5621	1	WS101	1.00	19-21	NONE/NONE	Asbestos detected in sample
19/5621	1	WS101	1.00	19-21	TM21/PM24	Asbestos detected in sample
19/5621	1	WS101	1.00	19-21	TM22/PM0	Asbestos detected in sample

Notification of Deviating Samples

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Pargate Place
Contact: Stephen Kealy

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 19/5621						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

JE Job No.: 19/5621

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

Appendix - Methods used for WAC (2003/33/EC)

JE Job No.: 19/5621

Leachate tests	
10l/kg; 4mm	I.S. EN 12457-2:2002 Specified particle size; water added to L/S ratio; capped; agitated for 24 ± 0.5 hours; eluate settled and filtered over 0.45 µm membrane filter.
Eluate analysis	
As	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ba	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cd	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cr total	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cu	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Hg	I.S. EN 13370 rec. EN 1483 (CVAAS)
Mo	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ni	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Pb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Sb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Se	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Zn	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Chloride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Fluoride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Sulphate	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Phenol index	I.S. EN 13370 rec. ISO 6439 (4-Aminoantipyrine spectrometic methods after distillation)* (BY HPLC - Jones Env)
DOC	I.S. EN 1484
TDS	I.S. EN 15216
Compositional analysis	
TOC	I.S. EN 13137 Method B: carbonates removed with acid; TOC by combustion.
BTEX	GC-FID
PCB7**	I.S. EN 15308 analysis by GC-ECD.
Mineral oil	I.S. EN 14039 C10 to C40 analysis by GC-FID.
PAH17***	I.S. EN 15527 PAH17 analysis by GC-MS
Metals	I.S. EN 13657 - Aqua regia digestion: EN ISO 11885 (ICP-OES)
Other	
Dry matter	I.S. EN 14346 sample is dried to a constant mass in an oven at 105 ± 3 °C; Method B Water content by direct Karl-Fischer-titration and either volumetric or coulometric detection.
LOI	I.S. EN 15169 Difference in mass after heating in a furnace up to 550 ± 25 °C.
ANC	CEN/TS 15364 Determined by amouns of acid or base needed to cover the pH range

Notes:

*If not suitable due to LOD, precision, etc., any other suitable method can be used, e.g. AFS, ICP-MS
**PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180

***Naphthalene, Acenaphthylene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Chrysene, Coronene, Dibenzo(a,h)anthracene, Fluorene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene.

JE Job No: 19/5621

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

JE Job No: 19/5621

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM62	Acid digestion of as received solid samples using Aqua Regia refluxed at 112.5 °C.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes

JE Job No: 19/5621

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM131	Quantification of Asbestos Fibres and ACM, based on HSG248 and SCA method.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	Yes
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	NONE	No Method Code			AR	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				

JE Job No: 19/5621

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower Grosvenor Place, London, SW1W 0EN. Reg No. 11371415

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

4225

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	Stephen Kealy
Date :	1st May, 2019
Your reference :	8507-02-19
Our reference :	Test Report 19/5725 Batch 1
Location :	Hickeys 43 Pargate Place
Date samples received :	8th April, 2019
Status :	Final report
Issue :	1

Five samples were received for analysis on 8th April, 2019 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Where Waste Acceptance Criteria Suite (EC Decision of 19 December 2002 (2003/33/EC)) has been requested, all analyses have been performed using the relevant EN methods where they exist.

Compiled By:

L Halliwell.

Lucas Halliwell
Project Co-ordinator

Client Name:	Ground Investigations Ireland	**Report :**	**Solid**
Reference:	8507-02-19		
Location:	Hickeys 43 Pargate Place	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Stephen Kealy		
JE Job No.:	19/5725		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	7-9	10-12											
Sample ID	WS105A	WS105A											
Depth	0.50	1.30											
COC No / misc													
Containers	V J T	V J T											
Sample Date	04/04/2019	04/04/2019											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	08/04/2019	08/04/2019										LOD/LOR	Units	Method No.
Antimony	611_{AB}	30_{AA}									<1	mg/kg	TM30/PM15
Arsenic #	37.3	16.5									<0.5	mg/kg	TM30/PM15
Barium #	585	115									<1	mg/kg	TM30/PM15
Cadmium #	1.5	0.8									<0.1	mg/kg	TM30/PM15
Chromium #	33.5	48.2									<0.5	mg/kg	TM30/PM15
Copper #	186	321_{AA}									<1	mg/kg	TM30/PM15
Lead #	4755_{AA}	165									<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1									<0.1	mg/kg	TM30/PM15
Molybdenum #	5.7	2.7									<0.1	mg/kg	TM30/PM15
Nickel #	38.8	27.1									<0.7	mg/kg	TM30/PM15
Selenium #	<1	2									<1	mg/kg	TM30/PM15
Zinc #	275	288									<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	1.72									<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.06	0.28									<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	3.26									<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	4.90									<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.34	27.35^{++}									<0.03	mg/kg	TM4/PM8
Anthracene #	0.08	11.28									<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.54	23.51^{++}									<0.03	mg/kg	TM4/PM8
Pyrene #	0.56	19.64									<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.41	11.32									<0.06	mg/kg	TM4/PM8
Chrysene #	0.41	10.50									<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.83	15.19									<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.35	8.97									<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.30	4.94									<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.08	1.46									<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.29	4.58									<0.04	mg/kg	TM4/PM8
Coronene	0.08	0.83									<0.04	mg/kg	TM4/PM8
PAH 17 Total	4.33	149.73									<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.60	10.94									<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.23	4.25									<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	97	93									<0	%	TM4/PM8
Mineral Oil (C10-C40)	75	937									<30	mg/kg	TM5/PM8/PM16

Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Pargate Place
Contact: Stephen Kealy
JE Job No.: 19/5725

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	7-9	10-12	LOD/LOR	Units	Method No.
Sample ID	WS105A	WS105A			
Depth	0.50	1.30			
COC No / misc					
Containers	V J T	V J T			
Sample Date	04/04/2019	04/04/2019			
Sample Type	Soil	Soil			
Batch Number	1	1			
Date of Receipt	08/04/2019	08/04/2019			
TPH CWG					
Aliphatics					
>C5-C6#	<0.1^{SV}	<0.1^{SV}	<0.1	mg/kg	TM36/PM12
>C6-C8#	<0.1^{SV}	<0.1^{SV}	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1^{SV}	0.2^{SV}	<0.1	mg/kg	TM36/PM12
>C10-C12#	<0.2	22.6	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16#	<4	80	<4	mg/kg	TM5/PM8/PM16
>C16-C21#	<7	91	<7	mg/kg	TM5/PM8/PM16
>C21-C35#	75	732	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	75	926	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics					
>C5-EC7#	<0.1^{SV}	<0.1^{SV}	<0.1	mg/kg	TM36/PM12
>EC7-EC8#	<0.1^{SV}	<0.1^{SV}	<0.1	mg/kg	TM36/PM12
>EC8-EC10#	<0.1^{SV}	<0.1^{SV}	<0.1	mg/kg	TM36/PM12
>EC10-EC12#	<0.2	2.4	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16#	<4	29	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21#	<7	111	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35#	99	858	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35#	99	1000	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	174	1926	<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE#	<5^{SV}	<5^{SV}	<5	ug/kg	TM31/PM12
Benzene#	<5^{SV}	<5^{SV}	<5	ug/kg	TM31/PM12
Toluene#	<5^{SV}	<5^{SV}	<5	ug/kg	TM31/PM12
Ethylbenzene#	<5^{SV}	<5^{SV}	<5	ug/kg	TM31/PM12
m/p-Xylene#	<5^{SV}	<5^{SV}	<5	ug/kg	TM31/PM12
o-Xylene#	<5^{SV}	<5^{SV}	<5	ug/kg	TM31/PM12
PCB 28#	<5	<5	<5	ug/kg	TM17/PM8
PCB 52#	<5	<5	<5	ug/kg	TM17/PM8
PCB 101#	<5	<5	<5	ug/kg	TM17/PM8
PCB 118#	<5	<5	<5	ug/kg	TM17/PM8
PCB 138#	<5	<5	<5	ug/kg	TM17/PM8
PCB 153#	<5	<5	<5	ug/kg	TM17/PM8
PCB 180#	<5	<5	<5	ug/kg	TM17/PM8
Total 7 PCBs#	<35	<35	<35	ug/kg	TM17/PM8
Natural Moisture Content	21.0	14.8	<0.1	%	PM4/PM0
% Dry Matter 105°C	84.4	84.3	<0.1	%	NONE/PM4
Hexavalent Chromium#	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Chromium III	33.5	48.2	<0.5	mg/kg	NONE/NONE
Total Organic Carbon#	38.44	6.48	<0.02	%	TM21/PM24

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Pargate Place
Contact: Stephen Kealy
JE Job No.: 19/5725

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	7-9	10-12											
Sample ID	WS105A	WS105A											
Depth	0.50	1.30											
COC No / misc													
Containers	V J T	V J T											
Sample Date	04/04/2019	04/04/2019											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	08/04/2019	08/04/2019									LOD/LOR	Units	Method No.
Loss on Ignition #	7.8	<1.0									<1.0	%	TM22/PM0
pH #	8.36	8.41									<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1064	0.1064										kg	NONE/PM17
Mass of dried test portion	0.09	0.09										kg	NONE/PM17

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Pargate Place
Contact: Stephen Kealy
JE Job No.: 19/5725

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	7-9	10-12	LOD/LOR	Units	Method No.
Sample ID	WS105A	WS105A			
Depth	0.50	1.30			
COC No / misc					
Containers	V J T	V J T			
Sample Date	04/04/2019	04/04/2019			
Sample Type	Soil	Soil			
Batch Number	1	1			
Date of Receipt	08/04/2019	08/04/2019			
Dissolved Antimony (A10) #	6.51 AA	0.59	<0.02	mg/kg	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	0.043	<0.025	mg/kg	TM30/PM17
Dissolved Barium (A10) #	0.04	0.09	<0.03	mg/kg	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	mg/kg	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	mg/kg	TM30/PM17
Dissolved Copper (A10) #	<0.07	0.12	<0.07	mg/kg	TM30/PM17
Dissolved Lead (A10) #	0.06	<0.05	<0.05	mg/kg	TM30/PM17
Dissolved Mercury (A10) #	<0.01	<0.01	<0.01	mg/kg	TM30/PM17
Dissolved Molybdenum (A10) #	0.03	0.17	<0.02	mg/kg	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Total Phenols HPLC	<0.05	<0.05	<0.05	mg/l	TM26/PM0
Fluoride	<3	5	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	6	267	<5	mg/kg	TM38/PM0
Chloride #	<3	31	<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	<2	4	<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	40	<20	mg/kg	TM60/PM0
Total Dissolved Solids #	440	1360	<350	mg/kg	TM20/PM0

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Exova Jones Environmental

Client Name:	Ground Investigations Ireland	**Report :**	**EN12457_2**
Reference:	8507-02-19		
Location:	Hickeys 43 Pargate Place	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Stephen Kealy		
JE Job No.:	19/5725		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	7-9	10-12														
Sample ID	WS105A	WS105A														
Depth	0.50	1.30														
COC No / misc																
Containers	V J T	V J T														
Sample Date	04/04/2019	04/04/2019														
Sample Type	Soil	Soil														
Batch Number	1	1										Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Date of Receipt	08/04/2019	08/04/2019														
Solid Waste Analysis																
Total Organic Carbon #	38.44	6.48									3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025 SV	<0.025 SV									6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs #	<0.035	<0.035									1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	75	937									500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	4.33	149.73									100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Mass of raw test portion	0.1064	0.1064									-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	84.4	84.3									-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.883	0.883									-	-	-		l	NONE/PM17
Eluate Volume	0.85	0.8									-	-	-		l	NONE/PM17

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 19/02/8507
Location: Hickeys 43 Pargate Place
Contact: Stephen Kealy

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/5725	1	WS105A	0.50	8	24/04/2019	**General Description (Bulk Analysis)**	soil-stones
					24/04/2019	**Asbestos Fibres**	NAD
					24/04/2019	**Asbestos ACM**	NAD
					24/04/2019	**Asbestos Type**	NAD
					24/04/2019	**Asbestos Level Screen**	NAD
19/5725	1	WS105A	1.30	11	18/04/2019	**General Description (Bulk Analysis)**	soil.stones
					18/04/2019	**Asbestos Fibres**	NAD
					18/04/2019	**Asbestos ACM**	NAD
					18/04/2019	**Asbestos Type**	NAD
					18/04/2019	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Pargate Place
Contact: Stephen Kealy

Matrix : Solid

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
19/5725	1	WS105A	0.50	7-9	EPH, GRO, PAH, PCB	Sample holding time exceeded
19/5725	1	WS105A	1.30	10-12	EPH, GRO, PAH, PCB	Sample holding time exceeded

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 19/5725

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution
AB	x50 Dilution

Appendix - Methods used for WAC (2003/33/EC)

JE Job No.: 19/5725

Leachate tests	
10l/kg; 4mm	I.S. EN 12457-2:2002 Specified particle size; water added to L/S ratio; capped; agitated for 24 ± 0.5 hours; eluate settled and filtered over 0.45 µm membrane filter.
Eluate analysis	
As	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ba	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cd	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cr total	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cu	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Hg	I.S. EN 13370 rec. EN 1483 (CVAAS)
Mo	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ni	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Pb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Sb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Se	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Zn	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Chloride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Fluoride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Sulphate	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Phenol index	I.S. EN 13370 rec. ISO 6439 (4-Aminoantipyrine spectrometic methods after distillation)* (BY HPLC - Jones Env)
DOC	I.S. EN 1484
TDS	I.S. EN 15216
Compositional analysis	
TOC	I.S. EN 13137 Method B: carbonates removed with acid; TOC by combustion.
BTEX	GC-FID
PCB7**	I.S. EN 15308 analysis by GC-ECD.
Mineral oil	I.S. EN 14039 C10 to C40 analysis by GC-FID.
PAH17***	I.S. EN 15527 PAH17 analysis by GC-MS
Metals	I.S. EN 13657 - Aqua regia digestion: EN ISO 11885 (ICP-OES)
Other	
Dry matter	I.S. EN 14346 sample is dried to a constant mass in an oven at 105 ± 3 °C; Method B Water content by direct Karl-Fischer-titration and either volumetric or coulometric detection.
LOI	I.S. EN 15169 Difference in mass after heating in a furnace up to 550 ± 25 °C.
ANC	CEN/TS 15364 Determined by amouns of acid or base needed to cover the pH range

Notes:

*If not suitable due to LOD, precision, etc., any other suitable method can be used, e.g. AFS, ICP-MS
**PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180

***Naphthalene, Acenaphthylene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Chrysene, Coronene, Dibenzo(a,h)anthracene, Fluorene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene.

JE Job No: 19/5725

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

JE Job No: 19/5725

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes		AR	Yes

JE Job No: 19/5725

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower Grosvenor Place, London, SW1W 0EN. Reg No. 11371415

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

4225

Attention :	Stephen Kealy
Date :	9th May, 2019
Your reference :	8507-02-19
Our reference :	Test Report 19/5884 Batch 1
Location :	
Date samples received :	10th April, 2019
Status :	Final report
Issue :	1

Sixteen samples were received for analysis on 10th April, 2019 of which fourteen were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Where Waste Acceptance Criteria Suite (EC Decision of 19 December 2002 (2003/33/EC)) has been requested, all analyses have been performed using the relevant EN methods where they exist.

Compiled By:

Phil Sommerton BSc
Project Manager

Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location:
Contact: Stephen Kealy
JE Job No.: 19/5884

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	12-14	15-17	18-20	21-23	27-29	30-32	33-35			
Sample ID	WS109	WS109	WS109	WS110	WS110	WS110	WS110	WS112	WS112	WS112			
Depth	0.90	1.90	2.90	0.90	1.80	2.90	3.50	0.70	1.70	2.70			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019			
Antimony	2	2	2	4	2	2	2	2	2	2	<1	mg/kg	TM30/PM15
Arsenic #	11.3	8.7	9.6	23.9	10.2	15.6	18.6	17.8	15.0	14.4	<0.5	mg/kg	TM30/PM15
Barium #	91	39	51	341	70	74	105	79	74	86	<1	mg/kg	TM30/PM15
Cadmium #	2.2	2.0	1.3	0.4	1.9	1.4	2.2	1.7	1.2	0.8	<0.1	mg/kg	TM30/PM15
Chromium #	30.9	33.5	30.9	31.6	26.0	36.4	40.7	34.7	38.6	32.1	<0.5	mg/kg	TM30/PM15
Copper #	32	25	22	84	29	27	34	37	55	39	<1	mg/kg	TM30/PM15
Lead #	21	21	36	2229	32	61	47	67	83	67	<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	0.3	0.1	<0.1	<0.1	<0.1	0.4	0.1	<0.1	<0.1	mg/kg	TM30/PM15
Molybdenum #	3.5	3.8	2.6	5.7	3.2	2.6	2.7	3.4	3.1	2.9	<0.1	mg/kg	TM30/PM15
Nickel #	40.7	27.2	26.8	27.8	36.1	33.1	47.0	39.2	30.6	35.6	<0.7	mg/kg	TM30/PM15
Selenium #	2	<1	<1	2	2	2	2	2	1	3	<1	mg/kg	TM30/PM15
Zinc #	89	72	76	79	90	109	157	113	117	85	<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	0.06	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03	<0.03	0.28	<0.03	0.05	0.08	0.06	0.10	0.10	<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03	<0.03	0.15	<0.03	<0.03	0.05	<0.03	<0.03	0.05	<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03	<0.03	0.15	<0.03	<0.03	<0.03	<0.03	<0.03	0.06	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	<0.06	0.17	<0.06	<0.06	<0.06	<0.06	<0.06	0.10	<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02	<0.02	0.20	<0.02	<0.02	<0.02	<0.02	<0.02	0.09	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07	0.19	<0.07	<0.07	<0.07	<0.07	<0.07	0.16	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	0.07	<0.04	<0.04	<0.04	<0.04	<0.04	0.05	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.05	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	0.06	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	mg/kg	TM4/PM8
PAH 17 Total	<0.64	<0.64	<0.64	1.33	<0.64	<0.64	<0.64	<0.64	<0.64	0.72	<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	0.14	<0.05	<0.05	<0.05	<0.05	<0.05	0.12	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	0.05	<0.02	<0.02	<0.02	<0.02	<0.02	0.04	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	100	99	99	99	96	95	95	95	93	95	<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30	<30	<30	<30	<30	57	<30	<30	<30	<30	mg/kg	TM5/PM8/PM16

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location:
Contact: Stephen Kealy
JE Job No.: 19/5884

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	12-14	15-17	18-20	21-23	27-29	30-32	33-35			
Sample ID	WS109	WS109	WS109	WS110	WS110	WS110	WS110	WS112	WS112	WS112			
Depth	0.90	1.90	2.90	0.90	1.80	2.90	3.50	0.70	1.70	2.70			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019			
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	<7	<7	<7	<7	<7	57	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	<19	<19	<19	<19	<19	<19	57	<19	<19	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics													
>C5-EC7 #	<0.1	<0.1	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1 [SV]	<0.1 [SV]	<0.1	<0.1	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	<7	<7	<7	<7	<7	<7	80	<7	79	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	<19	<19	<19	<19	<19	<19	80	<19	79	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	<38	<38	<38	<38	<38	<38	137	<38	79	<38	<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE #	<5	<5	<5 [SV]	<5 [SV]	<5	<5 [SV]	<5 [SV]	<5	<5	<5	<5	ug/kg	TM31/PM12
Benzene #	<5	<5	<5 [SV]	<5 [SV]	<5	<5 [SV]	<5 [SV]	<5	<5	<5	<5	ug/kg	TM31/PM12
Toluene #	<5	<5	<5 [SV]	<5 [SV]	<5	<5 [SV]	<5 [SV]	<5	<5	<5	<5	ug/kg	TM31/PM12
Ethylbenzene #	<5	<5	<5 [SV]	<5 [SV]	<5	<5 [SV]	<5 [SV]	<5	10	<5	<5	ug/kg	TM31/PM12
m/p-Xylene #	<5	<5	<5 [SV]	<5 [SV]	<5	<5 [SV]	<5 [SV]	<5	10	<5	<5	ug/kg	TM31/PM12
o-Xylene #	<5	<5	<5 [SV]	<5 [SV]	<5	<5 [SV]	<5 [SV]	<5	<5	<5	<5	ug/kg	TM31/PM12
PCB 28 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	<35	ug/kg	TM17/PM8
Natural Moisture Content	20.5	15.2	14.3	18.7	15.5	29.4	53.6	23.6	21.9	24.3	<0.1	%	PM4/PM0
% Dry Matter 105°C	84.3	88.4	85.3	84.6	87.8	83.3	66.8	84.4	84.5	81.3	<0.1	%	NONE/PM4
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Chromium III	30.9	33.5	30.9	31.6	26.0	36.4	40.7	34.7	38.6	32.1	<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.68	0.47	1.03	12.36	0.57	1.27	3.36	2.10	2.08	2.22	<0.02	%	TM21/PM24

Client Name:	Ground Investigations Ireland	**Report :**	**Solid**
Reference:	8507-02-19		
Location:		**Solids:**	V=60g VOC jar, J=250g glass jar, T=plastic tub
Contact:	Stephen Kealy		
JE Job No.:	19/5884		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	12-14	15-17	18-20	21-23	27-29	30-32	33-35			
Sample ID	WS109	WS109	WS109	WS110	WS110	WS110	WS110	WS112	WS112	WS112			
Depth	0.90	1.90	2.90	0.90	1.80	2.90	3.50	0.70	1.70	2.70			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1	LOD/LOR	Units	Method No.
Date of Receipt	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019			
Loss on Ignition #	2.7	2.0	2.8	9.2	2.1	3.9	9.6	4.2	4.0	4.1	<1.0	%	TM22/PM0
pH #	8.47	8.61	8.67	8.45	8.68	8.40	7.77	8.34	8.84	9.59	<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1073	0.1021	0.105	0.106	0.103	0.1075	0.1348	0.1066	0.1063	0.1102		kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09		kg	NONE/PM17

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location:
Contact: Stephen Kealy
JE Job No.: 19/5884

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	36-38	39-41	42-44	45-47							LOD/LOR	Units	Method No.
Sample ID	WS102A	WS102A	WS102A	WS102A									
Depth	0.90	1.50	2.50	3.50									
COC No / misc													
Containers	V J T	V J T	V J T	V J T									
Sample Date	07/04/2019	07/04/2019	07/04/2019	07/04/2019									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	10/04/2019	10/04/2019	10/04/2019	10/04/2019									
Antimony	11	4	3	3							<1	mg/kg	TM30/PM15
Arsenic #	23.4	19.7	18.5	9.0							<0.5	mg/kg	TM30/PM15
Barium #	226	288	86	70							<1	mg/kg	TM30/PM15
Cadmium #	0.3	<0.1	1.7	0.6							<0.1	mg/kg	TM30/PM15
Chromium #	59.3	43.7	47.2	53.3							<0.5	mg/kg	TM30/PM15
Copper #	142	181	18	6							<1	mg/kg	TM30/PM15
Lead #	114	179	29	11							<5	mg/kg	TM30/PM15
Mercury #	<0.1	0.2	<0.1	<0.1							<0.1	mg/kg	TM30/PM15
Molybdenum #	10.5	9.5	3.0	4.4							<0.1	mg/kg	TM30/PM15
Nickel #	77.7	104.9	34.6	14.2							<0.7	mg/kg	TM30/PM15
Selenium #	3	4	1	<1							<1	mg/kg	TM30/PM15
Zinc #	207	107	128	33							<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	0.55	0.10	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.06	<0.03	<0.03	<0.03							<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05							<0.05	mg/kg	TM4/PM8
Fluorene #	0.05	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Phenanthrene #	1.27	0.59	<0.03	<0.03							<0.03	mg/kg	TM4/PM8
Anthracene #	0.18	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.65	0.10	<0.03	<0.03							<0.03	mg/kg	TM4/PM8
Pyrene #	0.64	0.13	<0.03	<0.03							<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.46	0.16	<0.06	<0.06							<0.06	mg/kg	TM4/PM8
Chrysene #	0.50	0.22	<0.02	<0.02							<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.70	0.20	<0.07	<0.07							<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.41	0.10	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.21	0.07	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.08	0.07	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.28	0.09	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
PAH 17 Total	6.04	1.83	<0.64	<0.64							<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.50	0.14	<0.05	<0.05							<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.20	0.06	<0.02	<0.02							<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	95	93	96	95							<0	%	TM4/PM8
Mineral Oil (C10-C40)	218	<30	<30	<30							<30	mg/kg	TM5/PM8/PM16

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Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location:
Contact: Stephen Kealy
JE Job No.: 19/5884

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	36-38	39-41	42-44	45-47							LOD/LOR	Units	Method No.
Sample ID	WS102A	WS102A	WS102A	WS102A									
Depth	0.90	1.50	2.50	3.50									
COC No / misc													
Containers	V J T	V J T	V J T	V J T									
Sample Date	07/04/2019	07/04/2019	07/04/2019	07/04/2019									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	10/04/2019	10/04/2019	10/04/2019	10/04/2019									
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1 SV	<0.1 SV	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1 SV	<0.1 SV	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1 SV	<0.1 SV	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>C10-C12 #	12.4	<0.2	<0.2	<0.2							<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	16	<4	<4	<4							<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	34	<7	<7	<7							<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	156	<7	<7	<7							<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	218	<19	<19	<19							<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics													
>C5-EC7 #	<0.1 SV	<0.1 SV	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1 SV	<0.1 SV	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1 SV	<0.1 SV	<0.1	<0.1							<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2							<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	16	<4	<4	<4							<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	44	<7	<7	<7							<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	191	<7	<7	<7							<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	251	<19	<19	<19							<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	469	<38	<38	<38							<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE #	<5 SV	<5 SV	<5	<5							<5	ug/kg	TM31/PM12
Benzene #	<5 SV	<5 SV	<5	<5							<5	ug/kg	TM31/PM12
Toluene #	<5 SV	<5 SV	<5	<5							<5	ug/kg	TM31/PM12
Ethylbenzene #	<5 SV	<5 SV	<5	<5							<5	ug/kg	TM31/PM12
m/p-Xylene #	<5 SV	<5 SV	<5	<5							<5	ug/kg	TM31/PM12
o-Xylene #	<5 SV	<5 SV	<5	<5							<5	ug/kg	TM31/PM12
PCB 28 #	<5	<5	<5	<5							<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5							<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5							<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5							<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5							<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5							<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5							<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35							<35	ug/kg	TM17/PM8
Natural Moisture Content	25.6	30.1	34.3	7.2							<0.1	%	PM4/PM0
% Dry Matter 105°C	77.7	75.7	74.7	93.0							<0.1	%	NONE/PM4
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3							<0.3	mg/kg	TM38/PM20
Chromium III	59.3	43.7	47.2	53.3							<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	23.35	27.70	0.61	0.18							<0.02	%	TM21/PM24

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location:
Contact: Stephen Kealy
JE Job No.: 19/5884

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	36-38	39-41	42-44	45-47							LOD/LOR	Units	Method No.
Sample ID	WS102A	WS102A	WS102A	WS102A									
Depth	0.90	1.50	2.50	3.50									
COC No / misc													
Containers	V J T	V J T	V J T	V J T									
Sample Date	07/04/2019	07/04/2019	07/04/2019	07/04/2019									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	10/04/2019	10/04/2019	10/04/2019	10/04/2019									
Loss on Ignition #	12.4	10.3	3.2	<1.0							<1.0	%	TM22/PM0
pH #	8.35	8.42	8.52	9.29							<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1156	0.1185	0.1209	0.097								kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09								kg	NONE/PM17

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location:
Contact: Stephen Kealy
JE Job No.: 19/5884

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	12-14	15-17	18-20	21-23	27-29	30-32	33-35	LOD/LOR	Units	Method No.
Sample ID	WS109	WS109	WS109	WS110	WS110	WS110	WS110	WS112	WS112	WS112			
Depth	0.90	1.90	2.90	0.90	1.80	2.90	3.50	0.70	1.70	2.70			
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T			
Sample Date	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019			
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1	1	1	1	1	1	1			
Date of Receipt	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019			
Dissolved Antimony (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025	0.039	<0.025	<0.025	<0.025	<0.025	0.037	0.057	0.189	<0.025	mg/kg	TM30/PM17
Dissolved Barium (A10) #	0.06	<0.03	<0.03	0.22	<0.03	<0.03	0.25	0.08	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	mg/kg	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	0.018	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	mg/kg	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	mg/kg	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	0.31	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/kg	TM30/PM17
Dissolved Mercury (A10) #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	mg/kg	TM30/PM17
Dissolved Molybdenum (A10) #	0.08	0.12	0.15	0.04	0.07	0.03	0.12	0.07	0.05	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	mg/kg	TM30/PM17
Dissolved Selenium (A10) #	0.11	0.04	<0.03	0.04	<0.03	<0.03	<0.03	0.04	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	mg/kg	TM30/PM17
Total Phenols HPLC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	mg/l	TM26/PM0
Fluoride	<3	<3	<3	4	<3	<3	<3	<3	<3	<3	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	409	184	117	954	212	83	594	1096	177	34	<5	mg/kg	TM38/PM0
Chloride #	40	30	33	11	50	224	331	198	49	57	<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	4	<2	<2	<2	<2	2	7	<2	<2	3	<2	mg/l	TM60/PM0
Dissolved Organic Carbon	40	<20	<20	<20	<20	20	70	<20	<20	30	<20	mg/kg	TM60/PM0
Total Dissolved Solids #	1570	730	1161	2121	730	980	2230	2889	740	1040	<350	mg/kg	TM20/PM0

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location:
Contact: Stephen Kealy
JE Job No.: 19/5884

Report : **CEN 10:1 1 Batch**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	36-38	39-41	42-44	45-47							LOD/LOR	Units	Method No.
Sample ID	WS102A	WS102A	WS102A	WS102A									
Depth	0.90	1.50	2.50	3.50									
COC No / misc													
Containers	V J T	V J T	V J T	V J T									
Sample Date	07/04/2019	07/04/2019	07/04/2019	07/04/2019									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	10/04/2019	10/04/2019	10/04/2019	10/04/2019									
Dissolved Antimony (A10) #	0.32	<0.02	<0.02	<0.02							<0.02	mg/kg	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025	<0.025	<0.025							<0.025	mg/kg	TM30/PM17
Dissolved Barium (A10) #	0.09	0.09	0.08	<0.03							<0.03	mg/kg	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005							<0.005	mg/kg	TM30/PM17
Dissolved Chromium (A10) #	<0.015	0.051	<0.015	<0.015							<0.015	mg/kg	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07							<0.07	mg/kg	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05							<0.05	mg/kg	TM30/PM17
Dissolved Mercury (A10) #	<0.01	<0.01	<0.01	<0.01							<0.01	mg/kg	TM30/PM17
Dissolved Molybdenum (A10) #	0.08	0.10	0.09	0.08							<0.02	mg/kg	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	<0.02							<0.02	mg/kg	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03							<0.03	mg/kg	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	<0.03	<0.03							<0.03	mg/kg	TM30/PM17
Total Phenols HPLC	<0.05	<0.05	<0.05	<0.05							<0.05	mg/l	TM26/PM0
Fluoride	4	5	<3	<3							<3	mg/kg	TM173/PM0
Sulphate as SO4 #	225	71	73	24							<5	mg/kg	TM38/PM0
Chloride #	<3	7	66	95							<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	2	<2	3	<2							<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	<20	30	<20							<20	mg/kg	TM60/PM0
Total Dissolved Solids #	930	670	810	810							<350	mg/kg	TM20/PM0

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Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location:
Contact: Stephen Kealy
JE Job No.: 19/5884

Report : **EN12457_2**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	12-14	15-17	18-20	21-23	27-29	30-32	33-35	Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Sample ID	WS109	WS109	WS109	WS110	WS110	WS110	WS110	WS112	WS112	WS112						
Depth	0.90	1.90	2.90	0.90	1.80	2.90	3.50	0.70	1.70	2.70						
COC No / misc																
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T						
Sample Date	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019	06/04/2019						
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1	1	1	1	1	1	1						
Date of Receipt	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019	10/04/2019						
Solid Waste Analysis																
Total Organic Carbon #	0.68	0.47	1.03	12.36	0.57	1.27	3.36	2.10	2.08	2.22	3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025[SV]	<0.025[SV]	<0.025	<0.025[SV]	<0.025[SV]	<0.025	<0.025	<0.025	6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	<30	<30	<30	57	<30	<30	<30	500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	<0.64	<0.64	<0.64	1.33	<0.64	<0.64	<0.64	<0.64	<0.64	0.72	100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Mass of raw test portion	0.1073	0.1021	0.105	0.106	0.103	0.1075	0.1348	0.1066	0.1063	0.1102	-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	84.3	88.4	85.3	84.6	87.8	83.3	66.8	84.4	84.5	81.3	-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.883	0.888	0.885	0.884	0.887	0.882	0.855	0.883	0.884	0.879	-	-	-		l	NONE/PM17
Eluate Volume	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	-	-	-		l	NONE/PM17

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location:
Contact: Stephen Kealy
JE Job No.: 19/5884

Report : EN12457_2

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	36-38	39-41	42-44	45-47							Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Sample ID	WS102A	WS102A	WS102A	WS102A												
Depth	0.90	1.50	2.50	3.50												
COC No / misc																
Containers	V J T	V J T	V J T	V J T												
Sample Date	07/04/2019	07/04/2019	07/04/2019	07/04/2019												
Sample Type	Soil	Soil	Soil	Soil												
Batch Number	1	1	1	1												
Date of Receipt	10/04/2019	10/04/2019	10/04/2019	10/04/2019												
Solid Waste Analysis																
Total Organic Carbon #	23.35	27.70	0.61	0.18							3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025 SV	<0.025 SV	<0.025	<0.025							6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035							1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	218	<30	<30	<30							500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	6.04	1.83	<0.64	<0.64							100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Mass of raw test portion	0.1156	0.1185	0.1209	0.097							-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	77.7	75.7	74.7	93.0							-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.874	0.871	0.869	0.893							-	-	-		l	NONE/PM17
Eluate Volume	0.8	0.9	0.84	0.8							-	-	-		l	NONE/PM17

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 19/02/8507
Location:
Contact: Stephen Kealy

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/5884	1	WS109	0.90	2	01/05/2019	**General Description (Bulk Analysis)**	soil.stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/5884	1	WS109	1.90	5	01/05/2019	**General Description (Bulk Analysis)**	soil.stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/5884	1	WS109	2.90	8	01/05/2019	**General Description (Bulk Analysis)**	soil-stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/5884	1	WS110	0.90	13	01/05/2019	**General Description (Bulk Analysis)**	soil/stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/5884	1	WS110	1.80	16	01/05/2019	**General Description (Bulk Analysis)**	soil/stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/5884	1	WS110	2.90	19	01/05/2019	**General Description (Bulk Analysis)**	soil/stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/5884	1	WS110	3.50	22	01/05/2019	**General Description (Bulk Analysis)**	soil/stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD

Client Name: Ground Investigations Ireland
Reference: 19/02/8507
Location:
Contact: Stephen Kealy

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/5884	1	WS110	3.50	22	01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/5884	1	WS112	0.70	28	01/05/2019	**General Description (Bulk Analysis)**	soil/stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/5884	1	WS112	1.70	31	01/05/2019	**General Description (Bulk Analysis)**	soil/stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/5884	1	WS112	2.70	34	01/05/2019	**General Description (Bulk Analysis)**	soil.stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/5884	1	WS102A	0.90	37	01/05/2019	**General Description (Bulk Analysis)**	soil.stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/5884	1	WS102A	1.50	40	01/05/2019	**General Description (Bulk Analysis)**	soil.stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/5884	1	WS102A	2.50	43	01/05/2019	**General Description (Bulk Analysis)**	soil.stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/5884	1	WS102A	3.50	46	01/05/2019	**General Description (Bulk Analysis)**	soil.stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland **Matrix : Solid**
Reference: 8507-02-19
Location:
Contact: Stephen Kealy

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
19/5884	1	WS109	0.90	1-3	EPH, GRO, PAH, PCB	Sample holding time exceeded
19/5884	1	WS109	1.90	4-6	EPH, GRO, PAH, PCB	Sample holding time exceeded
19/5884	1	WS109	2.90	7-9	EPH, GRO, PAH, PCB	Sample holding time exceeded
19/5884	1	WS110	0.90	12-14	EPH, GRO, PAH, PCB	Sample holding time exceeded
19/5884	1	WS110	1.80	15-17	EPH, GRO, PAH, PCB	Sample holding time exceeded
19/5884	1	WS110	2.90	18-20	EPH, GRO, PAH, PCB	Sample holding time exceeded
19/5884	1	WS110	3.50	21-23	EPH, GRO, PAH, PCB	Sample holding time exceeded
19/5884	1	WS112	0.70	27-29	EPH, GRO, PAH, PCB	Sample holding time exceeded
19/5884	1	WS112	1.70	30-32	EPH, GRO, PAH, PCB	Sample holding time exceeded
19/5884	1	WS112	2.70	33-35	EPH, GRO, PAH, PCB	Sample holding time exceeded
19/5884	1	WS102A	0.90	36-38	EPH, GRO, PAH, PCB	Sample holding time exceeded
19/5884	1	WS102A	1.50	39-41	EPH, GRO, PAH, PCB	Sample holding time exceeded
19/5884	1	WS102A	2.50	42-44	EPH, GRO, PAH, PCB	Sample holding time exceeded
19/5884	1	WS102A	3.50	45-47	EPH, GRO, PAH, PCB	Sample holding time exceeded

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 19/5884

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

Appendix - Methods used for WAC (2003/33/EC)

JE Job No.: 19/5884

Leachate tests	
10l/kg; 4mm	I.S. EN 12457-2:2002 Specified particle size; water added to L/S ratio; capped; agitated for 24 ± 0.5 hours; eluate settled and filtered over 0.45 µm membrane filter.
Eluate analysis	
As	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ba	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cd	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cr total	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cu	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Hg	I.S. EN 13370 rec. EN 1483 (CVAAS)
Mo	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ni	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Pb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Sb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Se	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Zn	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Chloride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Fluoride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Sulphate	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Phenol index	I.S. EN 13370 rec. ISO 6439 (4-Aminoantipyrine spectrometic methods after distillation)* (BY HPLC - Jones Env)
DOC	I.S. EN 1484
TDS	I.S. EN 15216
Compositional analysis	
TOC	I.S. EN 13137 Method B: carbonates removed with acid; TOC by combustion.
BTEX	GC-FID
PCB7**	I.S. EN 15308 analysis by GC-ECD.
Mineral oil	I.S. EN 14039 C10 to C40 analysis by GC-FID.
PAH17***	I.S. EN 15527 PAH17 analysis by GC-MS
Metals	I.S. EN 13657 - Aqua regia digestion: EN ISO 11885 (ICP-OES)
Other	
Dry matter	I.S. EN 14346 sample is dried to a constant mass in an oven at 105 ± 3 °C; Method B Water content by direct Karl-Fischer-titration and either volumetric or coulometric detection.
LOI	I.S. EN 15169 Difference in mass after heating in a furnace up to 550 ± 25 °C.
ANC	CEN/TS 15364 Determined by amouns of acid or base needed to cover the pH range

Notes:

*If not suitable due to LOD, precision, etc., any other suitable method can be used, e.g. AFS, ICP-MS
**PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180

***Naphthalene, Acenaphthylene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Chrysene, Coronene, Dibenzo(a,h)anthracene, Fluorene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene.

JE Job No: 19/5884

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

JE Job No: 19/5884

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes		AR	Yes

JE Job No: 19/5884

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower Grosvenor Place, London, SW1W 0EN. Reg No. 11371415

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

4225

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	Stephen Kealy
Date :	2nd May, 2019
Your reference :	8507-02-19
Our reference :	Test Report 19/6185 Batch 1
Location :	Hickeys 43 Parkgate Place
Date samples received :	15th April, 2019
Status :	Final report
Issue :	1

Twelve samples were received for analysis on 15th April, 2019 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Where Waste Acceptance Criteria Suite (EC Decision of 19 December 2002 (2003/33/EC)) has been requested, all analyses have been performed using the relevant EN methods where they exist.

Compiled By:

Phil Sommerton BSc
Project Manager

Client Name:	Ground Investigations Ireland	**Report :**	**Solid**
Reference:	8507-02-19		
Location:	Hickeys 43 Parkgate Place	**Solids:**	V=60g VOC jar, J=250g glass jar, T=plastic tub
Contact:	Stephen Kealy		
JE Job No.:	19/6185		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	16-18	19-21			
Sample ID	TP102	TP102			
Depth	1.00	2.00			
COC No / misc					
Containers	V J T	V J T			
Sample Date	11/04/2019	11/04/2019			
Sample Type	Soil	Soil			
Batch Number	1	1	LOD/LOR	Units	Method No.
Date of Receipt	15/04/2019	15/04/2019			
Antimony	-	2	<1	mg/kg	TM30/PM15
Arsenic #	-	14.6	<0.5	mg/kg	TM30/PM15
Barium #	-	66	<1	mg/kg	TM30/PM15
Cadmium #	-	1.8	<0.1	mg/kg	TM30/PM15
Chromium #	-	23.2	<0.5	mg/kg	TM30/PM15
Copper #	-	35	<1	mg/kg	TM30/PM15
Lead #	-	42	<5	mg/kg	TM30/PM15
Mercury #	-	<0.1	<0.1	mg/kg	TM30/PM15
Molybdenum #	-	3.2	<0.1	mg/kg	TM30/PM15
Nickel #	-	35.3	<0.7	mg/kg	TM30/PM15
Selenium #	-	1	<1	mg/kg	TM30/PM15
Zinc #	-	106	<5	mg/kg	TM30/PM15
Antimony	99 AA	-	<1	mg/kg	TM30/PM62
Arsenic	30.3	-	<0.5	mg/kg	TM30/PM62
Barium	209	-	<1	mg/kg	TM30/PM62
Cadmium	0.4	-	<0.1	mg/kg	TM30/PM62
Chromium	153.3	-	<0.5	mg/kg	TM30/PM62
Copper	177	-	<1	mg/kg	TM30/PM62
Lead	692	-	<5	mg/kg	TM30/PM62
Mercury	1.8	-	<0.1	mg/kg	TM30/PM62
Molybdenum	8.5	-	<0.1	mg/kg	TM30/PM62
Nickel	76.3	-	<0.7	mg/kg	TM30/PM62
Selenium	3	-	<1	mg/kg	TM30/PM62
Zinc	360	-	<5	mg/kg	TM30/PM62

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/6185

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	16-18	19-21	LOD/LOR	Units	Method No.
Sample ID	TP102	TP102			
Depth	1.00	2.00			
COC No / misc					
Containers	V J T	V J T			
Sample Date	11/04/2019	11/04/2019			
Sample Type	Soil	Soil			
Batch Number	1	1			
Date of Receipt	15/04/2019	15/04/2019			
PAH MS					
Naphthalene #	0.59	<0.04	<0.04	mg/kg	TM4/PM8
Acenaphthylene	0.08	<0.03	<0.03	mg/kg	TM4/PM8
Acenaphthene #	0.08	<0.05	<0.05	mg/kg	TM4/PM8
Fluorene #	0.07	<0.04	<0.04	mg/kg	TM4/PM8
Phenanthrene #	1.42	<0.03	<0.03	mg/kg	TM4/PM8
Anthracene #	0.22	<0.04	<0.04	mg/kg	TM4/PM8
Fluoranthene #	1.09	<0.03	<0.03	mg/kg	TM4/PM8
Pyrene #	0.94	<0.03	<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.55	<0.06	<0.06	mg/kg	TM4/PM8
Chrysene #	0.68	<0.02	<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.99	<0.07	<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.42	<0.04	<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.30	<0.04	<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.07	<0.04	<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.35	<0.04	<0.04	mg/kg	TM4/PM8
Coronene	0.11	<0.04	<0.04	mg/kg	TM4/PM8
PAH 17 Total	7.96	<0.64	<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.71	<0.05	<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.28	<0.02	<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	95	99	<0	%	TM4/PM8
Mineral Oil (C10-C40)	1972	<30	<30	mg/kg	TM5/PM8/PM16
TPH CWG					
Aliphatics					
>C5-C6 #	<0.1 SV	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1 SV	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1 SV	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	120	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	1757	26	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	1877	26	<19	mg/kg	TM5/TM36/PM8/PM12/PM16

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/6185

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	16-18	19-21											
Sample ID	TP102	TP102											
Depth	1.00	2.00											
COC No / misc													
Containers	V J T	V J T											
Sample Date	11/04/2019	11/04/2019											
Sample Type	Soil	Soil											
Batch Number	1	1									LOD/LOR	Units	Method No.
Date of Receipt	15/04/2019	15/04/2019											
TPH CWG													
Aromatics													
>C5-EC7 #	<0.1 SV	<0.1									<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1 SV	<0.1									<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1 SV	<0.1									<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2									<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	19	<4									<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	52	<7									<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	754	18									<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	825	<19									<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	2702	<38									<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE #	<5 SV	<5									<5	ug/kg	TM31/PM12
Benzene #	<5 SV	<5									<5	ug/kg	TM31/PM12
Toluene #	<5 SV	<5									<5	ug/kg	TM31/PM12
Ethylbenzene #	<5 SV	<5									<5	ug/kg	TM31/PM12
m/p-Xylene #	<5 SV	<5									<5	ug/kg	TM31/PM12
o-Xylene #	<5 SV	<5									<5	ug/kg	TM31/PM12
PCB 28 #	<5	<5									<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5									<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5									<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5									<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5									<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5									<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5									<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35									<35	ug/kg	TM17/PM8
Natural Moisture Content	36.3	31.8									<0.1	%	PM4/PM0
% Dry Matter 105°C	78.8	80.4									<0.1	%	NONE/PM4
Hexavalent Chromium #	<0.3	<0.3									<0.3	mg/kg	TM38/PM20
Chromium III	NDP	23.2									<0.5	mg/kg	NONE/NONE
Chromium III	153.3	-									<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	NDP	0.94									<0.02	%	TM21/PM24
Loss on Ignition #	NDP	2.9									<1.0	%	TM22/PM0
pH #	8.49	8.71									<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1138	0.1114										kg	NONE/PM17
Mass of dried test portion	0.09	0.09										kg	NONE/PM17

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/6185

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	16-18	19-21									LOD/LOR	Units	Method No.
Sample ID	TP102	TP102											
Depth	1.00	2.00											
COC No / misc													
Containers	V J T	V J T											
Sample Date	11/04/2019	11/04/2019											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	15/04/2019	15/04/2019											
Dissolved Antimony (A10) #	4.17	0.06									<0.02	mg/kg	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025									<0.025	mg/kg	TM30/PM17
Dissolved Barium (A10) #	0.10	<0.03									<0.03	mg/kg	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005									<0.005	mg/kg	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015									<0.015	mg/kg	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07									<0.07	mg/kg	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05									<0.05	mg/kg	TM30/PM17
Dissolved Mercury (A10) #	<0.01	<0.01									<0.01	mg/kg	TM30/PM17
Dissolved Molybdenum (A10) #	0.04	0.08									<0.02	mg/kg	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02									<0.02	mg/kg	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03									<0.03	mg/kg	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03									<0.03	mg/kg	TM30/PM17
Total Phenols HPLC	<0.05	<0.05									<0.05	mg/l	TM26/PM0
Fluoride	<3	4									<3	mg/kg	TM173/PM0
Sulphate as SO4 #	38	<5									<5	mg/kg	TM38/PM0
Chloride #	<3	5									<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	2	2									<2	mg/l	TM60/PM0
Dissolved Organic Carbon	20	<20									<20	mg/kg	TM60/PM0
Total Dissolved Solids #	1030	820									<350	mg/kg	TM20/PM0

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/6185

Report : EN12457_2

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	16-18	19-21														
Sample ID	TP102	TP102														
Depth	1.00	2.00														
COC No / misc																
Containers	V J T	V J T														
Sample Date	11/04/2019	11/04/2019														
Sample Type	Soil	Soil														
Batch Number	1	1									Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Date of Receipt	15/04/2019	15/04/2019														
Solid Waste Analysis																
Total Organic Carbon #	NDP	0.94									3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025 SV	<0.025									6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs #	<0.035	<0.035									1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	1972	<30									500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	7.96	<0.64									100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Mass of raw test portion	0.1138	0.1114									-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	78.8	80.4									-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.876	0.878									-	-	-		l	NONE/PM17
Eluate Volume	0.86	0.85									-	-	-		l	NONE/PM17

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 19/02/8507
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/6185	1	TP102	1.00	17	23/04/2019	**General Description (Bulk Analysis)**	Soil/Stones
					23/04/2019	**Asbestos Fibres**	Fibre Bundles
					23/04/2019	**Asbestos ACM**	ACM Debris
					23/04/2019	**Asbestos Type**	Chrysotile
					23/04/2019	**Asbestos Level Screen**	less than 0.1%
					29/04/2019	**Total ACM Gravimetric Quantification (% Asb)**	<0.001 (mass %)
					29/04/2019	**Total Detailed Gravimetric Quantification (% Asb)**	0.006 (mass %)
					29/04/2019	**Total Gravimetric Quantification (ACM + Detailed) (% Asb)**	0.006 (mass %)
19/6185	1	TP102	2.00	20	23/04/2019	**General Description (Bulk Analysis)**	Soil/Stones
					23/04/2019	**Asbestos Fibres**	NAD
					23/04/2019	**Asbestos ACM**	NAD
					23/04/2019	**Asbestos Type**	NAD
					23/04/2019	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy

Matrix : Solid

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Method No.	NDP Reason
19/6185	1	TP102	1.00	16-18	NONE/NONE	Asbestos detected in sample
19/6185	1	TP102	1.00	16-18	TM22/PM0	Asbestos detected in sample
19/6185	1	TP102	1.00	16-18	TM21/PM24	Asbestos detected in sample

Notification of Deviating Samples

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 19/6185						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution

Appendix - Methods used for WAC (2003/33/EC)

JE Job No.: 19/6185

Leachate tests	
10l/kg; 4mm	I.S. EN 12457-2:2002 Specified particle size; water added to L/S ratio; capped; agitated for 24 ± 0.5 hours; eluate settled and filtered over 0.45 µm membrane filter.
Eluate analysis	
As	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ba	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cd	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cr total	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cu	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Hg	I.S. EN 13370 rec. EN 1483 (CVAAS)
Mo	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ni	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Pb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Sb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Se	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Zn	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Chloride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Fluoride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Sulphate	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Phenol index	I.S. EN 13370 rec. ISO 6439 (4-Aminoantipyrine spectrometic methods after distillation)* (BY HPLC - Jones Env)
DOC	I.S. EN 1484
TDS	I.S. EN 15216
Compositional analysis	
TOC	I.S. EN 13137 Method B: carbonates removed with acid; TOC by combustion.
BTEX	GC-FID
PCB7**	I.S. EN 15308 analysis by GC-ECD.
Mineral oil	I.S. EN 14039 C10 to C40 analysis by GC-FID.
PAH17***	I.S. EN 15527 PAH17 analysis by GC-MS
Metals	I.S. EN 13657 - Aqua regia digestion: EN ISO 11885 (ICP-OES)
Other	
Dry matter	I.S. EN 14346 sample is dried to a constant mass in an oven at 105 ± 3 °C; Method B Water content by direct Karl-Fischer-titration and either volumetric or coulometric detection.
LOI	I.S. EN 15169 Difference in mass after heating in a furnace up to 550 ± 25 °C.
ANC	CEN/TS 15364 Determined by amouns of acid or base needed to cover the pH range

Notes:

*If not suitable due to LOD, precision, etc., any other suitable method can be used, e.g. AFS, ICP-MS
**PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180

***Naphthalene, Acenaphthylene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Chrysene, Coronene, Dibenzo(a,h)anthracene, Fluorene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene.

JE Job No: 19/6185

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

JE Job No: 19/6185

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM62	Acid digestion of as received solid samples using Aqua Regia refluxed at 112.5 °C.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes

JE Job No: 19/6185

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM131	Quantification of Asbestos Fibres and ACM, based on HSG248 and SCA method.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	Yes
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	NONE	No Method Code			AR	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				

JE Job No: 19/6185

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower Grosvenor Place, London, SW1W 0EN. Reg No. 11371415

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

4225

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	Stephen McLoughlan
Date :	9th May, 2019
Your reference :	8507-02-19
Our reference :	Test Report 19/6282 Batch 1
Location :	Hickeys 43 Pargate place
Date samples received :	16th April, 2019
Status :	Final report
Issue :	1

Fourteen samples were received for analysis on 16th April, 2019 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Where Waste Acceptance Criteria Suite (EC Decision of 19 December 2002 (2003/33/EC)) has been requested, all analyses have been performed using the relevant EN methods where they exist.

Compiled By:

Phil Sommerton BSc
Project Manager

Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Pargate place
Contact: Stephen McLoughlan
JE Job No.: 19/6282

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	5-7	8-10	11-13	17-19	22-24	28-30	31-33	34-36					
Sample ID	BH102	BH102	BH102	BH102	BH103	BH103	BH103	BH103					
Depth	1.00	2.00	3.00	5.00	0.50	2.00	3.00	4.00					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1			LOD/LOR	Units	Method No.
Date of Receipt	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019					
Antimony	4	2	1	1	3	3	2	2			<1	mg/kg	TM30/PM15
Arsenic #	10.4	12.7	13.0	8.8	13.8	13.8	11.2	10.5			<0.5	mg/kg	TM30/PM15
Barium #	70	73	102	13	89	145	81	69			<1	mg/kg	TM30/PM15
Cadmium #	0.8	1.7	2.0	0.3	1.9	2.3	1.4	1.5			<0.1	mg/kg	TM30/PM15
Chromium #	38.3	39.2	49.9	77.5	35.3	35.9	32.7	59.6			<0.5	mg/kg	TM30/PM15
Copper #	31	32	30	5	47	73	37	23			<1	mg/kg	TM30/PM15
Lead #	119	39	39	9	48	56	74	25			<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	<0.1	0.1	0.4	<0.1			<0.1	mg/kg	TM30/PM15
Molybdenum #	2.9	4.3	3.2	6.5	4.5	4.6	3.5	4.2			<0.1	mg/kg	TM30/PM15
Nickel #	24.6	35.4	46.3	12.9	41.7	41.6	31.9	33.7			<0.7	mg/kg	TM30/PM15
Selenium #	1	2	2	<1	2	2	2	2			<1	mg/kg	TM30/PM15
Zinc #	98	86	165	29	132	100	100	102			<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	0.07	<0.04	<0.04	<0.04	0.13	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	0.04	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	0.17	<0.05	<0.05	<0.05			<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	0.15	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.32	<0.03	<0.03	<0.03	1.16	0.10	0.18	<0.03			<0.03	mg/kg	TM4/PM8
Anthracene #	0.08	<0.04	<0.04	<0.04	0.30	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.50	<0.03	<0.03	<0.03	1.63	0.06	0.07	<0.03			<0.03	mg/kg	TM4/PM8
Pyrene #	0.43	<0.03	<0.03	<0.03	1.42	0.06	0.05	<0.03			<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.33	<0.06	<0.06	<0.06	1.03	<0.06	0.08	<0.06			<0.06	mg/kg	TM4/PM8
Chrysene #	0.26	<0.02	0.04	<0.02	0.65	0.04	0.07	<0.02			<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.52	<0.07	0.12	<0.07	1.26	<0.07	<0.07	<0.07			<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.19	<0.04	<0.04	<0.04	0.60	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.18	<0.04	0.08	<0.04	0.41	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.08	<0.04	0.07	<0.04	0.17	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.20	<0.04	0.10	<0.04	0.42	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Coronene	0.06	<0.04	<0.04	<0.04	0.09	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
PAH 17 Total	3.22	<0.64	<0.64	<0.64	9.63	<0.64	<0.64	<0.64			<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.37	<0.05	0.09	<0.05	0.91	<0.05	<0.05	<0.05			<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.15	<0.02	0.03	<0.02	0.35	<0.02	<0.02	<0.02			<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	98	97	97	95	96	94	99	96			<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30	<30	<30	<30	<30	<30	<30			<30	mg/kg	TM5/PM8/PM16

Exova Jones Environmental

Client Name:	Ground Investigations Ireland	**Report :**	**Solid**
Reference:	8507-02-19		
Location:	Hickeys 43 Pargate place	**Solids:**	V=60g VOC jar, J=250g glass jar, T=plastic tub
Contact:	Stephen McLoughlan		
JE Job No.:	19/6282		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	5-7	8-10	11-13	17-19	22-24	28-30	31-33	34-36			LOD/LOR	Units	Method No.
Sample ID	BH102	BH102	BH102	BH102	BH103	BH103	BH103	BH103					
Depth	1.00	2.00	3.00	5.00	0.50	2.00	3.00	4.00					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019					
TPH CWG													
Aliphatics													
>C5-C6 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1 SV	<0.1			<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1 SV	<0.1			<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1 SV	<0.1			<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	<4	<4	<4	<4	<4			<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	<7	<7	<7	<7	<7	27	<7			<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	<19	<19	<19	<19	<19	<19	27	<19			<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics													
>C5-EC7 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1 SV	<0.1			<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1 SV	<0.1			<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1 SV	<0.1 SV	<0.1			<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4	<4	<4	<4	<4	<4			<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	<7	<7	<7	<7	<7	<7	41	<7			<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	<19	<19	<19	<19	<19	<19	41	<19			<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	<38	<38	<38	<38	<38	<38	68	<38			<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE #	<5	<5	<5	<5	<5	<5 SV	<5 SV	<5			<5	ug/kg	TM31/PM12
Benzene #	<5	<5	<5	<5	<5	<5 SV	<5 SV	<5			<5	ug/kg	TM31/PM12
Toluene #	<5	<5	<5	<5	<5	<5 SV	<5 SV	<5			<5	ug/kg	TM31/PM12
Ethylbenzene #	<5	<5	<5	<5	<5	<5 SV	<5 SV	<5			<5	ug/kg	TM31/PM12
m/p-Xylene #	<5	<5	<5	<5	<5	<5 SV	<5 SV	<5			<5	ug/kg	TM31/PM12
o-Xylene #	<5	<5	<5	<5	<5	<5 SV	<5 SV	<5			<5	ug/kg	TM31/PM12
PCB 28 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35	<35	<35	<35			<35	ug/kg	TM17/PM8
Natural Moisture Content	13.0	15.1	37.8	5.7	10.7	19.5	30.9	32.0			<0.1	%	PM4/PM0
% Dry Matter 105°C	85.8	83.8	75.9	95.7	88.4	81.2	69.5	90.2			<0.1	%	NONE/PM4
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3			<0.3	mg/kg	TM38/PM20
Chromium III	38.3	39.2	49.9	77.5	35.3	35.9	32.7	59.6			<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	1.71	1.18	2.08	0.08	1.16	1.73	3.87	1.28			<0.02	%	TM21/PM24

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Pargate place
Contact: Stephen McLoughlan
JE Job No.: 19/6282

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	5-7	8-10	11-13	17-19	22-24	28-30	31-33	34-36			LOD/LOR	Units	Method No.
Sample ID	BH102	BH102	BH102	BH102	BH103	BH103	BH103	BH103					
Depth	1.00	2.00	3.00	5.00	0.50	2.00	3.00	4.00					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019					
Loss on Ignition #	3.1	3.3	6.9	<1.0	3.3	4.3	9.1	4.8			<1.0	%	TM22/PM0
pH #	9.29	8.41	7.83	9.01	8.71	8.47	7.86	8.10			<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1052	0.1073	0.1183	0.094	0.1013	0.1103	0.13	0.1003				kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09				kg	NONE/PM17

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Exova Jones Environmental

Client Name:	Ground Investigations Ireland	**Report :**	**CEN 10:1 1 Batch**
Reference:	8507-02-19		
Location:	Hickeys 43 Pargate place	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Stephen McLoughlan		
JE Job No.:	19/6282		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	5-7	8-10	11-13	17-19	22-24	28-30	31-33	34-36					
Sample ID	BH102	BH102	BH102	BH102	BH103	BH103	BH103	BH103					
Depth	1.00	2.00	3.00	5.00	0.50	2.00	3.00	4.00					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1			LOD/LOR	Units	Method No.
Date of Receipt	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019					
Dissolved Antimony (A10) #	0.07	<0.02	0.03	<0.02	0.09	<0.02	0.05	0.06			<0.02	mg/kg	TM30/PM17
Dissolved Arsenic (A10) #	0.096	<0.025	<0.025	0.035	<0.025	0.042	<0.025	<0.025			<0.025	mg/kg	TM30/PM17
Dissolved Barium (A10) #	<0.03	0.09	0.29	<0.03	<0.03	<0.03	0.14	0.20			<0.03	mg/kg	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005			<0.005	mg/kg	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015			<0.015	mg/kg	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07			<0.07	mg/kg	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/kg	TM30/PM17
Dissolved Mercury (A10) #	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	mg/kg	TM30/PM17
Dissolved Molybdenum (A10) #	<0.02	0.15	0.18	<0.02	0.09	0.06	0.57	0.27			<0.02	mg/kg	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02			<0.02	mg/kg	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM30/PM17
Total Phenols HPLC	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/l	TM26/PM0
Fluoride	<3	<3	<3	<3	<3	<3	<3	<3			<3	mg/kg	TM173/PM0
Sulphate as SO4 #	35	10	112	13	15	23	297	110			<5	mg/kg	TM38/PM0
Chloride #	7	109	58	5	5	4	7	4			<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	2	4	8	<2	2	3	10	7			<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	40	80	<20	<20	30	100	70			<20	mg/kg	TM60/PM0
Total Dissolved Solids #	500	850	1359	630	610	680	1639	1380			<350	mg/kg	TM20/PM0

Client Name:	Ground Investigations Ireland	**Report :**	**EN12457_2**
Reference:	8507-02-19		
Location:	Hickeys 43 Pargate place	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Stephen McLoughlan		
JE Job No.:	19/6282		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	5-7	8-10	11-13	17-19	22-24	28-30	31-33	34-36								
Sample ID	BH102	BH102	BH102	BH102	BH103	BH103	BH103	BH103								
Depth	1.00	2.00	3.00	5.00	0.50	2.00	3.00	4.00								
COC No / misc																
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T								
Sample Date	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019	14/04/2019								
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil								
Batch Number	1	1	1	1	1	1	1	1			Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Date of Receipt	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019	16/04/2019								
Solid Waste Analysis																
Total Organic Carbon #	1.71	1.18	2.08	0.08	1.16	1.73	3.87	1.28			3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025[SV]	<0.025[SV]	<0.025			6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035			1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	<30	<30	<30	<30	<30			500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	3.22	<0.64	<0.64	<0.64	9.63	<0.64	<0.64	<0.64			100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Mass of raw test portion	0.1052	0.1073	0.1183	0.094	0.1013	0.1103	0.13	0.1003			-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	85.8	83.8	75.9	95.7	88.4	81.2	69.5	90.2			-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.885	0.883	0.871	0.896	0.888	0.879	0.86	0.89			-	-	-		l	NONE/PM17
Eluate Volume	8.57	0.81	0.8	0.89	0.78	0.83	0.76	0.89			-	-	-		l	NONE/PM17

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 19/02/8507
Location: Hickeys 43 Pargate place
Contact: Stephen McLoughlan

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/6282	1	BH102	1.00	6	01/05/2019	**General Description (Bulk Analysis)**	soil-stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/6282	1	BH102	2.00	9	01/05/2019	**General Description (Bulk Analysis)**	soil.stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/6282	1	BH102	3.00	12	01/05/2019	**General Description (Bulk Analysis)**	soil-stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/6282	1	BH102	5.00	18	01/05/2019	**General Description (Bulk Analysis)**	soil-sand-stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/6282	1	BH103	0.50	23	01/05/2019	**General Description (Bulk Analysis)**	soil.stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/6282	1	BH103	2.00	29	01/05/2019	**General Description (Bulk Analysis)**	soil-stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/6282	1	BH103	3.00	32	01/05/2019	**General Description (Bulk Analysis)**	soil.stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD

Client Name: Ground Investigations Ireland
Reference: 19/02/8507
Location: Hickeys 43 Pargate place
Contact: Stephen McLoughlan

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/6282	1	BH103	3.00	32	01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD
19/6282	1	BH103	4.00	35	01/05/2019	**General Description (Bulk Analysis)**	soil.stones
					01/05/2019	**Asbestos Fibres**	NAD
					01/05/2019	**Asbestos ACM**	NAD
					01/05/2019	**Asbestos Type**	NAD
					01/05/2019	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland **Matrix : Solid**
Reference: 8507-02-19
Location: Hickeys 43 Pargate place
Contact: Stephen McLoughlan

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
19/6282	1	BH102	1.00	5-7	EPH, PAH, PCB	Sample holding time exceeded
19/6282	1	BH102	2.00	8-10	EPH, PAH, PCB	Sample holding time exceeded
19/6282	1	BH102	3.00	11-13	EPH, PAH, PCB	Sample holding time exceeded
19/6282	1	BH102	5.00	17-19	EPH, PAH, PCB	Sample holding time exceeded
19/6282	1	BH103	0.50	22-24	EPH, PAH, PCB	Sample holding time exceeded
19/6282	1	BH103	2.00	28-30	EPH, PAH, PCB	Sample holding time exceeded
19/6282	1	BH103	3.00	31-33	EPH, PAH, PCB	Sample holding time exceeded
19/6282	1	BH103	4.00	34-36	EPH, PAH, PCB	Sample holding time exceeded

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 19/6282

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

Appendix - Methods used for WAC (2003/33/EC)

JE Job No.: 19/6282

Leachate tests	
10l/kg; 4mm	I.S. EN 12457-2:2002 Specified particle size; water added to L/S ratio; capped; agitated for 24 ± 0.5 hours; eluate settled and filtered over 0.45 µm membrane filter.
Eluate analysis	
As	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ba	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cd	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cr total	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cu	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Hg	I.S. EN 13370 rec. EN 1483 (CVAAS)
Mo	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ni	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Pb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Sb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Se	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Zn	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Chloride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Fluoride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Sulphate	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Phenol index	I.S. EN 13370 rec. ISO 6439 (4-Aminoantipyrine spectrometic methods after distillation)* (BY HPLC - Jones Env)
DOC	I.S. EN 1484
TDS	I.S. EN 15216
Compositional analysis	
TOC	I.S. EN 13137 Method B: carbonates removed with acid; TOC by combustion.
BTEX	GC-FID
PCB7**	I.S. EN 15308 analysis by GC-ECD.
Mineral oil	I.S. EN 14039 C10 to C40 analysis by GC-FID.
PAH17***	I.S. EN 15527 PAH17 analysis by GC-MS
Metals	I.S. EN 13657 - Aqua regia digestion: EN ISO 11885 (ICP-OES)
Other	
Dry matter	I.S. EN 14346 sample is dried to a constant mass in an oven at 105 ± 3 °C; Method B Water content by direct Karl-Fischer-titration and either volumetric or coulometric detection.
LOI	I.S. EN 15169 Difference in mass after heating in a furnace up to 550 ± 25 °C.
ANC	CEN/TS 15364 Determined by amouns of acid or base needed to cover the pH range

Notes:

*If not suitable due to LOD, precision, etc., any other suitable method can be used, e.g. AFS, ICP-MS
**PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180

***Naphthalene, Acenaphthylene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Chrysene, Coronene, Dibenzo(a,h)anthracene, Fluorene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene.

JE Job No: 19/6282

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

JE Job No: 19/6282

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes		AR	Yes

JE Job No: 19/6282

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower Grosvenor Place, London, SW1W 0EN. Reg No. 11371415

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

4225

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	Stephen Kealy
Date :	9th May, 2019
Your reference :	8507-02-19
Our reference :	Test Report 19/6335 Batch 1
Location :	Hickeys 43 Parkgate Place
Date samples received :	17th April, 2019
Status :	Final report
Issue :	1

Five samples were received for analysis on 17th April, 2019 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Where Waste Acceptance Criteria Suite (EC Decision of 19 December 2002 (2003/33/EC)) has been requested, all analyses have been performed using the relevant EN methods where they exist.

Compiled By:

Phil Sommerton BSc
Project Manager

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/6335

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6										
Sample ID	BH-104	BH-104										
Depth	3.00	4.00										
COC No / misc												
Containers	V J T	V J T										
Sample Date	15/04/2019	15/04/2019										
Sample Type	Soil	Soil										
Batch Number	1	1								LOD/LOR	Units	Method No.
Date of Receipt	17/04/2019	17/04/2019										
Antimony	2	3								<1	mg/kg	TM30/PM15
Arsenic #	16.1	19.4								<0.5	mg/kg	TM30/PM15
Barium #	87	402								<1	mg/kg	TM30/PM15
Cadmium #	0.8	1.1								<0.1	mg/kg	TM30/PM15
Chromium #	30.5	36.6								<0.5	mg/kg	TM30/PM15
Copper #	80	111								<1	mg/kg	TM30/PM15
Lead #	200	232								<5	mg/kg	TM30/PM15
Mercury #	1.1	0.6								<0.1	mg/kg	TM30/PM15
Molybdenum #	2.4	4.8								<0.1	mg/kg	TM30/PM15
Nickel #	36.1	59.8								<0.7	mg/kg	TM30/PM15
Selenium #	<1	2								<1	mg/kg	TM30/PM15
Zinc #	108	168								<5	mg/kg	TM30/PM15
PAH MS												
Naphthalene #	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	0.13								<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05								<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04								<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.46	0.31								<0.03	mg/kg	TM4/PM8
Anthracene #	0.05	0.16								<0.04	mg/kg	TM4/PM8
Fluoranthene #	0.52	1.05								<0.03	mg/kg	TM4/PM8
Pyrene #	0.45	1.09								<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	0.24	0.79								<0.06	mg/kg	TM4/PM8
Chrysene #	0.30	0.69								<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	0.46	1.59								<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	0.23	0.71								<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.15	0.56								<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.06	0.20								<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.17	0.64								<0.04	mg/kg	TM4/PM8
Coronene	<0.04	0.12								<0.04	mg/kg	TM4/PM8
PAH 17 Total	3.09	8.04								<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	0.33	1.14								<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.13	0.45								<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	97	91								<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30								<30	mg/kg	TM5/PM8/PM16

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Exova Jones Environmental

Client Name:	Ground Investigations Ireland	**Report :**	**Solid**
Reference:	8507-02-19		
Location:	Hickeys 43 Parkgate Place	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Stephen Kealy		
JE Job No.:	19/6335		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6			
Sample ID	BH-104	BH-104			
Depth	3.00	4.00			
COC No / misc					
Containers	V J T	V J T			
Sample Date	15/04/2019	15/04/2019			
Sample Type	Soil	Soil			
Batch Number	1	1			
Date of Receipt	17/04/2019	17/04/2019	LOD/LOR	Units	Method No.
TPH CWG					
Aliphatics					
>C5-C6[#]	<0.1[SV]	<0.1[SV]	<0.1	mg/kg	TM36/PM12
>C6-C8[#]	<0.1[SV]	<0.1[SV]	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1[SV]	<0.1[SV]	<0.1	mg/kg	TM36/PM12
>C10-C12[#]	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16[#]	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21[#]	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35[#]	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	<19	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics					
>C5-EC7[#]	<0.1[SV]	<0.1[SV]	<0.1	mg/kg	TM36/PM12
>EC7-EC8[#]	<0.1[SV]	<0.1[SV]	<0.1	mg/kg	TM36/PM12
>EC8-EC10[#]	<0.1[SV]	<0.1[SV]	<0.1	mg/kg	TM36/PM12
>EC10-EC12[#]	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16[#]	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21[#]	15	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35[#]	<7	56	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35[#]	<19	56	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	<38	56	<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE[#]	<5[SV]	<5[SV]	<5	ug/kg	TM31/PM12
Benzene[#]	<5[SV]	<5[SV]	<5	ug/kg	TM31/PM12
Toluene[#]	<5[SV]	<5[SV]	<5	ug/kg	TM31/PM12
Ethylbenzene[#]	<5[SV]	<5[SV]	<5	ug/kg	TM31/PM12
m/p-Xylene[#]	<5[SV]	<5[SV]	<5	ug/kg	TM31/PM12
o-Xylene[#]	<5[SV]	<5[SV]	<5	ug/kg	TM31/PM12
PCB 28[#]	<5	<5	<5	ug/kg	TM17/PM8
PCB 52[#]	<5	<5	<5	ug/kg	TM17/PM8
PCB 101[#]	<5	<5	<5	ug/kg	TM17/PM8
PCB 118[#]	<5	<5	<5	ug/kg	TM17/PM8
PCB 138[#]	<5	<5	<5	ug/kg	TM17/PM8
PCB 153[#]	<5	<5	<5	ug/kg	TM17/PM8
PCB 180[#]	<5	<5	<5	ug/kg	TM17/PM8
Total 7 PCBs[#]	<35	<35	<35	ug/kg	TM17/PM8
Natural Moisture Content	16.1	31.1	<0.1	%	PM4/PM0
% Dry Matter 105°C	82.9	65.5	<0.1	%	NONE/PM4
Hexavalent Chromium[#]	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Chromium III	30.5	36.6	<0.5	mg/kg	NONE/NONE
Total Organic Carbon[#]	3.68	4.14	<0.02	%	TM21/PM24

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name:	Ground Investigations Ireland	**Report :**	**Solid**
Reference:	8507-02-19		
Location:	Hickeys 43 Parkgate Place	**Solids:** V=60g VOC jar, J=250g glass jar, T=plastic tub	
Contact:	Stephen Kealy		
JE Job No.:	19/6335		

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6									LOD/LOR	Units	Method No.
Sample ID	BH-104	BH-104											
Depth	3.00	4.00											
COC No / misc													
Containers	V J T	V J T											
Sample Date	15/04/2019	15/04/2019											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	17/04/2019	17/04/2019											
Loss on Ignition #	5.6	5.8									<1.0	%	TM22/PM0
pH #	8.83	8.85									<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1087	0.1369										kg	NONE/PM17
Mass of dried test portion	0.09	0.09										kg	NONE/PM17

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/6335

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6											
Sample ID	BH-104	BH-104											
Depth	3.00	4.00											
COC No / misc													
Containers	V J T	V J T											
Sample Date	15/04/2019	15/04/2019											
Sample Type	Soil	Soil											
Batch Number	1	1											
Date of Receipt	17/04/2019	17/04/2019									LOD/LOR	Units	Method No.
Dissolved Antimony (A10) #	0.03	<0.02									<0.02	mg/kg	TM30/PM17
Dissolved Arsenic (A10) #	0.096	0.050									<0.025	mg/kg	TM30/PM17
Dissolved Barium (A10) #	<0.03	<0.03									<0.03	mg/kg	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005									<0.005	mg/kg	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015									<0.015	mg/kg	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07									<0.07	mg/kg	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05									<0.05	mg/kg	TM30/PM17
Dissolved Mercury (A10) #	<0.01	<0.01									<0.01	mg/kg	TM30/PM17
Dissolved Molybdenum (A10) #	0.07	0.08									<0.02	mg/kg	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02									<0.02	mg/kg	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03									<0.03	mg/kg	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03									<0.03	mg/kg	TM30/PM17
Total Phenols HPLC	<0.05	<0.05									<0.05	mg/l	TM26/PM0
Fluoride	<3	3									<3	mg/kg	TM173/PM0
Sulphate as SO4 #	428	95									<5	mg/kg	TM38/PM0
Chloride #	8	40									<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	2	2									<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	20									<20	mg/kg	TM60/PM0
Total Dissolved Solids #	1279	800									<350	mg/kg	TM20/PM0

Exova Jones Environmental

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/6335

Report : **EN12457_2**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6							
Sample ID	BH-104	BH-104							
Depth	3.00	4.00							
COC No / misc									
Containers	V J T	V J T							
Sample Date	15/04/2019	15/04/2019							
Sample Type	Soil	Soil							
Batch Number	1	1							
Date of Receipt	17/04/2019	17/04/2019							

	1-3	4-6	Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Solid Waste Analysis								
Total Organic Carbon[#]	3.68	4.14	3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025[SV]	<0.025[SV]	6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs[#]	<0.035	<0.035	1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	3.09	8.04	100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate								
Mass of raw test portion	0.1087	0.1369	-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	82.9	65.5	-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.881	0.853	-	-	-		l	NONE/PM17
Eluate Volume	0.8	0.79	-	-	-		l	NONE/PM17

Client Name: Ground Investigations Ireland
Reference: 19/02/8507
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/6335	1	BH-104	3.00	2	30/04/2019	**General Description (Bulk Analysis)**	soil/stones
					30/04/2019	**Asbestos Fibres**	NAD
					30/04/2019	**Asbestos ACM**	NAD
					30/04/2019	**Asbestos Type**	NAD
					30/04/2019	**Asbestos Level Screen**	NAD
19/6335	1	BH-104	4.00	5	30/04/2019	**General Description (Bulk Analysis)**	soil/stones
					30/04/2019	**Asbestos Fibres**	NAD
					30/04/2019	**Asbestos ACM**	NAD
					30/04/2019	**Asbestos Type**	NAD
					30/04/2019	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland **Matrix : Solid**
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
19/6335	1	BH-104	3.00	1-3	EPH, PAH, PCB	Sample holding time exceeded
19/6335	1	BH-104	4.00	4-6	EPH, PAH, PCB	Sample holding time exceeded

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 19/6335

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

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Appendix - Methods used for WAC (2003/33/EC)

JE Job No.: 19/6335

Leachate tests	
10l/kg; 4mm	I.S. EN 12457-2:2002 Specified particle size; water added to L/S ratio; capped; agitated for 24 ± 0.5 hours; eluate settled and filtered over 0.45 µm membrane filter.
Eluate analysis	
As	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ba	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cd	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cr total	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cu	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Hg	I.S. EN 13370 rec. EN 1483 (CVAAS)
Mo	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ni	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Pb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Sb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Se	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Zn	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Chloride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Fluoride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Sulphate	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Phenol index	I.S. EN 13370 rec. ISO 6439 (4-Aminoantipyrine spectrometic methods after distillation)* (BY HPLC - Jones Env)
DOC	I.S. EN 1484
TDS	I.S. EN 15216
Compositional analysis	
TOC	I.S. EN 13137 Method B: carbonates removed with acid; TOC by combustion.
BTEX	GC-FID
PCB7**	I.S. EN 15308 analysis by GC-ECD.
Mineral oil	I.S. EN 14039 C10 to C40 analysis by GC-FID.
PAH17***	I.S. EN 15527 PAH17 analysis by GC-MS
Metals	I.S. EN 13657 - Aqua regia digestion: EN ISO 11885 (ICP-OES)
Other	
Dry matter	I.S. EN 14346 sample is dried to a constant mass in an oven at 105 ± 3 °C; Method B Water content by direct Karl-Fischer-titration and either volumetric or coulometric detection.
LOI	I.S. EN 15169 Difference in mass after heating in a furnace up to 550 ± 25 °C.
ANC	CEN/TS 15364 Determined by amouns of acid or base needed to cover the pH range

Notes:

*If not suitable due to LOD, precision, etc., any other suitable method can be used, e.g. AFS, ICP-MS
**PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180

***Naphthalene, Acenaphthylene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Chrysene, Coronene, Dibenzo(a,h)anthracene, Fluorene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene.

JE Job No: 19/6335

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

JE Job No: 19/6335

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes		AR	Yes

JE Job No: 19/6335

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower Grosvenor Place, London, SW1W 0EN. Reg No. 11371415

Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

4225

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	Stephen Kealy
Date :	20th May, 2019
Your reference :	8507-02-19
Our reference :	Test Report 19/7526 Batch 1
Location :	Hickeys, 43 Parkgate Place
Date samples received :	9th May, 2019
Status :	Final report
Issue :	1

Five samples were received for analysis on 9th May, 2019 of which five were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Compiled By:

Bruce Leslie
Project Co-ordinator

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys, 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/7526

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H_2SO_4, Z=ZnAc, N=NaOH, HN=$HN0_3$

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-7	8-14	15-21	22-28	29-35								
Sample ID	BH101	BH104	BH103	BH107	BH106								
Depth	3.59	4.21	3.83	3.43	3.26								
COC No / misc													
Containers	V H HN P BOD G	V H HN P BOD G	V H HN P BOD G	V H HN P BOD G	V H HN P BOD G								
Sample Date	08/05/2019 13:30	08/05/2019 14:30	08/05/2019 15:00	08/05/2019 15:30	08/05/2019 16:00								
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water								
Batch Number	1	1	1	1	1						LOD/LOR	Units	Method No.
Date of Receipt	09/05/2019	09/05/2019	09/05/2019	09/05/2019	09/05/2019								
Dissolved Aluminium #	2.6	40.8	6.6	4.4	<1.5						<1.5	ug/l	TM30/PM14
Dissolved Antimony #	<2	<2	5	<2	<2						<2	ug/l	TM30/PM14
Dissolved Arsenic #	<0.9	<0.9	10.6	<0.9	<0.9						<0.9	ug/l	TM30/PM14
Dissolved Barium #	155.1	11.4	66.6	42.5	17.5						<1.8	ug/l	TM30/PM14
Dissolved Beryllium	<0.5	<0.5	<0.5	<0.5	<0.5						<0.5	ug/l	TM30/PM14
Dissolved Boron	512	25	99	263	202						<12	ug/l	TM30/PM14
Dissolved Cadmium #	<0.03	<0.03	<0.03	<0.03	<0.03						<0.03	ug/l	TM30/PM14
Dissolved Calcium #	156.7	29.9	107.7	96.2	79.2						<0.2	mg/l	TM30/PM14
Total Dissolved Chromium #	<0.2	<0.2	0.4	<0.2	1.4						<0.2	ug/l	TM30/PM14
Dissolved Cobalt #	<0.1	<0.1	1.3	0.2	1.3						<0.1	ug/l	TM30/PM14
Dissolved Copper #	<3	<3	<3	<3	<3						<3	ug/l	TM30/PM14
Total Dissolved Iron #	1840.0	17.1	1335.0	160.6	<4.7						<4.7	ug/l	TM30/PM14
Dissolved Lead #	<0.4	<0.4	<0.4	<0.4	<0.4						<0.4	ug/l	TM30/PM14
Dissolved Magnesium #	188.2$_{AA}$	4.3	14.1	26.1	28.9						<0.1	mg/l	TM30/PM14
Dissolved Manganese #	1637.0	24.5	617.3	322.5	635.7						<1.5	ug/l	TM30/PM14
Dissolved Molybdenum #	2.7	2.5	11.9	10.4	15.3						<0.2	ug/l	TM30/PM14
Dissolved Nickel #	0.8	1.3	5.6	5.3	9.6						<0.2	ug/l	TM30/PM14
Dissolved Potassium #	54.3	2.6	14.1	16.9	17.7						<0.1	mg/l	TM30/PM14
Dissolved Selenium #	<1.2	<1.2	<1.2	<1.2	<1.2						<1.2	ug/l	TM30/PM14
Dissolved Silver	<5	<5	<5	<5	<5						<5	ug/l	TM30/PM14
Dissolved Sodium #	1518.0$_{AB}$	17.2	24.6	53.2	110.6						<0.1	mg/l	TM30/PM14
Dissolved Strontium	1375	110	451	683	514						<5	ug/l	TM30/PM14
Dissolved Uranium	<5	<5	<5	<5	<5						<5	ug/l	TM30/PM14
Dissolved Zinc #	3.1	12.4	5.6	7.4	2.8						<1.5	ug/l	TM30/PM14
Mercury Dissolved by CVAF #	<0.01	<0.01	<0.01	<0.01	<0.01						<0.01	ug/l	TM61/PM0
GRO (>C4-C8) #	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
GRO (>C8-C12) #	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
GRO (>C4-C12) #	<10	<10	<10	<10	<10						<10	ug/l	TM36/PM12
MTBE #	<5	<5	<5	<5	<5						<5	ug/l	TM31/PM12
Benzene #	<5	<5	<5	<5	<5						<5	ug/l	TM31/PM12
Toluene #	<5	<5	<5	<5	<5						<5	ug/l	TM31/PM12
Ethylbenzene #	<5	<5	<5	<5	<5						<5	ug/l	TM31/PM12
m/p-Xylene #	<5	<5	<5	<5	<5						<5	ug/l	TM31/PM12
o-Xylene #	<5	<5	<5	<5	<5						<5	ug/l	TM31/PM12
EPH (C8-C40) #	<10	<10	<10	<10	<10						<10	ug/l	TM5/PM30
C8-C40 Mineral Oil (Calculation)	<10	<10	<10	<10	<10						<10	ug/l	TM5/PM30
Fluoride	0.4	0.6	<0.3	<0.3	0.4						<0.3	mg/l	TM173/PM0
Sulphate as SO4 #	363.5	44.0	21.5	133.4	97.5						<0.5	mg/l	TM38/PM0
Chloride #	2668.9	31.7	31.7	43.6	159.7						<0.3	mg/l	TM38/PM0
Nitrate as NO3 #	16.5	2.2	0.4	0.4	1.6						<0.2	mg/l	TM38/PM0

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys, 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/7526

Report : Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
$H=H_2SO_4$, Z=ZnAc, N=NaOH, $HN=HN0_3$

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-7	8-14	15-21	22-28	29-35								
Sample ID	BH101	BH104	BH103	BH107	BH106								
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COC No / misc													
Containers	V H HN P BOD G	V H HN P BOD G	V H HN P BOD G	V H HN P BOD G	V H HN P BOD G								
Sample Date	08/05/2019 13:30	08/05/2019 14:30	08/05/2019 15:00	08/05/2019 15:30	08/05/2019 16:00								
Sample Type	Ground Water	Ground Water	Ground Water	Ground Water	Ground Water								
Batch Number	1	1	1	1	1						LOD/LOR	Units	Method No.
Date of Receipt	09/05/2019	09/05/2019	09/05/2019	09/05/2019	09/05/2019								
Nitrite as NO2 #	<0.02	<0.02	<0.02	<0.02	<0.02						<0.02	mg/l	TM38/PM0
Ortho Phosphate as PO4 #	<0.06	<0.06	<0.06	<0.06	<0.06						<0.06	mg/l	TM38/PM0
MRP Ortho Phosphate as PO4	<0.06	<0.06	<0.06	<0.06	<0.06						<0.06	mg/l	TM38/PM0
Ammoniacal Nitrogen as N #	0.24	0.03	6.88	0.29	0.58						<0.03	mg/l	TM38/PM0
Hexavalent Chromium	<0.006	<0.006	<0.006	<0.006	<0.006						<0.006	mg/l	TM38/PM0
Total Alkalinity as CaCO3 #	368	101	674	362	1114						<1	mg/l	TM75/PM0
Carbonate Alkalinity as CaCO3	<1	<1	<1	<1	<1						<1	mg/l	TM75/PM0
Bicarbonate Alkalinity as CaCO3 (water soluble)	368	101	674	362	1114						<1	mg/l	TM75/PM0
BOD (Settled) #	<1	<1	11	1	<1						<1	mg/l	TM58/PM0
COD (Settled) #	53	9	28	11	22						<7	mg/l	TM57/PM0
Electrical Conductivity @25C #	8635	330	735	898	1210						<2	uS/cm	TM76/PM0
pH #	7.88	7.01	7.62	7.76	7.84						<0.01	pH units	TM73/PM0
Total Organic Carbon #	<2	<2	6	<2	<2						<2	mg/l	TM60/PM0
Total Dissolved Solids #	5008	213	448	584	678						<35	mg/l	TM20/PM0
Total Suspended Solids #	87	32	1524	231	3048						<10	mg/l	TM37/PM0
Turbidity	59.1	13.0	1705.0 AA	241.0	821.0						<0.1	NTU	TM34/PM0
Total Cations	90.72	2.66	7.97	9.69	11.59						<0.00	mmolc/l	TM30/PM14
Total Anions	90.48	3.86	14.82	11.25	28.83						<0.00	mmolc/l	TM0/PM0
% Cation Excess	0.13	-18.40	-30.06	-7.45	-42.65							%	TM0/PM0

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys, 43 Parkgate Place
Contact: Stephen Kealy

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
No deviating sample report results for job 19/7526						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 19/7526

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution
AB	x10 Dilution

JE Job No: 19/7526

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM0	Not available	PM0	No preparation is required.				
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.				
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM30	Water samples are extracted with solvent using a magnetic stirrer to create a vortex.	Yes			
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes			
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.				
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM14	Analysis of waters and leachates for metals by ICP OES/ICP MS. Samples are filtered for dissolved metals and acidified if required.	Yes			
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM34	Turbidity by 2100P Turbidity Meter	PM0	No preparation is required.				
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes			
TM37	Modified methods USEPA 160.2, EN872:2005 and SMWW 2540D. Gravimetric determination of Total Suspended Solids. Sample is filtered through a 1.5um pore size glass fibre filter and the resulting residue is dried and weighed.	PM0	No preparation is required.	Yes			

JE Job No: 19/7526

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.				
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes			
TM57	Modified US EPA Method 410.4. Comparable with ISO 15705:2002. Chemical Oxygen Demand is determined by hot digestion with Potassium Dichromate and measured spectrophotometerically.	PM0	No preparation is required.	Yes			
TM58	APHA Standard Methods for the extraction of water and waste water (SMEWW) 5210B. Comparible with ISO 5815:1989. Measurement of Biochemical Oxygen Demand. When cBOD (Carbonaceous BOD) is requested a nitrification inhibitor is added which prevents the oxidation of reduced forms of nitrogen, such as ammonia, nitrite and organic nitrogen which exert a nitrogenous demand. Determination of Dissolved Oxygen using the Hach HQ30D Oxygen Meter.	PM0	No preparation is required.	Yes			
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.	Yes			
TM61	Modified US EPA methods 245.7 and 200.7. Determination of Mercury by Cold Vapour Atomic Fluorescence.	PM0	No preparation is required.	Yes			
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.				
TM75	Modified US EPA method 310.1. Determination of Alkalinity by Metrohm automated titration analyser.	PM0	No preparation is required.	Yes			
TM76	Modified US EPA method 120.1. Determination of Specific Conductance by Metrohm automated probe analyser.	PM0	No preparation is required.	Yes			

Exova Jones Environmental

Registered Office: Exova Environmental UK Limited, 10 Lower Grosvenor Place, London, SW1W 0EN. Reg No. 11371415

Unit 3 Deeside Point
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CH5 2UA

Tel: +44 (0) 1244 833780
Fax: +44 (0) 1244 833781

4225

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	Stephen Kealy
Date :	6th June, 2019
Your reference :	8507-02-19
Our reference :	Test Report 19/7173 Batch 1
Location :	Hickeys 43 Parkgate Place
Date samples received :	2nd May, 2019
Status :	Final report
Issue :	1

Four samples were received for analysis on 2nd May, 2019 of which four were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Where Waste Acceptance Criteria Suite (EC Decision of 19 December 2002 (2003/33/EC)) has been requested, all analyses have been performed using the relevant EN methods where they exist.

Compiled By:

Lucas Halliwell
Project Co-ordinator

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/7173

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	10-12							LOD/LOR	Units	Method No.
Sample ID	WS107	WS107	WS107	WS107									
Depth	0.50	1.70	2.50	3.50									
COC No / misc													
Containers	V J T	V J T	V J T	V J T									
Sample Date	30/04/2019	30/04/2019	30/04/2019	30/04/2019									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	02/05/2019	02/05/2019	02/05/2019	02/05/2019									
Antimony	7	2	2	<1							<1	mg/kg	TM30/PM15
Arsenic #	12.8	17.7	10.7	5.6							<0.5	mg/kg	TM30/PM15
Barium #	97	97	71	40							<1	mg/kg	TM30/PM15
Cadmium #	1.1	1.7	1.5	0.6							<0.1	mg/kg	TM30/PM15
Chromium #	45.0	61.8	39.6	57.1							<0.5	mg/kg	TM30/PM15
Copper #	39	28	26	12							<1	mg/kg	TM30/PM15
Lead #	191	37	39	10							<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1							<0.1	mg/kg	TM30/PM15
Molybdenum #	4.1	4.5	3.5	4.3							<0.1	mg/kg	TM30/PM15
Nickel #	24.9	37.3	29.2	17.4							<0.7	mg/kg	TM30/PM15
Selenium #	1	1	2	<1							<1	mg/kg	TM30/PM15
Zinc #	136	121	93	41							<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	0.14	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03							<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05							<0.05	mg/kg	TM4/PM8
Fluorene #	0.05	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Phenanthrene #	0.87	<0.03	<0.03	<0.03							<0.03	mg/kg	TM4/PM8
Anthracene #	0.19	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Fluoranthene #	1.32	<0.03	<0.03	<0.03							<0.03	mg/kg	TM4/PM8
Pyrene #	1.12	<0.03	<0.03	<0.03							<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	1.13	<0.06	<0.06	<0.06							<0.06	mg/kg	TM4/PM8
Chrysene #	0.96	<0.02	<0.02	<0.02							<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	1.98	<0.07	<0.07	<0.07							<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	1.06	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	0.83	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	0.32	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	0.83	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
Coronene	0.15	<0.04	<0.04	<0.04							<0.04	mg/kg	TM4/PM8
PAH 17 Total	10.95	<0.64	<0.64	<0.64							<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	1.43	<0.05	<0.05	<0.05							<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	0.55	<0.02	<0.02	<0.02							<0.02	mg/kg	TM4/PM8
PAH Surrogate % Recovery	91	80	82	84							<0	%	TM4/PM8
Mineral Oil (C10-C40)	<30	<30	<30	<30							<30	mg/kg	TM5/PM8/PM16

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/7173

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	10-12	LOD/LOR	Units	Method No.
Sample ID	WS107	WS107	WS107	WS107			
Depth	0.50	1.70	2.50	3.50			
COC No / misc							
Containers	V J T	V J T	V J T	V J T			
Sample Date	30/04/2019	30/04/2019	30/04/2019	30/04/2019			
Sample Type	Soil	Soil	Soil	Soil			
Batch Number	1	1	1	1			
Date of Receipt	02/05/2019	02/05/2019	02/05/2019	02/05/2019			
TPH CWG							
Aliphatics							
>C5-C6 #	<0.1	<0.1	$<0.1^{SV}$	<0.1	<0.1	mg/kg	TM36/PM12
>C6-C8 #	<0.1	<0.1	$<0.1^{SV}$	<0.1	<0.1	mg/kg	TM36/PM12
>C8-C10	<0.1	<0.1	$<0.1^{SV}$	<0.1	<0.1	mg/kg	TM36/PM12
>C10-C12 #	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 #	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>C16-C21 #	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>C21-C35 #	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-35	<19	<19	<19	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Aromatics							
>C5-EC7 #	<0.1	<0.1	$<0.1^{SV}$	<0.1	<0.1	mg/kg	TM36/PM12
>EC7-EC8 #	<0.1	<0.1	$<0.1^{SV}$	<0.1	<0.1	mg/kg	TM36/PM12
>EC8-EC10 #	<0.1	<0.1	$<0.1^{SV}$	<0.1	<0.1	mg/kg	TM36/PM12
>EC10-EC12 #	<0.2	<0.2	<0.2	<0.2	<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 #	<4	<4	<4	<4	<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 #	<7	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 #	24	<7	<7	<7	<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-35 #	24	<19	<19	<19	<19	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-35)	<38	<38	<38	<38	<38	mg/kg	TM5/TM36/PM8/PM12/PM16
MTBE #	<5	<5	$<5^{SV}$	<5	<5	ug/kg	TM31/PM12
Benzene #	<5	<5	$<5^{SV}$	<5	<5	ug/kg	TM31/PM12
Toluene #	<5	<5	$<5^{SV}$	<5	<5	ug/kg	TM31/PM12
Ethylbenzene #	<5	<5	$<5^{SV}$	<5	<5	ug/kg	TM31/PM12
m/p-Xylene #	<5	<5	$<5^{SV}$	<5	<5	ug/kg	TM31/PM12
o-Xylene #	<5	<5	$<5^{SV}$	<5	<5	ug/kg	TM31/PM12
PCB 28 #	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35	ug/kg	TM17/PM8
Natural Moisture Content	14.0	28.9	28.4	13.1	<0.1	%	PM4/PM0
% Dry Matter 105°C	76.0	72.5	72.6	83.9	<0.1	%	NONE/PM4
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	mg/kg	TM38/PM20
Chromium III	45.0	61.8	39.6	57.1	<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	3.68	1.03	1.31	0.26	<0.02	%	TM21/PM24

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/7173

Report : **Solid**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	10-12									
Sample ID	WS107	WS107	WS107	WS107									
Depth	0.50	1.70	2.50	3.50									
COC No / misc													
Containers	V J T	V J T	V J T	V J T									
Sample Date	30/04/2019	30/04/2019	30/04/2019	30/04/2019									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	02/05/2019	02/05/2019	02/05/2019	02/05/2019							LOD/LOR	Units	Method No.
Loss on Ignition #	3.9	3.8	4.0	1.1							<1.0	%	TM22/PM0
pH #	9.16	8.35	8.09	8.72							<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1187	0.1237	0.1244	0.107								kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09								kg	NONE/PM17

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/7173

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	10-12							LOD/LOR	Units	Method No.
Sample ID	WS107	WS107	WS107	WS107									
Depth	0.50	1.70	2.50	3.50									
COC No / misc													
Containers	V J T	V J T	V J T	V J T									
Sample Date	30/04/2019	30/04/2019	30/04/2019	30/04/2019									
Sample Type	Soil	Soil	Soil	Soil									
Batch Number	1	1	1	1									
Date of Receipt	02/05/2019	02/05/2019	02/05/2019	02/05/2019									
Dissolved Antimony (A10) #	0.11	0.03	0.05	0.03							<0.02	mg/kg	TM30/PM17
Dissolved Arsenic (A10) #	0.194	<0.025	<0.025	<0.025							<0.025	mg/kg	TM30/PM17
Dissolved Barium (A10) #	0.11	0.06	0.21	0.04							<0.03	mg/kg	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005							<0.005	mg/kg	TM30/PM17
Dissolved Chromium (A10) #	0.054	<0.015	<0.015	<0.015							<0.015	mg/kg	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07							<0.07	mg/kg	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05							<0.05	mg/kg	TM30/PM17
Dissolved Mercury (A10) #	<0.01	<0.01	<0.01	<0.01							<0.01	mg/kg	TM30/PM17
Dissolved Molybdenum (A10) #	0.03	0.08	0.71	0.34							<0.02	mg/kg	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	0.05	<0.02							<0.02	mg/kg	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03							<0.03	mg/kg	TM30/PM17
Dissolved Zinc (A10) #	0.03	0.04	0.04	0.07							<0.03	mg/kg	TM30/PM17
Total Phenols HPLC	<0.05	<0.05	<0.05	<0.05							<0.05	mg/l	TM26/PM0
Fluoride	<3	3	<3	<3							<3	mg/kg	TM173/PM0
Sulphate as SO4 #	89	7	250	11							<5	mg/kg	TM38/PM0
Chloride #	<3	<3	<3	<3							<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	2	4	8	2							<2	mg/l	TM60/PM0
Dissolved Organic Carbon	20	40	80	20							<20	mg/kg	TM60/PM0
Total Dissolved Solids #	770	860	1610	830							<350	mg/kg	TM20/PM0

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All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 8507-02-19
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy
JE Job No.: 19/7173

Report : **EN12457_2**

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

J E Sample No.	1-3	4-6	7-9	10-12	Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Sample ID	WS107	WS107	WS107	WS107						
Depth	0.50	1.70	2.50	3.50						
COC No / misc										
Containers	V J T	V J T	V J T	V J T						
Sample Date	30/04/2019	30/04/2019	30/04/2019	30/04/2019						
Sample Type	Soil	Soil	Soil	Soil						
Batch Number	1	1	1	1						
Date of Receipt	02/05/2019	02/05/2019	02/05/2019	02/05/2019						
Solid Waste Analysis										
Total Organic Carbon #	3.68	1.03	1.31	0.26	3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025 SV	<0.025	6	-	-	<0.025	mg/kg	TM31/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035	1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	<30	500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 17	10.95	<0.64	<0.64	<0.64	100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate										
Mass of raw test portion	0.1187	0.1237	0.1244	0.107	-	-	-		kg	NONE/PM17
Dry Matter Content Ratio	76.0	72.5	72.6	83.9	-	-	-	<0.1	%	NONE/PM4
Leachant Volume	0.872	0.866	0.866	0.883	-	-	-		l	NONE/PM17
Eluate Volume	0.8	0.7	0.7	0.81	-	-	-		l	NONE/PM17

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 19/02/8507
Location: Hickeys 43 Parkgate Place
Contact: Stephen Kealy

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Jones Environmental Laboratory consultant, Jones Environmental Laboratory cannot be responsible for inaccurate or unrepresentative sampling.

Signed on behalf of Jones Environmental Laboratory:

Ryan Butterworth
Asbestos Team Leader

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Date Of Analysis	Analysis	Result
19/7173	1	WS107	0.50	2	29/05/2019	**General Description (Bulk Analysis)**	Soil/Stones
					29/05/2019	**Asbestos Fibres**	NAD
					29/05/2019	**Asbestos ACM**	NAD
					29/05/2019	**Asbestos Type**	NAD
					29/05/2019	**Asbestos Level Screen**	NAD
19/7173	1	WS107	1.70	5	29/05/2019	**General Description (Bulk Analysis)**	Soil/Stones
					29/05/2019	**Asbestos Fibres**	NAD
					29/05/2019	**Asbestos ACM**	NAD
					29/05/2019	**Asbestos Type**	NAD
					29/05/2019	**Asbestos Level Screen**	NAD
19/7173	1	WS107	2.50	8	29/05/2019	**General Description (Bulk Analysis)**	Soil/Stones
					29/05/2019	**Asbestos Fibres**	NAD
					29/05/2019	**Asbestos ACM**	NAD
					29/05/2019	**Asbestos Type**	NAD
					29/05/2019	**Asbestos Level Screen**	NAD
19/7173	1	WS107	3.50	11	29/05/2019	**General Description (Bulk Analysis)**	Soil/Stones
					29/05/2019	**Asbestos Fibres**	NAD
					29/05/2019	**Asbestos ACM**	NAD
					29/05/2019	**Asbestos Type**	NAD
					29/05/2019	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland **Matrix : Solid**

Reference: 8507-02-19

Location: Hickeys 43 Parkgate Place

Contact: Stephen Kealy

J E Job No.	Batch	Sample ID	Depth	J E Sample No.	Analysis	Reason
19/7173	1	WS107	0.50	1-3	EPH, GRO, LOI, PAH, PCB, TOC	Sample holding time exceeded
19/7173	1	WS107	1.70	4-6	EPH, GRO, LOI, PAH, PCB, TOC	Sample holding time exceeded
19/7173	1	WS107	2.50	7-9	EPH, GRO, LOI, PAH, PCB, TOC	Sample holding time exceeded
19/7173	1	WS107	3.50	10-12	EPH, GRO, LOI, PAH, PCB, TOC	Sample holding time exceeded

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 19/7173

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa.
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
++	Result outside calibration range, results should be considered as indicative only and are not accredited.
*	Analysis subcontracted to an Exova Jones Environmental approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

Appendix - Methods used for WAC (2003/33/EC)

JE Job No.: 19/7173

Leachate tests	
10l/kg; 4mm	I.S. EN 12457-2:2002 Specified particle size; water added to L/S ratio; capped; agitated for 24 ± 0.5 hours; eluate settled and filtered over 0.45 µm membrane filter.
Eluate analysis	
As	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ba	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cd	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cr total	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Cu	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Hg	I.S. EN 13370 rec. EN 1483 (CVAAS)
Mo	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Ni	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Pb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Sb	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Se	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Zn	I.S. EN 12506 : EN ISO 11885 (ICP-OES)
Chloride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Fluoride	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Sulphate	I.S. EN 12506 rec. EN ISO 10304-part 1 (liquid chromatography of ions)
Phenol index	I.S. EN 13370 rec. ISO 6439 (4-Aminoantipyrine spectrometic methods after distillation)* (BY HPLC - Jones Env)
DOC	I.S. EN 1484
TDS	I.S. EN 15216
Compositional analysis	
TOC	I.S. EN 13137 Method B: carbonates removed with acid; TOC by combustion.
BTEX	GC-FID
PCB7**	I.S. EN 15308 analysis by GC-ECD.
Mineral oil	I.S. EN 14039 C10 to C40 analysis by GC-FID.
PAH17***	I.S. EN 15527 PAH17 analysis by GC-MS
Metals	I.S. EN 13657 - Aqua regia digestion: EN ISO 11885 (ICP-OES)
Other	
Dry matter	I.S. EN 14346 sample is dried to a constant mass in an oven at 105 ± 3 °C; Method B Water content by direct Karl-Fischer-titration and either volumetric or coulometric detection.
LOI	I.S. EN 15169 Difference in mass after heating in a furnace up to 550 ± 25 °C.
ANC	CEN/TS 15364 Determined by amouns of acid or base needed to cover the pH range

Notes:

*If not suitable due to LOD, precision, etc., any other suitable method can be used, e.g. AFS, ICP-MS
**PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153 and PCB-180

***Naphthalene, Acenaphthylene, Acenaphthene, Anthracene, Benzo(a)anthracene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(g,h,i)perylene, Benzo(a)pyrene, Chrysene, Coronene, Dibenzo(a,h)anthracene, Fluorene, Fluoranthene, Indeno(1,2,3-c,d)pyrene, Phenanthrene and Pyrene.

JE Job No: 19/7173

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of 16 PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
TM17	Modified US EPA method 8270. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3: 1990/USEPA 160.3 Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

JE Job No: 19/7173

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM22	Modified BS1377-3:1990 Gravimetric determination of Loss on Ignition by temperature controlled Muffle Furnace (35C-440C). On request modified ASTM D2974-00 LOI (105C-440C)	PM0	No preparation is required.	Yes		AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM0	No preparation is required.	Yes		AR	Yes

JE Job No: 19/7173

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060, APHA Standard Methods for Examination of Water and Wastewater 5310B, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.				
NONE	No Method Code	PM17	Modified method BS EN12457-2 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.			AR	

JE Job No: 19/7526

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 340.2	PM0	No preparation is required.				

APPENDIX 7 – Groundwater and Gas Monitoring Monitoring

Ground Investigations Ireland
Gas Monitoring Field Sheet

(V1 May 2019)

Project Information			
Project Number	8507-02-19	**Sample Date**	03/05/2019
Client	ARUP	**Weather**	Dry
Site Name	Hickeys	**Weather Previous 24 hours**	Dry
Sampler I.D.	PC		
Well Data			
Casing Diameter (mm)	100mm	**Standpipe Type uPVC etc.**	PVC
Standpipe Diameter (mm)	50mm	**Total Well Depth (m)**	4.0
Stick Up (mm)	Flush	**Water Level (mBTOC)**	
Cover Condition	Good	**Odour**	Odourless
Gas Meter Model	Geotech GA 5000	**Gas Valve/Cap Condition**	In good repair

Gas Data

Sample I.D.	**Location Type**	**CH4 (%)**	**CO2 (%)**	**CO (ppm)**	**H2S (ppm)**	**O2 (%)**	**Barometric Pressure**	**Additional Comment**
WS110	Gas well	0.0	2.5	1	1	17.5%		
WS114	Gas well	0.1	3.0	1	1	18.2		
WS117	Gas well	1.4	4.3	1	1	12.7		

Additional Comments/Observations:

Ground Investigations Ireland
Gas Monitoring Field Sheet

(V1 May 2019)

Project Information			
Project Number	8507-02-19	**Sample Date**	30/05/2019
Client	ARUP	**Weather**	Dry
Site Name	Hickeys	**Weather Previous 24 hours**	Dry
Sampler I.D.	PC		
Well Data			
Casing Diameter (mm)	100mm	**Standpipe Type uPVC etc.**	PVC
Standpipe Diameter (mm)	50mm	**Total Well Depth (m)**	4.0
Stick Up (mm)	Flush	**Water Level (mBTOC)**	
Cover Condition	Good	**Odour**	Odourless
Gas Meter Model	Geotech GA 5000	**Gas Valve/Cap Condition**	In good repair

Gas Data

Sample I.D.	**Location Type**	**CH4 (%)**	**CO2 (%)**	**CO (ppm)**	**H2S (ppm)**	**O2 (%)**	**Barometric Pressure**	**Additional Comment**
WS110	Gas well	0.0	2.8	2	3	15.6%		
WS114	Gas well	-	-	-	-	-	-	Not Accessible
WS117	Gas well	0.1	3.9	2	3	13.0		

Additional Comments/Observations:

Ground Investigations Ireland
Gas Monitoring Field Sheet

(V1 May 2019)

Project Information			
Project Number	8507-02-19	**Sample Date**	13/06/2019
Client	ARUP	**Weather**	Dry
Site Name	Hickeys	**Weather Previous 24 hours**	Dry
Sampler I.D.	PC		
Well Data			
Casing Diameter (mm)	100mm	**Standpipe Type uPVC etc.**	PVC
Standpipe Diameter (mm)	50mm	**Total Well Depth (m)**	4.0
Stick Up (mm)	Flush	**Water Level (mBTOC)**	
Cover Condition	Good	**Odour**	Odourless
Gas Meter Model	Geotech GA 5000	**Gas Valve/Cap Condition**	In good repair

Gas Data

Sample I.D.	**Location Type**	**CH4 (%)**	**CO2 (%)**	**N2 (%)**	**H2S (ppm)**	**O2 (%)**	**Barometric Pressure**	**Flow (l/hr)**
WS110	Gas well	0.0	6.7	86	-	6.9	1008	0.2
WS114	Gas well	0.0	5	77	-	17.7	1008	0.01

Additional Comments/Observations:

GROUND INVESTIGATIONS IRELAND

Ground Investigations Ireland Ltd.,
Catherinestown House,
Hazelhatch Road,
Newcastle, Co Dublin.
Tel: 01 601 5175 / 5176 | Fax: 01 601 5173
Email: info@gii.ie | Web: gii.ie

GROUNDWATER MONITORING - RECENT BOREHOLES

Hickeys - 43 Pargate Place

BOREHOLE	DATE	TIME	GROUNDWATER (mBGL) BEFORE PURGE	GROUNDWATER (mBGL) AFTER PURGE	COMMENT
BH101	03.05.19		3.40	3.44	
BH102	03.05.19				**Borehole Not Completed**
BH103	03.05.19				**Borehole Not Completed**
BH104	03.05.19		4.12	4.35	
BH105	03.05.19				**Borehole Not Completed**
BH106	03.05.19		3.68	4.03	
BH107	03.05.19		3.65	3.73	
BH101	08.05.19			3.59	
BH102	08.05.19				**Borehole Not Completed**
BH103	08.05.19		3.75	3.83	
BH104	08.05.19			4.10	
BH105	08.05.19				**Borehole Not Completed**
BH106	08.05.19			3.26	
BH107	08.05.19			3.43	
BH101	30.05.19	14.50		4.02	
BH102	30.05.19				**Not Accessible**
BH103	30.05.19	15.00		3.88	

BOREHOLE	DATE	TIME	GROUNDWATER (mBGL) BEFORE PURGE	GROUNDWATER (mBGL) AFTER PURGE	COMMENT
BH104	30.05.19	16.20		5.43	
BH105	30.05.19				
BH106	30.05.19	15.50		4.49	
BH107	30.05.19	15.40		4.27	
BH101	13.06.19	11.39	3.44	3.44	
BH102	13.06.19				**Not Accessible**
BH103	13.06.19	11.07		3.83	
BH104	13.06.19	11.00		4.46	
BH105	13.06.19	10.45		3.14	
BH106	13.06.19	10.32		3.52	
BH107	13.06.19	10.27		3.73	

Ground Investigations Ireland Ltd.,
Catherinestown House,
Hazelhatch Road,
Newcastle, Co Dublin.
Tel: 01 601 5175 / 5176 | Fax: 01 601 5173
Email: info@gii.ie | Web: gii.ie

GROUNDWATER MONITORING

Hickeys - 43 Pargate Place - Historic Boreholes

BOREHOLE	DATE	TIME	GROUNDWATER (mBGL) BEFORE PURGE	GROUNDWATER (mBGL) AFTER PURGE	COMMENT
BH01	03/05/2019	11.18	2.87	2.95	
BH02	03/05/2019	12.00	3.38	3.42	
BH05	03/05/2019	12.30		3.10	Could not purge due to small diameter pipe
BH06	03/05/2019	13.0	3.36	3.36	
WS02	03/05/2019	13.35			No Water
WS06	03/05/2019	13.45	2.34	2.54	
WS05	03/05/2019	13.50			No Water
WS07	03/05/2019				Not Found
WS10	03/05/2019				Not possible to open
WS12	03/05/2019	14.10	3.68	3.72	
WS13	03/05/2019	14.30	3.60	3.60	
WS16	03/05/2019	15.00			No Water
BH01	30/05/2019	14.30		3.22	
BH02	30/05/2019	14.40		3.65	
BH07	30/05/2019	15.20			No Water
BH01	13/06/2019	11.36		3.01	
BH02	13/06/2019	11.33		3.44	

BOREHOLE	DATE	TIME	GROUNDWATER (mBGL) BEFORE PURGE	GROUNDWATER (mBGL) AFTER PURGE	COMMENT
BH05	13/06/2019				Not accessible
BH07	13/06/2019				No Water
WS05	13/06/2019				No Water
WS10	13/06/2019				Not possible to open
WS12	13/06/2019				Not possible to open - covered with cement
WS13	13/06/2019	10.39	3.54		
WS14	13/06/2019				Not possible to open - covered with cement
WS16	13/06/2019				No Water

APPENDIX 8 – Permeability Test Records

Test Type	Slug Test	**Diameter of hole (m)**	0.10
Well ID	BH101	**Depth of test (mbgl)**	4.01
Date	10/06/2019	**Dimensions of Slug (m)**	0.05
Test Start Time	13:15	**Test End Time**	15:15
Time elapsed (min)	**Dipped Waterlevel (mbgl)**	**Time elapsed (min)**	**Dipped Waterlevel (mbgl)**
0	4.01	35	3.83
0.5	3.84	40	3.82
1	3.84	45	3.82
1.5	3.84	50	3.82
2	3.84	55	3.81
2.5	3.84	60	3.80
3	3.84	75	3.78
3.5	3.84	90	3.77
4	3.84	105	3.77
4.5	3.84	120	3.77
5	3.84		
6	3.84		
7	3.84		
8	3.84		
9	3.84		
10	3.84		
12	3.84		
14	3.84		
16	3.84		
18	3.84		
20	3.83		
22	3.83		
24	3.83		
26	3.83		
28	3.83		
30	3.83		
Comments:	Waterlevel prior to purge (12:45), 3.28mbgl; purged for 90 minutes prior to test.		

Test Type	Slug Test	**Diameter of hole (m)**	0.10
Well ID	BH106	**Depth of test (mbgl)**	4.01
Date	10/06/2019	**Dimensions of Slug (m)**	0.05
Test Start Time	15:20	**Test End Time**	17:20
Time elapsed (min)	**Dipped Waterlevel (mbgl)**	**Time elapsed (min)**	**Dipped Waterlevel (mbgl)**
0	4.80	35	4.31
0.5	4.46	40	4.29
1	4.42	45	4.27
1.5	4.42	50	4.25
2	4.42	55	4.24
2.5	4.42	60	4.23
3	4.42	75	4.23
3.5	4.42	90	4.23
4	4.42	105	4.23
4.5	4.42	120	4.23
5	4.42		
6	4.41		
7	4.41		
8	4.41		
9	4.40		
10	4.39		
12	4.39		
14	4.38		
16	4.38		
18	4.38		
20	4.37		
22	4.36		
24	4.35		
26	4.35		
28	4.34		
30	4.32		
Comments:	Waterlevel prior to purge (14:50), 4.62mbgl; purged for 1 hour prior to test.		

APPENDIX 9 – Geophysical Survey

AGP19036_01

Report on the Geophysical Investigation At The Parkgate St. Site, Dublin for Ground Investigations Ireland Limited

APEX Geophysics Limited
Unit 6, Knockmullen Business Park
Gorey
Co. Wexford

T: 0402 21842
F: 0402 21843
E: info@apexgeophysics.ie
W: www.apexgeophysics.com

15th May 2019

PRIVATE AND CONFIDENTIAL

THE FINDINGS OF THIS REPORT ARE THE RESULT OF A GEOPHYSICAL SURVEY USING NON-INVASIVE SURVEY TECHNIQUES CARRIED OUT AT THE GROUND SURFACE. INTERPRETATIONS CONTAINED IN THIS REPORT ARE DERIVED FROM A KNOWLEDGE OF THE GROUND CONDITIONS, THE GEOPHYSICAL RESPONSES OF GROUND MATERIALS AND THE EXPERIENCE OF THE AUTHOR. APEX GEOPHYSICS LTD. HAS PREPARED THIS REPORT IN LINE WITH BEST CURRENT PRACTICE AND WITH ALL REASONABLE SKILL, CARE AND DILIGENCE IN CONSIDERATION OF THE LIMITS IMPOSED BY THE SURVEY TECHNIQUES USED AND THE RESOURCES DEVOTED TO IT BY AGREEMENT WITH THE CLIENT. THE INTERPRETATIVE BASIS OF THE CONCLUSIONS CONTAINED IN THIS REPORT SHOULD BE TAKEN INTO ACCOUNT IN ANY FUTURE USE OF THIS REPORT.

PROJECT NUMBER	AGP19021		
AUTHOR	CHECKED	REPORT STATUS	DATE
EURGEOL YVONNE O'CONNELL PH.D., M.SC. (GEOPHYSICS), PGEO	TONY LOMBARD M.SC (GEOPHYSICS)	V.01	15TH MAY 2019

CONTENTS

1. EXECUTIVE SUMMARY

APEX Geophysics Limited was requested by Ground Investigations Ireland Limited to carry out a geophysical survey at the Hickeys Site in Parkgate Street, Dublin. The site is located between Parkgate Street and the River Liffey, west of Sean Heuston Bridge and consists of a building with a car parking area to the west.

The survey was requested to aid in completing the ground model for the site, delineating the possible presence of an infill channel through the site and mapping any variation in the rockhead depth. Site topography ranges from 3.6 MSL southwest of the building, increasing to approx. 5.5 MSL along Parkgate Street, north and north east of the site.

Preliminary trial pit and borehole information provided to assist in the compilation of this report typically indicated 1.8 to 2.5 m made ground predominantly comprising sandy gravelly clay over soft to firm sandy gravelly clay, over loose to medium dense slightly clayey sand/gravel.

The geophysical survey was carried out on the night of April 13th, 2019. The investigation consisted of 4 x P-wave Seismic Refraction profiles coupled with 2 x 2D MASW profiles at accessible locations west and north of the building in addition to 4 x P-wave Seismic Refraction profiles and 4 x 1D MASW profiles within the building.

The geophysical data has been interpreted as indicating 4 subsurface layers across the site:

- **Layer 1** has an average thickness of 0.7 m. This layer has low Vp velocities (average 185 m/s) which would indicate very soft or very loose material. In conjunction with the available borehole and trial pit information this layer is likely to comprise of made ground.

- **Layer 2** has an average thickness of 2.0 m. This layer has an average Vp velocity of 385 m/s which would indicate soft or loose material. This layer has an average Poisson's Ratio of 0.36. In conjunction with the available borehole and trial pit information this layer is likely to comprise of made ground.

- **Layer 3** has an average thickness of 5.5 m. This layer has an average Vp velocity of 1120 m/s which would indicate firm to stiff or medium dense to dense material. The Vs velocities indicate firm/medium dense material in the upper half of the layer and stiff/dense material in the lower half of the layer. This layer has an average Poisson's Ratio of 0.47. In conjunction with the available borehole and trial pit information this layer is likely to comprise of sandy gravelly clay overlying clayey sand/gravel.

- **Layer 4** at an average depth of 8.2 m BGL has an average Vp velocity of 3215 m/s which is indicative of slightly weathered to fresh rock.

The findings of the geophysical investigation should be reviewed on completion of the direct investigation.

2. INTRODUCTION

APEX Geophysics Limited was requested by Ground Investigations Ireland Limited to carry out a geophysical survey at the Hickeys Site in Parkgate Street, Dublin. Available ground investigation data indicates that rockhead levels range from 8 m to 10 m below ground level (BGL), however Geological Survey of Ireland (GSI) Quaternary maps indicate the possible presence of a deep infilled gravel/glacial channel running north-south through the centre of the site. There is also a risk that rockhead levels may dip significantly through the centre of the site. The survey was requested to aid in completing the ground model for the site, delineating the possible presence of an infill channel through the site and mapping any variation in the rockhead depth.

2.1 Survey Objectives

The objectives of the investigation were to provide information on:

- variations in soil thickness and stratigraphy,
- variations in depth to bedrock,
- engineering properties of the overburden and underlying bedrock .

2.2 Site Background

The site is located between Parkgate Street and the River Liffey, west of Sean Heuston Bridge (Figure 2.1). The site consists of an existing building with a car parking area to the west of the building (Figure 2.2). Site topography ranges from 3.6 MSL southwest of the building, increasing to approx. 5.5 MSL along Parkgate Street, north and north east of the site.

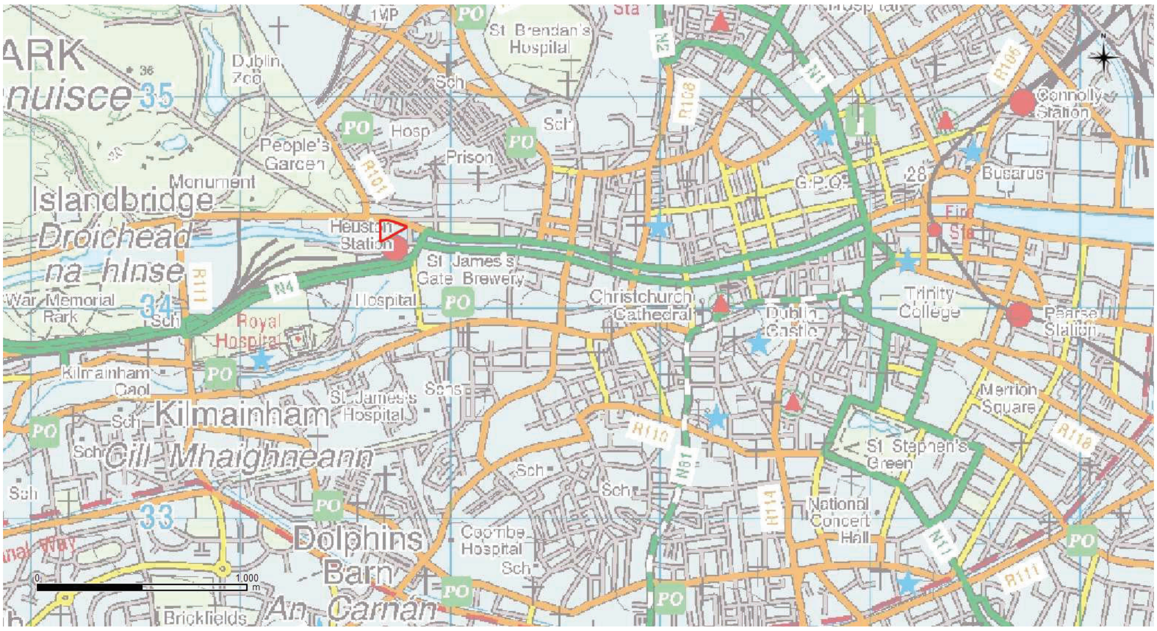

Fig 2.1: Location map (site outlined in red).

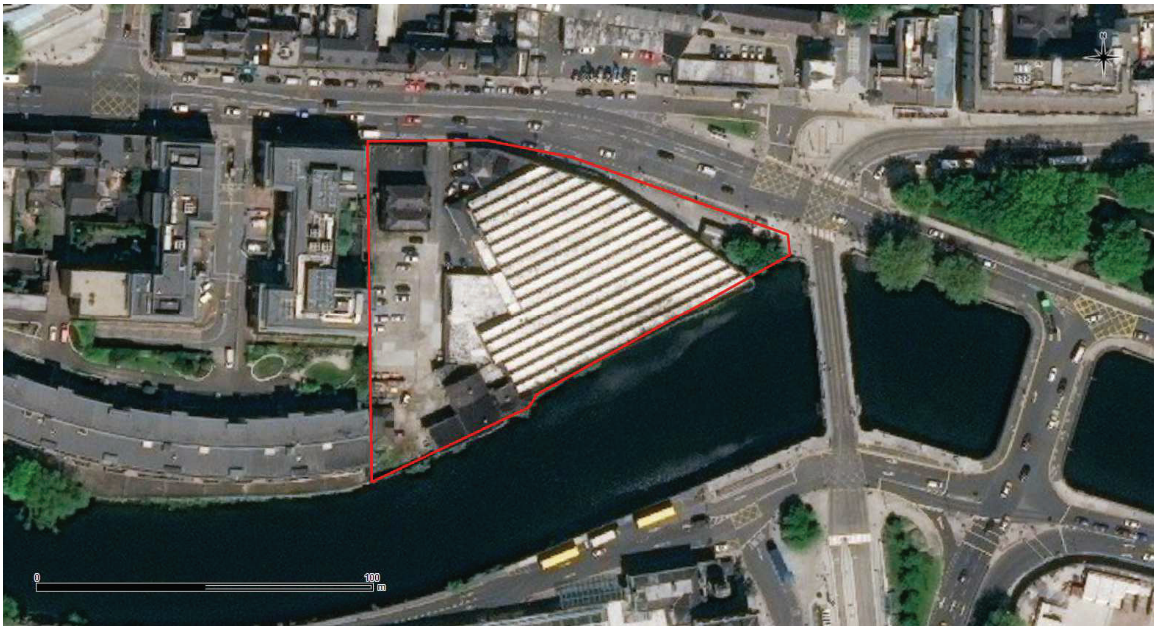

Fig 2.2: Aerial photo (site outlined in red).

2.2.1 Soils

The GSI and Teagasc subsoils map for the area (Figure 2.3) indicates that the site is underlain by urban deposits, with till derived from limestone in the broader area, alluvium channels along the River Liffey to the south and along a meltwater channel mapped northwest of the site.

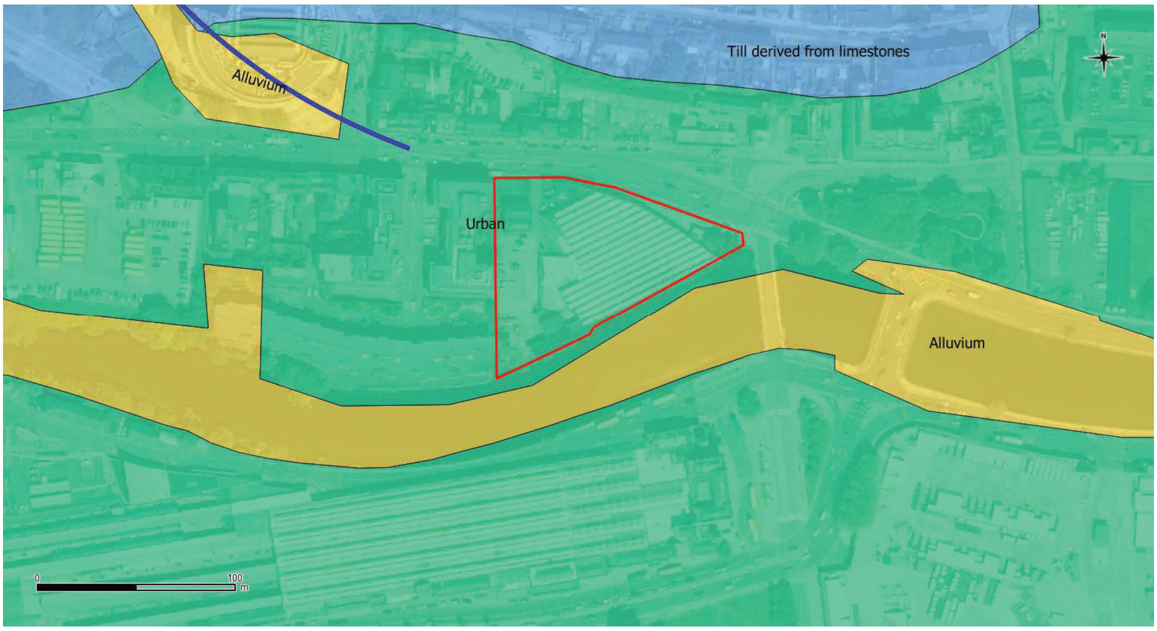

Fig 2.3: The GSI/Teagasc subsoils map (site outlined in red) with meltwater channel mapped as a blue line.

2.2.2 Geology

The GSI 1:100k Bedrock Geology map (Figure 2.4) indicates that the site is underlain by muddy limestone and shale of the Lucan Formation (Calp). The Lucan Formation is classified as a 'Locally Important aquifer – bedrock which is moderately productive only in local zones'.

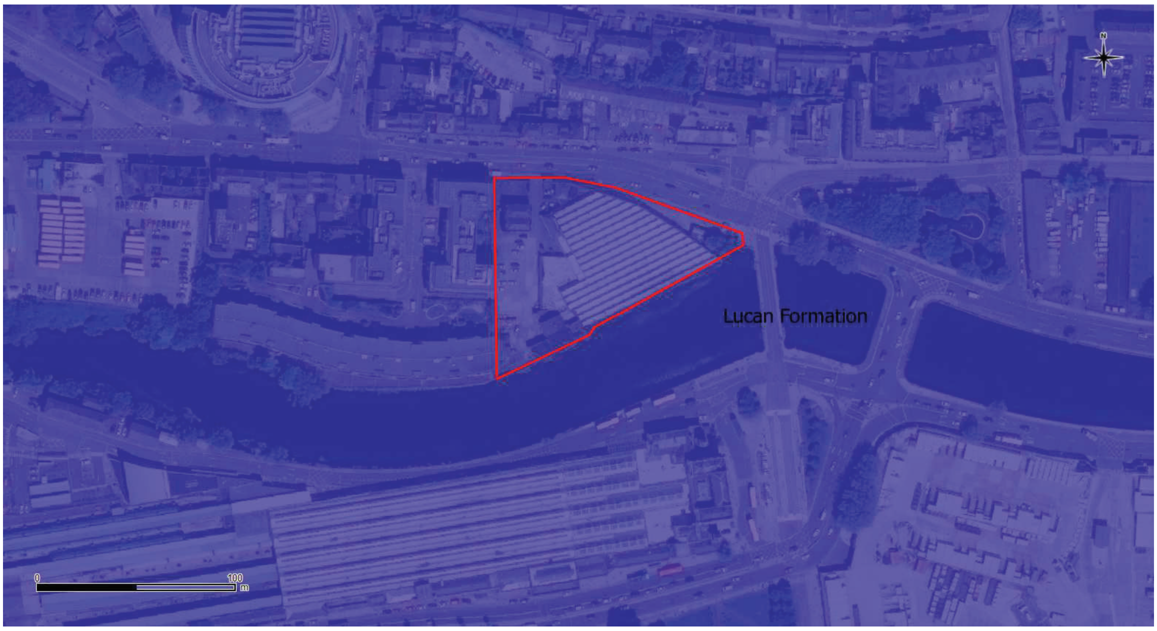

Fig 2.4: The GSI bedrock map (site outlined in red).

2.2.3 Groundwater Vulnerability

The groundwater vulnerability rating for the site (Figure 2.5) is classified as low in the north of the site and moderate in the south of the site.

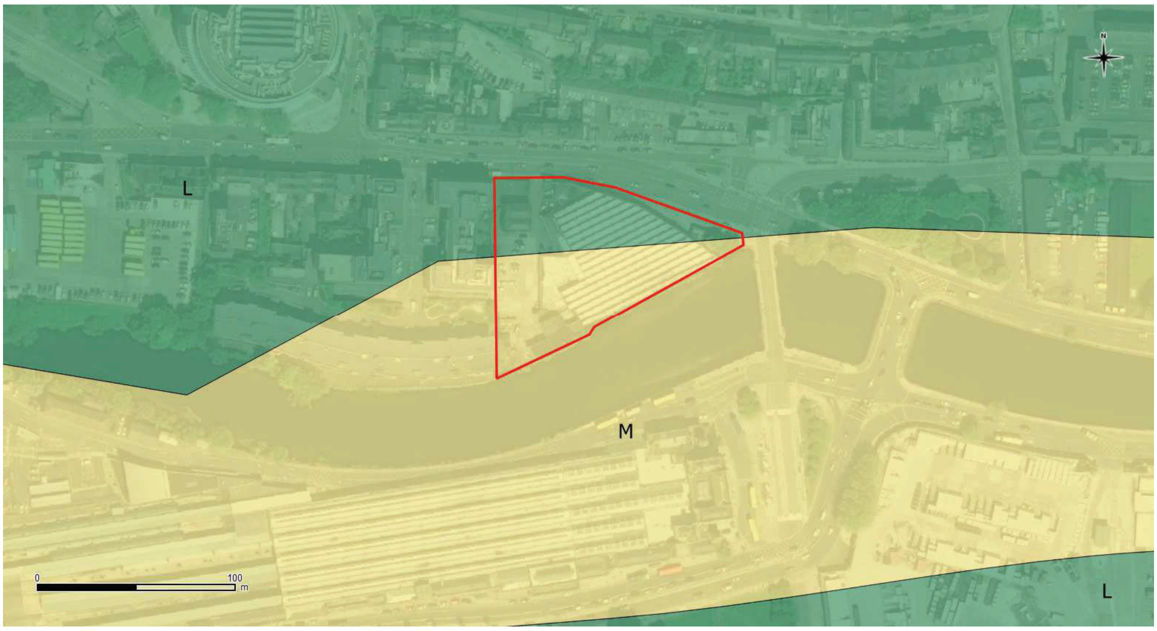

Fig 2.5: The GSI groundwater vulnerability classification map (site outlined in red).

2.2.4 Historical Data

The historical 6 inch sheet for the area indicates channels of alluvium running east-west north of the site and through the site, with a north-south alluvium channel mapped south of the site (Figure 2.5).

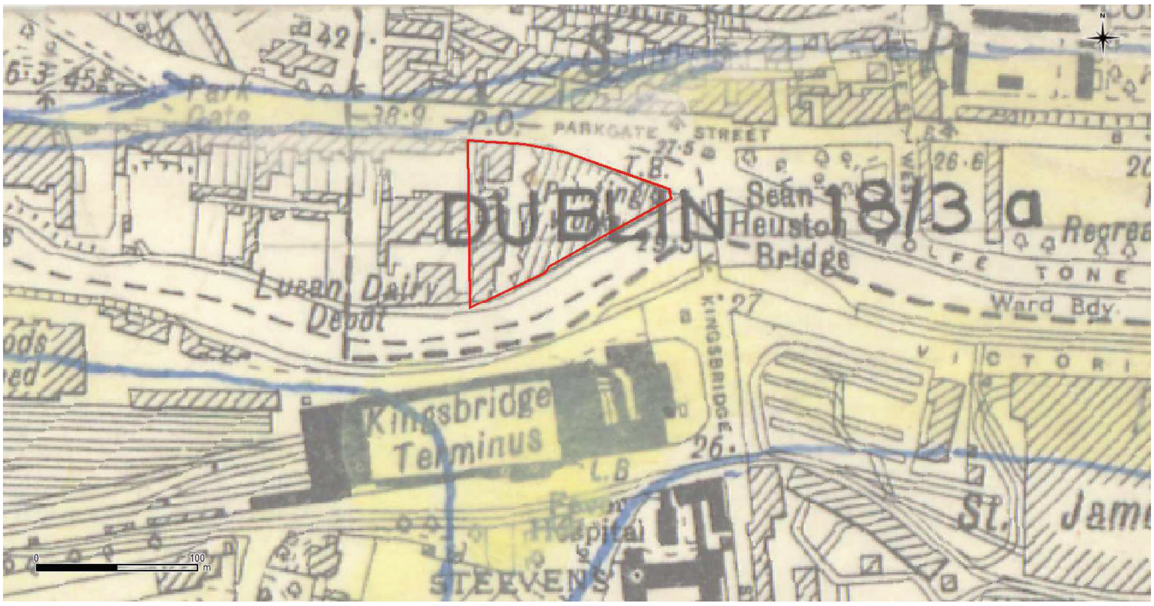

Fig 2.5: The historical 6inch map (site outlined in red, blue outlines alluvium deposits).

2.2.5 Direct Investigation Data

Preliminary trial pit and borehole information was provided to assist in the compilation of this report. The trial pits and boreholes typically indicated 1.8 to 2.5 m made ground predominantly comprising sandy gravelly clay over soft to firm sandy gravelly clay, over loose to medium dense slightly clayey sand/gravel.

2.3 Survey Rationale

The investigation consisted of P-wave Seismic Refraction profiling coupled with 2D and 1D Multichannel Analysis of Surface Wave (MASW) profiling:

P-wave Seismic Refraction profiling measures the P-wave velocity (Vp) of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher seismic velocities while soft, loose or fractured materials have lower velocities.

The **MASW** method is used to estimate Shear-wave velocities (Vs) and Gmax values of the ground material. Overburden material with a Vs <175 m/s is generally classified as soft/loose. The data was acquired using the same acquisition geometry as the P-wave Seismic Refraction profiling.

As with all geophysical methods the results are based on indirect readings of the subsurface properties. The effectiveness of the proposed approach will be affected by variations in the ground properties. Further information on the detailed methodology of each geophysical method employed in this investigation is given in **APPENDIX A: DETAILED METHODOLOGY**.

3. RESULTS

The survey was carried out on the night of April 13th, 2019. The investigation consisted of 4 x P-wave Seismic Refraction profiles (S5, S6, S7 & S8) coupled with 2 x 2D MASW profiles (M1 & M2) at accessible locations west and north of the building in addition to 4 x P-wave Seismic Refraction profiles (S1, S2, S3 & S4) and 4 x 1D MASW profiles within the building (Figure 3.1).

The Seismic Refraction data quality was fair outside of the building and relatively poor within the building (due to ground conditions e.g. concrete and vibration noise from e.g. vehicle traffic and services). As such, P-wave (Vp) results could only be obtained for one P-wave Seismic Refraction profile (S3) within the building.

Fig 3.1: Aerial photo (site outlined in red).

The geophysical survey locations are indicated on Drawing AGP19036_01 (Appendix B). Geophysical results and interpreted sections are plotted on Drawings AGP19036_02 and AGP19036_03 (Appendix B).

3.1 Seismic Refraction P-wave Velocity Profiling

Eight seismic refraction spreads were acquired (S1-S8). The seismic refraction data for profiles (S3, S5, S6, S7 & S8) indicated 4 velocity layers which have been interpreted as follows:

Layer	Seismic Vp Velocity (m/s)	Average Vp Seismic Velocity (m/s)	Interpretation	Stiffness/ Rock Quality	Excavatability
1	148-364	210	Soil	Soft /Loose	Diggable
2	329-556	405	Soil	Soft-Firm/Loose-medium dense	
3	626-1541	1100	Soil	Firm-Stiff/Medium Dense to Dense	
4	2710-3516	3070	Slightly Weathered – Fresh Bedrock	Good	Break/Blast

3.3 MASW S-wave Velocity Profiling

1D shear-wave velocity (Vs) and Gmax values were determined for the overburden material for each of the 4 P-wave seismic refraction profiles within the building. These have been plotted on Figures 3.2 and 3.3 together with 1D profiles for S5, S6, S7 and S8 taken from the 2D MASW profiles (M1 & M2).

The shallowest resolvable depth is a function of the shortest wavelength which is related to the geophone spacing. In this survey geophone spacings of 1.5 m to 3 m were employed to obtain a depth of investigation to rockhead. This has allowed the derivation of Vs/Gmax values from depths of approx. 1 m BGL to depths of 7 to 9 m BGL.

Vs values generally ranged from 135-360 m/s (Figure 3.2). The material in the upper 1 m to 2m is predominantly firm/medium dense (with the exception of S6 near the river). Soft/loose material was indicated from 2 m to 4m for S1, S3, S5 and S6 with firmer, denser material in the upper 4m underlying S2, S4, S7 and S8. The MASW data indicates Vs and Gmax values increasing with depth indicating stiff cohesive soils or dense non-cohesive soils at depths generally >4 m BGL. Vs values and corresponding soil cohesion ranges are summarised in Figure A.1, Appendix A.

Gmax values generally ranged from 40-300 MPa (Figure 3.3). A soil density of 2000 kg/m^3 was used in the Gmax calculations.

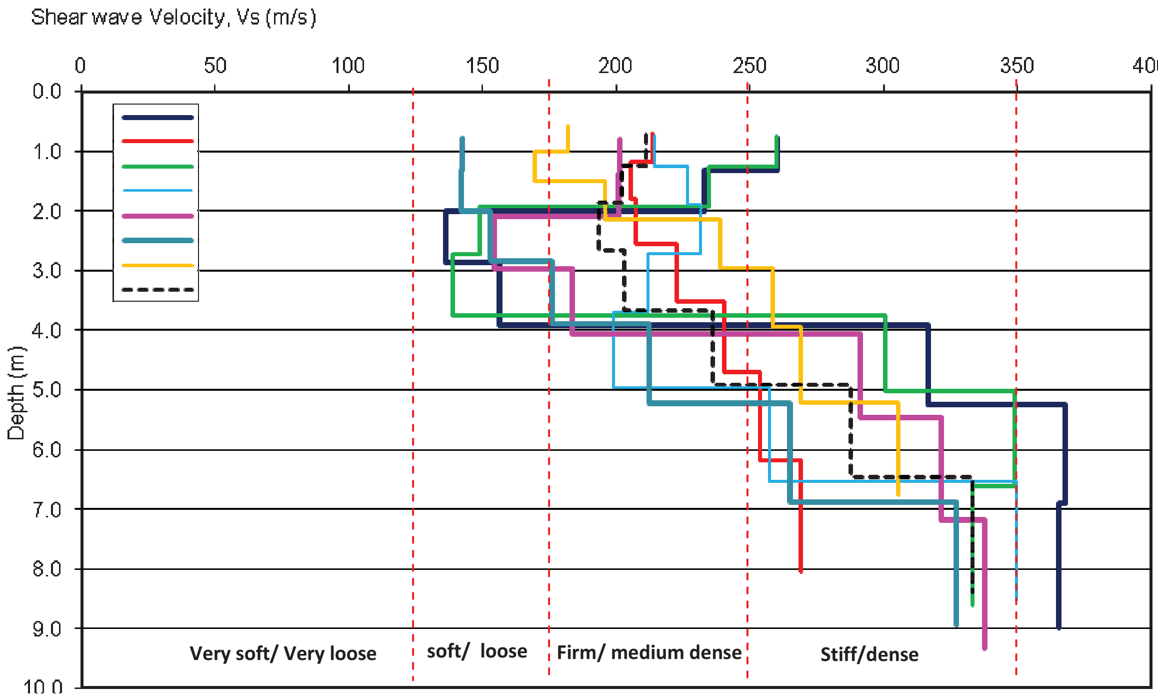

Fig 3.2: Vs values for S1-S8.

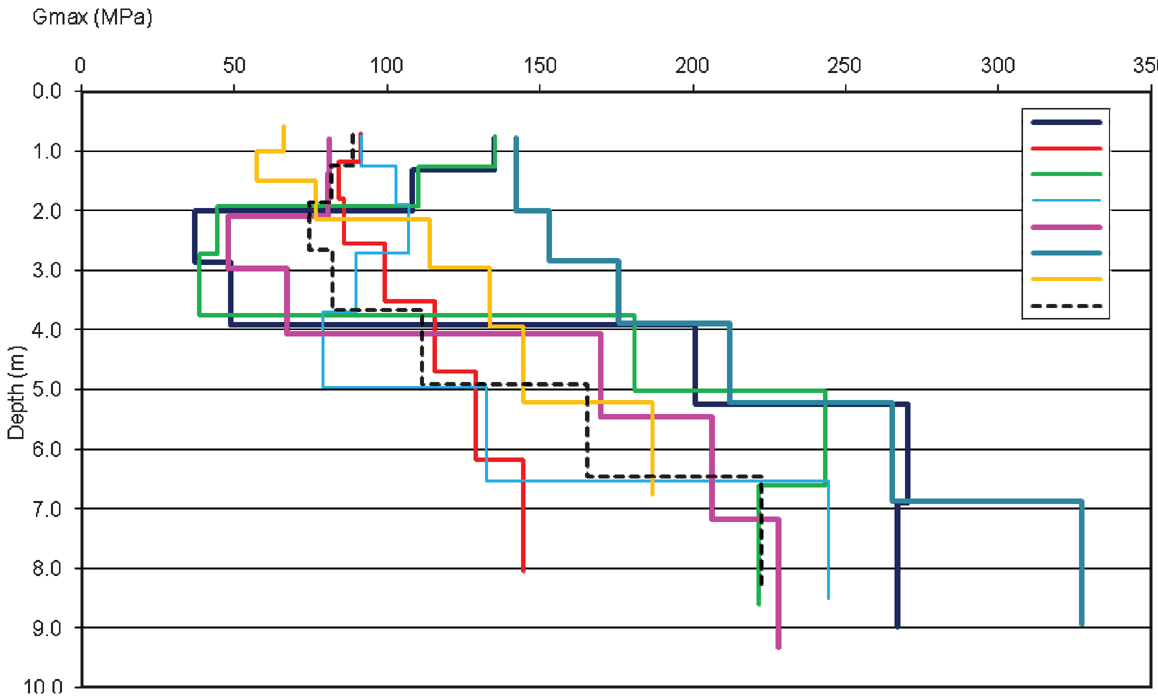

Fig 3.3: Gmax values for S1-S8.

Poisson's Ratio values have been determined for the soil layers for seismic refraction profiles S3, S5, S6, S7 and S8 (Figure 3.4). An average value of 0.36 has been determined for the upper 2.5 m and an average value of 0.47 has been determined for the underlying soils. No Vs values were determined in the upper c. 1 m.

Profile	Seismic Layer	Depth m BGL	Vp m/s	Vs m/s	Poissons Ratio
S3	Layer 1	1.02	252		
	Layer 2	2.63	429	215	0.33
	Layer 3	7.80	903	280	0.45
S5	Layer 1	0.42	283		
	Layer 2	2.34	467	201	0.39
	Layer 3	6.15	1069	238	0.47
S6	Layer 1	0.70	154		
	Layer 2	2.67	391	146	0.42
	Layer 3	8.35	1071	245	0.47
S7	Layer 1	0.58	174		
	Layer 2	2.03	409	182	0.38
	Layer 3	5.83	1437	268	0.48
S8	Layer 1	0.66	184		
	Layer 2	2.71	341	198	0.26
	Layer 3	7.17	1005	265	0.46
Average	Layer 1	0.7	210		
	Layer 2	2.5	409	188	**0.36**
	Layer 2	7.1	1097	259	**0.47**

Fig 3.4: Poisson's Ratio values determined from Vp & Vs values.

Note: Derived Vp and Vs values have been used for Poisson's Ratio calculations. These geotechnical parameters should be assessed by a geotechnical engineer.

3.4 Discussion

The combined Vp and Vs results have been summarised on the following basis:

Layer	Ave. Thickness (m)	Ave. Vp (m/s)	Ave. Vs (m/s)	Ave. Poisson's Ratio	Interpretation	Estimated Stiffness/ Rock Quality	Estimated Excavatability
1	0.7	185			Made Ground/Soils	Very soft-Very loose	Diggable
2	2.0	385	188	0.36	Made Ground/Soils	Soft-Firm/Loose-Medium dense	
3	5.5	1120	259	0.47	Soils	Firm-stiff/ Medium dense - dense	
4		3215			Slightly Weathered - Fresh Bedrock	Good	Break/Blast

The geophysical data indicates 4 subsurface layers interpreted as follows:

Layer 1 has an average thickness of 0.7 m. This layer has low Vp velocities (average 185 m/s) which would indicate very soft or very loose material. In conjunction with the available borehole and trial pit information this layer is likely to comprise of made ground.

Layer 2 has an average thickness of 2.0 m. This layer has an average Vp velocity of 385 m/s which would indicate soft to firm or loose to medium dense material. This layer has an average Poisson's Ratio of 0.36. In conjunction with the available borehole and trial pit information this layer is likely to comprise of made ground.

Layer 3 has an average thickness of 5.5 m. This layer has an average Vp velocity of 1120 m/s which would indicate firm to stiff or medium dense to dense material. The Vs velocities (see Drawing AGP19036_02) indicate firm/medium dense material in the upper half of the layer and stiff/dense material in the lower half of the layer. This layer has an average Poisson's Ratio of 0.47. In conjunction with the available borehole and trial pit information this layer is likely to comprise of sandy gravelly clay overlying clayey sand/gravel.

Layer 4 at an average depth of 8.2 m BGL has an average Vp velocity of 3215 m/s which is indicative of slightly weathered to fresh rock.

4. RECOMMENDATIONS

The findings of the geophysical investigation should be reviewed on completion of the direct investigation.

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APPENDIX A: DETAILED METHODOLOGY

A combination of geophysical techniques was used to provide a high quality interpretation and reduce any ambiguities, which may otherwise exist.

Seismic Refraction Profiling

Principles
This method measures the velocity of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher seismic velocities while soft, loose or fractured materials have lower velocities.

Seismic profiling measures the p-wave velocity (Vp) of refracted seismic waves through the overburden and rock material and allows an assessment of the thickness and quality of the materials present to be made. Stiffer and stronger materials usually have higher Vp velocities while soft, loose or fractured materials have lower Vp velocities. Readings are taken using geophones connected via multi-core cable to a seismograph.

Data Collection
A Geode high resolution 24 channel digital seismograph, 24 10HZ vertical geophones and a 10 kg hammer were used to provide first break information, with a 24 take-out cable (2m spacing). Equipment was carried was operated by a two-person crew.

Readings are taken using geophones connected via multi-core cable to a seismograph. The depth of resolution of soil/bedrock boundaries is determined by the length of the seismic spread, typically the depth of resolution is about one third the length of the profile (e.g. 46m profile ~16m depth). Shots from seven different positions were taken (2 x off-end, 2 x end, 3 x middle) to ensure optimum coverage of all refractors.

Data Processing
First break picking in digital format was carried out using the FIRSTPIX software program to construct p-wave (Vp) traveltime plots for each spread. Velocity phases were selected from these plots using the GREMIX software program and were used to calculate the thickness of individual velocity units. Topographic data were input. Material types were assigned and estimation made of material properties.

First break picking in digital format was carried out using the FIRSTPIX software program to construct traveltime plots for each spread. The recorded data was processed and interpreted using the GREMIX software program. GREMIX interprets seismic refraction data as a laterally varying layered earth structure. It incorporates the slope-intercept method, parts of the Plus-Minus Method of Hagedoorn (1959), Time-Delay Method, and features the Generalized Reciprocal Method (GRM) of Palmer (1980). Up to four layers can be mapped; one deduced from direct arrivals and three deduced from refractions. Phantoming of all possible travel time pairs can be carried out by adjusting reciprocal times of off shots. Material types were assigned and estimation made of material properties, cross-referenced to borehole data.

Approximate errors for Vp velocities are estimated to be +/- 10%. Errors for the calculated layer thicknesses are of the order of +/-20%. Possible errors due to the "hidden layer" and "velocity inversion" effects may also occur (Soske, 1959).

Multichannel Analysis of Surface Waves (MASW)

Principles

The Multi-channel Analysis of Surface Waves (MASW) (Park et al., 1998, 1999) utilizes Surface waves (Rayleigh waves) to determine the elastic properties of the shallow subsurface (<15m). Surface waves carry up to two/thirds of the seismic energy but are usually considered as noise in conventional body wave reflection and refraction seismic surveys. The penetration depth of surface waves changes with wavelength, i.e. longer wavelengths penetrate deeper. When the elastic properties of near surface materials vary with depth, surface waves then become dispersive, i.e. propagation velocity changes with frequency. The propagation (or phase) velocity is determined by the average elastic property of the medium within the penetration depth. Therefore the dispersive nature of surface waves may be used to investigate changes in elastic properties of the shallow subsurface. The MASW method employs multi-channel recording and processing techniques (Sheriff and Geldart, 1982) that have similarities to those used in a seismic reflection survey and which allow better waveform analysis and noise elimination.

To produce a shear wave velocity (Vs) profile and a stiffness profile of the subsurface using surface waves the following basic procedure is followed:

(i) a point source (e.g. a sledgehammer) is used to generate vertical ground motions,
(ii) the ground motion is measured using low frequency geophones, which are disposed along a straight line directed toward the source,
(iii) the ground motion is recorded using either a conventional seismograph, oscilloscope or spectrum analyzer,
(iv) a dispersion curve is produced from a spectral analysis of the data showing the variation of surface wave velocity with wavelength,
(iv) the dispersion curve in inverted using a modelling and least squares minimization process to produce a subsurface profile of the variation of Surface wave and shear wave velocity with depth.

Data Collection

1D MASW profiles were recorded at each s seismic refraction location. The acquisition configuration was the same as used for the seismic refraction acquisition.

Data Processing

MASW processing was carried out using the SURFSEIS processing package developed by Kansa Geological Survey (KGS, 2000). SURFSEIS is designed to generate a shear wave (Vs) velocity profile.

SURFSEIS data processing involves three steps:

(i) Preparation of the acquired multichannel record. This involves converting data file into the processing format.
(ii) Production of a dispersion curve from a spectral analysis of the data showing the variation of Raleigh wave phase velocity with wavelength. Confidence in the dispersion curve can be estimated through a measure of signal to noise ratio (S/N), which is obtained from a coherency analysis. Noise includes both body waves and higher mode surface waves. To obtain an accurate dispersion curve the spectral content and phase velocity characteristics are examined through an overtone analysis of the data.
(iii) Inversion of the dispersion curve is then carried out to produce a subsurface profile of the variation of shear wave velocity with depth.

The bedrock P-wave velocities were converted to S-wave velocities using the following equation:

$$V_s=(((Vp^2)-2*v*(Vp^2))/((1-v)*2))^{0.5}$$

Where V_s = S-wave velocity in m/s, Vp = P-wave velocity in m/s and ν = Poisson's ratio.

The Gmax values are calculated at each S-wave location using an overburden density of 2,000Kg/m^3. The Gmax calculation is: **Gmax (Mpa) = $Vs^2*(\rho / 1000000)$**
where ρ = density (kg/m^3).

Vs values and corresponding soil cohesion ranges are summarised in Figure A.1.

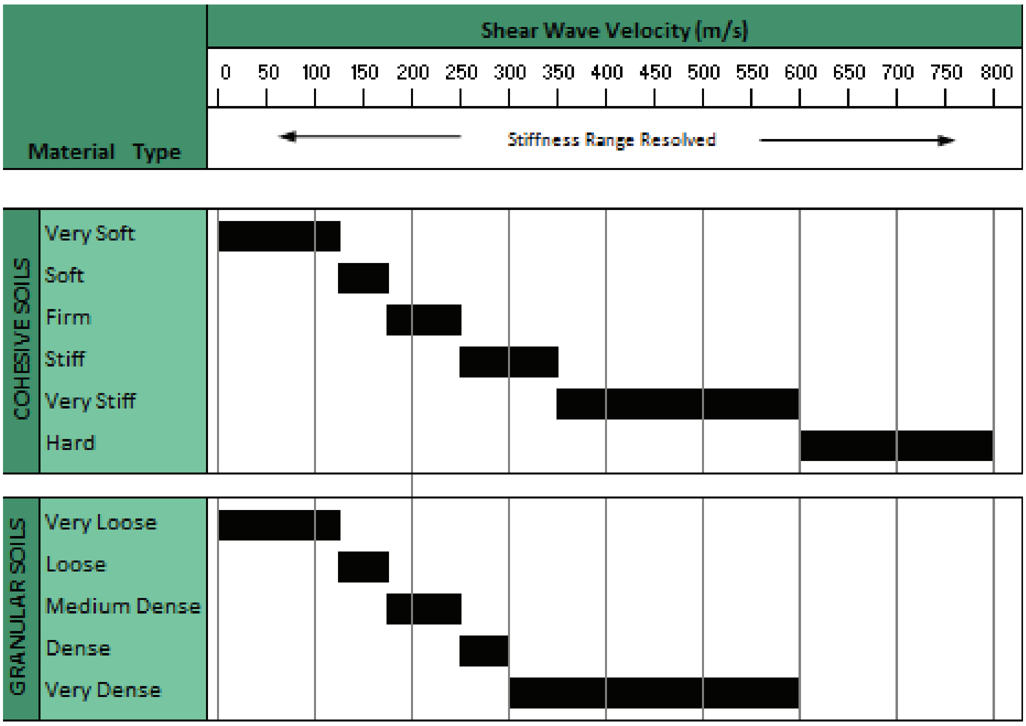


Figure A.1: Shear-wave velocity and corresponding soil cohesion.

Spatial Relocation

All the geophysical investigation locations were acquired using Trimble Geo 7X high-accuracy GNSS handheld GPS system using the settings listed below. This system allows collecting GPS data with c.20mm accuracy.

Projection:	Irish Transverse Mercator
Datum:	Ordnance
Coordinate units:	Meters
Altitude units:	Meters
Survey altitude reference:	MSL
Geoid model:	Republic of Ireland

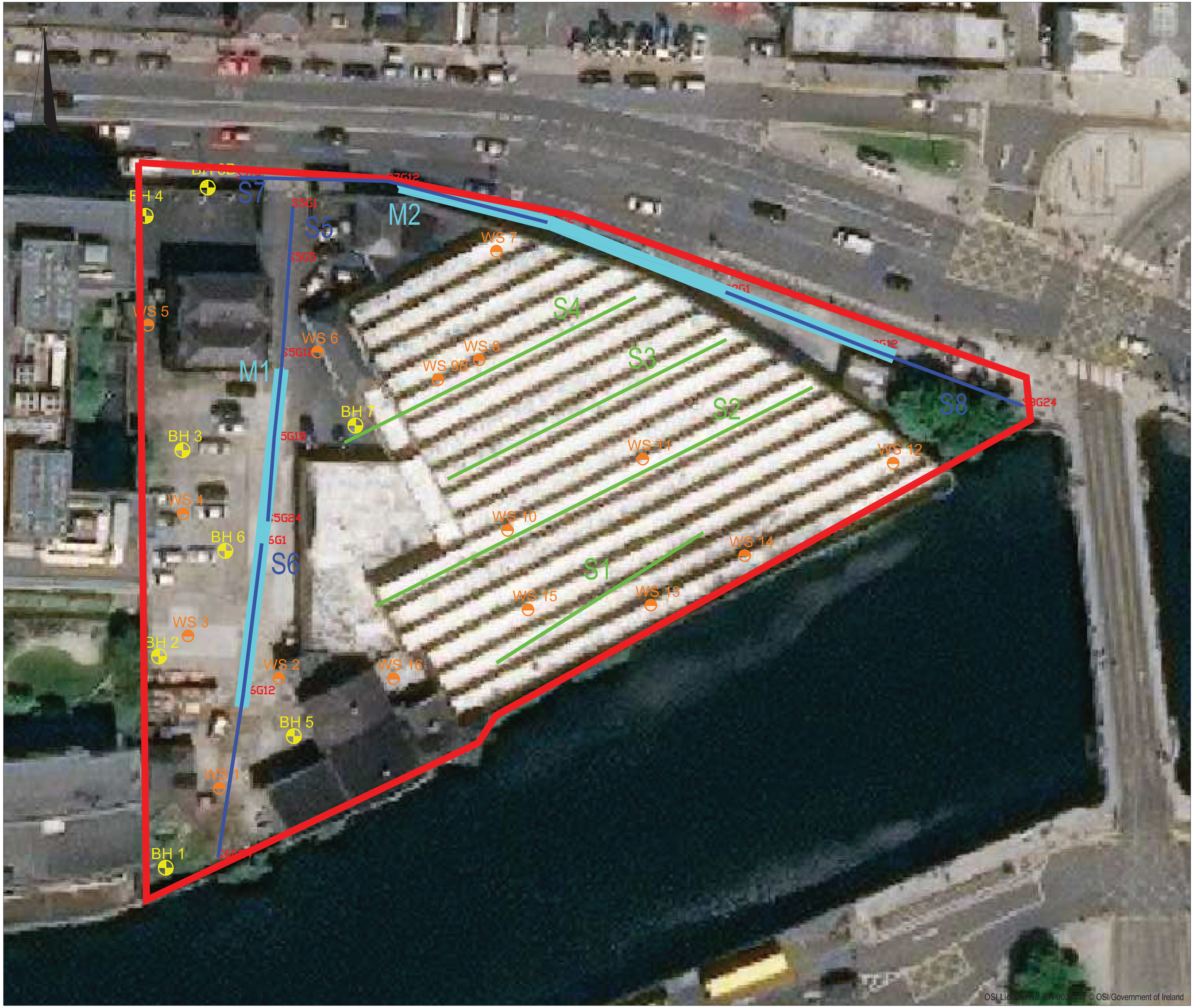
APPENDIX B: DRAWINGS

The information derived from the geophysical investigation is presented in the following drawings:

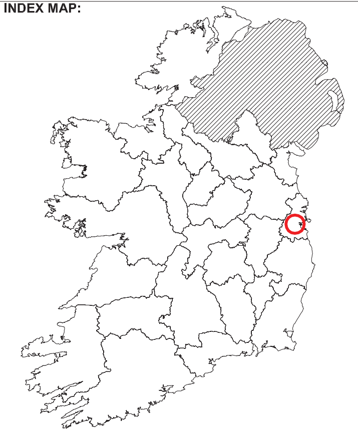
AGP19036_01	Aerial Photo - Geophysical Locations	1:1250	@ A4
AGP19036_02	Figure 1: Exterior Profile west of the building	1:400	@ A3
	Figure 2: Exterior Profile north of the building	1:400	@ A3
AGP19036_03	Profile S3 in centre of building	1:400	@ A4

AERIAL PHOTO - GEOPHYSICAL LOCATIONS

SCALE 1:750



INDEX MAP:



LEGEND:

- 2D MASW profile
- Interior Seismic refraction profile
- Exterior Seismic refraction profile

apex geophysics

6 Knockmullen Business Park
Gorey
Co. Wexford
Ireland.
T +353 (0)402-21842
F +353 (0)402-21843
E info@apexgeophysics.ie
www.apexgeophysics.ie

PROJECT:	HICKEY'S, PARKGATE STREET GEOPHYSICAL SURVEY
CLIENT.:	ARUP
DRAWING NO:	AGP19036_01
SCALE:	AS INDICATED @ A4
DATE:	15/05/2019

Version:	Date:	Drawn By:	Checked:
Draft	10/05/2019	YOC	
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FIGURE 1:EXTERIOR PROFILE WEST OF BUILDING

SCALE 1:400

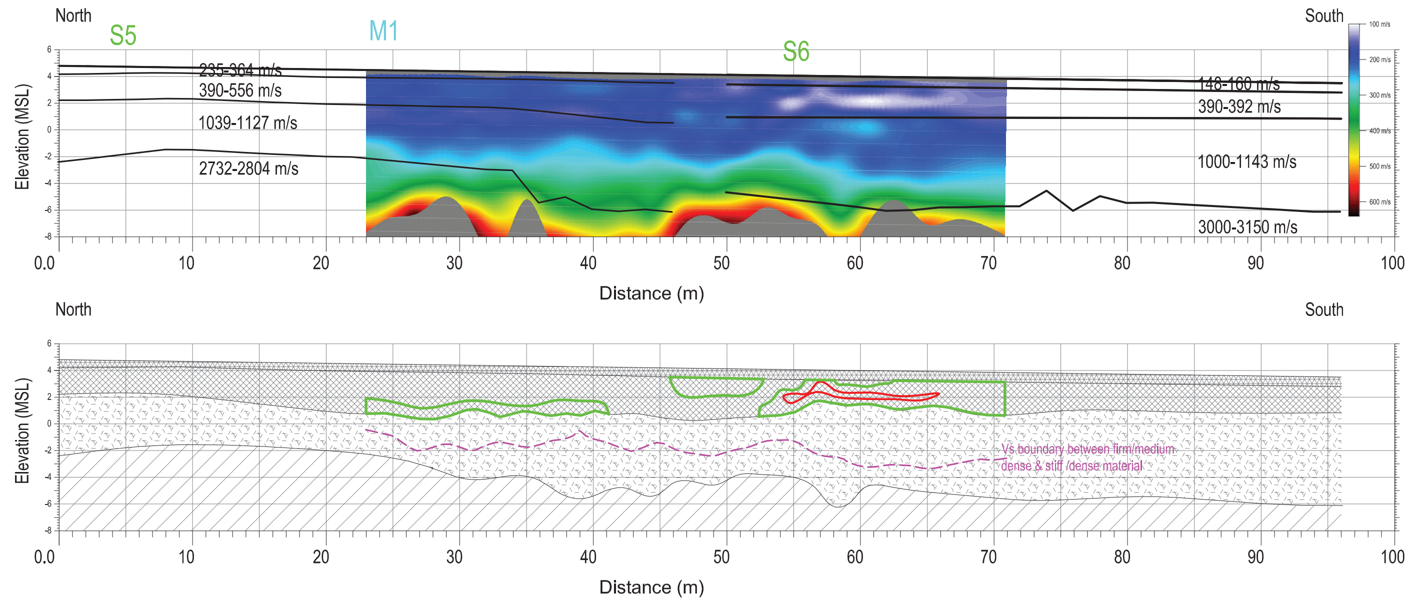
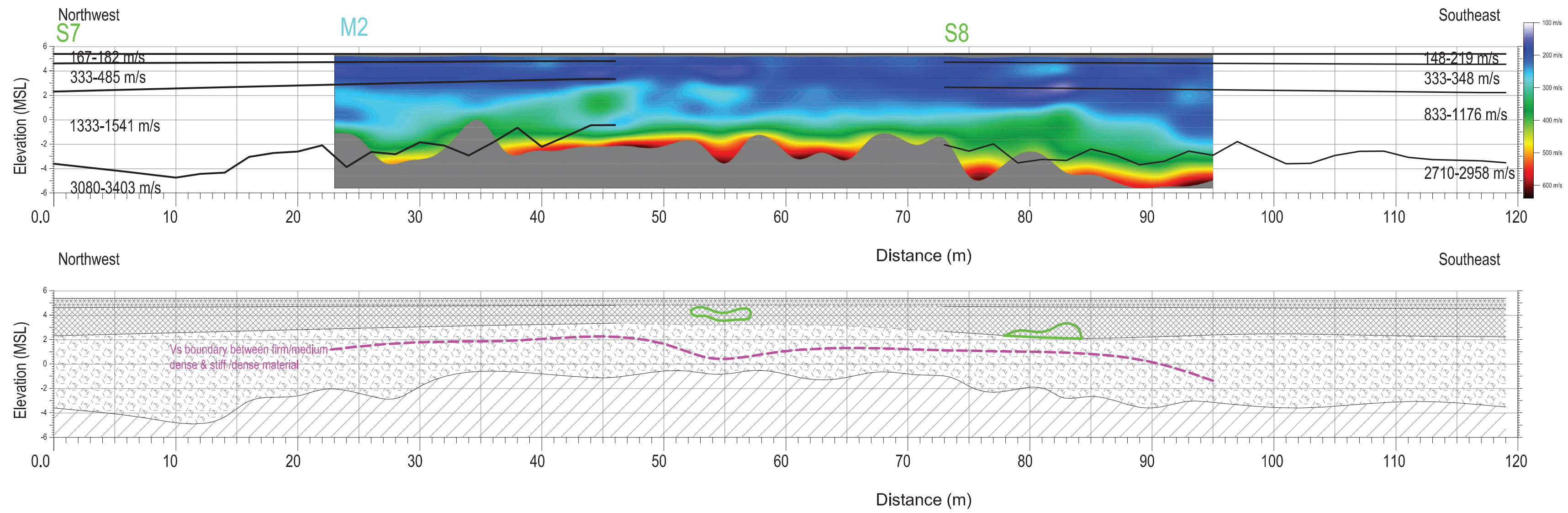
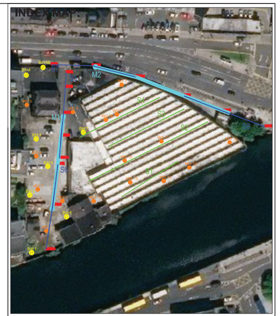


FIGURE 2: EXTERIOR PROFILE NORTH OF BUILDING

SCALE 1:400





LEGEND:

- Very soft/ Very loose SOILS and/or MADE GROUND
- Soft/ Loose SOILS and/or MADE GROUND
- Firm-stiff/Medium dense-dense SOILS
- Slightly weathered - Fresh BEDROCK
- Very soft/very loose material where Vs <175 m/s
- Soft/Loose material where Vs 175-225 m/s
- Vs boundary between shallower firm/medium dense soils & deeper stiff /dense material

The information displayed here is to be used in conjunction with Report AGP19036_01 Report on the Geophysical Investigation at Parkgate St., Dublin for Ground Investigations Ireland Ltd., APEX Geophysics Ltd. 15th May 2019

apex geophysics

6 Knockmullen Business Park
Gorey
Co. Wexford
Ireland.
T +353 (0)402-21842
F +353 (0)402-21843
E info@apexgeophysics.ie
www.apexgeophysics.ie

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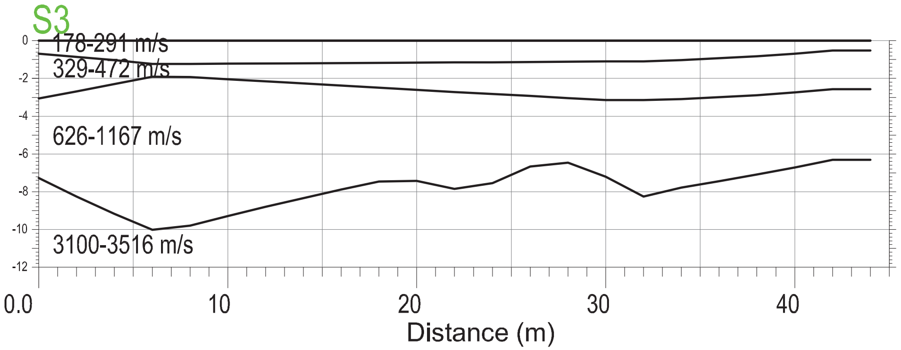
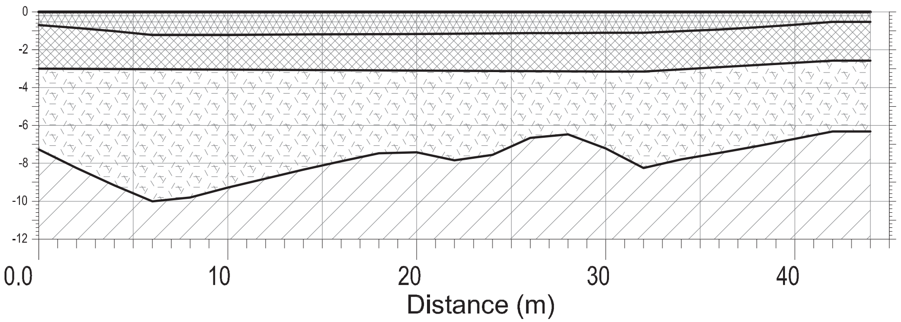
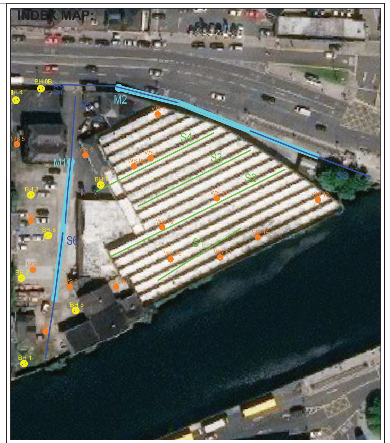
PROFILE S3 IN CENTRE OF BUILDING

SCALE 1:400







LEGEND:

Very soft/ Very loose SOILS and/or MADE GROUND

Soft/ Loose SOILS and/or MADE GROUND

Firm-stiff/Medium dense-dense SOILS

Slightly weathered - Fresh BEDROCK

The information displayed here is to be used in conjunction with Report AGP19036_01 Report on the Geophysical Investigation at Parkgate St., Dublin for Ground Investigations Ireland Ltd., APEX Geophysics Ltd. 15th May 2019

apex geophysics

6 Knockmullen Business Park
Gorey
Co. Wexford
Ireland.
T +353 (0)402-21842
F +353 (0)402-21843
E info@apexgeophysics.ie
www.apexgeophysics.ie

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Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Appendix 15.5: Preliminary Site Assessment

265381-00

ARUP

Ruirside Developments Limited

42A Parkgate Street

Preliminary Site Assessment

265381-00

Issue | 16 May 2019

Job number 265381-00

Ove Arup & Partners Ireland Ltd

Arup
50 Ringsend Road
Dublin 4
D04 T6X0
Ireland
www.arup.com

ARUP

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Appendix C

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Appendix E

Figures

Appendix F

Asbestos Survey 2019

Executive Summary

Arup was appointed by Chartered Land to prepare a Preliminary Site Assessment (PSA) of the site at No. 43 Parkgate Street, Dublin 8.

The objective of PSA was to identify areas of contamination within the Parkgate Street site, prepare a preliminary Conceptual Site Model (CSM) for the site in the context of future development of the site, establish if there are any potentially unacceptable risks to current or future site users and set out the rationale for the scope of a detailed site investigation.

The site is located on the banks of the River Liffey and was raised with the construction of the quay wall in the 1800s. Since then, the site has been used for a number of industrial activities. It is currently used as a store for Hickey's since 1976. It is proposed that site will be developed in the future for the construction of a mixed-used development comprising of commercial and residential units.

The PSA is a desk-based study and used a number of information sources including previous ground investigation reports, publicly available data sources and information gained from site walkovers and interviews with staff who have worked on the site since the 1970s.

The desk study concludes that there are a number of potential sources of contamination on site, particularly in the made ground where previous environmental soil and groundwater testing have shown petroleum hydrocarbons, polycyclic aromatic hydrocarbons and heavy metal contamination. Much of the contamination may be linked to previous site activities such as the iron works and printing. A recent asbestos survey in early 2019 showed that many of the buildings contain asbestos materials which is typical given the age of the buildings and the construction practices of that time.

A preliminary CSM was developed which identified the potential pathways for contamination on site including the made ground, gravel strata and groundwater flow. Potential receptors of the contamination on site include the current site staff, future site users as well as the groundwater and the River Liffey estuary. Pollutant linkages were highlighted where a source, pathway and receptor could be identified. Such pollutant linkages pose a potential risk to receptors including future site users.

The CSM also identified information gaps where additional information is required to confirm the potential pollutant linkages and the potential risks. The PSA concludes with a number of recommendations for the next steps that should be taken to confirm the findings of the PSA by carrying out a ground investigation.

EPA Contaminated Land & Groundwater Risk Assessment Methodology		Report Reference	Report Date	Status
STAGE 1: SITE CHARACTERISATION & ASSESSMENT				
1.1	PRELIMINARY SITE ASSESSMENT	265381-00_Preliminary Site Assessment Final	15 May 2019	Draft
1.2	DETAILED SITE ASSESSMENT			
1.3	QUANTITATIVE RISK ASSESSMENT			
STAGE 2: CORRECTIVE ACTION FEASIBILITY & DESIGN				
2.1	OUTLINE CORRECTIVE ACTION STRATEGY			
2.2	FEASIBILITY STUDY & OUTLINE DESIGN			
2.3	DETAILED DESIGN			
2.4	FINAL STRATEGY & IMPLEMENTATION PLAN			
STAGE 3: CORRECTIVE ACTION IMPLEMENTATION & AFTERCARE				
3.1	ENABLING WORKS			
3.2	CORRECTIVE ACTION IMPLEMENTATION & VERIFICATION			
3.3	AFTERCARE			

1 Introduction

1.1 Project Contractual Basis and Personnel Involved

Arup have been commissioned by Chartered Land to prepare a Preliminary Site Assessment PSA for the Hickey site at No. 43 Parkgate Street, Dublin 8.

Historic Ground Investigations (GI) across the site are presented in Appendix A. Gaps have been identified in the historic reports and a further stage of GI is set out in Table 8. A Detailed Site Assessment (DSA) will follow on from this recommended GI incorporating the findings of that investigation into the Conceptual Site Model (CSM) presented in this report.

The Arup personnel working on the project are summarised in **Table 1**.

Table 1: Arup Personnel

Personnel	Experience
EurGeol Eoin Wyse, BSc, PGeo,	Eoin Wyse has 14 years' experience in contaminated land. He has extensive experience in site assessment and the management of contaminated land. He is a Professional Geologist and is on the IGI Register of Professional Qualified Geoscientists/Competent (in respect of environmental risk assessment for regulated and unregulated waste disposal and contaminated land).
Alexandra Fleming BSc, MSc	Alexandra has 4 years' experience as an environmental consultant with a masters focusing on land contamination. She has assisted in the preparation of a number site assessment reports.
EurGeol Gerry Baker, MSc, BA, PGeo	Gerry Baker has 17 years' experience in the field of hydrogeology. His main areas of expertise are in groundwater modelling (conceptual, analytical and numerical) and hydrogeological risk assessment. He is a Professional Geologist and is on the IGI Register of Professional Qualified Geoscientists/Competent (in respect of environmental risk assessment for regulated and unregulated waste disposal and contaminated land).

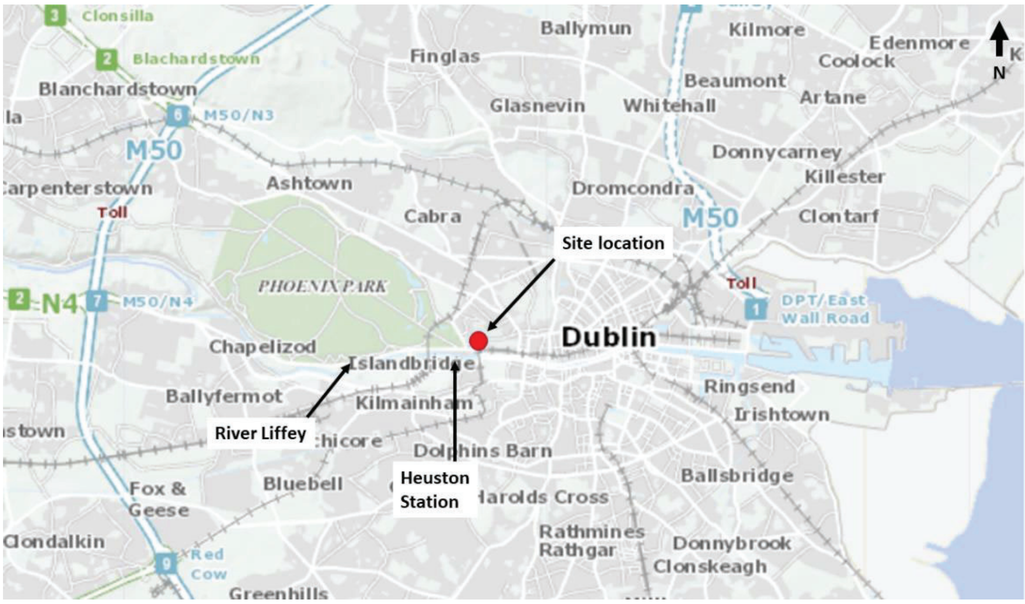
1.2 Background Information

This report is a PSA of the Hickey Fabrics Ltd site at No. 43 Parkgate House, Parkgate Street, Dublin 8. The site is located on the north bank of the River Liffey approximately 7 kilometres east and upstream of the River Liffey discharge point to the Irish Sea, refer to **Figure 1** below.

The land has been reclaimed from the River Liffey estuary and the ground level raised in the early 1800s for industrial use. For most of the 1800s an iron works operated on the site followed by a wool worsted (1900-1910), munitions factory (1916-1919), government store (1920-1930) and printing works (1930-1970s) until Hickeys took over the site to use as a store.

The site is currently in use as a store for the Hickeys businesses, Hickeys Fabrics and Home Focus. The site is owned by Chartered Land and currently leased to Hickeys Fabrics from the 1970s to the present day.

Figure 1: Site location at 43 Parkgate Street, Parkgate Road, Dublin 8. | Source GeoHive/Ordnance Survey Ireland | Not to scale



Arup has previously prepared two reports regarding the geo-environmental conditions of the site in 2003 and 2006. These reports are discussed in further detail in Section 2.1.2 and Section 5. In August 2018, Arup were asked by Delaston Limited, Quadrant Real Estate Advisors LLC and lender (QREA Ireland DAC) along with The Davy Platform ICAV, (together, the “Addressees”) to review the previous geotechnical and environmental assessment by Arup (2006), as discussed above comment on any legislative or technical changes which may have an impact on the redevelopment of the site.

Following on from this review, Arup were asked to prepare a PSA for the site with respect to the potential for land contaminations risks associated with the current site and future users based on the proposed development

This PSA has been prepared in accordance with the following guidance:

- *Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites* [1], Environmental Protection Agency 2013; and
- *Code of Practice, Environmental Risk Assessments for Unregulated Waste Disposal Sites*[2] (EPA, 2007), (referred to as the ‘CoP’).

[1] EPA (2013) Guidance on the Management of Contaminated Land and Groundwater at EPA Licensed Sites. Available at: https://www.epa.ie/pubs/advice/waste/contaminatedland/contaminatedland/Guidance_on_the_Management_of_Contaminated_Land_and_Groundwater_at_EPA_Licensed_Sites_FINAL.pdf

[2] EPA (2007) Code of Practice, Environmental Risk Assessments for Unregulated Waste Disposal Sites. Available at: https://www.epa.ie/pubs/advice/waste/waste/EPA_CoP_waste_disposal_sites.pdf

1.3 Project Objectives

The objectives of this PSA Report are to:

- Identify areas of contamination within the Parkgate Street site based on the historically available data;
- Present the preliminary CSM for the site in the context of future development of the site;
- Establish if there are any potentially unacceptable risks to current or future site users; and
- Set out the rationale for the scope of a detailed site investigation.

1.4 Scope of Works

The scope of works involves the preparation of a stage 1 contaminated land PSA in accordance with the EPA template ('Stage 1 Template for Preliminary Site Assessment Report[3]') and the CoP[4] (EPA, 2007)

This includes:

- A review of published information regarding the former activities on the site;
- A review of the results of previous site investigations and assessments available on the public register;
- A review of previous site investigations and site assessments previously prepared by Arup;
- Site walkover;
- Development of a preliminary CSM (See Appendix B); and
- Design of an intrusive site investigation to further refine the Preliminary CSM.

In undertaking this assessment, the project will consider past activities and land uses.

A summary of key background information and previous reports prepared in relation to the site is included throughout this report where relevant and in line with EPA guidance listed above.

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[3] EPA (2013) Management of Contaminated Land & Groundwater at EPA Licensed Sites (http://www.epa.ie/pubs/advice/waste/contaminatedland/contaminatedland/)
[4] EPA (2007) Code of Practice, Environmental Risk Assessments for Unregulated Waste Disposal Sites. Available at: https://www.epa.ie/pubs/advice/waste/waste/EPA_CoP_waste_disposal_sites.pdf

2 Source Audit Findings – Production and Operational History

2.1 Source of Information

2.1.1 Publicly Available Information

The following sources of information were reviewed:

- Bing Maps, aerial photography.
- Google Maps, aerial photography.
- GeoHive/Ordnance Survey Ireland, historic mapping including:
    - Historic 6 Inch Cassini (1830s-1930s);
    - Historic 6 inch (1837-1842);
    - Historic 25 inch (1888-1913); and
    - Aerial Imagery, Ordnance Survey Ireland (1995).
- Geological Survey of Ireland (GSI) - Geological maps of the site area produced by the Geological Survey of Ireland including:
    - Quaternary geological maps;
    - Bedrock mapping;
    - Groundwater Data Viewer;
    - Karst Database;
    - Geotechnical Data Viewer; and
    - Goldmine.
- Environmental Protection Agency – EPA soil and subsoil database; licensed industrial and waste facilities database and water quality records.
- National Parks and Wildlife Service (NPWS) - Protected ecological sites.
- Dublin City Development Plan 2016-2022 (2016) Dublin City Council.
- Dublin City Council Planning Application Database.

Ground investigation data is included as **Appendix A** to this report and discussed in Section 5.

2.1.2 Previous Reports

The following previous site investigations have been used to inform this report:

- Arup Consulting Engineers (2003) Site Investigation Report, Parkgate Street Development for Hickeys Fabrics & Co. Ltd., refer to **Appendix A**.
- Arup Consulting Engineers (2006) Geotechnical and Environmental Assessment Report for Hickeys Fabrics & Co. Ltd., refer to **Appendix B**.

- Historical ground investigation reports from the GSI's Goldmine and the Geotechnical Data Viewer databases, refer to Section 5 for further detail.

2.1.3 Site Visits

Arup staff visited the site on a number of occasions between January and April 2019 and spoken with those who work on the site. The purpose of the site walkovers was to identify potential sources of contamination and inform the design of an intrusive site investigation.

Previous site walkovers were also undertaken by Arup staff in August 2002 and this information was also use in this report. The site visits identified a number of features on the site which are described in Section 3.5 below. A number of photographs are presented in **Appendix C**.

3 Source Audit Findings – Production and Operational History

3.1 Current Site Operations

The site is currently under the ownership of Chartered Land and has been leased to Hickey Fabrics since 1976 until the present day. It is currently used as a warehouse for the Hickey Fabrics and Hickey at Home Focus retail businesses. Refer to **Figures 7** and **8** in **Appendix E**.

This section describes the current site operations in the context of potential contamination.

3.1.1 Storage Tanks

In 2002, a site reconnaissance was conducted by Arup with a site representative from Hickey Fabrics Ltd. This information was included in the 2003 site assessment report by Arup and is summarised below unless otherwise stated. More recent walkovers including in May 2019 have been carried out and the findings are presented below.

There are three Underground Storage Tanks (USTs) located beneath the site. One UST is located adjacent to the garage/paint room (No.1) and is no longer in use according to site staff. The UST No.1 may have been operated through a pump which still stands in the garage, refer to **Photograph 9** in **Appendix C**. It is believed that the UST No.1 was used for diesel fuel for the vehicles of the former print works.

The second UST (No.2) is still in operation and is located adjacent to the old generator room, refer to **Figure 7**. The tank was originally used for the site generator (located in the old generator room), but the system was later changed, and it is currently used to fuel the boiler located in the boiler house No. 2 (refer to Figure 7). The generator is no longer in use.

A third UST is believed to be located in front of the warehouse according to staff on site, however the exact location is unknown. According to a Hickey's staff member, the tank was not operated by Hickeys since they took over the site in 1976.

Pressure tests carried out in 2005 on both tanks showed that there were no significant leaks (Arup, 2005). It is not known whether any testing on the USTs have been carried out since. Details of the USTs are summarised below:

Table 2: Underground storage tanks (UST) details

Tank ID	Location	Capacity	Year Installed (approx.)
UST No.1	Adjacent to garage	300 Gallons (1,365 litres)	Pre-1976
UST No.2	In front of generator building	5,000 Gallons (22,730 litres)	Pre-1976
UST No.3	Unconfirmed location.	Unknown	Unknown

Four Above-ground Storage Tanks (AST's) are located on the site, refer to **Figure 7** in **Appendix E** and **Table 3** below. Three (No. 1, 2 and 4) are currently used to store heating oil for the buildings. The fourth tank (AST No. 5) is located in the south-eastern tip of the warehouse building, Refer to Figure7 in **Appendix E**. The fifth AST (AST No. 5) was located adjacent to the old office/residence but has been removed but the tank pedestals (concrete blocks) remain.

The Historic 25 inch Map (1888-1913) notes a 'Tank' located in front of the new warehouse. It is not clear whether this is an AST or UST, refer to **Figure 3** below.

Table 3: Above-ground Storage Tanks (AST) details

Tank ID	Location	Capacity	Year Installed (approx.)
AST No.1	North side of boiler house No.1	Plastic 300 Gallons (1,365 litres)	< 25 years ago
AST No.2	South side of boiler house No.1	Plastic, 300 Gallons (1,365 litres)	< 25 years ago
AST No.3	Adjacent to old office / residence. The tank has since been removed.	Unknown – Tank pedestals remain in place. Refer to Photograph 6 in Appendix C.	Unknown
AST No.4	Inside boiler house No.2.	Metal – 100 gallons	Unknown
AST No.5	Southeast tip if site within the New Warehouse	Metal 1,800 Gallons (8,000 litres). Refer to Photograph 13 in Appendix C.	1976

3.1.2 Former Office/Residence

This building was constructed around 1820 as the house of the Phoenix Iron Works manager/owner. It is now vacant and unused. The interior has deteriorated significantly. The building is listed in the National Inventory of Architectural Heritage (NIAH)[5]. Refer to **Figure 5** in **Appendix E**.

3.1.3 Garage/Paint Room

This building covers an area of approximately 50m^2 and has a concrete floor. The fuel pump from UST No.1 is located inside the garage (**Photograph 9**, **Appendix C**).

[5] National Inventory of Architectural Heritage (NIAH), Registration No. 50060347. Available at: http://www.buildingsofireland.ie/niah/search.jsp?type=record&county=DU&regno=50060347

The asbestos survey carried out in January 2019 identified cement slates on the roof that contain asbestos material (chrysotile), refer to **Section 5.2.4** and **Appendix F** for the asbestos survey report (2019). Small amounts of oil staining around the fuel pump were observed from outside during the 2002 site walkover. Refer to **Figure 5** in **Appendix E**.

3.1.4 Old Generator Room

This building covers an area of approximately 80m^2 and has a concrete floor which in partly tiled. It is currently used as a maintenance shop and for storage of miscellaneous items. According to Hickey Fabrics Ltd, the building formerly housed two large generators and an electricity board that was located on the east interior wall. The generator provided electricity to the site and a conduit/channel cut approximately 0.3 metres into the floor runs through the length of the building in an east-west direction. This conduit is covered with wooden slats and a small portion that was accessed for visual observation showed no signs of staining or odours during the 2002 site inspection by Arup, refer to **Photograph 14** in **Appendix C**. Behind the wall upon which the electricity board was housed are three small storage rooms that connect to the old storage area. Refer to **Figure 5** in **Appendix E**.

3.1.5 Boiler Houses

There are two boiler houses located on site; one adjacent to the former office/residence (No. 1) and the second is adjacent to the main warehouse (No. 2), refer to **Photograph 11** and **Photograph 12** in **Appendix C** and **Figure 5** in **Appendix E**. A photograph of the boiler house (No. 2), west and adjacent to the warehouse, taken in 2002, show staining on the walls of the building, (**Photograph 11**).

3.1.6 Old Storage Area

The old storage area covers approximately 760m^2 and comprises between eight to ten storage rooms located on ground floor and first floor level. The ground floor is concrete, and the upper floors are constructed in timber. The rooms are currently used for storage of furniture and clothes. Access to this portion of the site is from outer doors located adjacent to the boiler house (No.2) and from the interior of the 'new warehouse'. No storage tanks were identified in this area. Refer to **Figure 5** in **Appendix E**.

3.1.7 New Warehouse

This building covers over one half of the total surface area of the site i.e., approximately 2,500m^2. The Hickey Fabric's offices are located in the northwest corner of this building, adjoining Parkgate Street. The remaining area of the warehouse is open plan with an elevated ceiling and is currently used for the storage and display of fabrics. Access to this warehouse is from the site parking area, through the old storage area and a pedestrian access door at the south-eastern tip of the building.

One above ground storage tank (AST No. 3) is located at the south-eastern tip of this building adjacent to the pedestrian access door. A former train track once operated along the south boundary of this building, adjacent to the River Liffey. Refer to **Figure ?** in **Appendix E**.

According to information provided by Hickey Fabrics Ltd. this building housed the main elements associated with the former print works, which operated at the site. The main printing machine was located in the centre of the warehouse and lead melting for the print press was conducted along the north-eastern boundary wall.

3.2 Previous Site Operations

A history of the site was prepared by in the Arup Consulting Engineers (2003) and is summarised in **Table 4** below.

Table 4: Summary of site history at No. 43 Parkgate Street

Date	Site History
Early 1800s	2-5m of fill was used to raise the levels across the site above the River Liffey floodplains.
1800s – 1890 (approximate)	Phoenix and Royal Iron Works As shown on Figure 2, the Historic Map 6 Inch Colour (1837-1842)
c.1820	Construction of the Phoenix Iron Works manager's house located the in the north-west of the site. Listed under the National Inventory of Architectural Heritage (NIAH), Reg. No. 500060347.
c. 1895	Construction of the electricity sub-station east of the site. Listed under the National Inventory of Architectural Heritage (NIAH), Reg. No. 500060350
1900 - 1910	Woollen worsted manufacturing by Knightsbridge Mills
March 1916 – March 1919	Ireland National Shell Factory, Dublin, manufacturing 9.2 inch shells and fuses.
1920-1930	Government Stores
1930 -1970s	Printing works, refer to Figure 5 As shown in OSi Cassini 6 inch (1830s – 1930s)
Mid 1970s - Present	Hickey Fabrics warehouse.

Directly to the west of the site currently lie No.'s 41 and 42 Parkgate Street. Historic maps show that this site was also part of the Phoenix Iron Works (**Figure 2**, Historic Map 6 inch, 1837-1842) and later the Lucan Dairy Depot (**Figure 4**, OSi Cassini 6 inch).

Further west of the site along Conyngham Road, was the location of a chemical works around the early 1800s; no further information about these works was found. A chemical factory was also noted on the northern side of Parkgate Street, the use of which was recorded as chemical manufacturing and chemical importing at various times.

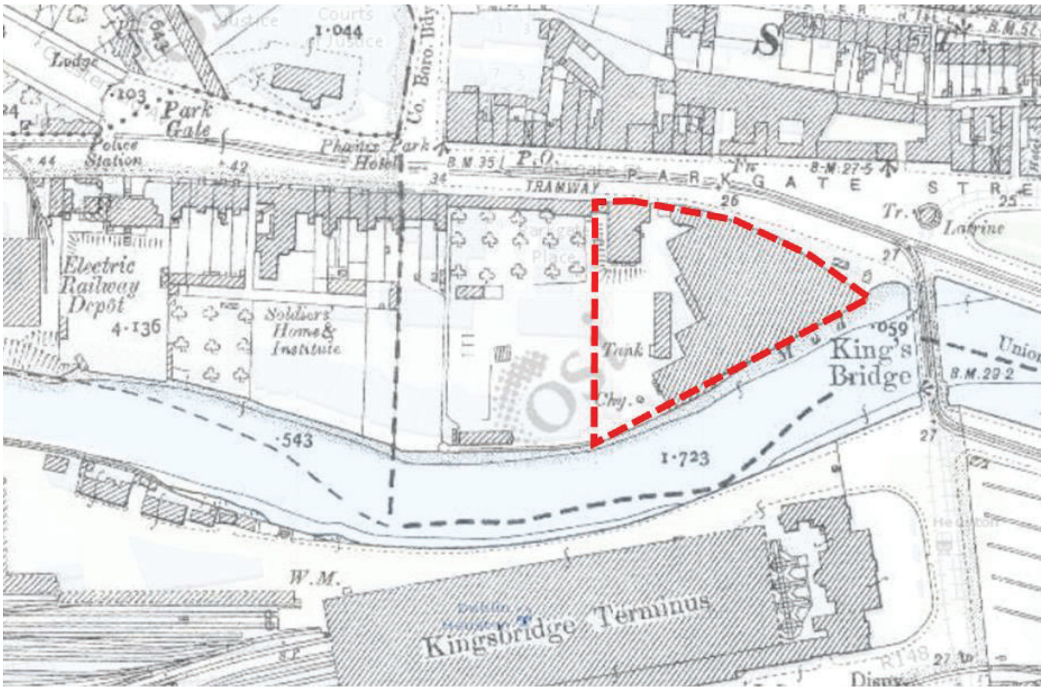
The iron works were in operation from approximately the 1880s to 1890. Following the iron works the site was used as a mill under Knightsbridge Mills from approximately 1900-1910.

Figure 3 shows that in the past, the site was in proximity to several other garages and depots (bus and electric railway), both on Conyngham Road and on the northern side of Parkgate street. Within the site, a tank and chimney are noted on the map.

During World War I, the site was used for the manufacture of munitions for the British Army from mid-1915 until 1919 when operations ceased, refer to **Photograph 1** below, from the Imperial War Museum archives. The site was then used as a government store until the 1930s when the printing works began.

Figure 2: Historic Map 6 inch (1837-1842) showing the approximate site boundary | Source GeoHive, Ordnance Survey Ireland | Not to scale

Figure 3: Historic Map 25 inch (1888-1913) showing the approximate site boundary | Source GeoHive, Ordnance Survey Ireland | Not to scale



Photograph 1: Photograph of the National Shell Factory on the River Liffey at Parkgate Street, c.1917-1919. | Source Imperial War Museum © IWM

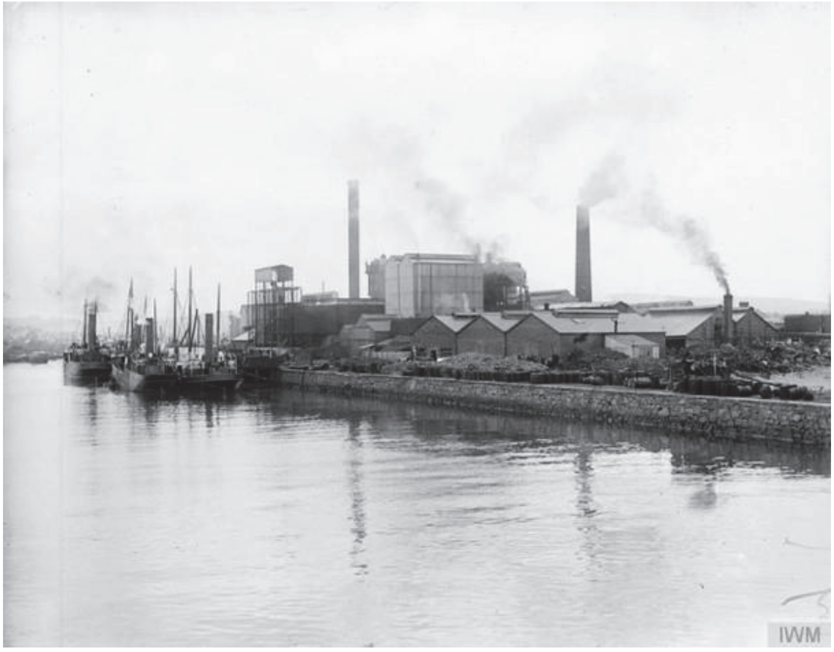


Figure 4: Historic Map 6 inch Cassini (1830s-1930s) showing the approximate site boundary | Source GeoHive, Ordnance Survey Ireland | Not to scale

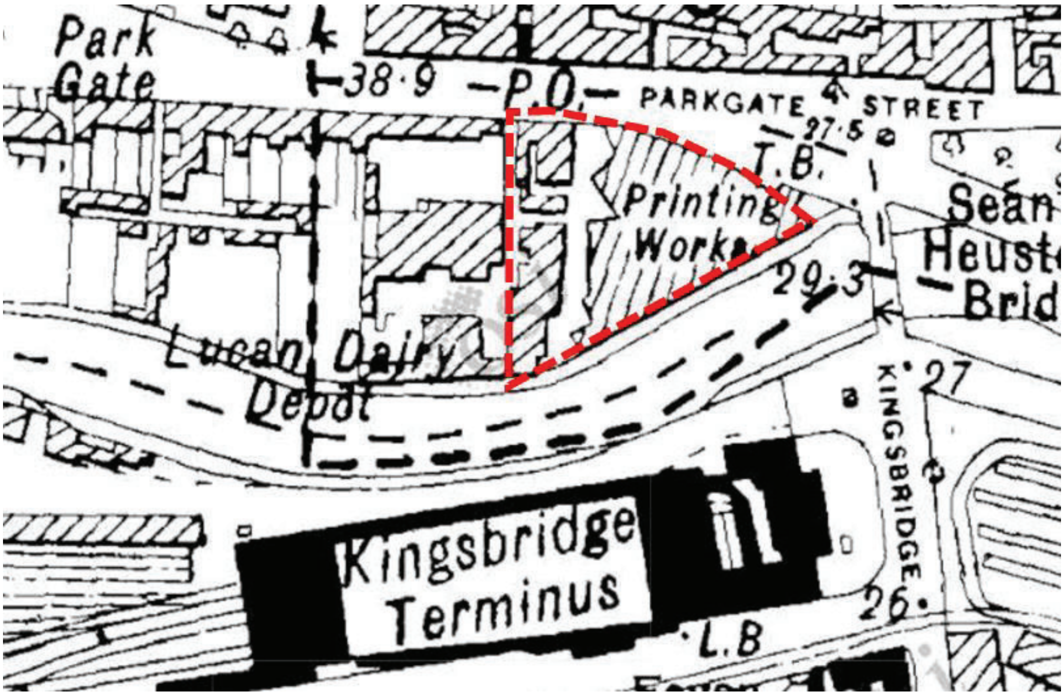


Figure 4 shows that the warehouse has been extended and the site is used as a printing works (1930s-1970s). The Lucan Dairy Depot is shown to be located west of the site at the time this map was created.

Hickey Fabrics took ownership of the site in the 1970s and it has since been used as a warehouse for Hickey's stock up until the present day.

3.3 Other Features and Events

Information procured by Arup from Dublin City Council, during a previous desk study (Arup, 2003), shows that a soil and groundwater investigation and remediation was conducted at the former adjoining Maxol station at No. 42 Parkgate Street, refer to **Figure 7** in **Appendix E**. Office blocks are now built of the site. The former Maxol station extended from Parkgate Street to the quay wall of the River Liffey. A Hickey staff member recalls that storage tanks were located in the area near the quay wall and trucks accessed this area, presumably to unload/fill. It was observed that at the time this tank farm and unloading/filling area was at a lower ground level than the Hickeys site. The Parkgate Complex apartments were built on this area of the site at No. 42 Parkgate Street and are located on an underground car park.

A report entitled 'Environmental Review and Remediation Proposal' dated June 1997, and subsequent correspondences indicate that on-site sources/events that contributed to soil and groundwater contamination include 'a major petroleum leakage', former packaging operations, leakages from AST's and heavy lube oil storage. Groundwater samples taken from monitoring wells within 10m of the Hickey site boundary showed values of volatile organic compounds (VOCs) of up to 9,850µg/l (MW5 located to the southwest corner of the Hickey site) (Arup, 2006).

The planning application (Ref 1728/97) made by Asondale Developments for No.42 Parkgate Street for the mixed-use development included the demolition of the Maxol Service Station. The development was granted planning in March 1998 and part of the planning conditions included the remediation of the site in advance of construction to the 1994 Dutch S Standards for soil (mineral oils (50 mg/kg dry material); PAH's - total of 10 (1 mg/kg dry material) and BTEX (each 0.05 mg/kg)) and ground water (mineral oils (50 µg/l), 10 individual P.A.H.'s as listed and BTEX (each to 0.2 µg/l)). The developer was required under planning to obtain certification that each sub-site of the site complied with the specified standards before development.

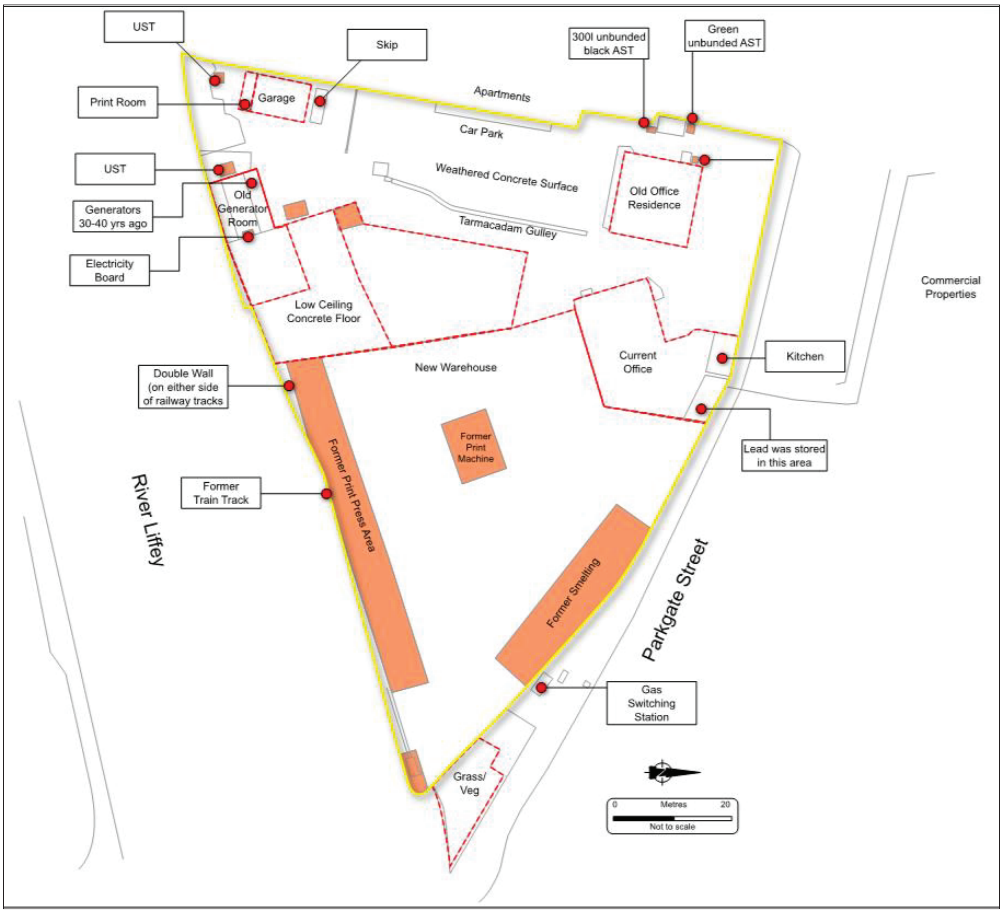
3.4 Chemicals of Potential Concern

This section summarises the contaminants of concern associated with the previous activities on the site and information gathered during site walkovers, refer to **Table 5**. Refer to **Figure 2** to **5** for the location of the historic activities.

Table 5: Chemicals of potential concern identified during the desk study

Activity	Source	Contaminant(s)
Land reclamation	Fill was used on site to raise the ground levels from 2-5m above the original. Unknown sources of fill. Potentially river dredge material.	Unknown Potentially high organic content.
Phoenix Iron Works (1800s – 1890)	Iron making, casting, rolling and finishing	Heavy metals (including Fe, Pb, Al, Cr, Cu, Mn, Mo, Ni, Sn, V and Zn) Polycyclic aromatic hydrocarbons (PAHs)
Electricity Substation (c.1895-Present)	Electrical transformers	Polychlorinated Biphenyls (PCBs)
Woolen Worsted (1900-1910)	Dying fabric, bleaching. Machinery maintenance	Organic compounds
Munitions factory (March 1916-1919)	*"Chemical works: Explosives, propellant and pyrotechnics manufacturing works"*	Nitric and sulphuric acids Organic solvents (e.g. acetone); Organic compounds (e.g. hexamine, toluene or glycerine); and Fuels (liquid hydrocarbons) Inorganic compounds (e.g. ammonium nitrate, sodium nitrate) Metals (lead, copper).
Printing Works (1930s - 1970s)	Printing metals, lead smelting, machinery maintenance.	Metals (including Fe, Pb, Al, Cr, Cu, Mn, Mo, Ni, Sn, V and Zn)
Maxol Garage (1970-1990s)	Fuel leak from an underground storage tank (unconfirmed)	Diesel or petrol
Heating system (1970's to present)	Above ground storage tanks (5), refer to Table 4.	Kerosene fuel
Fuel storage (1970's to present)	Underground (3) ground storage tanks, refer to Table 3.	Diesel to refuel vehicles.

Figure 5: Summary of the location of the historical activities on the site. | Not to scale.



3.5 Planning History

In 2006, a planning application was submitted to Dublin City Council (DCC) for a mixed use residential and commercial development at No.43 Parkgate Street (Planning Ref. 3613-06). As part of that planning application, Arup prepared the planning report which included a geotechnical and environmental assessment of the site. This report incorporated the results of the site investigation carried out under the direction of Arup and presented in the 2003 report. The planning application was granted by DCC in December 2006.

The planning permission (Planning Ref. 3613-06) in was subsequently appealed and overturned by An Bord Pleanála (ABP) in September 2007 (Case Ref. PL29N.221587) on two grounds as stated in the Inspector's Report,

1. In relation to the location of the proposed development "*on a significant visual connection running from the City Quays to the Phoenix Park and Wellington Monument*", the Inspector's Report stated that "[T]*he proposed development would therefore, seriously injure the amenities of the area and be contrary to proper planning and sustainable development in the area*."

2. In relation to the proposed part demolition of a protected structure (riverside stone wall) and to relocate a protected structure (entrance stone arch) within the site, "…… [T]*he proposed development would, therefore, interfere with a view or prospect of special amenity value which it is necessary to preserve, would seriously injure the amenities of the area and be contrary to proper planning and sustainable development of the area*."

4 Site Environmental Setting

The following section describes the site and environmental settings of the site in a local and regional context. The relevant **Figure 7** to **20** are presented in **Appendix E** of this report.

4.1 Site Location

The site is located on the original floodplain of the River Liffey. The site is approximately 7km east of the River Liffey discharge point to the Irish Sea. There is one main access point to the site, from Parkgate Street. Access through the stone arch is not permitted. The public do not have access to the site.

The River Liffey forms the southern boundary of the site and Parkgate Street runs parallel to the northern site boundary. Sean Heuston Bridge (Luas crossing and pedestrian only) is located 20m of the east tip of the site, refer to **Figure 7** in **Appendix E**. The Frank Sherwin Bridge which permits vehicular access to the southside of the Liffey is located approximately 100m further downstream of the site. Refer to **Figure ?** in **Appendix E**. A Dublin Bikes Stand is located on Parkgate Street and in proximity to the northern boundary of the site. A substation is located adjacent to the northern boundary at the eastern tip of the site. There is a small cluster of trees located at the eastern boundary of the site which are separated from the footpath by railings.

The site is located in a built up urban environment. West of the site is an apartment complex, Parkgate Complex, and commercial office buildings at Parkgate Place, presently occupied by Transport Infrastructure Ireland (TII). Parkgate street is lined with two and three storey buildings used for retail and potentially some residential apartments over the ground floor retail units.

Significant landmarks in proximity to the site include the Criminal Courts and Phoenix Park, located approximately 200m north-east of the north-western tip of the site. East of the site is Collins Barracks. Heuston Station opposite the southern boundary site, on the southern bank of the River Liffey.

4.2 Regional Geology and Hydrogeology

4.2.1 Geology

According to the GSI database, the site is underlain with the Lucan Formation, dark limestone and shale. Due to proximity of the site to the River Liffey, there is a strong likelihood of glacial and alluvial gravels also being present. Refer to **Figure ?** in **Appendix E**.

4.2.2 Soils and Subsoils

According to the EPA soil map, the soils and subsoils in the vicinity of the site are described as made ground. Tills derived from limestone are also shown to be in the vicinity as well as an Alluvium channel to the northwest of the site as indicated by the EPA Soil and sub-soils databases respectively. Refer to **Figures 10** and **11** in **Appendix E**.

The GSI GeoUrban Depth to Bedrock database indicates that the bedrock is overlain by 5-10m of tills and/or alluvium as well as made ground. Refer to **Figure 17** in **Appendix E**.

4.2.3 Hydrogeology

The GSI Groundwater Data viewer shows that the site is located on a Locally Important (LI) aquifer that is moderately productive in local zones. Under the Water Framework Directive (WFD), groundwater bodies (GWB) have been identified for each river basin district. The WFD classification has four aquifer types: karst, productive fissured, poorly productive and sand and gravel. The site is classified as being located on a poorly productive aquifer. Refer to **Figure 12** in **Appendix E**.

4.2.3.1 Groundwater Recharge

Recharge is the amount of rainfall that replenishes the aquifer. It is a function of the effective rainfall, the permeability and thickness of the subsoil and the aquifer characteristics.

According to the GSI groundwater recharge database, the recharge to the area is 68mm/yr which accounts for approximately 20% of the effective annual rainfall (341mm/yr) over the area. The maximum recharge capacity for the area is 200mm/yr. Refer to **Figure 13** in **Appendix E**.

4.2.3.2 Aquifer Vulnerability

Aquifer vulnerability is a relative measure of the susceptibility of groundwater in the bedrock aquifer to contamination by human activities. This depends on the aquifer’s intrinsic geological and hydrogeological characteristics.

The vulnerability is determined by the permeability of any overlying deposits. For example, bedrock with a thick, low permeability, clay-rich overburden is less vulnerable than bedrock with a thin, high permeability, gravelly overburden.

According to the GSI database, the groundwater vulnerability under the site is low in the northern side of the site to moderate vulnerability in the southern half of the site. Refer to **Figure 14** in **Appendix E**.

4.2.4 Sensitive Features – Groundwater Dependent Habitats

Groundwater dependent ecosystems are defined as habitats or species that are dependent on groundwater to maintain the environmental supporting conditions required to sustain that habitat and/or species.

The National Parks and Wildlife Service (NPWS) database was consulted to establish whether there are areas with national or international important ecological sites in proximity to the study site. Under the Habitats Directive (92/43/EEC) and the EU Birds Directive (79/409/EEC), Member States are required to establish a Natura 2000 network of sites of highest biodiversity importance for rare and threatened habitats and species across the EU. In Ireland, the Natura 2000 network of European sites includes Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

There are no European sites, within 1km of the site. The closest European ecological site is the South Dublin Bay and River Tolka Estuary SPA (site No. 004024) and the South Dublin Bay SAC (site No. 000210) which are approximately 7km downstream of the site, in Dublin Bay. Refer to **Figure 15** in **Appendix E**.

In Ireland, areas considered nationally important for the habitats present or holds species of plants and animals who habitat needs protection, are granted protection under the Wildlife (Amendment Act) 2000. Such areas may be designated Natural Heritage Areas (NHAs) or proposed NHAs (pNHAs). Under the Wildlife Amendment Act (2000), NHAs are legally protected from damage from the date they are formally proposed for designation. There are no NHAs or pNHAs within 1km of the site. The nearest downstream NHA or pNHA is the South Dublin Bay pNHA (site code 000210) which includes lands that are part of the South Dublin Bay SAC and South Dublin Bay and River Tolka Estuary SPA.

4.2.5 Sensitive Features – Groundwater Abstractions

Based on the GSI database there is one well listed within 1km of the centre of the site. The exact location is unclear as the well location in the GSI database is only accurate to 500m however North Brunswick Street is recorded as the address, which is approximately 750m north east from the site boundary. This well is reported as having a ‘good’ yield of 393m^3/day and understood to be drilled for industrial use. The source of water is from bedrock which is reported to be 2.5mbgl. Refer to **Figure 16** in **Appendix E**.

The site is not located over or in the vicinity of a groundwater supply protection area or National Federation of Group Water Schemes source protection zones.

4.3 Site Geology and Hydrogeology

Site specific geological information is summarised from the report by Arup Consulting Engineers (2003) which contains the result of the geotechnical and environmental assessment.

4.3.1 Soils and Geology

Records show that between 2-5 metres of fill (man-made deposits) was placed on the original ground around the flood plain to raise ground levels to present day elevations (Arup, 2003).

A summary of the stratigraphy of the ground conditions is presented in **Table 6**. It should be noted that all geotechnical site investigation took place in the yard to the western end of the site. The presence of the main building prevented further geotechnical investigation in the remainder of the site.

Table 6: Ground Stratigraphy Summary for No.43 Parkgate House. Source: Arup Consulting Engineers (2003)

Stratum	Thickness (m)	Max. depth to top of stratum (mOD Malin) (approximate)
MADE GROUND consisting of clayey sandy gravel with bricks, cobbles and ash.	2.0 – 4.0	Ground level (3.3 – 4.8mOD)
* Sandy CLAY – soft to firm / stiff sandy CLAY	* 0.5 – 2.0	* 0.8mOD
* SILT – soft grey SILT	1.0 – 4.0	*1.0mOD
GRAVEL – medium dense sandy fine to coarse	1.0 – 4.0	-0.16mOD
* SILT - soft grey SILT	*0.3	*-2.4mOD
GRAVEL – medium dense sandy fine to coarse sub rounded GRAVEL	*0.7	*-2.7mOD
LIMESTONE – strong to locally moderately strong thickly to locally thinly bedded, grey to dark grey fine-grained LIMESTONE fresh to locally moderately weathered.	4.5m +	-3.43mOD

* The above sequence represents the general order of occurrence of the strata below ground surface; however, one or more of the units may be absent at specific locations/

As discussed in **Section 3.2**, the site levels are known to have been raised 2-5m from the original ground level, using fill in the 1800s. This was reflected in the ground conditions; the fill (made ground) was shown to be of varying thickness across the area of the site investigated. The made ground comprised of bricks, cobbles and ash in a clayey sandy gravel matrix.

According to the Dublin Depth to Bedrock mapping (GSI), bedrock is approximately 5-10mbgl and 10-15mbgl for the southern section of the site, refer to **Figure** ? in **Appendix E**.

Gravels were noted as being encountered across the site. The SI (Arup, 2003) confirmed the presence of the limestone bedrock underlying the site as per the GSI database, refer to **Appendix A**.

These gravels may be associated with a meltwater channel that flowed from north-west to south-east to the River Liffey, potentially flowing through the site towards the river channel as shown from the EPA soil mapping. Refer to Figures 10 and 11 which show the alluvium channel to the north-west of the site.

4.3.2 Hydrogeology

Based on the logs from the 2003 GI by IGSL (**Appendix A**), there are likely to be two main aquifers in the area around the study site; the limestone bedrock and overlying gravel stratum.

The limestone bedrock was noted as being highly fractured in nature, which will have effect of causing a localised increase in permeability and storage capacity.

Three in-situ variable head permeability tests were performed in the gravel strata on each of the 3 No. boreholes (BH1, BH5, BH7) tested on three dates (17, 27 & 30 March 2003) by IGSL with the water escaping so quickly that measurements could not be made. This suggests the material to have a permeability in of approximately 10^{-4} m/s.

The groundwater gradient in the upper gravel aquifer at low tide is believed to be south to southeast, towards the River Liffey.

Three rounds of ground gas and groundwater level monitoring was carried out over almost three weeks (18 days) on site during the 2003 GI by IGSL. No tidal information was presented. Borehole logs recorded water strikes at depths of between 4.0 and 4.5mbgl approximately and standing water levels of between about 2.4 and 3.7mbgl with no tidal information presented.

Boreholes carried out by Site Investigations Limited in November 1973 (GSI Report No. 760), on the adjoining land, west of the site, revealed water strikes at depths of between 4.3mbgl and 4.6mbgl approximately and standing water levels of between about 4.3mbgl and 4.9mbgl with no tidal information presented. Water levels may fluctuate on a seasonal basis and may be found at depths deeper or shallower, depending on rainfall and surrounding hydrogeological conditions. Refer to **Figure 20** in **Appendix E** for the borehole locations.

4.3.3 Hydrology and Water Quality

The local water body is the River Liffey, which forms the southern boundary of the site and discharges into the sea approximately 7km downstream to the east. The site is adjacent to a section of the river referred to as the Liffey Estuary Upper as a transitional water body.

The Water Framework Directive (2000/60/EC) requires that all member states achieve good water status in all waters (rivers, lakes, groundwater, estuarine and coastal waters). The overall water quality status for the River Liffey Estuary Upper is classed as ‘moderate’ for the most recently reported monitoring period (2010-2015) under the WFD monitoring programme. The Directive runs in six-year cycles and the second cycle therefore runs from 2016-2021.

4.4 Other Sensitive Features

4.4.1 Licensed Industrial Sites

Diageo Ireland (St. James Gate) (Licence No. P0301-04) at Victoria Quay is the nearest licensed industrial site, approximately 130m south-east of the site. Refer to **Figure 18** in **Appendix E**.

4.4.2 Licensed Waste Facilities

There are no licensed waste facilities is proximity to the site. The nearest waste facility is Sita Environmental Ltd (Licence No. W0035-01) on Sheriff Street Upper, Dublin 1, approximately 3.7km east of the site. Refer to **Figure 18** in **Appendix E.**

4.4.3 Geological Heritage Sites

There are no geological heritage sites (GHS) within the site boundary. The nearest GHS is the Phoenix Park (Code DC009) which is listed as a County Geological Site and recommended for Geological Natural Heritage Area. Refer to **Figure 19** in **Appendix E**.

5 Previous Sampling, Monitoring and Assessment

This section reviews the environmental testing carried out on site as well as materials and substances noted during site walkovers to be stored and used on the site that may contain chemicals of potential concern.

5.1.1 Site Investigations Ltd. (1973) Site Investigation

The GSI online databases, Goldmine and the Geotechnical Data Viewer were checked for historical site investigations within or in proximity to the site. A site investigation (SI) was carried out in November 1973 by Site Investigations Ltd. for Joseph McCullough & Associates at Parkgate Street (GSI Report No. 760). The investigation consisted of 3 No. shell and auger boreholes (BHs 1 to 3) and was undertaken in November 1973. The boreholes were located to the west and northwest of the existing building near the site boundary. The logs reveal the subsurface to consist of 2.4 to 6.1m of FILL overlying natural ground. The underlying soil was found to be quite variable, with layers of silt, sand, gravel and clay (with shells and organics) all encountered. Refer to **Appendix C** and **Figure 20** in **Appendix E**.

5.1.2 Caltex Site Investigation – Report ID 256

The GSI online databases, Goldmine and the Geotechnical Data Viewer showed that 3 No. boreholes were dug adjacent to the site (GSI Report No. 256). The boreholes were dug on the lands to the west of the site. The company name is recorded as Caltex which may be related to the Maxol garage that was located approximately where these boreholes were dug, refer to Figures **8** (location of the former Maxol garage) and **20** (borehole locations) in **Appendix E**.

The records do not show who the carried out the drilling or the technique used, maximum depths recorded were recorded as being between 2.74 to 7.01mbgl.

5.1.3 Arup Consulting Engineers (2003) Geotechnical and Environmental Assessment Report

Arup Consulting Engineers (now Arup), prepared a geotechnical and environmental assessment report in 2003 for No. 43 Parkgate Street.

The ground investigation works were carried out by IGSL Limited (IGSL) in December 2002 under the direction of representatives from Arup Consulting Engineers, Dublin (Arup). The GI consisted of 8 No. shell and auger boreholes (No. 1 to 7, and 8B) and 16 No. window samples (No. 1 to 8, 9B and 10 to 16). Refer to **Appendix A**.

During the GI works, environmental soil sampling was carried out. Analyses were carried out for the purposes soil disposal. However, these tests were carried out before Waste Acceptance Criteria set out in the Council Decision (2003/33/EC) of the Landfill Directive was finalised. The Council Decision (2003/33/EC) specifies a sample preparation of leachates as according to the CEN method. The method used during the 2002 SI was that of the NRA method. While the correct sample preparation was not carried out for waste characterisation, the results serve to indicate the potential chemicals of concern on site.

The following organic contaminants were observed to be present in the soils:

- Mineral Oil – Associated with diesel, turpentine, and fuel oil;
- Polycyclic Aromatic Hydrocarbons (PAHs) – Formed through the incomplete combustion of fossil fuels, typically found in ash and clinker. Also, a component of petrol.

Furthermore, the following heavy metals were detected within the soils associated with the lead works and potentially the print works. The following metals were noted to be present in the made ground:

- Arsenic;
- Chromium;
- Copper;
- Lead; and
- Zinc.

Concentrations of these metals were found to exceed the Dutch Intervention Values (DIV). The DIV values were used in Holland as Generic Assessment Criteria for sites and represented concentrations above which there would be an unacceptable risk to human health and the environment, assuming a final use of residential and including for potential plant uptake. DIV exceedances of arsenic and chromium were isolated to one sample respectively. Elevations of copper was noted in 3 No. samples which exceeded the DIV threshold (190mg/kg Cu) while 6 No. samples contained concentrations of lead that exceeded the DIV threshold (530mg/kg Pb). These exceedances were located within the top 2-3m (0-3mbgl) across the site, refer to **Table 7** below.

Table 7: Samples Exceeding the Dutch Intervention Values for Soil

Metals	DIV (soil) mg/kg	No. of DIV exceedances for Soil
Arsenic	76	WS12 0.5mbgl-1.0mbgl, 126.0mg/kg
Chromium III/VI	180/78	WS15 0.5-1.0mbgl, 848mg/kg (Total Cr)
Copper	190	WS4 1.5-2.0mbgl, 191mg/kg WS11 0.5-1.0mbgl, 403mg/kg WS15 0.5-1.0mbgl, 299mg/kg
Lead	530 mg/kg	WS2 0.5-1.0mbgl, 946mg/kg WS3 0.5mbgl, 1031mg/kg

Metals	DIV (soil) mg/kg	No. of DIV exceedances for Soil
		WS4 1.5-2.0mbgl, 552mg/kg WS11 0.5-1.0mbgl, 625mg/kg WS12 0.5-1.0mbgl, 981mg/kg WS15 0.5mbgl-1.0mbgl, 710mg/kg

One groundwater sample was taken from a borehole adjacent to the River Liffey quay wall in south-western corner of the site (BH1 at 3.5mbgl). The water sample was analysed using gas chromatography and showed to contain hydrocarbons (188.3mg/l) for petrol rage organics (>C_{10}). The laboratory analysis identified the hydrocarbons as 'possible gasoline residues'.

As mentioned in **Section 4.3.2**, three rounds of ground gas and water level monitoring was carried out in 2003 (25 February and 3 & 15 March 2003).

Carbon dioxide was detected at a number of locations (maximum concentration of 2.3% CO_2) and methane was detected at one location only (WS5 3.3-3.9% CH_4) over the three rounds of monitoring. The previous report assessed the concentrations against CIRIA 149, however methodology this is now obsolete.

The water level monitoring results are discussed in **Section 4.3.2**.

5.1.4 Arup Consulting Engineers (2006) Geotechnical and Environmental Assessment

In March 2006, at the request of Hickey Fabrics & Co. Ltd., Arup Consulting Engineers completed a Geotechnical and Environmental Assessment of the Hickey & Co. Ltd. Fabrics Wholesale, located at No. 43 Parkgate House, Parkgate Street, Dublin 8.

The principal aims of the site assessment were to:

a) Evaluate the environmental and geotechnical setting of the site including local geology and hydrogeology;

b) Investigate the ground conditions of the site including an assessment for subsurface contamination;

c) Provide information from which likely contaminant pathway-receptor relationships can be identified;

d) Evaluate environmental and geotechnical options relating to the site development in accordance with relevant legislation;

e) Assess the geotechnical conditions across the site and provide recommendations for foundations, excavations, gas control measures, dewatering and further investigative work.

The following items were noted:

Two underground storage tanks were noted to be in use on the site in 2006 (as discussed in **Section 3.1.1**). These were used for the storage of petrol for delivery vehicles which were refuelled on site from pumps located in the garage. A further third storage tank was noted to be potentially on site. The location of this tank was unknown and was noted to represent a potential source of ground contamination beneath the site.

The report noted four AST on site. Three were used for the storage of heating oil and the fourth tank was noted to be out of use. There was evidence of a fifth tank (likely AST No. 3, refer to Figure 7) with the concrete pedestals still in place. This assessment also highlighted the likely presence of asbestos sheeting in the roof tiles of the garage building.

The old generator room was also described. This was used at that time as a maintenance shop. The room previously housed two generators. There was no evidence of major contamination present in this area.

The two boiler houses were also inspected. One was noted to contain an AST 1.5m above the floor level of the building (boiler house No.2 and AST No.4, refer to **Figure 7**). This AST was used for the temporary storage of oil for the generators. Evidence of spills and hydrocarbon contamination was noted with staining observed on some of the walls. Refer to **Photograph 11** in **Appendix C**.

There was also a comment about "fibrous lagging material that was possibly asbestos containing" covering some of the pipework.

5.2 Results of Previous Site Sampling, Monitoring and Assessment

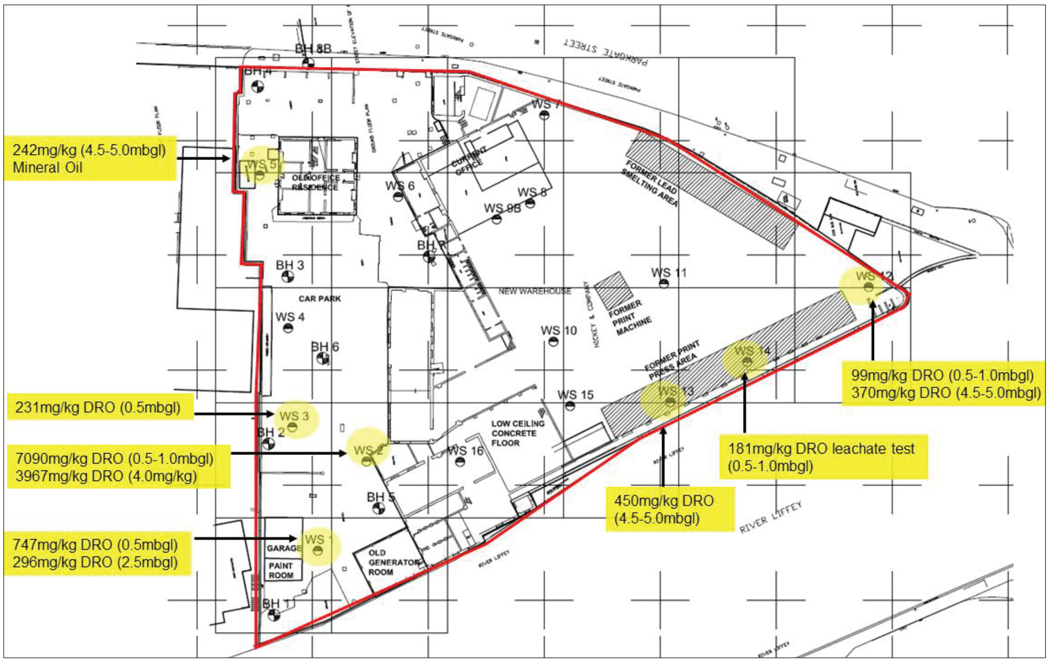
A review of the results of the environmental soil and water testing from the 2003 Arup report was carried out and is summarised below. The results of the testing are largely in line with the potential contaminants identified in Section 3.6 on review of the site activities.

5.2.1 Hydrocarbons

A review of the environmental soil testing results showed hydrocarbons present in the made ground and natural material in the south-western and southern areas of the site, particularly adjacent to the boiler house No. 2 (WS2), refer to **Figure 21** below. Hydrocarbons in these areas may be attributed to the storage of fuel and boilers.

Hydrocarbons were detected at a number of locations along the western site boundary. This may be associated with the ASTs and USTs that historically stored gas, oil and fuels on the site. The north-western section of the boundary is adjacent to the former Maxol station site where a historic spill was reported to have occurred (as discussed in **Section 3.2.1**), refer to **Figure 21** below.

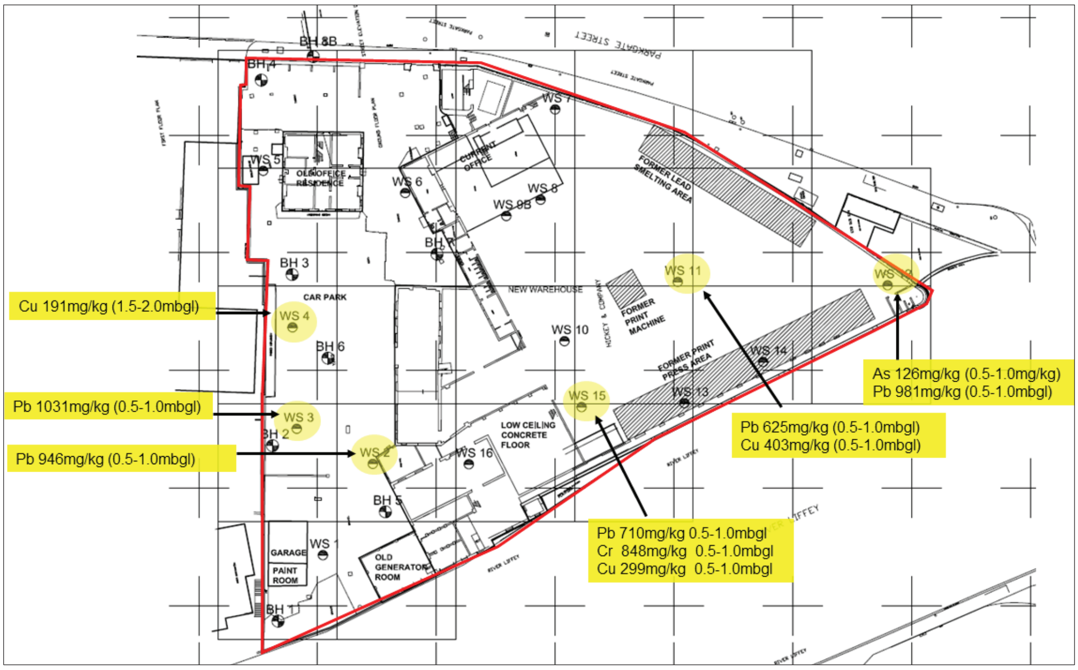
Figure 21: Hydrocarbon concentrations from the GI (IGSL, 2002)



5.2.2 Heavy Metals

A review of the environmental soil testing results showed lead cadmium, arsenic and copper in soil samples across the southern half of the site that exceeded the DIV, as discussed in **Section 5.1.3**. Refer to **Figure 22** below.

Figure 22: Metal concentrations from the GI (IGSL, 2002)



5.2.3 Polycyclic Aromatic Hydrocarbons

A review of the environmental soil testing results showed polycyclic aromatic hydrocarbon (PAH) compounds were detected in in the made ground across the site. The laboratory results reported the results for the sum of 19 PAH compounds and concentrations ranged from 0.13mg/kg to 18.9mg/kg. Refer to **Appendix A**.

5.2.4 Asbestos

An asbestos survey was carried out on the site in by Phoenix Environmental Safety Ltd. The site was surveyed over three days January (24th) and March (23rd & 28th) 2019, refer to **Appendix F**.

A number of asbestos containing materials (ACM) were found in the new warehouse, old storage area and the former residence/office. Examples of ACM identified on site included cement replacement tiles in the roof, rope seals, thermal insultation on pipe work (boiler house and sprinkler room), floor tiles and bitumen adhesives (main factory floor), toilet cisterns, cement pipes and cement board. Refer to the survey report in **Appendix F** for further detail.

6 Summary, Conclusions and Recommendations

6.1 Summary and Conclusions

A desk-based study and site visits were undertaken to investigate potential contamination at the Hickey site, No. 43 Parkgate Street, Dublin 8. Information gathered during this exercise showed a number of features with potential for causing contamination on site. Previous site activities such as the unknown source infill material and industrial activities such as the iron works, wool worsted, munitions factory and printing works have potential to have impacted upon soil and groundwater beneath the site. The site walkovers identified a number of features of the current site layout that may also impact the local environment.

A previous ground investigation in 2002 and desk based geo-environmental assessment in 2006 were carried out under the direction of Arup. The results of the 2002 ground investigation provide an indication of areas of the site which have been affected by the industrial history of the site and neighbouring sites. This largely reflects those areas of potential contamination identified during the desk study. A review of the information and data available highlights gaps where we have insufficient information to carry out a robust assessment.

The groundwater regime on site is unknown as well as the interaction between the River Liffey estuary and groundwater. The desk study and site walkovers have identified a number of potential sources of groundwater contamination but there is insufficient information to provide a level of certainty in relation to potential environmental risk.

6.2 Preliminary Conceptual Site Model

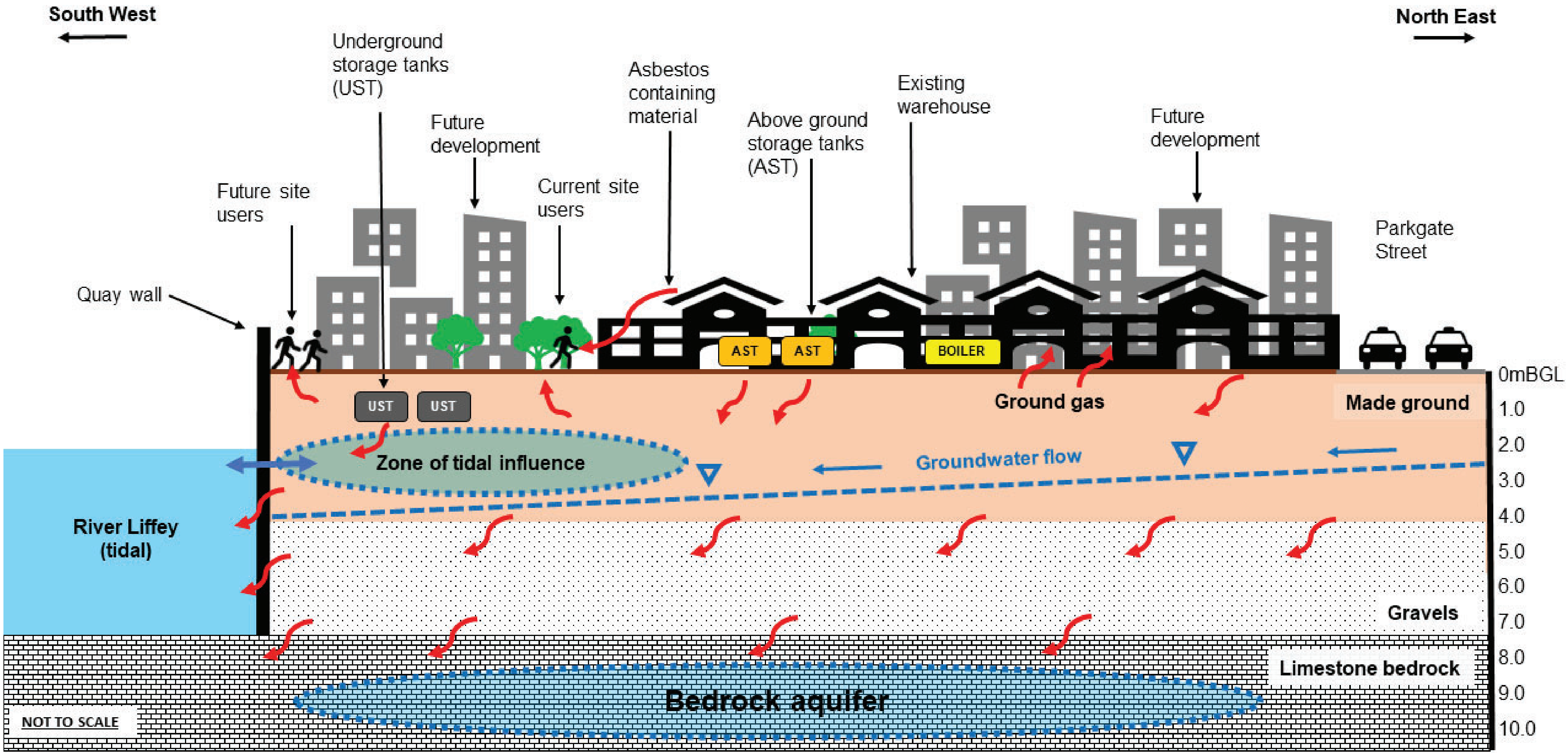
Based on a review of previous site reports and the desk study, a preliminary CSM has been prepared that highlights the key receptors, pathways and potential source(s) of contamination. Based on the EPA guidance[6] (2013), where a complete source-pathway-receptor scenario exists there is a potential pollutant linkage and a potential risk to the specific receptor can be identified.

The CSM is presented in **Figure 23** below. The CSM shows a diagram of a cross-section of the site, south-west to north-east between the River Liffey and Parkgate Street. The CSM considers the future development on site which is likely to be mixed-use with commercial or retail on the ground floor and residential or commercial on upper floors. It is assumed that there will be limited green space within the future development that will be used by site users and residents.

Section 6.2.1 to **6.2.3** outlines the potential sources, pathways and receptors on site as illustrated in Figure 23, the preliminary CSM.

[6] EPA (2013) Management of Contaminated Land & Groundwater at EPA Licensed Sites (http://www.epa.ie/pubs/advice/waste/contaminatedland/contaminatedland/)

Figure 23: Preliminary Conceptual Site Model for No. 43 Parkgate Street, Dublin 8 | Not to scale



6.2.1 Potential Sources of Contamination

The following potential sources of contamination were identified:

- Made-ground of unknown origin;
- Above ground storage tanks;
- Underground storage tanks;
- Historical contamination from former Maxol station (adjoining the site);
- Asbestos containing materials in the soil.

6.2.2 Potential Pathways

The following potential pathways were identified:

- Direct exposure of contamination in the made ground (ingestion, inhalation and dermal contact);
- Percolation of recharge through the unsaturated made ground to the groundwater in the made ground;
- Percolation of liquid contaminants through the made ground to the gravel layer;
- Percolation of liquid contaminants through the made ground and gravel layer to the underlying bedrock;
- Groundwater flow through the made ground and quay wall;
- Groundwater flow through the gravel layer and the quay wall; and
- Movement of ground gas through the unsaturated made ground.

6.2.3 Potential Receptors

The principal receptors highlighted in the PSA are:

- Demolition and construction workers;
- Site users (current and future including employees, residents, etc.);
- Groundwater in the made ground;
- Groundwater in the gravel layer;
- River Liffey;
- Irish Sea.

6.2.4 Pollutant Linkages

The Sources, Pathways and Receptors (SPRs) identified above have been identified during the desk study, previous GI results and information gathered during the site walkovers. The results of the ground investigation will validate the potential sources of contamination identified in **Section 6.2.1**.

As discussed in **Section 6.2**, where a complete Source-Pathway-Receptor linkage exists there is a potential risk to the specific receptor identified in the linkage. Considering the CSM outlined above and presented in **Figure 8**, Table 8 presents the SPR linkages identified for the current site use and proposed development of the site.

Table 8: Identified Pollutant Linkages for the No. 43 Parkgate Street, Dublin 8

Source	Pathway	Receptor
Made ground Above ground storage tanks Underground storage tanks Historical contamination from neighbouring sites i.e. former Maxol station.	Direct contact (ingestion, inhalation and dermal contact).	Demolition and construction workers, Irish Water site operators and current site users.
	Migration of ground gas though the permeable unsaturated zone.	Current buildings, demolition and construction workers and the proposed development.
	Percolation of recharge through the unsaturated made ground.	Groundwater in the made ground.
	Percolation of dissolved phase or liquid contaminants through the made ground.	Groundwater in the gravel layer.
	Percolation of dissolved phase or liquid contaminants through the made ground and gravel layer.	Bedrock aquifer (Lucan Formation, dark limestone and shale).
	Groundwater flow in the made ground through the quay wall.	River Liffey estuary and Irish Sea.
	Groundwater flow in the gravel layer through the quay wall.	River Liffey estuary and Irish Sea.
Asbestos containing materials in the existing building	Direct contact (ingestion, inhalation and dermal contact).	Current site users, demolition and construction workers and future site users.

6.3 Recommended Way Forward

An investigation is proposed to inform a detailed land contamination assessment and confirm the findings of the previous site investigation. The investigation will assess the extent of contamination identified in previous site investigations in the soil and groundwater. In summary the investigation comprises:

- 18 No. window samples to depths of up to 4mBGL
- 5 No. cable percussion boreholes to depths of up to 8mBGL
- 5 No. rotary follow-on to cable percussion holes to 15mBGL
- 7 No. groundwater monitoring installations.
- 3 No. gas monitoring installations.

- Geotechnical, geochemical and environmental sampling and laboratory testing.

A copy of the specification for site investigation is presented in **Appendix D**. A figure showing the indicative locations is presented in Drawing 002 in **Appendix D**. The proposed site investigation programme may be altered during the site investigation as the extent of the potential areas of contamination is established. A summary of the ground investigation locations and the proposed objectives is presented in **Table 9** below.

Table 9: Summary of the proposed ground investigation locations and objectives

Works	Location and Objective	Historic Contamination
18 No. window samples to depths of up to 4mbgl	Locations – across the site. Objective: Environmental testing of made ground and natural material to 4mbgl for potential contamination associated with historic site activities (iron works, wool worsted, printing works, munitions), features on site (AST's and UST's) and reported past incidents (spill at former Maxol station) as identified in the previous SI (2002) and during the desk study.	Hydrocarbons (DRO/Min. Oil, BTEX and PAHs) Metals Potential physical hazards (asbestos) have been identified in the buildings on site.
5 No. cable percussion boreholes and follow on rotary coring to 15mbgl	Locations – across the site but not within the warehouse building (inaccessible to rig). Objective: Environmental testing of made ground and natural material to 8mbgl for potential contamination associated with historic site activities (iron works, wool worsted, printing works, munitions), features on site (AST's and UST's) and reported past incidents (spill at former Maxol station) as identified in the previous SI (2002) and during the desk study.	Hydrocarbons (DRO/Min. Oil, BTEX and PAHs) Metals Potential physical hazards (asbestos) have been identified in the buildings on site.
Environmental testing of groundwater samples	Location – Boreholes across the site. Objective: Assess groundwater contamination in the gravel response zone and the tidal influence on the groundwater within the site.	Hydrocarbons (DRO/Min. Oil, BTEX and PAHs) Dissolved metals
4 No. rounds of groundwater monitoring	Location: In all 5 No. boreholes. Objective: Assess the up and down gradient groundwater and tidal influence of the River Liffey estuary on the groundwater.	N/A
4 No. rounds of gas monitoring	Location: In 3 No. boreholes. Objective: Assess ground gas generation on site from underlying the made ground.	Landfill gas (methane and carbon dioxide) from made ground.

Consistent with the 2013 EPA guidance, the information from the site investigation will be used to refine the conceptual site model and inform a detailed site assessment (DSA). This will consider the impact of the elevated concentration on nearby receptors and establish if any remediation is necessary for the purpose of the proposed development.

Should any contamination be proven it may be necessary to carry out a quantitative risk assessment (QRA) to establish the impacts of the development or need for remediation.

7 References

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Appendix A

Site Investigation Report, Arup (2003)

A1 Site Investigation Report, Arup (2003)

Note: to avoid duplication, Appendix A1 'Site Investigation Report' has been removed. Please refer to Appendix 15.2 of this EIAR for the Site Investigation Report 2003.

Appendix B

Geo-environmental and Geotechnical Assessment, Arup (2006)

B1 Geo-environmental and Geotechnical Assessment, Arup (2006)

Note: to avoid duplication, Appendix 1 'Geo environmental and Geotechnical Assessment, Arup (2006)' has been removed. Please refer to Appendix 15.3 of this EIAR for the Geo environmental and Geotechnical Assessment, Arup (2006).

Appendix C

Site Photographs

C1 Site Photographs

Photograph 2: Site entrance, Parkgate Street, looking north-east

Photograph 3: Warehouses, looking south-east to the River Liffey

Photograph 4: (Panoramic aspect) Quay wall and southern site boundary on the River Liffey, looking north-west

Photograph 5: Above ground storage tank (No.1) at the western boundary, looking west

Photograph 6: Above ground storage tank (No.2) at the western boundary, looking north

Photograph 7: Former location of former location of an above ground storage tank (No. 3) adjacent to the former office/residence. Photo taken by Arup in August 2002. Area no longer accessible

Photograph 8: Garage/paint room in south-western corner of the site, looking west

Photograph 9: Disused pump at the garage/paint room

Photograph 10: Sub-station (protected structure) on Parkgate Street, looking north-east

Photograph 11: Boiler house No. 2 (Photography taken in 2002)

Photograph 12: Boiler house No. 2 (Photography taken in May 2019)

Photograph 13: Access point for underground storage tank adjacent to the old generator room

Photograph 14: Old generator room (right) adjacent to the quay wall looking east

Photograph 15: Above ground storage tank (No. 5) located in the south-eastern tip of the new warehouse

Appendix D

Ground
Investigation Report
2019

D1 Ground Investigation Report

Note: to avoid duplication, Appendix D1 'Ground Investigation Report' has been removed. Please refer to Appendix 15.4 of this EIAR for the Ground Investigation Report.

Appendix E

Figures

E1 Figures

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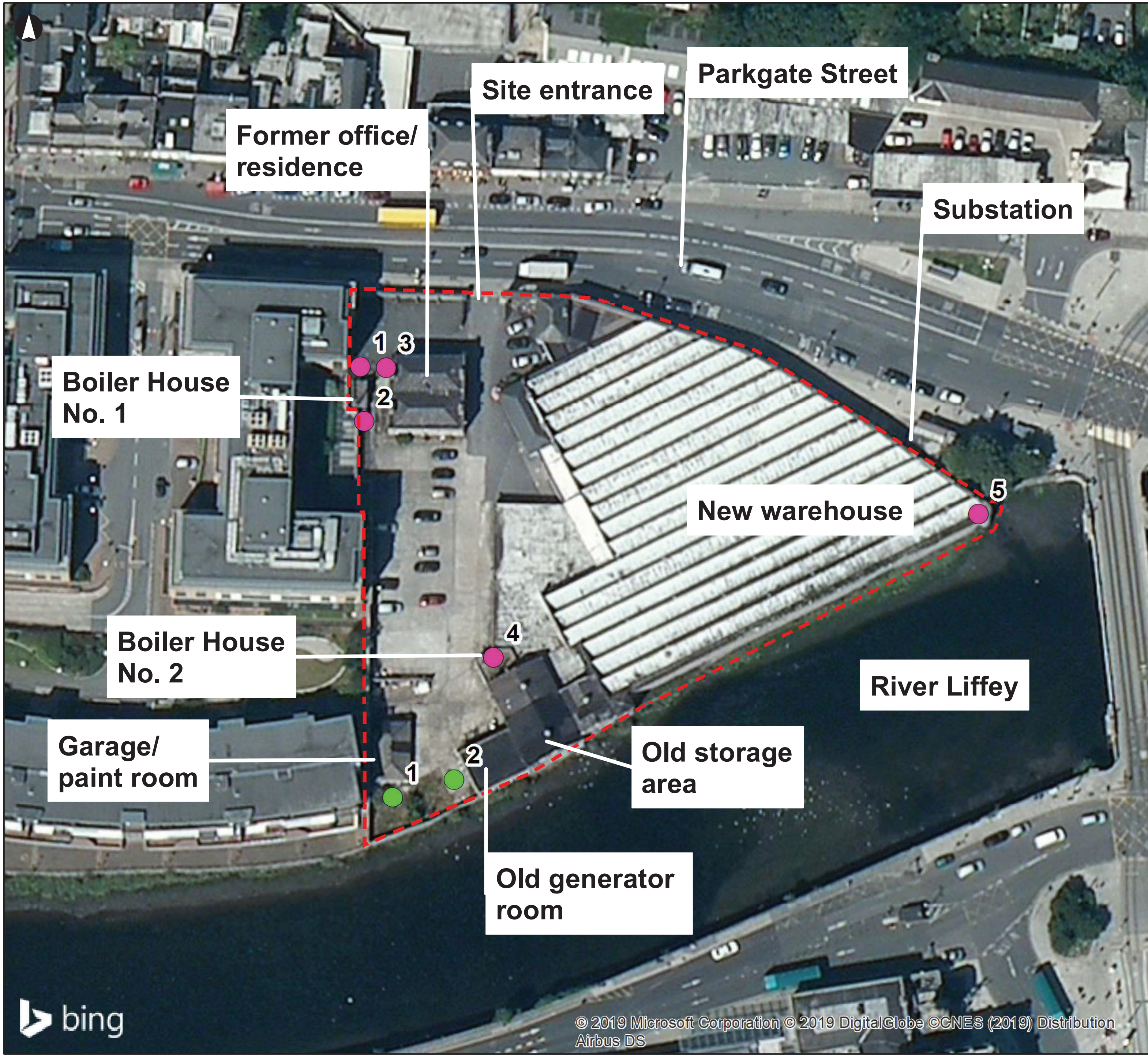

Site Boundary

Underground storage tanks (UST) No. 1 and 2

Above ground storage tanks (AST) No. 1 to 5

Metres

0 12.5 25 50

P0	2019-05-14	AF	AF	AF
Rev	Date	By	Chkd	Appd

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client

Ruirside Developments Ltd.

Project Title

Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title

Site Layout

Scale at A4

1:1,000

Role

Suitability

Preliminary

Arup Job No	Rev
265381-00	**P0**

Name

007

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A4

Legend

Site Boundary

Former Maxol Service Station Footprint (approximate)

Metres

0 37.5 75 150

Rev	Date	By	Chkd	Appd
P0	2019-05-14	AF	AF	AF

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client
Ruirside Developments Ltd.

Project Title
Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title
Site and Surrounds

Scale at A4
1:3,000

Role

Suitability
Preliminary

Arup Job No	Rev
265381-00	P0

Name
008

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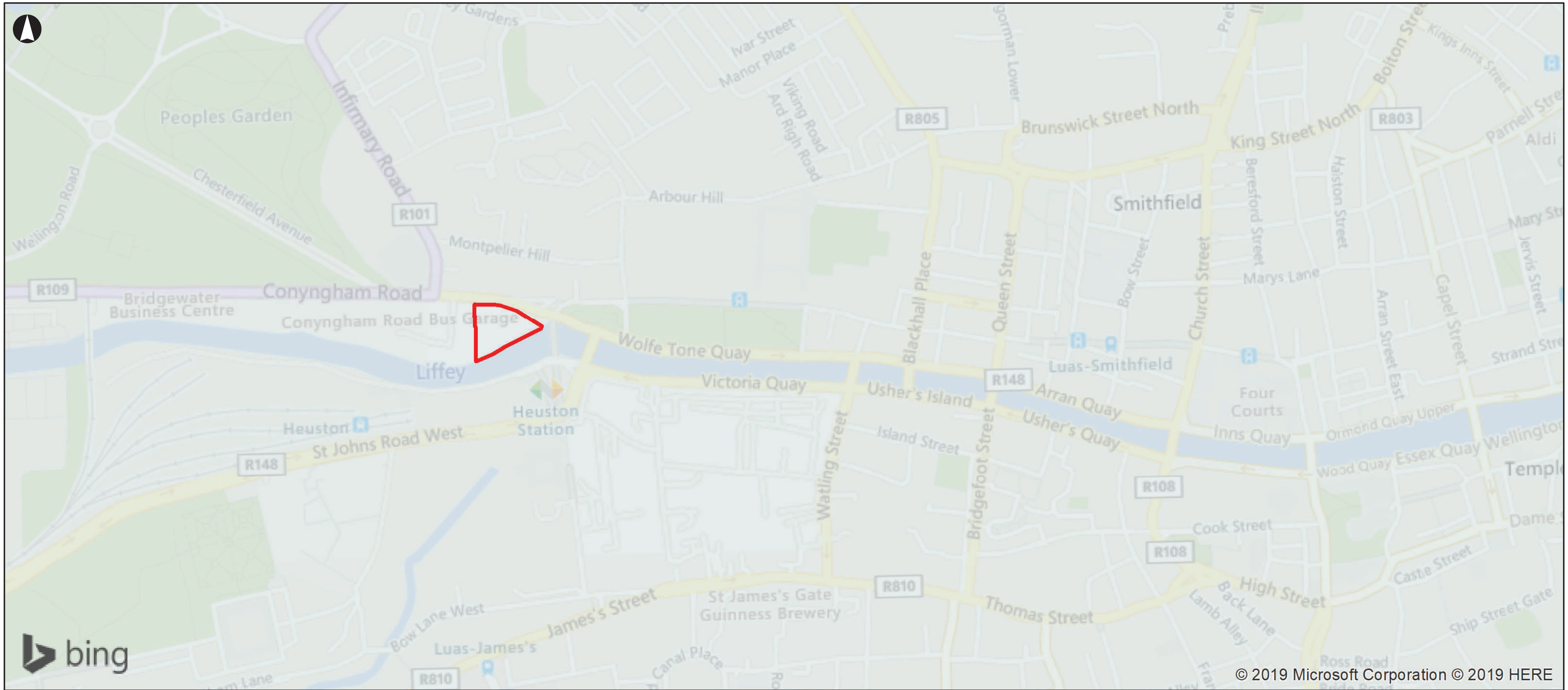

Legend

Site Boundary

Site Boundary

Bedrock Units (Scale 1:100,000)

Lucan Formation

Metres

0 155 310 620

Rev	Date	By	Chkd	Appd
P0	2019-05-14	AF	AF	AF

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client
Ruirside Developments Ltd.

Project Title
Preliminary Site Assessment for No. 43 Parkgate Street, Dublin 8

Drawing Title
Bedrock Geology

Scale at A4
1:10,000

Role

Suitability
Preliminary

Arup Job No
265381-00

Rev
P0

Name
009

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A4

Site Boundary

EPA Soils

Soil Type

- AlluvMIN - Mineral alluvium
- BminDW - Grey Brown Podzolics / Brown Earths Basic
- BminPD - Surface water Gleys / Ground water Gleys Basic
- BminSW - Renzinas / Lithosols
- Made Ground
- Water

Metres

0 155 310 620

Rev	Date	By	Chkd	Appd
P0	2019-05-14	AF	AF	AF

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client

Ruirside Developments Ltd.

Project Title

Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title

Regional Soils

Scale at A4

1:10,000

Role

Suitability

Preliminary

Arup Job No

265381-00

Rev

P0

Name

010

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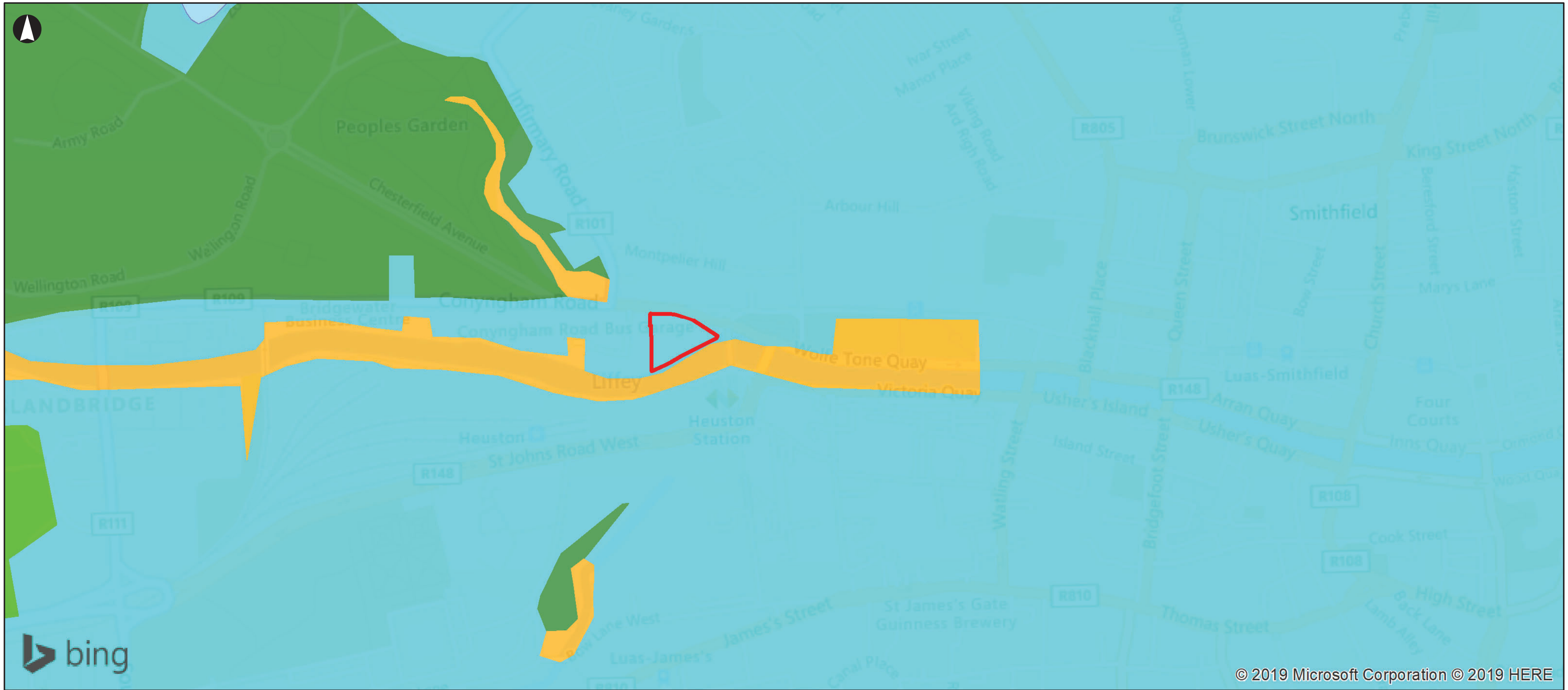

Legend

Site Boundary

EPA Subsoils

Parent Material

A - Alluvium undifferentiated gravelly

GLs - Limestone sands and gravels Carboniferous

Made ground

TLs - Limestone till Carboniferous

Water

Metres

0 155 310 620

Rev	Date	By	Chkd	Appd
P0	2019-05-14	AF	AF	AF

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client
Ruirside Developments Ltd.

Project Title
Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title
Regional Sub-soils

Scale at A4
1:10,000

Role

Suitability
Preliminary

Arup Job No
265381-00

Rev
P0

Name
011

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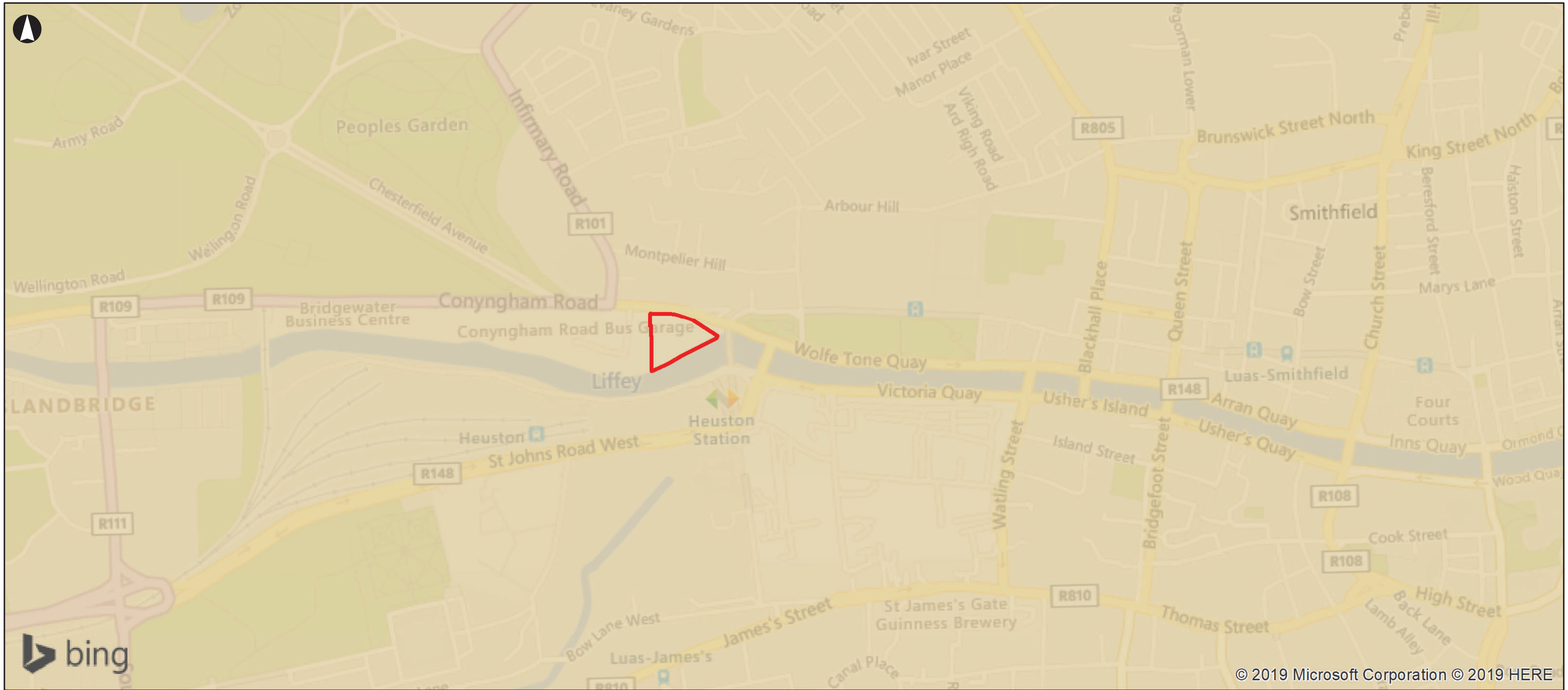

Legend

Site Boundary

Bedrock Aquifers

Aquifer Category

Locally Important Aquifer (LI)

Metres

0 155 310 620

Rev	Date	By	Chkd	Appd
P0	2019-05-14	AF	AF	AF

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client
Ruirside Developments Ltd.

Project Title
Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title
Aquife Classification

Scale at A4
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Role

Suitability
Preliminary

Arup Job No
265381-00

Rev
P0

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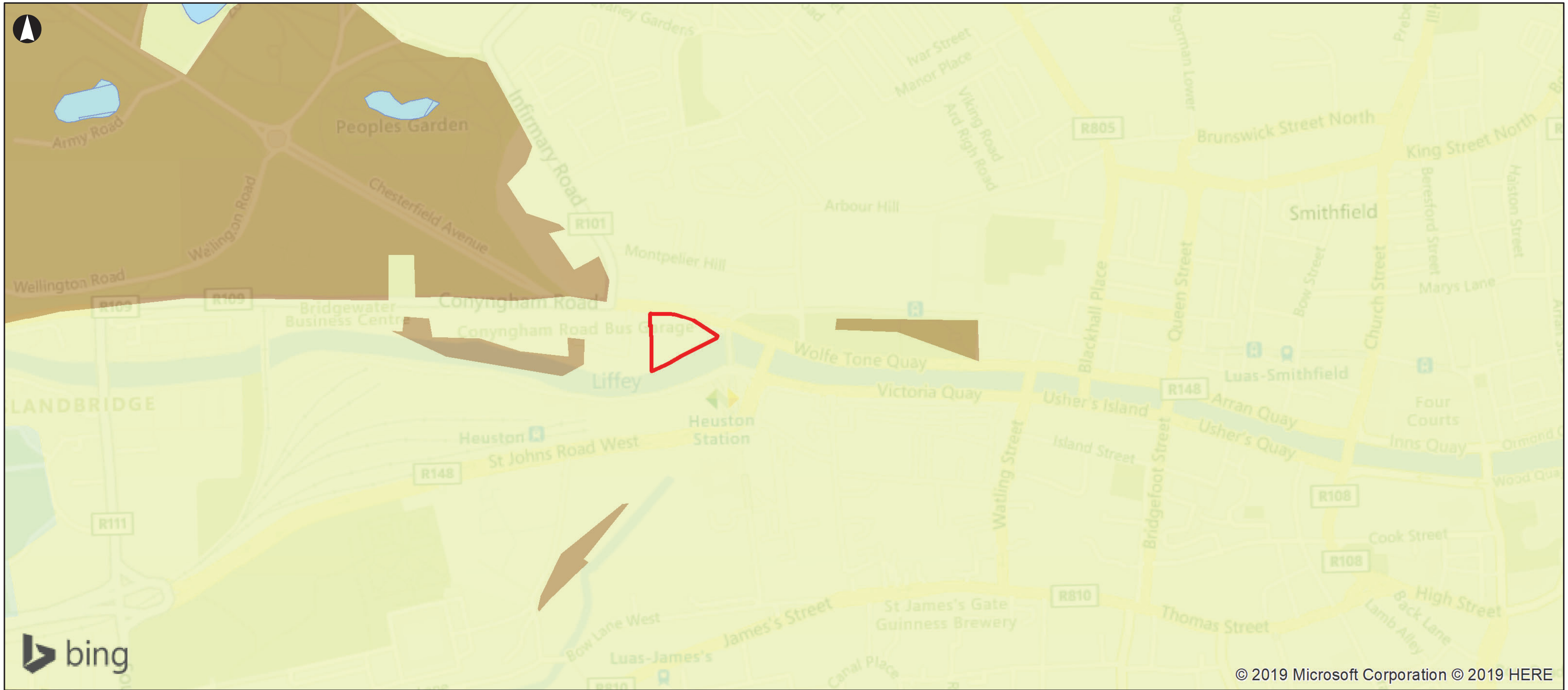

Legend

Site Boundary

National Groundwater Recharge Rates (mm/yr)

- 1-50 mm/yr
- 51-100 mm/yr
- 151-200 mm/yr
- Water

Metres
0 155 310 620

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P0	2019-05-14	AF	AF	AF

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client
Ruirside Developments Ltd.

Project Title
Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title
Groundwater Recharge

Scale at A4
1:10,000

Role

Suitability
Preliminary

Arup Job No
265381-00

Rev
P0

Name
013

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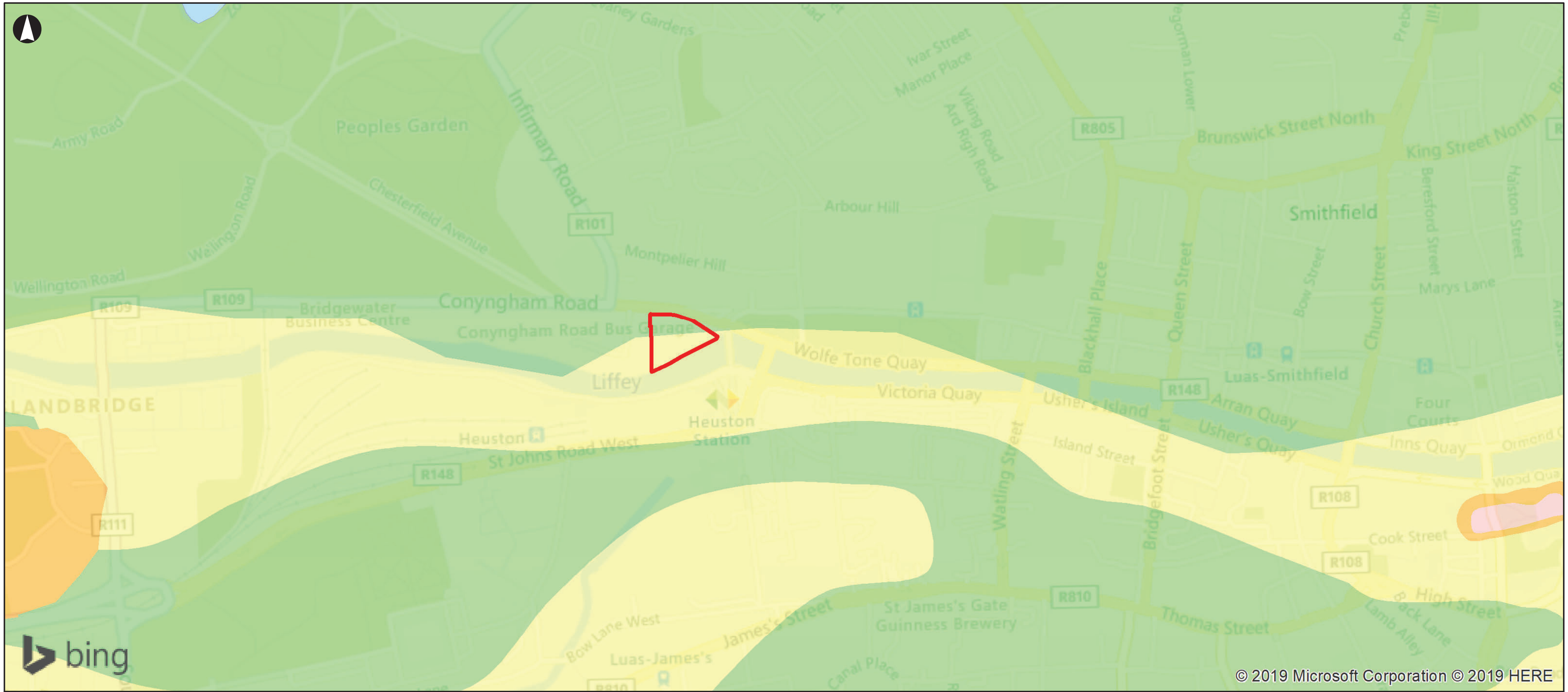

Legend

Site Boundary

Site Boundary

Aquifer Vulnerability

Extreme

High

Low

Moderate

Water

Metres

0 155 310 620

Rev	Date	By	Chkd	Appd
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ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client

Ruirside Developments Ltd.

Project Title

Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title

Aquifer Vulnerability

Scale at A4

1:10,000

Role

Suitability

Preliminary

Arup Job No

265381-00

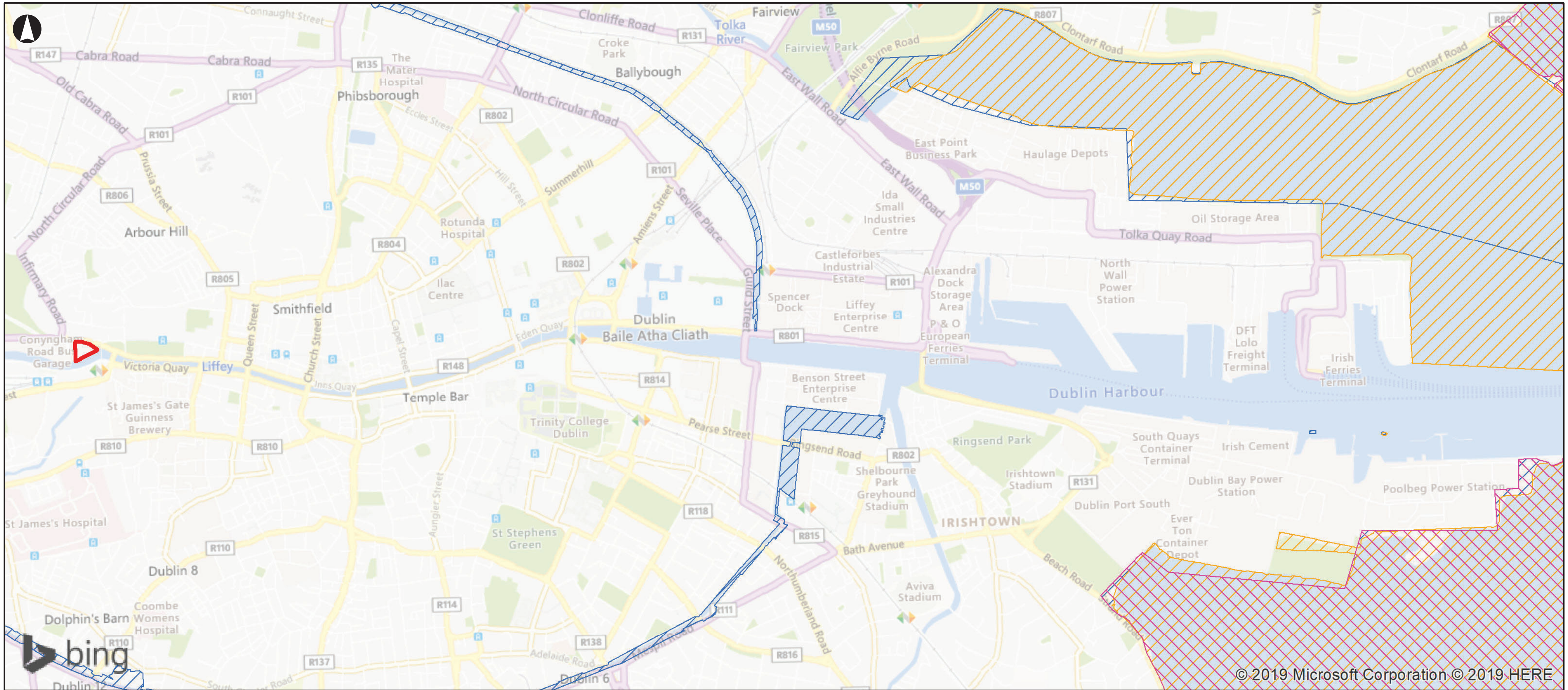
Rev

P0

Name

014

A4



Legend

Site Boundary

Site Boundary

Special Area of Conservation (SAC)

Special Area of Conservation (SAC)

Special Protection Area (SPA)

Special Protection Area (SPA)

Proposed National Heritage Area (pNHA)

Proposed National Heritage Area (pNHA)

© National Parks and Wildlife Service

Metres

0 465 930 1,860

P0	2019-05-14	AF	AF	AF
Rev	Date	By	Chkd	Appd

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client
Ruirside Developments Ltd.

Project Title
Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title
Ecological Sites

Scale at A4
1:30,000

Role

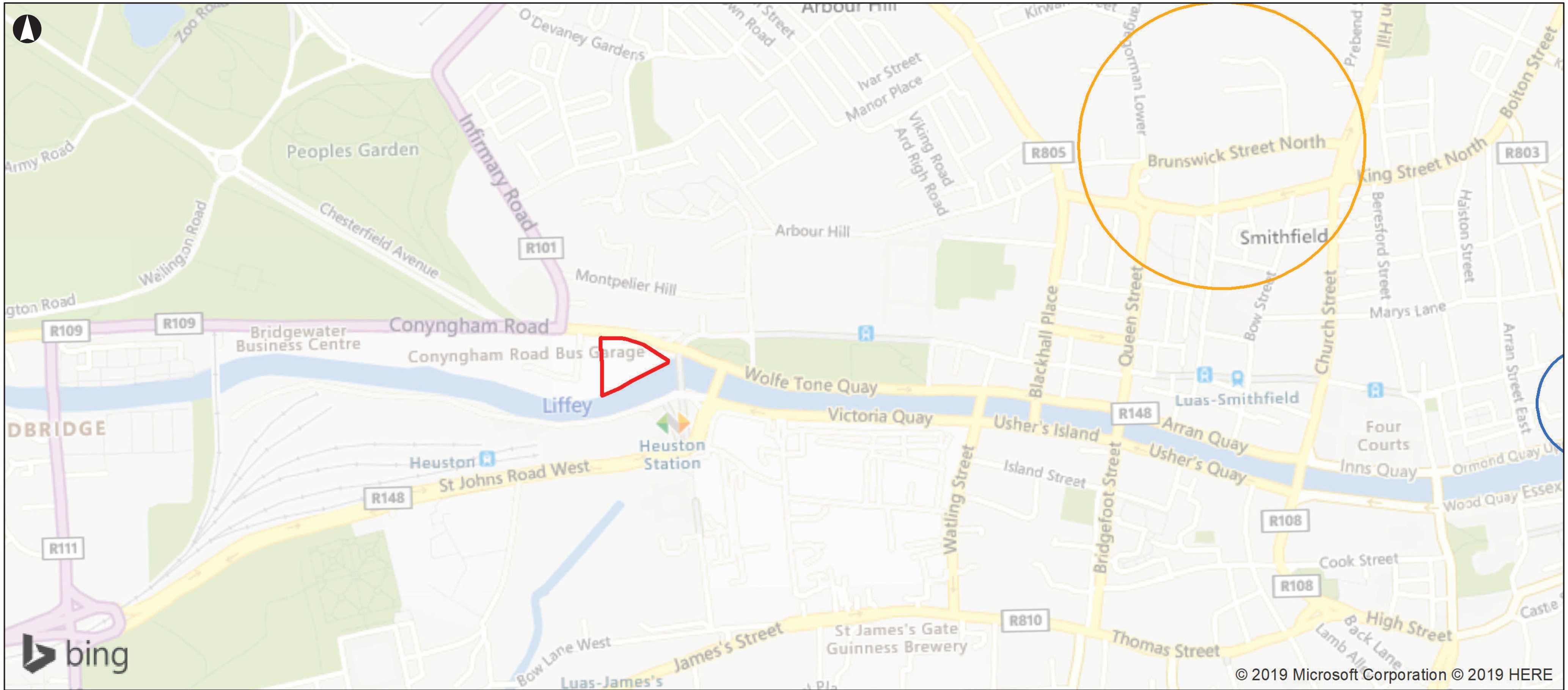
Suitability
Preliminary

Arup Job No
265381-00

Rev
P0

Name
015

A4



Legend

Site Boundary

Site Boundary

Wells (100-200m accuracy)

Wells (100-200m accuracy)

Metres

0 155 310 620

Wells (250-500m location accuracy)

Wells (250-500m location accuracy)

P0	2019-05-14	AF	AF	AF
Rev	Date	By	Chkd	Appd

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client

Ruirside Developments Ltd.

Project Title

Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title

Groundwater Abstraction

Scale at A4

1:10,000

Role

Suitability

Preliminary

Arup Job No

265381-00

Rev

P0

Name

016

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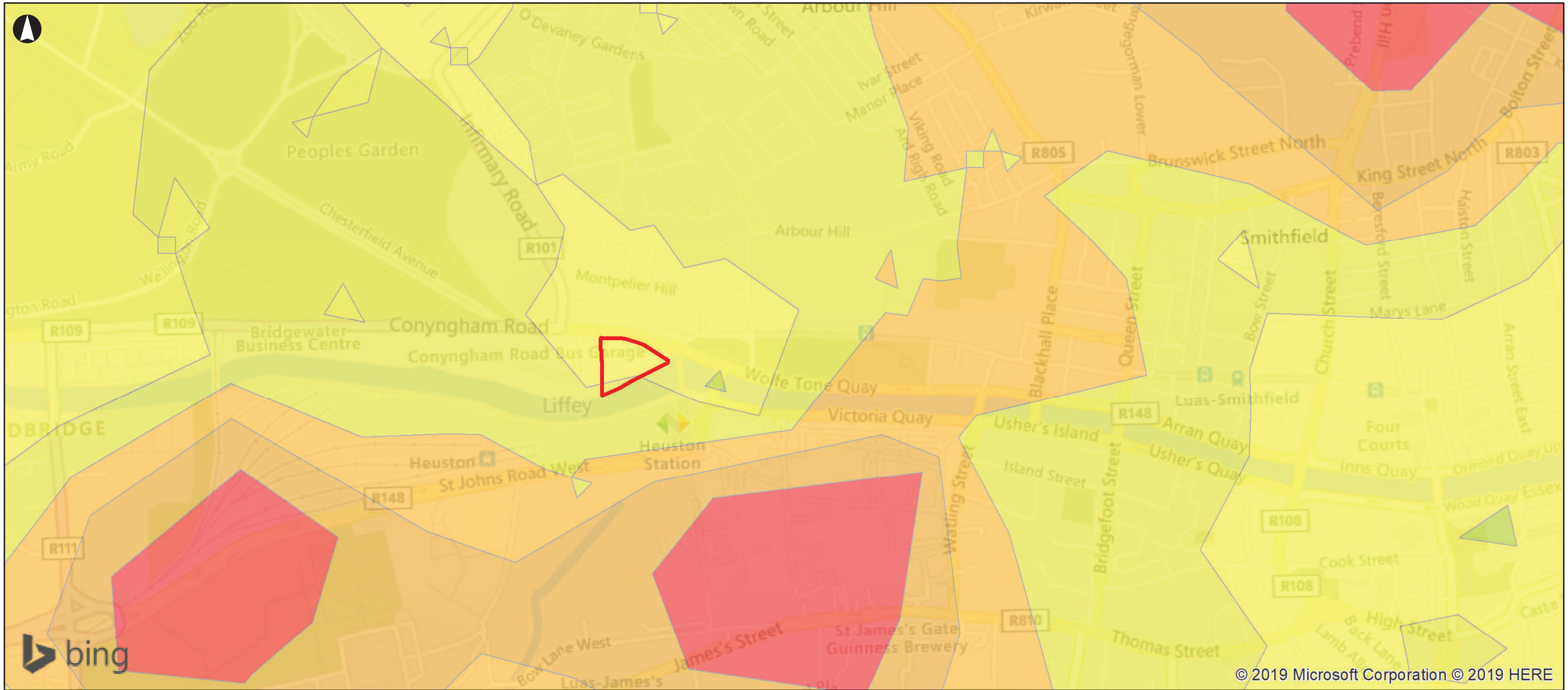

Legend

Site Boundary

Dublin Depth to Bedrock

RANGE

- 3 to 5m
- 5 to 10m
- 10 to 15m
- 15 to 20m
- 20 to 25m
- 25 to 30m

Metres

0 155 310 620

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Rev	Date	By	Chkd	Appd
P0	2019-05-14	AF	AF	AF

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client
Ruirside Developments Ltd.

Project Title
Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title
Depth to Bedrock

Scale at A4
1:10,000

Role

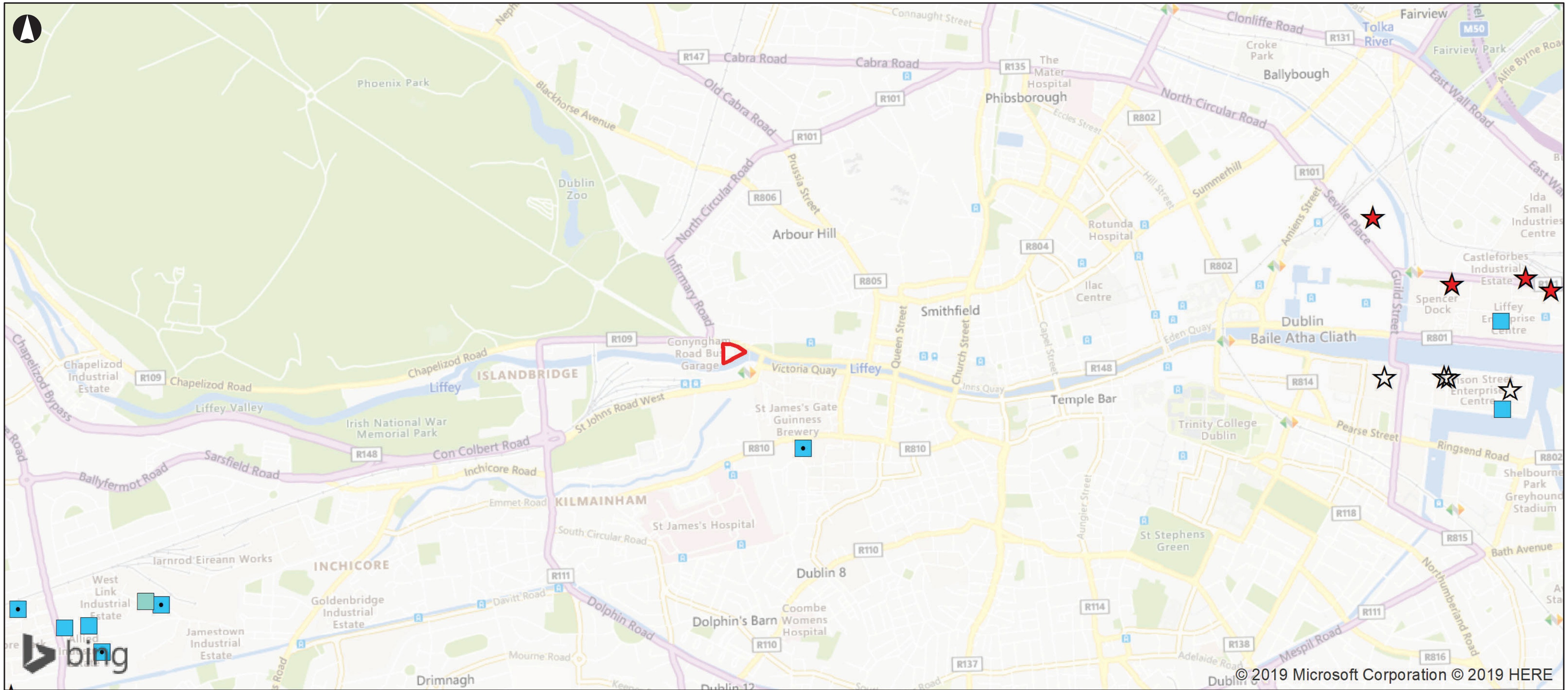
Suitability
Preliminary

Arup Job No
265381-00

Rev
P0

Name
017

A4



Legend

Site Boundary

Licensed Waste Facilities

Licence Status

★ Licensed

☆ Surrendered

Metres

0 465 930 1,860

Licensed IPC Facilities

Licensed

Surrendered

Licensed IPPC Facilities

Licence Status

Licensed

© Environmental Protection Agency

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50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client

Ruirside Developments Ltd.

Project Title

Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title

Licensed Industrial and Waste Sites

Scale at A4

1:30,000

Role

Suitability

Preliminary

Arup Job No

265381-00

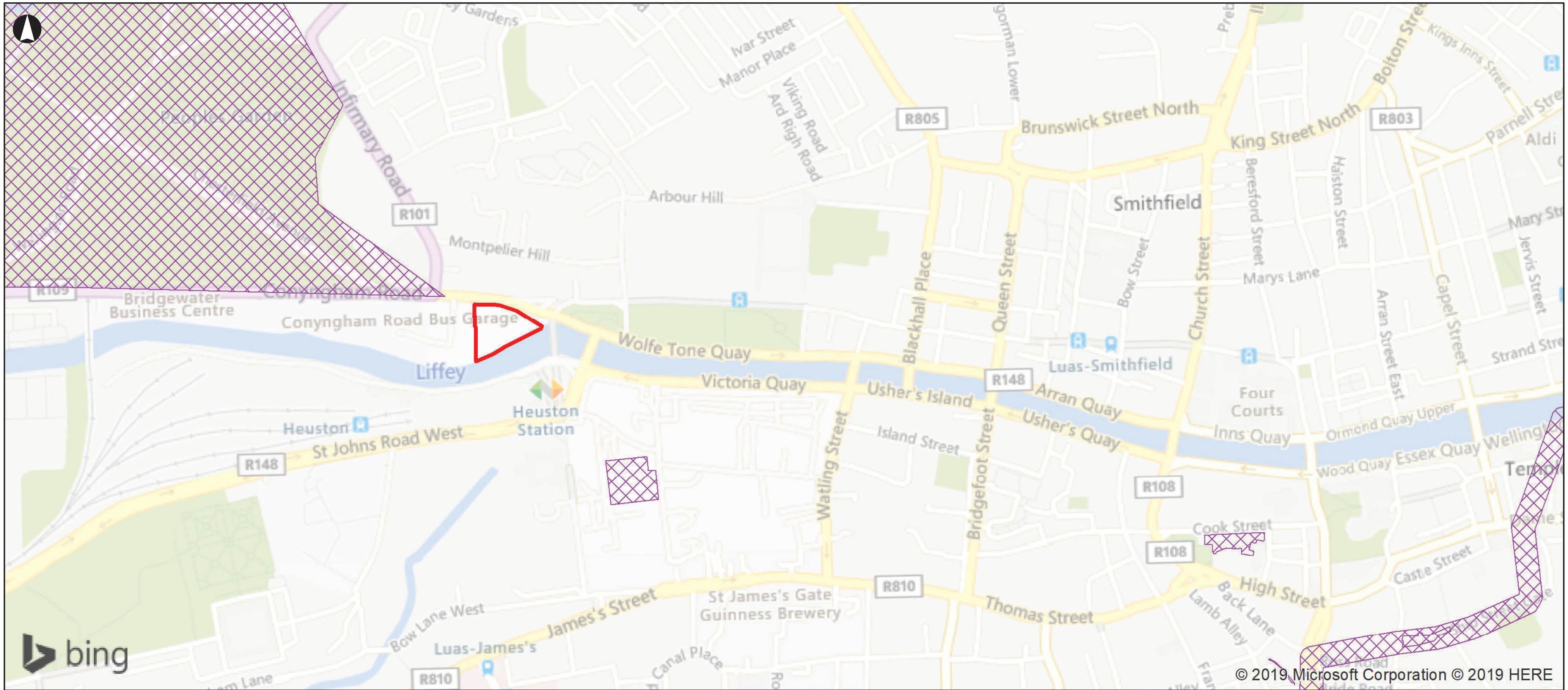
Rev

P0

Name

018

A4



Legend

Site Boundary

Site Boundary

Sites of Geo Heritage Audited with Boundaries

Sites of Geo Heritage Audited with Boundaries

Metres

0 155 310 620

P0	2019-05-14	AF	AF	AF
Rev	Date	By	Chkd	Appd

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client
Ruirside Developments Ltd.

Project Title
Preliminary Site Assessment for No. 43 Parkgate Street

Drawing Title
Geological Heritage Sites

Scale at A4
1:10,000

Role

Suitability
Preliminary

Arup Job No
265381-00

Rev
P0

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019

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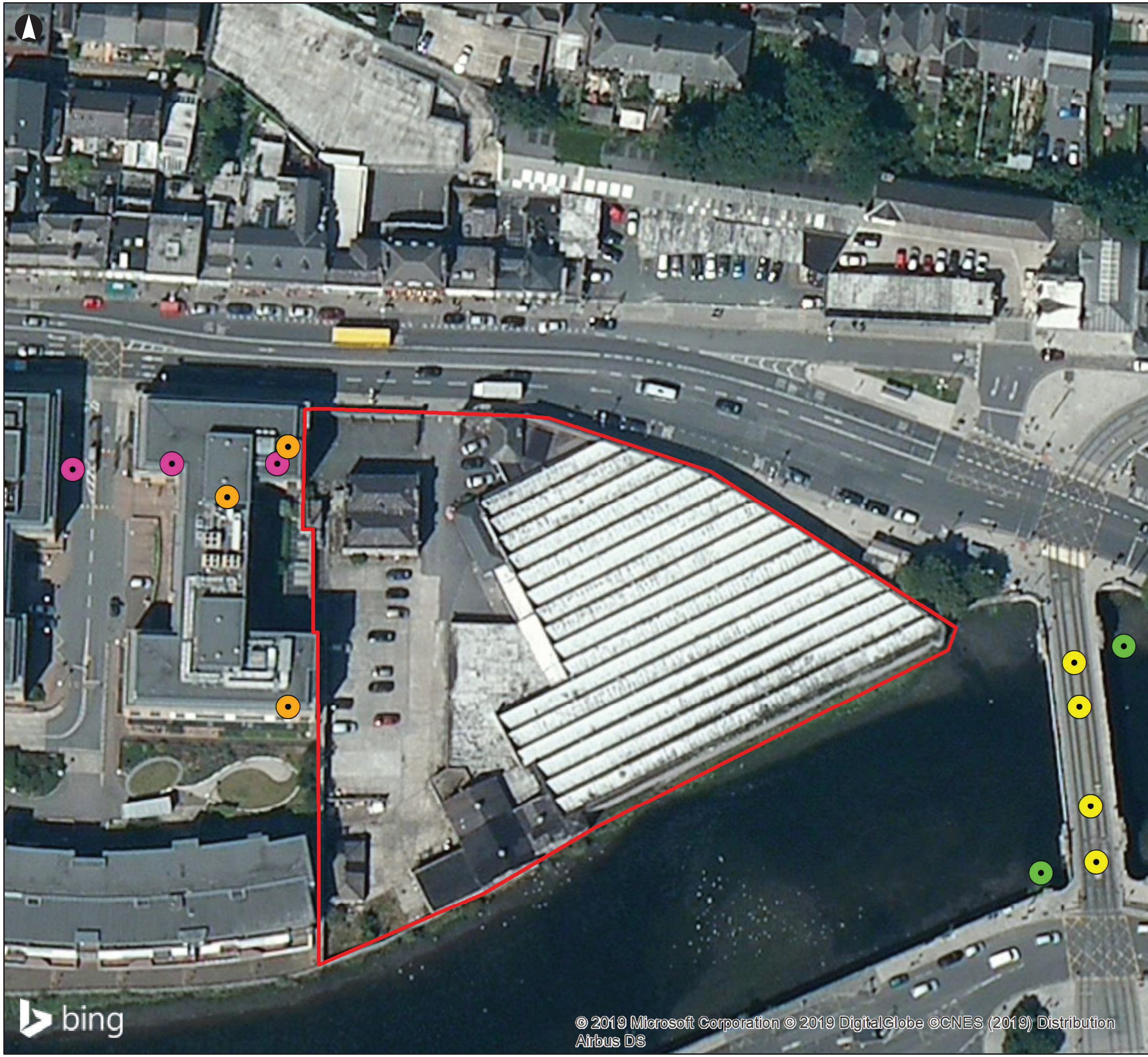

Site Boundary

GSI Boreholes

Geotechnical Report No.

- 256
- 410
- 760
- 2505

© Geological Survey Ireland

Metres

0 12.5 25 50

Rev	Date	By	Chkd	Appd
P0	2019-05-14	AF	AF	AF

ARUP

50 Ringsend Road,
Dublin 4
D04 T6XO
Ireland

Client

Ruirside Developments Ltd.

Project Title

Preliminary Site Assessment for No. 43 Parkgate Street, Dublin 7

Drawing Title

National Geotechnical Borehole Database (GSI)

Scale at A4

1:1,000

Role

Suitability

Preliminary

Arup Job No

265381-00

Rev

P0

Name

020

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Appendix F

Asbestos Survey 2019

F1 Asbestos Survey 2019

ASBESTOS SURVEY REPORT

(Refurbishment / Demolition Survey)

Client: Delaston Limited,
C/O Chartered Land, Usher House, Main Street, Dundrum, Dublin 14

Location: Parkgate House Site,
Parkgate Street, Dublin 8

Date: 29th March 2019

Report No. PE 19-312-V2

Graigueswood, Freshford, Co. Kilkenny
Tel: 056 8832414
Fax: 056 8832950
admin@phoenixenv.ie
www.phoenixenv.ie

Client Name: Delaston Limited, C/O Chartered Land, Usher House, Main Street, Dundrum, Dublin 14

Property: Parkgate House Site, Parkgate Street, Dublin 8

Asbestos Survey Type: Refurbishment/Demolition Asbestos Survey

Survey Company: Phoenix Environmental Safety Ltd.

Surveyors: Jane Hickey & Andrew Hickey

Testing Laboratory: G&L Consultancy Ltd.

Date of Survey: 24th January, 23rd March & 28th March 2019

Date of Survey Report: 29th March 2019

Report issue: Draft

Signed: *Andrew Hickey* Date: 29th March 2019

This report cannot be used for contractual or engineering purposes unless this sheet is signed where indicated by Surveyor. The report must also be designated `final` on the signatory sheet.

Please note that Phoenix Environmental Safety Ltd. cannot be held responsible for the way in which the Client interprets or acts upon the results. The report must be read in its entirety including any appendices. Phoenix Environmental Safety Ltd. accepts no responsibility for sub-division of this report. All measurements in this report are approximate and therefore should not be used by the asbestos removal contractor for pricing purposes. The asbestos removal contractors should ascertain for themselves, by site measurements and inspection, the exact nature and extent of the work to be done.

The survey information should be used to help in the tendering process for removal of ACMs from the building before work starts. The survey report should be supplied by the client to designers and contractors who may be bidding for the work, so that the asbestos risks can be addressed. In this type of survey, where the asbestos is identified so that it can be removed (rather than to manage it), the survey does not normally assess the condition of the asbestos, other than to indicate areas of damage or where additional asbestos debris may be present. However, where the asbestos removal may not take place for some time, the ACMs' condition will need to be assessed and the materials managed.

TABLE OF CONTENTS PAGE

SUMMARY

Following a request made by Lafferty Architects & Project Managers, we have produced this Refurbishment/Demolition Asbestos Survey report of the Parkgate House Site, Parkgate Street, Dublin 8 with the aim of finding asbestos containing materials (ACMs) within the scope of the asbestos survey.

The scope of the asbestos survey was confined to all accessible areas of the existing factory building and an outbuilding at the rear of the site. No. 43 Parkgate Street was not surveyed as the building was unsafe to enter. All buildings on the site are due for complete demolition in the near future

During the asbestos survey of the Parkgate House Site, the following asbestos containing materials were detected in the following locations:

MAIN BUILDING – FACTORY FLOOR, OFFICES, STORES & PLANT ROOMS

- The main pitched roof area is currently covered in felt. Investigation works found natural slate debris within this void. It would be good practice to presume a small quantity of asbestos cement replacement slates may be present
- A small quantity of asbestos cement replacement slates where identified on the pitched roof areas (mainly natural slates)
- Asbestos rope seals are presumed behind the glazing bars of the north light windows on the pitched roof area over the main factory building
- Asbestos cement slates were identified on the roof over the meeting room (40 m^2 approx.)
- Asbestos containing felt was identified on the roof of Matts Workshop (80 m^2 approx.)
- Asbestos containing thermal insulation was identified on pipe work in the boiler house (10 linear meters approx.)
- Asbestos containing thermal insulation was identified on pipe work in the Sprinkler Room (7 linear meters approx.)
- Asbestos spark arrestors and rope seals were identified on older electrical equipment throughout the building
- Asbestos containing floor tiles and bitumen adhesive was identified on the main factory floor (3,200 m^2 approx.)
- Asbestos containing toilet cisterns were identified in the male toilets on the ground floor and disused toilets on the first floor (6 cisterns)

STORAGE BUILDING - REAR RIGHT-HAND SIDE

- Asbestos cement slates were identified on the roof of the rear storage building (70 m^2 approx.)
- Asbestos cement board was identified on the high-level diving wall in the rear storage building (20 m^2 approx.)
- Asbestos cement pipes were identified stored in the internal store room in the rear right-hand side storage building

PARKGATE HOUSE

- Asbestos containing thermal insulation was identified on the boiler and pipework in the external boiler room
- Asbestos rope was identified on the flue pipe joints in the external boiler room
- Asbestos cement replacement slates were identified mixed between the natural slates on the main roof

See Appendix C & F for more details

INTRODUCTION

Background

Asbestos has been used extensively in the building industry for over one hundred years and has proved to be an excellent product for a variety of uses, having many qualities such as insulation, fire and chemical resistance to name a few. Its suitability across a wide range of uses and its relatively cheap cost made it very popular, with over 3,000 different asbestos products having been recorded.

The use of asbestos containing materials (ACM's) was most prevalent between the 1950's and 1970's when it provided an economic, easy to use and versatile material. Unfortunately, given the constitution and make up of asbestos it can give rise to microscopic airborne fibres being released into the working environment. The fibres have carcinogenic properties caused by inhalation of the fibres which can get lodged in the lining of the lungs causing disease and death.

Scope & Purpose

Delaston Limited, C/O Chartered Land has commissioned Phoenix Environmental Safety Ltd. to undertake an asbestos survey of the Parkgate House Site, Parkgate Street, Dublin 8. The aim of the survey was to locate and identify the presence of asbestos containing materials (ACM's) or suspected ACM's. This report provides a record and assessment of the extent and characteristics of ACM's and is based on information made available on 24th January and the 23rd & 28th March 2019.

This particular survey comprised of a Refurbishment / Demolition Survey, carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006, the Health and Safety Executive's (UK) guidance document HSG 264 (Asbestos: The Survey Guide) and HSG 227 (A Comprehensive Guide to managing Asbestos in Premises).

This means that:

- As far as reasonably practicable, locate and describe all ACM's in all reasonably accessible areas within the scope of the survey
- A sampling programme is undertaken to identify possible ACM's and estimates of the volumes and the surface areas of ACM made
- A record of the condition of the ACM's or where additional asbestos debris may be expected to be present is produced

Refurbishment / Demolition Surveys (formerly type 3 surveys)

This type of survey is necessary prior to any refurbishment (including "minor") or demolition work being carried out. These "refurbishment / demolition" surveys will be much more intrusive and destructive compared with management surveys as their intention is to locate all the ACMs so that they can be removed before the refurbishment or demolition takes place. Refurbishment/demolition surveys are required as necessary when the needs or use of the building changes and the fabric of the building will be disturbed or complex fixed plant and equipment are to be dismantled.

The purpose of the report is to:

- Enable the client to take appropriate precautions so that people who work at the Parkgate House Site during the forthcoming demolition works are not exposed to asbestos-related health risks
- Provide information to assist the client in developing and implementing an action plan before any refurbishment works or demolition is carried out

Presentation of Findings

Data Sheets

A series of data sheets have been prepared to provide assessments and recommendations for each of the locations where samples were taken. These data sheets are presented in Appendix C.

Figures

The schematic diagrams presented in Appendix F at the rear of this document shows the locations of all of the asbestos containing materials detected during the asbestos survey.

Caveats

All reasonable steps have been taken to ensure that the contents and findings of this report are true and accurate. Though as stated below, further undetected ACM's may still be present within the premises. The client should therefore be aware of his responsibilities for identifying, locating, removing and/or managing all ACM's within the premises, and for notifying the appropriate authorities where necessary.

Refurbishment / Demolition Surveys

This type of survey employs the use of destructive sampling techniques of an unfamiliar site. Although every effort is made to locate all asbestos containing materials, it is impossible to rule out the possibility that undiscovered asbestos materials may be present. If the building is to undergo major refurbishment or demolition, it is recommended that the persons carrying out the work are made aware of this and take sufficient precautions, as may be appropriate, to ensure the health and safety of their own employees and any other parties who may be affected by the works.

APPENDIX A

ASBESTOS MATERIALS IN BUILDINGS

Sprayed coatings applied in Ireland were typically a mixture of hydrated asbestos cement containing up to 85% asbestos, mainly amosite but crocidolite and mixtures have been used. Primarily used for anti-condensation and acoustic control and fire protection to structural steelwork. It is a friable material but if in a good condition and unlikely to be disturbed presents no immediate danger; however it is likely to release fibres, if disturbed especially during repair and maintenance work. As it ages the binding medium of sprayed asbestos may degrade with the consequent release of more fibres.

Thermal insulation to boilers, vessels, pipe work, valves, pumps etc also known as hand applied lagging. Lagging may have a protective covering of cloth, tape, paper, metal or a surface coating of cement. All types of asbestos may be found in lagging and the content can vary between 15 and 85% asbestos with the protective papers being up to 100% chrysotile. The likelihood of fibre release depends upon its composition, friability and state of repair, but it is particularly susceptible to damage and disturbance through maintenance work or the action of water leaks.

Asbestos insulating boards usually contain between 16 to 40% amosite, although boards may be found to contain other types of asbestos and in other quantities. Insulating boards were developed in the 1950s to provide an economical, lightweight, fire resisting insulating material. As insulation board is semi-compressed it is more likely to release fibres as a result of damage or abrasion. Work on asbestos insulation board can give rise to high levels of asbestos fibre.

Asbestos cement products as in roofing slates, wall cladding, permanent shuttering, flue, rain water and vent pipes generally contain 10 to 15% of asbestos fibre bounded in Portland cement, some flexible boards contain a small proportion of cellulose. All three types of asbestos have been used in the manufacture of asbestos cement. The asbestos fibres in asbestos cement are usually firmly bound in the cement matrix and will be released only if the material is mechanically damaged or as it deteriorates with age.

Ropes and yarns are usually high in asbestos content, approaching 100% and all three types of asbestos have been used in their manufacture. They were used as in the pipe lagging process and in pipe jointing and also for packing materials as in heat/fire resistant boiler, oven and flue sealing or anywhere thermal of fire protection was required. The risk of fibre release depends upon the structure of the material; bonded gasket material is unlikely to release asbestos but an unbonded woven material may give rise to high fibre release especially if when damaged or frayed.

Cloth thermal insulation and lagging, including fire resistant blankets, mattresses and protective curtains, gloves, aprons, overalls etc. All types of asbestos have been used in the manufacture but since the mid 60's the majority has been chrysotile, the content of which can be up to 100 %.

Millboard, paper and CAF gaskets usually have an asbestos content approaching 100% with all three types of asbestos being used in their manufacture. They were used for insulation of electrical equipment and for thermal insulation. Asbestos paper has been used as a laminate for fireproofing to various fibre panels. These materials are on some occasions not well bonded and will release asbestos fibres if subject to abrasion and wear.

Bitumen felts and coatings may contain asbestos either bound in the bitumen matrix or as an asbestos paper liner. These materials are not likely to present a hazard during normal installation or use, but should be removed and disposed of in compliance with any regulation applicable.

Thermoplastic floor tiles can contain up to 25% asbestos usually chrysotile, PVC vinyl floor tiles and unbacked PVC flooring normally 7-10% chrysotile and asbestos paper backed PVC flooring the paper backing may contain up to 100% chrysotile. Fibre release is not normally an issue but may occur when the material is cut or subjected to abrasion.

Textured coatings. Decorative coatings on walls and ceilings usually contain 3-5% chrysotile. Fibre release may occur when subjected to abrasion.

Mastics, sealants, putties and floor tile adhesives may contain small amounts of asbestos. The only possible risk is from sanding of hardened material when appropriate precautions should be taken.

Reinforced plastic and resin composites, used for toilet cisterns, seats, banisters, stair nosings, window seals, lab bench tops, brake shoes and clutches in machines. The plastics usually contain 1-10% chrysotile and were used in for example car batteries to improve the acid resistance. Resins may contain between 20 and 50% amosite, but because of its composition fibre release is likely to be low.

Asbestos Fibre Type Common

ASBESTOS FIBRE TYPE COMMON NAMES	
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	N/A
Fibrous Anthophyllite	N/A
Fibrous Tremolite	N/A

APPENDIX B

RESULTS OF LABORATORY ANALYSIS

GRAIGUESWOOD,
FRESHFORD,
CO. KILKENNY

Phoenix Environmental Safety Ltd.

TEL: 056 8832414
FAX: 056 8832950
admin@phoenixenv.ie
www.phoenixenv.ie

ASBESTOS BULK IDENTIFICATION REPORT

Report no: PE19-163	Date of Issue: 28th January 2019

Client details:

Delaston Limited, C/O Chartered Land, Usher House, Main Street, Dundrum, Dublin 14

Identification of asbestos content of suspected asbestos containing material stated to have been sampled from the following location/site:

Parkgate House Site, Parkgate Street, Dublin 8

No of Samples received: 17	Date of receipt of samples: 24.1.2019	Date of analysis: 28.1.2019

Methodology. Analysis of samples received was carried out in accordance with HSE Method MDHS 77/HGS 248 and documented in-house methods.
For samples received from the client and not sampled by Phoenix Environmental Safety Ltd.
This report is given in good faith on the basis of the samples and information received. Phoenix Environmental Safety Ltd. can take no responsibility for omissions, unrepresentative samples, inaccuracies or discrepancies in samples and information received.

TEST RESULTS

LAB. REF.	SAMPLE NO.	LOCATION	MATERIAL	ASBESTOS TYPE
S 01	BS 167658	Rear RHS Store – Roof	Cement slate	Chrysotile
S 02	BS 167659	Rear RHS Store - High Level Wall	Cement board	Chrysotile
S 03	BS 167660	Rear RHS Store – Debris	Cement pipes	Chrysotile + Amosite + Crocidolite
S 04	BS 167661	Rear Stores - Matts Workshop – Ceiling	Textured coating	No asbestos detected in sample
S 05	BS 167662	Boiler House – Pipework	Thermal insulation	Amosite
S 06	BS 167663	Boiler House – Pipework	Gasket	No asbestos detected in sample
S 07	BS 167664	Boiler House – Pipework	Gasket	No asbestos detected in sample
S 08	BS 167665	Pitched Roof Area – Debris	Cement slate	Chrysotile
S 09	BS 167666	Pitched Roof Area	Felt	No asbestos detected in sample
S 10	BS 167667	Meeting Room – Roof	Cement slate	Chrysotile
S 11	BS 167668	Sprinkler Room – Pipework	Thermal insulation	Chrysotile
S 12	BS 167669	Rear Store - Electrical Equipment – Spark Arrestor	Textile	Chrysotile
S 13	BS 167670	Rear Stores - Electrical Equipment - Doors	Rope	No asbestos detected in sample
S 14	BS 167671	Main Warehouse - Rear RHS	Floor tile & adhesive	Chrysotile
S 15	BS 167672	Main Warehouse - Far LHS	Floor tile & adhesive	Chrysotile
S 16	BS 167673	Warehouse - Front Area	Floor tile & adhesive	Chrysotile
S 17	BS 167674	Male W/C	Toilet cistern	Amosite

LABORATORY ANALYST	G&L Consultancy Ltd.	DATE:	28th January 2019

GRAIGUESWOOD,
FRESHFORD,
CO. KILKENNY

Phoenix Environmental Safety Ltd.

TEL: 056 8832414
FAX: 056 8832950
admin@phoenixenv.ie
www.phoenixenv.ie

ASBESTOS BULK IDENTIFICATION REPORT

Report no: PE19-297	Date of Issue: 26th March 2019

Client details:

Delaston Limited, C/O Chartered Land, Usher House, Main Street, Dundrum, Dublin 14

Identification of asbestos content of suspected asbestos containing material stated to have been sampled from the following location/site:

Parkgate House Site, Parkgate Street, Dublin 8

No of Samples received: 14	Date of receipt of samples: 26.3.2019	Date of analysis: 26.3.2019

Methodology. Analysis of samples received was carried out in accordance with HSE Method MDHS 77/HGS 248 and documented in-house methods.
For samples received from the client and not sampled by Phoenix Environmental Safety Ltd.
This report is given in good faith on the basis of the samples and information received. Phoenix Environmental Safety Ltd. can take no responsibility for omissions, unrepresentative samples, inaccuracies or discrepancies in samples and information received.

TEST RESULTS

LAB. REF.	SAMPLE NO.	LOCATION	MATERIAL	ASBESTOS TYPE
S 01	BS 169201	X2	Felt	No asbestos detected in sample
S 02	BS 169202	Pitched slated roof beside main pitched felted roof (replacement slate)	Cement Slate	Chrysotile & Crocidolite
S 03	BS 169203	X3	Felt	No asbestos detected in sample
S 04	BS 169204	X5	Felt	No asbestos detected in sample
S 05	BS 169205	X6	Felt	No asbestos detected in sample
S 06	BS 169206	X7	Felt	No asbestos detected in sample
S 07	BS 169207	X8	Felt	No asbestos detected in sample
S 08	BS 169208	X9	Felt	No asbestos detected in sample
S 09	BS 169209	X10	Felt	No asbestos detected in sample
S 10	BS 169210	X11	Felt	No asbestos detected in sample
S 11	BS 169211	Flat roof at X12 (debris)	Cement slate	Chrysotile
S 12	BS 169212	X13	Felt	Chrysotile
S 13	BS 169213	Parkgate House – Main roof (replacement slate)	Cement slate	Chrysotile
S 14	BS 169214	Parkgate House – Boiler house – Boiler	Rope	No asbestos detected in sample

LABORATORY ANALYST	G&L Consultancy Ltd.	DATE:	26th March 2019

GRAIGUESWOOD,
FRESHFORD,
CO. KILKENNY

Phoenix Environmental Safety Ltd.

TEL: 056 8832414
FAX: 056 8832950
admin@phoenixenv.ie
www.phoenixenv.ie

ASBESTOS BULK IDENTIFICATION REPORT

Report no: PE19-312	Date of Issue: 29th March 2019

Client details:

Delaston Limited, C/O Chartered Land, Usher House, Main Street, Dundrum, Dublin 14

Identification of asbestos content of suspected asbestos containing material stated to have been sampled from the following location/site:

Parkgate House Site, Parkgate Street, Dublin 8

No of Samples received: 3	Date of receipt of samples: 28.3.2019	Date of analysis: 29.3.2019

Methodology. Analysis of samples received was carried out in accordance with HSE Method MDHS 77/HGS 248 and documented in-house methods.
For samples received from the client and not sampled by Phoenix Environmental Safety Ltd.
This report is given in good faith on the basis of the samples and information received. Phoenix Environmental Safety Ltd. can take no responsibility for omissions, unrepresentative samples, inaccuracies or discrepancies in samples and information received.

TEST RESULTS

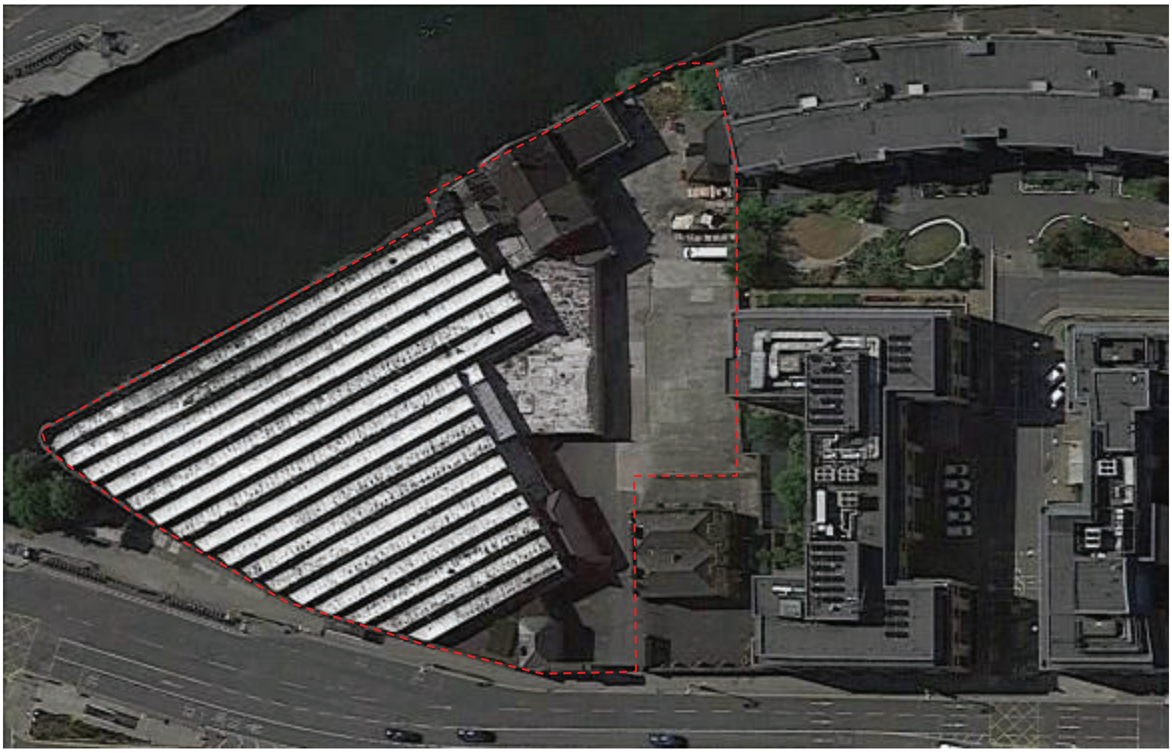
LAB. REF.	SAMPLE NO.	LOCATION	MATERIAL	ASBESTOS TYPE
S 01	BS 169304	Parkgate House – Boiler room - Boiler	Thermal insulation	Amosite
S 02	BS 169305	Parkgate House – Boiler room – pipework over boiler	Thermal insulation	Amosite
S 03	BS 169306	Parkgate House – Boiler room – Boiler flue	Rope	Chrysotile

LABORATORY ANALYST	G&L Consultancy Ltd.	DATE:	26th March 2019

APPENDIX C

ASBESTOS DATA SHEETS

Parkgate House Site, Parkgate Street, Dublin 8



PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th March 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Main factory
Location	Pitched roof area
Extent/ Amount	Not quantified

Survey Date	24.1.2019	Sample No.	BS 167665
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Cement slate debris	Normal occupant activity	N/A
Extent of damage	High damage	Likelihood of disturbance	N/A
Surface treatment	Unsealed & sealed	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The cement slate debris & replacement slates identified around the main pitched roof area contains Chrysotile (white) asbestos fibres. Asbestos cement products generally contain 10 to 15% asbestos fibres bounded in Portland cement

The pitched roof area is currently covered in felt and it is possible that some asbestos cement replacement slates may be present between the felt and the timber lining board as natural slates can be found in this void. If cement slates are identified, they should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

DETAIL OF THE ASBESTOS CEMENT REPLACEMENT SLATES & DEBRIS

Natural slates present in the void between the felted roof and the lining boards beneath

View of the lining boards under the felted pitched roof

DETAIL OF THE ASBESTOS CEMENT REPLACEMENT SLATES & DEBRIS

Cement replacement slates identified on the rear roof beside the main pitched roof

Cement slates identified on the flat roof area

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Phoenix Environmental Safety Ltd.

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Main factory
Location	North light windows
Extent/ Amount	Not quantified

Survey Date	24.1.2019	Sample No.	N/A
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Rope seal (presumed)	Normal occupant activity	N/A
Extent of damage	Unknown	Likelihood of disturbance	N/A
Surface treatment	Sealed	Human exposure potential	N/A
Asbestos type	Chrysotile (presumed)	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

Asbestos rope seals are presumed behind the glazing bars of the north light windows on the pitched roof area over the main factory. Asbestos rope seals contain up to 100% asbestos fibres.

The asbestos rope seals are usually sealed between the glass and the glazing bars. The north light windows should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence. The windows should be sampled as soon as they have been removed

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Phoenix Environmental Safety Ltd.

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Meeting room
Location	Roof
Extent/ Amount	40 m² approx.

Survey Date	24.1.2019	Sample No.	BS 167667
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Cement slates	Normal occupant activity	N/A
Extent of damage	Medium damage	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The cement slates identified on the roof over the meeting room contain Chrysotile (white) asbestos fibres. Asbestos cement products generally contain 10 to 15% asbestos fibres bounded in Portland cement

The cement slates should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Boiler room
Location	Pipe work
Extent/ Amount	10 linear meters approx.

Survey Date	24.1.2019	Sample No.	BS 167662
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Thermal insulation	Normal occupant activity	N/A
Extent of damage	High	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Amosite	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The thermal insulation identified on the pipe work in the main boiler house contains Amosite (brown) asbestos fibres. Thermal insulation can contain between 15 and 85% asbestos fibres

The asbestos thermal insulation should be removed under controlled conditions by a specialist asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Sprinkler room
Location	Pipe work
Extent/ Amount	7 linear meters approx.

Survey Date	24.1.2019	Sample No.	BS 167668
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Thermal insulation	Normal occupant activity	N/A
Extent of damage	High	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Amosite	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The thermal insulation identified on the pipe work in the sprinkler room contains Amosite (brown) asbestos fibres. Thermal insulation can contain between 15 and 85% asbestos fibres

The asbestos thermal insulation should be removed under controlled conditions by a specialist asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

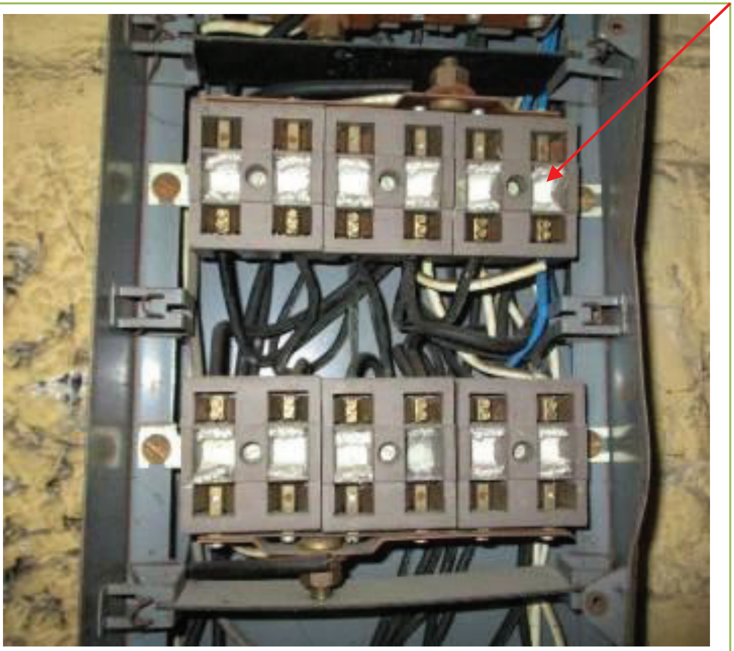
See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Phoenix Environmental Safety Ltd.



Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Main factory
Location	Electrical equipment
Extent/ Amount	Not quantified

Survey Date	24.1.2019
Sample No.	BS 167669
Survey Company	Phoenix Environmental Safety Ltd.
Testing Laboratory.	G&L Consultancy Ltd.

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Textile	Normal occupant activity	N/A
Extent of damage	Medium	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The textile spark arrestors and rope seals identified on the older electrical equipment throughout the main factory building contains Chrysotile (white) asbestos fibres. Asbestos textiles and rope seals contain up to 100% asbestos fibres

The textile spark arrestors and rope seals should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Phoenix Environmental Safety Ltd.

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Main factory
Location	Floor areas
Extent/ Amount	3,200 m² approx.

Survey Date	24.1.2019	Sample No.	BS 167671
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Floor tiles and adhesive	Normal occupant activity	N/A
Extent of damage	High damage	Likelihood of disturbance	N/A
Surface treatment	Composite material	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The floor tiles and bitumen adhesive identified throughout the main factory floor contain Chrysotile (white) asbestos fibres. Thermoplastic floor tiles can contain up to 25% asbestos fibres, usually Chrysotile. Bitumen adhesives contain a small quantity of asbestos fibres

The floor tiles and bitumen adhesive should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Phoenix Environmental Safety Ltd.

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Main factory building
Location	Male W/C and 1st floor W/C
Extent/ Amount	6 cisterns

Survey Date	24.1.2019	Sample No.	BS 167674
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Toilet cisterns	Normal occupant activity	N/A
Extent of damage	Low damage	Likelihood of disturbance	N/A
Surface treatment	Composite material	Human exposure potential	N/A
Asbestos type	Amosite	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The toilet cisterns identified in the ground floor male W/C and 1st floor disused W/C contain Amosite (brown) asbestos fibres. Resins products may contain between 20 and 50% asbestos fibres

The asbestos containing toilet cisterns should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th March 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-297
Building Ref.	Matt's Workshop
Location	Roof
Extent/ Amount	80 m² approx.

Survey Date	23.3.2019	Sample No.	BS 169212
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Felt	Normal occupant activity	N/A
Extent of damage	Medium damage	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The felt identified on the roof of Matt's Workshop contains Chrysotile (white) asbestos fibres. Asbestos felt contains small quantities of asbestos fibres

The felt should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Phoenix Environmental Safety Ltd.

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Rear RHS Storage building
Location	Roof
Extent/ Amount	70 m² approx.

Survey Date	24.1.2019	Sample No.	BS 167658
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Cement slates	Normal occupant activity	N/A
Extent of damage	High damage	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The cement slates identified on the roof of the rear RHS storage shed contain Chrysotile (white) asbestos fibres. Asbestos cement products generally contain 10 to 15% asbestos fibres bounded in Portland cement

The cement slates should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Rear RHS Storage building
Location	High-level internal wall
Extent/ Amount	20 m² approx.

Survey Date	24.1.2019	Sample No.	BS 167659
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Cement board	Normal occupant activity	N/A
Extent of damage	High damage	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The cement board identified on the high-level wall in the rear RHS storage shed contains Chrysotile (white) asbestos fibres. Asbestos cement products generally contain 10 to 15% asbestos fibres bounded in Portland cement

The cement board should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Jane Hickey
Date	29th January 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-163
Building Ref.	Rear RHS Storage building
Location	Stored internally
Extent/ Amount	Not quantified

Survey Date	24.1.2019	Sample No.	BS 167660
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Cement pipes	Normal occupant activity	N/A
Extent of damage	High damage	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Chrysotile + Amosite + Crocidolite	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The cement pipes identified in the store room in the rear RHS storage shed contain Chrysotile (white), Amosite (brown) and Crocidolite (blue) asbestos fibres. Asbestos cement products generally contain 10 to 15% asbestos fibres bounded in Portland cement

The cement pipes should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Andrew Hickey
Date	29th March 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-312
Building Ref.	Parkgate House
Location	External Boiler Room
Extent/ Amount	Not quantified

Survey Date	28.3.2019	Sample No.	BS 169304
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Thermal insulation	Normal occupant activity	N/A
Extent of damage	High	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Amosite	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The thermal insulation identified on the boiler and pipework over the boiler unit in the external boiler room of Parkgate House contains Amosite (brown) asbestos fibres. Thermal insulation can contain between 15 and 85% asbestos fibres

The asbestos thermal insulation should be removed under controlled conditions by a specialist asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Phoenix Environmental Safety Ltd.

Created By	Andrew Hickey
Date	29th March 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-312
Building Ref.	Parkgate House
Location	External Boiler Room
Extent/ Amount	Not quantified

Survey Date	28.3.2019	Sample No.	BS 169306
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Rope	Normal occupant activity	N/A
Extent of damage	Medium	Likelihood of disturbance	N/A
Surface treatment	Unsealed	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The rope seals identified around the joints in the flue pipe in the external boiler room of Parkgate House contains Chrysotile (white) asbestos fibres. Asbestos textiles and rope seals contain up to 100% asbestos fibres

The rope seals should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

PHOENIX ENVIRONMENTAL SAFETY LTD.

ASBESTOS DATA SHEET

Created By	Andrew Hickey
Date	29th March 2019
Site Details	Parkgate House Site, Parkgate Street, Dublin 8
Client Name	Delaston Limited
Survey Type	R/D Asbestos Survey
Site Ref	PE 19-297
Building Ref.	Parkgate House
Location	Roof area
Extent/ Amount	Small amounts

Survey Date	23.3.2019	Sample No.	BS 169213
Survey Company	Phoenix Environmental Safety Ltd.		
Testing Laboratory.	G&L Consultancy Ltd.		

	MATERIAL ASSESSMENT		PRIORITY ASSESSMENT
Product type	Cement slate	Normal occupant activity	N/A
Extent of damage	Medium damage	Likelihood of disturbance	N/A
Surface treatment	None	Human exposure potential	N/A
Asbestos type	Chrysotile	Maintenance activity	N/A
	Material assessment score: N/A	TOTAL SCORE: N/A	Priority assessment score: N/A

CONCLUSIONS AND RECOMMENDATIONS

The cement replacement slates identified on the main roof of Parkgate House contains Chrysotile (white) asbestos fibres. Asbestos cement products generally contain 10 to 15% asbestos fibres bounded in Portland cement

The cement slates should be removed by an asbestos removal contractor and disposed of as asbestos waste before the demolition works commence

See Appendix F for more details

All asbestos removal work must be carried out in accordance with S.I. No. 386 of 2006 Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006-2010

APPENDIX D

NON ASBESTOS CONTAINING MATERIALS

Felt on main pitched roof. No Asbestos Containing Materials (ACM's) detected

Natural slates on some rear roofs. No ACM's detected

NON ASBESTOS CONTAINING MATERIALS

Plasterboard ceiling boards under main pitched roof. No ACM's detected

Plasterboard ceilings in sprinkler room. No ACM's detected

APPENDIX E

NON ACCESSIBLE LOCATIONS

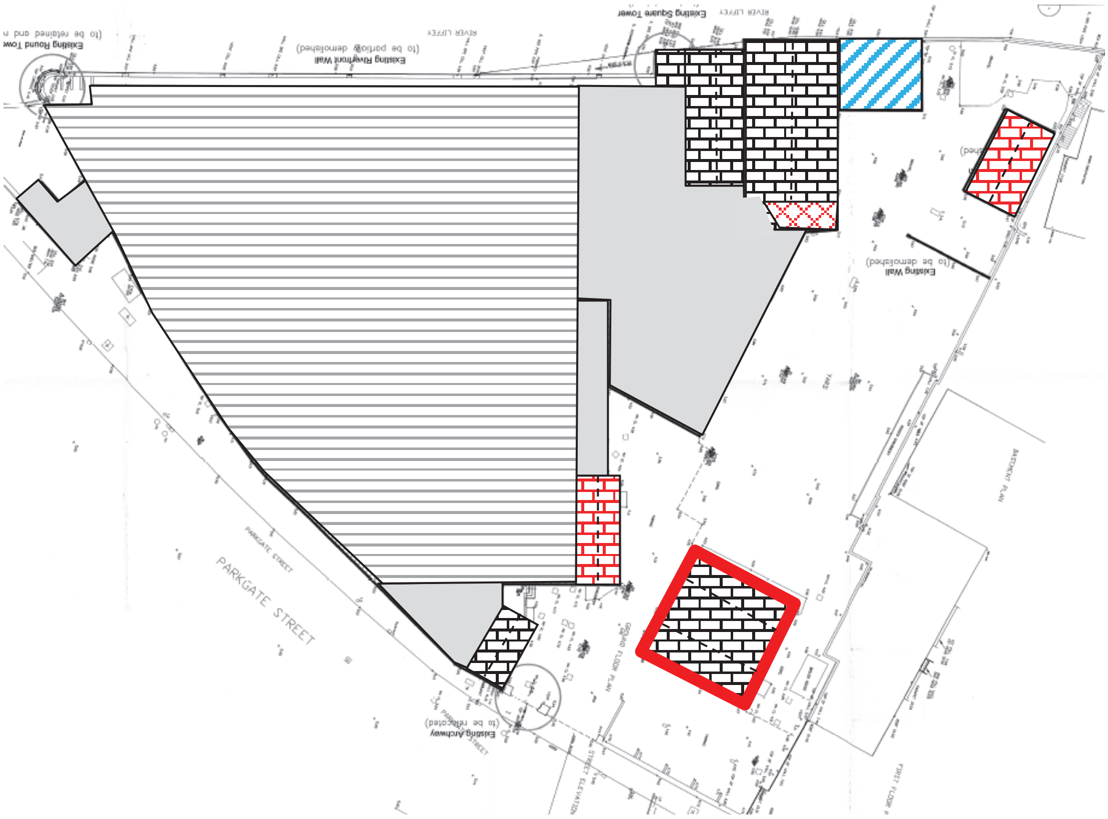
- The buildings were live and in use during the asbestos survey and intrusive surveying and sampling was curtailed in some areas. Some areas could not be inspected thoroughly such as office areas and meeting rooms
- Parkgate House was not surveyed – unsafe structure
- The ESB substation building was not surveyed
- No inspection of live electrical or mechanical plant or similar requiring the attendance of a specialist engineer was carried out
- No inspection of any areas requiring specialist access equipment other than telescopic ladder was carried out
- All contractors working on the site should always remain vigilant to the possibility that concealed asbestos containing materials may be present on site. If any suspect asbestos containing materials are uncovered during the course of the work, works must stop in that area and the suspect material should be sampled and analysed immediately for the presence of asbestos

APPENDIX F

FLOOR PLANS & LOCATION OF ASBESTOS CONTAINING MATERIALS

Schematic diagram only Not to scale 29th March 2019	Parkgate House Site, Parkgate Street, Dublin 8

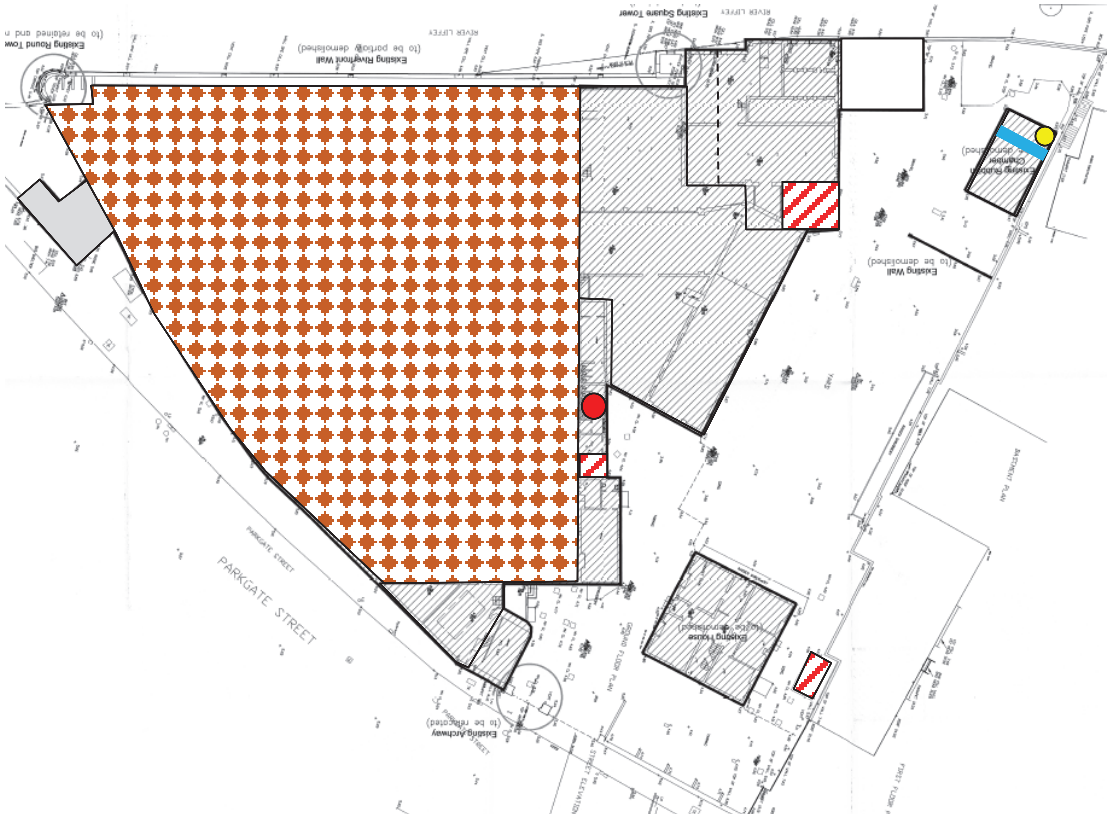
ROOF PLAN



	Areas where asbestos cement slates were identified
	Area where asbestos containing felt was identified
	Area where loose asbestos cement slates were identified
	Areas where asbestos cement replacement slates were identified (mainly natural slates on roof)
	Area with no safe internal access

Schematic diagram only Not to scale 29th January 2019	Parkgate House Site, Parkgate Street, Dublin 8

FLOOR PLAN



	Area where asbestos floor tiles and bitumen adhesive was identified
	Area where asbestos thermal insulation was identified
	Area where asbestos cement board was identified
	Area where asbestos cement pipes were identified
	Area where asbestos toilet cisterns were identified (ground & first floor)
	Note: asbestos textiles and rope were identified in older electrical & boiler equipment throughout

Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Appendix 15.6: Detailed Site Assessment

265381-00

ARUP

Ruirside Developments Ltd.

42A Parkgate Street

Detailed Site Assessment

265381-00_Hickeys-DSA_2019-12-05

Issue | 05/12/2019

Job number 265381-00

Ove Arup & Partners Ireland Ltd

Arup
50 Ringsend Road
Dublin 4
D04 T6X0
Ireland
www.arup.com

ARUP

Contents

Appendices

1 Introduction

1.1 Project Contractual Basis

Arup were appointed by Ruirside Developments Ltd. to prepare a detailed assessment of the potential for land contamination at the Hickeys site located on Parkgate Street.

This assessment comprises an appendix to the Environmental Impact Assessment Report that supports the planning application for the Hickeys Parkgate Street Project.

1.2 Project Objectives

This report presents a Detailed Site Assessment (DSA) of the current land contamination risks and the potential land contamination risks associated with the use of the site following the proposed development.

The DSA includes findings of a detailed intrusive site investigation and subsequent monitoring of groundwater and ground gases. The report discusses the potential land contamination risks associated with the proposed use for the site. It has taken account of the site specific Preliminary Site Assessment (PSA) [1] previously prepared for the site.

Potential contamination risks associated with the demolition of the existing buildings are not covered by this PSA. These are covered by the construction strategy and Construction Environmental Management Plan (CEMP) which are appended to the Environmental Impact Assessment Report.

1.3 Scope of Work

The scope of works includes:

- Review and interpretation of the results of the site investigation carried out in March and May 2019 and subsequent monitoring of groundwater, surface water and ground gases.
- Review the Source-Pathway-Receptor (SPR) linkages on site for the current situation and the proposed development.
- Undertake a Generic Quantitative Risk Assessment of any Source-Pathway-Receptor (SPR) linkages, where such linkages exist; and
- Assess the impact of the proposed development on any land contamination present.

1.4 Proposed End Use of the Site

Ruirside Developments Limited seeks Permission, at a site (c.0.73ha), at 42A Parkgate Street, Dublin 8, for a ‘Build-to-Rent’ strategic housing development of mixed-use residential and commercial development. This comprises of a number of residential units (including 'shared living' units) and associated residential amenity facilities, office space, retail space, café/ restaurant space, all accommodated in 4no. blocks ranging in height from 6 to 27 storeys.

Further works which are relevant to this assessment include:

- Conservation, repair and adaptation of protected structures (including (a) stone wall; (b) turret and (c) square tower, all on the riverfront side, and (d) entrance stone arch on the Parkgate Street frontage) and some other existing structures of heritage interest on site, in part or in full.
- Demolition of existing Parkgate House, large warehouse and miscellaneous structures.
- Construction of 1-level basement to accommodate c.50 private car parking spaces, c.40no. car club parking spaces and 650no. bicycle parking spaces.
- Landscape design to include new public plaza and pedestrian connections from Parkgate Street to proposed new 'river walk', behind the existing heritage structures to be retained. Also, communal residential courtyard between Blocks B1, B2 and B3, and external rooftop terraces at Levels 06, 07, 08 and 09.

1.5 Guidance

At present, there is no statutory nor regulatory guidance on the assessment of land contamination in Ireland, except where the site is operated under an EPA regulated licence [3] e.g. Industrial Emission Licence (IEL) or Integrated Pollution Control (IPC) permit. This 2013 EPA [3] guidance document presents a summary of the processes to be followed and clearly sets out the documents to be prepared at each stage. The 2013 EPA guidance follows a similar international guidance on the assessment of land contamination (CLR11). In the absence of a directly relevant guidance the 2013 EPA guidance has been followed.

This Geo-environmental and Geotechnical Interpretive Report has been prepared in general accordance with the EPA Detailed Site Assessment (DSA) template within the EPA's guidance document on management of contaminated land [3].

2 Previous Ground Investigations

2.1 Introduction

The GSI online databases, Goldmine and the Geotechnical Data Viewer were checked for historical site investigations within or in proximity to the site. The following sections outline the historic investigations identified and a brief summary of their findings.

2.2 Site Investigations Ltd. (1973) Site Investigation

A site investigation (SI) was carried out in November 1973 by Site Investigations Ltd. for Joseph McCullough & Associates at Parkgate Street (GSI Report No. 760).

The investigation consisted of 3 No. shell and auger boreholes (BHs 1 to 3) and was undertaken in November 1973.

The boreholes were located to the west and northwest of the existing building near the site boundary.

The logs reveal made ground to be present beneath the site in thicknesses ranging from 2.4 to 4.3m overlying natural ground consisting of a mixture of silts and gravels to a depth of 6.7 to 7.9mBGL before encountering possible bedrock. Thicknesses of made ground and depths to bedrock appear to increase from north to south, towards the River Liffey.

2.3 Caltex Site Investigation – Report ID 256

3 No. boreholes were dug adjacent to the site (GSI Report No. 256) along the Parkgate Street side of the existing TII building.

The company name is recorded as Caltex which may be related to the Maxol garage that was located approximately where these boreholes were dug.

The records do not show who the carried out the drilling or the technique used, maximum depths recorded were recorded as being between 2.74 to 7.01mbgl.

The logs reveal made ground to be present beneath the site in thicknesses ranging from 2.1 to 4.3m overlying natural ground consisting of a mixture of sands and gravels to a depth of 5.6 to 6.1mBGL before encountering what was described as Black Boulder Clay.

2.4 Arup Consulting Engineers (2003) Geotechnical and Environmental Assessment Report

Arup Consulting Engineers (now Arup), prepared a geotechnical and environmental assessment report in 2003 for No. 43 Parkgate Street.

The ground investigation works were carried out by IGSL Limited (IGSL) in December 2002 under the direction of representatives from Arup. The GI consisted of 8 No. shell and auger boreholes (No. 1 to 7, and 8B) and 16 No. window samples (No. 1 to 8, 9B and 10 to 16). Refer to **Appendix A** of the PSA.

During the GI works, environmental soil sampling was carried out. Analyses were carried out for the purposes of soil disposal. However, these tests were carried out before Waste Acceptance Criteria set out in the Council Decision (2003/33/EC) of the Landfill Directive was finalised. The Council Decision (2003/33/EC) specifies a sample preparation of leachates as according to the CEN method. The method used during the 2002 SI was that of the NRA method. While the correct sample preparation was not carried out for waste characterisation, the results serve to indicate the potential chemicals of concern on site.

The following organic contaminants were observed to be present in the soils:

- Mineral Oil – Associated with diesel, turpentine, and fuel oil;
- Polycyclic Aromatic Hydrocarbons (PAHs) – Formed through the incomplete combustion of fossil fuels, typically found in ash and clinker. Also, a component of petrol.

Furthermore, the following heavy metals were detected within the soils associated with the lead works and potentially the print works. The following metals were noted to be present in the made ground:

- Arsenic;
- Chromium;
- Copper;
- Lead; and
- Zinc.

Concentrations of these metals were found to exceed the Dutch Intervention Values (DIV). The DIV values were used in Holland as Generic Assessment Criteria for sites and represented concentrations above which there would be an unacceptable risk to human health and the environment, assuming a final use of residential and including for potential plant uptake. DIV exceedances of arsenic and chromium were isolated to one sample respectively. Elevations of copper was noted in 3 No. samples which exceeded the DIV threshold (190mg/kg Cu) while 6 No. samples contained concentrations of lead that exceeded the DIV threshold (530mg/kg Pb). These exceedances were located within the top 2-3m (0-3mbgl) across the site, refer to **Table 1** below.

Table 1: Samples Exceeding the Dutch Intervention Values for Soil

Metals	DIV (soil) mg/kg	No. Exceedances	No. of DIV exceedances for Soil
Arsenic	76	1	WS12 0.5mbgl-1.0mbgl, 126.0mg/kg
Chromium III/VI	180/78	1	WS15 0.5-1.0mbgl, 848mg/kg (Total Cr)
Copper	190	3	WS4 1.5-2.0mbgl, 191mg/kg WS11 0.5-1.0mbgl, 403mg/kg

Metals	**DIV (soil) mg/kg**	**No. Exceedances**	**No. of DIV exceedances for Soil**
			WS15 0.5-1.0mbgl, 299mg/kg
Lead	530 mg/kg	6	WS2 0.5-1.0mbgl, 946mg/kg WS3 0.5mbgl, 1031mg/kg WS4 1.5-2.0mbgl, 552mg/kg WS11 0.5-1.0mbgl, 625mg/kg WS12 0.5-1.0mbgl, 981mg/kg WS15 0.5mbgl-1.0mbgl, 710mg/kg
Total No. Exceedances		11	

One groundwater sample was taken from a borehole adjacent to the River Liffey quay wall in south-western corner of the site (BH1 at 3.5mbgl). The water sample was analysed using gas chromatography and showed to contain hydrocarbons (188.3mg/l) for petrol rage organics ($>C_{10}$). The laboratory analysis identified the hydrocarbons as 'possible gasoline residues'.

As mentioned in **Section 4.2 and Section 4.3**, three rounds of ground gas and water level monitoring was carried out in 2003 (25 February and 3 & 15 March 2003).

Carbon dioxide was detected at a number of locations (maximum concentration of 2.3% CO_2) and methane was detected at one location only (WS5 3.3-3.9% CH_4) over the three rounds of monitoring. The previous report assessed the concentrations against CIRIA 149, however methodology this is now obsolete.

The water level monitoring results are discussed in **Section 4.2**.

3 Ground Investigation 2019

3.1 Rationale and Strategy

As mentioned in Section 2.5, a GI was carried out at Hickeys from March to May 2019. The GI was carried out as the preliminary site assessment (PSA) identified a number of where there is insufficient information to carry out a robust assessment with the information available during the preparation of the PSA. The PSA identified a number of features with potential for causing contamination on site and the potential pollutant linkages identified in the conceptual site model (CSM).

3.2 Intrusive Investigation

Ground Investigations Ireland Ltd. (GII), under the instruction of Arup, carried out the GI between March and May 2019. The GII Ground Investigation Report (2019) is presented in **Appendix A**.

The following intrusive works relevant to the DSA were carried out:

- 18 No. window sample boreholes to recover soil samples;

- 4 No. cable percussion boreholes to a maximum depth of 7.6mbgl;
- 4 No. rotary core follow-on boreholes to a maximum of 15.60mbl;
- 4 No. rotary core follow-on boreholes to a maximum depth of 17.0mbgl;
- Installation of 10 No. groundwater monitoring wells;
- Installation of 3 no. gas monitoring caps;
- Geophysical survey; and
- Geotechnical and environmental laboratory testing.

3.2.1 Window Samples

As listed above, 18 No. window sample boreholes were carried out and soil samples were recovered for environmental and geotechnical soil testing.

Window sampling was carried out across the site including within the warehouse building. The locations of the window samples are show in the GII (2019) report.

The logs from the window sampling is presented in Appendix 4 of the GII report, shown in Appendix A of this report.

Samples were chosen for environmental testing based on information recorded on the logs by the site engineer and taking into account the site history.

3.2.2 Boreholes

As listed above, a total of 12 No. boreholes were dug on site:

- 4 No. cable percussion boreholes to a maximum depth of 7.6mBGL;
- 8 No. rotary core follow-on boreholes to a maximum of 17.0mBGL.

The boreholes were carried out to establish the nature, thickness and depth of the overburden and bedrock.

The rotary boreholes were located within the footprint of the warehouse building. Due to access restraints, cable percuissive boreholes could not be carried out within the footprint of the warehouse and as such were progressed at external locations close to the existing buildings.

The locations of the boreholes are shown in the GII (2019) report. The logs are presented in Appendix 4 of the GII report, shown in Appendix A of this report.

3.2.3 Soil Sampling

To give a robust understanding of the nature of contamination within the made ground and natural soils in vertical and lateral extent, environmental samples were taken from both boreholes and window samples. At boreholes, bulk distributed samples were taken from made ground and granular soil at 1m intervals to 8mbgl. In window samples, a small distributed sample was taken from the made ground and natural material at 1m intervals commencing at 0.5mbgl to a 4mbgl or until practical refusal.

Samples were collected in dedicated soil pots and jars as specified and supplied by the analytical laboratory. Samples were taken in accordance with methods specified and referenced in the Investigation of potentially contaminated sites - Code of practice (BS 10175:2011+A1:2013).

Representative geotechnical samples of the soils were also collected in dedicated sample pots and bulk bags.

3.2.4 Monitoring Installations

Monitoring installations were installed at boreholes across the site to record the groundwater levels and gas emissions from the made ground. Given the proximity of the site to the river Liffey estuary this information will be used to establish the tidal influence of the estuary and the flow of ground water in the site. Overall the following monitoring installations were constructed:

- Installation of 10 No. groundwater monitoring wells
- Installation of 3 no. gas monitoring caps

3.2.5 Groundwater Monitoring

Following the completion of the ground investigation, monitoring was carried out comprising one round of manual groundwater level and groundwater quality sampling in all installed monitoring well boreholes. All wells were developed using a plastic bailer, with at least three times the volume of the water within the well was extracted from each location. The groundwater monitoring results are presented in Appendix 7 of the GII report in Appendix A of this report.

Where possible, groundwater monitoring was carried out on a number of historic boreholes where they could be located or where it was feasible. These boreholes had been established during the GI carried out in 2002 (Arup Report, 2003), refer to Section 2.3. The locations of the historic boreholes are shown in Figure 2, Volume I of the IGSL GI factual report that formed part of the Arup geotechnical and geo-environmental assessment report issued in 2003, refer to Appendix A of the PSA report.

Water samples were collected from BH101, BH103, BH104, BH106 and BH107 using low-flow sampling techniques in accordance with “Water quality - Sampling. Guidance on sampling of groundwater” (BS ISO 5667-11:2009) [6].

The sample containers used were provided by the laboratory.

A number of field analytical tests were carried out including pH, Electrical Conductivity (EC), Dissolved Oxygen (DO) and Redox. The results of the field monitoring are presented in Appendix B of the ground investigation report (Appendix A). These were measured using a YSI Pro Plus Quatro multiparameter meter and a Eijkelkamp 12Vdc peristaltic pump.

Samples were only collected once the consecutive pH, EC and DO readings were observed within 10% of each other. After sampling, the samples were stored in cool boxes with ice packs before being sent to the laboratory.

3.2.6 Ground Gas Monitoring

Three rounds of ground gas monitoring were carried out on 3 No. boreholes (WS110, WS114, WS117) on the 3rd, 30th May and 13th June 2019. The gas monitoring results are presented in Appendix 7 of the GII report in Appendix A of this report.

3.2.7 Laboratory Analysis

All soil and water samples taken on site were kept cool on site until they were transported by courier the laboratory in the UK (Exova Jones). Samples were scheduled for analysis as instructed by Arup engineers based on information collated during the PSA and the logs recorded during the GI.

4 Results and Discussion of Ground Investigation

4.1 Site Geology

The site geology consists generally of made ground overlying a layer of clay with occasional shell fragments, which overlies sand and gravel. Limestone bedrock is present underneath the natural soils. A summary of the strata proven at the site is summarised in Table 2. This information is compiled from the borehole and window sample logs from the site investigation as presented in Appendices 4 and 5 of the site investigation report produced by Ground Investigations Ireland presented in Appendix A of this DSA. The strata proven is consistent with the regional geology and generally consistent with findings from previous site investigations for the site presented in the PSA.

Table 2: Site geology

Lithology	Description	Depth (mbgl)	Thickness (m)
Made ground	**Hardcore** Concrete and Tarmacadam	0 – 1.3	0.04 – 1.3
	Clay/ Gravel Brown to dark brown slightly sandy clay and gravel with cobbles and anthropogenic materials (including, but not limited to slag, redbrick, mortar, charcoal). Gravel is angular to subrounded, fine to coarse.	0 – 5.0	1.4 – 5.0
Clay	Soft, light brown to brown, slightly sandy silty clay with occasional shell fragments	1.9 – 6.20	0.3 – 1.40
Sand and gravel	Loose to very dense grey to brown slightly clayey gravelly fine to coarse sand and gravel with occasional cobbles. Gravel is subangular to subrounded.	2.6 – 8.50	1.2 - 3.8
Weathered Bedrock	Angular cobbles of weak, thinly laminated dark grey to black Mudstone and Limestone	6.4 – 8.6	0.2 - 1.5
Limestone Bedrock	Weak to very strong dark grey fine grained limestone with bands of mudstone (?) and calcite veining	6.7 – 17.0 (proven)	8.7 (proven

4.1.1 Made Ground

The made ground is present in all boreholes and window samples on the site. A generally thin layer of concrete or tarmacadam overlies the clay and gravel made ground layers.

The thickness of the made ground varies between 1.4m in WS113 to 5.0m in BH104 and typically contains slag, red brick fragments, mortar and charcoal.

4.1.2 Natural Strata

A clay layer with occasional shell fragments is present across the site and is likely to be alluvium deposits from the River Liffey floodplain before the site was reclaimed in the early 1800's.

Layers of sand and gravel underlying the clay layer were also present throughout the site and are likely to be river or estuarine deposits in the area of the River Liffey channel.

A layer of angular cobbles of limestone were then encountered, described by the drillers as weathered bedrock followed by weak to very strong dark grey fine-grained limestone with bands of mudstone and calcite veining, proven to 17.0mBGL.

4.2 Site Hydrogeology

During the site investigation, only the natural sand and gravel was found to be water bearing. No groundwater was encountered in the made ground. Groundwater monitoring installations were installed in all boreholes, with response zones in the following locations:

- BH101, BH103, BH106 in the natural clay and/ or gravel;
- BH102, BH104, BH105 in the limestone bedrock;
- BH107 in the natural gravel and the limestone bedrock.

Water levels in the boreholes and historic boreholes (BH101, BH103, BH104, BH105, BH106, BH107, BH01, BH02, BH05, BH06, WS06, WS12 and WS13) were manually recorded on four occasions in May and June 2019 while the site investigation works were ongoing. Water levels were not recorded in BH102 as it was not completed or was not accessible during this time.

Water levels in the boreholes were electronically recorded over a four-week period between 14th August and 12th September 2019 using transducers in BH101, BH102, BH103 and BH106. A summary of this data is presented in Table 3 and Figure 1 below.

The groundwater level in both the natural sand and gravel aquifer and in the limestone bedrock aquifer varied with the tide during the monitoring period.

BH106 in the south-centre of the site had the maximum variation in groundwater level as it was closest to the River Liffey and so was impacted by the tidal variation most. Groundwater levels in BH103, located in the north-centre of the site and furthest away from the river, varied the least but was still influenced slightly by tidal variation.

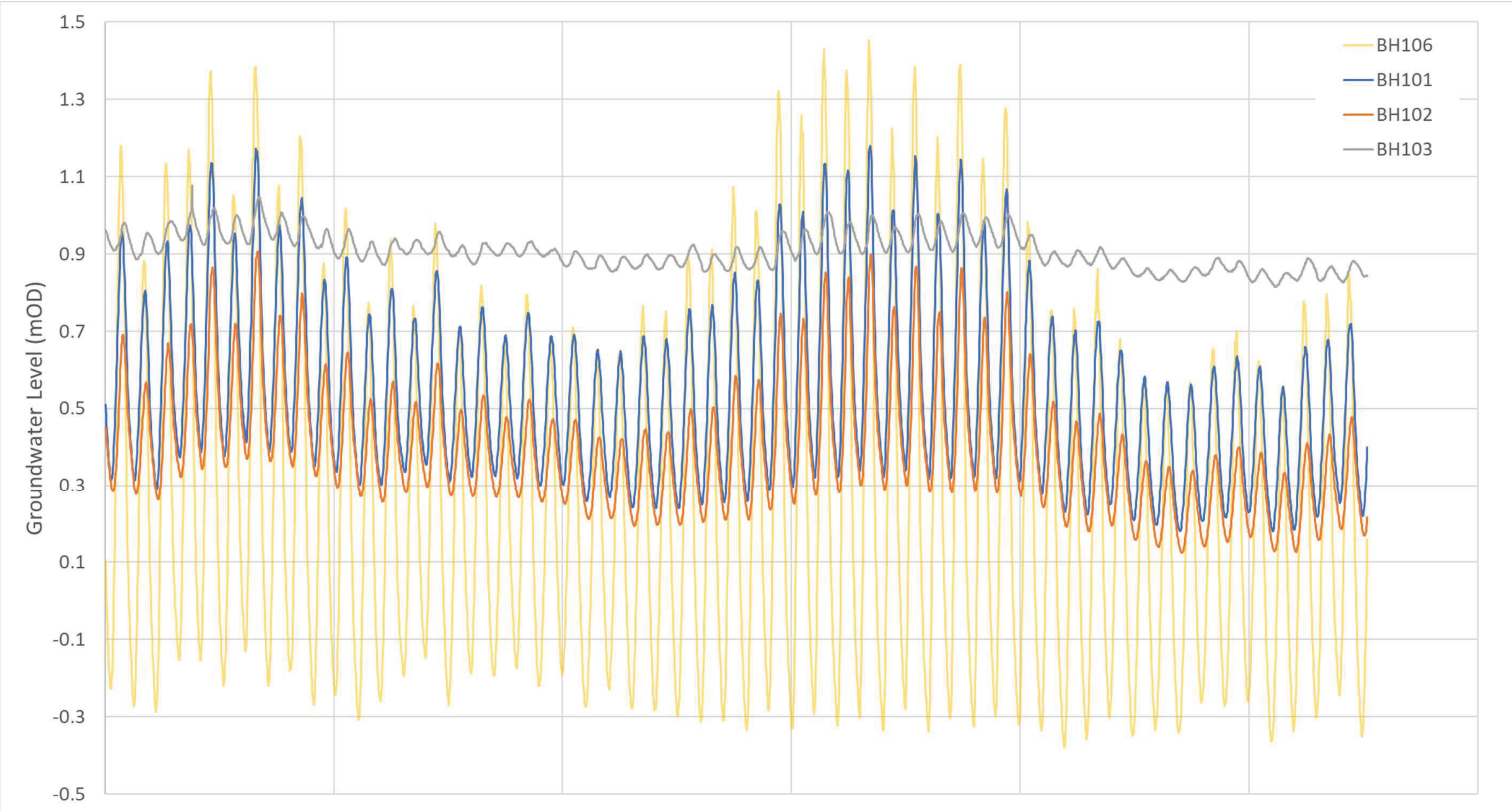
Based on this data, groundwater flow across the site is in a north-west to south-east direction toward the river during low tide and in a south-east to north-west direction at high tide.

Table 3: Summary of monitored groundwater levels

Location ID	**Aquifer Type**	**Groundwater Level Maximum (mOD)**	**Groundwater Level Minimum (mOD)**
BH101	Sand and gravel	1.18	0.18
BH102	Limestone bedrock	0.91	0.12
BH103	Sand and gravel	1.08	0.82
BH106	Sand and gravel	1.45	-0.38

The data from the transducers and manual readings are presented in Appendix A.

Figure 1: Groundwater Transducer Data - 14/08/2019 to 12/09/2019



4.3 Gas Monitoring

Gas monitoring installations were installed in three window samples – WS110, WS114 and WS1117. The response zone was installed in the made ground and the natural clay.

Gas monitoring was carried out on three occasions during the site investigation works in May 2019 and on one occasion in June 2019 in tandem with the groundwater monitoring.

4.4 Laboratory Testing Results

4.4.1 Soil Analysis

Soil samples were collected from the window samples and boreholes during the site investigation period and are presented in Appendix A. A summary of the soil sample results are as follows:

4.4.2 Water Quality

Water quality samples were taken from the boreholes on one occasion during the groundwater monitoring rounds and are presented in Appendix A.

4.4.3 Ground Gas

Gas monitoring results taken from the window samples are presented in Appendix A. A summary of the results are as follows:

4.5 Conceptual Site Model

An initial conceptual model was presented in the PSA which raised several site uncertainties, some of which have been addressed through the DSA.

Below is a summary of the CSM in which the site has been subdivided into sources, pathways and receptors and key source pathway receptor (SPR) linkages are highlighted.

4.5.1 Sources

The PSA highlighted the following potential sources:

- Made-ground of unknown origin;
- Above ground storage tanks;
- Underground storage tanks;
- Historical contamination from former Maxol station (adjoining the site);
- Asbestos containing materials in the soil.

4.5.2 Pathways

The principal pathways highlighted in the PSA were:

- Direct exposure of contamination in the made ground (ingestion, inhalation and dermal contact);
- Percolation of recharge through the unsaturated made ground to the groundwater in the made ground;
- Percolation of liquid contaminants through the made ground to the gravel layer;
- Percolation of liquid contaminants through the made ground and gravel layer to the underlying bedrock;
- Groundwater flow through the made ground and quay wall;
- Groundwater flow through the gravel layer and the quay wall; and
- Movement of ground gas through the unsaturated made ground.

4.5.3 Potential Receptors

The principal receptors highlighted in the PSA are:

- Demolition and construction workers;

- Site users (current and future including employees, residents, etc.);
- Groundwater;
- Groundwater in the gravel layer;
- River Liffey;
- Irish Sea.

4.5.4 Source Pathway Receptor (SPR) Linkages

Considering the CSM outlined above, the following plausible SPR linkages are highlighted in Table 4 for the current and proposed development of the site.

Table 4 -Identified Source-Pathway-Receptors

Source	Pathway	Receptor
Made-ground of unknown origin;	Direct exposure of contamination in the made ground (ingestion, inhalation and dermal contact);	Demolition and construction workers;
	Percolation of recharge through the unsaturated made ground to the groundwater in the made ground;	Groundwater;
	Percolation of liquid contaminants through the made ground to the gravel layer;	Groundwater in the gravel layer;
	Percolation of liquid contaminants through the made ground and gravel layer to the underlying bedrock;	Groundwater;
	Groundwater flow through the made ground and quay wall;	River Liffey;
		Irish Sea.
	Movement of ground gas through the unsaturated made ground.	Site users (current and future including employees, residents, etc.);
		Demolition and construction workers;
Above ground storage tanks;	Percolation of liquid contaminants through the made ground to the gravel layer;	Groundwater in the gravel layer;
	Percolation of liquid contaminants through the made ground and gravel layer to the underlying bedrock;	Groundwater;
Underground storage tanks;	Percolation of liquid contaminants through the made ground to the gravel layer;	Groundwater in the gravel layer;
	Percolation of liquid contaminants through the made ground and gravel layer to the underlying bedrock;	Groundwater;
Historical contamination from former Maxol station (adjoining the site);	Direct exposure of contamination in the made ground (ingestion, inhalation and dermal contact);	Demolition and construction workers;
		Site users (current and future including employees, residents, etc.);

Source	Pathway	Receptor
	Percolation of liquid contaminants through the made ground to the gravel layer;	Groundwater;
	Percolation of liquid contaminants through the made ground and gravel layer to the underlying bedrock;	Groundwater in the gravel layer;
	Movement of ground gas through the unsaturated made ground.	Site users (current and future including employees, residents, etc.);
		Demolition and construction workers;
Asbestos containing materials in the soil.	Direct exposure of contamination in the made ground (ingestion, inhalation and dermal contact);	Demolition and construction workers;
		Site users (current and future including employees, residents, etc.);

Considering the receptors highlighted above, human health criteria for the soils and environmental quality standards for the groundwater are considered as part of a generic quantitative risk assessment (GQRA). The GQRA has been carried out for the contaminants identified in Section 4.4.

5 Generic Quantitative Risk assessment (GQRA)

5.1 Generic Assessment Criteria (GACs)

5.1.1 Soil

There are no Irish soil quality standards for assessing risk of contaminated soils to site users. EPA guidance states that:

"EPA recommends the use of GAC, based on the UKEA Contaminated Land Exposure Assessment (CLEA) model, either produced by the UKEA itself (known as Soil Guideline Values/SGVs) or values generated using the CLEA model by reputable third-party organisations such as Land Quality Management (LQM) or Contaminated Land: Applications in Real Environments (CL:AIRE). Where GAC have not been published or if practitioners don't use human health GAC publications, values should be generated by appropriately qualified and experienced professionals using the CLEA model to ensure consistency with the EPA approach"

Consistent with the EPA guidance limits this GQRA refers to C4SL's (Category 4 Screening Levels) derived using CLEA and as an output from the UK Department for Environment, Food and Rural Affairs (DEFRA) research project SP1010 and which incorporate feedback from the project's Steering Group and the wider contaminated land community [15]. The project's Steering Group included individuals from the following organisations:

- Department for Environment, Food and Rural Affairs (Defra)
- Department for Communities and Local Government (DCLG)
- Welsh Government (WG)
- Environment Agency (EA)
- Natural Resources Wales (NRW)
- Public Health England (PHE, formerly the Health Protection Agency)
- Food Standards Agency (FSA) and
- Homes and Communities Agency (HCA)

Where no C4SL is available, the LQM's S4UL's (suitable for use limits) have been derived using the CLEA model by a group of contaminated land consultants and members of academia [16]. These have been endorsed in the UK by the Chartered Institute of Environmental Health (CIEH). The S4UL's are relatively conservative and do not take account of individual exposure pathways at each site or the local soil type.

Where no S4UL is available, Generic Assessment Criteria developed by Arup using the CLEA model have been used.

Where, no C4SL, S4UL or Arup standards are available, values from the other countries surrogates comprising similar compounds have been used. These have not been derived using the CLEA model but are considered to be conservative and comprise a suitable standard for this preliminary assessment.

In the GQRA the soil assessment criteria are collectively referred to as GAC.

Although all standards used in this assessment were not specifically derived for Irish soil, the large factor of safety built into the CLEA model makes them a suitable conservative assessment criteria in the absence of Irish soil standards. They are also commonly used in Northern Ireland.

The GAC's are available for a range of different land uses. These have been reviewed and compared to the site uses proposed for the Parkgate Street site.

The proposed development at No. 42A Parkgate Street will be a mixed-use development with both commercial and residential units. For this reason, the environmental soil testing results were screened against two sets of GAC thresholds modelled for Commercial and Residential (without home-grown produce) site uses respectively.

Section 4.3.4 of the CLEA Software Handbook[1] (V1.05) describes the assumptions made by the CLEA model on the receptor behaviour under the standard commercial land use:

"*The standard commercial land use described in the CLEA software assumes a typical commercial or light industrial property; it does not apply to heavy industrial workers and facilities, nor to work that is predominantly undertaken outside such as construction work or landscape maintenance. Soil and soil-derived dust ingestion rates, proportion of time spent inside and outside, number of hours on site and proportion of time spent in active and passive respiration are defined for the patterns of an office or warehouse worker undertaking relatively light work indoors with standard hour days and short outside breaks.*

[…]

Children are not the critical receptor for long-term risks for the commercial land use scenario, as they are not typical regular users of the land."

Under the commercial land use, the default critical receptor in the CLEA model is an adult male and female over the age of 17 years. The Commercial GAC values are derived from the CLEA modelling this scenario.

In the residential land use scenario (without homegrown produce), the CLEA model uses receptor data for those persons aged 1-18 years of age as the default critical receptors and therefore the GAC thresholds derived are typically lower as it assumes a more vulnerable default site user who is exposed to the soil, for example, residents using green spaces and in contact with the soil but without consumption of produce grown in the soil.

[1] Environment Agency (2010) CLEA Software (Version 1.05) Handbook. Accessible at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/455747/LIT_10167.pdf

The soil organic matter (SOM) for the site was set at 2.5% as this was shown to be most representative of the material on site.

5.1.1.1 Asbestos

Currently, there are no Irish or UK GAC for asbestos. Based on current understanding there is no 'zero risk level' for asbestos [9], hence any measurable amount can pose a risk to a receptor. In this assessment it has been assumed that if the laboratory limit of detection is not exceeded, no asbestos is present in the sample.

However, even if asbestos was not observed in the tested sample, there still remains the possibility that it could be present in concentrations less than the laboratory detection limit. Hence soils with recorded concentrations of asbestos below the detection limit could still present a risk.

5.1.2 Groundwater

The EQSs are prepared by the European Union to assess the quality of water within the member states of the Union [10][11][12]. They are not statutory requirements for land owners, but exceedances of the standards are considered to comprise pollution as they could affect the quality status of the water body.

Where no surface water EQS are available, in order of preference, groundwater quality standards [12] and then older EPA interim guideline values (IGV) [13] have been used to provide a qualitative assessment levels. An exceedance of a groundwater standard or IGI value does not necessarily denote that the water quality is unacceptable but highlights that the concentration could be unacceptable and requires additional consideration.

If water quality beneath the site is seen to exceed the EQS value, this could be either due to an on-site contamination source or an off-site source.

5.2 Results of GQRA

5.2.1 Soils

Under the commercial land-use scenario, the following samples exceeded the GAC thresholds, refer to Table 5.

Table 5 - Samples exceeding GAC threshold for Commercial land use.

Contaminant	**GAC Threshold**	**No. Exceedances**	**Sample ID and Depth (mbgl)**	**Sample Result**
Lead	2300 mg/kg	1	WS105A at 0.5mbgl	4755mg/kg
Dibenzo[ah] anthracene	3.55 mg/kg	1	WS106 at 0.5mbgl	4.81mg/kg
Total No. of Exceedances		2		

Under the residential (without home grown produce) land use scenario, a total of No. 15 samples exceeded the GAC thresholds, refer to Table 6 below. The locations of the window samples and boreholes from where the samples were taken, are show in the GII (2019) report, shown in Appendix A of this report.

Table 6 - Samples exceeding GAC threshold for residential (without home grown produce) land use scenario.

Contaminant	**GAC Threshold**	**No. Exceedances**	**Sample ID and Depth (mbgl)**	**Sample Result**
Arsenic	2 mg/kg	1	BH101 at 1.0 mbgl	43.1 mg/kg
Lead	310 mg/kg	8	WS106 at 0.5 mbgl	366 mg/kg
			WS106 at 1.0 mbgl	414 mg/kg
			WS114 at 1.5 mbgl	385 mg/kg
			WS103 at 2.6 mbgl	521 mg/kg
			WS101 at 1.0 mbgl	312 mg/kg
			WS105A at 0.5 mbgl	4755 mg/kg
			TP102 at 1.0 mbgl	692 mg/kg
			WS110 at 0.9 mbgl	2229 mg/kg
Benzo[a] anthracene	14 mg/kg	1	WS106 at 0.5 mbgl	19.01 mg/kg
Benzo[a] pyrene	3 mg/kg	2	WS106 at 0. 5 mbgl	17.27 mg/kg
			WS105A at 1.3 mbgl	8.97 mg/kg
Dibenzo[ah] anthracene	0.32 mg/kg	3	WS106 at 0.5 mbgl	4.81 mg/kg
			WS106 at 1.0 mbgl	0.64 mg/kg
			WS105A at 1.3 mbgl	1.46 mg/kg
Total No. of Exceedances		15		

Based on the results of the soil testing, except for lead and Dibenzo[ah] anthracene on one occasion, the determinands are below the (commercial) GAC limit.

It is likely the lead is resultant from the previous uses on site such as the printworks and metalworks. Dibenzo[ah] anthracene is a PolyAromatic Hudrocarbon (PAH) and these are typically associated with the partial combustion of fossil fuels. While the description of the made ground at 0.5mBGL mentions only mortar and redbrick fragments, from 1.4mBGL down there is mention of the presence of slag. This slag may have been present in the upper sample and was not observed.

While the exceedances for the Residential (without home grown produce) were more extensive, this should be recognised as a more conservative screening value than the Commercial GACs.

The majority of the exceedances (eight from fifteen in total) against the residential GACs were for Lead, which as stated above can be linked back to the previous uses of the site. The next most common exceedances were for PAH's (Benzo [a] anthracene, Benzo [a] Pyrene and Dibenzo [ah] anthracene) (six from fifteen in total). Typically PAH's are linked to partial combustion of fossil fuels and given the descriptions of made ground across the site made reference to slag, ash and charcoal, this is not unexpected.

The final exceedance was for arsenic which was located in one sample and may be associated with the slag which was noted in the made ground descriptions from the sample.

It should be noted that the exceedances in relation to the commercial GACs are both located in WS105A and WS106 at a depth of 0.5mBGL. These are both located in the courtyard area adjacent to the site boundary with the TII Building.

One sample which had lead concentrations in excess of the residential GAC was recovered from (2.6mBGL / +1.09mOD). This sample would be situated 1.6m beneath the top of the proposed slab and as such would pose a negligible risk to any receptors on the site. The remaining samples, WS110, 0.9mBGL / +3.35mOD and WS114, 1.5mBGL / +2.75mOD, will both be situated beneath the ground floor of the other buildings on site which appear to have ground floor levels of +5.2 to +5.5mOD meaning at least 2.45m of cover between those soils and any potential receptors.

5.2.2 Groundwater Quality

A summary of the results are presented in Table 7 - Groundwater GAC Exceedances**Error! Reference source not found.**.

The majority of GAC exceedances are observed in BH101, located in the south-west of the site and in the area of the old generator room, boiler house No. 2 and the old chimney and downgradient of underground storage tanks 1 and 2.

Table 7 - Groundwater GAC Exceedances

Test	Units	LOD*	GAC	BH101	BH103	BH104	BH106	BH107	Number of Exceedences	Max	Median	Min
Dissolved Arsenic	ug/l	<0.9	7.5	<LOD	10.6	<LOD	<LOD	<LOD	1	10.60	10.60	10.60
Dissolved Barium	ug/l	<1.8	100	155.1	66.6	11.4	17.5	42.5	1	155.10	42.50	11.40
Total Dissolved Iron	ug/l	<4.7	200	1840	1335	17.1	4.7	160.6	2	1840.00	160.60	4.70
Dissolved Magnesium	mg/l	<0.1	50	188.2	14.1	4.3	28.9	26.1	1	188.20	26.10	4.30
Dissolved Manganese	ug/l	<1.5	50	1637	617.3	24.5	635.7	322.5	4	1637.00	617.30	24.50
Dissolved Potassium	mg/l	<0.1	5	54.3	14.1	2.6	17.7	16.9	4	54.30	16.90	2.60
Dissolved Sodium	mg/l	<0.1	150	1518	24.6	17.2	110.6	53.2	1	1518.00	53.20	17.20
Sulphate as SO_4	mg/l	<0.5	187.5	363.5	21.5	44	97.5	133.4	1	363.50	97.50	21.50
Chloride	mg/l	<0.3	187.5	2668.9	31.7	31.7	159.7	43.6	1	2668.90	43.60	31.70
Ammoniacal Nitrogen as N	mg/l	<0.03	0.175	0.24	6.88	0.03	0.58	0.29	4	6.88	0.29	0.03
Electrical Conductivity @25C	uS/cm	<2	1875	8635	735	330	1210	898	1	8635.00	898.00	330.00
Total Dissolved Solids	mg/l	<35	1000	5008	448	213	678	584	1	5008.00	584.00	213.00

*LOD = Limit of Detection

Orange shaded cells indicate an exceedance.

6 Soil Management Options

The most cost effective and environmentally sustainable solution for the management of excavation spoil on site is for reuse in landscape features or as fill, where appropriate. The options for soils disposal include:

1. Reuse on the source site
2. Reuse on another development site (carried out under an Article 27 determination);
3. Recovery and use in a permitted waste recovery facility; and
4. Disposal to Licensed Landfill/Disposal Facility.

6.1 Reuse on Site

The engineering design of the proposed structure requires the raising of site levels to approximately +5.5mOD beneath parts of the site, namely the areas where the current factory building is located, beneath proposed Blocks A and B1.

The undercroft is being constructed along the western margin of the site beneath Block B2 and this will be excavated down to a provide a finished slab level of +2.6mOD.

Existing levels across the site vary from +5.29mOD to the north to +3.8mOD to the south close to the quay wall for the River Liffey. The floor slab in the existing warehouse is at approximately +4.3mOD.

This would suggest that there is an excavation of approximately 2.7 to 1.2m required for the construction of the undercroft and filling from a minimum of 1.2m for the slab level for Block A and Block B1.

Where the excavated material from the undercroft can be shown to not contain elements which potentially pose a risk to site occupants or the proposed structures on site, the material may be reused. Given the current design of the proposed buildings includes for suspended slabs sited on pile caps it would be proposed to use site won materials which do not contain asbestos or exhibit any exceedances of the GACs which fulfil the Class 1 / Class 2 General fill Specification from Series 600 of the TII Specification for Roadworks. This material could then be used around the pile caps which shall be constructed for the slab beneath Blocks A and B1.

6.2 Reuse on another site

Under Article 27 the excavated materials are deemed to be a ‘by-product’ of a ‘process’, which have a lawful and beneficial re-use at a separate location that requires such materials. Excavated materials that can meet these requirements are natural soil and rock and engineered materials that meet technical specifications and create no environmental risk to the receiving environment. Where feasible the Article 27 approach provides a cost-effective solution, which does not require any waste licencing or permitting, just an EPA determination of the material as a by-product.

As the materials to be excavated from the subject site are predominantly made-ground, determination as a by-product is considered unlikely. In addition, the determination requires confirmation of a lawful re-use, which means the receiving site has to have appropriate planning permission to receive such materials and have the capacity at the time of excavation. In light of these constraints we consider this option to be unlikely and have not considered it further.

6.3 Recovery

Recovery and use in a permitted waste recovery facility is based on complying with the prevailing limits for soil recovery as set for each facility. These are typically lower than the acceptance criteria set for inert licenced landfills.

Given that the majority of the soils to be excavated during the construction of the undercroft are classified as requiring disposal to non-hazardous or hazardous licenced landfill, recovery is not considered as a likely option for these soils.

Some of the soils from elsewhere classified as potentially suitable for an inert licenced landfill could be sent to a recovery facility should they meet the site-specific standards and particular requirements of the facilities permit, e.g. a site may not be permitted to take made ground.

6.4 Disposal to a Licenced Landfill

Disposal of the materials to licenced facilities is considered the most likely option based on the assessment undertaken on the data available to date. The costs of disposal are based on the classification of the materials requiring disposal, falling into one of the following categories. These are listed in order of increasing costs:

- Suitable for disposal to an Inert Licenced Landfill;
- Suitable for disposal to a Non-Hazardous Licenced Landfill;
- Suitable for disposal to a Non-Hazardous Licenced Landfill, but containing <0.1% Asbestos;
- Suitable for Disposal to a Hazardous Licenced Landfill;
- Suitable for Disposal to a Hazardous Licenced Landfill but containing <0.1% Asbestos;
- Soils requiring export for specialist disposal or incineration.

6.4.1 Waste Classification Criteria

The soils within the assumed excavation areas have been classified in respect of their waste classification. The waste assessment criteria that have been used were derived from:

- Waste Assessment Criteria as presented in Annex II to Directive 1999/31/EC;

- Environmental Protection Agency's 2015 report entitled Waste Classification List of Waste and Determining if Waste is Hazardous or Non-Hazardous; and
- Joint agency document entitled Waste Classification guidance on the classification and assessment of waste (1st Edition, Version 1.1 dated May 2018) referred to as WM3.

The WM3 document is applied through the HazWasteOnline tool which has been used to carry out part of this assessment.

It should be noted that the assessment criteria used to categorize the soils are based on Irish and European standard criteria.

Specific landfills were not consulted in relation to their acceptance criteria, which would be required in further stages of assessment to provide actual alternatives.

The criteria outlined in the Landfill Directive represents the minimum limits for acceptance of materials. The operators of landfills may use their own discretion to set their own limits for materials.

The soils categorized largely includes made ground (historic fill and recent made ground). It is not likely that any consideration was given to potential contamination at the time of deposition of these materials. It is likely, therefore, that there is a high level of heterogeneity within the made ground. Considering this heterogeneity, it should be noted that proportionally the soil sample analysed and categorized represents a very small quantity of the total volume of soil and therefore are only representative of a discrete location.

As a consequence of the nature of the material and notwithstanding the results of our classification for each cell there remains a risk that the classification is not representative of the bulk of soils in each cell. Allowance should be made for encountering hotspots of contamination within the site.

6.5 Method

In order to quantify the volume of soil with differing waste classification the site was sub-divided into cells based on the position of ground investigation locations and the sampling frequency. Samples collected from boreholes in each cell were used to attribute a waste classification to each cell.

This exercise was repeated for 1m lifts from ground level across the site (4.5mOD to 3.5mOD, 3.5mOD to 2.5mOD and 2.5mOD to 1.5mOD). This was based on the assumed depth of dig to 2.6mOD to facilitate the construction of the undercroft.

Where no soil samples were collected from a cell the waste classification is based on the nearest confirmed classification with the same depth within similar soil types.

These breakdowns do not account for any potential hotspots located across the site which were not identified during the ground investigations.

Additional costs may be associated with the disposal and/or treatment of contaminated groundwater arising from dewatering operations across the site.

Materials with a high proportion of waste may require some limited screening prior to disposal. The selective excavation and handling of materials according to their waste classification also poses challenges in terms of site logistics and programming. Earthworks contracts may indeed choose to apply a much simpler and conservative classification to each site that allows them to excavate and deposit in the one location.

7 Likely Remediation Strategy

This section presents options for remediation strategy for the proposed works. The options are considered illustrative and are all subject to the final design of the buildings. These will be finalised during the planning process and detailed design of the site. An options appraisal has not been undertaken as the mitigation measures are intrinsic to the development design or relate to site management as described below.

7.1 Excavated Materials Management

To facilitate the controlled excavation of these soils, the site was divided into 20m by 20m grids labelled A to D from North to South, and numbered 1 to 4 going from West to East. Therefore on this basis we have assigned a category for disposal to each of these cells based on the results of the chemical testing.

However, firstly we must consider the results of the various screening exercises applied to the tested soils in turn.

7.1.1 GACs

Based on the screening carried out on the soils, a number of locations were identified where the soils contained parameters which exceeded the GACs for Residential Land Use (without Plant Uptake). These were as presented in Table 8 and are reproduced below.

Table 8 - GAC Exceedances

Contaminant	GAC Threshold	No. Exceedances	Sample ID and Depth (mbgl)	Sample Result
Arsenic	2 mg/kg	1	BH01 at 1.0 mbgl	43.1 mg/kg
Lead	310 mg/kg	8	WS106 at 0.5 mbgl	366 mg/kg
			WS106 at 1.0 mbgl	414 mg/kg
			WS114 at 1.5 mbgl	385 mg/kg
			WS103 at 2.6 mbgl	521 mg/kg
			WS101 at 1.0 mbgl	312 mg/kg
			WS105A at 0.5 mbgl	4755 mg/kg
			TP102 at 1.0 mbgl	692 mg/kg
			WS110 at 0.9 mbgl	2229 mg/kg
Benzo[a] anthracene	14 mg/kg	1	WS106 at 0.5 mbgl	19.01 mg/kg
Benzo[a] pyrene	3 mg/kg	2	WS106 at 0. 5 mbgl	17.27 mg/kg
			WS105A at 1.3 mbgl	8.97 mg/kg
	0.32 mg/kg	3	WS106 at 0.5 mbgl	4.81 mg/kg

Contaminant	GAC Threshold	No. Exceedances	Sample ID and Depth (mbgl)	Sample Result
Dibenzo[ah] anthracene			WS106 at 1.0 mbgl	0.64 mg/kg
			WS105A at 1.3 mbgl	1.46 mg/kg
Total No. of Exceedances		15		

Based on this table and Figure 1 (Location of GAC exceedances) it can be seen that the majority of the exceedances (13 of 15) occur within the second lift on site, (3.5mOD to 2.5mOD).

Materials arising from grids which are shown to contain exceedances of the GACs are not suitable for reuse on site and as such will require categorisation and disposal off-site.

7.1.2 Asbestos

Excavated soils which were noted to contain low levels of asbestos (<0.1%) will require disposal off site.

In one case four of the asbestos detects all occurred in close proximity, at TP102, BH101, WS101 and WS103, all within the 3.5-2.5mOD lift.

Three of the remaining detects were located in the top lift (4.5-3.5mOD) at locations WS108 (+3.78mOD), WS114 (+3.78mOD) and WS117 (+3.78mOD).

The final detect was located in WS115 at 1.78mOD, within the 2.5-1.5mOD lift. These soils are located beneath the footprint of Block A and Block B1 and as such the levels in this area will be built up to 5.5mOD.

7.1.3 Disposal Categories

Materials requiring Disposal need to be classified according to the following:

- Waste Assessment Criteria as presented in Annex II to Directive 1999/31/EC;
- Environmental Protection Agency's 2015 report entitled Waste Classification List of Waste and Determining if Waste is Hazardous or Non-Hazardous; and
- Joint agency document entitled Waste Classification guidance on the classification and assessment of waste (1st Edition, Version 1.1 dated May 2018) referred to as WM3.

Based on the findings of these assessments the soils were divided into the following categories:

- Suitable for disposal to an Inert Licenced Landfill
- Suitable for disposal to a Non-hazardous Licenced Landfill

- Suitable for disposal to a Non-hazardous Licenced Landfill which can also accept asbestos
- Suitable for disposal to a Hazardous Licenced Landfill
- Suitable for disposal to a Hazardous Licenced Landfill which can also accept asbestos
- Requires Specialist Disposal and/or Ex-Situ Treatment

A number of figures were prepared which detailed the disposal categories for the soils which would apply, should they be sent off-site for disposal as a waste.

Note that the site was divided into a number of grids for the purpose of this exercise. These grids could be further subdivided and additional testing could be carried out if required to further define the extent of the contaminated soils.

However, provision should always be included for the management of unidentified hotspots across the dig, given the variable nature of the made ground across the site.

The categories proposed above are based on current legislation and requirements. Additional Criteria or alternative limits may apply to some specific landfills based upon their licence.

Table 9 - Disposal Category Breakdown

Lift	**GL - 3.5**	**3.5-2.5**	**2.5-1.5**	**Overall %**
Classification	%			
Inert Licenced Landfill	0%	21%	26%	16%
Non Hazardous Licenced Landfill	50%	32%	63%	48%
Non Hazardous Licenced Landfill with Asbestos	17%	5%	11%	11%
Hazardous Licenced Landfill	8%	32%	0%	13%
Hazardous Licenced Landfill with Asbestos	17%	10%	0%	9%
Specialist disposal or Ex-Situ Treatment	8%	0%	0%	3%

7.2 Gas Protection Measures

Three rounds of ground gas monitoring were carried out on 3 No. boreholes (WS110, WS114, WS117) on the 3rd, 30th May and 13th June 2019.

Results are presented in Table 10.

Table 10 - Ground gas monitoring

Sample ID	Date	Barometric Pressure	Methane	CO_2	CO	H_2S	O_2	Flow Rate	Comment
		mbar	%	%	ppm	ppm	%	l/s	
WS110	03/05/2019	-	0	2.5	1	1	17.5		

Sample ID	Date	Barometric Pressure	Methane	CO_2	CO	H_2S	O_2	Flow Rate	Comment
		mbar	%	%	ppm	ppm	%	l/s	
	30/05/2019		0	2.8	2	3	15.6		
	13/06/2019	1008	0	6.7			6.9	0.2	
	03/05/2019	-	0.1	3	1	1	18.2		
	30/05/2019		-	-	-	-	-		
WS114	13/06/2019	1008	0	5	-	-	17.7	0.01	
	03/05/2019		1.4	4.3	1	1	12.7		
	30/05/2019		0.1	3.9	2	3	13		
WS117	13/06/2019		-	-	-	-	-	-	Concreted Over

Based on the limited data available, and considering no identifiable sources were observed during the ground investigation, a characteristic Gas screening Value of 0.0134L/h was calculated. Noting that the flow rates, where recorded were low and the concentrations of methane and carbon dioxide were typically below 1% and 5% respectively the site would be described as a low risk site with a Characteristic Gas Situation (CS) of 1.

The proposed property would be classed as a Type B property according to BS8485:2015:+A1:2019. A type B property is described as follows:

> *private or commercial property with central building management control of any alterations to the building or its uses but limited or no central building management control of the maintenance of the building, including the gas protection measures. Multiple occupancy. Small to medium size rooms with passive ventilation of rooms and other internal spaces throughout ground floor and basement areas. May be conventional building or civil engineering construction. Examples include managed apartments, multiple occupancy offices, some retail premises and parts of some public buildings (such as schools, hospitals, leisure centres) and parts of hotels.*

A Type B building with CS1 would therefore have a Gas Protection Score of 0.

A gas protection score is usually achieved through using a combination of the following three methods with particular scores related to different approaches to these measures:

- Floor slab, basement slab or basement slab and walls
- Ventilation measures

- Gas resistant membrane.

The tables 5, 6 and 7 from BS8485:2015+A1:2019 outline the scoring for the different types of slab, ventilation measures and membranes available to the designer.

8 Summary and Conclusions

Some soils have been shown to reflect the industrial history of the site and contain the following elevated parameters:

- Arsenic
- Lead
- Benzo[a] anthracene
- Benzo[a] pyrene
- Dibenzo[ah] anthracene

Arsenic and lead are metals and the remaining three compounds (Benzo[a] anthracene, Benzo[a] pyrene and Dibenzo[ah] anthracene) are PolyAromatic Hydrocarbons.

In addition, low levels of asbestos contamination were observed in the soils.

Ground gas was not noted in concentrations or at flow rates so as to pose a potential risk.

The following parameters were noted to exceed the GACS for Groundwater:

- Arsenic
- Barium
- Iron
- Magnesium
- Manganese
- Potassium
- Sodium
- SO4
- Chloride
- Ammoniacal Nitrogen as N
- Electrical Conductivity @25C
- Total Dissolved Solids

The majority of these exceedances were noted in BH101 which is to the south of the site, near the quay wall. The borehole is also located next to the generator building and down gradient from the UST (underground storage tanks) identified on site. No hydrocarbons were detected and it should be noted that some of the exceedances could be linked to the tidal behaviour of the waters in the River Liffey.

Exceedances in Arsenic, Iron, Manganese, Potassium and Ammoniacal Nitrogen were noted in BH103 which was located at the northern (upgradient) boundary of the site. Manganese, Potassium and Ammoniacal Nitrogen were also picked up in BH106 and BH107.

Based on the above we do not observe any major impacts to the River Liffey. The detected exceedances in BH101, likely have originated from the waters within the River Liffey.

9 Recommendations

The soil samples recovered during the Ground Investigation were tested against a suite of parameters which included the contaminants highlighted in the PSA as Potential Contaminants of Concern. These results were screened with a view to assessing the possibility of retaining these materials on site and reusing them as fill materials beneath the development where there is an expected materials deficit. By demonstrating there is no associated risk with the soils currently beneath the site, we can retain on site suitable materials and limit the costly and unnecessary disposal of materials suitable for reuse.

Two main questions dictate whether any excavated material can be reused on site:

- Does the material pose a risk to the surrounding environment or future site users; and
- Will the material have acceptable geotechnical qualities to be suitable for use as fill material beneath the proposed development?

The environmental question was assessed by screening the soil results against the Arup derived Generic Assessment Criteria (GACs).The GACs are values which have been calculated for typical soils in certain proposed end uses to determine the concentration above which there would be an unacceptable risk to human health or the environment. The samples recovered during the ground investigation were screened against the GACs for a residential end use without plant uptake. In addition, the samples were screened for the presence of asbestos fibres. There is no calculated GAC for Asbestos.

Asbestos fibres were detected at concentrations at <0.1% in a number of locations across the site (8/73). Exceedances of the GACS were detected in 10/73 samples, with 3 samples containing exceedances of both the GACS and containing Asbestos <0.1%.

Therefore, soils showing exceedances of the GACs and/or containing Asbestos are automatically ruled out for reuse and will require disposal offsite. Locations which did not have any evidence of parameters elevated above the GACs or containing asbestos would be suitable for retention and reuse on site as long as the proposed end use did not change.

The remaining surplus soils would require disposal according to their classification based on:

- Waste Assessment Criteria as presented in Annex II to Directive 1999/31/EC;
- Environmental Protection Agency's 2015 report entitled Waste Classification List of Waste and Determining if Waste is Hazardous or Non-Hazardous; and
- Joint agency document entitled Waste Classification guidance on the classification and assessment of waste (1st Edition, Version 1.1 dated May 2018) referred to as WM3.

10 References

Environment Agency (2010) CLEA Software (Version 1.05) Handbook. Accessible at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/455747/LIT_10167.pdf

Appendix A

Ground
Investigation Report

Note: To avoide duplication, Appendix A 'Ground Investigation Report' has been removed. Refer to Appendix 15.4 of the EIAR for the Ground Investigation Report.

Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

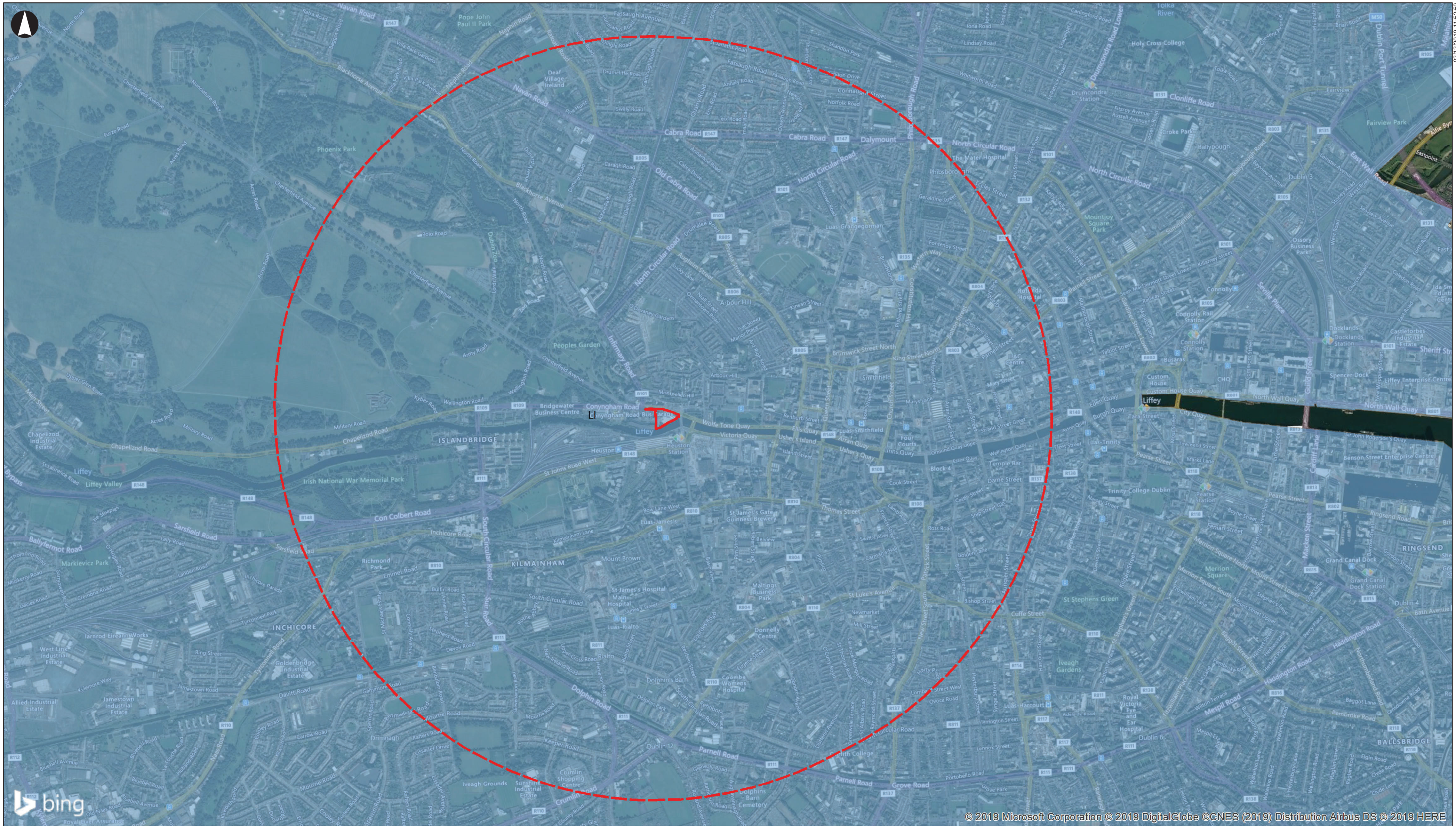
42A Parkgate Street, Dublin 8

Appendix 16.1: Figures

265381-00

ARUP

A3



Proposed Site

2km Buffer Zone

Bedrock Aquifer

Locally Important Aquifer - Bedrock which is Moderately Productive only in Local Zones

Metres

0 237.5 475 950

Coordinate System: IRENET95 Irish Transverse Mercator

D1	2019-10-18	CF	EW	GB
Rev	Date	By	Chkd	Appd

ARUP

50 Ringsend Road
Dublin 4 DO4 T6XO Ireland
Tel +353 1 233 4030
www.arup.com

Client

Ruirside Developments Ltd.

Project Title

Parkgate Street

Drawing Title

Bedrock Aquifers

Scale at A3

1:20,000

Job No

265381

Drawing Status

Final

Rev

D1

Figure number

Figure 16.1

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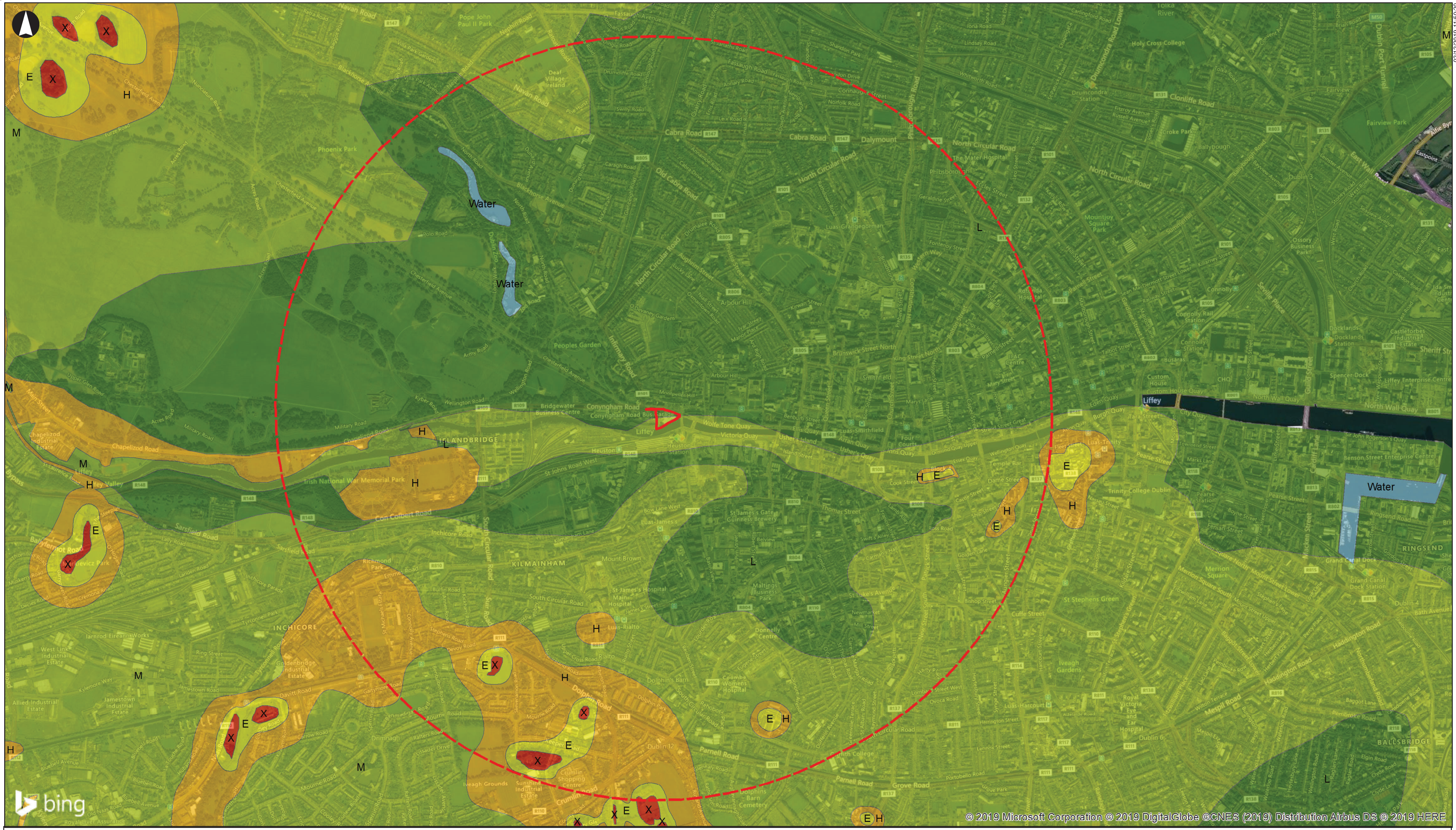
A3



Proposed Site
2km Buffer Zone
Groundwater Vulnerability
Rock at or near Surface or Karst
E(Rock_near_surface/Karst)
High
Extreme
Moderate
Low
Water

Metres
0 237.5 475 950

Coordinate System: IRENET95 Irish Transverse Mercator

D1	2019-10-18	CF	EW	GB
Rev	Date	By	Chkd	Appd

ARUP

50 Ringsend Road
Dublin 4 DO4 T6XO Ireland
Tel +353 1 233 4030
www.arup.com

Client
Ruirside Developments Ltd.

Project Title
Parkgate Street

Drawing Title
Groundwater Vulnerability

Scale at A3
1:20,000
Job No
265381
Drawing Status
Final
Rev
D1
Figure number
Figure 16.2

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A3

Proposed Site
2km Buffer Zone

Groundwater Recharge mm/yr

- 1-50
- 101-150
- 151-200
- 51-100
- water

Metres

0 | 237.5 | 475 | 950

Coordinate System: IRENET95 Irish Transverse Mercator

D1	2019-10-18	CF	EW	GB
Rev	Date	By	Chkd	Appd

ARUP

50 Ringsend Road
Dublin 4 DO4 T6XO Ireland
Tel +353 1 233 4030
www.arup.com

Client
Ruirside Developments Ltd.

Project Title
Parkgate Street

Drawing Title
Groundwater Recharge

Scale at A3
1:20,000

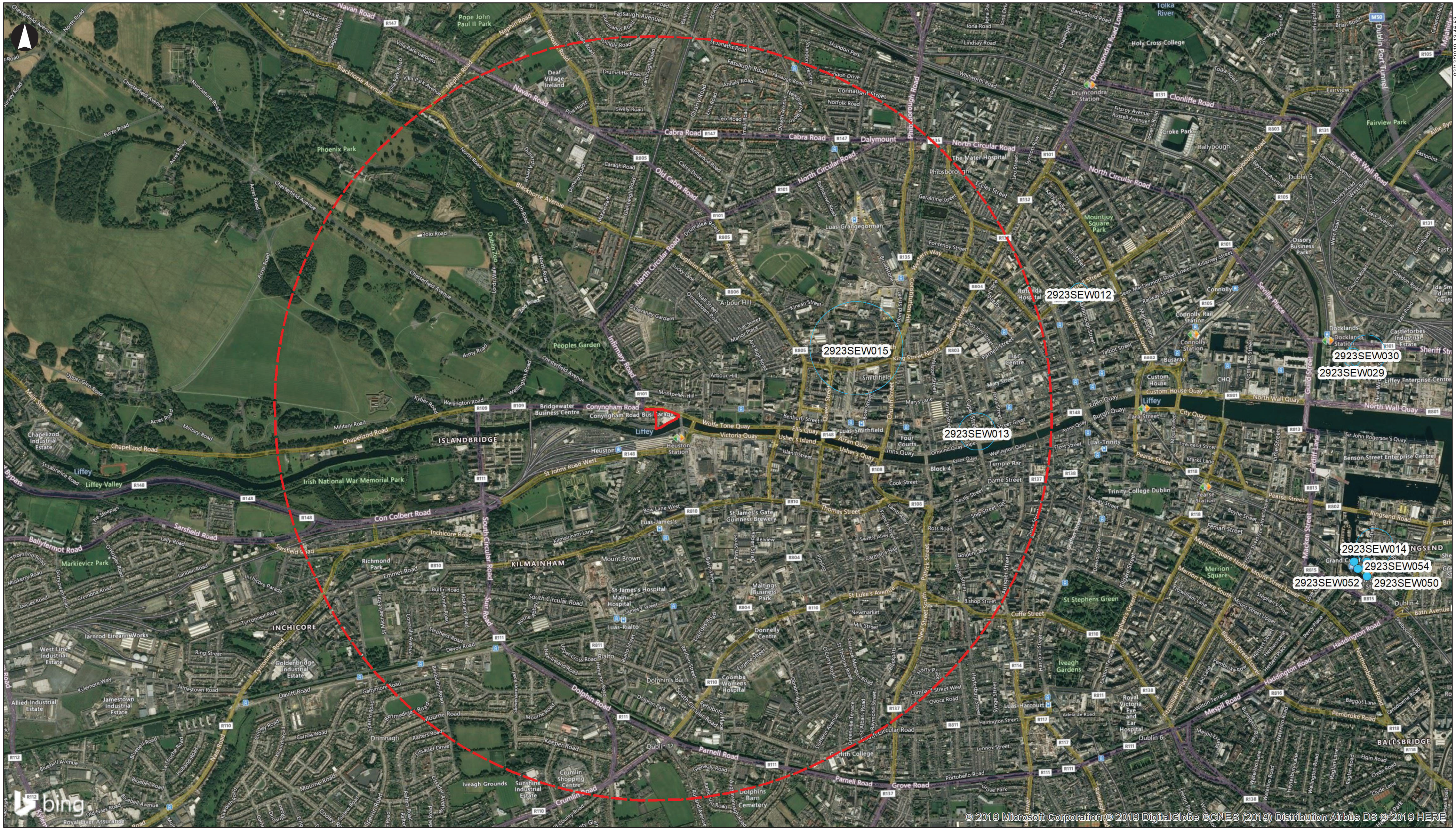
Job No
265381

Drawing Status
Final

Rev
D1

Figure number
Figure 16.3

A3



Proposed Site
2km Buffer Zone
Location of Well/Spring- size of the circle denotes the uncertainty of the location

Metres
0 237.5 475 950

Coordinate System: IRENET95 Irish Transverse Mercator

D1	2019-10-18	CF	EW	GB
Rev	Date	By	Chkd	Appd

ARUP

50 Ringsend Road
Dublin 4 D04 T6XO Ireland
Tel +353 1 233 4030
www.arup.com

Client
Ruirside Developments Ltd.

Project Title
Parkgate Street

Drawing Title
Groundwater Abstractions

Scale at A3
1:20,000

Job No
265381

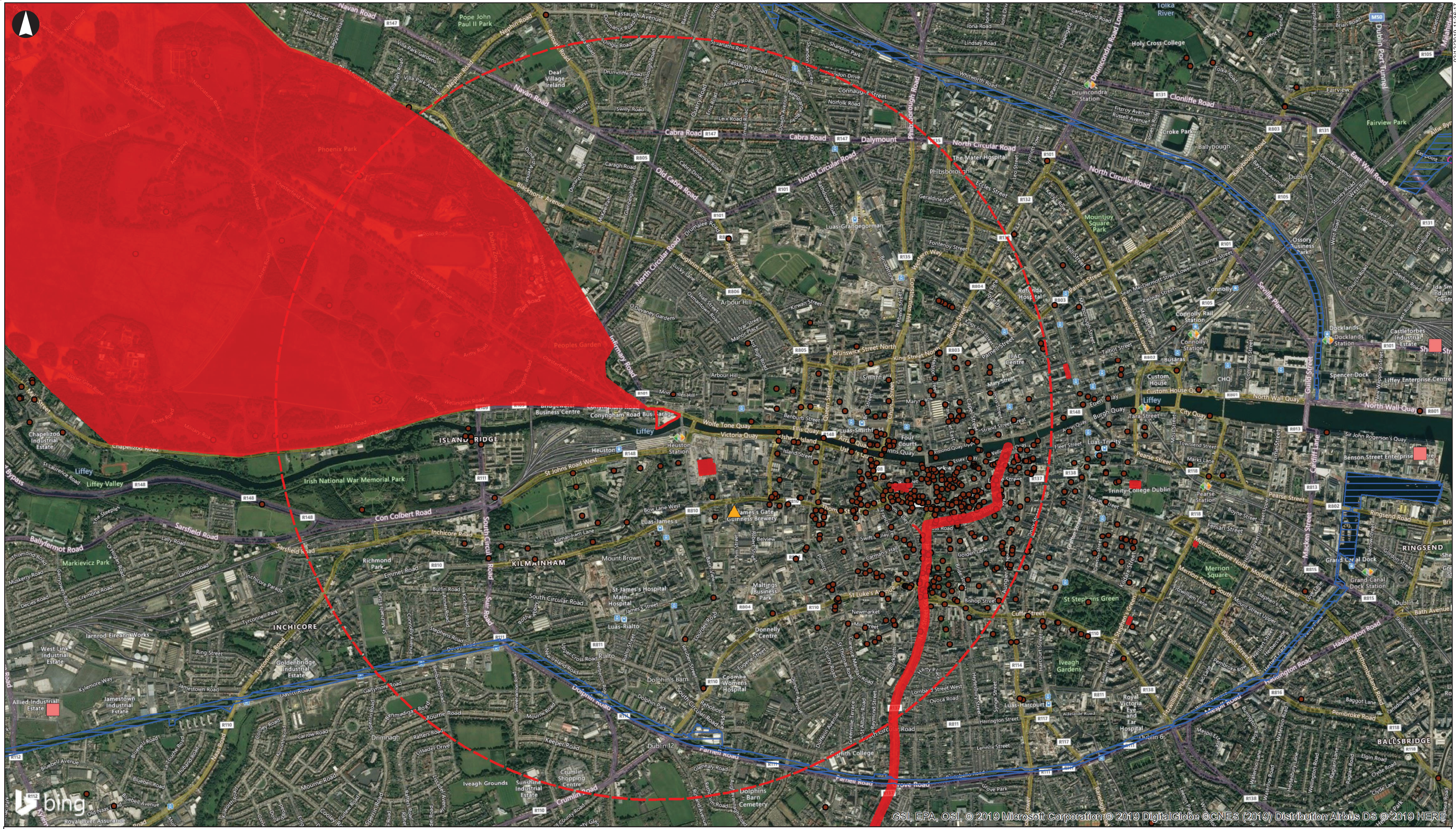
Drawing Status
Final

Rev
D1

Figure number
Figure 16.4

\\global\europe\dublin\jobs\270000\270978-00\4. Internal\4-03 Design\4-03-03 Infrastructure\01_Soils Geology and Hydrogeology\Regional Desk Study\Working GIS Files\265381_EIAR_MN.mxd

A3



- Proposed Site
- 2km Buffer Zone
- Proposed Natural Heritage Areas, NPWS
- Designated (Habitat) Areas, NPWS, Ireland
- Heritage Site Audited Boundaries
- Heritage Sites Unaudited Boundaries
- National_Monuments
- Animal and vegetable products from the food and beverage sector
- Waste Facilities

Metres
0 237.5 475 950

Coordinate System: IRENET95 Irish Transverse Mercator

Rev	Date	By	Chkd	Appd
D1	2019-10-18	CF	EW	GB

ARUP

50 Ringsend Road
Dublin 4 DO4 T6XO Ireland
Tel +353 1 233 4030
www.arup.com

Client
Ruirside Developments Ltd.

Project Title
Parkgate Street

Drawing Title
Sensitive Features

Scale at A3
1:20,000

Job No
265381

Drawing Status
Final

Rev
D1

Figure number
Figure 16.5

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Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Appendix 17.1: Outline Construction & Demolition Waste Management Plan

265381-00

ARUP

OUTLINE CONSTRUCTION & DEMOLITION WASTE MANAGEMENT PLAN FOR A PROPOSED MIXED-USE DEVELOPMENT

AT

42A PARKGATE STREET, DUBLIN 8

APPENDIX 17.1

Report Prepared For

Ruirside Development Limited

Report Prepared By

Chonaill Bradley, Senior Environmental Consultant

Our Reference

CB/19/10606WMR01

Date of Issue

11 December 2019

Document History

Document Reference		Original Issue Date	
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Revision Level	Revision Date	Description	Sections Affected

Record of Approval

Details	Written by	Approved by
Signature	[illegible]	Elaine Neary
Name	Chonaill Bradley	Elaine Neary
Title	Senior Environmental Consultant	Associate
Date	11 December 2019	11 December 2019

CONTENTS

1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) has prepared this Outline Construction & Demolition Waste Management Plan (C&D WMP) on behalf of Ruirside Development Ltd, for a proposed mixed-use development at 42A Parkgate Street, Dublin 8. The development will consist of the demolition of some of the existing structures on site and construction of a mixed-use development comprising of retail, office, café, and residential units, along with residents' amenities including gymnasium, lobby, management office and works to Parkgate Street.

The purpose of this plan is to provide information necessary to ensure that the management of construction and demolition (C&D) waste at the site is undertaken in accordance with current legal and industry standards including the *Waste Management Acts 1996 - 2011* and associated Regulations [1], *Protection of the Environment Act 2003* as amended [2], *Litter Pollution Act 1997* as amended [3] and the *Eastern-Midlands Region Waste Management Plan 2015 – 2021* [4]. In particular, this Plan aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. It also seeks to provide guidance on the appropriate collection and transport of waste from the site to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil and/or water).

This C&D WMP includes information on the legal and policy framework for C&D waste management in Ireland, estimates of the type and quantity of C&D waste to be generated by the proposed development and makes recommendations for management of different waste streams.

2.0 CONSTRUCTION & DEMOLITION WASTE MANAGEMENT IN IRELAND

2.1 National Level

The Irish Government issued a policy statement in September 1998 known as *'Changing Our Ways'* [5], which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. The target for C&D waste in this report was to recycle at least 50% of C&D waste within a five year period (by 2003), with a progressive increase to at least 85% over fifteen years (i.e. 2013).

In response to the *Changing Our Ways* report, a task force (Task Force B4) representing the waste sector of the already established Forum for the Construction Industry, released a report entitled '*Recycling of Construction and Demolition Waste'* [6] concerning the development and implementation of a voluntary construction industry programme to meet the Government's objectives for the recovery of C&D waste.

The most recent national policy document was published in July 2012, entitled '*A Resource Opportunity - Waste Management Policy in Ireland'* [7]. This document stresses the environmental and economic benefits of better waste management, particularly in relation to waste prevention. The document sets out a number of actions in relation to C&D waste and commits to undertake a review of specific producer responsibility requirements for C&D projects over a certain threshold.

The National Construction and Demolition Waste Council (NCDWC) was launched in June 2002, as one of the recommendations of the Forum for the Construction Industry, in the Task Force B4 final report. The NCDWC subsequently produced '*Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects'* [8] in July 2006 in conjunction with the then Department of the Environment, Heritage and Local Government (DoEHLG). The guidelines outline the issues that need to be addressed at the pre-planning stage of a development all the way through to its completion. These guidelines have been followed in the preparation of this document and include the following elements:

- Predicted C&D wastes and procedures to prevent, minimise, recycle and reuse wastes;
- Waste disposal/recycling of C&D wastes at the site;
- Provision of training for waste manager and site crew;
- Details of proposed record keeping system;
- Details of waste audit procedures and plan; and
- Details of consultation with relevant bodies i.e. waste recycling companies, Dublin County Council etc.

Section 3 of the Guidelines identifies thresholds above which there is a requirement for the preparation of a C&D Waste Management Plan for developments. This development requires a C&D WMP under the following criterion:

- New residential development of 10 houses or more;
- New developments other than (1) above, including institutional, educational, health and other public facilities, with an aggregate floor area in excess of 1,250m^2; and
- Demolition/renovation/refurbishment projects generating in excess of 100m^3 in volume, of waste.

Other guidelines followed in the preparation of this report include *'Construction and Demolition Waste Management – a handbook for Contractors and Site Managers'* [9] published by FÁS and the Construction Industry Federation in 2002.

These guidance documents are considered to define best practice for C&D projects in Ireland and describe how C&D projects are to be undertaken such that environmental impacts and risks are minimised and maximum levels of waste recycling are achieved.

2.2 Regional Level

The proposed development is located in the Local Authority area of Dublin City Council (DCC).

The *EMR Waste Management Plan 2015 – 2021* is the regional waste management plan for the DCC area published in May 2015.

The regional plan sets out the following strategic targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

Municipal landfill charges in Ireland are based on the weight of waste disposed. In the Leinster Region, charges are approximately €130 - €150 per tonne (2019) of waste which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015.*

The *Dublin City Council Development Plan 2016 – 2022* [10] sets out a number of objectives and actions for the Dublin City area in line with the objectives of the regional waste management plan.

Waste Policies and Objectives with a particular relevance to the proposed development are as follows:

Policies:

- *SI19: To support the principles of good waste management and the implementation of best international practice in relation to waste management in order for Dublin City and the region to become self-reliant in terms of waste management.*
- *SI20: To prevent and minimise waste and to encourage and support material sorting and recycling.*
- *SI21: To minimise the amount of waste which cannot be prevented and ensure it is managed and treated without causing environmental pollution.*

Objectives:

- *SIO17: To promote the re-use of building materials, recycling of demolition material and the use of materials from renewable sources. In all developments in excess of 10 housing units and commercial developments in excess of 1000 sqm, a materials source and management plan showing type of materials/proportion of re-use/recycled materials to be used shall be implemented by the developer.*
- *SIO18: To implement the current Litter Management Plan through enforcement of the litter laws, street cleaning and education and awareness campaigns.*
- *SIO19: To implement the Eastern-Midlands Waste Management Plan 2015-2021 and achieve the plan targets and objectives*.

2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the proposed development are:

- Waste Management Act 1996 (No. 10 of 1996) as amended. Sub-ordinate legislation includes:
  - European Communities (Waste Directive) Regulations 2011 (SI 126 of 2011) as amended
  - Waste Management (Collection Permit) Regulations (S.I No. 820 of 2007) as amended
  - Waste Management (Facility Permit and Registration) Regulations 2007, (S.I No. 821 of 2007) as amended
  - Waste Management (Licensing) Regulations 2004 (S.I. No. 395 of 2004) as amended
  - Waste Management (Packaging) Regulations 2014 (S.I. 282 of 2014) as amended
  - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997)
  - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015)
  - European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)
  - European Union (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended
  - Waste Management (Food Waste) Regulations 2009 (S.I. 508 of 2009), as amended
  - European Union (Household Food Waste and Bio-waste) Regulation 2015 (S.I. No. 191 of 2015)
  - Waste Management (Hazardous Waste) Regulations, 1998 (S.I. No. 163 of 1998) as amended

  - Waste Management (Shipments of Waste) Regulations, 2007 (S.I. No. 419 of 2007) as amended
  - Waste Management (Movement of Hazardous Waste) Regulations, 1998 (S.I. No. 147 of 1998)
  - European Communities (Transfrontier Shipment of Waste) Regulations 1994 (SI 121 of 1994)
  - European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015) as amended
- Environmental Protection Act 1992 (No. 7 of 1992) as amended.
- Litter Pollution Act 1997 (No. 12 of 1997) as amended.
- Planning and Development Act 2000 (No. 30 of 2000) as amended [11].

One of the guiding principles of European waste legislation, which has in turn been incorporated into the *Waste Management Act 1996 - 2001* and subsequent Irish legislation, is the principle of *"Duty of Care"*. This implies that the waste producer is responsible for waste from the time it is generated through until its legal recycling, recovery or disposal (including its method of disposal). As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final destination, waste contractors will be employed to physically transport waste to the final destination. Following on from this is the concept of *"Polluter Pays"* whereby the waste producer is liable to be prosecuted for pollution incidents, which may arise from the incorrect management of waste produced, including the actions of any contractors engaged (e.g. for transportation and disposal/recovery/recycling of waste).

It is therefore imperative that the client ensures that the waste contractors engaged by demolition and construction contractors are legally compliant with respect to waste transportation, recycling, recovery and disposal. This includes the requirement that a contractor handle, transport and recycle/recover/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the *Waste Management (Facility Permit & Registration) Regulations 2007 and Amendments* or a waste or IE licence granted by the EPA. The COR/permit/licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

3.0 DESCRIPTION OF THE PROJECT

3.1 Location, Size and Scale of the Development

The development is a mixed use residential and commercial scheme comprising build to rent residential units with associated residential amenities and facilities, commercial office, café/ restaurant floor space and works to Parkgate Street. A new public square is provided, along with a public riverside walk and private amenity courtyard.

481 no. residential units with 3698 sqm commercial office space, 214 sqm retail and 444 sqm café/ restaurant space is proposed. The residential units are served by amenity and management areas including a reception area, a post room, a quiet room, gym, business suites, lounge and TV rooms and other bookable rooms. In addition to the above amenity facilities are miscellaneous support facilities including sub/switch room, refuse and waste management areas, electric meters, administrative areas and

cycle parking areas. At basement level further bicycle parking is provided, as well as car parking.

3.2 Details of the Non-Hazardous Wastes to be produced

There will be waste materials generated from the demolition of some of the existing buildings and hardstanding areas onsite. The volume of waste generated from demolition will be more difficult to segregate than waste generated from the construction phase, as many of the building materials will be bonded together or integrated i.e. plasterboard on timber ceiling joists, steel embedded in concrete etc.

There will also be soil, stone, gravel and clay excavated to facilitate site preparation for construction and basement level excavations. The volume of material to be excavated has been estimated by the project engineers to be c.14,620m^3. The importation of c. 6,100m^3 of fill materials will be required for ground preparation works. It is anticipated, where appropriate, that the majority of this fill requirement will be obtained from the quantum of excavated materials. The remaining balance of excavated materials, which is either unsuitable for use as fill, or not required for use as fill, will be exported off site.

During the construction phase there may be a surplus of building materials, such as timber off-cuts, broken concrete blocks, plastics, metals and tiles generated. There may also be excess concrete during construction which will need to be disposed of. Plastic and cardboard waste from packaging and oversupply of materials will also be generated.

Waste will also be generated from construction workers e.g. organic/food waste, dry mixed recyclables (wastepaper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided onsite during the construction phase. Waste printer/toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

3.3 Potential Hazardous Wastes to be produced

3.3.1 Contaminated Soil

Soil and site investigations were undertaken by Ground Investigation Ireland Ltd. (GII) between March and June 2019 for the purpose of investigating subsurface conditions. Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design. Environmental testing, including Waste Acceptance Criteria (WAC) was carried out by Jones Environmental Laboratory in the UK.

The soil samples recovered during the ground investigation were tested against a suite of parameters which included the contaminants highlighted in the Preliminary Site Assessment (PSA) as Potential Contaminants of Concern. The soil results screened against the Arup-derived Generic Assessment Criteria (GACs). The GACs are values which have been calculated for typical soils in certain proposed end uses to determine the concentration above which there would be an unacceptable risk to human health or the environment. The samples recovered during the ground investigation were screened against the GACs for a residential end use without plant uptake. In addition, the samples were screened for the presence of asbestos fibres. There is no calculated GAC for Asbestos. Asbestos fibres were detected at concentrations at <0.1% in a number of locations across the site (8/73). Exceedances of the GACs were detected in 10/73 samples, with 3 samples containing exceedances of both the GACs and containing Asbestos <0.1%.

Soils showing exceedances of the GACs and/or containing Asbestos are automatically ruled out for reuse and will require disposal offsite. Locations which did not have any evidence of parameters elevated above the GACs or containing asbestos would be suitable for retention and reuse on site.

Any potentially contaminated material encountered, will need to be segregated where possible from clean/inert material, tested and classified as either non-hazardous or hazardous in accordance with the EPA publication entitled *'Waste Classification: List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* [13] using the *HazWasteOnline* application (or similar approved classification method). The material will then need to be classified as clean, inert, non-hazardous or hazardous in accordance with the *EC Council Decision 2003/33/EC*, which establishes the criteria for the acceptance of waste at landfills.

3.3.2 Fuel/Oils

As fuels and oils are classed as hazardous materials, any on-site storage of fuel/oil, all storage tanks and all draw-off points will be bunded (or stored in double-skinned tanks) and located in a dedicated, secure area of the site. Provided that these requirements are adhered to and site crew are trained in the appropriate refuelling techniques, it is not expected that there will be any fuel/oil wastage at the site.

Any existing fuel oil tanks on site, will be decommissioned in accordance with the general practice outlined in Section 6.0 Demolition.

3.3.3 Asbestos

A Refurbishment/Demolition Asbestos Survey was carried out at this site in March 2019 by Phoenix Environmental Safety Ltd. The buildings were surveyed for the purpose of detecting and recording incidences of asbestos containing materials (ACMs). A report was issued which contains a register showing the location and type of asbestos and the risks and recommendations in relation to the material found. The scope of the asbestos survey was confined to all accessible areas of the existing factory building and an outbuilding at the rear of the site. No. 43 Parkgate Street was not surveyed as the building was unsafe to enter.

During the course of the survey, ACMs were identified in a number of locations including but not limited to cement roof slates, roof matts, pipe work, electronic equipment and floor tiles. All areas surveyed containing asbestos were included on the Asbestos Register.

The ACMs and suspected ACMs identified by the Asbestos survey will be required to be removed by a suitably trained and competent person prior to commencement of demolition works. ACMs will only be removed from site by a suitably permitted waste haulier and will be brought to a suitably licenced facility. Where required, the HSA should be contacted in relation to the handling of asbestos and material should be dealt with in accordance with the *Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006*, as amended and associated approved Codes of Practice. The contractor will also be required to refer to the *Construction & Demolition Management Plan* in relation to asbestos identification and removal.

3.3.4 Japanese Knot Weed and Other Invasive Plant Species

Ecological Site surveys have been undertaken at this site and in the surrounding area as part of the site ecological assessment. As part of this, a site walkover was undertaken for the purpose of identifying and managing any schedule 3 (*Regulations SI No. 355/2015)* invasive species such as Japanese Knotweed (*Fallopia japonica)*. This included a walkover survey of the entire site and around part of the outside perimeter.

No Japanese Knotweed plant species or third schedule invasive species were recorded within the property boundary.

3.3.5 Other known Hazardous Substances

Paints, glues, adhesives and other known hazardous substances will be stored in designated areas. They will generally be present in small volumes only and associated waste volumes generated will be kept to a minimum. Wastes will be stored in appropriate receptacles pending collection by an authorised waste contractor.

In addition, WEEE (containing hazardous components), printer toner/cartridges, batteries (Lead, Ni-Cd or Mercury) and/or fluorescent tubes and other mercury containing waste may be generated from during C&D activities or temporary site offices. These wastes (if encountered) will be stored in appropriate receptacles in designated areas of the site pending collection by an authorised waste contractor.

3.4 Main C&D Waste Categories

The main non-hazardous and hazardous waste streams that could be generated by the construction and demolition activities at a typical site are shown in Table 3.1. The List of Waste (LoW) code (as effected from 1 June 2015) (also referred to as the European Waste Code or EWC) for each waste stream is also shown.

Waste Material	LoW/EWC Code
Concrete, bricks, tiles, ceramics	17 01 01-03 & 07
Wood, glass and plastic	17 02 01-03
Treated wood, glass, plastic, containing hazardous substances	17-02-04*
Bituminous mixtures, coal tar and tarred products	17 03 01*, 02 & 03*
Metals (including their alloys) and cable	17 04 01-11
Soil and stones	17 05 03* & 04
Gypsum-based construction material	17 08 01* & 02
Paper and cardboard	20 01 01
Mixed C&D waste	17 09 04
Green waste	20 02 01
Electrical and electronic components	20 01 35 & 36
Batteries and accumulators	20 01 33 & 34
Liquid fuels	13 07 01-10
Chemicals (solvents, pesticides, paints, adhesives, detergents etc.)	20 01 13, 19, 27-30
Insulation materials	17 06 04
Insulation containing asbestos and asbestos-containing construction materials and other insulation containing hazardous substances	17-06-01*, 03* & 05*
Organic (food) waste	20 01 08
Mixed Municipal Waste	20 03 01

Table 3.1 *Typical waste types generated and EWCs (i*ndividual waste types may contain hazardous substances)

4.0 WASTE MANAGEMENT

4.1 Demolition Waste Generation

Demolition works at the site will involve the demolition of the existing structures and hard standing areas on site. Demolition figures published by the EPA in the *'National Waste Reports'* [14] and data from previous projects have been used to estimate the approximate break-down for indicative reuse (offsite), recycling and disposal targets of demolition waste. Estimates have been based on the building areas supplied by the project quantity surveyors This breakdown is shown in Table 4.1.

Waste Type	Tonnes	Reuse/Recovery		Recycle		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Glass	25.4	0	0.0	85	21.6	15	3.8
Concrete, Bricks, Tiles, Ceramics	1449.5	30	434.9	65	942.2	5	72.5
Plasterboard	101.7	0	0.0	80	81.4	20	20.3
Asphalts	228.8	0	0.0	25	57.2	75	171.6
Metal	381.3	5	19.1	80	305.1	15	57.2
Slate	203.4	0	0.0	85	172.9	15	30.5
Timber	305.1	10	30.5	60	183.0	30	91.5
Total	**2695.2**		**484.4**		**1763.3**		**447.5**

Table 4.1 *Estimated off-site reuse, recycle and disposal rates for demolition waste*

The appointed demolition contractor will be required to prepare a detailed demolition management plan prior to work commencing which should refine the above estimated worst case waste figures.

4.2 Construction Waste Generation

Table 4.2 shows the breakdown of C&D waste types produced on a typical site based on data from the EPA *National Waste Reports, the GMIT* [15] and other research reports.

Waste Types	%
Mixed C&D	33
Timber	28
Plasterboard	10
Metals	8
Concrete	6
Other	15
Total	**100**

Table 4.2 *Waste materials generated on a typical Irish construction site*

Table 4.3 shows the predicted construction waste generation for the proposed development based on the information available to date along with the targets for management of the waste streams. The predicted waste amounts are based on an average large-scale development waste generation rate per m^2, using the waste breakdown rates shown in Table 4.2.

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	851.2	10	85.1	80	681.0	10	85.1
Timber	722.3	40	288.9	55	397.2	5	36.1
Plasterboard	258.0	30	77.4	60	154.8	10	25.8
Metals	206.4	5	10.3	90	185.7	5	10.3
Concrete	154.8	30	46.4	65	100.6	5	7.7
Other	386.9	20	77.4	60	232.2	20	77.4
Total	2579.5		585.5		1751.5		242.5

Table 4.3 *Estimated off-site reuse, recycle and disposal rates for construction waste*

In addition to the information in Table 4.3, the quantity of excavated material that will be generated has been estimated to be c. 14,620 m^3. Any suitable excavated material will be temporarily stockpiled for reuse as fill or for landscaping, where possible, however it is anticipated that most of the excavated material is to be removed offsite for appropriate reuse, recovery and/or disposal.

It should be noted that until final materials and detailed construction methodologies have been confirmed, it is difficult to predict with a high level of accuracy the construction waste that will be generated from the proposed works as the exact materials and quantities may be subject to some degree of change and variation during the construction process.

4.3 Proposed Waste Management Options

Waste materials generated will be segregated on site, where it is practical. Where the on-site segregation of certain waste types is not practical, off-site segregation will be carried out. Due to space restrictions onsite, it is expected that most segregation will occur offsite at the waste contractors licensed waste facilities. There will be skips and receptacles provided to facilitate segregation at source where feasible. All waste receptacles leaving site will be covered or enclosed. The appointed waste contractor will collect and transfer the wastes as receptacles are filled. There are numerous waste contractors in the Dublin Region that provide this service.

All waste arising's will be handled by an approved waste contractor holding a current waste collection permit. All waste arising's requiring disposal off-site will be reused, recycled, recovered or disposed of at a facility holding the appropriate registration, permit or licence, as required.

Some of the sub-contractors on site will generate waste in relatively low quantities. The transportation of non-hazardous waste by persons who are not directly involved with the waste business, at weights less than or equal to 2 tonnes, and in vehicles not designed for the carriage of waste, are exempt from the requirement to have a waste collection permit (Ref. Article 30 (1) (b) of the Waste Collection Permit Regulations 2007 as amended). Any sub-contractors engaged that do not generate more than 2 tonnes of waste at any one time can transport this waste offsite in their work vehicles (which are not designed for the carriage of waste). However, they are required to ensure that the receiving facility has the appropriate COR / permit / licence.

Written records will be maintained by the contractor(s) detailing the waste arising throughout the C&D phases, the classification of each waste type, waste collection permits for all waste contactors who collect waste from the site and COR/permit or licence for the receiving waste facility for all waste removed off site for appropriate reuse, recycling, recovery and/or disposal.

Dedicated bunded storage containers will be provided for hazardous wastes which may arise such as batteries, paints, oils, chemicals etc, if required.

The management of the main waste streams is outlined as follows:

Soil, Stone, Gravel and Clay
The Waste Management Hierarchy states that the preferred option for waste management is prevention and minimisation of waste, followed by preparing for reuse and recycling/recovery, energy recovery (i.e. incineration) and, least favoured of all, disposal. The excavations are required to facilitate construction works so the preferred option (prevention and minimisation) cannot be accommodated for the excavation phase.

It is anticipated that most of the excavated material will be taken off site. When material is removed off-site it could be reused as a by-product (and not as a waste), if this is done, it will be done in accordance with Article 27 of the *European Communities (Waste Directive) Regulations 2011*. Article 27 requires that certain conditions are met and that by-product notifications are made to the EPA via their online notification form. Excavated material should not be removed from site until approval from the EPA has been received.

The next option (beneficial reuse) may be appropriate for the excavated material pending environmental testing to classify the material as hazardous or non-hazardous in accordance with the EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* publication. Clean inert material may be used as fill material in other construction projects or engineering fill for waste licensed sites. Beneficial reuse of surplus excavation material as engineering fill may be subject to further testing to determine if materials meet the specific engineering standards for their proposed end-use.

Any nearby sites requiring clean fill/capping material will be contacted to investigate reuse opportunities for clean and inert material. If any of the material is to be reused on another site as a by-product (and not as a waste), this will be done in accordance with Article 27. It is not envisaged that article 27 will be used to export material off this site.

Similarly, although unlikely for this proposed development, if any soils/stones are imported onto the site from another construction site as a by-product, this will also be done in accordance with Article 27

If the material is deemed to be a waste, then removal and reuse/recovery/disposal of the material will be carried out in accordance with the *Waste Management Acts 1996 – 2011* as amended, the *Waste Management (Collection Permit) Regulations 2007* as amended and the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended. Once all available beneficial reuse options have been exhausted, the options of recycling and recovery at waste permitted and licensed sites will be considered.

In the event that contaminated material is encountered and subsequently classified as hazardous, this material will be stored separately to any inert and/or non-hazardous material. It will require off-site treatment at a suitable facility or disposal abroad via Transfrontier Shipment of Wastes (TFS).

Bedrock
It is not anticipated that bedrock will be encountered during the excavation phase of this development.

Silt & Sludge
During the construction phase, silt and petrochemical interception should be carried out on runoff and pumped water from site works, where required. Sludge and silt will then be collected by a suitably licensed contractor and removed offsite.

Concrete Blocks, Bricks, Tiles & Ceramics
The majority of concrete blocks, bricks, tiles and ceramics generated as part of the construction and demolition works are expected to be clean, inert material and should will be recycled, where possible.

Hard Plastic
As hard plastic is a highly recyclable material, much of the plastic generated will be primarily from material off-cuts. All recyclable plastic will be segregated and recycled, where possible.

Timber
Timber that is uncontaminated, i.e. free from paints, preservatives, glues etc., will be disposed of in a separate skip and recycled off-site.

Metal
Metal will be segregated and stored in skips. Metal is highly recyclable and there are numerous companies that will accept these materials.

Plasterboard
There are currently a number of recycling services for plasterboard in Ireland. Plasterboard from the demolition and construction phases will be stored in a separate skip, pending collection for recycling. The site manager will ensure that oversupply of new plasterboard is carefully monitored to minimise waste.

Glass
Glass materials will be segregated for recycling, where possible.

Waste Electrical and Electronic Equipment (WEEE)
Any WEEE will be stored in dedicated covered cages/receptacles/pallets pending collection for recycling.

Other Recyclables
Where any other recyclable wastes such as cardboard and soft plastic are generated, these will be segregated at source into dedicated skips and removed off-site.

Non-Recyclable Waste
C&D waste which is not suitable for reuse or recovery, such as polystyrene, some plastics and some cardboards, will be placed in separate skips or other receptacles. Prior to removal from site, the non-recyclable waste skip/receptacle will be examined by a member of the waste team (see Section 7.0) to determine if recyclable materials have been placed in there by mistake. If this is the case, efforts will be made to determine the cause of the waste not being segregated correctly and recyclable waste will be removed and placed into the appropriate receptacle.

Asbestos Containing Materials

A Refurbishment and Demolition Asbestos Survey was be undertaken by Phoenix Environmental Safety Ltd. in March2019. The survey was carried out for the purpose of identifying and managing any ACMs on the premises. ACMs were identified in multiple locations including in roofing slate, floor tiles and pipe work. A full list of ACMs identified by Phoenix Environmental Safety LTD. can found within their report submitted with the planning application.

The ACMs and suspected ACMs identified by the Asbestos survey will be required to be removed by a suitably trained and competent person prior to commencement of demolition works. ACMs will only be removed from site by a suitably permitted waste haulier and will be brought to a suitably licenced facility. Where required, the HSA should be contacted in relation to the handling of asbestos and material should be dealt with in accordance with the *Safety, Health and Welfare at Work (Exposure to Asbestos) Regulations 2006*, as amended and associated approved Codes of Practice. The contractor will also be required to refer to the *Construction & Demolition Management Plan* in relation to asbestos identification and removal.

Other Hazardous Wastes

On-site storage of any hazardous wastes produced (i.e. contaminated soil if encountered and/or waste fuels) will be kept to a minimum, with removal off-site organised on a regular basis. Storage of all hazardous wastes on-site will be undertaken so as to minimise exposure to on-site personnel and the public and to also minimise potential for environmental impacts. Hazardous wastes will be recovered, wherever possible, and failing this, disposed of appropriately.

4.4 Tracking and Documentation Procedures for Off-Site Waste

All waste will be documented prior to leaving the site. Waste will be weighed by the contractor, either by weighing mechanism on the truck or at the receiving facility. These waste records will be maintained on site by the nominated project Waste Manager (see Section 7.0).

All movement of waste and the use of waste contractors will be undertaken in accordance with the *Waste Management Acts 1996 - 2011*, *Waste Management (Collection Permit) Regulations 2007* as amended and *Waste Management (Facility Permit & Registration) Regulations 2007* and amended. This includes the requirement for all waste contractors to have a waste collection permit issued by the NWCPO. The nominated project Waste Manager (see Section 7.0) will maintain a copy of all waste collection permits on-site.

If the waste is being transported to another site, a copy of the Local Authority waste COR/permit or EPA Waste/IE Licence for that site will be provided to the nominated project Waste Manager (see Section 7.0). If the waste is being shipped abroad, a copy of the Transfrontier Shipping (TFS) notification document will be obtained from DCC (as the relevant authority on behalf of all local authorities in Ireland) and kept on-site along with details of the final destination (COR, permits, licences etc.). A receipt from the final destination of the material will be kept as part of the on-site waste management records.

All information will be entered in a waste management recording system to be maintained on site.

5.0 ESTIMATED COST OF WASTE MANAGEMENT

An outline of the relative costs associated with different aspects of waste management is provided below.

The total cost of C&D waste management will be measured and will take into account handling costs, storage costs, transportation costs, revenue from rebates and disposal costs.

5.1 Reuse

By reusing materials on site, there will be a reduction in the transport and recycle/recovery/disposal costs associated with the requirement for a waste contractor to take the material off-site.

Clean and inert soils, gravel, stones etc. which cannot be reused on site may be used as access roads or capping material for landfill sites etc. This material is often taken free of charge or at a reduced fee for such purposes, reducing final waste disposal costs.

5.2 Recycling

Salvageable metals will earn a rebate which can be offset against the costs of collection and transportation of the skips.

Clean uncontaminated cardboard and certain hard plastics can also be recycled. Waste contractors will charge considerably less to take segregated wastes, such as recyclable waste, from a site than to take mixed waste.

Timber can be recycled as chipboard. Again, waste contractors will charge considerably less to take segregated wastes such as timber from a site than to take mixed waste.

5.3 Disposal

Landfill charges in the Leinster region are currently at around €130 - €150 per tonne (2019) which includes a €75 per tonne landfill levy specified in the *Waste Management (Landfill Levy) Regulations 2015*. In addition to disposal costs, waste contractors will also charge a collection fee for skips.

Collection of segregated C&D waste usually costs less than municipal waste. Specific C&D waste contractors take the waste off-site to a licensed or permitted facility and, where possible, remove salvageable items from the waste stream before disposing of the remainder to landfill. Clean soil, rubble, etc. is also used as fill/capping material, wherever possible.

6.0 DEMOLITION PROCEDURES

The demolition stage will involve the removal of some of the existing structures and hard standing areas. A formal demolition plan should be prepared for the site; however, in general, the following sequence of works should be followed during the demolition stage.

6.1 Check for Hazards

Prior to commencing works, buildings and structures to be demolished will be checked for any likely hazards including asbestos, ACMs, electric power lines or cables, gas reticulation systems, telecommunications, unsafe structures and fire and explosion hazards, e.g. combustible dust, chemical hazards, oil, fuels and contamination.

6.2 Removal of Components

All hazardous materials will be removed first. All components from within the buildings that can be salvaged will be removed next. This will primarily include metal however may also include timbers, doors, windows, wiring and metal ducting, etc.

6.3 Removal of Roofing

Steel roof supports, beams etc. will be dismantled and taken away for recycling/salvage.

6.4 Excavation of Services, Demolition of Walls and Concrete

Services will be removed from the ground and the breakdown of walls will be carried out once all salvageable or reusable materials have been taken from the buildings. Finally, any existing foundations and hard standing areas will be excavated.

7.0 TRAINING PROVISIONS

A member of the construction team will be appointed as the project Waste Manager to ensure commitment, operational efficiency and accountability during the C&D phases of the project.

7.1 Waste Manager Training and Responsibilities

The nominated Waste Manager will be given responsibility and authority to select a waste team if required, i.e. members of the site crew that will aid them in the organisation, operation and recording of the waste management system implemented on site. The waste manager will have overall responsibility to oversee, record and provide feedback to the client on everyday waste management at the site. Authority will be given to the waste manager to delegate responsibility to sub-contractors, where necessary, and to coordinate with suppliers, service providers and sub-contractors to prioritise waste prevention and material salvage.

The waste manager will be trained in how to set up and maintain a record keeping system, how to perform an audit and how to establish targets for waste management on site. The waste manager will also be trained in the best methods for segregation and storage of recyclable materials, have information on the materials that can be reused on site and be knowledgeable in how to implement this C&D WMP.

7.2 Site Crew Training

Training of site crew is the responsibility of the Waste Manager and, as such, a waste training program should be organised. A basic awareness course will be held for all site crew to outline the C&D WMP and to detail the segregation of waste materials at source. This may be incorporated with other site training needs such as general site induction, health and safety awareness and manual handling.

This basic course will describe the materials to be segregated, the storage methods and the location of the Waste Storage Areas (WSAs). A sub-section on hazardous wastes will be incorporated into the training program and the particular dangers of each hazardous waste will be explained.

8.0 RECORD KEEPING

Records should be kept for all waste material which leaves the site, either for reuse on another site, recycling or disposal. A recording system will be put in place to record the waste arising's on site.

A waste tracking log should be used to track each waste movement from the site. On exit from the site the waste collection vehicle driver should stop at the site office and sign out as a visitor and provide the security personnel or waste manager with a waste docket (or WTF for hazardous waste) for the waste load collected. At this time, the security personnel should complete and sign the Waste Tracking Register with the following information:

- Date
- Time
- Waste Contractor
- Company waste contractor appointed by e.g. Contractor or subcontractor name
- Collection Permit No.
- Vehicle Reg.
- Driver Name
- Docket No.
- Waste Type
- EWC/LoW

The waste transfer dockets will be transferred to the site waste manager on a weekly basis and can be placed in the Waste Tracking Log file. This information will be forwarded onto the DCC Waste Regulation Unit on a monthly basis.

Alternatively, each subcontractor that has engaged their own waste contractor will be required to maintain a similar waste tracking log with the waste dockets/WTF maintained on file and available for inspection on site by the main contractor as required.

A copy of the Waste Collection Permits, CORs, Waste Facility Permits and Waste Licences will be maintained on site at all times. Subcontractors who have engaged their own waste contractors, should provide the main contractor with a copy of the waste collection permits and COR/permit/licence for the receiving waste facilities and maintain a copy on file available for inspection on site as required.

9.0 OUTLINE WASTE AUDIT PROCEDURE

9.1 Responsibility for Waste Audit

The appointed Waste Manager will be responsible for conducting a waste audit at the site during the C&D phase of the development.

Contact details for the nominated Waste Manager will be provided to the DCC Waste Regulation Unit after the main contractor is appointed and prior to any material being removed from site.

9.2 Review of Records and Identification of Corrective Actions

A review of all the records for the waste generated and transported off-site should be undertaken mid-way through the project. If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. The waste records will be compared with the established recovery/reuse/recycling targets for the site.

Each material type will be examined, in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how the targets can be achieved.

Waste management costs will also be reviewed.

Upon completion of the C & D phase, a final report will be prepared, summarising the outcomes of waste management processes adopted and the total recycling/reuse/recovery figures for the development.

10.0 CONSULTATION WITH RELEVANT BODIES

10.1 Local Authority

Once demolition and construction contractors have been appointed and prior to removal of any C&D waste materials offsite, details of the proposed destination of each waste stream will be provided to the DCC Waste Regulation Unit.

DCC will also be consulted, as required, throughout the demolition, excavation and construction phases in order to ensure that all available waste reduction, reuse and recycling opportunities are identified and utilised and that compliant waste management practices are carried out.

10.2 Recycling/Salvage Companies

Companies that specialise in C&D waste management will be contacted to determine their suitability for engagement. Where a waste contractor is engaged, each company will be audited in order to ensure that relevant and up-to-date waste collection permits and facility COR/permits/licences are held. These permit details will be sent to the DCC Waste Regulation Unit.

11.0 REFERENCES

1. Waste Management Act 1996 (No. 10 of 1996) as amended. Sub-ordinate and associated legislation includes:
   - European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) as amended.
   - Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) as amended.
   - Waste Management (Facility Permit and Registration) Regulations 2007 (S.I No. 821 of 2007) as amended.
   - Waste Management (Licensing) Regulations 2000 (S.I No. 185 of 2000) as amended.
   - European Union (Packaging) Regulations 2014 (S.I. No. 282 of 2014) as amended.
   - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997) as amended.
   - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015)
   - European Union (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)
   - European Union (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended.
   - Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009) as amended.
   - European Union (Household Food Waste and Bio-waste) Regulations 2015 (S.I. No. 191 of 2015)
   - Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163 of 1998) as amended.
   - Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007) as amended.
   - The European Communities (Transfrontier Shipment of Hazardous Waste) Regulations 1988 (S.I. No. 248 of 1988)
   - European Communities (Shipments of Hazardous Waste exclusively within Ireland) Regulations 2011 (S.I. No. 324 of 2011)
   - European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015) as amended
2. Protection of the Environment Act 2003, (No. 27 of 2003) as amended.
3. Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended
4. Eastern-Midlands Region Waste Management Plan 2015 – 2021 (2015).
5. Department of Environment and Local Government (DoELG) *Waste Management – Changing Our Ways, A Policy Statement* (1998).
6. Forum for the Construction Industry – *Recycling of Construction and Demolition Waste.*
7. Department of Environment, Communities and Local Government (DoECLG), *A Resource Opportunity - Waste Management Policy in Ireland* (2012).
8. Department of Environment, Heritage and Local Government, *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects* (2006).
9. FÁS and the Construction Industry Federation (CIF), *Construction and Demolition Waste Management – a handbook for Contractors and Site Managers* (2002).
10. Dublin City Council (DCC)*, Dublin City Develoment plan 2016-2022 (2015)*
11. Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended
12. EPA, *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2015)

13. Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.

14. Environmental Protection Agency (EPA), *National Waste Database Reports 1998 – 2012*.

15. EPA and Galway-Mayo Institute of Technology (GMIT), *EPA Research Report 146 – A Review of Design and Construction Waste Management Practices in Selected Case Studies – Lessons Learned* (2015).

Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Appendix 17.2: Operational Waste Management Plan

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ARUP

awnconsulting

The Tecpro Building,
Clonshaugh Business & Technology Park,
Dublin 17, Ireland.

T: + 353 1 847 4220
F: + 353 1 847 4257
E: info@awnconsulting.com
W: www.awnconsulting.com

OPERATIONAL WASTE MANAGEMENT PLAN FOR A PROPOSED MIXED-USE DEVELOPMENT

AT

42 A PARKGATE STREET, DUBLIN 8

APPENDIX 17.2

Report Prepared For

Ruirside Development Limited

Report Prepared By

Chonaill Bradley, Senior Environmental Consultant

Our Reference

CB/19/10606WMR02

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21 January 2020

Cork Office
Unit 5, ATS Building,
Carrigaline Industrial Estate,
Carrigaline, Co. Cork.
T: +353 21 438 7400
F: +353 21 483 4606

AWN Consulting Limited
Registered in Ireland No. 319812
Directors: F Callaghan, C Dilworth,
T Donnelly, E Porter
Associate Director: D Kelly

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Signature		Elaine Neary
Name	Chonaill Bradley	Elaine Neary
Title	Senior Environmental Consultant	Associate
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CONTENTS

1.0 INTRODUCTION

AWN Consulting Ltd. (AWN) has prepared this Operational Waste Management Plan (OWMP) on behalf of Ruirside Development Ltd, for a proposed mixed-use development. The development will consist of the demolition of some of the existing structures on site and construction of a mixed-use development comprising of retail, office, café, and residential units, along with residents' amenities including gymnasium, lobby, management office and works to Parkgate Street at 42A Parkgate Street, Dublin 8.

This OWMP has been prepared to ensure that the management of waste during the operational phase of the proposed development is undertaken in accordance with the current legal and industry standards including, the *Waste Management Act 1996 – 2011* as amended and associated Regulations [1], *Protection of the Environment Act 2003* as amended [2], *Litter Pollution Act 2003* as amended [3], the *'Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021'* [4] and the Dublin City Council (DCC) '*Dublin City Council (Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws' (2018)* [5]. In particular, this OWMP aims to provide a robust strategy for storing, handling, collection and transport of the wastes generated at site.

This OWMP aims to ensure maximum recycling, reuse and recovery of waste with diversion from landfill, wherever possible. The OWMP also seeks to provide guidance on the appropriate collection and transport of waste to prevent issues associated with litter or more serious environmental pollution (e.g. contamination of soil or water resources). The plan estimates the type and quantity of waste to be generated from the proposed development during the operational phase and provides a strategy for managing the different waste streams.

At present, there are no specific guidelines in Ireland for the preparation of OWMPs. Therefore, in preparing this document, consideration has been given to the requirements of national and regional waste policy, legislation and other guidelines.

2.0 OVERVIEW OF WASTE MANAGEMENT IN IRELAND

2.1 National Level

The Government issued a policy statement in September 1998 titled as *'Changing Our Ways'* [6] which identified objectives for the prevention, minimisation, reuse, recycling, recovery and disposal of waste in Ireland. A heavy emphasis was placed on reducing reliance on landfill and finding alternative methods for managing waste. Amongst other things, Changing Our Ways stated a target of at least 35% recycling of municipal (i.e. household, commercial and non-process industrial) waste.

A further policy document *'Preventing and Recycling Waste – Delivering Change'* was published in 2002 [7]. This document proposed a number of programmes to increase recycling of waste and allow diversion from landfill. The need for waste minimisation at source was considered a priority.

This view was also supported by a review of sustainable development policy in Ireland and achievements to date, which was conducted in 2002, entitled *'Making Irelands Development Sustainable – Review, Assessment and Future Action'* [8]. This document also stressed the need to break the link between economic growth and waste generation, again through waste minimisation and reuse of discarded material.

In order to establish the progress of the Government policy document *Changing Our Ways*, a review document was published in April 2004 entitled *'Taking Stock and Moving Forward'* [9]. Covering the period 1998 – 2003, the aim of this document was to assess progress to date with regard to waste management in Ireland, to consider developments since the policy framework and the local authority waste management plans were put in place, and to identify measures that could be undertaken to further support progress towards the objectives outlined in *Changing Our Ways*.

In particular, *Taking Stock and Moving Forward* noted a significant increase in the amount of waste being brought to local authority landfills. The report noted that one of the significant challenges in the coming years was the extension of the dry recyclable collection services.

The most recent policy document was published in July 2012 titled *'A Resource Opportunity'* [10]. The policy document stresses the environmental and economic benefits of better waste management, particularly in relation to waste prevention. The document sets out a number of actions, including the following:

- A move away from landfill and replacement through prevention, reuse, recycling and recovery.
- A Brown Bin roll-out diverting 'organic waste' towards more productive uses.
- Introducing a new regulatory regime for the existing side-by-side competition model within the household waste collection market.
- New Service Standards to ensure that consumers receive higher customer service standards from their operator.
- Placing responsibility on householders to prove they use an authorised waste collection service.
- The establishment of a team of Waste Enforcement Officers for cases relating to serious criminal activity will be prioritised.
- Reducing red tape for industry to identify and reduce any unnecessary administrative burdens on the waste management industry.
- A review of the producer responsibility model will be initiated to assess and evaluate the operation of the model in Ireland.
- Significant reduction of Waste Management Planning Regions from ten to three.

While *A Resource Opportunity* covers the period to 2020, it is subject to a mid-term review in 2016 to ensure that the measures are set out properly and to provide an opportunity for additional measures to be adopted in the event of inadequate performance. In early 2016, the Department of the Environment, Community and Local Government invited comments from interested parties on the discussion paper '*Exporting a Resource Opportunity'*. While the EPA have issued a response to the consultation, an updated policy document has not yet been published.

Since 1998, the Environmental Protection Agency (EPA) has produced periodic *'National Waste (Database) Reports'* [11] detailing among other things estimates for household and commercial (municipal) waste generation in Ireland and the level of recycling, recovery and disposal of these materials. The 2016 National Waste Statistics, which is the most recent study published, reported the following key statistics for 2016:

- **Generated –** Ireland produced 2,763,166 t of municipal waste in 2016, this is a six percent increase since 2014. This means that each person living in Ireland generated 580kg of municipal waste in 2016
- **Managed –** Waste collected and treated by the waste industry. In 2016, a total of 2,718,298 t of municipal waste was managed
- **Unmanaged –**Waste that is not collected or brought to a waste facility and is therefore likely to cause pollution in the environment because it is burned, buried or dumped. The EPA estimates that 44,868 t was unmanaged in 2016

- **Recovered –** the amount of waste recycled, used as a fuel in incinerators, or used to cover landfilled waste. In 2016, almost three quarters (74%) of municipal waste was recovered, this is a decrease from 79% in 2014
- **Recycled –** the waste broken down and used to make new items. Recycling also includes the breakdown of food and garden waste to make compost. The recycling rate in 2016 was 41%, the same as 2014
- **Disposed –** the waste landfilled or burned in incinerators without energy recovery. Just over a quarter (26%) of municipal waste was landfilled in 2016.

2.2 Regional Level

The proposed development is located in the Local Authority area of Dublin City Council (DCC).

The *EMR Waste Management Plan 2015 – 2021* is the regional waste management plan for the DCC area published in May 2015.

The regional plan sets out the following strategic targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

The *Dublin City Council Development Plan 2016 – 2022* [12] sets out a number of objectives and actions for the Dublin City area in line with the objectives of the waste management plan.

Waste policies and objectives with a particular relevance to this proposed development are:

<u>Policies:</u>

- *SI19: To support the principles of good waste management and the implementation of best international practice in relation to waste management in order for Dublin city and the region to become self-reliant in terms of waste management.*
- *SI20: To prevent and minimise waste and to encourage and support material sorting and recycling.*
- *SI21: To minimise the amount of waste which cannot be prevented and ensure it is managed and treated without causing environmental pollution.*
- *SI22: To ensure that effect is given as far as possible to the "polluter pays" principle.*

<u>Objectives:</u>

- *SIO16: To require the provision of adequately-sized-recycling facilities in new commercial and large scale residential developments, where appropriate.*
- *SIO18: To implement the current Litter Management Plan through enforcement of the litter laws, street cleaning and education and awareness campaigns.*
- *SIO19: To implement the Eastern-Midlands Waste Management Plan 2015 - 2021 and achieve the plan targets and objectives.*

2.3 Legislative Requirements

The primary legislative instruments that govern waste management in Ireland and applicable to the project are:

- Waste Management Act 1996 (No. 10 of 1996) as amended 2001 (No. 36 of 2001), 2003 (No. 27 of 2003) and 2011 (No 20 of 2011). Sub-ordinate and associated legislation includes:
    - European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) as amended
    - Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) as amended
    - Waste Management (Facility Permit and Registration) Regulation 2007 (S.I No. 821 of 2007) as amended
    - Waste Management (Licensing) Regulations 2000 (S.I No. 185 of 2000) as amended
    - European Union (Packaging) Regulations 2014 (S.I. No. 282 of 2014) as amended.
    - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997) as amended
    - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015)
    - European Communities (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)
    - Waste Management (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended
    - Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009) as amended
    - European Union (Household Food Waste and Bio-waste) Regulations 2015 (S.I. No. 191 of 2015)
    - Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163 of 1998) as amended
    - Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007) as amended
    - *European Communities (Transfrontier Shipment of Waste) Regulations 1994 (SI 121 of 1994)*
    - European Union (Properties of Waste Which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015) as amended
- Environmental Protection Act 1992 (S.I. No. 7 of 1992) as amended;
- Litter Pollution Act 1997 (Act No. 12 of 1997) as amended and
- Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended [15]

These Acts and subordinate Regulations enable the transposition of relevant European Union Policy and Directives into Irish law.

One of the guiding principles of European waste legislation, which has in turn been incorporated into the *Waste Management Act 1996 - 2011* and subsequent Irish legislation, is the principle of *"Duty of Care"*. This implies that the waste producer is responsible for waste from the time it is generated through until its legal disposal (including its method of disposal.) As it is not practical in most cases for the waste producer to physically transfer all waste from where it is produced to the final disposal area, waste contractors will be employed to physically transport waste to the final waste disposal site.

It is therefore imperative that the residents, tenants and the facilities management company undertake on-site management of waste in accordance with all legal requirements and employ suitably permitted/licenced contractors to undertake off-site management of their waste in accordance with all legal requirements. This includes the requirement that a waste contactor handle, transport and reuse/recover/recycle/dispose of waste in a manner that ensures that no adverse environmental impacts occur as a result of any of these activities.

A collection permit to transport waste must be held by each waste contractor which is issued by the National Waste Collection Permit Office (NWCPO). Waste receiving facilities must also be appropriately permitted or licensed. Operators of such facilities cannot receive any waste, unless in possession of a Certificate of Registration (COR) or waste permit granted by the relevant Local Authority under the *Waste Management (Facility Permit & Registration) Regulations 2007* as amended or a waste or IED (Industrial Emissions Directive) licence granted by the EPA. The COR/permit/licence held will specify the type and quantity of waste able to be received, stored, sorted, recycled, recovered and/or disposed of at the specified site.

2.3.1 Dublin City Council Waste Bye-Laws

The DCC "Dublin City Council (Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws (2018)" came into effect in May 2019. These Bye-laws repeal the previous '*Bye-Laws for the Storage, Presentation and Collection of Household and Commercial'*. The Bye-laws set a number of enforceable requirements on waste holders with regard to storage, separation and presentation of waste within the DCC functional area. Key requirements under these Bye-laws of relevance to the proposed development include the following

- Kerbside waste presented for collection shall not be presented for collection earlier than 5.00 pm on the day immediately preceding the designated waste collection day;
- In the Central Commercial District, the prescribed time for kerbside waste to be presented shall be not before 5.00 pm on the designated waste collection day; (This development is located outside the CCD)
- All containers used for the presentation of kerbside waste and any uncollected waste shall be removed from any roadway, footway, footpath or any other public place no later than 10:00am on the day following the designated waste collection day, unless an alternative arrangement has been approved in accordance with bye-law 2.3;
- Documentation, including receipts, is obtained and retained for a period of no less than one year to provide proof that any waste removed from the premises has been managed in a manner that conforms to these bye-laws, to the Waste Management Act and, where such legislation is applicable to that person, to the European Union (Household Food Waste and Bio-Waste) Regulations 2015; and
- Adequate access and egress onto and from the premises by waste collection vehicles is maintained.

The full text of the Waste Bye-Laws are available from the DCC website.

2.4 Regional Waste Management Service Providers and Facilities

Various contractors offer waste collection services for the residential and commercial sectors in the DCC region. Details of waste collection permits (granted, pending and withdrawn) for the region are available from the NWCPO.

As outlined in the regional waste management plan, there is a decreasing number of landfills available in the region. Only three municipal solid waste landfills remain operational and are all operated by the private sector. There are a number of other licensed and permitted facilities in operation in the region including waste transfer stations, hazardous waste facilities and integrated waste management facilities. There are two existing thermal treatment facilities, one in Duleek, Co. Meath and a second facility in Poolbeg in Dublin.

There is a DCC civic amenity c. 2.79km to the south east of the development at Eamonn Ceannt Park, which can be utilised by the residents of the development for certain household waste streams. This centre can accept paper, cans, cardboard, batteries, WEEE, plastics, textiles, glass and flat glass. There is also a bring bank at the Tesco Metro Stoneybatter c. 1.01km to the north east where glass and textiles can be deposited.

The bottle bank located adjacent to the Dublin bicycle stand on the eastern side of the development will be relocated to a new position, which will be agreed with DCC at a later date.

A copy of all CORs and waste permits issued by the Local Authorities are available from the NWCPO website and all waste/IE licenses issued are available from the EPA.

3.0 DESCRIPTION OF THE PROJECT

3.1 Location, Size and Scale of the Development

The development is a mixed use residential and commercial scheme comprising build to rent residential units with associated residential amenities and facilities, commercial office and café/ restaurant floor space. A new public square is provided, along with a public riverside walk, private amenity courtyard and works to Parkgate Street.

481 no. residential units with 3698 sqm commercial office space, 214 sqm retail and 444 sqm café/ restaurant space is proposed. The residential units are served by amenity and management areas including a reception area, a post room, a quiet room, gym, business suites, lounge and TV rooms and other bookable rooms. In addition to the above amenity facilities are miscellaneous support facilities including sub/switch room, refuse and waste management areas, electric meters, administrative areas and cycle parking areas. At basement level further bicycle parking is provided, as well as car parking.

At ground floor level the proposed development will largely consist of retail, café/ restaurant and resident's amenity/ancillary facilities which will serve to activate the street level and new open spaces.

The development will be characterised by a landmark 29 storey tower on the eastern corner of the site. The Site Coverage of the proposed development is approximately 42% (based upon entire site area), and the Plot Ratio of the proposed development is 5.8.

3.2 Typical Waste Categories

The typical non-hazardous and hazardous wastes that will be generated at the proposed development will include the following:

- Dry Mixed Recyclables (DMR) - includes waste paper (including newspapers, magazines, brochures, catalogues, leaflets), cardboard and plastic packaging, metal cans, plastic bottles, aluminium cans, tins and Tetra Pak cartons;
- Organic waste – food waste and green waste generated from internal plants/flowers;
- Glass; and
- Mixed Non-Recyclable (MNR)/General Waste.

In addition to the typical waste materials that will be generated at the development on a daily basis, there will be some additional waste types generated in small quantities which will need to be managed separately including:

- Green/garden waste may be generated from internal plants or external landscaping;
- Batteries (both hazardous and non-hazardous);
- Waste electrical and electronic equipment (WEEE) (both hazardous and non-hazardous);
- Printer cartridges/toners;
- Chemicals (paints, adhesives, resins, detergents, etc.) ;
- Lightbulbs;
- Textiles (rags);
- Waste cooking oil (if any generated by the residents or commercial tenants);
- Grease/waste water from passive grease trap (if one installed);
- Furniture (and from time to time other bulky wastes); and
- Abandoned bicycles.

Wastes should be segregated into the above waste types to ensure compliance with waste legislation and guidance while maximising the re-use, recycling and recovery of waste with diversion from landfill wherever possible.

3.3 European Waste Codes

In 1994, the *European Waste Catalogue* [14] and *Hazardous Waste List* [15] were published by the European Commission. In 2002, the EPA published a document titled the *European Waste Catalogue and Hazardous Waste List* [16], which was a condensed version of the original two documents and their subsequent amendments. This document has recently been replaced by the EPA '*Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous'* [17] which became valid from the 1st June 2015. This waste classification system applies across the EU and is the basis for all national and international waste reporting, such as those associated with waste collection permits, COR's, permits and licences and EPA National Waste Database.

Under the classification system, different types of wastes are fully defined by a code. The List of Waste (LoW) code (also referred to as European Waste Code or EWC) for typical waste materials expected to be generated during the operation of the proposed development are provided in Table 3.1 below.

Waste Material	LoW/EWC Code
Paper and Cardboard	20 01 01
Plastics	20 01 39
Metals	20 01 40
Mixed Non-Recyclable Waste	20 03 01
Glass	20 01 02
Biodegradable Kitchen Waste	20 01 08
Oils and Fats	20 01 25
Textiles	20 01 11
Batteries and Accumulators*	20 01 33* - 34
Printer Toner/Cartridges*	20 01 27* - 28
Green Waste	20 02 01
WEEE*	20 01 35*-36
Chemicals (solvents, pesticides, paints & adhesives, detergents, etc.) *	20 01 13*/19*/27*/28/29*30
Fluorescent tubes and other mercury containing waste*	20 01 21*
Bulky Wastes	20 03 07

** Individual waste type may contain hazardous materials*

Table 3.1 Typical Waste Types Generated and LoW Codes

4.0 ESTIMATED WASTE ARISINGS

A waste generation model (WGM) developed by AWN, has been used to predict waste types, weights and volumes arising from operations within the proposed development. The WGM incorporates building area and use and combines these with other data including Irish and US EPA waste generation rates.

The estimated quantum/volume of waste that will be generated from the residential units has been determined based on the predicted occupancy of the units. The waste generation for the commercial units is based on waste generation rates per m^2 floor area for the proposed area uses.

The estimated waste generation for the development for the main waste types is presented in Table 4.1 and 4.2

Waste type	Waste Volume (m^3/week)			
	Residential Block A	Residential Block B1	Residential Block C1	Residential Block C2
Organic Waste	2.03	1.80	0.78	0.51
DMR	13.87	13.20	5.68	3.76
Glass	0.39	0.35	0.15	0.10
MNR	9.23	7.32	3.15	2.08
Total	**25.53**	**22.67**	**9.76**	**6.46**

Table 4.1 Estimated waste generation for the proposed development for the main waste types

Waste type	Waste Volume (m^3/week)			
	Residential Block C3	Office Unit	Retail Unit	Café/Restaurant Unit
Organic Waste	1.13	0.41	0.07	0.44
Confidential Paper	-	3.65	-	-
DMR	7.51	8.93	1.42	1.04
Glass	0.22	0.07	0.02	0.02
MNR	4.34	3.88	0.59	1.16
Total	**13.20**	**16.95**	**2.12**	**2.66**

Table 4.2 Estimated waste generation for the proposed development for the main waste type

The BS5906:2005 Waste Management in Buildings – Code of Practice [18] was considered in the estimations of the waste arising.

5.0 WASTE STORAGE AND COLLECTION

This section provides information on how waste generated within the development will be stored and how the waste will be collected from the development. This has been prepared with due consideration of the proposed site layout as well as best practice standards, local and national waste management requirements including those of DCC. In particular, consideration has been given to the following documents:

- BS 5906:2005 Waste Management in Buildings – Code of Practice,
- EMR Waste Management Plan 2015 – 2021;
- Dublin City Council Development Plan 2016 – 2022 (Appendix 10);
- DCC Dublin City Council (Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws (2018); and
- DoEHLG, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2018) [19].

Two dedicated shared Waste Storage Areas (WSAs) have been allocated within the development design for the residential units. The shared residential WSAs are located on the ground level under Block C1 and Block A. Commercial tenants will have a shared WSA allocated to them under block B. All WSA locations can be viewed on the drawings submitted with this application

All residential and commercial waste located under Block C1 & B1 will be taken from these WSAs and taken to the loading area adjacent to the carpark on the western side of the development for collection and emptying. Residential waste in Block A will be collected directly from the western side of Block A.

Using the estimated waste generation volumes in Table 4.1 and 4.2, the waste receptacle requirements for MNR, DMR, organic waste and glass have been established for the WSAs. These are presented in Table 5.1.

Area/Use	Bins Required			
	MNR*	DMR**	Organic	Glass
Residential WSAs	24 x 1100L	42 x 1100L	27 x 240L	6 x 240L
Commercial WSA	6 x 1100L	11 x 1100L	4 x 240L	1 x 240L

Note: * = Mixed Non-Recyclables
** = Dry Mixed Recyclables

Table 5.1 *Waste storage requirements for the proposed development*

The waste receptacle requirements have been established from distribution of the total weekly waste generation estimate into the holding capacity of each receptacle type.

Waste storage receptacles as per Table 5.1 above (or similar appropriate approved containers) will be provided by the facilities management company in the residential and commercial WSAs.

The types of bins used will vary in size, design and colour dependent on the appointed waste contractor. However, examples of typical receptacles to be provided in the WSAs are shown in Figure 5.1. All waste receptacles used will comply with the IS EN 840 2012 standard for performance requirements of mobile waste containers, where appropriate.

Figure 5.1 *Typical waste receptacles of varying size (240L and 1100L)*

5.1 Waste Storage – Residential Units

Residents will be required to segregate waste into the following main waste streams:

- DMR;
- MNR;
- Organic waste; and

- Glass;

Residents will be required to take their segregated waste materials to their designated residential WSA and dispose of their segregated waste into the appropriate bins. Locations of all WSAs can found on the plans submitted with the application.

Each bin/container in the WSAs will be clearly labelled and colour coded to avoid cross contamination of the different waste streams. Signage will be posted above or on the bins to show exactly which waste types can be placed in each bin.

Access to the shared residential WSAs will be restricted to authorised residents, facilities management and waste contractors by means of a key or electronic fob access.

Using the estimated figures in Tables 4.1 and 4.2, organic waste and glass will be collected on a weekly basis, while DMR and MNR will be collected on a three times a week basis.

Other waste materials such as textiles, batteries, printer toner/cartridges and WEEE may be generated infrequently by the residents. Residents will be required to identify suitable temporary storage areas for these waste items within their own units and dispose of them appropriately. Further details on additional waste types can be found in Section 5.5.

5.2 Waste Storage – Office

The office tenant(s) will segregate waste into the following main waste streams:

- DMR;
- MNR;
- Organic Waste; and
- Glass.

The office unit(s) may be occupied by a single tenant or multiple tenants. It is recommended that the office tenants implement the ‘binless office’ concept where employees do not have bins located under desks and instead bring their waste to Area Waste Stations (AWSs) located strategically on the office floors, at print stations/rooms and at any canteens, micro kitchens or tea stations which may be provided within the tenant’s office space. Experience has shown that the maximum travel distance should be no more than 15m from the employee’s desk to the AWS. This ‘best in class’ concept achieves maximum segregation of waste in an office setting.

Typically, an AWS would include a bin for DMR and a bin for MNR. It is recommended that a confidential paper bin with a locked lid/door should also be provided for at each AWS and/or adjacent to photocopy/printing stations, as required. In addition, it is recommended that organic and glass bins should be provided at any canteens or micro kitchens or tea stations, where appropriate.

A printer cartridge/toner bin should be provided at the print/copy stations, where appropriate.

It is recommended that all bins/containers should be clearly labelled and colour coded to avoid cross contamination of the different waste streams. Signage should be posted on or above the bins to show which wastes can be put in each bin.

The’ binless office’ concept, in addition to assisting in maximising recycling rates and minimising associated landfill disposal costs, also has the advantage of substantially reducing cleaning costs, as cleaners visit only the AWSs on each floor, as opposed to each desk.

If a full canteen/restaurant is provided within the office development, this will generate additional waste volumes on a daily basis, primarily organic waste from food preparation/leftovers and possible waste cooking oil and waste sludge. The kitchen is also likely to generate extra packaging waste material such as cardboard and plastic from decanting of goods received. The estimated waste volumes in Table 4.1 include for waste from a full canteen/restaurant.

Suppliers for the tenants should be requested by the tenants to make deliveries in reusable containers, minimize packaging and/or to remove any packaging after delivery where possible, to reduce waste generated by the development.

Personnel nominated by the office tenants will empty the bins in the AWSs, as required, and bring the segregated waste using trolleys/carts/bins to the WSA located on ground floor.

It is proposed that confidential paper waste will be managed separately to non-confidential paper waste. Tenants will be required to engage with an appropriately permitted/licenced confidential waste management contractor for collection and shredding of confidential paper. It is anticipated that tenants will place locked confidential wastepaper bins as required throughout their office areas. The confidential waste company will typically collect bins directly from the office areas, under agreement with the tenant, and bring the locked bin or bags of confidential waste via the lifts to their collection truck. It is envisaged that confidential paper waste will be shredded on-site in the dedicated collection truck or bought to an authorised facility for offsite shredding.

Using the estimated figures in Table 4.2, organic waste and glass will be collected on a weekly basis, DMR and MNR will be collected on a twice weekly basis.

Other waste materials such as textiles, batteries, printer toner/cartridges and WEEE may be generated infrequently by the residents. Residents will be required to identify suitable temporary storage areas for these waste items within their own units and dispose of them appropriately. Further details on additional waste types can be found in Section 5.5.

5.3 Waste Storage –Retail and Café/Restaurant Units

The Commercial tenants will be required to segregate waste within their own unit into the following main waste types:

- DMR;
- MNR;
- Organic waste; and
- Glass.

Tenants will be required to take their segregated waste materials to their designated commercial WSAs and dispose of their segregated waste into the appropriate bins. Locations of all WSAs can found on the plans submitted with the application.

Café/restaurant in Block A will be required to allocate a waste store within their own unit to temporarily store waste, before moving waste to the commercial WSA under Block B1.

Suppliers for the tenants should be requested by the tenants to make deliveries in reusable containers, minimise packaging or to remove any packaging after delivery where possible, to reduce waste generated by the development.

If any kitchens are allocated in unit areas, this will contribute a significant portion of the volume of waste generated on a daily basis, and as such it is important that adequate provision is made for the storage and transfer of waste from these areas to the WSA.

If kitchens are required it is anticipated that waste will be generated in kitchens throughout the day, primarily at the following locations:

- Food Storage Areas (i.e. cold stores, dry store, freezer stores and stores for decanting of deliveries);
- Meat Preparation Area;
- Vegetable Preparation Area;
- Cooking Area;
- Dish-wash and Glass-wash Area; and
- Bar Area.

Small bins will be placed adjacent to each of these areas for temporary storage of waste generated during the day. Waste will then be transferred from each of these areas to the appropriate waste store within their unit.

All bins/containers in the tenants areas as well as in the WSAs will be clearly labelled and colour coded to avoid cross contamination of the different waste streams. Signage will be posted above or on the bins to show exactly which wastes can be put in each.

Using the estimated figures in Table 4.2, organic waste, cardboard and glass will be collected on a weekly basis, DMR and MNR will be collected on a twice weekly basis.

Other waste materials such as textiles, batteries, printer toner/cartridges and WEEE may be generated infrequently by the residents. Residents will be required to identify suitable temporary storage areas for these waste items within their own units and dispose of them appropriately. Further details on additional waste types can be found in Section 5.5.

5.4 Waste Collection

There are numerous private contractors that provide waste collection services in the Dublin area. All waste contractors servicing the proposed development must hold a valid waste collection permit for the specific waste types collected. All waste collected must be transported to registered/permitted/licensed facilities only.

All waste from the development will be collected by the waste contractor from either the shared loading area adjacent to the carpark or the internal path adjacent to Block A. Facilities management or the waste contractor (depending on the agreement) will be in responsible for moving waste receptacles from both commercial and residential WSAs to their collection locations. All waste collection points and WSAs can viewed in Appendix A of this report.

The facility management or waste contractor will ensure that empty bins are promptly returned to the WSAs after collection/emptying.

It is recommended that bin collection times/days are staggered to reduce the number of bins required to be emptied at once and the time the waste vehicle is onsite. This will be determined during the process of appointment of a waste contractor.

5.5 Additional Waste Materials

In addition to the typical waste materials that are generated on a daily basis, there will be some additional waste types generated from time to time that will need to be managed separately. A non-exhaustive list is presented below.

Green waste
Green waste may be generated from external landscaping and internal plants/flowers. Green waste generated from landscaping of external areas will be removed by external landscape contractors. Green waste generated from gardens internal plants/flowers can be placed in the organic waste bins.

Batteries
A take-back service for waste batteries and accumulators (e.g. rechargeable batteries) is in place in order to comply with the Waste Management Batteries and Accumulators Regulations 2014 as amended. In accordance with these regulations consumers are able to bring their waste batteries to their local civic amenity centre or can return them free of charge to retailers which supply the equivalent type of battery, regardless of whether or not the batteries were purchased at the retail outlet and regardless of whether or not the person depositing the waste battery purchases any product or products from the retail outlet.

The commercial tenants cannot use the civic amenity centre. They must segregate their waste batteries and either avail of the take-back service provided by retailers or arrange for recycling/recovery of their waste batteries by a suiltably permited/licenced contractor. Facilties management may arrange collection depending on the agreement.

Waste Electrical and Electronic Equipment (WEEE)
The *WEEE Directive 2002/96/EC* and associated Waste Management (WEEE) Regulations have been enacted to ensure a high level of recycling of electronic and electrical equipment. In accordance with the regulations, consumers can bring their waste electrical and electronic equipment to their local recycling centre. In addition consumers can bring back WEEE within 15 days to retailers when they purchase new equipment on a like for like basis. Retailers are also obliged to collect WEEE within 15 days of delivery of a new item, provided the item is disconnected from all mains, does not pose a health and safety risk and is readily available for collection.

As noted above, the commercial tenants cannot use the civic amenity centre. They must segregate their WEEE and either avail of the take-back/collection service provided by retailers or arrange for recycling/recovery of their WEEE by a suiltably permited/licenced contractor. Facilties management may arrange collection depending on the agreement.

Printer Cartridge/Toners
It is recommended that a printer cartridge/toner bin is provided in the commercial units, where appropriate. The commercial tenants will be required to store this waste within their unit and arrange for return to retailers or collection by an authorised waste contractor, as required.

Waste printer cartridge/toners generated by residents can usually be returned to the supplier free of charge or can be brought to a civic amenity centre.

Chemicals (solvents, paints, adhesives, resins, detergents etc)
Chemicals (such as solvents, paints etc) are largely generated from building maintenance works. Such works are usually completed by external contractors who

are responsible for the off-site removal and appropriate recovery/recycling/disposal of any waste materials generated.

Any waste cleaning products or waste packaging from cleaning products generated in the commercial units that is classed as hazardous (if they arise) will be appropriately stored within the tenants own space. Facilties management may arrange collection depending on the agreement.

Any waste cleaning products or waste packaging from cleaning products that are classed as hazardous (if they arise) generated by the residents should be brought to a civic amenity centre.

Light Bulbs (Fluorescent Tubes, Long Life, LED and Lilament bulbs)
Waste light bulbs may be generated by lighting at the commercial tenants. It is anticipated that commercial tenants will be responsible for the off-site removal and appropriate recovery/disposal of these wastes. Facilties management may arrange collection depending on the agreement.

Light bulbs generated by residents should be taken to the nearest civic amenity centre for appropriate storage and recovery/disposal.

Textiles
Where possible, waste textiles should be recycled or donated to a charity organisation for reuse.

Waste Cooking Oil
If the commercial tenants use cooking oil, waste cooking oil will need to be stored within the unit on a bunded area or spill pallet and regular collections by a dedicated waste contractor will need to be organised as required. It is envisaged that the restaurant units and some of the retail units will generate waste cooking oil.

If the residents generate waste cooking oil, this can be brought to a civic amenity centre.

Waste Sludge
If a passive grease separator is required in any of the commercial units, waste sludge/wash-water from the grease separators will need to be pumped from the grease separators by vacuum tanker as required by the manufacturer's instructions and trade effluent discharge licence conditions.

Furniture (and other bulky wastes)
Furniture and other bulky waste items (such as carpet etc.) may occasionally be generated by the commercial tenants. The collection of bulky waste will be arranged as required by the tenant. If residents wish to dispose of furniture, this can be brought to a civic amenity centre.

Abandoned Bicycles
Bicycle parking areas are planned for the development. As happens in other developments, residents and tenants sometimes abandon faulty or unused bicycles and it can be difficult to determine their ownership. Abandoned bicycles should be donated to charity if they arise.

5.6 Waste Storage Area Design

The residential and commercial WSAs as described in Section 5.0, should be designed and fitted-out to meet the requirements of relevant design standards, including:

- Be fitted with a non-slip floor surface;

- Provide ventilation to reduce the potential for generation of odours with a recommended 6-10 air changes per hour for a mechanical system for internal WSAs;
- Provide suitable lighting – a minimum Lux rating of 220 is recommended;
- Be easily accessible for people with limited mobility;
- Be restricted to access by nominated personnel only;
- Be supplied with hot or cold water for disinfection and washing of bins;
- Be fitted with suitable power supply for power washers;
- Have a sloped floor to a central foul drain for bins washing run-off;
- Have appropriate signage placed above and on bins indicating correct use;
- Have access for potential control of vermin, if required; and
- Be fitted with CCTV for monitoring.

The facilities company will be required to maintain the waste storage areas in good condition as required by the DCC Waste Bye-Laws.

6.0 CONCLUSIONS

In summary, this OWMP presents a waste strategy that complies with all legal requirements, waste policies and best practice guidelines and demonstrates that the required storage areas have been incorporated into the design of the development.

Implementation of this OWMP will ensure a high level of recycling, reuse and recovery at the development. All recyclable materials will be segregated at source to reduce waste contractor costs and ensure maximum diversion of materials from landfill, thus achieving the targets set out in the *EMR Waste Management Plan 2015 – 2021*.

Adherence to this plan will also ensure that waste management at the development is carried out in accordance with the requirements of the *DCC Waste Bye-Laws.*

The waste strategy presented in this document will provide sufficient storage capacity for the estimated quantity of segregated waste. The designated area for waste storage will provide sufficient room for the required receptacles in accordance with the details of this strategy.

7.0 REFERENCES

1. Waste Management Act 1996 (S.I. No. 10 of 1996) as amended 2001 (S.I. No. 36 of 2001), 2003 (S.I. No. 27 of 2003) and 2011 (S.I. No. 20 of 2011). Sub-ordinate and associated legislation includes:
    - European Communities (Waste Directive) Regulations 2011 (S.I. No. 126 of 2011) as amended
    - Waste Management (Collection Permit) Regulations 2007 (S.I. No. 820 of 2007) as amended
    - Waste Management (Facility Permit and Registration) Regulations 2007 (S.I No. 821 of 2007) as amended
    - Waste Management (Licensing) Regulations 2000 (S.I No. 185 of 2000) as amended
    - European Union (Packaging) Regulations 2014 (S.I. No. 282 of 2014)
    - Waste Management (Planning) Regulations 1997 (S.I. No. 137 of 1997)
    - Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015)
    - European Communities (Waste Electrical and Electronic Equipment) Regulations 2014 (S.I. No. 149 of 2014)
    - Waste Management (Batteries and Accumulators) Regulations 2014 (S.I. No. 283 of 2014) as amended
    - Waste Management (Food Waste) Regulations 2009 (S.I. No. 508 of 2009) as amended 2015 (S.I. No. 190 of 2015)
    - European Union (Household Food Waste and Bio-waste) Regulations 2015 (S.I. No. 191 of 2015)
    - Waste Management (Hazardous Waste) Regulations 1998 (S.I. No. 163 of 1998) as amended 2000 (S.I. No. 73 of 2000)
    - Waste Management (Shipments of Waste) Regulations 2007 (S.I. No. 419 of 2007) as amended
    - *European Communities (Transfrontier Shipment of Waste) Regulations 1994 (SI 121 of 1994)*
    - European Union (Properties of Waste which Render it Hazardous) Regulations 2015 (S.I. No. 233 of 2015)
2. Environmental Protection Act 1992 (Act No. 7 of 1992) as amended;
3. Litter Pollution Act 1997 (Act No. 12 of 1997) as amended;
4. Eastern-Midlands Waste Region, *Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021* (2015)
5. Dublin City Council (DCC), *Dublin City Council (Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws (2018*)
6. Department of Environment and Local Government (DoELG) *Waste Management – Changing Our Ways, A Policy Statement* (1998)
7. Department of Environment, Heritage and Local Government (DoEHLG) *Preventing and Recycling Waste - Delivering Change* (2002)
8. DoELG, *Making Ireland's Development Sustainable – Review, Assessment and Future Action (World Summit on Sustainable Development)* (2002)
9. DoEHLG, *Taking Stock and Moving Forward* (2004)
10. DoECLG, *A Resource Opportunity - Waste Management Policy in Ireland* (2012)
11. Environmental Protection Agency (EPA), *National Waste Database Reports 1998 – 2012*.
12. DCC*, Dublin City Development Plan 2016 – 2022* (2016)
13. Planning and Development Act 2000 (S.I. No. 30 of 2000) as amended 2010 (S.I. No. 30 of 2010) and 2015 (S.I. No. 310 of 2015).
14. European Waste Catalogue - Council Decision 94/3/EC (as per Council Directive 75/442/EC).
15. Hazardous Waste List - Council Decision 94/904/EC (as per Council Directive 91/689/EEC).
16. EPA, *European Waste Catalogue and Hazardous Waste List* (2002)

17. EPA, *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* (2015)
18. BS 5906:2005 Waste Management in Buildings – Code of Practice.
19. DoEHLG, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2018).

Appendix A

Waste Storage & Collection Areas


Collection Point
Collection Point
Waste Area
Waste Area
Waste Area
PARKGATE ST
LOADING
Ex Bus Stop Location
Residential Courtyard
Gated Access
Protected Structure [see drawing No. PGATE-RAU-ZZ-ZZ-DR-A-HTG-31133]
Protected Structure [see drawing No. PGATE-RAU-ZZ-ZZ-DR-A-HTG-31134]
Protected Structure [see drawing No. PGATE-RAU-ZZ-ZZ-DR-A-HTG-31133-31138]
RIVER LIFFEY
Existing Sub Station
20m
20m
0
Proposed Ground Floor Plan

Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Appendix 18.1: Childcare Needs Assessment Report

265381-00

ARUP

SLA | Stephen Little & Associates

Childcare Needs Assessment Report

Proposed Strategic Housing Development

Proposed Residential and Commercial Development at site of 42A Parkgate Street, Dublin 8

For Ruirside Developments Ltd

Document Control: -

Author	Checked by	Purpose	Date
VW/NC	EMP	Final Draft	23.10.2019
VW	NC	Final	04.12.2019

TABLE OF CONTENTS

1 INTRODUCTION

Stephen Little & Associates Chartered Town Planning & Development Consultants, is instructed by our Client, Ruirside Developments Ltd, to prepare this Childcare Needs Assessment to support this development proposal.

The proposal comprises a Strategic Housing Development of 481no. Build-to-Rent residential units, commercial/retail facilities and public open space at 42A Parkgate Street, Dublin 8.

The rationale for writing this report lies in the fact that the proposed development involves more than 75no. dwellings, which is broadly speaking the threshold for provision of a childcare facility within a development.

2 CHILDCARE ASSESSMENT

The purpose of this Childcare Needs Assessment is to demonstrate and justify that a crèche facility is not required at on site.

As such, this Childcare Assessment considers the following:

- Review of relevant guidelines and policies in relation to the provision of childcare facilities
- Identification of existing registered and permitted / proposed childcare facilities in the surrounding area and their child space capacity.
- Demographic analysis of population and likely childcare demand within the relevant Electoral Division, using Census figures.
- Conclusions drawn from policy and data review.

2.1 Guidelines & Policies on the Provision of Childcare Facilities

The following provides a review of relevant guidelines and policies applicable to childcare facilities and the current proposal.

2.1.1 Childcare Facilities: Guidelines for Planning Authorities

Under Section 28 of the Planning and Development Act 2000, the then minister issued guidelines in relation to Childcare Facilities entitled *'Childcare Facilities: Guidelines for Planning Authorities June 2001'.* The document sets out general standards and guidance for the land use planning of childcare facilities in Ireland. It advocates a more proactive role by the planning authority in the promotion and management of childcare provision in their area.

Section 2.4 of the guidelines sets out the appropriate locations for childcare facilities, stating that:

> *"Planning authorities should require the provision of at least one childcare facility for new housing areas unless there are significant reasons to the contrary or where there are adequate childcare facilities in adjoining developments."*

There is sufficient flexibility therefore, under the guidelines, to ensure that childcare facilities are not required in instances where they are not necessary due to local circumstances.

The Childcare Guidelines recommend the provision of 20no. childcare spaces for every 75no. dwellings permitted in a scheme. The 2018 Apartment Guidelines (Sustainable Urban Housing: Design Standards for New Apartments) however introduce some further clarification and flexibility to this requirement, noting that the 2001 Guidelines are subject to a review which is to be progressed. They state that the threshold for provision of childcare facilities in apartment schemes:

> *"…should be established having regard to the scale and unit mix of the proposed development and the existing geographical distribution of childcare facilities and the emerging demographic profile of the area. One-bedroom or studio type units should not generally be considered to contribute to a requirement for any childcare provision and subject to location, this may also apply in part or whole, to units with two or more bedrooms."*

The proposed development will consist of 481no. Build-to-Rent apartment units, ancillary commercial/retail facilities and public open space. The proposed dwelling mix is as follows:

- 66no. studio apartments
- 298no. 1-bedroom units
- 117no. 2-bedroom units

On the basis of the clarification provided by the Apartment Guidelines 2018, it can be concluded that the 66no studios and 298no. 1 bedroom apartment units, proposed as part of this scheme, would not generally contribute to demand for childcare provision.

Having regard to the Apartment Guidelines, it could be further considered that approximately 50% of the 2 bedroom units could be discounted in the estimate of childcare demand arising from this project – i.e. 58no. apartments. In this scenario the total number of new dwellings with potential to give rise to childcare demand (i.e. 58no. 2-bed units) falls below the threshold for childcare provision. It could therefore be asserted that due to the proposed dwelling mix, this development falls below the recommended threshold for the provision of a childcare facility.

Nonetheless, a detailed assessment of childcare needs in this area has been carried out. The Childcare Guidelines acknowledge the factors associated with determining the appropriate level of childcare facilities required in an area, namely:

- The current provision of childcare in the area.
- The nature of emerging new communities.
- Current demographic trends.

and specifically states that:

> *"The threshold for provision should be established having had regard to the existing geographical distribution of childcare facilities and the emerging demographic profile of areas".*

It is possible, therefore, to demonstrate in accordance with the Guidelines, whether a childcare facility is required, based on an analysis of the existing and proposed level of childcare provision and the demographic structure of the area. The following sections of this Childcare Assessment provide a review of such factors.

2.1.2 Sustainable Residential Development in Urban Areas (2009)

Chapter 4 of the Sustainable Residential Development in Urban Areas guidelines sets out criteria for planning for sustainable neighbourhoods. Specifically, Section 4.5 relates to Childcare (pg. 25 & 26), stating that: -

> *"The Department's guidelines on childcare facilities (DoEHLG, 2001) emphasise the importance of local assessment of the need to provide such facilities at the development plan or local area plan stage, having regard to the provision of existing facilities in the area. When considering planning applications, in the case of larger housing schemes, the guidelines recommend the provision of one childcare facility (equivalent to a minimum of 20 child places) for every 75 dwelling units. However, the threshold for such provision should be established having regard to the existing geographical distribution of childcare facilities and the emerging demographic profile of areas, in consultation with city / county childcare committees. The location of childcare facilities should be easily accessible by parents, and the facility may be combined with other appropriate uses, such as places of employment."*

This Childcare Assessment reviews the relevant demographic profile and existing childcare provision in the area, to determine whether a childcare facility is warranted at this location.

2.1.3 Circular Letter PL3/2016

The Department of Environment, Community & Local Government issued a Circular Letter (PL3/2016 – Childcare facilities operating under the Early Childhood Care Education (ECCE) Scheme (Planning System support for childcare post September 2016-Implementation of the Childcare Facility Guidelines for Planning Authorities 2001) in which it is noted that the Early Childhood Care Education (ECCE) has been expanded to make it available to all children from the age of 3 years until they transfer to primary school.

Planning Authorities have been asked that:

> *"…insofar as is possible, consideration of all planning applications or Section 5 declaration submissions in respect of childcare facilities in order to facilitate the expansion of required capacity as appropriate."*

While we note that emphasis has been placed on the provision of childcare facilities, it appears that the emphasis is placed on *'expansion of required capacity as appropriate'.* This would suggest that childcare provision should be subject to demand within a given catchment.

This Circular further clarifies that the Guidelines outline general planning related standards for childcare facilities. Planning Authorities are requested to exclude from their consideration of planning applications matters relating to childcare facility standards outlined in Appendix 1 of the Guidelines, such as minimum floor area requirements per child. Therefore TUSLA, as opposed to the Planning Authority, is responsible for enforcing compliance with Childcare (Pre-School Services) Regs 2006.

2.2 Review of Childcare Facilities

In order to assess the requirements for childcare facilities in this area, it was considered appropriate to review existing childcare facilities in the vicinity of the subject site and underlying demographic trends in order to determine if a childcare facility is required at this location.

Given that this study was primarily a desk based study, the data and information contained herein is as accurate as the sources of data retrieved would allow.

2.2.1 Existing Childcare Facilities

A review was carried out to determine the number of existing childcare facilities in the vicinity of the site, as detailed within the tables below.

A total of 63no. childcare facilities were identified within a c. 1.5km radius of the Hickey's/Parkgate Street development (49no. of which are identified as TUSLA childcare services provided on the pobal.ie website). A catchment of 1.5km was chosen as this equates to approximately 15 minutes walking time, which is considered a reasonable journey time for accessing childcare. Of these facilities, 37no. are between 1.0 and 1.5km from the subject site, 26no. are between 0.5 and 1.0km of the site. There are no facilities within 0.5km of the subject site, with Safari Childcare Heuston South Quarter lying just beyond the 500m study area radius.

At the time of preparing this Report, approximately 50% of the childcare facilities identified had responded to our request for information. A majority of those respondents either had additional capacity currently or spaces would become available in September 2020.

Within 1km of Application Site:

Pobal Map Ref. No.	Name	Address	Size of Facility (no. spaces)	Spaces Available at Present	Spaces Available Sept 2020	Distance from Site
35	Fountain Resource Group Bizzy Bees Afterschool	Bridgefoot Street, Dublin 8.	40	6	Data not currently available	0.75km
28	Fountain Resource Group Wee Tots	2A Basin Street, Dublin 8	44	6	Data not currently available	0.87km
26	Fountain Resource Group Junior Youth	Old Convent Chapel, Basin Lane, Dublin 8.	47	Currently none available	No response to date	0.86km
50	Robert Emmet CDP Afterschool	Bridgefoot Street, Dublin 8.	24	Currently none available	Currently none available	0.92km
36	Robert Emmet CDP Afterschool	3/8 Usher Street, Dublin 8	25	Currently none available	Data not currently available	0.92km
51	School Street Youth Project	School Street Family Resource Centre, School Street, Dublin 8	52	Currently none available	Waiting list	0.97km
27	SICCDA Afterschool	San Seamus, Basin Lane		No response to date	No response to date	0.82km
34	Solas Afterschool Project	St Catherine's Church, Thomas Street, Dublin 8	16	Currently none available	Currently none available	0.91km
31	Solas Afterschool Project	40 Marrowbone Lane, Dublin 8		No response to date	No response to date	0.97km
29	Solas Afterschool Project	Basin Lane, Dublin 8		No response to date	No response to date	0.87km
	Aosog	Unit 2-3 Stanley Court, 62-63 Prussia Street	25	Currently none available	Waiting list	0.9km
8	Blackhall Parade Childrens Project (Little Stars)	116 North King Street, Dublin 7	43	c.5	Currently none available	0.86km
3	Dunard Community Playgroup	St Gabriels School, Cowper Street, Cowper Street, Dublin 7		No response to date	No response to date	0.6km
9	One Family	8 Coke Lane, Smithfield, Dublin 7		No response to date	No response to date	0.86km

7	Kent/Rainbow Community Playgroup	28 Stoneybatter, Dublin 8	22	3	c.15	0.76km
4	Seven Dwarfs Community Playgroup	Holy Family Parish Centre, 13 Prussia Street, Dublin 7	36	4	Data not currently available	0.84km
5	Tiny Toes Creche	42 Manor Street, Dublin 7	c.25	No response to date	No response to date	0.81km
6	Krazy Kids and Company	Stanhope Street Primary School, Stanhope Street, Dublin 7	c.110	Currently none available	c.20	0.81km
	School Street Family Resource Centre,	22/28 School St. Pimilico, Dublin 8	54	Currently none available	c. 20	0.92km
32	Fountain Resource Group Marrowbone Lane Youth Project	Marrowbone Lane Complex, Dublin 8.	c.40	Currently none available	Data not currently available	0.92km
30	Footprints Early Years Ltd	St. Catherine's Sports Centre, Marrowbone Lane, Merchant's Quay, Dublin 8	49	25	Data not currently available	0.95km
25	Creative Kids and Co	The Haven, St. James Primary School, Basin Lane, Dublin 8	c.38	Currently none available	c.5	0.83km
33	Early Days Creche	School Street Family Resource Centre, 22/28 School St. Pimilico, Dublin 8	52	Currently none available	Data not currently available	0.95km
15	Safari Childcare Ltd - Heuston South Quarter	Hibernia Building, Heuston South Quarter, Military Road, Kilmainham, Dublin 8	110	Currently none available	Waiting List	0.55km
	Fountain Resource Marrowbone Lane Youth Project and Afterschool	St. James Presbyterian Church, James Strete, Dublin 8	44	9	Data not currently available	0.55km

	The Elbowroom	36 North Brunswick Street, Dublin 7		No response to date	No response to date	0.94km
		Total	**896**	**58**	**60**	

Table 1: Summary of the availability of spaces in childcare facilities between 0.5km and 1km from the subject site.

Within 1 – 1.5km of Application Site:

Pobal Map Ref. No.	Name	Address	Size of Facility (spaces)	Spaces Available at Present	Spaces Available Sept 2020	Distance from Site
1	Jumblies	10 Glenbeigh Park, Dublin 7		No response to date	No response to date	1.29km
42	Connolly Childrens Centre	8 Ash Grove, The Coombe, Dublin 8		No response to date	No response to date	1.31km
17	Dolphin Creche	310-311 Dolphin House, Rialto, Dublin 8		No response to date	No response to date	1.5km
18	Dolphin Homework Club	Dolphin House Community Centre, Rialto, Dublin 8.		No response to date	No response to date	1.5km
19	Dolphin House Homework Club	Dolphin House Community Centre, Rialto, Dublin 8.		No response to date	No response to date	1.5km
20	Childrens Centre Rialto	468 South Circular Road, Rialto, Dublin 8		No response to date	No response to date	1.38km
37	Donore Breakfast & Afterschool Club	Donore Youth & Community Centre, Donore Ave., Dublin 8		No response to date	No response to date	1.5km
21	Fatima Childrens Day Care Centre	Fatima Children's Day Care Centre, 78 Reuben Street, Rialto, Dublin 8		No response to date	No response to date	1.17km
22	Fatima Homework Club	F2 Centre, Reuben Plaza, Ruben Street, Rialto, Dublin 8		No response to date	No response to date	1.14km
44	Saoirse Waldorf School	92 Meath Street, Dublin 8.	32	4	Currently none available	1.07km
43	SICCDA Afterschool	92 Meath Street, Dublin 8.		No response to date	No response to date	1.07km
44	SICCDA Afterschool	St Brigids, The Coombe, Dublin 8		No response to date	No response to date	1.5km

47	Solas Afterschool Project	Swifts Alley, Francis Street, Dublin 8		No response to date	No response to date	1.26km
48	Francis Stret CBS			No response to date	No response to date	1.44km
41	Solas Afterschool Project	80 The Coombe, Dublin 8		No response to date	No response to date	1.33km
46	St Audoens Afterschool Project	St Audoens National School, Cook Street, Dublin 8	80	Currently none available	Currently none available	1.29km
45	St Audoens Pre-School	St Audoens National School, Cook Street, Dublin 8	20	Currently none available	Yes- figure not available	1.29km
	St Brigids Early Start	St. Luke's Avenue, The Coombe, Dublin 8		No response to date	No response to date	1.5km
23	The First Steps Trust Ltd	St. Josephs Early Childhood & Education Centre, Morningstar Road, Maryland, Dublin 8	32	7	Data not currently available	1.2km
38	The Mercy Family Centre	Brown Street South, Warrenmount, Dublin 8		No response to date	No response to date	1.2km
24	Tir na nOg Early Childhood Development Service	Cameron Hall, Cameron Street, Off Cork Street, Dublin 8		No response to date	No response to date	1.32km
12	Constitution Hill Creche	50/51 Constitution Hill, Dublin 7		No response to date	No response to date	1.37km
	Just Ask (Dublin Christian Mission	5&6 Chancery Place, Dublin 7		No response to date	No response to date	1.37km
11	Pitter Patter Community Creche	Macro Resource Centre, Green Street, Dublin 1		No response to date	No response to date	1.45km
	Rainbow Community Playgroup	Presentation Primary School, George’s Hill, Dublin 7	36	5	c.30	1.35km
40	The Nest (Brabazon Hall)	Brabazon Hall, Ardee Street, Dublin 8		No response to date	No response to date	1.23km
39	Sophia Nurturing Centre Cork Street	Sophia Housing Association, 25 Cork Street, Dublin 8	25	Currently none available	Data not currently available	1.26km
	Mayfield Montessori	8 Mayfield Road, Kilmainham, Dublin 8	22	Currently none available	c.5	1.23km

49	Christchurch Creche	Block 2G Floor Civic Offices, Dublin 8		No response to date	No response to date	1.5km
	Whitefriars Creche and Montessori	St. Luke's Avenue, The Coombe, Dublin 8		No response to date	No response to date	1.47km
	Waterlily Montessori & Childcare	22A Old Kilmainham, Dublin 8	5	Currently none available	c.2	1.04km
16	Mayfield Montessori	8 Mayfield Road, Kilmainham, Dublin 8	22	Currently none available	c.5	1.23km
2	Traceys Tots	Dunard Community, Dunard Road, Blackhorse Avenue, Dublin 7		No response to date	No response to date	1km
	Le Cheile Nurturing Centre	Sophia Housing, 25 Cork street, Dublin 8		No response to date	No response to date	1.25km
13	Naoinra Bogha Paisti	Gaelscoil Inse Chor, Islandbridge, Kilmainham, Dublin 8	22	Currently none available	Currently none available	1.25km
	The Childrens Project	R.C.D.T. St Andrews Community Centre, 468, South Circular Road, Dublin 8		No response to date	No response to date	1.41km
14	Safari Childcare Ltd - Kilmainham	Kilmainham Square, Inchicore Rd, Dublin 8	40	Currently none available	Waiting List	1.17km
		Total	336	16	42	

Table 2: Summary of the availability of spaces in childcare facilities between 1.0 and 1.5km from the subject site.

	Overall Capacity of Facilities	Spaces Available at Present	Spaces Available Sept. 2020
Total	1,232	74	102

Table 3: Summary of the total availability of spaces in childcare facilities.

The above childcare facilities were extrapolated from the current TUSLA childcare services provided on the pobal.ie website and the Dublin City Childcare Committee CLG (DCCC) Directory. It is noted that there is also a wide range of other crèche facilities located in the wider Dublin 8 / 7 area. This list above may not be conclusive, and it is noted that additional unregistered childcare facilities or informal child minding services may also be in operation in this area.

Figure 1 (below) highlights the location of each of the identified childcare facilities (listed on pobal.ie), in proximity to the subject site. It is evident that this area is well served by existing childcare facilities, with a wide range available to residents of the Parkgate Street development, and the Dublin 8 / 7 area as a whole.

We would note that it is normal in any given year / semester that operators of childcare facilities would seek to fully occupy their facilities. Natural progression of children from the 0 – 4 age cohort through pre-school care would see constant turnover, therefore, spaces become available and are subsequently filled regularly.

A number of operators, who were contacted in the course of gathering the above data, noted that capacity fluctuated. This often stemmed from children being removed from the facility for various reasons. As the assessment of childcare facilities above is a snapshot in time, it cannot be stated that full capacity means that childcare spaces will not naturally become available over time.

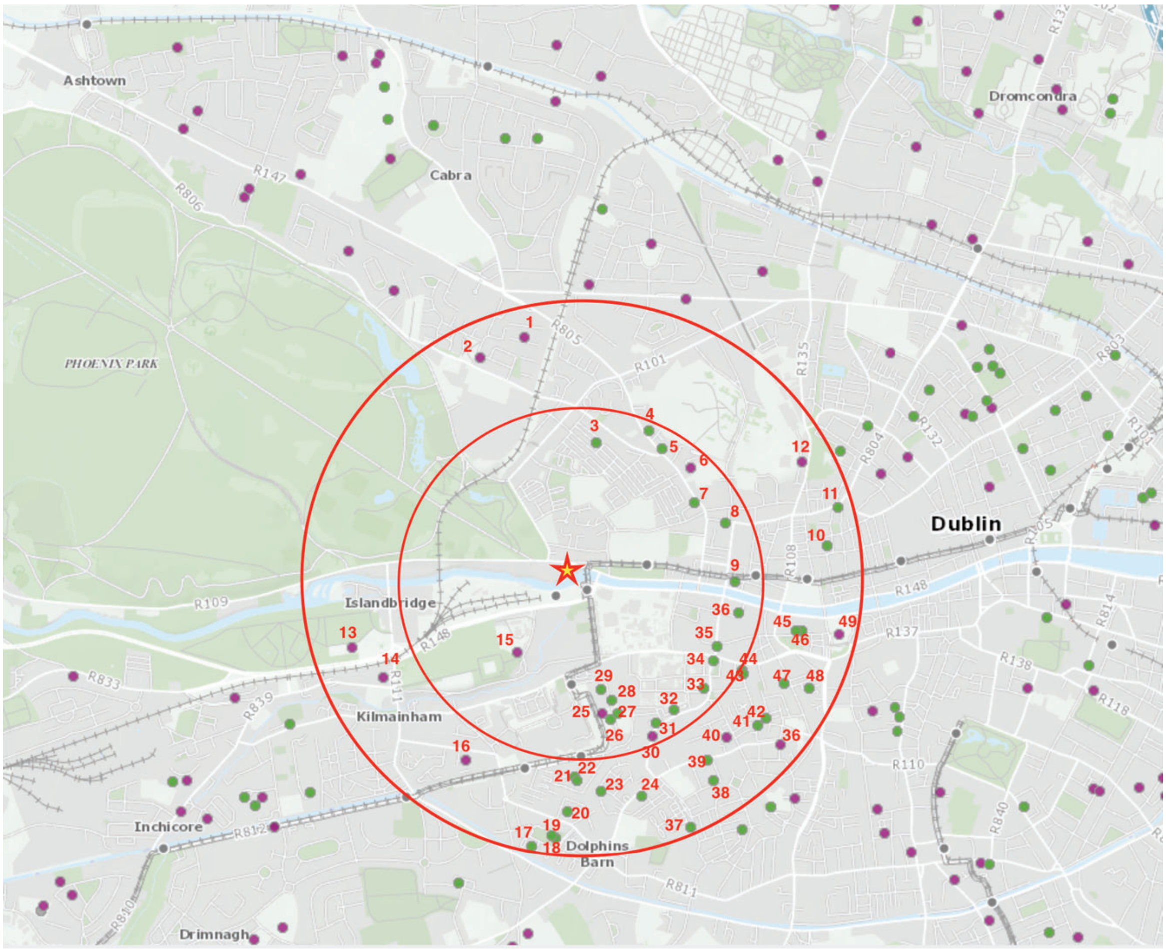


Figure 1: Extract from Pobal Maps which identifies TUSLA registered childcare facilities. The childcare facilities are numbered to reference the table above. The subject site is identified (yellow star) with an indicative 1.5 km radius show in red (Overlay by SLA).

2.2.2 Permitted Childcare Facilities

An online planning search was carried out in order to establish the number of permitted / proposed childcare spaces in the vicinity of the site.

Where the number of spaces provided is not stated in the application documents, the capacity of each childcare facility is estimated on the basis of 20no. spaces per 75no. residential units, as per the standard contained in the 2001 Childcare Guidelines.

This planning search revealed that the following childcare facilities have been granted permission as part of residential developments within a 1.5km radius of the subject site.

As with Section 2.2.1 of this report, these permitted facilities have been divided into 2no. tables on the basis of their proximity to the subject site.

Reg. Ref.	Location	Childcare Facility Size	No. of Dwellings	Capacity	Distance from site
2774/14	Heuston South Quarter, St. John's Road, Kilmainham, Dublin 8	348sqm	126	c.34 (our estimate based on c. 20 spaces per 75no. dwellings)	0.55km
3209/19	Grand Canal Harbour, Grand Canal Place, Dublin 8	224sqm	550	14	0.63km
2246/17	8-10, Coke Lane, Smithfield, Dublin 7	39sqm	N/A	10	0.86km
				Total: 58	

Table 4: Capacity of permitted childcare facilities located within 0.5km and 1km from the subject site.

With regards to Reg Ref 3209/19 above, Dublin City Council requested further information on 1 August 2019 relating to 8 separate items. The applicant responded on 1 October 2019 and the Planning Authority granted permission subject to 28 no. conditions on the 25 November 2019. The conditions did not relate to the proposed childcare facility.

Reg. Ref.	Location	Childcare Facility Size	No. of Dwellings	Capacity	Distance from site
3923/19	Block H, Clancy Quay, Islandbridge, Dublin 8	792sqm	N/A	100	0.95km
				Total: 100	

Table 5: Capacity of childcare facilities currently under consideration by DCC located within 1km from the subject site.

With regards to Reg Ref 3923/19 above, a request for further information was issued by the planning authority on the 31 October 2019. The request for further information did not relate to the principle of the childcare facility.

Reg. Ref.	Location	Childcare Facility Size	No. of Dwellings	Capacity	Distance from site
3466/18	Dunard Community Centre, 20, Dunard Road, Cabra West, Dublin 7	135sqm	N/A	22	1.24km
				Total: 22	

Table 6: Capacity of permitted childcare facilities located between 1.0 and 1.5km from the subject site.

As shown in the tables above, there are a number of pending and extant permissions for childcare facilities in proximity to the subject site. These amount to approximately 180 no. additional childcare spaces potentially available within c. 1.5km of the subject site. The additional childcare spaces potentially available through the implementation of the permitted developments outlined above further illustrate that there is capacity to absorb future demand.

2.2.3 Summary

Based on the above, it is estimated that there are:

- c.63 no. existing childcare facilities (containing in excess of 1,232 no. existing childcare spaces) within c. 0.5km - 1.5km of the subject site, and
- an additional 180 no. childcare spaces pending and permitted within c. 1.5km of the subject.

With at least 74no. spaces available in existing operational facilities at the time of writing this report, and 102no. spaces currently predicted to be available for September 2020, this demonstrates that the area is already well served by childcare facilities.

We would conclude on this basis that a further childcare facility to accommodate the proposed residential development (approximately 117no. 2-bed apartment units, giving rise to a potential demand for 31no. childcare spaces) at the application site is not required. There is sufficient capacity in the existing registered and permitted childcare facilities in the identified catchment to absorb this demand.

2.3 Population & Childcare Demand

Having established the existing childcare spaces available within proximity of the site, a review of population data is now provided to identify how local population trends might influence the need for childcare provision in this area.

The following analysis is largely based on the Census 2016 and Census 2011 data. Census data for the Phoenix Park ED (02079) has been analysed in addition to the relevant Small Area Population Statistics (SAPS) within 1.5km of the site. This allowed for a detailed population analysis for the subject area.

2.3.1 Population Change 2011 – 2016

Census 2016 data indicates that at a national level, the population grew by 3.8%, over the period 2011 – 2016. The population of Dublin City grew by 5.1% for the same period (2011 – 2016).

Census 2011 data indicates that at a national level, the population grew by 8.2%, over the period 2006 – 2011. In the same period, the population of Dublin City grew by 4.2%.

This shows that population growth for the state has slowed. However, the population growth rate of Dublin City has increased.

Census 2016 data indicates that Phoenix Park ED has a population of 1,534 persons, compared to a population of 1,538 persons in 2011. This amounts to a percentage population change of -0.3%, in contrast to the overall population growth of Dublin City (5.1%) for the same period.

For convenience, this following table summarises the population changes discussed above:

Category	% Change 2011 -2016
National	3.8%
Dublin City	5.1%
Phoenix Park ED	-0.3%

Table 7: Population change from 2011-2016

It is therefore clear that the population levels in the ED within which the subject site is located, experienced a slight decline in population between Census 2011 and Census 2016, in contrast to the relatively strong population growth of Dublin City for the same period.

2.3.2 Population Age Distribution (0-4 Years Age Cohort)

Given that childcare provision applies to a specific population cohort, typically 0 – 4 years, it was considered appropriate to examine the age distribution of the population within the study area.

Nationally, Census 2016 data indicates that the population of pre-school children (typically 0 – 4 years) stands at 331,515 persons, which is a decrease of 7% compared to the 2011 Census. Dublin experienced a marginal decrease in its pre-school population by 0.2% for the same period (2011 – 2016).

As recorded in Census 2016 for Phoenix Park ED, there are 59 persons within the 0 – 4 age cohort, representing 3.8% of the total population of the ED. This age cohort represented 3.6% of the total ED population in 2011, thus indicating that there has been a slight increase in the demographic share of this cohort during the 2011-2016 period. These Census results are illustrated below:

Phoenix Park ED	2011	2016
Total Population	1,538	1,534
0 – 4 Age Cohort	55	59
% of Total Pop.	3.6%	3.8%

Table 8: Population change of 0-4 Age Cohort from 2011-2016

It is evident that the population levels within the 0 - 4 age group cohort within the subject ED has remained relatively steady over the last Census period with only a minor increase in total percentage terms. The population of the ED area appears to remain stable over the last census period. Likewise, the 0 – 4 age cohort has remained relatively stable. This would further support the argument that a childcare facility is not required within this area on the basis of current population trends.

2.3.3 Small Area Population Statistics (SAPS)

The assessment of existing childcare provision (see Section 2.2 above) was based on a review of existing and proposed childcare facilities within a 1.5km radius of the subject site. As such, it would seem appropriate to include a review of population statistics within the appropriate SAPS surrounding the subject site, in line with the childcare facilities assessment.

76no. SAPS are contained within this area. The table below outlines the total population and the population within the 0 – 4 years age cohort for these SAPS:

Census	2011		2016	
SAPMAP	**0 to 4**	**Total**	**0 to 4**	**Total**
268118001	14	574	8	462
268118002	8	178	6	165
268084009	6	182	15	206
268084010	9	201	14	209
268118007	14	172	15	198
268084004	18	259	21	263
268148004/01			7	207
268148004/02	12	242	15	258
268148004/03			16	393

268118003	2	175	9	193
268118004	7	160	5	191
268118006	6	130	3	121
268118005	4	149	13	204
268148006	10	334	4	174
268148005	13	289	28	505
268148010	15	356	7	395
268148011	28	237	17	272
268083006	3	124	12	136
268036007/02	20	410	11	203
268036007/01			3	222
268036004	11	221	10	225
268036006	9	258	17	258
268036002	15	240	7	252
268083007	10	229	9	247
268036005	11	192	16	202
268032009	14	220	9	208
268032002	20	304	22	367
268032010	1	77	1	84
268032001	24	365	12	367
268032011	2	121	1	145
268032008	6	187	21	274
268032016	4	172	19	238
268032017	8	131	7	131
268032018	14	229	4	250
268002004	9	163	10	181
268002003	14	253	11	255
268002002	4	246	4	143
268002009	0	75	0	76
268002010	7	172	5	193
268005017	8	237	12	253
268005016	5	97	6	118
268005014	10	287	7	293
268005012	9	169	14	213
268005013	5	121	4	118
268005015	10	116	7	143
268005011	15	172	13	185
268005009	3	141	3	149
268005008	9	200	9	217
268005007	11	153	8	156
268005005	2	153	11	154
268005002	14	173	12	172
268005004	19	243	14	234
268005003	5	214	12	273
268005001	8	166	19	194

268005006	7	203	11	216
268004001	24	270	14	261
268004003	9	233	12	246
268004016/268004017	5	121	5	121
268004002/268004008	30	299	11	271
268004013	21	210		
268004011	2	97	0	117
268004012	3	80	2	89
268004006	8	185	12	186
268004005	16	195	13	219
268004004	9	289	11	277
268004010	28	342	26	317
268004009	5	453	10	538
268004007	6	298	6	293
268003012	16	221	12	194
268003013	5	130	4	142
268003018	1	172	2	163
268003016	8	219	5	209
268002020	7	160	5	149
268002019	9	174	13	204
268003010	13	300	21	316
268003009	19	317	14	307
268003017	4	210	18	258
268084007	11	337	15	291
268084008	16	328	10	411
268084005	12	231	13	272
268085010/01	12	124	2	102
268085006	10	165	17	177
268085016	17	295	14	298
268085007	10	219	3	217
268148001	5	212	7	235
268148002	12	208	8	194
268148003	12	214	14	220
268148009	15	202	18	227
268148008	28	339	18	372
268148007	27	241	9	223
268153006	20	233	11	219
268153005	25	169	18	161
268153003	13	144	11	159
268153004	21	309	27	291
268153002	23	216	9	242
268153001	9	147	7	179

268153010	29	261	19	270
268153008	11	282	15	330
268153007	9	142	9	184
268153011	9	202	2	202
268153009	9	1,033	12	1,023
268152001	14	130	9	145
268152002	13	235	16	249
268152003	12	186	7	185
268152004	4	195	13	239
268152009	5	186	12	212
268151002	4	158	4	156
268151001	6	174	10	195
268151009	3	123	2	116
268151006	4	115	8	131
268151011	12	210	11	218
268151012	2	135	34	260
268151010	9	104	23	181
268151008	13	233	10	195
268151007	4	92	3	89
268151005	10	223	6	208
268150009	13	151	29	280
268150010	11	219	36	295
268150003	10	283	16	278
268150002	15	274	25	306
268150012	20	290	34	312
268150011	17	297	16	296
268103007	11	195	20	221
268103010	22	264	18	258
268100003	15	234	14	240
268100004	6	223	9	251
268150004	9	193	18	185
268150005	10	220	9	198
268150006	30	317	42	298
268153012	11	243	7	224
268150008	13	124	9	117
268150007	14	182	5	157
268150015	2	128	2	95
268150014	16	215	11	208
268150013	19	312	22	296
268150016	22	149	28	183

268150017	3	97	1	180
268099002	8	122	7	126
268099016	10	150	9	150
268099003	7	139	5	134
268099001	5	196	6	210
268099004	9	135	4	102
268098003	21	241	27	312
268098007	14	194	11	191
268098002	24	276	26	287
268098005	4	138	9	159
268098004	4	128	7	158
268149002	3	106	4	96
268149003	7	197	10	192
268149004	0	115	4	100
268149006	13	200	11	205
268149005	10	178	11	204
268149008	2	152	8	163
268149007	17	194	13	199
268149001	26	150	14	153
Total	**1,713**	**32,220**	**1,805**	**34,335**
Total %	**5.32%**		**5.26%**	

Table 9: Small Area Population Statistics (SAPS) 0 – 4 years age cohort. (Census 2011 and 2016)

The total population in the 0 – 4 years age cohort within the 154no. SAPS located within c. 1.5km radius of the subject site was recorded as 1,713. persons in Census 2016. This represented 5.26% of the overall population of the area, compared with 3.8% recorded for the overall Phoenix Park ED for the same Census. In the 2011 Census, the 0 – 4 age cohort represented 5.32% of the total population for the same 154no. SAPS also.

The above demographic data illustrates that the 0 – 4 age cohort remained relatively consistent within the last 2no. Census periods for the Phoenix Park ED. The detailed analysis of the SAPS identifies a similar consistency in terms of percentage of total population. In fact, the detailed SAPS analysis identified a slight decrease in 0 – 4 year olds as a percentage of the total population. This provides some evidence that current population trends would indicate that there has been no significant growth in the 0-4 year old age cohort that would accelerate the need for further childcare provision in this area, or that a childcare facility should be provided as part of the proposed development.

3 CONCLUSIONS

There is flexibility provided in the national guidance on the provision of new childcare facilities, rather than a rigid blanket approach. It is possible to demonstrate in accordance with the relevant policy, whether a childcare facility is required, based on an analysis of the existing and proposed level of childcare provision and the demographic structure of the area. Essentially, the delivery of childcare facilities needs to be balanced on the specific circumstances within a geographical area.

On this basis, it is considered that this Childcare Needs Assessment has demonstrated that a childcare facility is not required as part of the proposed development on the following grounds:

Existing Childcare Provision

- It is estimated that there are 63no. existing childcare facilities and more than 74no. currently available childcare spaces within c. 1.5km of the subject site. Of these:
    - 26no. registered facilities / more than 896no. spaces are within 1km of the subject site.
    - 37no. registered facilities / more than 336no. spaces are between 1.0 and 1.5km of the subject site.
- There is an estimated current capacity of approximately 74no. childcare spaces within these existing childcare facilities. Furthermore, it is anticipated that at least 102no. childcare spaces within these existing childcare facilities will become available in September 2020. However, a number of operators in the study area noted that capacity can fluctuate where children are removed for a variety of possible reasons. It therefore cannot be directly concluded that childcare spaces will not become available over time even for childcare facilities currently at full capacity.
- There is an additional 80 no. childcare spaces permitted within c. 1.5km of the subject site, under extant planning permissions, and a further 100 no. spaces currently under consideration by the planning authority.
- Additional childcare facilities are also available within the wider Dublin 7 / 8 area, noting that many parents opt to avail of childcare on route or close to their place of work.

Demographic Trends

- Population growth rates in Dublin City decreased in the period between 2001 and 2016. Population growth levels in Phoenix Park ED also decreased.
- The Phoenix Park ED experienced a slight decrease in population during the 2011 – 2016 period, in contrast to Dublin City which experienced population growth for the same period.
- The population levels within the 0 - 4 age group cohort within the Phoenix Park ED has remained steady over the last Census period (2011 – 2016).
- An examination of the SAPS within the study area, indicate that the percentage population within the 0 - 4 age group cohort has also remained steady.

Therefore, at a micro ED and SAPS level, the rate of population growth is decreasing over time and the rate of growth is slower than Dublin City as a whole. Furthermore, the percentage population within the 0 - 4 age group cohort has remained consistent over a 5 year period and generally in line with the same age cohort within the Phoenix Park ED.

In light of this, it is concluded that by virtue of the capacity of the existing childcare facilities and recent population and demographic trends, there is sufficient capacity to cater for the existing and future childcare needs in this area.

STEPHEN LITTLE & ASSOCIATES
December 2019

Stephen Little & Associates are committed to progressing and achieving sustainable development goals.

Chartered Town Planners and Development Consultants

Address:
26/27
Upper Pembroke Street
Dublin 2, D02 X361

Contact:
t: 353-1 676 6507
info@sla-pdc.com
sla-pdc.com

Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Appendix 18.2: Community & Social Infrastructure Audit

265381-00

ARUP

SLA | Stephen Little & Associates

Community and Social Infrastructure Audit

Proposed Strategic Housing Development

Proposed Residential and Commercial Development at site of 42A Parkgate Street, Dublin 8

For Ruirside Development Ltd

December 2019

Document Control:-

Author	Checked by	Purpose	Date
VW	NC	Draft for Client	22.10.2019
VW	NC	Final	04.12.2019

1 INTRODUCTION

We, Stephen Little & Associates, Chartered Town Planners & Development Consultants, 26/27 Upper Pembroke Street, Dublin 2, have undertaken an Audit of Community Infrastructure as part of a proposed planning application for a residential development at a site on Parkgate Street, Dublin 8.

This document has been prepared in compliance with the provisions of Policy SN5 of the Dublin City Development Plan, 2016 – 2022.

The Audit provides a breakdown of infrastructure and community services in the area around the application site. Community infrastructure includes a wide range of services and facilities, including health, education, community, cultural, play, faith, recreation and sports facilities that contribute to quality of life.

Specifically, this audit has been produced to address the needs relating to particular infrastructure types, which are outlined in section 1.2.

The study area of the audit covers lands within a 1000m radius of the site, with special attention paid to those services and resources located within 500m of the site.

1.1 Area Context

The subject site is approx. 0.82 ha. in size and is accessed from the north west via Parkgate Street.

The development site is well served by public transport and within walking distance of a number of public transportation services, including Heuston Railway Station which is approximately 200m (a 3 minute walk) from the site and provides national and regional rail services, as well as the Heuston and Museum Red Line LUAS stops. The nearest bus stop is immediately to the front of the site at Parkgate Street and is served by numerous bus routes including nos. 25, 26, 66, 66a, 66b, 66e, 67 and 69. Bus route nos. 145, 747 (Airport Express) and 860 are also available at Heuston Station. There are also number of Dublin Bike stands within the immediate vicinity of the subject site at Parkgate Street, Heuston Bridge (North) and Heuston Bridge (South).

The site is well served by local amenities and easily within walking distance of most of the key amenities of the city centre. Directly adjacent to the subject site are local neighbourhood facilities such as Londis, a Post Office and numerous café/restaurant units including The Natural Bakery, FX Buckley, The Sandwich Market. Heuston South Quarter and Thomas Street are located within 1 km of the subject site, which contains a wide array of amenities such as banks, post office, local offices, restaurants, public houses, community and cultural facilities. Phoenix Park is located to the north west of the subject site which provides a significant amount of open space including faciltites such as playing pitches, polo and cricket grounds and a children’s playground. The subject site is in close proximity to a number of other open spaces including The Croppies Acre (within 300m), Irish Museum of Modern Art Gardens, Irish War Memorial Gardens and Grangegorman Playing Fields.

1.2 Infrastructure Types

The Study Area of the Audit extends to lands within a c. 1000m radius of the site, with special emphasis paid to those services and resources within a c.500m radius of the site. A 500m walk is generally considered to take 5-6 minutes; a 1000m walk 10-12 minutes.

The audit seeks to identify how the needs of the local population are met in terms of community infrastructure within this catchment area. Community infrastructure includes the following:

- Education/Training - including pre-schools, primary, secondary, third level and upskilling workshops, adult education, evening course, traineeships etc.;
- Health - including health centres, GPs, health nurses, dentists and other health care professionals;
- Sports & Recreation - including sports centres, sports clubs, play areas, playing pitches etc.;
- Social/Community Services - including local authority services, statutory welfare services, public libraries and community services;

- Arts & Culture - including museums, heritage attractions, theatres, performance areas, art and music centres etc.;
- Faith - including churches, related community halls and centres;
- Other - including post offices, credit unions and transport.

2 DEMOGRAPHIC PROFILE

The subject site is located within 'Phoenix Park' Electoral Division. Below is a breakdown of the population as per the census:

Census Year	Population	% Increase
Census 2016	**1,534**	**-0.3%**
Census 2011	1,538	

At the 2016 census, the electoral division recorded a population decrease of -0.3% from 2011. The surrounding electoral divisions are Arran Quay D, Arran Quay C, Ushers A and Ushers B.

Arran Quay C, Ushers A and Ushers B electoral divisions recorded population growth, with the highest increase being a 21% increase in population in Ushers A. A population decrease was also recorded in Arran Quay D to the immediate north of the subject site. Overall, the area saw 5.2% population growth between 2011 and 2016, which is above the national average of 3.7%.

The age profile of the population within 'Phoenix Park ED' has a lower percentage of people under the age of 18 comparable with that of the State with 7.9% of the population were recorded as being aged under 18 in Census 2016, compared to 26.3% nationally. The electoral division has a higher percentage of people over 65, with 18.9% of the population recorded as being over 65, compared to 13.4% nationally.

3 METHODOLOGY

The Audit of Community Infrastructure consists of three stages: -

1. Establishing what the 'Existing Provision' of Community Infrastructure is in the Audit area.
2. Determining what the 'Future Needs' in terms of Community Infrastructure are in the Audit area.
3. Making outline recommendations on identified requirements, including consideration of key priority focus areas.

We have followed the methodology undertaken by Dublin City Council in their Audit of Community and Social Infrastructure for the Dublin Docklands Area.

4 PROPOSALS AT THE SUBJECT SITE

The purpose of the Audit is to contribute to the ongoing assessment and monitoring of community facilities by Dublin City Council, and to identify the additional facilities being provided by the proposed scheme.

Section 2 of this report identifies that the demographic profile of the area is slightly older that the national average, with less people under age 18, and more people over the age of 65. Section 5 identifies the existing services within a 500m and 1000m catchment area of the site, which are broad ranging.

In land use zoning terms, the proposed development is located in 'Z5 – City Centre - to consolidate and facilitate the development of the central area, and to identify, reinforce, strengthen and protect its civic design character and dignity'; 'Z6 – Enterprise and Employment – to provide for the creation and protection of enterprise and facilitate opportunities for employment creation' and 'Z9 – Amenity/Open Space Lands/ Green Network - to preserve, provide and improve recreational amenity and open space and green networks'. Such sites are sought by the Dublin City Development Plan 2016 – 2022 to contribute to the promotion of the inner city as an attractive place for urban living, working and visiting. The Development Plan envisages the delivery of urban regeneration, the emergence of spatial clusters of economic specialisms, public realm improvements and the strengthening of the retail core. A small parcel of land with Z6 land use zoning lies partly inside the application site where it is proposed to undertake external works which comprise minor works along the south footpath on Parkgate Street and provide pedestrian access along the southern river edge of the application site.

The proposed development of residential, office, retail, café/ restaurant uses at this site accords with its Z5 zoning. In addition to providing a high quality residential scheme, the development proposes a significant quantum of employment generating floorspace. This will contribute to the Development Plan aspiration for a mix of uses at this site. The groundfloor of the scheme is primarily given to active uses such as retail and café, which will animate and enliven the streetscape along Parkgate Street, as well as the new public open spaces.

The redevelopment of this site also presents a rare opportunity to open up access to the River Liffey to the public, which had previously not been possible. This aspiration is clearly recognised within the Development Plan, as the strip of land adjacent to the river is zoned Z9 - Open Space. The proposed treatment of the Z9 part of the site responds carefully to the zoning objective to provide recreational amenity and open space in this area, while addressing the heritage value of the structures in this location. The restoration of the site's protected structures, as well as other historic structures will enhance the cultural fabric of the area.

The proposed development will also provide a high quality public plaza. The proposal will provide for retail and café / restaurant uses which will benefit the existing residents in the area as well as the future residents.

The co-working spaces will be available for hire for cultural uses/ events, while the public open space will have the potential to accommodate uses such as farmers markets and outdoor cinema events, subject to appropriate licencing and consents.

These new uses will increase the variety of offering in the area. It is considered that the proposed development represents a signficant contribution to the community infrastructure of the local area, on the basis of the scale of this development and the existing local facilities.

5 EXISTING PROVISION

5.1 Education and Training

Within 500m

No primary or secondary schools are located within 500m of the subject site.

Within 1000m

- St. James's Primary School,
- Canal Way Educate Together School
- Stanhope Street Convent Primary School
- St. Gabriel's National School

In addition to this, there are two Secondary Schools within 1 kilometre. These are:-

- CBS James's Street
- St. Josephs Secondary School

There are 40 no. primary schools and 13 no. post-primary schools in the surrounding Dublin 8 and Dublin 7 area. Of these, 4 no. primary schools and 2no. post primary schools are within 1000m of the subject site. These are outlined in the following Map and shaded in green in Table 1 below:

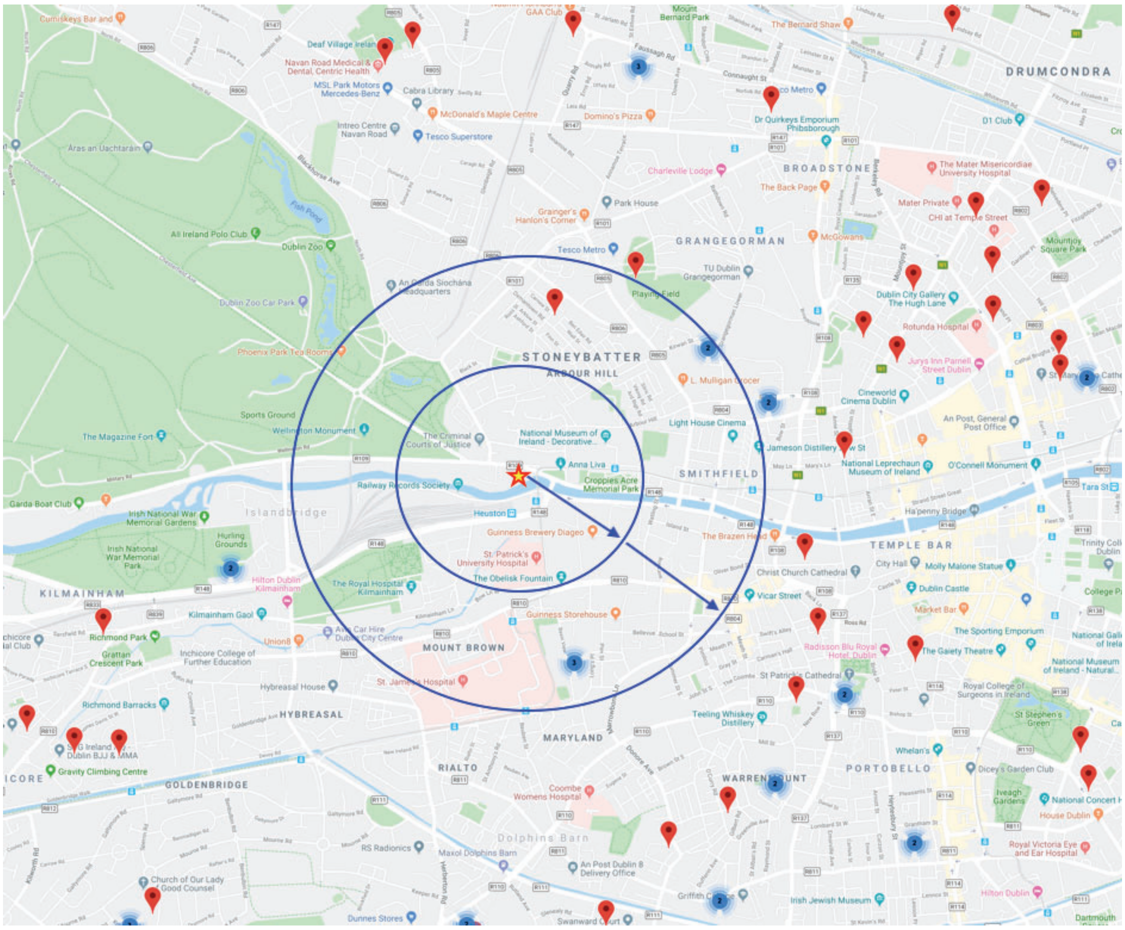


Figure 1: Primary and Post-Primary Schools. Extract from Department of Education and Skills, School Search Results Map. Approximate location of subject site (yellow star), with approximate 500m and 1000m radii marked in blue.

5.1.1 Assessment of Schools Demand Arising from Proposed Development

Section 4.2 – 4.4 of the Sustainable Residential Development in Urban Areas 2009 outlines the provision for school places in conjunction with residential development, as follows;

> ***4.2*** *New residential communities can generate a demand for a significant number of new school places, particularly where families are attracted to the area. In such cases, it is vital to the process of supporting sustainable communities that the planning system facilitates the timely provision of new school buildings. Detailed guidance on planning for school provision through the development plan, local area plan and development management processes and the roles, responsibilities and specific actions to be taken in relation to forecasting future demand for school places is available in the Joint Code of Practice on Provision of Schools and the Planning System (August 2008).*
>
> ***4.3*** *No substantial residential development should proceed without an assessment of existing schools capacity or the provision of new school facilities in tandem with the development.*
>
> ***4.4*** *Within the development management process, it is recommended that planning applications for 200+ dwelling units should be accompanied by a report identifying the demand for school places likely to be generated by the proposal and the capacity of existing schools in the vicinity to cater for such demand. In very large-scale residential developments (say, 800+ units), planning authorities must consider whether there is a need to link the phased completion of dwellings with the provision of new school facilities.*

The Development as proposed caters for 481 no. build to rent residential units, which is in excess of the 200+ unit threshold but is considerably under the threshold of 800+ units identified in the Guidelines.

A crude assessment of the demand arising from the proposed development was determined by multiplying the proposed number of units by the projected Average Household Size for Dublin City in 2016. An average household size of 2.5 in Dublin City is derived from the 2016 Census.

Based on discussion with the Forward Planning Unit of the DES, it was confirmed that the following percentages of the estimated population is utilised to determine the number of people of school going age: -

- **Primary School:** 12%.
- **Post-Primary:** 8.5%.

It would be reasonable to assume that the proposed studios and 1-bed units are unlikely to generate any demand for schools, and therefore demand should be calculated on the basis of the 117no. 2 bed units. Based on this, the proposed development will produce a demand of 35 spaces for primary schools and 25 for post primary schools. The actual demand may be less than this, given that the proposed development follows the build to rent model which, although accommodating families, generally attracts a majority of young, mobile professionals.

Completion of the development is expected in 2023. Any increase in population in the area would not therefore be felt immediately by school infrastructure in the vicinity. The occupancy lag would allow time for the DES and the Planning Authority to plan to accommodate any estimated surge in demand for school places arising from residential development in this area through the development plan process. In their recent report on enrolment projections *('Regional Projections of full-time enrolments Primary and Second Level, 2019 – 2036'*) the Department of Education and Skills findings indicate a peak demand for primary and post primary enrolments up to 2019 which is expected to drop off year on year up to 2036.

The Department of Education and Skills have determined *'School Planning Areas'* which would generally delineate the catchment area for a proposed residential development. At the time of this audit a 'School Planning Area' map was not available for the development area, so for the purposes of this study, a desk-based assessment was conducted into the existing and planned provision of primary and post- primary schools in Dublin 8 and Dublin 7, having regard to the Department of Education website.

Roll Number	Primary School Name	Address	Total enrolments Academic Year Sept 2014	Total enrolments Academic Year Sept 2018
05933G	PRESENTATION PRIMARY SCHOOL	Dublin 7	172	137
07546J	GOLDENBRIDGE CONVENT Note: Plans to rebuild	Dublin 8	265	251
09932B	STANHOPE ST CONVENT	Dublin 7	319	347
13611D	PRESENTATION PRIMARY SCHOOL	Dublin 8	311	210
14556D	ST ENDAS PRIMARY SCHOOL	Dublin 8	135	121
15625B	ST CATHERINES WEST N S	Dublin 8	183	214
16695E	SCOIL NA MBRATHAR BOYS SENIOR SCHOOL	Dublin 7	164	164
16786H	ST BRIGIDS PRIMARY SCHOOL	Dublin 8	108	265
16988T	CHRIST THE KING B N S	Dublin 7	94	116
16989V	CHRIST THE KING GIRLS SENIOR SCHOOL	Dublin 7	91	95
17083B	S N MUIRE GAN SMAL B	Dublin 8	327	348
17367P	MARY, HELP OF CHRISTIANS G.N.S. Note: Plans to rebuild	Dublin 7	435	423
17459U	CHRIST THE KING I G	Dublin 7	59	60
17464N	FIONNBARRA NAOFA B.N.S.,	Dublin 7	139	150
17465P	DOMINICAN CONVENT GIRLS SENIOR SCHOOL	Dublin 7	155	216
17466R	ST CATHERINES INFANT SCHOOL	Dublin 7	212	146
17893N	SANCTA MARIA C B S	Dublin 8	80	93
17912O	S N EOIN BOSCO BUACH Note: Plans to rebuild	Dublin 7	370	442
18477E	SCOIL NA MBRATHAR	Dublin 8	126	157
18632N	S N EOIN BOSCO NAI BUAC Note: Plans to rebuild	Dublin 7	247	215
19480V	ST PATRICKS	Dublin 8	28	26
19589U	GAELSCOIL INSE CHOR	Dublin 8	246	238
19933J	SCOIL TREASA NAOFA	Dublin 8	173	177
20012S	GRIFFITH BARRACKS MULTI D SCHOOL	Dublin 8	247	275
20035H	ST GABRIELS N S	Dublin 7	123	118
20091R	ST PETERS NS	Dublin 7	450	461
20104A	ST AUDOENS NS	Dublin 8	188	197

20131D	EDUCATE TOGETHER NS	Dublin 7	406	465
20152L	NORTH DUBLIN MUSLIM NS PROJECT Note: Plans to rebuild	Dublin 7	243	289
20429F	ST. JAMES'S PRIMARY SCHOOL	Dublin 8	250	245
20430N	CANAL WAY EDUCATE TOGETHER NATIONAL SCHOOL	Dublin 8	91	281
20436C	ST MARY'S PRIMARY SCHOOL	Dublin 7	180	240
20453C	BROOMBRIDGE EDUCATE TOGETHER NATIONAL SCHOOL	Dublin 7		74
			6,617	**7,616**
Roll Number	**Special School Name**	**Address**	**Total Academic Year Sept 2014**	**Total enrolments Academic Year Sept 2018**
19039I	ST VINCENTS HOME NS	Dublin 7	71	69
19151C	ST JOHN OF GOD SP SCH		86	89
19281P	MATER SCHOOL		6	6
19409P	CASA CATERINA S S	Dublin 7	27	34
19500B	PHOENIX PARK SPECIALIST SCHOOL		18	19
20495S	HOLY FAMILY SCHOOL FOR THE DEAF	Dublin 7		130
			208	**347**
Roll Number	**Post-Primary School Name**	**Address**	**Total Academic Year Sept 2014**	**Total enrolments Academic Year Sept 2018**
60410I	C.B.S. JAMES STREET	Dublin 8	150	145
60470D	CHRISTIAN BROTHERS, SYNGE ST.	Dublin 8	248	274
60491L	ST DECLAN'S COLLEGE	Dublin 7	638	636
60660I	ST PATRICKS CATHEDRAL G.S	Dublin 8	155	198
60731F	ST DOMINICS COLLEGE	Dublin 7	897	829
60872A	MERCY SECONDARY SCHOOL	Dublin 8	175	157
70150O	CABRA COMMUNITY COLLEGE	Dublin 7	150	120
60843Q	ST JOSEPHS SECONDARY SCHOOL	Dublin 7	230	181
60731F	ST DOMINICS COLLEGE	Dublin 7	897	829
60430O	ST PAULS C.B.S.	Dublin 7	254	226
60491L	ST DECLAN'S COLLEGE	Dublin 7	638	636
60792C	PRESENTATION COLLEGE	Dublin 8	261	187
60872A	MERCY SECONDARY SCHOOL	Dublin 8	175	157

			4,868	**4,575**

Table 1: Department of Education and Skills, primary and post-primary schools enrolments for the academic years 2014 and 2018. Schools within 1.5km of the site are highlighted in green. Where enrolments have declined since 2014, figures are highlighted in red.

With regards to post primary schools, Table 1 identifies that there has been an overall decline in enrolments at post primary schools in the study area. This indicates that there is ample capacity to absorb any additional demand for places arising from the proposed development. Furthermore, it is generally accepted that travel distances to post primary schools can be longer than those to primary schools where public transport facilities support this. Therefore a wider range of options for post primary schools exists.

With regards to primary schools, Table 1 above indicates a decline in enrolment in 1 no. primary school and within 1000m of the subject site in the period between 2014 and 2018. Overall however it shows an increase in enrolment during this period. It should be noted that the figures in Table 1 are not indicative of the maximum capacity of each school, but simply provide the enrolment numbers.

In the case of Canal Way Educate Together School, Broombridge Educate Together School and Holy Family School for the Deaf - these are new schools and considerable capacity exists above the current enrolment figures. Direct enquiries to these schools found that their estimated respective capacities were approximately 416, 480 and 200 – giving in total an extra 611 spaces above their current enrolment figures.

In addition, the DES Building Programme plans for the construction of 6 schools in Dublin 8 and Dublin 7 in the coming years (see Table 2 below). These plans principally involve rebuilding existing schools. Details of the proposed capacity of these rebuilt schools is not available. However, the Department advises that most new schools must have the capacity to operate schools in the size range of 800 to 1,000 pupils.

Roll Number	School Name and Address	Schools Project Status	
07546J	Goldenbridge Convent, D8	Stage 2b (Detailed Design)	Rebuild of existing school
16864B	St. Joseph’s School for the Deaf, Cabra, Dublin 7	Project Brief Stage	Rebuild of existing school
20152L	North Dublin Muslim NS, Navan Road, Dublin 7	Stage 2b (Detailed Design)	Rebuild of existing school
20131D	Grangegorman ETNS, Dublin 7	Stage 2b (Detailed Design)	Rebuild of existing school
TBD	New Children’s Hospital, St. James’s, Dublin 8	Projected Devolved to Department of Health for Delivery	
17367P/17912O/18632N	Mary Help of Christian School/Scoil Eoin Baiste BNS/Scoil Eoin Baiste JBNS, Navan Road, Dublin 7	Stage 1 (Preliminary Design)	Rebuild of existing school

Table 2: Department of Education and Skills - Current status of large-scale projects being delivered under the school building programme.

Regard should be had to the likely enrolment projections for Primary and Post-Primary Schools as set out by DES. The projections indicate that Primary School enrolment will begin to decline after 2019. This is shown in table 3 below.

Table 3 Projected enrolments in primary schools, by region, 2018-2036 (Excel file)

	Dublin	Mid-East	Midlands	Mid-West	South-East	South-West	Border	West	Total
2018	144,509	93,774	38,597	56,058	51,789	81,045	48,939	53,108	567,819[2]
2019	145,304	93,348	38,598	55,450	51,399	80,739	48,574	52,808	566,220
2020	144,493	92,125	38,273	54,612	50,654	79,797	47,686	52,183	559,822
2021	142,851	90,262	37,553	53,619	49,536	78,343	46,719	51,144	550,027
2022	141,365	88,221	36,887	52,449	48,204	76,549	45,496	50,085	539,256
2023	139,417	86,032	36,101	51,225	47,007	74,493	44,178	48,976	527,429
2024	137,897	84,159	35,490	50,196	45,858	72,625	43,070	47,956	517,251
2025	136,027	82,524	34,907	49,070	44,730	70,722	41,963	46,830	506,773
2026	133,733	80,865	34,264	48,000	43,536	68,619	40,766	45,498	495,282
2027	131,332	79,481	33,648	47,000	42,370	66,747	39,727	44,237	484,542
2028	128,951	78,367	33,119	45,969	41,334	64,891	38,854	43,132	474,619
2029	126,248	77,732	32,892	45,035	40,559	63,257	38,120	42,092	465,937
2030	123,014	77,440	32,756	44,257	39,989	61,888	37,692	41,130	458,168
2031	119,595	77,436	32,704	43,585	39,537	60,646	37,380	40,255	451,138
2032	116,117	77,745	32,745	43,056	39,216	59,573	37,185	39,481	445,119
2033	112,754	78,360	32,883	42,671	39,025	58,696	37,116	38,817	440,323
2034	109,601	79,259	33,108	42,434	38,958	58,018	37,171	38,282	436,833
2035	106,656	80,418	33,417	42,335	39,020	57,543	37,356	37,888	434,632
2036	104,029	81,825	33,807	42,373	39,198	57,263	37,665	37,634	433,795

Table 3: Department of Education and Skills – Projected enrolments in primary schools by region, 2018-2036

The expected completion date of the proposed development is in 2023. Any theoretical increase in demand for school places would not therefore be immediately felt by the educational facilities within the catchment area. The completion would coincide with a steady decline in demand for primary school spaces in Dublin.

Having regard to the minimal demand for primary school places expected to arise from the proposed development (35), the planned schools under the DES Schools Building Programme and the overall projected decline in primary school enrolment, it is anticipated that the existing and planned schools would cater for current and future demand in the area.

5.2 Health

The following healthcare facilities are identified within the **500m** catchment:

- Heuston South Quarter Pharmacy
- Dublin Dental Specialist Clinic
- St. Patrick's University Hospital

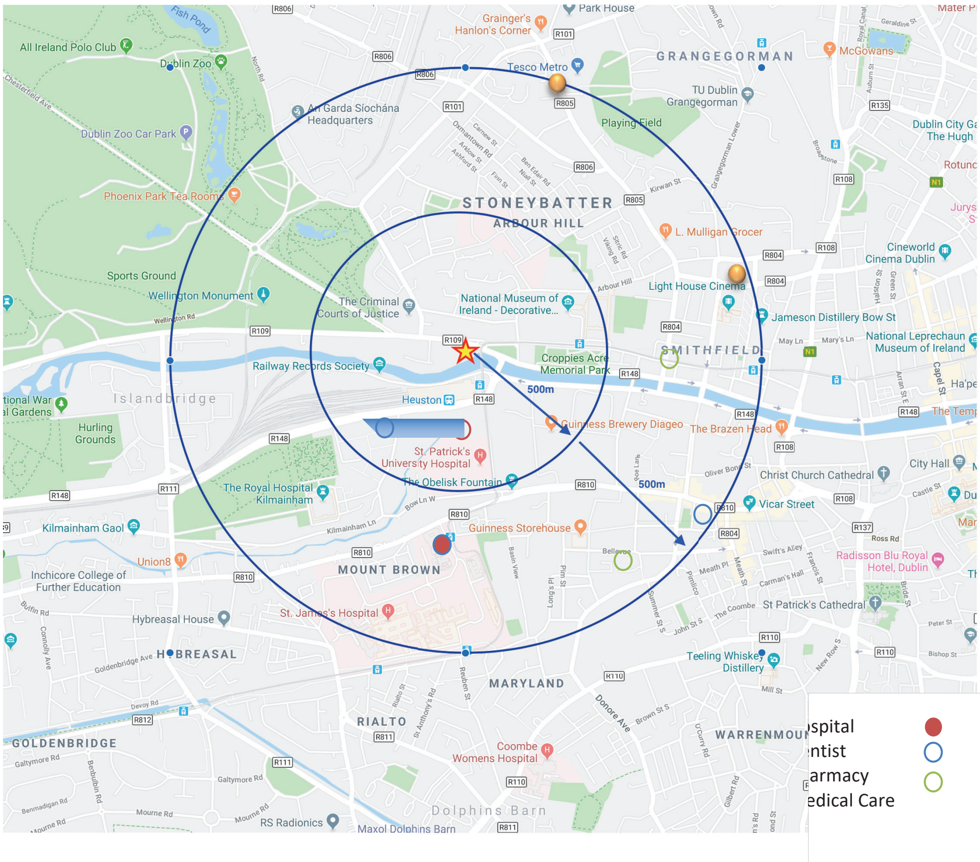


Figure 2: Map showing location of healthcare and medical facilities.

Within 1000m:

- St. James's Hospital
- Thomas Court Primary Care Centre
- Cassidy's Pharmacy
- Blackhall Pharmacy
- Lloyds Pharmacy
- Easy SOP Pharmacy
- Janet Dillon Pharmacy
- Market Pharmacy Smithfield
- Liberites CarePlus Pharmacy
- Plaza Health Smithfield

St. James's Medical Centre
Medicus Medical Centre
Charter Medical Smithfield
Polska Przychodnia Smithfield
Stoneybatter Family Practice
Manor Street Family Practice
Marinas Brilliant Smile Dental Services
Art Medica Dental Clinic
One Manor Place Dental Practice

5.3 Sports & Recreation

Within 500m:

- Phoenix Park
- The Croppies Acre Park

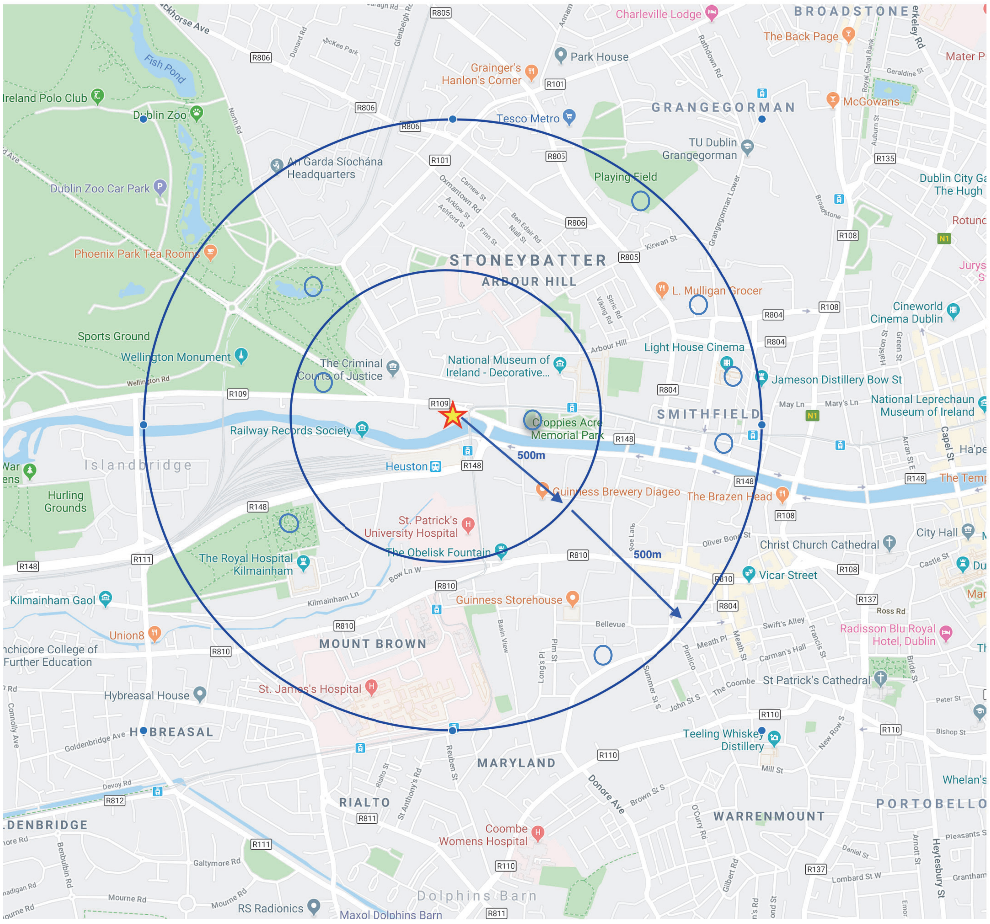


Figure 3: Map showing location of sport & recreation facilities. Each facility is represented by a blue dot.

Within 1000m:

- it. James's Gate Health & Fitnes lub
- . Escape Healthclub Smithfield
- .ift Training Studios Smithfield
- /iribus Crossfit Smithfield
- The Royal Gardens at the Royal Hospital Kilmainham
- St. Catherine's Sports Centre
- Marshall Art Incorporated Dublin 7
- Origins Muay Thai

A number of additional sports facilities exist within reasonable proximity of the site, such as the Irish War Memorial Hurling Grounds, St. Brendan's GAA Club, Navan Road United FC, Dublin Municipal Rowing Club, Dynamo Dublin FC, Bohemian FC Football Grounds, Oblate Basketball Club, Richmond Park Football Club, Liffey Gaels GAA Club all within 3km of the subject site.

5.4 Social & Community Services

Within 1000m:

- St. Catherine's Community Centre
- Aughrim Street Sports Hall
- St. James's Parochial Hall
- Blackhall Street St. Pauls Community Hall
- Stoneybatter Community Training Centre
- Aughrim Street Scout Group

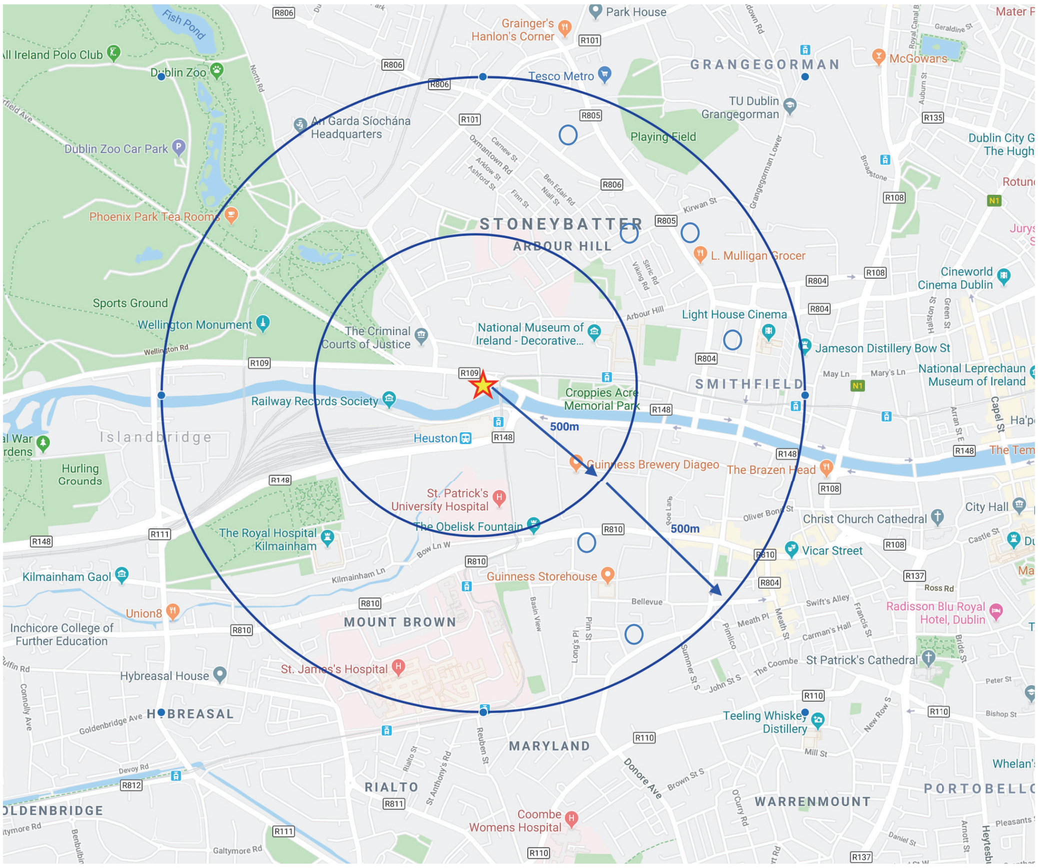


Figure 4: Map showing location of social & community facilities. Each facility is represented by a blue dot.

Inchicore Library and The National Visual Arts Library NIVAL are also both under 1.5km from subject site

5.5 Art & Culture

Within 500m:

- National Museum of Ireland
- Pearse Lyons Distillery
- Guinness Open Gate Brewery

Within 1000m:

- Guinness Storehouse
- Irish Museum of Modern Art
- Lighthouse Cinema
- Jameson Distillery
- Mother's Tankstation Arts Centre
- National College of Art & Design

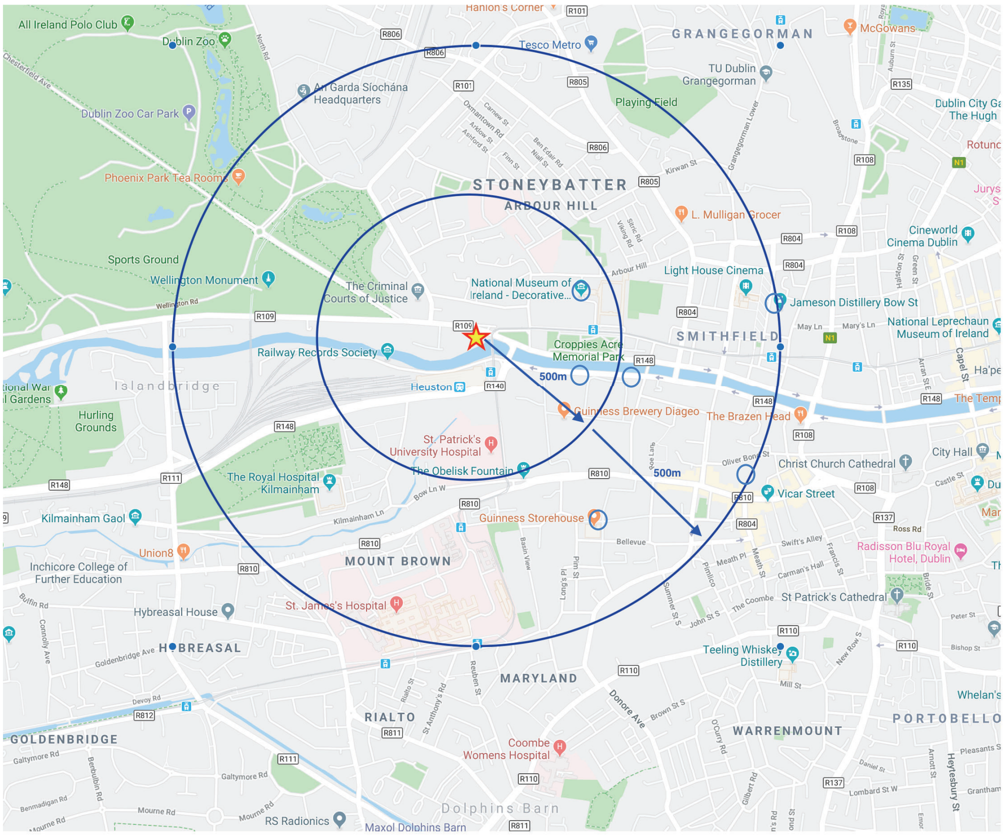


Figure 5: Map showing location of arts and culture facilities. Each facility is represented by a blue dot.

It is worth noting that a number of additional cultural facilities exist within reasonable proximity of the site, such as the Zoological Gardens, Aras an Uachtarain and Farmleigh Estate within Phoenix Park, Kilmainham Gaol, Irish War Memorial Gardens, Vicar Street Venue, Vaults Live theatre.

The site is also less than 3km from Dublin City Centre, which provides a wide arts and culture offering.

5.6 Faith Services

Within 500m:

- Sacred Heart Catholic Church
- Greek Orthodox Church of the Annunciation

Within 1000m:

- St. James's Catholic Church
- St. Catherine's Church of Ireland
- Aughrim Street Parish

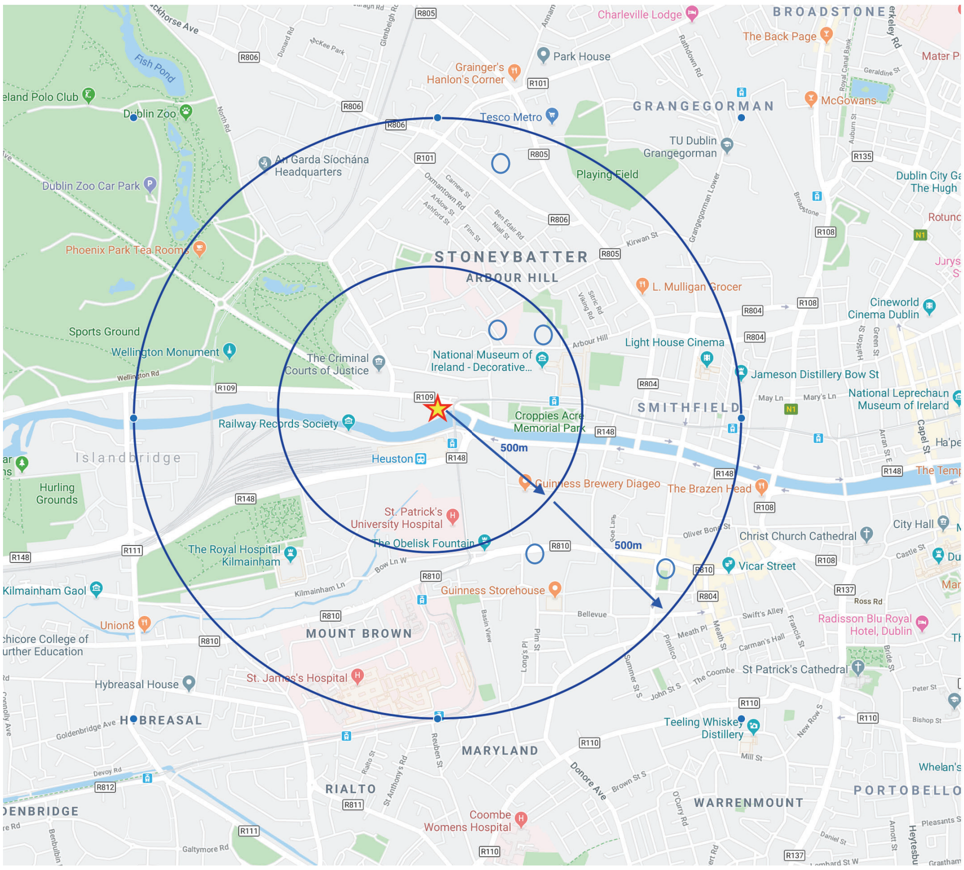


Figure 6: Map showing location of faith services. Each facility is represented by a blue dot.

5.7 Other Services

Within 500m:

- Heuston Station
- Dublin Bus routes 25, 25a, 25b, 25x, 26, 51d, 66, 66a, 66b, 66e, 66x, 67, 67x, 145, 747, 860
- LUAS Red Line
- Parkgate Street Post Office

Within 1000m:

- Kilmainham Garda Station
- Bank of Ireland Thomas Street
- James's Street Credit Union
- James's Street Post Office
- Aonghus McCarthy Solicitors
- Tracy Horan & Co. Solicitors
- Cahir O' Higgins Solicitors
- Michael Kelleher Solicitors

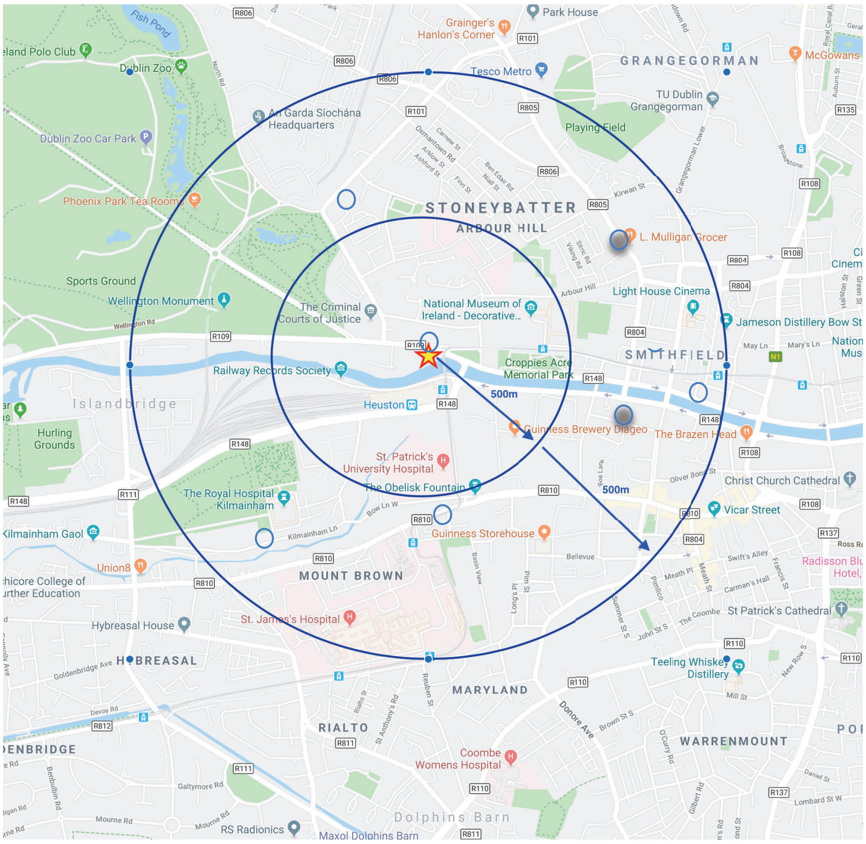


Figure 7: Map showing location of other services and facilities. Each facility is represented by a blue dot and Dublin Bus routes are represented by the blue arrows.

6 FUTURE NEEDS ASSESSMENT

The purpose of the community audit is to determine if the Heuston area is well served by community related facilities to support the future residents of the proposed development.

The audit area is well serviced in terms of community infrastructure, as examined in Section 5 above.

Having regard to the schools assessment conducted which is outlined in Section 5.1.1 of this report, in our professional opinion, the demand created for school places by the proposed development will be comfortably absorbed by the existing educational facilities in proximity to the application site. The most recent Department of Education and Skills enrolment data on post primary schools indicates that there has been a general decline in enrolment in the area over the past number of years, and therefore the expected minimal demand for spaces arising from the proposed development should be comfortably met by the existing schools.

While primary school enrolment in the area has increased over the same period, it is expected to decline steadily from 2019 year on year until 2036. In addition, the development of future schools under the DES Schools Building Programme in the Dublin 8 and Dublin 7 area will ensure that Primary and Post Primary school needs are effectively met. Furthermore, given the likely timeframe for permission, construction and occupation of the proposed development in its entirety, the DES would have an opportunity to consider local demand for school places and any requirement to expand existing or provide new facilities in this area in the next tranche of its Capital Investment for Schools Infrastructure, should the need arise. It is therefore concluded that the existing provision of schools in the area is sufficient to cater for the proposed development.

The subject site is well located, with convenience (including Lidl, Fresh and Supervalu supermarkets) and comparison shopping available at nearby Thomas Street and Smithfield located approximately 1 kilometre from the subject site, as well as Heuston South Quarter located within 500m of the subject site. The audit area has a range of existing amenities which can be accessed by future residents of the proposed development.

The urban structure of the audit area is strong as the site benefits from proximity to a wide array of services at Smithfield, Thomas Street and Heuston South Quarter. The site is also situated less than 3km from Dublin City Centre, which provides an even wider range of community and social infrastructure and amenities. Additionally, there is a broad spectrum of health-related facilities within the immediate catchment area which affords a choice of services. Other numerous amenity facilities are situated around the immediate locality which residents can avail of such as sports clubs, gyms and parks.

The site is within walking distance of numerous bus routes which allows greater flexibility and access to an even wider range of services outside of the immediate locality. The development site is well served by public transport and within walking distance of a number of public transportation services, including Heuston Railway Station which is approximately 200m (a 3 minute walk) from the site and provides national and regional rail services. The Heuston and Museum Red Line LUAS stops are also immediately accessible. The nearest bus stop is immediately to the front of the site at Parkgate Street and is served by numerous bus routes including nos. 25, 26, 66, 66a, 66b, 66e, 67 and 69. Bus route nos. 25a, 25b, 145, 747 (Airport Express) and 860 are also available at Heuston Station. The planned Bus Connects Route (Route 6: Lucan > City Centre) is proposed to have a bus stop at St. John's Road West (a 200m walk) which will further improve access to and from the area.

As the extant population of this area ages, and as population density in the audit area grows in accordance with strategic planning policy, it will become more important for services to be clustered and accessible.

In summary, it is considered that the Hickeys site at Parkgate Street is accessible to a range of leisure facilities including sports grounds and clubs, Phoenix Park; a number of existing education facilities, including five primary schools, two secondary schools within the 1km study area, arts and cultural faciltites such as museums, ditilleries and art galleries and a quantum of community facilities located throughout the Dublin 7/Dublin 8 area. As such the facilities in the area provide a good offering will be able to support the future residents of the proposed Parkgate Street development.

Furthermore, the proposed development will contribute to the community infrastructure of the area by expanding the retail and restaurant offering, while also providing new, high quality public open space. The potential for cultural events is also provided through hire of the co-woring spaces and use of the public open space, subject to appropriate consents and licencing. The proposed development will therefore enhance the community infrastructure that exists in the area.

STEPHEN LITTLE & ASSOCIATES

04 December 2019

Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Appendix 19.1: Utilities & Services

265381-00

ARUP

ESB Networks

TITLE: 20181214-039_A3

COLOUR CODE:

- BLACK - 38KV & HIGHER VOLTAGE OVERHEAD LINES
- GREEN - MV(10KV/20KV) OVERHEAD LINES
- BLUE - LV (400V/230V) OVERHEAD LINES
- CYAN - 38KV & HIGHER VOLTAGE UNDERGROUND CABLE ROUTES
- RED - MV/LV (10KV/20KV/400V/230V) UNDERGROUND CABLE ROUTES

DATE: 14-Dec-2018

** SCALE: 1:700

** SCALE WHEN PRINTED ON AN A3 PAGE
XY COORDINATES DISPLAYED IN IRISH GRID COORDINATE SYSTEM

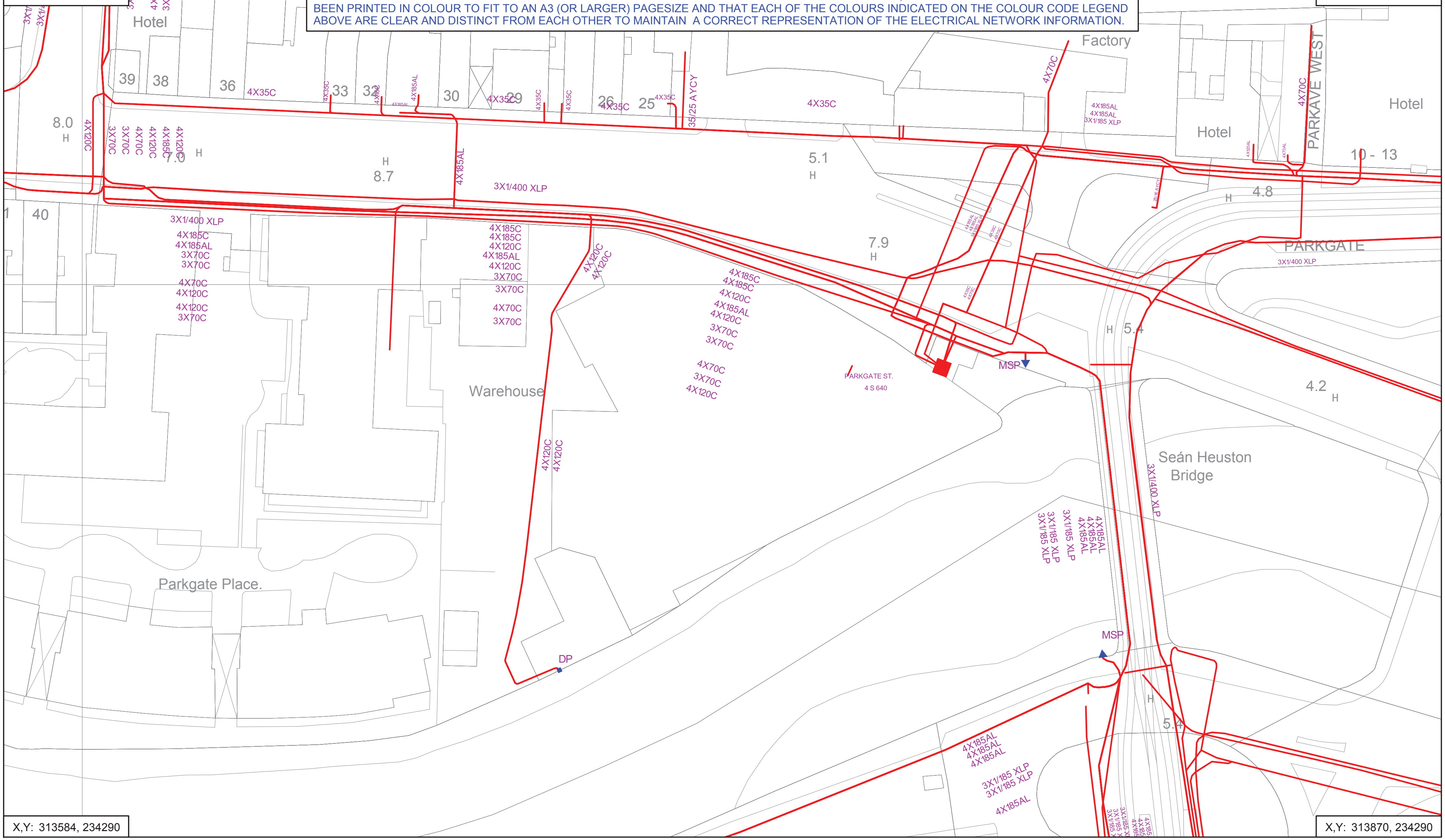
WARNING

THIS MAP INDICATES THE APPROXIMATE LOCATION OF ESB TRANSMISSION (400KV, 220KV, 110KV, 38KV) AND DISTRIBUTION (20KV, 10KV, 230V/400V) UNDERGROUND CABLES AND OVERHEAD LINES IN THE GENERAL AREA OF THE PROPOSED WORKS. ESB NETWORKS TAKES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE MAP. IT IS THE USER'S RESPONSIBILITY TO INDEPENDENTLY VERIFY THE INFORMATION AND THE LOCATION OF UNDERGROUND CABLES AND OVERHEAD LINES. LOW VOLTAGE (230V/400V) SERVICE CABLES (E.G. HOUSE SERVICES, FACTORY/SHOP SERVICES, PUBLIC LIGHTING LAMP SERVICES, ETC) ARE NOT INCLUDED BUT THEIR PRESENCE SHOULD BE ANTICIPATED. THE DEPTHS OF UNDERGROUND CABLES MUST NEVER BE ASSUMED. ADDITIONAL MORE DETAILED INFORMATION IS AVAILABLE FOR HIGH VOLTAGE TRANSMISSION UNDERGROUND CABLES (38KV, 110KV, 220KV, 400KV) FROM THE LOCAL ESB NETWORKS TRANSMISSION REPRESENTATIVE - SEE ATTACHED LIST FOR CONTACT DETAILS OR CALL 1850 372 757. NO WORK SHOULD BE CARRIED OUT IN THE VICINITY OF 38KV OR HIGHER VOLTAGE UNDERGROUND CABLES WITHOUT PRIOR CONSULTATION WITH ESB NETWORKS. BEFORE ANY MECHANICAL EXCAVATION IS UNDERTAKEN, THE ACTUAL LOCATION OF ALL UNDERGROUND ELECTRICITY CABLES MUST BE ESTABLISHED AND VERIFIED ON THE SITE USING: (A) UP-TO-DATE MAP RECORDS; (B) CABLE LOCATER EQUIPMENT OPERATED IN BOTH POWER AND RADIO MODES; (C) CAREFUL HAND DIGGING OF TRIAL HOLES USING 'SAFE DIGGING PRACTICE'. REFER ALSO TO 'HSA CODE OF PRACTICE FOR AVOIDING DANGER FROM UNDERGROUND SERVICES'. ESB TAKES NO RESPONSIBILITY FOR AND SHALL BEAR NO LIABILITY, HOWSOEVER ARISING, IN RELATION TO ANY DAMAGE, INJURY/DEATH OR LOSS OF SUPPLY AS A RESULT OF DAMAGE OR INTERFERENCE WITH ITS NETWORKS.

X,Y: 313584, 234460

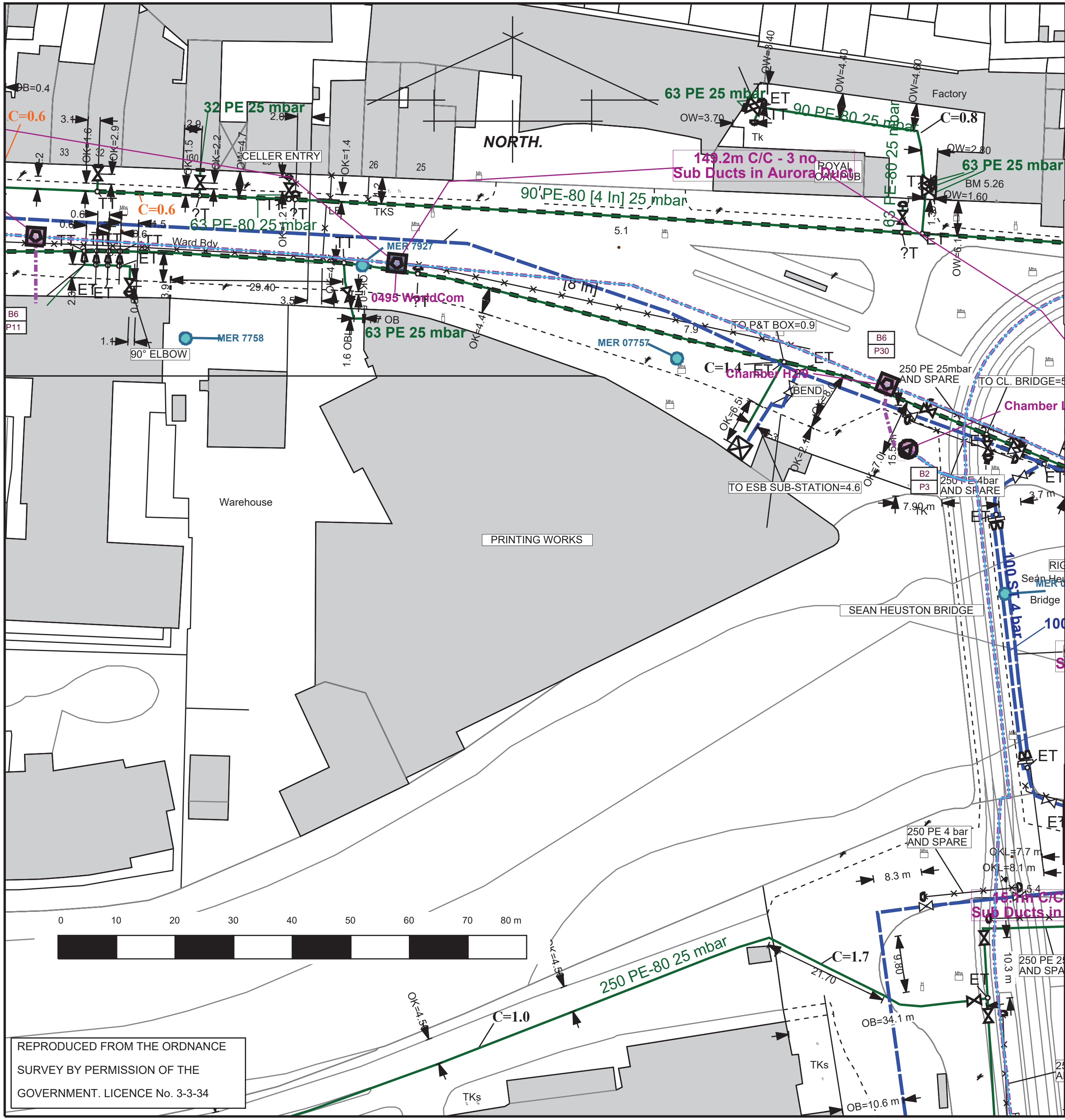
ESB NETWORKS HAS ISSUED THIS MAP AS A PDF DOCUMENT. IF VIEWING A PAPER VERSION OF THIS MAP, THE VIEWER MUST ENSURE THAT IT HAS BEEN PRINTED IN COLOUR TO FIT TO AN A3 (OR LARGER) PAGESIZE AND THAT EACH OF THE COLOURS INDICATED ON THE COLOUR CODE LEGEND ABOVE ARE CLEAR AND DISTINCT FROM EACH OTHER TO MAINTAIN A CORRECT REPRESENTATION OF THE ELECTRICAL NETWORK INFORMATION.

X,Y: 313870, 234460



X,Y: 313584, 234290

X,Y: 313870, 234290



Important Safety Notice:

Damage to gas pipelines can result in serious injury or death. Gas network information is provided as a general guide. The exact location and depth of medium or low pressure distribution gas pipes must be verified on site by carrying out necessary investigations, including, for example, hand digging trial holes along the route of the pipe.
Service pipes are not generally shown but their presence should always be anticipated.

High pressure transmission pipelines are shown in red. If a transmission pipeline is identified within 10m of any intended excavations then work must not proceed before GNI has been consulted. The true location and depth of a transmission pipeline must be verified on site by a representative of GNI. Contact can be made through 1850 427 747.

All work in the vicinity of the gas network must be completed in accordance with the current edition of the Health & Safety Authority publication, Code of Practice For Avoiding Danger From Underground Services which is available from the Health and Safety Authority (1890 289 389) or can be downloaded at www.hsa.ie.

Legal Notice:

Gas Networks Ireland (GNI) and its affiliates, accept no responsibility for the accuracy of any information contained in this document including data concerning location and technical designation of the gas distribution and transmission network (the Information). The Information should not be relied on for accurate distance or depth of cover measurements.

Any representations and warranties, express or implied, are excluded to the fullest extent permitted by law. No liability shall be accepted for any loss or damage including, without limitation, direct, indirect or consequential loss, arising out of or in connection with the use or re-use of the Information.

Aurora Telecom Fibre Optic Cable
Aurora Telecom Duct
Aurora Telecom Sub-duct
Aurora Telecom Inserted Gas Pipe

Contact Aurora Telecom on 1850-427-399 or (01)203-0120.

Transmission Pipe (High Pressure)
Transmission Pipe (Construction Issue)
Distribution Pipe (Medium Pressure)
Distribution Pipe (Low Pressure)
Service Pipe (Medium Pressure)
Service Pipe (Low Pressure)
Strategic Pipe (Medium Pressure)
Strategic Pipe (Low Pressure)
Inserted Pipe (Medium Pressure)
Inserted Pipe (Low Pressure)
Distribution Pipe (Abandoned)

.C=? Cover (depth in meters)
CP Test Point
End Cap
Hot Tap
Installation
Valve
Mains Verification **
Pressure Monitor
Protection (Sleeve)
Protection (Slabbing)
Reducer
Service Terminator
Tee
Transition

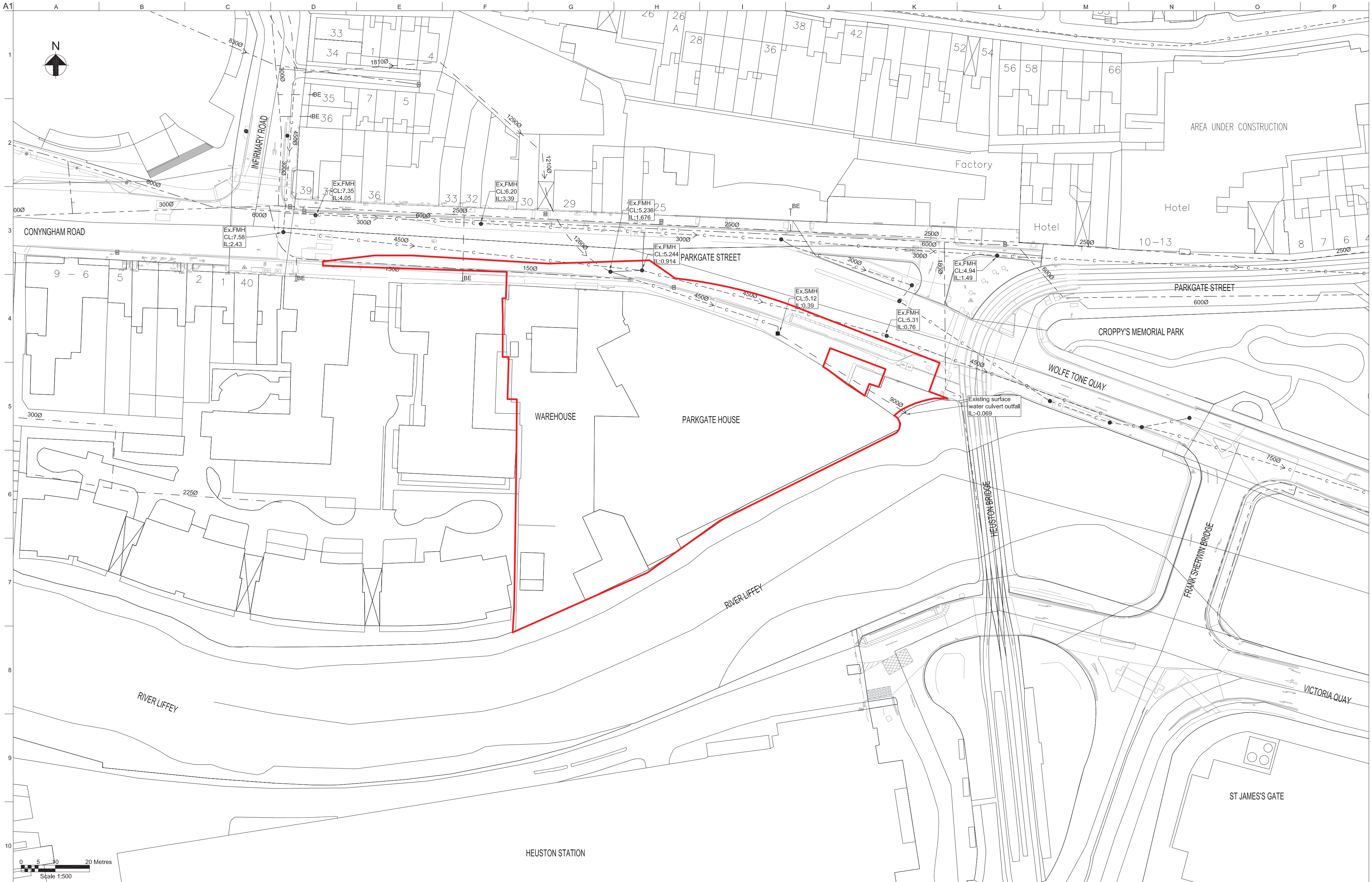
** Please contact GNI on 1850-427747 for specific information.

Design Department - CORK

Gas Networks Ireland

GAS NETWORK INFORMATION

Issue: IN2	
Location: 42A Parkgate St, Phoenix Park, D8	
Plot Date: 11/12/2018	Contact: S O' Brien
Plotted by: KOC	Scale: 1:1000



Legend

Existing Watermain	Hydrant
Existing Surface Sewer	Ex. SMH
Existing Combined Sewer	Ex. FMH
Site Boundary Line	

P01	27/05/19	MC	AB	KD
	Issued for Information			
Rev	Date	By	Chkd	Appd

ARUP

Arup, 50 Ringsend Road
Dublin, D04 T6X0
www.arup.ie
Tel +353(0)1 233 4455 Fax +353(0)1 668 3169

Client
Chartered Land

Project Title
Parkgate Street Redevelopment

Drawing Title
Existing Drainage and Watermain Site Plan Layout

Scale at A1	1:500
Role	Civil
Suitability	S2 - Suitable for Information
Arup Job No	265381-00
Rev	P01
Name	C001

Do not scale

Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Appendix 19.2: ISM Telecommunications Site Analysis

265381-00

ARUP

66 Camden Street Lower, Dublin 2 Ireland D02X201
: +353 (0)1 905 8800 : info@ismireland.com
: www.ismireland.com

iSM INDEPENDENT SITE MANAGEMENT

Joseph O'Mahony BSc Arch Tech
Project Manager
Lafferty
Dundrum Town Centre
Sandyford Road
Dundrum
Dublin · D16 A4W6

By email 07 January 2020

Cc:

RE: An Bord Pleanála – Submission Parkgate Street Development

Dear Sirs,

It has been requested that Independent Site Management ('ISM'), in its capacity as a specialist property telecom consultant, acting on behalf of Ruirside Developments Limited ('RDL'), review and asses the proposal being made by RDL within it's submission to An Bord Pleanála ('ABP'), that it allows for the retention of important telecommunication channels such as microwave links.

ISM has reviewed both the proposed development by RDL, (hereinafter referred to as "Parkgate Street"), and the immediate surrounding registered and documented telecommunication sites, and based on the aforementioned information, can conclude that the height and scale being sought by RDL for the Parkgate Street development, will have an impact on a current microwave telecommunication channel.

Notwithstanding, the proposed development is being designed, employing ISM's background and specialty in this area, with specific intent to be in a position to mitigate any such disruption to these telecommunication channels as well as with any unknown, or future telecommunication channels.

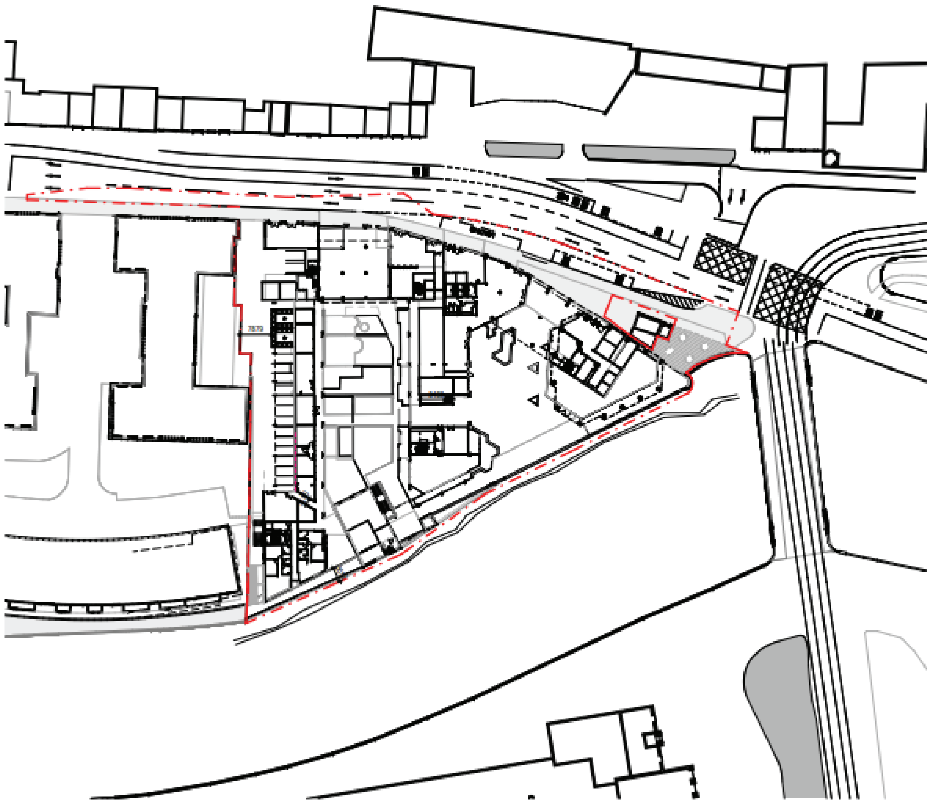
ABP should note that the closest multiple telecommunication operator site located at the Guinness Flaking Plant (112 James Street, Dublin 8), is currently managed by ISM and it has installed mobile base station sites for Three Ireland, Vodafone Ireland, & Eir. The building itself has ample capacity and willingness to provide mitigating infrastructure in the unlikely event that the measures being made in the design for Parkgate Street, be insufficient in any regard.

PARKGATE STREET DEVELOPMENT – 42A PARKGATE STREET, DUBLIN 8

The development is a mixed use residential and commercial scheme comprising build to rent residential units with associated residential amenities and facilities, commercial office and café/ restaurant floor space. A new public square is provided, along with a public riverside walk and private amenity courtyard. 481 no. residential units with 3698 sqm commercial office space, 214 sqm retail and 444 sqm café/ restaurant space is proposed. The development will be characterised by a landmark 29 storey tower on the eastern corner of the site. The Site Coverage of the proposed development is approximately 42% (based upon entire site area), and the Plot Ratio of the proposed development is 5.8. The new development elements will range in height from 8 to 29 storeys, with each block in the development broken down as follows:

- **Block A:** 29 storeys. Comprising café/restaurant, retail and resident's amenity at ground floor and mezzanine level, 160 No. residential units from first floor to 27th floor inclusive.
- **Block B1:** 8 – 13 storeys. Comprising café/ restaurant at ground floor level, resident's amenity areas and 141 No. residential units, from mezzanine level to 11th storey inclusive.
- **Block C1 / C2 and C3:** 8-11 storeys. 180 No. residential units, from mezzanine level to 9th storey inclusive.

Site Map



FINDINGS

ISM has identified 2 No. telecommunication channels that will potentially be effected by the height and scale of the Parkgate Street Development. Both are microwave link dishes installed by both Three and Vodafone on the Criminal Court of Justice to serve their indoor mobile solutions.

The impact of the development on the aforementioned microwave link dishes will likely occur during the construction period. At this stage in the development process, Vodafone and Three will re-align the identified microwave links to new hop sites. In the unlikely event that Parkgate Street continues to impact on existing or new microwave channels, RDL is committed to assisting in mitigating the issues as illustrated in the appendices accompanying this document.

INDEPENDENT SITE MANAGEMENT

ISM is a specialised property consultant and asset manager that provides telecommunication consultancy and services to developers and property owners. ISM works closely with all providers of wireless and fixed line telecommunication services to bridge their infrastructure requirements with that of private and public development. ISM has successfully been providing this service in Ireland for the past 20 years.

ISM has set out a brief explanation of our analysis in Appendices attached hereto.

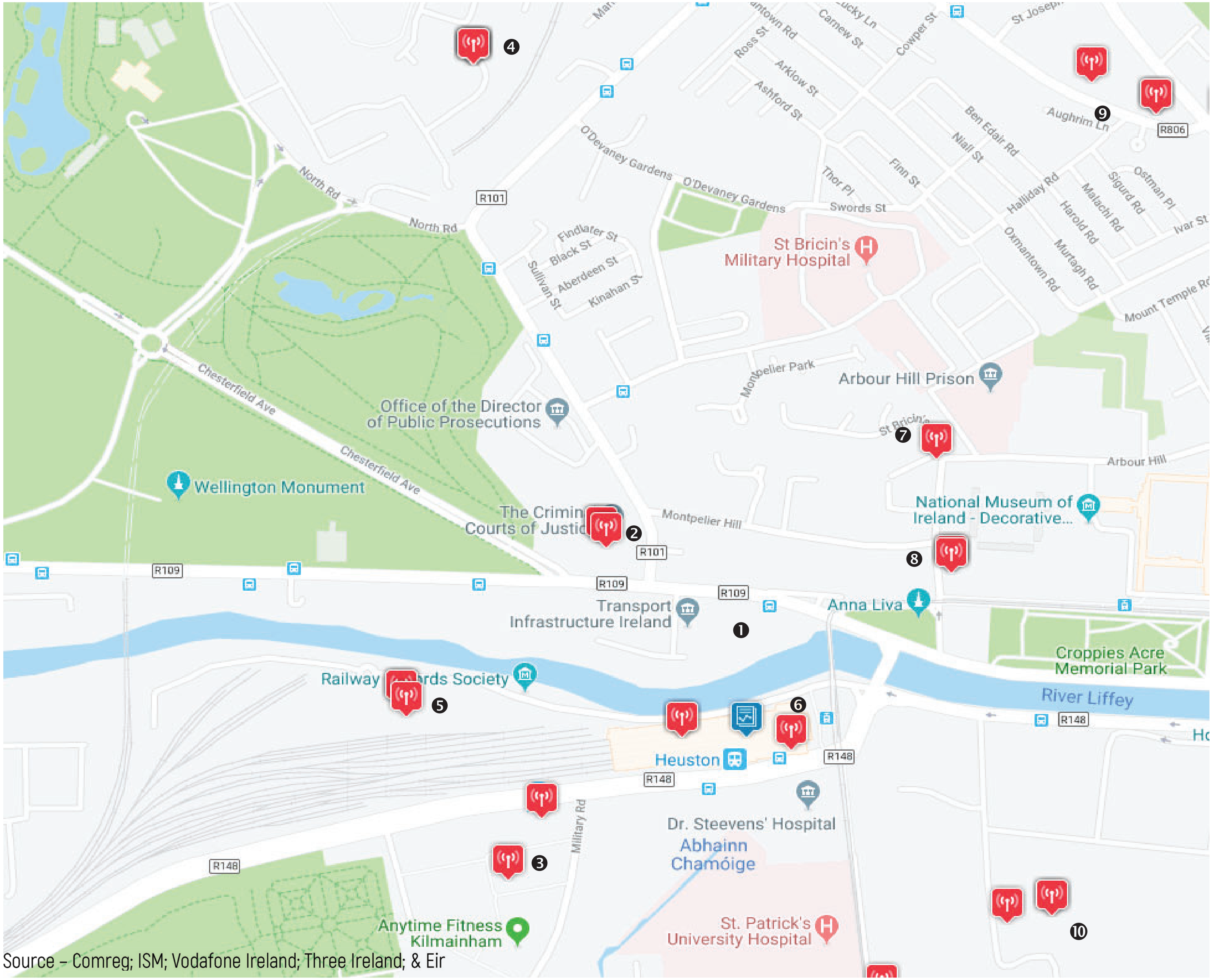
Encl. Appendices Figure 1 Figure 2 Figure 3

Yours Faithfully,

Christopher Plockelman
Independent Site Management Limited
✉: christopher@ismireland.com
: +353 (0)86 600 4697

Figure 1

Area Telecommunication Site Analysis



Source – Comreg; ISM; Vodafone Ireland; Three Ireland; & Eir

Note
All Dimensions to be checked on site
No Dimensions to be scaled from this Drawing
This drawing to be read with relevant Consultant Drawings

1. Proposed Development
2. Criminal Justice
3. Eir HQ
4. Garda Headquarters
5. Irish Rail
6. Heuston Station
7. Arbour Terrace
8. Temple Street West
9. Motor Parts
10. Guinness Flaking Plant

FINAL

iSM INDEPENDENT SITE MANAGEMENT

66 Camden Street Lower
Dublin 2, Ireland D02 X201
☎ +353 1 905 8800
✉ info@ismireland.com

Client
Ruirside Developments Limited

Project
Parkgate Street

Option	1
Date	07/01/2020
File Name	Parkgate Street

Drawing:

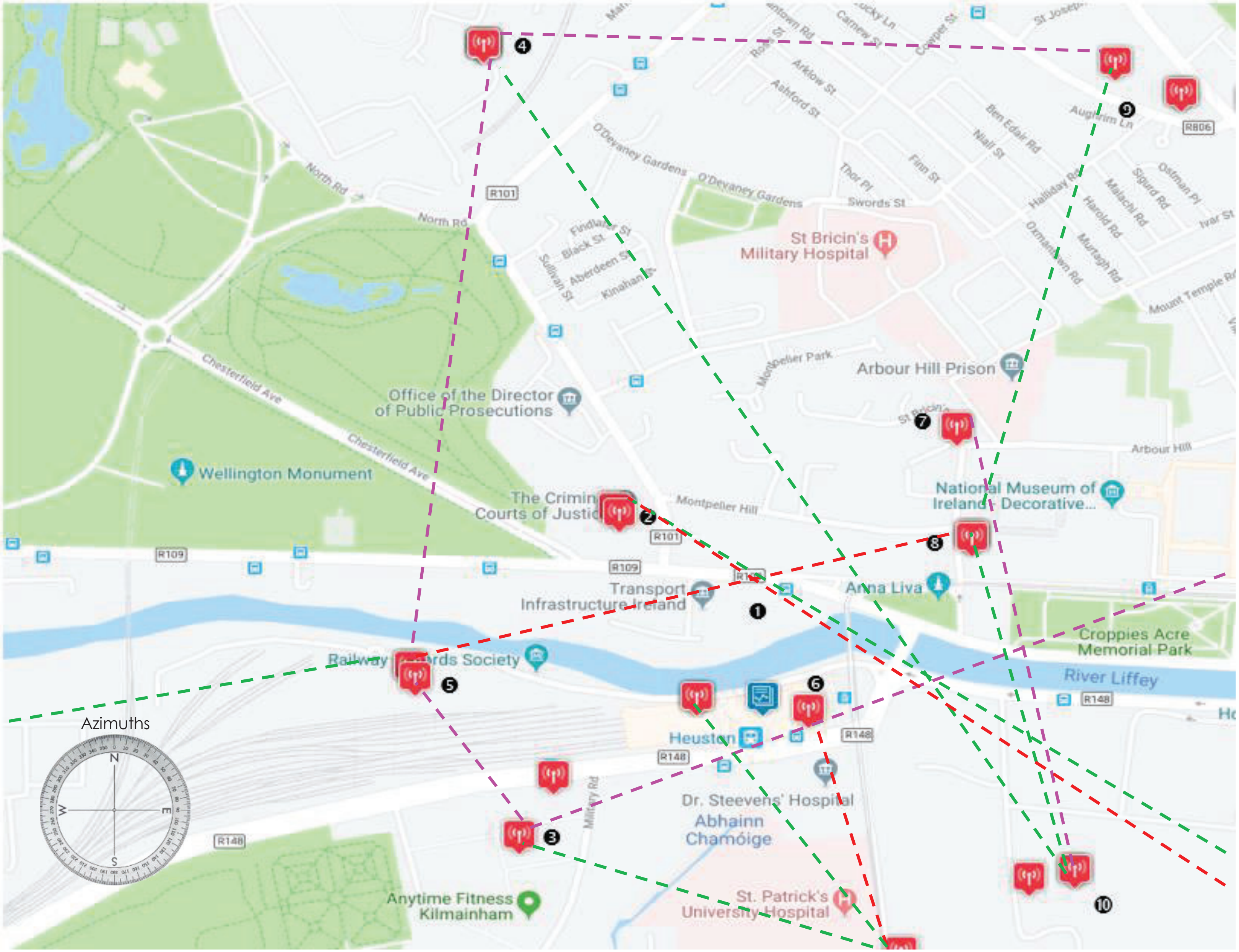
Area Site Analysis

Building	Drawing No.	Zone	Rev
SPN	J 0910		1

Figure 2

Transmission Link Analysis

Source – Comreg; ISM; Vodafone Ireland; Three Ireland; & Eir



Note
All Dimensions to be checked on site
No Dimensions to be scaled from this Drawing
This drawing to be read with relevant Consultant Drawings

---- Three Transmission Link
---- Vodafone Transmission Link
---- Eir Transmission Link

FINAL

iSM INDEPENDENT SITE MANAGEMENT
66 Camden Street Lower
Dublin 2, Ireland D02 X201
☎ +353 1 905 8800
✉ info@ismireland.com

Client
Ruirside Developments Limited

Project
Parkgate Street

Option	1
Date	07/01/2020
File Name	Parkgate Street

Drawing:

Link Analysis

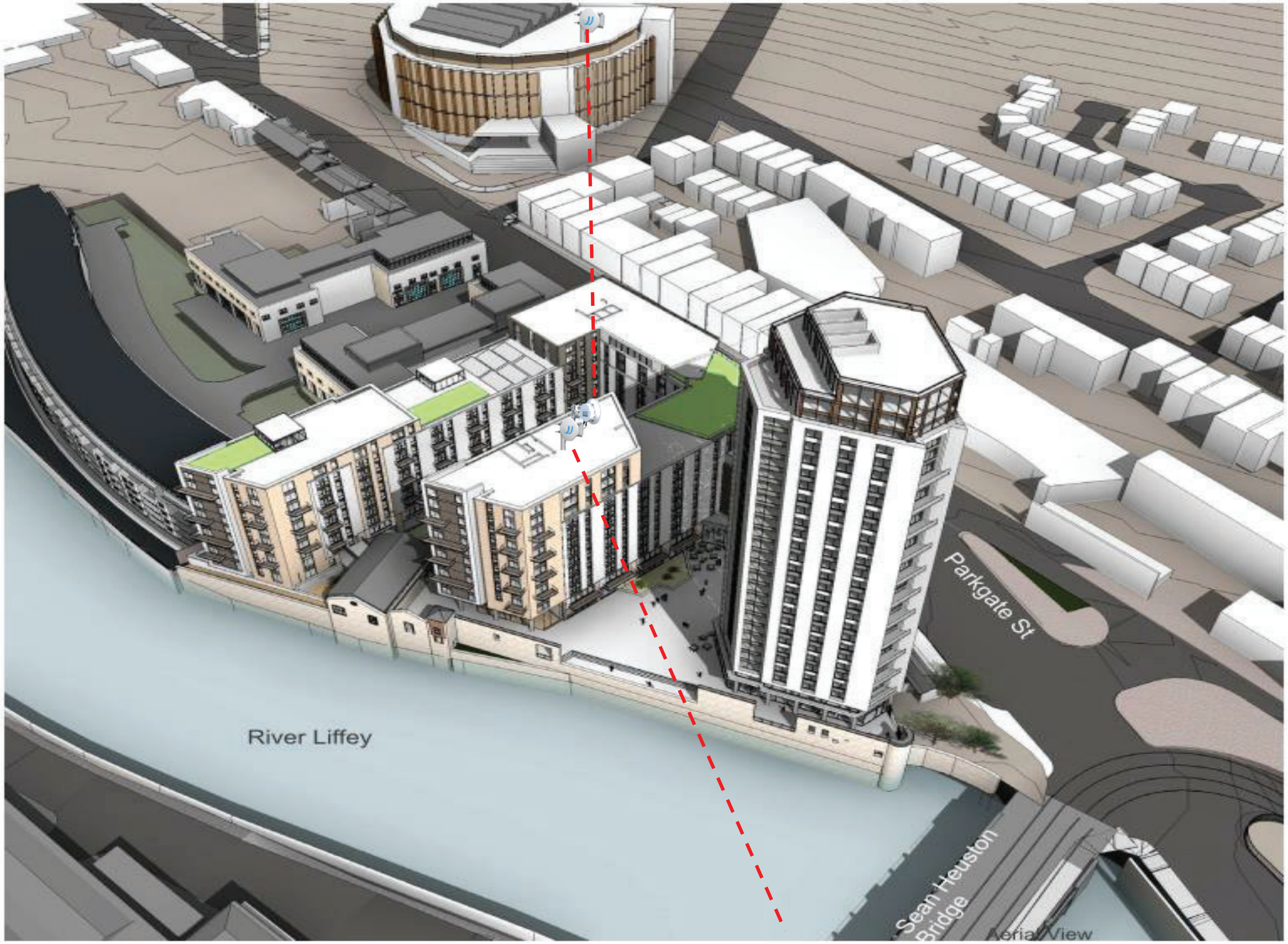
Building	Drawing No.	Zone	Rev
	J 0910		1

Figure 3

Mitigating Measures

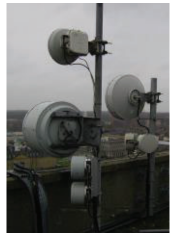
EXAMPLE

The building will be designed so that in the event that a microwave transmission link is required or obstructed by the elevation then the roof can support what is commonly referred to as a hop site. See below **example**.



Note
All Dimensions to be checked on site
No Dimensions to be scaled from this Drawing
This drawing to be read with relevant Consultant Drawings

Typical Installation



FINAL

iSM INDEPENDENT SITE MANAGEMENT

66 Camden Street Lower
Dublin 2, Ireland D02 X201
☎ +353 1 905 8800
✉ info@ismireland.com

Client
Ruirside Developments Limited

Project
Parkgate Street

Option	1
Date	07/01/2020
File Name	Parkgate Steet

Drawing:

Mitigation Measures

Building	Drawing No.	Zone	Rev
	J 0910		1

Ruirside Developments Limited
Environmental Impact Assessment Report | January 2020

42A Parkgate Street, Dublin 8

Appendix 21.1: Proposed & Permitted Developments in the Local Area

265381-00

ARUP

Table of Proposed and Permitted Developments in the Local Area.

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
1	Atlas GP Ltd	Grand Canal Harbour, Grand Canal Place, Dublin 8	3209/19		The proposed development will supersede the previously permitted development, Reg. Ref. 3855/09, which provided for the demolition of existing structures on site (total GFA of 9,330sq m); retention, renovation, refurbishment and extension of the protected structure (RPS No. 3275) as part of a mixed-use development in six blocks, over basement. Similarly, the proposed development will consist of a mixed-use development in five blocks, over basement. Block 3/4 shall divide into two blocks at upper levels. The residential component shall be 'Build to Rent' scheme of 550 no. residential units with associated resident support facilities and resident services and amenities. Of the 550 no. residential units, 428 no. will be one-bedroom units and 122 no. two bedroom units. Other uses (7,289sq m) within the proposed development shall be retail, medical, cafes, restaurant, childcare facility and co-working spaces. The proposed development will provide for a water feature to the south of the protected structure to represent the historic use of Grand Canal Harbour. Building height shall range from three storeys to thirteen storeys. Communal terraces, roof gardens shall be provided at roof level on Block 1, Block 2, Block 3/4 and Block 6. Balconies will be provided on all external elevations, save for Block 5 where the protected structure is located. Basement: the basement will be reduced in size from the permitted 8,149sq m to 5,572sq m with water attenuation tank as proposed. The basement will include 50 no. car parking spaces, 737 no. cycle parking spaces, and associated repair areas, plant and services, bin storage, waste compactor and other storage areas for residents' support facilities. Block 1: shall provide for a 696sq m retail unit, a cafe of 144sq m, ESB substation and switch room, and 84 sqm of residents' support services at ground floor to 126 no. residential units. The block shall be 11 storeys, with maximum parapet height of 57.10mOD. A communal roof garden for residents shall be provide along with an internal atrium feature and a semi open winter garden.	Application received June 2019 Additional Information Requested August 2019

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					Block 2: shall provide for residents' amenities (1,187sq m), childcare facility (224sq m) with dedicated outdoor space of 123sq m, ESB substation and switch room, and 2 no. lobby entrances to 170 no. residential units. The block shall be 11 storeys with a maximum parapet height of 59.4mOD. At the 8th & 9th floors, the floor area is reduced to provide for communal terraces. A communal roof garden for residents shall be provided above the 11th storey with a semi open winter garden. Block 3/4: shall provide for a restaurant (454sq m), 157sqm of retail/non-retail service, ESB substation and switch room, and two no. lobbies providing access to 133 residential units at ground floor, 1,707sqm of office space at ground and first floor. At 6th floor, the floorplate reduces to allow 2 smaller footprint blocks to emerge. Block 3 shall continue to 9 storeys while Block 4 shall continue to 13 storeys, with maximum height of 64.08mOD. Communal roof gardens for residents will be accessed from floor 6,9, and above the final storey. A semi open winter garden will be provided on the roof of Block 4. Block 5: works to an existing four-storey warehouse building (c.1396sq m), a protected structure (RPS no. 3275), including the demolition of an existing single storey structure (c.255sq m) adjoining the building to the west & the removal of 6 no. dormer roof windows, metal bars to first floor window opes on north and south elevations, roller shutter door on north elevation, 1 no. window ope on north elevation, all internal stairs & the reinstatement of window opes on north, south and west elevations & the alteration of roof rafters & the refurbishment of external and internal stone/brick work, internal timber floors, internal timber doors and structural steelwork & the refurbishment/ replacement of slate roof finishes, roof vents, eaves rail guardings, rainwater goods, windows & the re-positioning of internal timber hoppers & the addition of 10no. roof dormer windows, 3 no. new window opes on north elevation and 4 no. new window opes on south elevation, 1 no. stair/lift core, 2 no. new entrances on north elevation including the excavation of the entire ground floor, new floor plate to section of second floor level (c.181sq m), new internal partition walls, new door opes to internal stone/brick work walls & the construction of 1 no. new three-storey extension (c.698sq m) adjoining the building to the west.	

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					The building will have a total gross floor area of c.2277sqm and will provide 1 no. retail unit (c.154sq m), 1 no. cafe unit (c.215sq m), 1 no. co-working office unit (c.1,376sq m) and 1 no. medical centre (c.532sq m). Block 6: shall provide for the basement access ramp which runs underneath the building, resident support facility (104sq m) use, ESB substation and switch room, and two lobbies to residential units (111 no.) at ground floor. Medical use (1,630sqm) over ground and first floor, with apartments also to be provided at first floor. Apartments shall be provided for the rest of the building, which is seven storeys in total. A communal roof garden with semi open winter garden shall be provided for residents. The parapet height of Block 6 is 45.40 OD, with a corner at south at 46.075OD. Ancillary works, servicing and plant, pedestrian circulation, landscaping, cycle parking (118 at ground level to give a total of 855 spaces), vehicular set down, waste marshalling area, ventilation opes, and all associated site works. Total gross floor area of proposed redevelopment is 49,710sq m. An Environmental Impact Assessment Report and Natura Impact Statement will be submitted to the planning authority with the application and we be made available for inspection or purchase at a fee not exceeding the reasonable cost of making a copy at the offices of the Planning Authority.	
2	Balark Investments Ltd.	84-87 Prussia Street, Stoneybatter, Dublin 7	4035/16	PL29N.247939	Development at a 0.5 hectares site. The proposed development comprises of the demolition of the existing vacant single storey commercial building and the construction of a student accommodation development with 203 no. bed spaces in 32 no. student accommodation units. The proposed development comprises of the construction of a series of 1, 2, 3 and 4 storey buildings, including a 4-storey building (3 storey plus 4th storey set-back) fronting Prussia Street. The proposed development is proposed to be used for student accommodation or accommodation related to a Higher Education Institute only during the academic year and student accommodation or accommodation related to a Higher Education Institute or tourist/ visitor accommodation only during academic holiday periods.	Granted May 2017

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					The proposed development includes a number of outdoor amenity areas throughout the site to serve the student accommodation development. The proposed development also provides for ancillary services including a lounge, gym, concierge and social room all at ground floor level with laundry room, bin store area, plant room accommodated in a small basement area. 3 no. set-down/ drop-off car parking spaces are proposed, and 120 no. sheltered bicycle spaces are proposed at surface level. Access to the development is to be via controlled pedestrian access from Prussia Street with access for service vehicles also provided from Prussia Street. Permission is also sought for all ancillary engineering, landscaping and site development works necessary to facilitate the development, including the provision of an ESB substation. The proposed development comprises of a total of 4,778 sq m gross floorspace.	
3	Bartra Real Estate Ltd.	40-41 Stoneybatter, & 1-3 Blackhall Place, Dublin 7	3538/17	ABP-300466-17	The development comprising the construction of a seven storey/ four storey building consisting of a total 23 No. apartments, (6 No. 1 bedroom units; 14 No. 2 bedroom units 3 no. 3 bedroom units); with balconies (2no.) at first floor level; balconies (3 no.) at second and third floor levels; balconies (2no.) at fourth, fifth and sixth floor levels, all on the eastern elevation; ground floor terraces (3no.); balconies (3no.)at first, second and third floor levels, and balconies (2 no.) at fourth, fifth and sixth floor levels. all on the western elevation; a total of 24 no. bicycle spaces; a bin store; an area of communal open space (175m^2), including a play space, and associated site development works.	Granted October 2018
4	Board of Management, Canal Way Educate Together National School	Canal Way Educate Together, Basin View, Dublin, 8	3843/19		The development will consist of: 1) the demolition of the existing cycle shelter to the north of the site; 2) the provision of a new temporary, two storey prefabricated block - approx. 475sq m total area - comprising 6 no. mainstream classrooms, ancillary accommodation and sanitary facilities with obscured glazing to the windows on the first floor northern elevation;	Application received August 2019

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					3) the repositioning and widening of the entrance gates from Basin View and; 4) all associated site and drainage works.	
5	Board of St James's Hospital	St James's Hospital, James's Street, Dublin 8	2625/15		The development will consist of the construction of a two-storey building to the north of the approved Mercer's Institute for Successful Aging Building consisting of a pedestrian link to the Hospital 1 building and clinical facilities at ground floor and treatment facilities and offices at first floor as a replacement of the single storey link building previously approved under Register Reference 3607/12.	Granted July 2015
6	Board of St James's Hospital	St James's Hospital, James's Street, Dublin 8	2761/15		The development, within Courtyard 10, Phase 1C of the Main Hospital Block, will consist of the removal of a temporary storage unit and the erection of a modular building, comprising an Aseptic Compounding Unit facility 4.3m high, with ancillary office and storage facilities, an enclosed pedestrian corridor and lobby linking the proposed building to the hospital at two points, a cycle parking shelter and conversion of an existing store room 43sq m in area, at ground level, with all other site development works above and below ground required to facilitate the development. The proposed modular building will have an integrated plant room, 87sq m at its roof level giving a total building height of 7.95m and a total area of 357sq m.	Granted August 2015
7	Board of St James's Hospital	St James's Hospital, James's Street, Dublin 8	2787/15		Planning permission for development at the Haemophilia & Hepatology building in the southern part of the St James's Hospital site, James's Street, Dublin 8 bounded by the open space known as St James's Linear Park, parallel to St James's Walk to the south.	Granted August 2015

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					The development will consist of construction of a 575sq m additional floor on the building to accommodate the National Centre for Hereditary Coagulation Disorders Outpatient Clinic; the construction of a 26sq m fire escape stairs structure and an 11sq m. plant room on the roof of the proposed additional floor; and the incorporation of the approved terrace garden on the eastern elevation into the building to provide additional patient accommodation and associated alterations to the elevations including the blocking of openings and the insertion of new fenestration.	
8	Board of St James's Hospital	St James's Hospital, James's Street, Dublin 8	3069/15		The development will consist of the removal of an existing temporary building located along the northern elevation to the existing Central Pathology Laboratory building in the north eastern corner of the hospital site and the construction of a 467.5sq m two storey extension to the northern elevation to the building to provide laboratory and office accommodation at ground floor and offices and staff facilities at first floor; and all associated temporary works required to facilitate the development.	Granted September 2015
9	Board of St James's Hospital	St James's Hospital, James's Street, Dublin 8	3681/15		The development will consist of the erection of temporary modular buildings and structures on an existing car park in the eastern part of the hospital site to the south of Hospital 2 building and to the east of the National Plan for Radiation Oncology building for a temporary period of seven years comprising: i) a two storey building (1,330 sq. m.) containing a staff canteen and offices on the ground and administrative offices on the first floor; ii) a single storey building (246sq.m) providing out-patient facilities; and iii) a pedestrian corridor (50sq.m) to link to other departments on the hospital campus.	Granted January 2016

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
10	Conneely Construction (New Road) Limited	18 Old Kilmainham, Dublin 8	4005/19		The proposed development will consist of: (i) demolition of existing two storey building fronting Old Kilmainham and double storey offices and sheds to the rear; (ii) construction of a new part six part eight storey apartment building comprising 1 no. commercial unit at ground floor level (56.3sq m) and 28 no. apartments (3 no. one bedroom, 22 no. two-bedroom and 3 no. three-bedroom) fronting Old Kilmainham and developed around an internal courtyard. The apartment building is set back from Old Kilmainham at upper floor levels. Apartments are provided with private balconies and access to 2 no. communal roof terraces, communal landscaped courtyard and bicycle parking area; and (iii) landscaping, boundary treatments, SuDS drainage, infrastructural works and all ancillary works necessary to facilitate the development.	Application received September 2019 Decision due date November 2019
11	Co-operative Housing Ireland Society Ltd	84 North King Street & North Brunswick Street, Dublin 7	3163/16	PL29N.247811	The development will consist of the removal of all existing buildings on the site, and the construction of a commercial unit and 33 apartments in 2 buildings; Block A facing onto North Brunswick Street is a 6-storey building including a recessed penthouse floor, and comprises 17 apartments; and Bock B facing onto North King Street is a 5-storey building, including a recessed penthouse floor, and comprises 16 apartments and 1 commercial unit. The overall development comprises 4 no. 3-bedroomed units, 18 no. 2-bedroomed units, 11 one-bedroomed units, all with balconies, one ground-floor commercial unit, bin store, internal landscaped courtyard, photovoltaic solar panels on support grids on roofs, and all associated site works.	Granted May 2017
12	Coras Iompair Eireann (CIE)	Heuston Station, Saint John's Road West, Islandbridge, Dublin 8	3711/16		PROTECTED STRUCTURE: The development will consist of construction of a new two storey demountable office building for CIE Group IT, the building will have a total area of 813sq m, the ground and first floor each of 400sq m with access to screened plant at roof level, associated ground works are also proposed in this application for planning permission for 5 years. The proposed structure is within the curtilage of Protected Structure RPS 7576.	Granted December 2016

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
13	CSD (Stoneybatter) Limited	20-23a Stoneybatter & 1-2a Manor Street, Stoneybatter, Dublin 7	4734/18	ABP-304715-19	Permission for development on a 2,160sqm site at No. 20 Stoneybatter and the lands to the rear of Nos. 20-23a Stoneybatter, and Nos. 1-2a Manor Street, Stoneybatter, Dublin 7. The development will consist of the demolition of all existing structures on site including No. 20 Stoneybatter (958.87sq m); and the construction of a part 3 No. storey to part 5 No. storey Student Accommodation development with staircases to roof gardens over, comprising a main block (3,735.2sq m) and a Gatehouse building at No. 20 Stoneybatter (187.7sq m) providing a total of 142 No. student accommodation bed spaces (3,922.9sq m). The 142 No. bed spaces are provided in (a) 19 No. cluster units comprising of 3 No. four bedroom clusters, 1 No. six bedroom cluster, 6 No. seven bedroom clusters and 9 No. eight bedroom clusters; (b) 4 No. studio units and (c) 6 No. bed spaces within the Gatehouse building. The development also proposes ancillary facilities including internal communal space; reception; office; roof terraces facing north, east, south and west; hard and soft landscaping; boundary treatments; upgraded vehicular access; pedestrian access; bicycle parking; signage; lighting; plant; sub-station and switch room, bin store and all associated works above and below ground.	Granted July 2019
14	Danny O'Malley	10 Usher's Island & 32 Island Street, Dublin 8	3503/16	PL29S.247837	The proposed development consists of demolition of existing structures comprising disused buildings and sheds, construction of 10 x 2 bedroom apartments with balconies in two 6 storey blocks with associated facilities at ground floor including: 10 storage rooms with cycle parking, communal facilities, caretaker's room bin storage, plant & service rooms, service connections and a raised courtyard garden at 1st floor level, services enclosures on roofs, landscaping, railings and all associated site works.	Granted May 2017

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
15	Derek Beahan Ltd.	23-25 Old Kilmainham Road, Dublin 8	3188/17	ABP-300972-18	Demolition of existing buildings on site construction of a 26 no. unit apartment development in two blocks over basement car park, with 26 no. car parking spaces and 26 no. bicycle parking spaces, as follows : Block A facing onto Old Kilmainham being 5 storeys with the uppermost storey set back, with projecting and recessed balconies, containing 17 no. Apartments - 3 no. x 1 bed units, 12 no. x 2 bed units, and 2 no. x 3 bed units; Block B situated across an internal landscaped courtyard and overlooking the river Camac, being 4 storeys with the uppermost storey set back , with recessed balconies, containing 9 no. apartments - 1 no. x 1 bed unit, 5 no. x 2 bed units and 3 no. x 3 bed units; vehicular access to ramp at location of existing site entrance; associated landscaping and site works.	Granted September 2018
16	Diageo Ireland	Guinness Brewery Lands, Saint James's Gate Brewery, Dublin 8	2628/16		Development at the new Guinness Brewhouse Building, Victoria Quay, Dublin 8. The subject site is bound by Victoria Quay to the north and existing brewery areas to the south, east and west. The proposed development will consist of two no. grain storage silos (60 tonne capacity each) contained within a cladded enclosure (including stairs for maintenance purposes) providing approximately 51 sq. m in total floor area. The proposed development is functionally linked to existing grain silos contained within the existing Raw Materials Handling (RMH) Tower- Planning Reference 3730/11- facing Victoria Quay. The proposed cladded enclosure is 16.1 m in height above external ground level (20.34mOD.) including associated site works. The proposed development relates to an existing brewery operation approved under Diageo Ireland's existing IE (Industrial Emissions) Licence (Ref. No. P0301-04). The proposed development does not increase the output capacity of the brewery.	Granted July 2016
17	Diageo Ireland	Guinness Power House Building,	2504/17		Permission for change of use (from former Guinness Power House to Distillery including Visitor experience) of the Guinness Power House Building James's Street, Dublin 8 at lower ground, upper ground and 1st floor levels of the existing building.	Granted June 2017

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
		James's Street, Dublin 8			The proposed development includes a cladded extension at 1st floor level (concealed to James's Street by existing brick parapet) the proposed cladded enclosure is 8.06m in height above external ground level (21.37mOD) and shall accommodate staff facilities and provide a double height space for tall vessels (to be located below at upper ground level), new visitor entrance (upper ground level) and 3 no. new windows at 1st floor level to east facing facade, minor alterations to south and west facing facades including 1 no. new doorway (south facade), 1 no. new doorway (west facade), removal of existing steel flue from roof level, external bollard lights and up-lighting to existing facades, new vehicle set-down area fronting James's Street, hard and soft landscaping, 2 no. disabled parking spaces and associated site works including drainage works, demolition of existing sheds in delivery service yard to north of building and the installation of 2 no. external vessels (approximately 4 metres in height). The proposed visitor Experience shall be composed of the following elements: reception/ticketing, exhibition area, guided tour over process (distillery area), tasting bar retail area and support facilities all to be located at upper ground and first floor levels - the total internal area of the proposed development is approximately 3,133m^2. The proposed development is located within a site which has an approved IE (Industrial Emissions) Licence (Ref No. P0301 - 04).	
18	Diageo Ireland	Guinness Flavour Extract Plant 2, Bellevue & Crane Street, Dublin 8	3634/17		Planning permission for development at the Guinness Flavour Extract Plant 2 (known as GFE2), Bellevue and Crane Street, Dublin 8, which is part of the existing Guinness Brewery lands to the south of James's Street, Dublin 8. The subject site is bound by existing brewery buildings/areas to the north, Bellevue to the south, Crane Street/ Bellevue to the east and existing brewery buildings/areas (including Vat House 9) to the west. The proposed development will consist of the demolition (to ground level) of the following buildings, structures, elements and associated services which comprise GFE2 and the provision of associated remedial works as follows:	Granted November 2017

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					• The 1 storey Main Fermentation Building (approx. 810sq m) and its 23 no. associated storage tanks (overall height of approx. 20.4m), • The 2 storey office building (approx. 1,060sq m, overall height of approx. 11m) to the west of the Main Fermentation Building, • A 1 storey Clean in Place (CIP) building (approx. 330sq m, overall height of approx. 9m), A 1 storey chemical tank store (approx. 92sq m, overall height of approx. 9m) to the west of the CIP building, • A 1 storey store (approx. 50sq m, overall height of approx. 4.7m) to the south of the Drumstore, • A 1 storey Drumstore (approx. 280sq m, overall height of approx. 5.5m) and the associated elevated pipe rack along the facade of VAT House 9 connected to the workshop building (and the making good of the building facade following removal), • The external canopy and associated supports to the east of the parlour building, • An elevated link bridge across Rainsford Street (between the Parlour Building and VAT House 4) (following removal the making good of the points of contact with both buildings), • The propping of the southern boundary wall of the site following removal of the CIP building and the chemical tanks, and • Associated reinstatement works, drainage modifications and all associated site development works on a site of approx. 0.3316 ha. The application related to development which is for the purpose of an activity within the scope of Diageo's existing IE (Industrial emissions) Licence (Ref. No. P0301-04), formerly known as an Integrated Pollution Prevention Control Licence (IPPC Licence). The proposed development does not increase the output capacity of the brewery.	

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					The Guinness Brewery lands contain Protected Structures, the proposed development does not comprise works to any Protected Structure.	
19	Diageo Ireland	Guinness Flavour Extract Plant 1, Grand Canal Place & Pim Street, Dublin 8	3635/17		The subject site is bound by existing brewery buildings/area to the north, Portland Street West /the Guinness Storehouse (a Protected Structure) and its yard to the south, existing brewery buildings/areas to the east and west. The proposed development will consist of the demolition of the following buildings, structures, elements and all associated services which comprise GFE1 and the provision of associated remedial works as follows: The 1 to 3 storeys main GFE1 buildings (Phase 1 and Phase 2) (approx. 2150sq m) its 13 no. associated storage tanks and structures (overall height approx. 18.5m, approx. 20.30 OD). This is to be demolished to basement level, which will be backfilled and surfaced to existing yard level. A safety barrier/hand rail (overall height of approx. 1.2m) is proposed at the northern and eastern perimeter of the backfilled basement area, 2 elevated link structures connecting the main GFE1 building and the old Brew house building to the north and east, Services and brackets fixed to the southern facade of the old Brew house (north of the main GFE1 1 building) and the making good of the connection points at this facade, External plant and tank areas to the north west and west of the main GFE1 building and to the north east of Gate 59c The elevated pipe rack pipe work and support located to the west of the main GFE 1 building and to the north of Gate 4 , Supporting and making good of the exposed edge of the section of wall along Portland Street West following removal of the main GFE 1 building, and Associated reinstatement works, drainage modifications and all associated site development works on a site of approx. 0.2355 ha The application relates to development which is for the purpose of an activity within the scope of Diageo's existing IE (industrial Emissions)Licence (Ref. No.P0301-04), Formally known as an Integral Pollution Prevention Control Licence (IPPC Licence)The proposed development does not increase the output capacity of the brewery.	Granted November 2017

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					The Guinness brewery lands contain Protected Structure, the proposed development does not comprise work to any protected structure.	
20	Diageo Ireland	Guinness Brewery Lands, James's Street, Dublin 8	3818/18		The subject site is within the Guinness Brewery Lands to the North of James's Street. Bounded by Victoria Quay to the north, Watling Street to the east, Steven's Lane to the west and James's St. to the south; Saint James's Gate Brewery, Dublin 8. The development will consist of: Application for Permission for the demolition of the existing single storey industrial-use building knows as the Return Beer (RB) Stores Building (1,055m^2) including all internal structures. Overall height approx. 11.9m, (approx. 17.45 OD). The building is to be demolished to ground level, which will be backfilled and surfaced to match existing surrounding yard level. The proposed development is located within a site which has an approved IE (Industrial Emissions) Licence (Ref No. P0301-04).	Granted November 2018
21	Diageo Ireland		2313/19	ABP-304474-19	Planning permission for a 2-storey extension over the existing 3 storey Guinness Enterprise Centre, consisting of 3,735m^2 of incubator and co- working space, including the provision of an external stairs and passenger lift and all ancillary site works for the Guinness Enterprise Centre, Taylor's Lane, Dublin 8.	Granted August 2019
22	Digital Hub Development Agency	1 Crane Street & 7-8 Thomas Street, Dublin 8	3770/14		Change of use from former use residential/retail use to office, commercial and retail, cafe/restaurant use of three Protected Structures at 1 Crane Street, 7 Thomas Street and 8 Thomas Street, Dublin 8. The associated development works will consist of: 1. 3 storeys over basement infill extension to the rear of 7 and 8 Thomas Street providing inter connection at each floor level between 7 and 8 Thomas Street and 1 Crane Street requiring provision of new openings and alteration of existing window openings in external walls.	Granted March 2015

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					2. Enlarging existing external open basement area to rear of 1 Crane Street. 3. Provision of new basement within 2 storeys return to 7 Thomas Street. 4. Provision of new basement within rear of 8 Thomas Street and new connecting stair and platform lift between ground and basement level. 5. Pointing renewal works to all external facades. 6. Demolition and provision of new boundary wall to 9 Thomas Street. 7. Removal of boundary wall between 7 & 8 Thomas Street. 8. Repair and alteration of existing shop fronts and fascia signage. 9. Lowering of extant basement floor levels with provision of new floor within 1 Crane Street, 7 Thomas Street and 8 Thomas Street. 10. Lowering of ground floor level with 1 Crane Street. 11. Unblocking of in-filled openings onto Crane Street within 7 Thomas Street. 12. Provision of new entrance opening onto Crane Street within rear return to 7 Thomas Street. 13. Provision of new opening connections between 7 and 8 Thomas Street at each level. 14. Removal of extant stair from ground level to second floor level within 8 Thomas Street. 15. Modifications and alterations to internal openings within 7 Thomas Street and 8 Thomas Street. 16. Renewal of basement stair within 7 Thomas Street. 17. Removal of intermediate floor within 2 storeys return to 7 Thomas Street. 18. Modification and alterations to existing roof to 2 storeys return to 7 Thomas Street.	

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					19. Alterations to rear wall to two storeys return to 7 Thomas Street. 20. Removal of stair within 1 Crane Street at basement level. 21. Removal of cross wall within 1 Crane Street at ground, first and second floor level. 22. Reordering of layout at basement level within 8 Thomas Street to provide sanitary facilities. 23. Reordering of layout at basement level within 1 Crane Street to provide sanitary facilities. 24. Fabric upgrade work. 25. Integration of electrical and mechanical services and provision of riser ducts within 1 Crane Street and 8 Thomas Street. 26. Associated site ancillary works.	
23	Dr Pearse Lyons	121-124 James's Street, Dublin 8	3213/14		PROTECTED STRUCTURE: Development of a micro distillery and a visitor centre at a site of c.0.164 ha at Nos. 121 - 124 James's Street, Dublin 8. Part of the site (Nos. 121 - 122 James's Street) is occupied by the former St. James's (Church of Ireland) Church, which is a Protected Structure (Ref. 4053), including the front entrance gates, railings and gate piers. (The boundary walls to the adjoining graveyard (located outside the application site) are also a Protected Structure. The remainder of the site (Nos. 123 - 124 James's Street) is occupied by a two-storey building (which is not a Protected Structure). Nos. 121 - 122 James's Street, the former St. James's Church: The development will consist of the refurbishment and adaptive reuse of the former church (c. 740sq m) (most recently in use as a lighting showroom and warehouse), as a micro distillery and visitor centre (c. 491sq m) (including a	Granted January 2015

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					tasting area; exhibition and merchandise area (including sale of whiskey for consumption off the premises); distillation equipment; plant; ancillary staff and storage facilities. The works include the construction of a glass spire to match the proportions of the original spire (maximum height of 36.3m above ground level) requiring the removal of non-original lead flashing covering the top of the remaining portion of the spire. Removal of non-original internal fabric of the former church including: internal walls; glazed internal lobby; doors and joinery; floors, ceilings and associated structural steelwork; internal stairs; ducts; pipes and plaster. Removal of non-original material including structural supports and panelling around the gallery and modesty screen, to reveal the remaining original fabric. Restoration of the original gallery structure and modesty screen. Construction of a new cast iron column, to match original existing column on the ground floor to support the gallery above. Removal of non-original concrete ramp to west of the former church, restoration of stone steps and provision of new removable ramp. Removable of modern infill from the stone buttresses and, where required, application of new limestone. Removal of concrete block infill from original windows. Repair or, if required, replace stone tracery and leaded glass. Repair external timber doors where possible and remove modern additions. Restore and clean stone exterior of former church, including: walls, dressings, tracery, finials and internal stone stairs cases. Repair or, if required, replace: roof slates, flashing, ridge pieces and rainwater goods. Application of new lime plaster to internal walls. Internal timber trusses to be cleaned and decorated. Construction of new first floor structure (c. 12sq m) in the Vestry roof to accommodate plant. Construction of new stone ground floor above the existing non-original floor slab and a new raised stone floor in the Chancel and South Transept to accommodate services below. Construction of new air handling ducting suspended beneath existing trusses and new c. 600mm diameter opes in internal walls (between the Chancel and the Vestry) to accommodate same. Construction of 2 no. new c. 600mm diameter opes in the Vestry roof to accommodate air extract exhausts with cowls (c.	

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					600mm and 1500mm above roof level); 1 no. new c. 800mm diameter ope to north facade for air intake duct; and 2 no. new c. 300mm diameter opes in southern facade to allow for grain intake and spent grain extract. Demolition of the existing single storey, partially sunken plant enclosure abutting the northeast walls of the former church (c.12sq m) and the construction in its place of a 2-level plant enclosure (c. 58sq m across two levels) and internal and external access ladders. Construction of a single storey barrel filling room (c. 11sq m) abutting the east wall of the Vestry., including new sump. Relocation of electrical meter to the Vestry. Construction of a detached, screened single storey enclosure for coolers (c. 15 sq. m) located to the south-east of the former church. Remove the oil tank located to the northwest of the former church and demolish the associated walls. The development also consists of the removal of non-original fabric across the site including: internal site fencing and gates; signage; tarmac; modern external light fittings and lamp standards; modern dwarf walls around graves. Railings; Front Entrance Gates; Gate Piers; the development will consist of the repair (and where necessary replacement) and painting of the railings at the front of the site. Removal of the modern gate and its replacement with an automated inward opening gate, to match the railings. Removal of modern light fittings from railings. Repair and clean stone wall, plinth, coping and gate piers. Nos. 123 - 124 James's Street: - The development will consist of the demolition of the existing two storey building (c. 134sq m) (including a ground floor commercial unit and a first floor residential apartment (c. 60sq m); and the construction of a part-four, part-five storey visitor centre including: reception, exhibition space, ancillary visitor and staff facilities, and ancillary offices (c. 331sq m). The development will also consist of: all hard and soft landscaping, including soakaways, changes to levels, signage; external lighting; seating; and all associated development above and below ground.	

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
24	Dr Pearse Lyons	121-125 James's Street, Dublin 8	3690/15	PL29S.245886	PROTECTED STRUCTURE: Planning permission for development of a Visitor Centre, associated with the adjoining previously permitted micro distillery, at a site of approximately 0.0484 ha, at Nos. 121-125 James's Street, Dublin 8, Eircodes D08 ET27; D08 T284; and D08 R2C3. (No. 125 James's Street includes a rear yard formerly known as Lamb's Court.) The application site includes a part of the graveyard and graveyard boundary wall associated with the former St James's (Church of Ireland) Church, Nos. 121 - 122 James's Street, which is a Protected Structure (DCC Ref. 4053). (No works are proposed to the former St James's (Church of Ireland) Church through this application.) The remainder of the site (Nos. 123 - 125 James's Street) comprise two storey buildings (which are not protected structures). The development will consist of: the amendment of the previously permitted development (Dublin City Council Reg. Ref. 3213/14) including the demolition of the existing two storey buildings at Nos. 123/125 James Street (291sq m). (No. 123 - 124 includes a first-floor residential apartment (57sq m) which was previously permitted to be used as a Visitor Centre. No. 125 includes a first-floor residential apartment (88sq m). The development will also consist of: the construction of a three storey Visitor Centre including reception, exhibition space, ancillary visitor and staff facilities, ancillary offices (575sq m) and roof plant. The development will also consist of: all hard and soft landscaping, boundary treatments, green roofs; changes to levels; signage; piped services; and all associated development above and below ground.	Granted February 2016
25	Dublin Corporate Apartments Ltd	28-31 Benburb Street & 6-9 Wood Lane, Dublin 7	2692/16	PL29N.247314	The development will consist of: the demolition of six derelict dwellings plus the remains of two further dwellings (ground floor facade only) measuring a total of 437sq m; and the provision of a three to six storey over basement level Hotel (progressively set back at its fourth and sixth storeys); comprising 96 No. bedrooms with a gross floor area of 3,904sq m, which includes a basement level	Granted February 2017

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					of 730sq m. The development will also include: the provision of vehicular access to the site from Wood Lane; the provision of 3 No. car parking spaces; 10. No. bicycle parking spaces; loading bay; hard and soft landscaping; an outdoor terrace area at sixth storey level on the southern elevation (17sq m); signage; ancillary plant; attenuation; ESB sub-station and all associated site development and site excavation works above and below ground.	
26	Dublin Simon Community	Dublin Simon Community, 25-26, Usher's Island & Island House, Island Street, Dublin 8	3084/17	PL29S.249110	The site is bound to the north by Ushers Island, to the south by Island Street, to the west by Watling Street and to the east by the Viking Harbour apartments. The c. 1,059 sq. m subject site (includes c. 98.5 sq. m of lands) that are also within the ownership of Dublin City Council. The development will consist of: 1) the demolition of the existing Dublin Simon Community facilities (c. 1,240 sq. m) and 2) the construction of an expanded Medical Residential Treatment and Recovery Centre comprising of a new five/ six storey building over partial basement with a maximum overall height of c. 25.6mOD (including plant/ lift overrun) and a total gross floor area of c. 4,152sq m (excluding basement level). The new building will include: • 70 no. bedrooms en-suite; - meeting rooms and living spaces; • a canteen, kitchen and associated cleaning room; • treatment rooms, GP's room, nurse's bases and staff offices; • a gym and associated changing facilities; • staff, patient and visitor WC's; utility and laundry rooms; • storage rooms (including separate bicycle store and waste store); • a c. 163sq m sedium roof at fifth floor level; and • associated circulation spaces, lobby areas, stair and lift cores, plant rooms, substation, switch room, attenuation tank and other ancillary service areas.	Granted January 2018

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					The development will also include: an enclosed courtyard at lower ground floor level (c.40sq m); a courtyard and terrace at ground floor level (c.51.5sq m and c. 19.8sq m); a terrace at first floor level (c. 65sq m) and associated landscaping, boundary treatments, drainage arrangements and site development works.	
27	Dublin Simon Community	55B Arbour Hill, Dublin 7	3001/18		Permission for demolition works to existing buildings and the construction of 18 no. one-bedroom apartments in a five-storey building with balconies and bicycle parking, bin store, landscaping, boundary treatments and all associated site and engineering works necessary to facilitate the development.	Granted November 2018
28	Dublin Simon Community	25-26 Ushers Island & Island House & 20-22 Island Street, Dublin 8	4610/18		The development will consist of: the demolition of the existing c. 370sq m two storey Dublin Simon Community building in the eastern portion of the subject site (nos. 20 - 22, Island Street) to provide for an extension to the permitted Medical Residential Treatment and Recovery Centre (DCC Reg. Ref. 3084/17, ABP Ref. PL 29S.249110). The proposed extension to the permitted facilities will comprise a six-storey building which will connect to the permitted facilities at Levels 2-5, allowing for gated vehicular and pedestrian access from Island Street to the Viking Harbour courtyard to the rear. The proposed extension will have a maximum overall height of c. 26.06mOD and a total gross floor area of c. 1,151.7sq m. The total floor area of the permitted facility and proposed extension will be c. 5,304sq m. The extension and amendments proposed by the subject planning application will deliver an additional 30 no. bedrooms, resulting in an overall total of 100 no. bedrooms between the permitted facility and the proposed extension and alterations. The proposed extension to the permitted facility will include; additional bedrooms; gymnasium; meeting rooms; counselling rooms; utility and laundry rooms; storage rooms (including separate bicycle store); and associated circulation spaces, lobby areas stair and lift core, plant rooms, substation, switch room and other ancillary service areas. The proposed development will include the relocation of permitted stairs, plant room, ESB, ELV switch room and bike	Granted March 2019

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					store into the proposed extension to allow for: the enlargement of the permitted reception/waiting area and provision of new windows at Level 0; and provision of new bedrooms with windows at Levels 2 - 5. The proposed development also includes other amendments to the permitted facilities including: widening the permitted entrance alcove to Watling Street; removal of a window at Level 2; replacement of 1no. bedroom overlooking the central courtyard at Levels 2 and 4 with external terraces; replacement of permitted support room at Level 1 with 1 no. bedroom; relocation of permitted gym to Level 1 in proposed extension and replacement with a multipurpose room; provision of aluminium fins at 450 & 900mm centres along the eastern and northern facades overlooking the central courtyard in lieu of timber fins; replacement of permitted angled facade to Viking Harbour courtyard with a stepped facade; increase of height of permitted eastern boundary wall; and amendments to the permitted internal layout to improve operational efficiencies and meet fire safety requirements. The proposed development will also include all associated boundary treatments, drainage arrangements and site development works.	
29	Durkan (Pim Street) Ltd.	6, 6A and 7 Pim Street, Dublin 8	2290/19		Permission for a residential development on this overall site of c. 0.07 ha. The proposed development shall comprise the demolition of the onsite vacant 2-storey dwelling unit and vacant 1-storey shed and provide for the construction of 29 no. residential units in the form of 1 no. 2 to 6 storey apartment building. The development shall provide for 11 no. studio apartments, 12 no. 1 bed apartments and 6 no. 2 bed apartments, all with associated private balcony/terrace/roof garden areas. Pedestrian access only is proposed and is provided from Pim Street. The proposed development shall also provide for 29 no. sheltered bicycle parking spaces, 15 visitor bicycle parking spaces and bin storage at surface level;	Granted August 2019

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					a 181 sqm landscaped communal open space area at ground level; all boundary treatment and landscaping works and all associated site development works.]	
30	EWR Investments Ltd	The Printworks, Brookfield Road, Kilmainham, Dublin 8	4179/15	PL29S.247001	The proposed development comprises a part 2, part 4 and part 6-storey building over lower ground floor level to provide 14 no. residential dwellings (comprising 12 x 3-bedroom, double stacked duplex residential units and 2 x 3-bedroom houses (with integrated car parking provision)) and c. 1,971 sq. m (GFA) of office accommodation. An ancillary roof terrace is proposed at first floor level to the rear (east) of the proposed office block and is enclosed by high level obscured glass balustrading. Ancillary roof terraces/balconies with glass balustrading are proposed at third floor level to the western elevation of the building serving the 6-no. duplex residential units at second and third floor level. Car parking in connection with the duplex units and the office accommodation are provided at lower ground level (22 No. car parking spaces) together with associated and ancillary bicycle and refuse storage areas. Vehicular access to the lower ground level is proposed at the northern end of the site off Brookfield Road. Communal landscaped open space and private gardens are provided to the rear of the proposed building at podium and ground floor levels.	Granted December 2016
31	First Ireland Risk Management Ltd	14-16 Parkgate Street, Dublin 8	2168/15		Planning permission sought for a. Proposed demolition of substandard attached two storey building circa 227m^2 (formally Kingsbridge Bed & Breakfast) at 14 Parkgate Street, Dublin 8. b. Proposed construction of three storey offices extension circa 368m^2 to side (In the place of 14 Parkgate Street, Dublin 8) of existing established three storey offices building (First Ireland House, 15 & 16 Parkgate Street, Dublin 8) with all associated external, internal alterations, ground floor level display signage to match existing and site development works. c. Proposed additional fire escape staircase structure circa 6m (single storey above rear terrace level) to connect	Granted May 2015

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					existing basement level to rear terrace area with all associated site development works.	
32	Flair Salon Services Ltd.	26-29 Old Kilmainham Road, Kilmainham, Dublin 8	3078/16		The development will comprise of: - the demolition of an existing two-storey storage building (345sq m); - the construction of a new 4-storey office and training centre building (776.5sq m) with associated toilets, internal circulation including shared stairway and lift and roof mounted solar panels; - alterations to plans and elevations of the existing rear 2-storey hair academy building incorporating new fire exits located at the rear of the site; - connection to existing site services; - alterations to site boundaries and ancillary site development works. The new building will comprise as follows: - 8 bicycle stands and external amenity space; - 181sq m of entrance foyer, offices and training centre with associated signage at ground floor level incorporating a pedestrian link; - 198.5sq m of offices and training centre at first floor level; - 198.5sq m of offices and training centre to the second floor; - 198.5sq m of offices and training centre at third floor level. The proposed building is set back a minimum of 8m from the existing water edge to the Camac River edge along the north site boundary.	Granted September 2016
33	Grangegorman Development Agency	Grangegorman, Dublin 7	GSDZ3926/17		Development at a site within the overall Grangegorman Strategic Development Zone (SDZ) of approx. 28.69 hectare at Grangegorman, Dublin 7. The development will consist of a new one to two storey building comprising energy centre and educational facility (approx. 1,868sq m) ranging in height from approx. 8.36m (34.86mOD) to approx. 14.08m (41.45mOD) including parapet and a flue (approx. 30M (56.5mOD) at the north elevation, other elements include: -plant and photo voltaic panels at roof level; -service access road, gated entrance and yard to the west of the building adjoining existing boundary wall (Note: Sections of the existing Grangegorman boundary walls are	Granted November 2017

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					a Protected Structure); -associated permanent and temporary boundary treatments; -temporary landscaping to the south and north of the building; -and all associated site development works (including drainage works, lighting and building signage) All located at or in proximity to the western boundary of the SDZ lands to the south of the Phoenix Care Centre, west of the Top House and north of St. Brendan's Way.	
34	Grangegorman Development Agency	Grangegorman, Dublin 7	GSDZ2116/19		Planning permission for development at a site located within a larger development site which is bound to the north by the HSE Phoenix Care Centre; to the south by St. Brendan's Way and sports grounds; and to the west by residential properties at St. Joseph's Court and a number of industrial units fronting onto Prussia Street. The site is located within the overall Grangegorman Strategic Development Zone (SDZ). The temporary development will consist of an energy centre facility with a cedar clad finish, measuring a total of 220sq m. and c.3.8m in height, with flues of c.14m; a temporary access that will facilitate deliveries and maintenance vehicles; a boundary fence around the units; and all ancillary and associated development works; all on a site of c. 0.55ha.	Granted March 2019
35	GSA Developments (Ireland) Ltd	3-7 & 9-11 Grangegorman Lower, 1-2 Blake Villas Grangegorman Lower, 8-8a Grangegorman Lower, 22-27 North Brunswick Street, Dublin 7	2830/16		Planning permission for development at this site -No's 3-7 and 9-11 Grangegorman Lower & The Yard, And Buildings To Rear Thereof, 1&2, Blake Villas Grangegorman Lower, 8&8a Grangegorman Lower & 22 - 27 North Brunswick Street, Dublin 7. The development comprises the demolition of all existing structures and 3 No. houses on site together with site clearance works and the erection of high-level (approximately 3m high) temporary hoardings along the Grangegorman Lower and North Brunswick Street site boundaries.	Granted August 2016

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
36	GSA Developments (Ireland) ltd	3-7 & 9-11 Grangegorman Lower, 1-2 Blake Villas Grangegorman Lower, 8-8a Grangegorman Lower, 22-27 North Brunswick Street, Dublin 7	2858/16	PL29N.247008	Planning permission for development at this site -No's 3-7 and 9-11 Grangegorman Lower and the yard and buildings to the rear thereof and No's 1&2, Blake Villas Grangegorman Lower and No's 8&8a Grangegorman Lower and those lands known as 22-27 North Brunswick Street, Dublin 7. The development comprises the demolition of all existing structures on site, including 3 no. houses together with site clearance works and the construction of a new mixed used building of part 4-, part 5- and part 6-storey height with a total Gross Floor Area (GFA) of 20,999sq m (all above ground floor level) to include discount supermarket (2,764sq m GFA), including part off-licence (95 sq. m) at ground floor level fronting North Brunswick Street; 624.8 sq. m GFA of retail floorspace arranged in two separate retail units fronting Grangegorman Lower; an ancillary student/ community group recreational facility of 265.99sq m GFA (including mezzanine level) arranged over two floors and fronting Grangegorman Lower together with reception (430.55sq m) for Student Accommodation and ancillary Student Services (404.69sq m) over two floors (inclusive of mezzanine levels) and Gym (142.66sq m) at ground floor. All of the upper floors (first to fifth floor level) are proposed as Student Accommodation to provide a total of 126 units, comprising 5x3 bed units (15 bed spaces), 29x 4 bed units (116 bed spaces), 29x 5 bed units (145 bed spaces), 14 x 6 bed units (84 bed spaces), 13 x 7 bed units (91 bed spaces), 12 x 8 bed units (96 bed spaces) and 24 x studio type units (24 bed spaces) resulting in a total provision of 571 no. bed spaces. Balconies are proposed at 2nd to 5th floor levels on the internal west facing elevation overlooking the internal courtyard. A roof terrace is proposed at 4th floor level to the southern elevation onto north Brunswick Street and at 5th floor level to the western elevation fronting Grangegorman Lower. Vehicular access is provided at the eastern end of the site along North Brunswick Street frontage to provide access to a loading bay to serve the proposed discount supermarket. This access is enclosed by a high level (4.5m high) galvanised steel gate.	Granted December 2016

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					The main pedestrian access to the site is provided along the northern part of the Grangegorman Lower Street frontage and is formed by a series of high level pivot gates fixed to the undercroft of the building. An on-street loading bay is also provided in close proximity to the main entrance along the Grangegorman Lower frontage. A combination of hard and soft landscaping measures are proposed areas of communal open space along the northern, eastern and western boundaries of the site (including areas of public realm) and the proposed internal courtyard space that is enclosed by the proposed part4-, part5-, part6-storey high perimeter block. Provision is made for 191 no. internally located bicycle parking spaces at ground floor level within the proposed building. Provision is also made for 20 no. visitor's bicycle parking spaces external to the proposed building. The proposed building incorporates sustainable urban drainage measures, including the provision of green roofs (2,612.3sq m) and a rainwater harvesting system that drains to a proposed sub-surface level (approximately 0.75m below ground level) attenuation tank that is situated along the northern boundary of the site together with all associated site development and landscaping works.	
37	Gurtmont Ltd	20-23a Stoneybatter & 1-2 Manor street, Stoneybatter, Dublin 7	4261/16		The development will consist of the demolition of all existing structures including no. 20 Stoneybatter and the construction of a part 1, 3, 4 and 5 storey student accommodation development of 2,980.8 sqm, containing 96 single ensuite study bedrooms arranged in 12 no. 'houses' with shared kitchen/living rooms, 222.6sq m of indoor recreational facilities, 735sq m active landscaped garden, 505sq m landscaped roof terraces, 74 no. covered bicycle parking spaces in addition to replacement of no. 20 Stoneybatter to include upgraded vehicular access and a three bedroom apartment of 168.4 sqm with a rear balcony. Also proposed are all ancillary site and services accommodation works.	Granted September 2017
38	Hattington Student Housing Ltd	30, 32-36 Thomas Street &	2453/15	PL29S.246290	Permission for development of a site of c.0.31ha. at Nos. 30 & 32-36 Thomas Street and 10 Hanbury Lane, Dublin 8.	Granted April 2016

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
		10 Hanbury Lane, Dublin 8			The site is bounded generally to the north by Thomas Street, to the west by St. Catherine's Lane West, to the east by No. 37 Thomas Street, to the south by an existing office building on the corner of Hanbury Lane and St. Catherine's Lane West and the Hanbury Court Apartments on the corner of Hanbury Lane and Swan Alley. The development comprises a 247-unit (296 student bed spaces) Student Accommodation Facility with ancillary facilities, together with retail uses at the ground floor of the existing Thomas Street properties. The overall proposal includes the conservation and refurbishment of Nos. 30 & 32-36 Thomas Street along with the change of use of these buildings to accommodate the development now being proposed, along with the construction of new buildings that range in height from 3-6 storeys over ground which are set back behind the existing Thomas Street buildings via a newly formed private pedestrian street. The overall development comprises approx. 8625sqm in floor area (existing and new building combined). The main entrance to the student accommodation complex is proposed via No. 32 Thomas Street providing a ground floor reception area and leisure/recreation space with student accommodation on the 1st-3rd floors above Nos. 30, 33, 34-35 and 36 Thomas Street will provide 4 no. ground floor retail units (c. 28 sqm, 54 sqm, 108 sqm, 80 sqm respectively) with student accommodation from 1st floor to 3rd/4th floor above. There is also ancillary student accommodation to the rear of No. 30 at ground floor level. Nos. 30 & 32-36 Thomas Street are being conserved and refurbished as part of this proposal. An additional fourth floor in Nos. 34-35 Thomas Street is being accommodated in the roof space following works to repair/replace the roof. There is a new building proposed set back from the rear of the existing Nos. 30, 32-36 Thomas Street buildings which will house the majority of the student accommodation at lower ground, ground floor and upper floors, with communal living/dining accommodation and associated facilities (c. 6740sq m GFA in total).	

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					The development proposed is being accommodated in a building that ranges in height as follows; 6 storeys over lower ground at rear of existing Thomas Street buildings, 5 storeys plus roof terrace along St. Catherine's Lane West, 5 storeys plus roof terrace over lower ground floor along eastern site boundary, stepping down to 4 storeys plus roof terrace; the proposal also includes 1 no. 3 storey townhouse (c. 213 sqm) on Hanbury Lane which will accommodate 8 no. student accommodation bed spaces; all associated site development and landscape works, including the demolition of structures at the rear of the site (approx. 2195 sqm), provision of courtyards and roof terraces, a bicycle parking facility and 2 no. controlled pedestrian / cycle entrances are also proposed on St. Catherine's Lane West and 1 no. controlled pedestrian / cycle entrance on Hanbury Lane, 1 no. ESB substation plus switch room. All of a site of c.0.31ha.	
39	Hattington Student Housing Ltd	43, 45, 47, 51, 53 Montpelier Hill & 37, 39, 41, 55 Montpelier Hill, Dublin 7	3772/16	PL29N.248208	PROTECTED STRUCTURE: The proposed development consists of a student accommodation facility (c. 8,834.5sq m GFA) with 48 no. student house units provided in 3 no. buildings as follows: Block A consists of a 3-4 storey building above ground fronting Montpelier Hill, containing 5 no. student house units and ancillary facilities to serve the development including a gym, common room, study, laundry, screening room, reception, staff facilities and management suite; Block B consists of a 3-5 storey over partial basement building to the rear of Block A towards the eastern site boundary containing 25 no. student house units, an ESB substation, customer switch room, basement plant room and caretaker room; Block C consists of a 3-4 storey building above ground to the rear of Block A towards the western site boundary containing 18 no. student house units; The proposed student house units comprise of 3 no. 4-bed units, 4 no. 5-bed units, 10 no. 6-bed units, 11 no. 7-bed units and 20 no. 8-bed units (total of 329 bed spaces). Each block will have roof access for maintenance purposes only; and all associated site development, boundary treatments and landscaping works including external amenity space at ground level, 110 cycle parking spaces at various locations throughout the site, bin storage facilities and a controlled	Granted July 2017

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					pedestrian / cycle access from Montpelier Hill. The proposed development also includes the demolition of existing structures on the site (c. 2474.6sq m) including a 20th century building in the curtilage of No. 41 Montpelier Hill (a Protected structure) and boundary walls within the original curtilage of No. 55 Montpelier Hill (a protected structure).	
40	Hugh McDonnell	19-20 Blackhall Street, Dublin 7	4143/16		The development will consist of the demolition of an existing structure and construction of a circa 2725 square metre part five-storey office building, including toilets, other ancillary accommodation and the necessary circulation space. In addition to this provision of associated cycle parking, ten spaces accessed from Blackhall Street and sixteen internal spaces with access from Oxmantown Lane. The main entrance to the development will be on Blackhall Street, recessed from the street line and protected by a cantilever at second storey level. Fire escape routes will also escape onto Oxmantown Lane at the rear of the proposed building.	Granted February 2017
41	IDV Boyne Future Ltd.	1, 1A, 2 Usher Street & 29-30 Usher's Quay, Dublin 8	3328/18		The proposed development will involve the demolition of all existing structures onsite (c. 1,028sq m) to provide for a new 6-8 storey residential over ground floor commercial development (c.3,166.7sq m GFA), in one block accommodating 28 no. apartments: 5 no. 1 bed units; 22 no. 2 bed units; and 1 no. 3 bed unit; with private balconies at each floor level. The parapet height of the proposed development at its highest point is 26.3m and the uppermost floors of the building will be set back fronting onto Usher Street and Usher's quay. at ground floor level,1 no. commercial unit (c.1 72.7sq m, to accommodate use class 1 and 2 type uses such as retail, professional / financial services) will be provided along with ancillary laundry room and gym facility; secure bicycle store with 66 no. spaces; store; plant rooms; and ESB substation.	Granted February 2019

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					The development also includes all hard and soft landscaping including, a communal roof terrace at 6th floor level and private terrace at penthouse level; boundary treatments; PV panels; SuDS measures including blue roof surface water attenuation; and all other associated site excavation and site development works above and below ground. Access to the residential units will be provided via a private entrance lobby off Usher Street, with access to the commercial unit provided off Usher's Quay.	
42	James Street Christian Brothers School	Christian Brothers School, James's Street, Dublin 8	WEB1313/16		The development will consist of the installation of a multi-use games area (MUGA) in artificial turf over an existing macadam playground. The development will comprise of a ball stop fencing system to encapsulate the MUGA. Floodlighting will be incorporated into the development to allow extended use of the facility in the evenings.	Granted November 2016
43	Joburn Holdings Ltd	17-22 Parkgate Street, Dublin 8	3539/17	ABP-300821-18	PROTECTED STRUCTURE; Planning permission at this site of c.0.1285 hectares known as 17 to 22 Parkgate Street, Dublin 8 (a Protected Structure). The development will consist of the following: (a) the demolition of the existing single storey shed structure and associated billboard fronting onto Parkgate Street; (b) the construction of a standalone four storey building fronting onto Parkgate Street comprising of café with front and rear terrace areas, office entrance foyer with associated ancillary accommodation, all at ground floor level with office accommodation at upper floor levels (overall area 1156m^2); (c) a three storey extension to the rear of the existing central office building fronting onto Parkgate Street with new fourth floor level over existing building with associated internal alterations overall additional area 151m2; (d) proposed new roof covering with new raised lantern clerestory glazing replacing existing roof finish and associated roof light over existing building located to the east of the site fronting onto Parkgate Street;	Granted August 2018

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					(e) modifications to the existing stone warehouse located to the rear of the site including removal of existing entrance and reinstatement of window to match existing ground floor window arrangement. A landscaped courtyard will be provided between the new building and the existing stone warehouse building with pedestrian access to Parkgate Street. The scheme provides 30 no. bicycle parking spaces, including all associated landscaping, boundary treatment, site development and service works.	
44	KW PRS ICAV, First Floor	The Black and Amber Inn, 778 South Circular Road & Hospital Lane, Islandbridge, Dublin 8	4660/18		The site is generally bound to the east and south by the existing Clancy Quay mixed-use development, to the west by the South Circular Road, and to the north by Riverbank House apartment building. The proposed development will consist of the demolition of The Black And Amber Inn (1-2 storey building, c.602m^2 GFA) and basement vault (c.201m^2 GFA) and construction of a 6 storey over ground mixed-use building (c.1,247m^2 GFA) to accommodate at 1st to 5th floor levels, 20 no. studio apartments each with a private balcony; at ground floor level, a commercial unit (c. 88m^2 GFA) fronting onto South Circular Road, and , all associated and ancillary site development works, landscaping and boundary treatments, including a bin store (c.21m^2), bike store (c.17m^2 and providing 20 no. covered bicycle parking spaces), 3 no. under croft car parking spaces accessed directly from Hospital Lane, 10 no. external bicycle parking spaces; a canopy above the residential entrance on the southern elevation; at roof level, 49 no. solar PV Panels and lift overrun; reconfiguration of Hospital Lane east of the access to Riverbank House to provide vehicular access to the proposed car parking spaces, replace the existing footpath (c.0.96m wide) on the southern edge of the carriageway with a wider footpath (c.1.3m wide), and to replace the existing footpath (c.0.8m wide) on the northern edge of the existing carriageway with grass verge (c. 0.5m wide), resulting in a wider carriageway (c.4.8m wide); re-surfacing works to Hospital Lane; a temporary turning head and landscaped area, to be subject of future permanent works under a separate planning permission; new taxi set down/loading area on	Granted May 2019

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					South Circular Road and associated reconstruction of existing steps and part of wall at south western corner of the site; all on a site c.991.7m^2.	
45	KW Real Estate PLC	Clancy Quay, South Circular Road, Islandbridge, Dublin 8	3632/16		PROTECTED STRUCTURE: KW Real Estate Plc acting for and on behalf of its sub fund KW Irish Real Estate Fund XI, intends to apply for planning permission at a site (0.33 ha). The development will consist of: - Change of use from 'Officers' Quarters and Mess Establishment' to a multi-unit residential building (c.1,701 sq. m gross floor area), comprising 13 no. residential units (6 no. 1-bed apartments, 2 no. 2-bed apartments, 3 no. 3-bed apartments and 2 no. 2-bed duplex units) from lower ground to first floor levels within the existing building. - Associated external and internal conservation, alteration, repair and refurbishment works affecting existing internal walls, floors, stairs, opes and external walls, windows, doors, glazing, roof lantern, shutters, stairs, flues/ vents, chimney stacks, roofs, pipes and gutters. - Lowering of existing perimeter wall and railing, extension of light wells in some locations, re-use of the original railings and provision of new railings to facilitate the creation of 7 no. private terraces to proposed units at lower ground level. Excavation of external central sunken courtyard, with new stepped access and erection of glass balustrade on top of associated retaining wall. New temporary landscaped area to the north of the building, to accommodate temporary drop off area at interface with Clancy Quay Phase 2 (under construction), emergency exit route to South Circular Road, 7 no. bike stands and an enclosed bin store, pending separate future planning application for Clancy Quay Phase 3 redevelopment, landscaping and boundary works.	Granted February 2017

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
46	KW Real Estate PLC	Clancy Quay, South Circular Road, Islandbridge, Dublin 8	2850/17		The proposed development is a mixed use residential (246no. units in total) and retail (c.598 sqm gfa) development comprising, 5no. apartment buildings (c. 21,575 sqm gfa) ranging from 6 to 9 storeys, accommodating 241no. apartment units (75no. 1-bed units, 134no. 2-bed units, 32no. 3-bed units) and 1no. ground floor retail unit (c. 598 sqm) in proposed apartment Block 1 abutting South Circular Road. 5no. 2-storey, 3-bed mews units (c. 608 sqm gfa) Balconies and or terraces on all proposed buildings. All ancillary and associated site development works, including, Repair and refurbishment of the former Barrack boundary wall (protected structure) and minor demolition works of 20th Century non-habitable structures. Vehicular access via the existing site entrance on South Circular Road subject to minor modifications. 163no. new undercroft car parking spaces. 56no. new surface car parking spaces. 27no. replacement car parking places previously permitted under planning reference 2593/14 as part of Clancy Quay phase 2. 244 no. bicycle spaces. Bin storage, horizontally fixed solar panels at roof level of all blocks, plant, ESB sub-station, hard and soft landscaping, lighting and boundary treatment works.	Granted October 2017
47	Larkmount Developments Ltd.	Long's Place, Dublin 8	2205/19	ABP-304331-19	Permission for a Build to Rent residential development on a site at Long's Place, Dublin 8. The application site has an area of c. 0.071 hectares and is bound by Long's Place to the east, C.B.S. James Street to the south and vacant lands to the north. The proposed development consists of the construction of an eight storey (with single and two-storey element) building, with communal garden terrace, PV panels and plant at roof level. The building will accommodate 28 no. Build to Rent units, comprising 21 no. studio units and 7 no. one-bedroom units. Balconies are provided for the residential apartments on the north and east elevations. The development includes a ground floor gym for residents (70sq m), a communal resource room (38 sq. m), a lobby and concierge area, bin store and bike storage are also accommodated at ground floor level. A laundry room is proposed at second floor level. The total GFA of the proposed building is 2188sq m.	Granted August 2019

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					The development includes a total of 92 no. bicycle parking spaces, landscaping, services, ESB substation, private and communal open space and all associated works.	
48	Linders of Smithfield Ltd	1-6 Haymarket & 56-58 Smithfield, Smithfield Chambers, Dublin 7	3475/19		Permission at No's 1-6 Haymarket; No's 56-58 Smithfield, including Smithfield Chamber's, Smithfield, Dublin 7 (the site is bounded by Haymarket to the north; Arran Quay Terrace to the south; Burgess Lane to the west and Smithfield to the east). The proposed development will consist of the completion of the demolition of all existing buildings and structures on site as commenced under Planning Permission DCC Ref. 3271/18 (total gross floor area of the buildings to be demolished c.5,628sq m) together with site clearance works, and the construction of a new 6-storey mixed use building over double basement levels with a total Gross Floor Area (GFA) of 8,645sq m. (above ground floor level). The proposed development will incorporate 6,006sq m (GFA) of office floorspace (ground to fifth floor levels); 335sq m of Cafe/Restaurant floorspace (ground floor), and 439 sq. m of Retail/Restaurant floorspace (ground floor). An ESB sub-station and Switch room are proposed at ground floor level along the western elevation of the proposed building. A roof terrace with associated balustrading wraps around the northern, eastern and southern part of the projecting rooftop plant room at sixth floor level that also encloses an open rooftop plant area with associated screening to the west. The main lobby and office reception are at ground floor level and are accessed from Smithfield Square. Vehicular access is provided via a ramped access off Burgess Lane to the west with a separate bicycle lobby and lift off Haymarket to the north leading to the basement levels below. Basement level -1 contains 19 no. car parking spaces and plant room. At basement -2 level, provision is made for bicycle storage for 150 no. bicycles; shower and changing facilities; ancillary waste storage areas; plant and storage rooms. The proposed building includes sustainable and renewable energy	Application received July 2019 Decision due date September 2019

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					measures which includes PV panels on green roof on part of rooftop at sixth floor level.	
49	Mullins Investments Limited	180, 182, 183,184 James's Street, Dublin 8	2950/17	ABP-300057-17	The proposed development comprises site clearance and levelling works, including the demolition of all existing building(s) on site and the construction of a new Aparthotel building that ranges in height between 3 and 7-storeys above two lower ground levels (along the southern part of site) to provide a total Gross Floor Area (GFA) of 6,346.8sq m, including ancillary staff and guest facilities, plant, storage and waste/refuse storage areas and a minimum of 15 no. bicycle parking spaces. An ESB sub-station is proposed at ground floor level at the south-eastern corner of the proposed building. Guest/ pedestrian access is provided along the southern frontage onto James Street leading into the reception area with ancillary Café at ground floor. A combination of hard and soft landscaping measures are proposed along all elevations to enhance areas of public realm and ancillary amenity spaces. The proposed building includes for the provision of sustainable drainage measures together with the provision of green roofs.	Granted May 2018
50	Norman and Alan Prendergast	Benburb Street, Dublin 7	2529/14		Change of use of existing 2no.storey light industrial building (now vacant) to retail/retail warehouse use, including ancillary storage and office space at first floor level (approx. 2,985sq m overall); provision of 10 no. car parking spaces; 30 no. cycle parking spaces all on a site of 0.3Ha.	Granted January 2015
51	Park Shopping Centre Limited	Park Shopping Centre & 42-45 Prussia Street, Dublin 7	2038/17		PROTECTED STRUCTURE: The proposed development shall comprise the following: (1) Demolition of existing Park Shopping Centre and nos. 42-45 Prussia Street, Dublin 7 and creation of portal openings in the former boundary wall (Protected Structure). (2) Construction of new District Shopping Centre to comprise part-licensed	Granted July 2017

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					supermarket, retail/non-retail service units, licensed restaurants and medical clinic. The District Centre Development will accommodate: Two vehicular entrances from Prussia Street to access deliveries and services (south entrance) and to access undercroft/surface car parking for 117 cars and light van deliveries (north entrance); Areas for deliveries, waste collection in designated service yards (south service yard) and the parking of cars (northern undercroft) and bicycles; All associated ancillary facilities, landscaping and boundary treatments including acoustic attenuation measures where required. (3) Construction of student residential accommodation overhead the district centre buildings (15 no. student houses accommodating 105 no. student residential units and 541 bed spaces) in two buildings ranging from 2 to 6 storeys over ground floor commercial north side and 4 to 6 storeys over ground floor commercial south side of a new pedestrian and bicycle street connecting Prussia Street to the Grangegorman SDZ. The buildings range in height from two-storey over retail (3-storeys) near the existing northern, western and southern boundaries-nearest to Prussia Street-to six-storey over retail (7-storeys) and four-storey over retail (5-storeys) along the new street extending towards the Grangegorman SDZ campus. The northern building comprises the major part of the student residential accommodation with reception and offices at ground floor level and a first-floor level podium garden from which 8 houses of student apartments and various student amenity areas (to include a study centre, a recreation centre, a fitness centre and laundry) are directly accessible. The southern building comprises the minor part of the student residential accommodation with ground floor level foyer and staff accommodation and a first-floor level podium garden from which 4 houses of student apartments, 2	

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					graduate townhouses and various student amenity areas (to include a study centre and laundry) are directly accessible. The proposed new street establishes a new urban plaza designed to provide an appropriate contemporary setting for Jameson House (Protected Structure, located on the opposite side of Prussia Street) and requires insertion of a portal connection though a former boundary wall (Protected Structure) into the development permitted under the approved Grangegorman SDZ Planning Scheme 2012, linking to the permitted Public Realm and Site Infrastructure (DCC Ref. 3373/12), being developed under the auspices of GDA as Development Agency. The new street continues through the portal, with 2 student houses accessed from the street. The development includes upper level balconies/terraces addressing Prussia Street and the new street.	
52	Pure Gym Ltd	Smithfield Market, Smithfield, Dublin 7	2737/16	PL29N.246897	The development will consist of (a) the change of use from Retail/Commercial/Cultural use to Assembly and Leisure use comprising a 24 hour,7 day a week Gymnasium (b) the erection of new illuminated signage to the front elevation (c) the installation of a new front entrance door and (d) all associated site works.	Granted October 2016
53	Red Rock 1920BS Ltd	19/20 Blackhall Street, Smithfield, Dublin 7	3014/18		Development comprising: (i) Demolition of the existing two-storey, flat roof, commercial building; (ii) Construction of a new seven-storey (22 metres in height) apartment building comprising 41 apartments (19 no. one-bedroom and 22 no. two-bedroom apartments) fronting Blackhall Street and Oxmantown Lane and developed around an internal courtyard. The apartment building is setback from the eastern boundary at upper floor levels. Apartments are provided with private balconies and access to a communal landscaped open space area, hot desk room, community room and bicycle	Granted November 2018

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					parking area; and (iii) landscaping; boundary treatments; SuDs drainage; and all ancillary works necessary to facilitate the development.	
54	Rosemary Ryan and Rory Burgess	The Hops, 9B/10 Basin View, Dublin 8	4745/18		The development will consist of an extension to provide 10 no. additional apartments to an existing development of a 28-no. apartment block ranging from 4 to 7 stories high over a basement. No work is to be carried out at basement, ground, first, second and third floor levels. The proposed development is comprised of: (1) 2no 1 bed apartments at fourth floor level, (2) 2no 1 bed apartments at fifth floor level, (3) 2no 2 bed duplex apartments at fifth and sixth floor levels, (4) 2no 1 bed apartments at sixth floor level, (5) 2no 1 bed apartments at seventh floor level, (6) Rooftop garden above new seventh floor apartments, (7) Increase in floor area (15m2) of existing apartment 25 at fourth floor level, (8) Connections to all services and (9) All necessary ancillary site development works to facilitate this development.	Granted March 2019
55	Rothco Unlimited Company	Smithfield Market Square, Smithfield, Dublin 7	3913/17		The development will consist of the: change of use of part of ground floor level (2311sq m) and part of first floor level (1,941sq m) from permitted retail / gym / cultural use to creative industries use. The development will also consist of: the provision of a new entrance door and an entrance canopy to the Haymarket (south) elevation; the replacement of an existing door on Haymarket Way with a fixed light window; the provision of a new facade treatment on part of the Haymarket Square (south) elevation, part of the Haymarket Way (east) elevation and part of the Black Hall Walk (north) elevation including a blackened timber batten wall cladding with integrated openable sections primarily at ground floor level and a living wall primarily at first floor level with a mural to the Haymarket Way (east) elevation; the provision of green roof planting to the existing canopy to the haymarket way (East) elevation; the provision of external lighting, and of illuminated and non-illuminated signage (totalling 1.38sq m); the provision of all hard and soft landscaping; and all other associated site excavation, infrastructural and site development works	Granted January 2018

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					above and below ground including; internal changes in level; boundary treatments; and associated site servicing (foul and surface water drainage and water supply).	
56	Shoreview Properties Ltd (In Receivership)	Heuston South Quarter, St. John's Road, Kilmainham, Dublin 8	2551/15		The development will consist of change of use from Retail Commercial to Gymnasium for Unit 9 (c.662sqm), located on the Lower Ground Floor/Intermediate Floor Level of Building 9. The works will also comprise minor alterations to the existing South and East elevations, including provision of new access door to South Elevation, provision of new access door to East (Military Road) Elevation. Provision of new signage above the new access door on East (Military Road) Elevation together with all associated site development works.	Granted July 2015
57	The Dublin Loft Company Limited	Arran Street West, Smithfield Square South, Dublin 7	2792/14		Planning permission for a proposed mix-use development at Arran Street West, Smithfield Square South, Dublin 7 (bounded by Arran Quay Terrace and Coke Lane). The site is currently vacant. The development will consist of the demolition of a small existing single storey disused ESB substation and the construction of a new infill six storey apartment building, with a restaurant / cafe / retail unit at ground floor level. The main entrance to the apartments will be from Coke Lane, with the entrance to the restaurant / cafe / retail unit off Arran Street West. Total area of building is 2,599sq.m, inclusive of a restaurant / cafe / retail unit of 226sq.m. The building will contain a total of 18 no. apartments consisting of 1 no. 1bed [55sq.m approx.], 12 no. 2 bed apartments [80-84sq.m approx.] and 5 no. 3 bed apartments [100sq.m approx.]. Application to include entrance lobby, lockers and bike store for 20 no. bikes and a waste management area at ground level with all access from Coke Lane, a landscaped communal garden at level 4, with balcony / winter-gardens to each apartment. At roof level; low level external screen to set-back low external plant [40sq m approx.] and 2 low banks of solar panels. The application includes 4 no. external signs in individually mounted lettering; 1 no. building name sign [1500 mm wide	Granted December 2014

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					x 850mm high], 3 no. retail signs [2600mm wide x 850mm high, 500mm wide x 8000mm high, 3200mm wide x 500 mm high], and 3 no. neon illuminated signs mounted internally [2600mm wide x 850mm high].	
58	The Dublin Loft Company Limited	6, 7, 8, 9, 10, 11 Hendrick Street, Dublin 7	3613/16	PL29N.248024	Permission for development of a 175-no. bedroom hotel, ranging in height from five to seven storeys (partly set back at 5th storey) plus setback plant areas at roof level, over basement, with an overall height of approximately 31.7mOD (including plant) and an overall gross floor area of approximately 5586.48sq m (including roof plant and plant/storage at basement level). The development will consist of: (1) The demolition of the remains of the existing single storey industrial building (approximately 273.17sq m), the existing single storey commercial building (approximately 535sq m) and the removal of the existing buttresses at the boundary to no. 12 Hendrick Street (a Protected Structure), (2) The provision of hotel accommodation and all associated ancillary elements including; Ground floor level: lobby, check in area, bar, servery and dining areas, bedroom accommodation, en suites and ancillary areas, staff facilities (changing areas and canteen), storage areas, refuse store, ancillary offices, lifts and ESB substation and switch room and circulation areas. First to seventh storey - Provision of general bedroom accommodation, en suites, lifts, associated ancillary areas and circulation areas. Roof level - Provision of setback screened enclosed plant areas (combined are approximately 249sq m and approximately 135.36sqm of Photo Voltaic (PV) Solar Panels, Basement level - Provision of plant area (approximately 130sq m) and storage (approximately 65sq m) and circulation areas (with an overall basement area of approximately 272.88sq m). (3) The development will also comprise 2no. signage zones on the southern facade (addressing Hendrick Street) approximately 3.43sq m and approximately 7.83 sqm and 1 no. signage zone on the eastern facade (approximately 7.83sq m), an external landscaped courtyard area (approximately 77.7sq m), attenuation,	Granted May 2017

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					rainwater harvesting, and drainage works and all associated site development works. (4) Provision of temporary shoring at the boundary of no. 12 Hendrick Street (a Protected Structure), during construction.	
59	The Governors of St. Patrick's Hospital	St Patrick's University Hospital, James's Street, Dublin 8	3609/17		PROTECTED STRUCTURE; The development will consist of a three-storey health care building of c1,093m2 including a screened, partially enclosed plant room of 34m^2 at roof level and an external fire escape on the northern elevation, which will accommodate consultation suites, group therapy suites, administration and ancillary accommodation. The overall height of the building to the top of the plant room at roof level is 13.5 meters. The development will include the diversion of existing on-site services, piped infrastructure and ducting, site landscaping and boundary treatments internal roads and pathways, bicycle parking, signage, changes in level and all associated site development and excavation works above and below ground.	Granted November 2017
60	The Governors of St. Patrick's Hospital	St Patrick's University Hospital, James's Street, Dublin 8	3760/17		PROTECTED STRUCTURE: Development on a site located within St. Patrick's University Hospital campus, James's Street, Dublin 8 (overall site area of c. 4.2ha, which includes a Protected Structure; Dublin City Council RPS Ref. 856). The development will consist of the provision of additional hospital floorspace comprising a part-two storey over basement in-patient bedroom extension (102 No. bedrooms) with associated staff, clinical support and daily living spaces (5,963sq m approximately) linked to the existing historic structures at ground and first floor levels, including secure internal landscaped courtyards and garden, all to the southern and western side of the hospital campus. The development will also include the demolition of an existing single storey clinical services building (568sq m); the provision of a single storey ESB substation with associated service rooms adjoining the western boundary and a new single storey energy centre (103sq m) adjoining the south-western	Granted December 2017

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					boundary. The development will also consist of the provision of a new vehicular and pedestrian entrance from Bow Lane West requiring the removal of a section of the existing site boundary wall to the south-western corner of the campus. The development will include piped infrastructure (including diversions) and ducting, landscaping and boundary treatments, internal roads and pathways, bicycle parking, alterations to car parking layout, changes in level, plant, interfaces with existing historic structures and all associated site development and excavation works above and below ground.	
61	The Governors of St. Patrick's Hospital	St Patrick's University Hospital, James's Street, Dublin 8	2881/19		PROTECTED STRUCTURE: Planning permission for development on this site located within St. Patrick's University Hospital campus, James's Street, Dublin 8 Overall site area of c.4.2 ha, which includes a Protected Structure: Dublin City Council RPS Ref. 856). The development will consist of the provision of additional floor space comprising a part-four storey development to incorporate a ground floor in-patient bedroom extension (13 no. bedrooms) to the existing 'Willow Grove' Adolescent Care Unit with associated recreation hall, staff, clinical support and daily living spaces (956 sq. m). roof mounted plant room (36 sq. m) linked to existing structures at ground and first floor level, including secure internal landscaped courtyards. The development will also include an advocacy and research National Hub for Mentally Healthy Living, located over the proposed Adolescent Unit extension (898 sq. m) all to the south eastern corner of the hospital campus. The development will also include the demolition of an existing single storey recreation hall building (466sq m); piped infrastructure and ducting, landscaping and boundary treatments, internal roads and pathways, bicycle parking, changes	Granted August 2019

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					in level, plant, interfaces with existing historic structures and all associated site development and excavation works above and below ground.	
62	The Law Society of Ireland	The Law Society of Ireland, Blackhall Place, Dublin 7	2720/16	PL29N.247231	PROTECTED STRUCTURE: Permission for development consisting of a new sports pavilion along the boundary wall to Collins Barracks at Blackhall Place, Dublin 7, both protected structures. The proposed works include the removal of the following: 1no. tennis court and fencing, 2no. self-seeded trees, existing changing room container units, retaining wall and part of existing embankment. The proposed works include the following: new 2 storey sports pavilion (230sq m) consisting of locker rooms, toilets, storage and plant on ground floor together with an exercise space and balcony on first floor, relocation of flood lights, new fencing to relined multiuse court, new roadway, steps to high level walkway, repair to boundary walls and landscaping to existing green.	Granted January 2017
63	Tuath Housing Association	Ellis Court, Benburb Street, Dublin 7	3885/17		The development will consist of the refurbishment and deep retrofit of the existing 4-storey Block A and 2-storey Block B; the total area of the completed development is c. 2,023sq m over 4 storeys and 2 storeys respectively, providing a total of 22 units; 6 no. 1 bed apartments, 13 no. 2 bed apartments, 2 no. 2 bed townhouses and 1 no. 3 bed townhouse; demolition of existing rear return to Block A and construction of a new 4 storey extension to Block A; window alterations to the north facade of Block A onto Benburb Street to provide 2 no. door opes; window alterations to the west facade of Block A to provide door opes; provision of new balconies to the west facade of Block A; new internal lift cores to improve accessibility; pedestrian and service vehicular access off Benburb Street; removal of all existing railings and gates at the entrance to Ellis Court; new brickwork wall with signage comprising wall mounted lettering 300mm in height, entrance gates and railings to Benburb Street to provide secure access to the courtyard; no car parking spaces; 22 no. bicycle parking spaces within the courtyard; new brickwork clad single storey ESB meter room and water tank	Granted January 2018

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
					enclosure within the courtyard; new hard and soft landscaping to the courtyard; new foul and surface water drainage infrastructure, mains water supply site lighting and all associated ancillary site development works.	
64	Welthomas Property Limited	151-156 Thomas Street, Dublin 8	4396/18		The proposed development will consist of (1) change of use of existing storage/warehouse space (1,976sq m) contained within the rear extension of the existing building at first, second and third floor level to office space; (2) change of use of existing office space (328sq m) at ground floor level fronting Thomas Street to provide a restaurant/cafe (3) internal alterations at ground, first, second and third floor level comprising the removal of existing non-original wall partitions and the installation of new partitions to provide informal meeting booths, offices, perimeter offices, co-working office spaces, breakout spaces, reception areas and staff facilities including WCs; (4) internal alterations at fourth floor level comprising extension of existing staircase by 5sq m; (5) external alterations comprising (a) removal and replacement of existing double door on front (southern) elevation with new timber entrance door, (b) replacement of existing steel and timber windows with new double glazed UPVC windows, painting and sealing of existing double door, removal of window and replacement with metal door to provide rear access and removal/replacement of existing windows with exit doors leading onto fire staircase on rear (northern) elevation, and (c) removal of existing glazed porch, painting and sealing of existing door, replacement of existing steel and timber windows with new double glazed UPVC windows on side (eastern) elevation; (6) removal of 5 no. existing rooflights and replacement with 6 no. rooflights; and, (7) all ancillary works necessary to facilitate the development.	Granted April 2019

Number	Name	Location	Planning Ref.	Appeal Ref.	Description	Status
65	West Issuer DAC	9-13 Blackhall Place, Dublin 7.	3979/19		The proposed development comprises of: Change of use from the existing Enterprise Centre use to Student Accommodation at ground, first, second, third and fourth floor levels at Block C; change of use of existing basement areas from Gymnasium use to Student Accommodation use at Block C and below the existing east courtyard; Demolition of existing roof and demolition of existing rear facade wall of Block C; Construction of a new additional fifth floor level as Student Accommodation and new roof to Block C; Construction of extensions/floor area to the rear of Block C at ground, first, second, third and fourth levels as student accommodation. The development will consist of 80 no. new additional student bed spaces and additional ancillary student communal amenity areas (2,511sq m); Removal of 6 no. existing car parking spaces at basement level and the addition of 94 no. bicycle spaces; All necessary consequent internal, external and facade alteration and; All ancillary landscaping, site development works and services.	Application received September 2019 Decision due date November 2019
66	Yuriy Kychan	17, 18, 19 Newport Street, Dublin 8	2744/14	PL29S.244206	The development will consist of the demolition of existing house and commercial sheds and construction of a mixed-use building ranging from 4 to 5 stories with: 12x2 bedroom apartments with 16 private balconies and 1 shared roof garden; 1 cafe / commercial / retail unit at ground floor level; ground level car park with 7 parking spaces accessed from Pim St.; Ancillary site-works including bicycle parking, bin storage, pedestrian entrances on Newport St. and service connections.	Granted March 2015