Strategic Housing Development (SHD) at Charlestown Place and St. Margaret's Road, Charlestown, Dublin 11

PUDDENHILL PROPERTY LIMITED (APPLICANT)

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

May 2021

BMA PLANNING

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NON-TECHNICAL SUMMARY

This Environmental Impact Assessment Report (EIAR) has been prepared on behalf of the applicant, *Puddenhill Property Limited*, in association with the submission of a planning application to An Bord Pleanala for a Strategic Housing Development (SHD) at Charlestown Place & St. Margaret's Road, Charlestown, Dublin 11.

DESCRIPTION OF PROJECT AND ALTERNATIVES

Charlestown is located c.1.5kms to the north of Finglas Village, east of the N2/ North Road, south of the M50, north of Charlestown Place and west of St. Margaret's Road. The Charlestown Centre Shopping Centre is located directly to the north of the current application site and the northern and eastern boundaries of the site are defined by Charlestown Place and St. Margaret's Road respectively. The McKelvey estate is located to the south with McKelvey Celtic AFC playing pitches to the south east.

The subject site comprises in the main a large open area of part temporary carpark and part open field. There are no existing buildings on the site.

The development will consist of construction of 590no. apartment units in 4no. 2 to 10 storey blocks (Blocks 1 to 4) comprising of 234no. 1 bed apartments, 316no. 2 bed apartments and 40no. 3 bed apartments.

A creche (542sq.m) and associated external play area is provided within Block 1 to serve the proposed residential development and the wider community. 2no. retail / commercial units (350sq.m) are provided at the corners of Blocks 1 and 2 on the corners of Charlestown Place and a proposed pedestrian boulevard. The development also includes 4no. office suites (224aq.m) and a health/ medical centre (526sq.m).

Permission is also sought for 515no. car parking spaces and 1068no. cycle parking spaces at basement and surface levels, bin storage areas, ESB substations, public lighting, boundary treatments, surface water drainage infrastructure including connection to the attenuation tank permitted by Reg. Ref. F19A/0146 and located beneath a proposed central landscaped public open space (4,737sq.m) and all associated site development and infrastructure works including demolition of the existing temporary surface car park. Communal open spaces are provided within the courtyard areas at the ground floor levels of Blocks 1 to 4 and roof gardens within Blocks 1, 2 and 4.

Vehicular access to serve the proposed development will be provided from Charlestown Place via the southern arm of the existing signalised junction which is proposed to be upgraded. The existing pedestrian access from the Charlestown Shopping Centre across Charlestown Place is proposed to be relocated to the west to align with the proposed internal pedestrian boulevard within the current application site and the internal street within the Charlestown Shopping Centre. Permission is also sought for associated reconfiguration of the central median on Charlestown Place and the existing footpath, cycle track and hard and soft landscaping on the northern edge of Charlestown Place and south of the Charlestown Shopping Centre. Pedestrian and cycle access to the development is also proposed via a new entrance on St. Margaret's Road. Provision is also made for vehicular access from Charlestown Place through the site to McKelvey Celtic AFC playing pitch at the south eastern corner of the site including relocation of the existing entrance to McKelvey Celtic AFC playing pitch and a future access to the undeveloped greenfield site to the west.

Regarding the construction phase of the proposed development, the construction phase will be managed in accordance with the submitted Outline Construction Management Plan (OCMP). The

OCMP is a ‘live’ document and will be updated and developed by the developer and their main contractor as the scheme progresses. Post a grand of planning permission this will comprise a Construction and Environmental Management Plan combining the measures outlined in the OCMP, relevant mitigation measures from this EIAR and compliance with relevant conditions attached to the permission.

The Contactors Construction Management Plan will identify a Community Liaison Officer (CLO). The CLO’s role will include keeping the local community informed of site operations, through regular meetings, mail drops and newsletters, etc. The CLO can also be contacted directly by local residents / members of the public with concerns / complaints.

The site area will be enclosed with a 2.4m high hoarding around the proposed site perimeter in line with the extent of the finished development. Hoarding panels will be maintained and kept clean for the duration of the works. The contractor’s compound will be set up within the site boundary.

The site compound, site roads, storage areas, contractors parking will be constructed using a clean permeable stone finish. Site accommodation to be provided will include suitable-washing / dry room facilities for construction staff, sanitary facilities, office accommodation etc. The compound will contain an area for containment of all construction-related fuel and oils, it is proposed to use specially bunded HDPE tanks for all fuel stored on site. On completion of the works all construction materials, debris, temporary hardstanding’s, etc. from the site compound will be removed off site and the site compound area reinstated in full.

The appointed contractor will prepare a Construction Traffic Management Plan (CTMP) for the site prior to commencement and the provisions of this plan including erection of signage on public roads, will be agreed with Fingal County Council in advance of commencement on site. The CTMP shall be updated appropriately to ensure coordinated and effective traffic management practices and arrangements are in place throughout the construction period. While parking will be available in the compound area of the site, workers will be encouraged to use public transport where possible to reduce congestion on public roads. Dublin Bus services are readily available in the immediate vicinity. Controlled access to the site, in the form of gates will be monitored by site personnel, while site access to the existing McKelvey Celtic AFC football grounds will be maintained during the works via a temporary access route. CCTV will also be used for periods outside working hours to prevent unauthorised site access.

For the duration of the proposed building works the working hours shall be 07:00 to 18:00 Monday to Friday (excluding bank holidays) and 08:00 to 14:00 Saturdays, subject to any restrictions or relaxations imposed by the local authorities. No working will be allowed on Sundays and Public Holidays. All working hours are subject to agreement with Fingal County Council. Out of hours working may be required occasionally for the watermain and drainage connections and final junction/road upgrades, as well as finishing of concrete.

The construction activities will begin with the demolition of the existing car park. The intention is for the macadam surface to the temporary carpark to be taken up and removed off-site for recycling. The granular stone under the macadam will be reused on site as site fill for haul roads, etc. The topsoil will be stripped from the grassed area and stored on site for reuse for the landscaping work later on.

The development requires the construction two single storey basements located under Blocks 1/2 and Block 4. It is estimated the total excavation volumes will be approximately 86,000m3 of material. The site investigation report under taken on the current application site and included as Appendix 6A shows the materials to be excavated is mainly medium dense clay.

The excavation will start in Block 4 and Blocks 1/2 at the same time, however Block 4 being much smaller, this will finish first. It’s estimated the Block 4 basement excavations will take 16 weeks, and Blocks 1 and 2 will take 32 weeks. Where possible the excavated material will be moved straight off site and is not expected to be stored on site. This will avoid double handling of the material.

The basements will accommodate car parking spaces and ancillary uses to service the apartments and non residential uses. It is proposed that the basements will be constructed using waterproofed concrete retaining walls and basement slab with deepening at the edges and under internal columns and walls to support the building above. Block 3 doesn’t have a basement so this is likely to be supported on Continuous Flight Auger (CFA) piles extending under the building.

There is sufficient space around the basement to allow the excavation embankment to the battered back at a safe slope without the need for side temporary works. Temporary dewatering will be required to facilitate the basement construction; the methodology for temporary dewatering is described in Chapter 6 Water of the EIAR. The proposed method of construction will not affect neighbouring structures and roads as adequate support is maintained at all times.

Above basement level the buildings will be constructed in a mixture of insitu or precast concrete floors and walls, and clad in brick, render and/or stone as noted on the Architects drawings. The use of precast floor and wall has the benefit of utilising off-site construction and minimising waste.

In arriving at the development proposed and the construction methodology chosen, all reasonable alternatives to the proposed development are considered and no alternatives have been overlooked which would significantly reduce or further minimise environmental effects.

POPULATION AND HUMAN HEALTH

This chapter is prepared by BMA Planning and considers the potential impacts of the proposed development on people – it addresses the more social and economic impacts arising such as employment and economic activity, land use patterns, social infrastructure (i.e. educational, community facilities), tourism, residential amenity and health. A study area is defined to consider the effects and the most sensitive receptors are specifically identified.

During construction, the main likely significant effects are a positive impact on employment with onsite jobs created and indirect employment generated in the local economy as a result of the multiplier effect.

No significant adverse effects on human health are anticipated during the construction of this development. Measures to address health and safety considerations, including risks of fire, flooding or drowning, will be subject to Regulations under the Health and Safety code.

On receipt of a grant of permission, the appointed contractor will prepare a Construction and Environmental Management Plan (CEMP). The CEMP will implement the requirements and mitigation and monitoring measures set out in this EIAR and any conditions attached to a grant of planning. It will also address the detailed phasing and sequence of the development, construction management issues including traffic management and the appointment of a community liaison officer (CLO). The CLO will inform the public of site operations and be available to local residents / members of the public with concerns / complaints.

The main likely areas of impacts during the operational phase are an increase in population, a permanent positive significant change in the landscape from underutilised brownfield to urban streetscape; the commercial and community facilities in the proposed development will likely have a positive moderate impact on facilities in the area for existing and future populations.

The effects on air quality, noise and vibration, traffic and the landscape are addressed in Chapters 8, 9, 10, 11 and 14 of this EIAR.

BIODIVERSITY

A review of the biodiversity of the site was carried out by Openfield Ecological Services and this included a study of existing information from the area and a site survey. A site survey was carried out on the 29th of May 2020. May is within the optimal period for general habitat survey, as well as surveying for breeding birds, amphibians and large mammals (particularly Badgers). No constraints to a full assessment of biodiversity impacts were encountered.

It was found that the site is not within or adjacent to any area that is designated for nature conservation at a national or international level. There are no plants recorded from the site that are listed as rare or of conservation value. There are no habitats that are examples of those listed on Annex I of the Habitats Directive. There are no plants which are alien invasive plant species as listed on Schedule 3 of SI No. 477 of 2011. The site can be described as rough grassland with disturbed ground. A mature treeline along a portion of the southern boundary is a habitat of high local biodiversity value. There are no significant water courses, ponds or wetland areas. There is a drainage ditch accompanying the treeline which leads to the Bachelor’s Stream, a highly modified tributary of the River Tolka. There is no evidence of Badgers using the site. Larges trees have bat roost potential while the treeline is likely to be used for foraging, although high levels of artificial light and limited other semi-natural habitat is likely to reduce the attractiveness of the site to bats.

No semi-natural habitats of high biodiversity value are to be affected by this project. The treeline is to be protected and enhanced with new open space planting. Good site management practices will ensure that pollution to water courses does not occur during the construction phase. Surface water will be attenuated using sustainable urban drainage systems (SUDS). With the suggested mitigation in place, the ecological impacts of this proposed development will be neutral. There are no impacts that could affect any area designated for nature conservation.

LAND AND SOILS

POGA Consulting Engineers have assessed the potential impact that construction phase and operational phase on the Land and soils associated with the proposed Charlestown Strategic Housing Development may have on the receiving environment.

The impact of the project on the surrounding land, soil and geological environment has been assessed. In assessing the impact, a study of the existing geological landscape (land, soil and geology) within the site boundary was undertaken. These studies identify the possible effects of the development on the surrounding land and soils over the lifetime of the project (Construction phase and Operational phase). As a result of the study proposals to mitigate, eliminate or remediate any possible impacts from this development has been proposed.

The impact assessment has concluded that the construction phase of the development will be negative, but the significance having a slight effect on the environment. The impact of the operational phase will be natural and will not have a significant effect on the environment.

WATER

POGA Consulting Engineers have assessed the potential impact that construction phase and operational phase on the water associated with the proposed Charlestown Strategic Housing Development may have on the receiving environment.

The impact of development has been assessed in terms of water, (including existing watercourses, surface water drainage, wastewater, and water supply) and hydrogeology of the subject lands and assesses the impact of the proposed development on these aspects of the existing environment.

The impact assessment has concluded that the construction phase of the development will be neutral, with an imperceptible effect on the environment. The impact of the operational phase will be natural and will not have a significant effect on the environment.

AIR AND CLIMATE

Byrne Environmental Consulting Ltd have assessed the potential air quality and climatic impacts that the Charlestown Place Strategic Housing Development may have on the receiving environment during the construction and operational phases of the project. The assessment includes a comprehensive description of the existing air quality in the vicinity of the subject site, a description and assessment of how construction activities and the operation of the development may impact existing air quality and climate, the mitigation measures that will be implemented to control and minimise the impact that the development may have on local ambient air quality and finally to demonstrate how the development shall be constructed and operated in an environmentally sustainable manner.

In terms of the existing baseline air quality environment, site specific baseline data and published data available from similar environments indicates that levels of nitrogen dioxide (NO2), carbon monoxide (CO), sulphur dioxide (SO2) particulate matter less than 10 microns (PM10) and less than 2.5 microns (PM2.5) and benzene are well below the National and European Union (EU) ambient air quality standards.

The construction phase of the development has the potential to generate short term fugitive dust emissions and diesel engine exhaust emissions associated with construction vehicles and plant however these emissions will be controlled by appropriate mitigation techniques and through the implementation of a construction phase air quality management and monitoring plan throughout the duration of the construction phase. The predicted construction phase residual impacts on air quality and climate will be negative, not-significant and short-term.

The operational phase of the development will see the functioning of modern, well insulated thermally efficient buildings in which energy efficiency shall be achieved by implementing sustainable features into the development’s buildings and infrastructure design. The design of the residential units will ensure their operation will have a minimum impact on the receiving climate and that their design will withstand future potential extreme weather events associated with climate change.

The predicted impacts of domestic heating and traffic generated air pollutants associated with the development will not exceed the ambient air quality standards and the impact of the development on ambient air quality and climate been determined to be imperceptible and long-term.

NOISE AND VIBRATION

Byrne Environmental Consulting Ltd have assessed the potential noise and vibrational impacts that the proposed Charlestown Strategic Housing Development may have on the receiving environment during the construction and operational phases of the proposed development. The assessment includes a comprehensive description of the existing ambient baseline noise climate in the vicinity of the subject site, a description of how construction activities may impact the existing ambient noise climate, the mitigation measures that shall be implemented to control and minimise the impact that the development may have on the receiving environment and the mitigation by design measures that are intended to ensure that the inward noise impact from the external environment is controlled within the residential units of the development.

The existing baseline noise climate has been assessed at the site over the course of typical daytime and night time periods. The principal sources of existing noise experienced at the site include road traffic noise from the M50 Motorway, St Margaret's Road and from Charlestown Place.

Ambient noise levels in the vicinity of the site shall temporarily increase during the construction phase, however noise levels shall be controlled, minimised and managed through the implementation of best practice construction noise and vibration mitigation measures. The operational phase of the development will not have an adverse or unacceptable outward noise impact on the receiving environment including existing noise sensitive receptors located in the vicinity of the site.

The noise impact assessment has considered the potential outward noise and vibrational impacts associated with the construction and operational phases of the proposed development on the surrounding environment. The assessment has also assessed the inward noise impact of the surrounding environment including external transportation noise on the proposed development in order to ensure that suitable internal noise levels can be achieved across the site within the residential dwellings.

Internal noise levels within the proposed residential dwellings across the site have been assessed with regard to the existing noise levels and future noise sources, in particular road traffic noise. Sound insulation performance values for glazing, walls, roofs and ventilation systems have been specified as part of the assessment in order to ensure acceptable internal noise levels are achieved during both daytime and nightime periods.

The impact assessment has concluded that the construction phase noise impacts with mitigation will be negative, slight to moderate and short-term at existing local residential receptors and the operational phase noise impact will be neutral, imperceptible and long-term at local residential receptors. It is predicted that the inward noise impact with mitigation will be neutral, not-significant and long-term.

MATERIAL ASSETS: BUILT SERVICES

POGA Consulting Engineers have assessed the potential impact the construction phase and operational phase on the Material Assets & Built Services associated with the proposed Charlestown Strategic Housing Development may have on the receiving environment.

The impact of the proposed development on the existing services and material assets of the subject site and its surrounding has been assessed. Material assets relate to the infrastructure and services alongside the subject site and are either human or natural in nature, a value may arise from either human or cultural reasons.

The impact assessment has concluded that the construction phase of the development will be neutral and will not have a significant effect on the environment. The impact of the operational phase will be natural and will not have a significant effect on the environment.

MATERIAL ASSETS: TRANSPORTATION

Receiving Environment

Located within a key metropolitan area of Dublin City and zoned for Town and District Centre, Charlestown Place is well placed within an existing high quality public transport service and a planned multimodal transport network. Existing pedestrian, cycling, public transport and road infrastructure forms a firm foundation for sustainable transport travel.

Finglas and Charlestown form a strong focal point for existing and major planned improvements in transport infrastructure in the Greater Dublin Area as set out in the Greater Dublin Area Transport Strategy and Cycle Network Plan and this reflects the substantial existing population and the future development of the Finglas area.

Additionally, the close proximity of the proposed development to the district centre of Charlestown Centre, ensures that a wide range of amenities and services are available to future residents of the proposed development. Coupled with the existing provision of strong pedestrian connections, this will significantly reduce the reliance on the private car.

Therefore, the proposed development is an exemplar of sustainable land use and transportation planning at a site, local and regional scale.

Construction Traffic Impacts

The overall traffic generation for the construction phase of the proposed development has been devised with the anticipated volumes of excavation of the site from the prospective Contractor.

It is demonstrated that the increase in traffic volumes at the main site access (Access No. 2) is below 5% during the AM peak hour and PM peak hours of the adjacent road network. it is therefore considered theta the level of traffic impact during the construction stage is of an acceptable level in the short term. The above impacts represent a short term slight negative impact due to construction traffic.

A range of mitigation measures are proposed as part of an Outline Construction Traffic Management Plan, contained within the separately bound Traffic and Transport Assessment, which will be the responsibility of the contractor to finalise and agree with the Planning Authority prior to commencing the works.

Operational Traffic Impacts

The development access / Charlestown Place junction is expected to operate sufficiently during all periods while queuing and delay are acceptable and do not impact adjacent junctions. The maximum queue associated with the Charlestown Place eastern arm will not be impacted by nor impact on the proposed siting of a new direct pedestrian crossing located 70m from the junction. The above reported impact represents a long term not significant negative effect on this junction.

The R104 / Charlestown Place junction continues to operate sufficiently during all peak periods and queueing and delay are acceptable and do not impact on adjacent junctions. The above reported impact represents a long term not significant negative effect on this junction.

The R135 / Charlestown Place junction is a large signalised junction that experiences a high volume of vehicle throughput in an urban location, and thus it is normally considered acceptable for junctions of this nature to operate at or somewhat above saturation levels for short periods of time such as during morning and evening peak hours. The upgraded intersection layout proposed for the Charlestown Centre, as permitted under Reg. Ref. F19A/0146, is shown to provide significant additional capacity. The assessment has shown that junction capacity is generally operating satisfactorily in most assessment scenarios except for the N2 northern approach arm and Charlestown Place approach arm which are operating above saturation levels during the weekday morning peak during the 2036 with development scenario only. The evening peak is expected to generally operate within or around saturation levels. It should however be noted that given this is an urban junction, with enhanced facilities for pedestrians, it is generally considered acceptable, as promoted in DMURS, for there to be an element of congestion experienced at such junctions. The above reported impact represents a long term moderate negative effect.

A sensitivity analysis of the 2036 assessment year wherein the impact of remote working patterns that have developed from the Covid19 restrictions will be continued to a substantial degree in the post Covid19 scenario has been undertaken. In this Post COVID Scenario, it is demonstrated that the Charlestown Place / R135 junction will perform below capacity during both the with and without development scenario. It is considered that this is the most likely sustainable scenario that will occur. In overall terms this longer-term change in working patterns will help achieve a longer-term fundamental change in travel behaviour by reducing the need travel to work on a daily basis. It is considered, based on the sensitivity analysis, that the junction operation during the Opening +15 Year scenario is acceptable for a typical urban junction. Thus, the above reported impact represents a long term slight negative effect.

The proposed development is consistent with all national, regional and local policies. In particular those policies and objectives aligned with active and sustainable travel and transportation. The proposed development incorporates are arrange of specific mitigation measures that are intrinsic to its location and design development.

Conclusion
It is clear that national investment in public transport such as the BusConnects initiatives, the Luas extension to Finglas and the identification of Charlestown as a major public transport terminus, will further improve capacities, frequencies and above all reliability of the adjacent bus network to the city centre and other key destinations such as Blanchardstown, Swords and the Airport. These transport infrastructural developments would induce a modal shift from private cars to public transport thereby limiting or precluding the potential for background traffic growth in the area.

As such given the location of the site, existing good level of public transport provision and the future provision of public transport, it is considered that the proposed site is ideally suited for the development of high-density housing.

Furthermore, measures intrinsic to the proposed development, such as a reduced car parking provision, a car sharing scheme, high quality bicycle parking facilities and tailored travel information packs, which will promote low car ownership and encourage sustainable and alternative transport choices to the future inhabitants will be provided.

In overall terms the proposed development will have an acceptable level of vehicular traffic impact on the adjacent local and strategic road network.

MATERIAL ASSETS: RESOURCE AND WASTE MANAGEMENT

Byrne Environmental Consulting Ltd have assessed the potential impact that construction phase and operational phase wastes associated with the proposed Charlestown Strategic Housing Development may have on the receiving environment and on local and regional waste management infrastructure.

The assessment includes a comprehensive description of the nature and quantities of wastes that shall be generated during the construction and operational phases of the development and a description of how wastes generated shall be managed in accordance with the Eastern-Midlands Region Waste Management Plan 2015-2021 and Fingal County Development Plan 2017-2023 Waste Management Objectives.

The Site Specific Construction and Operational Waste Management Plans have been designed to ensure that the construction and operational phases of the proposed development will be managed to reduce the generation of unsegregated wastes, to maximise the potential for recycling, recovery and re-use and to demonstrate how the development will operate in a sustainable manner in terms of waste management and how the development will contribute to the achievement of the regions compliance with the waste reduction targets specified in the Eastern-Midlands Region Waste Management Plan 2015-2021.

The residual impact associated with the construction phase with mitigation will generate a small quantity of unrecyclable and non-reusable construction wastes which will result in a negative, not significant and short-term impact.

The residual impact associated with the operational phase with mitigation, will generate a small quantity of unrecyclable and non-reusable domestic and commercial waste which will result in a negative, not significant and long-term impact.

CULTURAL HERITAGE

IAC Archaeology has prepared this chapter to study the impact, if any, on the archaeological and cultural heritage resource of a proposed development at Charlestown Place and St Margaret's Road, Dublin 11. The assessment was carried out by Faith Bailey and Ross Waters of IAC Archaeology.

The proposed residential development is located within a highly developed area and contains a car park and a portion of disturbed open field. There are no recorded monuments within 500m of the site and none of the previous archaeological works in the surrounding area have encountered anything of archaeological significance. The nearest recorded monument comprises an enclosure (Ref.: DU014-102), c. 525m to the north-northwest in the townland of Balseskin. The townland boundary between Charlesland and Stockens to the immediate south is the only cultural heritage feature within the proposed development and its study area.

It is possible that ground disturbances associated with the proposed development may have a direct negative impact on archaeological remains that may survive beneath the current ground level in the south-western part of the site. Prior to the application of mitigation, impacts may range from moderate to significant. No negative impacts are predicted in the area where the existing car park is located, as ground disturbances here are likely to have resulted in the removal of any archaeological features or deposits.

In order to mitigation any direct and negative impacts upon the archaeological resource, all topsoil stripping in the south-western portion of the site will be monitored by a suitably qualified archaeologist. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the Department of Culture, Heritage and the Gaeltacht.

No impacts are predicted upon the archaeological or cultural heritage resource as a result of the operation of the proposed development.

LANDSCAPE

The Landscape chapter assesses the potential effects of the proposed development on the townscape character and views/visual amenity of the receiving environment. It should be read in conjunction with the verified photomontages contained in Appendix 14A of the EIAR. The Landscape chapter was prepared by Richard Butler (BSc, MSc, MILI, MIPI) of Model Works Ltd.

The site is a 3.9 ha land parcel comprised of a large surface parking area and an area of undeveloped grassland. It is located in the centre of Charlestown, a rapidly developing urban core at the northern edge of Dublin City, bound by the M50 to the north and the N2/ North Road to the west. The site has c. 220m frontage to Charlestown Place to the north, and c. 100m frontage to St Margaret's Road to the east. These are the two main thoroughfares serving Charlestown. The site is thus a part-brownfield site of strategic scale, centrally located in the town centre of Charlestown with frontage to the two main streets, zoned for town centre development with an objective to achieve higher densities.

The townscape of Charlestown has evolved rapidly since the construction of the M50 in the 1990s, which established a new, clearly defined edge to Dublin's urban area. Extensive industrial and low density residential development initially took place in the area, until the first phase of the Charlestown Centre established a new urban core. This was a mixed use, high density development of distinctly urban character and appreciably high design and material quality. It employed urban design principles such as the use of strong building lines, active frontage and building height to define streets and generate place-identity, improving legibility. The buildings are mostly five residential storeys above a two storey commercial base, and there is also a landmark residential tower of 12 storeys beside the central junction. The quality of the development, in combination with the mix of uses (introducing convenience and comparison retail) were such that they changed the character and raised the quality of the Charlestown townscape generally. Phase 2 of the development, currently nearing completion, is of similar quality.

The townscape will remain incomplete however until the subject site is developed. In its current use and condition, it detracts from the townscape character, quality and visual amenity in the area.

Townscape Effects

The sensitivity of the townscape can be classified 'low' (definition: *Areas where the townscape has few valued elements, features or characteristics and the character is weak. The character is such that it has capacity for change; where development would make no significant change or would make a positive change. Such townscapes are generally unrecognised in policy and the principal management objective may be to facilitate change through development, repair, restoration or enhancement*).

The classification of townscape sensitivity takes account of the existing condition of the receiving environment, but also (a) the trends of change in the area, (b) the development policy applying to the affected area, and (c) the nature of the development proposed. The only potentially sensitive receptor of townscape effects in the receiving environment is the residential neighbourhood of McKelvey Avenue.

The magnitude of townscape change which would result from the proposed development can be classified 'high' (definition: *Change that is moderate to large in extent, resulting in major alteration to key elements, features or characteristics of the townscape, and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the townscape*).

The high magnitude classification arises not from the proposal being uncharacteristic in the context (it is a development of town centre character in a designated town centre area), but rather from the potential for the development to change certain key elements and characteristics of the receiving environment. These changes include:

- The introduction of buildings of urban character and scale to the streetscapes of Charlestown Place and St Margaret's Road, resulting in town centre-type enclosure of the streets and strengthening/ reinforcing the urban structure. This would make a significant positive contribution to townscape legibility (by appreciably defining Charlestown Place as the main street, and marking the junctions with St Margaret's Road as the 'centre').
- The expansion of the town centre across Charlestown Place, with the new high density residential neighbourhood complementing the existing Charlestown Centre to collectively form a distinct urban core of scale (in terms of spatial extent, built form, population, etc.) and diversity. The development would make a significant contribution to the realisation of the FCDP Objectives SS15 and SS16 as they apply to Charlestown.
- The completion and improvement of the Charlestown Place and St Margaret's Road streetscapes along the frontage of the site, most notably by the provision of a major pedestrian crossing over Charlestown Place, the provision of improved pedestrian and cycle paths on the site-side of the streets, and the introduction of a large number of street trees in green verges.
- The extension of the public realm, the pedestrian and cycle circulation network and the green infrastructure network across the site, significantly improving the permeability and navigability of the town centre. The most notable elements of the proposal in this regard are the pedestrian boulevard (which is aligned to function as an extension of the pedestrian street in the existing Charlestown Centre) and the linear open space connecting the boulevard to St Margaret's Road.
- The provision of a new public park at the southern end of the pedestrian boulevard, functioning as an anchor/attraction in the public realm and green infrastructure network. The co-location of the park with the McKelvey Celtic football grounds means that together they would form a substantial, multi-functional open space in the town centre.
- A significant increase in the number and variety of shrubs and trees on the site and in the town centre generally, by the generous planting proposed in the streetscapes of Charlestown Place and St Margaret's Road, in the new public park and the linear open space, on the internal streets and in the courtyards. This would have significant positive effects on the site's biodiversity, landscape and visual amenity value.
- The retention (and augmentation) of the site's one valued landscape and biodiversity feature, the ditch, hedgerow and tree line along the southern site boundary. This is valuable not only as an historic and structural element of the landscape, but also as a buffer/ screen between the town centre area and the McKelvey Avenue residential neighbourhood.

In summary, the significance of the townscape effects is predicted to be 'moderate' (definition: *An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends*) and the effects would be positive.

Visual Effects

To assess the proposed development's potential visual effects 18 no. viewpoints were selected for detailed assessment informed by verified photomontages. The viewpoints were selected to address all the key elements and character areas around the site, and to show the proposal from a range of angles and distances. The most significant findings of the visual effects assessment are as follows:

- Views from within and adjacent to Charlestown town centre (Viewpoints 3, 4, 5, 7, 8, 13, 15) would be significantly improved. In all of these views the development would introduce buildings of high design and material quality to the townscape, generating urban-type street enclosure along Charlestown Place and St Margaret's Road without any sense of excessive enclosure. By expanding the town centre across Charlestown Place a critical mass of contemporary urban development would be achieved, reversing the existing situation in which the town centre appears incomplete and un-balanced. The streetscapes would also be improved by the introduction of green verges and a large number of street trees.

- Views from the approaches to the town centre (Viewpoints 1, 2, 6, 12, 14) would be improved. In these views the development would complement the existing Charlestown Centre buildings, forming a more substantial and diverse urban core, thereby improving townscape legibility.
- The visual effects on McKelvey Avenue (the public realm) would be of slight to moderate significance and neutral (if not positive, considering the policy for the site). Due to its considered massing/ height the visible part of Block 4 would be no more prominent than the existing industrial shed on the neighbouring plot, and the proposed building would be a high quality addition to the townscape, reflecting McKelvey Avenue's location adjacent to the town centre.
- The composition and character of views from the nearest McKelvey Avenue houses to the site would be changed by the introduction of a building (Block 4) of contemporary urban character to the site c.26m to the rear of the houses. However, given the site's town centre zoning and the associated policy driving its development and the mitigation measures employed, including (a) the stepping down of massing/ height towards the houses, and (b) the existing/ proposed vegetation screen on both sides of the boundary, the potential negative effects have been minimised.

SIGNIFICANT EFFECTS, INTERACTIONS AND OTHER IMPACTS

The EIAR has considered the likely, significant, adverse effects of the proposed project on the receiving environment. Mitigation measures are included, to avoid and / or reduce impacts on the environment where considered necessary. This includes mitigation measures incorporated into the design of the proposed development.

The EIAR concludes that there are no significant environmental effects arising from the project that would prohibit the planning authority from issuing consent for the development of the Charlestown Place SHD.

1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

This Environmental Impact Assessment Report (EIAR) has been prepared on behalf of Puddenhill Property Limited (hereafter PPL / The Applicant) in association with the submission of a planning application to An Bord Pleanala, for a proposed Strategic Housing Development (SHD) at Charlestown Place and St. Margaret's Road, Charlestown, Dublin 11.

The EIA process, including the preparation of this EIAR, and the examination of the information presented by the Local Authority, will inform the decision-making process. The purpose of this EIAR is to assist and inform the Competent Authority in undertaking an environmental assessment of this project.

Therefore, the objectives of this EIAR are summarised as follows:-

- To identify the significant environmental impacts of the proposed development during the construction and operational phases having regard to the characteristics of the receiving environment.
- To evaluate the magnitude and significance of impacts and to propose appropriate measures to mitigate potential adverse impacts.
- To identify, where appropriate, monitoring measures to be implemented during the construction and operational phases.

The nature and extent of the development proposed, i.e. the project being assessed in this EIAR, is outlined in Chapter 3. This is prepared with reference to the plans and particulars submitted with the planning application.

Details of the project will be available online through the EIA Portal[1] and on the website of Competent Authority. A copy of the application, including this EIAR, will also be available on the project specific website for this SHD development.

1.2 STATUTORY REQUIREMENTS

The EIA Directive, Council Directive 85/337/EEC of 27 June 1985 *on the assessment of the effects of certain public and private projects on the environment*, is designed to ensure that projects likely to have significant effects on the environment are subject to a comprehensive assessment of environmental effects prior to development consent being given.

Council Directive 85/337/EEC has been amended by Council Directives 97/11/EC, 2003/35/EC and 2009/31/EC. These amendments were codified in Directive 2011/92/EU. In 2014, the Directive was further amended by Directive 2014/52/EU.

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[1] The EIA Portal is accessible via the Department of Housing, Planning and Local Government website at https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal

Directive 2014/52/EU (Amendment of Directive 2011/92/EU)

Directive 2014/52/EU amending Directive 2011/92/EU *on the assessment of the effects of certain public and private projects on the environment* was adopted on 16 April 2014.

The definition of the EIA process is redefined under Article 2(g) as follows:-

> *"Environmental impact assessment" means a process consisting of:*
>
> > *(i) The preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2);*
> > *(ii) The carrying out of consultations as referred to in Article 6 and, where relevant, Article 7;*
> > *(iii) the examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer in accordance with Article 5(3), and any relevant information received through the consultations under Articles 6 and 7;*
> > *(iv) the reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination referred to in point (iii) and, where appropriate, its own supplementary examination; and*
> > *(v) The integration of the competent authority's reasoned conclusion into any of the decisions referred to in Article 8a."*

The content of an EIAR is included in Article 5(1) and expanded upon in Annex IV (See Box 1.1):-

> *"Article 5*
> *1. Where an environmental impact assessment is required, the developer shall prepare and submit an environmental impact assessment report. The information to be provided by the developer shall include at least:*
>
> > *(a) a description of the project comprising information on the site, design, size and other relevant features of the project;*
> > *(b) a description of the likely significant effects of the project on the environment;*
> > *(c) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;*
> > *(d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;*
> > *(e) a non-technical summary of the information referred to in points (a) to (d); and*
> > *(f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected."*

BOX 1.1 ANNEX IV: DIRECTIVE 2011/92/EU AS AMENDED BY DIRECTIVE 2014/52/EU

INFORMATION REFERRED TO IN ARTICLE 5(1)
(INFORMATION FOR THE ENVIRONMENTAL IMPACT ASSESSMENT REPORT)

1. *A Description of the project, including in particular:*
   (a) a description of the location of the project;
   (b) a description of the physical characteristics of the whole project, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;
   (c) a description of the main characteristics of the operational phase of the project (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;
   (d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities and types of waste produced during the construction and operation phases.
2. *A description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.*
3. *A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.*
4. *A description of the factors specified in Article 3(1) likely to be significantly affected by the project: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.*
5. *A description of the likely significant effects of the project on the environment resulting from, inter alia:*
   (a) the construction and existence of the project, including, where relevant, demolition works;
   (b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;
   (c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;
   (d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);
   (e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;
   (f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;
   (g) the technologies and the substances used.
   The description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary, cumulative,

transboundary, short-term, medium- term and long-term, permanent and temporary, positive and negative effects of the project. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project.

6. *A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.*
7. *A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.*
8. *A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.*
9. *A non-technical summary of the information provided under points 1 to 8.*
10. *A reference list detailing the sources used for the descriptions and assessments included in the report.*

National EIA Legislation

The EIA Directive was first transposed into Irish law by the *European Communities (Environmental Impact Assessment) Regulations*, 1989 (S.I. No. 349 of 1989) which amended the *Local Government (Planning and Development) Act*, 1963 (and other legislation) to provide for environmental impact assessment. These Regulations, together with the *Local Government (Planning and Development) Regulations*, 1990 (S.I. No. 25 of 1990), which made more detailed provision in relation to planning consents, came into effect on 1 February 1990.

The 2014 EIA Directive has principally been transposed into national planning law by the *European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018* (S.I. No. 296 of 2018).

EIA provisions in relation to planning permissions are contained in the Part X of the *Planning and Development Act, 2000*, As Amended and Part 10 and Schedules 5, 6, 7 and 7A of the *Planning and Development Regulations*, 2001, As Amended.

National Guidance

The Department of Housing, Planning and Local Government (DHPLG) issued *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*, in August 2018. The footnote below contains a glossary of terms from these Guidelines and used in this EIAR[2].

The Environmental Protection Agency (EPA) prepared revised (draft) guidance to respond to the 2014 EIA Directive. The current Draft *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (2017) and Draft *Advice Notes for Preparing Environmental Impact Statements* (2015), have been referenced in the preparation of this EIAR.

The SEA Directive

Directive 2001/42/EC on the assessment of the effects of certain plans and programmes on the environment requires that plans and programmes, including those prepared for land use planning, are assessed at an early stage in the decision-making process to evaluate the likely environmental effects of implementing the plan or programme i.e. a Strategic Environmental Assessment (SEA).

This Directive was transposed into Irish Law (becoming operational on 21 July 2004). It requires that a SEA is undertaken in the plan making process for all land use plans i.e. a development plan, local area plan or planning scheme. The SEA process provides a strategic level assessment of the effects of the proposals contained in a Plan, including land use planning proposals, and their impacts on the environment.

1.3 THE NEED FOR AN EIAR – SCREENING

Schedule 5 of the Planning and Development Regulations 2001, As Amended, specifies a variety of projects which require an EIAR. Part 2 (10) relates to 'Infrastructure Projects' and states as follows: -

> *10. Infrastructure projects*
> *(a) Industrial estate development, where the area would exceed 15 hectares.*
> *(b) (i) Construction of more than 500 dwelling units.*
> *(ii) Construction of car-parks providing more than 400 spaces, other than a car-park provided as part of, and incidental to the primary purpose of, a development.*
> *(iii) Construction of shopping centres with a gross floor space exceeding 10,000 square metres*
> *(iv) Urban development which would involve an area greater than 2 hectares in the case of a Business District, 10 hectares in the case of other parts of a built-up area, and 20 hectares elsewhere. (In this paragraph "business district" means*

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[2] **Competent Authority** - The authority designated as responsible for performing the duties arising from the Directive. In this guidance competent authorities are planning authorities and An Bord Pleanála.
Development consent - The decision of the competent authority or authorities which entitles the developer to commence the project.
EIA - The process of carrying out environmental impact assessment as required by the EIA Directive.
EIA Report (EIAR) - The report prepared by the developer in accordance with the requirements of article 5 of the EIA Directive and submitted to the competent authority, together with the application documentation, for development consent.
Reasoned Conclusion - The statement made by the Competent Authority on the significant effects of the project on the environment, based on an examination of the EIA report and, where appropriate, the results of its own supplementary examination.

> *a district within a city or town in which the predominant land use is retail or commercial use.)"*

The development proposed is above the relevant threshold for Part 10(b)(i) and therefore an EIAR is required for this project.

1.4 SCOPING OF EIAR

'Scoping' is a process to determine what information should be contained in an EIAR. It will also decide what methods should be used to gather and assess that information.

Statutory Instruments and Guidance

In the first instance, the scope of the EIAR has been determined with regard to the Statutory Instruments and Regulations relating to EIA and related guidance from the European Union, the Government and the EPA. These include the following: -

EU Directives / Legislation

- The EU Directives on Environmental Impact Assessment (85/337/EEC as amended by 97/11/EC, 2003/35/EC, 2009/31/EC, codified in 2011/92/EU and amended by 2014/52/EU)
- The Planning and Development Act, 2000 (as amended)
- The Planning and Development Regulations, 2001 (as amended)

EIA and related Guidance

- EPA (2002) *Guidelines on the Information to be contained in Environmental Impact Statements*
- EPA (2003) *Advice Notes on Current Practice in the preparation of Environmental Impact Statements*
- EPA (2015) *Advice Notes for preparing Environmental Impact Statements* (Draft)
- EPA (2017) *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (Draft)
- European Commission (2017) *Environmental Impact Assessment of Projects - Guidance on Scoping*
- European Commission (2017) *Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report*
- DHPCLG (2018) *Circular* PL05/2018 – *Transposition into Planning Law of Directive 2014/52/EU amending Directive 2011/92/EU on the effects of certain public and private projects on the environment (the EIA Directive) and Revised Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.*
- DHPCLG (2018) *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment.*
- DEHLG (2003) *Environmental Impact Assessment (EIA) Guidance for Consent Authorities regarding Sub-threshold Development.*

The scope of the study is also informed by the extent to which other assessments have addressed some types of effects adequately and appropriately. This includes other sources of relevance to the proper planning and sustainable development of the site. Chapter 2.0 contains an overview of the main planning policy sources relevant to the project.

Environmental Factors

The 2017 EPA Draft Guidelines recommend that the scoping process use ‘likely’ and ‘significant’ as the principal determining criteria for what should be assessed in the EIAR. Any issues which do not pass the test are omitted or ‘scoped out’ from further assessment.

A description of the likely significant effects of the project on the environmental factors listed in Article 3(1) of the 2014 Directive is included in this EIAR under the following headings: -

• Population and Human Health	Chapter 4
• Biodiversity	Chapter 5
• Land and Soils	Chapter 6
• Water	Chapter 7
• Air and Climate	Chapter 8
• Noise and Vibration	Chapter 9
• Material Assets: Built Services	Chapter 10
• Material Assets: Transportation	Chapter 11
• Material Assets: Resource and Waste Management	Chapter 12
• Cultural Heritage	Chapter 13
• Landscape	Chapter 14

The scope of this EIAR focuses on the effects at project level and does not re-assess the alternatives or effects on the environment already considered at the higher strategic level. This is in accordance with Section 3.3.5 of the 2017 EPA Draft *Guidelines*:- *The extent to which higher level considerations have already been assessed and so do not need to be assessed again should inform and be referred to in the EIA scoping process.”*

Consultation

Scoping of individual chapters was undertaken as appropriate by the experts assigned to the topic. Details are provided in the relevant Chapters, as applicable.

Related Projects/ Cumulative Impacts

The scoping of the assessment also considers other projects or activities (permitted or planned) that are not included in the current application but which may result in cumulative impacts. By considering these related projects, the EIAR allows the CA to form an overall understanding of the likely effects that will arise, including direct, indirect / secondary or cumulative impacts, if the current project proceeds. The main projects whose implementation may coincide with the proposed development are considered in Chapter 3.

Plans and programmes relevant to the proposed development are listed in Chapter 2. These plans have been subjected to a higher tier of environmental assessment through the Strategic Environmental Assessment (SEA) process and in line with the Guidance from the EPA (see section 1.4.2 above), the higher level considerations do not need to be assessed again. This EIAR however, has due regard to the policies and objectives in the relevant plans and programmes.

1.5 RISK OF MAJOR ACCIDENTS AND/ OR DISASTERS

In accordance with Article 3(2) and Annex IV of the 2014 EIA Directive, the vulnerability of the project to risks of major accidents and/or disasters is considered, and the implications for likely significant effects on the environment if it did occur.

Article 3(2) of the 2014 EIA Directive states that an EIAR shall consider:-

> *'The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned'.*

An EIAR should also contain the following information prescribed in 5(d) of Annex IV of the 2014 EIA Directive: -

> *5. "A description of the likely significant effects of the project on the environment resulting from, inter alia:*
> *….*
> *(d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);"*

The 2018 *Guidelines for Planning Authorities and An Bord Pleanala on carrying out Environmental Impact Assessment* sets out two key considerations to address this: -

- *"The potential of the project to cause accidents and/or disasters, including implications for human health, cultural heritage, and the environment;*
- *The vulnerability of the project to potential disasters/accidents, including the risk to the project of both natural disasters (e.g. flooding) and man-made disasters (e.g. technological disasters)."*

(Source: Page 31, Section 4.29)

During the construction phase the risk of accidents and/ or disasters arise from the potential for construction accidents. However, these are addressed under Health and Safety Regulations and other codes and therefore not within the scope of this EIA. Insofar as they are relevant to the planning and EIA process, mitigation measures that will prevent and/ or mitigate the significant effects are contained in the Outline Construction Management Plan (OCMP).

During the operational phase the risk of fire related accidents is similarly addressed through the Building Regulations (Fire Safety) and is therefore addressed through primary mitigation in the design process. Residual risks of fire and road traffic accidents will be managed by emergency services as per their standard procedures.

The risk of flooding and vulnerability of the project is addressed in Chapter 7 and the Site Specific Flood Risk Assessment (SSFRA) submitted with the planning application documentation.

Otherwise, in terms of the project, no other major accidents or disasters are considered to give rise to effects that are 'likely' and 'significant'.

1.6 STRUCTURE/ METHODOLOGY

Structure of EIAR

The overall structuring and scope of this EIAR has regard to the information requirements of the EC Directives, Irish Statutory Regulations and established best practice.

The EIAR has been written and illustrated with figures in a manner which, insofar as possible, is intended to be understandable to the public generally.

In accordance with the statutory regulations, a Non-Technical Summary has been prepared and included in this EIAR.

Chapters 1-3 of the EIAR provides the context for the EIA assessment including details of the planning policy context, alternatives considered, a description of the site, the project (i.e. the proposed development) and the construction methodology.

This is followed by each of the assessment chapters. The structure used in this EIAR is a Grouped Format structure which examines each environmental topic in a separate chapter. The chapter headings reflect the broadened scope of the environmental factors introduced by the 2014 Directive.

The final chapter identifies the significant effects, including cumulative and in-combination effects, of the project and summarises the interactions between the environmental factors discussed in the assessment chapters.

The Appendices contain background and technical details relating to the proposed development and are referred to in the relevant Chapters (numbered with the relevant Chapter number and followed by A, B, C etc.).

In accordance with Section 3.8.4 of the *Draft Guidelines on Information to be Contained in Environmental Impact Assessment Reports* (August 2017), a compendium of the mitigation and monitoring measures to be adopted during the construction and operational phases of the project, detailed within each chapter, are listed in Appendix 1A.

Methodology

A systematic approach is employed using standard descriptive methods, replicable prediction techniques and standardised impact descriptions to provide an appropriate evaluation of each environmental topic under consideration.

An outline of the methodology employed in each chapter to examine each environmental topic is provided below:

- **Introduction**: Provides an overview of the specialist area and specifies the specialist who prepared the assessment.
- **Study Methodology**: This subsection outlines the method by which the relevant impact assessment has been conducted within that chapter.
- **The Existing Receiving Environment** (Baseline Situation): In describing the receiving environment, the context, character, significance and sensitivity of the baseline receiving environment into which the proposed development will fit is assessed. This also takes account of any proposed developments that are likely to proceed.
- **Impacts and Mitigation**: This section provides a description of the impacts that may arise during the construction and operational phases of the project. Appropriate mitigation measures are included where required. A description of any Residual Impacts post implementation of the mitigation measures is given where they occur.
- The impacts will consider both “Do-Nothing” (where the development does not proceed and the environment would not change as a result) and worst case is undertaken.

Where necessary and appropriate the following are also considered:-

- **Monitoring**: This involves a description of monitoring in a post-development phase, if required. This section addresses the effects that require monitoring, along with the methods and the agencies that are responsible for such monitoring. The level of monitoring proposed is proportionate to the nature, location and size of the project and the significance of its effects.
- **Reinstatement**: While not applicable to every aspect of the environment considered within the EIAR, certain measures need to be proposed to ensure that in the event of the proposal being discontinued, there will be minimal impact to the environment.
- **Interactions**: Where applicable, the assessment refers to impact interactions, including potential indirect, secondary and cumulative impacts.

Forecasting Methods

The individual forecasting methods used to assess the various effects of the proposed development on the environment are outlined in the relevant Chapters of this EIAR under the subheading 'Assessment Methodology'.

Difficulties Encountered

Some details of the project and the construction methodology / programme are matters which may be subject to change depending on the contractor(s) appointed and other considerations which are not finalised at this stage, and which cannot be finalised until a grant of planning permission for the proposed development has been issued. These are matters which can be addressed prior to commencement of development in consultation with the planning authority and other relevant stakeholders.

No other significant difficulties were encountered in the preparation of the EIAR. Any limitations or technical difficulties associated with assessment of an environmental topic are detailed in the relevant chapter.

1.7 TERMINOLOGY

The descriptions used to describe the effects on the environment in this EIAR are listed below. These descriptions are taken from the EPA *Guidelines on the Information to be contained in Environmental Impact Statements* (2002) and *Advice Notes on Current Practice in the preparation of Environmental Impact Statements* (2003) and the updated publications prepared by the EPA in response to the 2014 EIA Directive i.e. the Draft *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (2017) and Draft *Advice Notes for preparing Environmental Impact Statements* (2015):-

The quality of the effects is defined as:-

Positive effects	A change which improves the quality of the environment (e.g. by increasing species diversity; or the improving reproductive capacity of an ecosystem, or removing nuisances or improving amenities).
Negative effects	A change which reduces the quality of the environment (e.g. lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).

Neutral effects	A change which does not affect the quality of the environment.

The significance of the effects is described as:-

Imperceptible	An effect capable of measurement but without noticeable consequence
Not significant	An effect which causes noticeable changes in the character of the environment but without noticeable consequences.
Slight effects	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate effects	An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends.
Significant effects	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very significant	An effect which, by its character, magnitude, duration or intensity significantly alters the majority of a sensitive aspect of the environment.
Profound effects	An effect which obliterates sensitive characteristics.

The magnitude of the effect is, where appropriate, indicated as:-

Extent	Describe the size of the area, the number of sites, and the proportion of a population affected by an effect.
Duration	Describe the period of time over which the effect will occur. (See further detail below)
Frequency	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions (is it the biggest, longest effect ever?)

The probability of the effect is, where appropriate, indicated as:-

Likely Effects	The effects that can reasonably be expected to occur as a result of the planned project if all mitigation measures are properly implemented.
Indeterminable Effects	When the full consequences of a change in the environment cannot be described.
\`Worst case' Effects	The effects arising from a project in the case where mitigation measures substantially fail

The duration of the effect is, where appropriate, indicated as:-

Momentary Effects	Effects lasting from seconds to minutes
Brief Effects	Effects lasting less than a day
Short-term Effects	Effects lasting one to seven years.
Medium-term Effects	Effects lasting seven to fifteen years.
Long-term Effects	Effects lasting fifteen to sixty years.
Permanent Effects	Effects lasting over sixty years.

The type of effect is described, where appropriate, as:-

Cumulative Effects	The addition of many small effects to create one larger, more significant, impact.
Do-nothing Effects	The environment as it would be in the future should no development of any kind be carried out.
Indeterminable Effects	When the full consequences of a change in the environment cannot be described.
Irreversible Effects	When the character, distinctiveness, diversity or reproductive capacity of an environment is permanently lost.
Residual Effects	The degree of environmental change that will occur after the proposed mitigation measures have taken effect.
Worst-case	The impacts arising from a development in the case where mitigation measures substantially fail.
Synergistic Effects	Where the resultant effects is of greater significance than the sum of its constituents.
Indirect Effects	Effects that arise off-site or are caused by other parties that are not under the control of the developer (such as a quarry)
Secondary Effects	Effects that arise as a consequence of a project (a new wastewater treatment plant will reduce the yield of mussels in a nearby estuary).

1.8 PROJECT TEAM / CONTRIBUTORS

This EIAR has been prepared on behalf of the developer by a team of qualified experts, as required by Article 5(3) of Directive 2014/52/EU. The contributors involved in the preparation of this EIAR are identified in Table 1.1.

Table 1.1: EIA Team

Chapter		Consultant	Expert Contributor
	Non-Technical Summary	ALL	
1	**Introduction**	BMA Planning Taney Hall, Eglinton Terrace, Dundrum, Dublin 14	John Murphy BA MRUP MIPI. John is a Senior Planner with BMA Planning and has over 17 years' experience in planning and development projects including experience of directing and contributing to the preparation of environmental impact assessments for a variety of projects.
2	**Planning Policy Context**	BMA Planning	John Murphy BA MRUP MIPI
3	**Description of Project and Alternatives**	BMA Planning	John Murphy BA MRUP MIPI

4	**Population and Human Health**	BMA Planning	John Murphy BA MRUP MIPI
5	**Biodiversity / Species and Habitats**	Openfield Ecological Services, 12 Maple Avenue, Castleknock, Dublin 15	Pádraic Fogarty B.Sc. Analytical Science, Msc. in Environmental Protection, Dip. in Environment and Geography, Dip. Field Ecology, IEMA. Pádraic is Managing Director of Openfield Ecological Services and has 25 years' experience in the environmental sector. He has a primary degree in Analytical Science from DCU, a Masters in Environmental Protection from Sligo IT, a Diploma in Environment and Geography from the Open University and a Diploma in Field Ecology from UCC. He is a full member of the Institute for Environmental Management and Assessment.
6	**Land and Soils**	POGA Consulting Engineers, Unit C2, Nutgrove Office Park, Meadow Park Avenue, Rathfarnham, Dublin 14	Paul Moran Bachelor of Engineering (Hons) Chartered Engineer (CEng) Member of the Institute of Engineers of Ireland (MIEI).Member of the Federation of European Engineers (Eur.Ing.) Fellow of the Association of Consultant Engineers of Ireland. Certified Internal QMS Auditor. Design and Assigned Certifier. Managing Director of POGA Consulting Engineers with 20 years' experience as a Consultant Engineer in Ireland. Eamonn Mahon Bachelor of Engineering (Hons), Master of Science. Chartered Engineer (CEng) Member of the Institute of Engineers of Ireland (MIEI).Member of The Institution of Structural Engineers. Design and

		Assigned Certifier. Associates at POGA Consulting Engineers with 17 years’ experience as a Consultant Engineer in Ireland
7 Water	POGA Consulting Engineers	Noel Mahon Bachelor of Engineering. Masters in Engineering (M Eng). Member of the Institute of Engineers of Ireland (MIEI). Project Supervisor Design Process Senior Engineer at POGA Consulting Engineers with 7 years’ experience as a Consultant Engineer in Ireland and New Zealand. Eamonn Mahon BEng (Hons) MSc CEng MIEI MIStructE
8 Air and Climate	Byrne Environmental Consulting Ltd., Red Bog, Skryne Road, Dunshaughlin, Co. Meath	Ian Byrne MSc Environmental Protection, Dip Environmental and Planning Law, Member of the Institute of Acoustics. Ian has over 24 years’ experience as an acoustic consultant and has particular speciality in the monitoring assessment and management of the impacts on noise and vibration on human health and on the receiving environment. Ian has prepared numerous air quality and climate impact assessments for large residential, commercial and industrial developments for private and public clients.
9 Noise and Vibration	Byrne Environmental Consulting Ltd	Ian Byrne MSc Environmental Protection, Dip Environmental and Planning Law, Member of the Institute of Acoustics.
10 Material Assets: Built Services	POGA Consulting Engineers	Paul Moran BEng (Hons) Dip.Eng Eur.Ing CEng MIEI.

		Eamonn Mahon BEng (Hons) MSc CEng MIEI MIStructE
11 Material Assets: Transportation	Atkins Atkins House, 150 Airside Business Park, Swords, Co. Dublin	Chris Fay BEng PGradDip CEng MIEI. Chris Fay is a senior engineer with Atkins and has over 13 years' experience in relation to traffic and transportation projects of varying types sizes and complexity including direct experience of contributing to the preparation of environmental impact assessments.
12 Material Assets: Resource and Waste Management	Byrne Environmental Consulting Ltd	Ian Byrne MSc Environmental Protection, Dip Environmental and Planning Law, Member of the Institute of Acoustics.
13 Cultural Heritage	IAC Archaeology Unit G1, Network Enterprise Park, Kilcoole, Co. Wicklow	Faith Bailey BA (Hons), MA, MCIfA, MIAI is an Associate Director and Senior Archaeologist and Cultural Heritage Consultant with IAC Archaeology. She holds an MA in Cultural Landscape Management (archaeology and built heritage) and a BA in single honours archaeology from the University of Wales, Lampeter. She is a licence eligible archaeologist and has over 18 years' experience working in the commercial archaeological and cultural heritage sector. Faith has significant experience in the preparation of Briefs of Evidence and taking the stand as the expert witness at Oral Hearings. Ross Waters is a graduate of University College London where he completed a MA in Managing Archaeological Sites in 2017. He obtained

		his undergraduate degree, Ancient and Medieval History and Culture, from Trinity College Dublin in 2015 (BA Mod.). Ross has been working with IAC Archaeology since 2016 where he has been involved in the compilation of multiple archaeological assessments and EIAR chapters for a large variety of proposed developments (including SID projects) across Ireland.
14 The Landscape	Model Works The Old Courtyard, Newtownpark Ave, Glebe, Blackrock, Co. Dublin	Richard Butler MSc Sp. Planning, BSc Landscape Arch., Dip Proj Mgmt, MIPI, MILI. Richard is Director of Model Works's Planning Services department. He has an MSc in planning, a BSc in landscape architecture and is an active member of the IPI and ILI. Richard has 23 years' experience in development and environmental planning, specialising in Landscape and Visual Impact Assessment (LVIA).
15 Significant Effects, Interactions and Other Impacts	BMA Planning	John Murphy BA MRUP MIPI and input from Contributors of each of the assessment chapters.

2.0 PLANNING POLICY CONTEXT

2.1 INTRODUCTION

The current application has been prepared in the context of a range of national, regional and local planning policy sources. These are reviewed and commented on in detail in the ***Statement of Consistency***, prepared by BMA Planning and submitted with this application. It is not proposed to repeat these provisions in this document.

The following is a summary of the most relevant plans to the current project.

2.2 DEVELOPMENT PLAN

The ***Fingal County Development Plan 2017 – 2023*** (the "Development Plan") is the current statutory development plan for the area.

The Development Plan sets out the policies and objectives for the development of the county over the plan period and is comprised of a Written Statement including Appendices.

The following outlines the most relevant provisions of the Development Plan as a context for the proposed development.

Core Strategy and Settlement Strategy (Chapter 2)

The Development Plan Core Strategy and Settlement Strategy prioritises the consolidation of future growth within strong and dynamic urban centres. The Strategy also directs development in the Hinterland to towns and villages to discourage dispersed development and unsustainable travel patterns.

Charlestown is classified as a '*Consolidation Area Within Gateway'.* **Objective SS15** and **Objective SS16** are applicable to the Subject Site and both Objectives aim to strengthen and consolidate existing urban areas through encouraging higher densities, particularly on brownfield sites.

Placemaking (Chapter 3)

Charlestown is designated as a *'Town and District Centre'* in this Chapter. The function of Town and District Centres is to *"offer a range of services, facilities and retail for their immediate hinterland".*

There are a number of Objectives in this Chapter which are applicable to the proposed development. The following are worthy of note: -

> **Objective PM39:** "*Ensure consolidated development in Fingal by facilitating residential development in existing urban and village locations."* (Page 71)
>
> **Objective PM41**: "*Encourage increased densities at appropriate locations whilst*

> *ensuring that the quality of place, residential accommodation and amenities for either existing or future residents are not compromised."* (Page 71)
>
> **Objective PM44:** "*Encourage and promote the development of underutilised infill, corner and backland sites in existing residential areas subject to the character of the area and environment being protected.*" (Page 72)

Urban Fingal (Chapter 4)

Under the '*Charlestown and Meakstown'* header of this Chapter, the Development Plan states that Charlestown is an 'an important residential settlement' which is well served by *'retail facilities focussed on the Charlestown Shopping Centre and with schools and community facilities'.*

Economic Development (Chapter 6)

This Chapter outlines a strategy for Fingal's economic development.

Objective ED08 in this Chapter aims to *"Utilise the measures and powers available to Fingal to encourage and promote the regeneration of areas in need of renewal, for instance in underperforming or outdated commercial and/ or industrial areas, and in town and village centres where higher vacancy rates exist."*

Objective ED42 in this Chapter aims to *"Ensure the development of Balbriggan, Malahide, Skerries and Charlestown as sustainable, vibrant and prosperous Town Centres performing at a high retail level within the Fingal Retail Hierarchy".*

Movement and Infrastructure (Chapter 7)

This Chapter aims to promote and facilitate sustainable transport and travel through prioritising walking, cycling and public transport.

Given the location of the proposed development and its proximity to Charlestown Shopping Centre, the proposed development encourages and prioritises walking, cycling and public transport.

Land Use Zoning Objectives (Chapter 11)

The subject site is zoned *"TC* – Town and District Centre". The zoning objective is to *"Protect and enhance the special physical and social character of town and district centres and provide and/or improve urban facilities."* Use classes related to the "*TC*" Zoning Objective are listed in Page 403 of this Chapter and "*Residential*" use is "*Permitted in Principle*".

Figure 2.1 illustrates the current application site in the context of the zoning objectives map

Development Management Standards (Chapter 12)

All Development Management Standards included in Chapter 12 have been considered and the development has incorporated these principles and standards insofar as they are relevant to the proposals (e.g. Common Principles for all Planning Applications – Section 12.2, Design Criteria for Urban Development – Section 12.3, Design Criteria for Residential Development - Section 12.4, Open Space – Section 12.7 and Community Infrastructure, Facilities and Services

– 12.8).

Common Principles for all Planning Applications (Section 12.2)

Consideration of issues relating to access for all, green infrastructure and sustainable design are inherent in the design and layout of the proposed development as detailed in the architectural and landscape design statements prepared by the project architect and landscape architect. These proposals are supported by the required assessments including the current EIAR and a Screening Report for appropriate assessment.

Design Criteria for Urban Development (Section 12.3)

In accordance with Objective DMS03 of the Development Plan a detailed design statement has been prepared by the project architect and is enclosed with the application. The design statement sets out the design principles and concept on which the proposed development is based and should in read in conjunction with the project landscape architects design statement which details how green infrastructure is integrated into the development.

Design Criteria for Residential Development (Section 12.4)

Section 12.4 sets out qualitative and quantitative standards for residential development including apartment and duplex developments. In addition to the project architect and project landscape architect design statements, a Housing Quality Assessment has been prepared and is submitted to demonstrate compliance with the relevant standards for apartment developments.

Open Space (Section 12.7)

Qualitative and quantitative standards for public and private open space are provided within Section 12.7 of the Development Plan. These standards have informed the design and layout of the proposed development and compliance with these standards is demonstrated within the enclosed architectural and landscape design statements and the Housing Quality Assessment submitted with the current application.

Community Infrastructure, Facilities and Services (Section 12.8)

Section 12.8 of the Development Plan seeks the provision of community facilitates as a pre-requisite to the creation and enhancement of viable and sustainable communities. The provision of community facilities within the current application has been informed by a Social Infrastructure Audit. Facilities included within the current application include a creche and health centre.

Figure 2.1: Extract from *Fingal County Development Plan 2017 – 2023 Zoning Objectives Map*

2.3 SECTION 28 MINISTERIAL GUIDELINES

Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas (2009) and Associated Urban Design Manual Best Practice Guidelines (2009)

These Guidelines set out the key planning principles for residential development in urban areas. The Guidelines are accompanied by a non-statutory Design Manual which illustrates how the policy principles can be translated into practice by developers.

The principles of the Guidelines are translated into the planning and design objectives and standards contained in the Development Plan.

These objectives and standards have informed the nature, scale and form of development within the current application and ensure a plan-led approach to the development of the site.

The Urban Design Manual provides a series of criteria against which residential developments can be assessed. These are divided into 3 categories: - Neighbourhood, Site and Home.

The proposed layout, design and built form is guided by the principles set out within the Guidelines and the design criteria within the Design Manual. This ensures that the proposed development provides residential dwellings that are connected to local public transport options and accessible to existing retail and local services.

Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for Planning Authorities (2018)

These Guidelines, hereafter referred to as the 'Apartment Guidelines' contain qualitative and quantitative measures for the design of apartments and related facilities including storage areas, open spaces and communal facilities. *Specific Planning Policy Requirements* (SPPRs) included in the Guidelines take precedence over policies and objectives of development plans, local area plans or SDZ planning schemes.

The design and layout of the proposed apartments are consistent with the standards for internal floor areas, rooms sizes, private amenity space and communal amenity space. Comprehensive schedules and floor plans demonstrating compliance are provided in the Housing Quality Assessment submitted with the planning application.

Urban Development and Building Heights Guidelines for Planning Authorities (2018)

The Government has issued new Section 28 Guidelines that set out national planning policy guidelines on building heights, building on the policies in Project Ireland 2040 and the National Planning Framework (NPF).

The Building Height Guidelines support, in principle, heights of **6 storeys** at street level with scope to consider greater building heights within city centre areas including within the canal ring in Dublin.

Applications for increased building heights, taller than the prevailing building heights in urban areas, can be considered and approved by the Planning Authority / An Bord Pleanala under Specific Planning Policy Requirement 3 (SPPR3) where the relevant plan (i.e. Development Plan) pre-dates these Guidelines.

Section 2.8 of the Building Height Guidelines refers to the potential impact of taller buildings on historic environments and the need to establish the sensitivities of a place and its capacity for development or change.

The proposed development is a response to the specific site considerations with a mix of 2 to 10 storeys in building heights. This will provide an appropriate form of development to ensure an efficiency in land usage adjacent to public transport links and will provide a compact urban form for this accessible site.

Design Manual for Urban Roads and Streets (2019)

The *Design Manual for Urban Roads and Streets* (DMURS) aims to create well-designed streets which are not dominated by traffic but balanced to the needs of all users and appropriate to the type of place in which the street is located.

A DMURS Statement of Consistency by Pat O'Gorman Consulting Engineers accompanies this planning submission. This document confirms that the proposed design and layout of the road and street network is consistent with the *Design Manual for Urban Roads and Streets 2019.*

Childcare Facilities Guidelines for Planning Authorities (2001)

The *Childcare Facilities Guidelines for Planning Authorities* refer to a benchmark of an average of one facility (with 20 childcare spaces) for 75 houses and also provide broader guidance on internal standards for childcare facilities.

The *Sustainable Urban Housing: Design Standards for New Apartments (2018)* provided an update on this guidance, noting studio and 1 bed units should not generally be considered to contribute a requirement for childcare provision.

The design and layout of the childcare facility provided in the project is in accordance with these Guidelines and Design Standards.

The Planning System and Flood Risk Assessment - Guidelines for Planning Authorities (2009)

These Guidelines introduce comprehensive mechanisms for the incorporation of flood risk identification and management into the planning process.

A Site-Specific Flood Risk Assessment (SSFRA) has been prepared for the current application and is enclosed with the application. Flood risk and stormwater impact on the proposed development was considered in the SSFRA and it was found that there is no risk of flooding to the proposed development, its occupants or users and adjoining properties.

2.4 NATIONAL AND REGIONAL POLICY

The following national and regional policy documents are relevant to this project: -

- *Project Ireland 2040 - The National Planning Framework*
- *Rebuilding Ireland – Action plan for Housing and Homelessness (2016)*
- *Regional Spatial & Economic Strategy (RSES) 2019-2031 for the Eastern & Midland Region*

Project Ireland 2040 – National Planning Framework

The National Planning Framework (NPF) is the Government's high-level strategic plan for shaping the future growth and development of the Country out to the year 2020.

A key element of the NPF's strategy is compact growth with the key features being: -

- *Targeting a greater proportion (40%) of future housing development to be within and close to the existing 'footprint' of built-up areas.*
- *Making better use of under-utilised land and buildings, including 'infill', 'brownfield' and publicly owned sites and vacant and under-occupied buildings, with higher housing and jobs densities, better serviced by existing facilities and public transport.*
- *Supporting both urban regeneration and rural rejuvenation through a €3 Billion Regeneration and Development Fund and the establishment of a National Regeneration and Development Agency.*
  (Page 22)

In accordance with the National Policy Objectives of the NPF, the current application will deliver a high-density development of modern and adaptable new homes within an existing urban area in close proximity to existing public transport and local service provision.

Rebuilding Ireland – Action Plan for Housing and Homelessness (2016)

This document is the Government's Action Plan on Housing and Homelessness. It seeks to improve the viability of housing construction and ensure that an average of 25,000 homes are produced every year in the period to 2021.

Action Plan
For Housing and
Homelessness

Rebuilding
Ireland

This is an initiative of the Government of Ireland

To achieve this, Five Pillars are outlined, each with specific key actions: -

- Pillar 1 – Address Homelessness
- Pillar 2 – Accelerate Social Housing
- Pillar 3 – Build More Homes
- Pillar 4 – Improve the Rental Sector
- Pillar 5 – Utilise Existing Housing

The proposed residential development will help to achieve the objectives of this Action Plan, particularly Pillar 3, where a target of 25,000 homes annually, built by the private sector, is targeted for the period of 2016-2021.

Regional Spatial and Economic Strategy 2019-2031

The *Regional Spatial & Economic Strategy, 2019-2031* (RSES) for the Midlands and Eastern Region was made on 28th June 2019.

This Plan, which replaces the *Regional Planning Guidelines for the Greater Dublin Area 2010-2022*, is a strategic plan providing a multifaceted approach based upon *Health Placemaking; Climate Change; and Economic Opportunity.*

The RSES provides: -

- a spatial strategy;
- an economic strategy;
- an investment framework;
- a climate action strategy;
- a Metropolitan Area Strategic Plan (MASP) for Dublin.

The proposed development will deliver a high-density scheme of modern new homes, within an existing urban area, in close proximity to existing public transport and local service provision. This is in accordance with the principles and vision of the Metropolitan Area Strategic Plan (MASP) and *Regional Spatial & Economic Strategy, 2019-2031* (RSES).

3.0 DESCRIPTION OF PROJECT AND ALTERNATIVES

3.1 INTRODUCTION

This Chapter provides a description of the project site in the context of its receiving environment and a description of the project and the main alternatives considered in so far as relevant from an environmental impact perspective.

The project description should be read in conjunction with the plans and particulars submitted with the planning application including the Planning Application Report, design statements and other technical studies. To avoid unnecessary repetition, it is not proposed to repeat the contents of these reports.

3.2 THE SITE

Site Context

Charlestown is located c.1.5kms to the north of Finglas Village, east of the N2/ North Road, south of the M50 and west of St. Margaret's Road within the townland of Charlestown, Dublin 11.

The Charlestown Centre Shopping Centre is located directly to the north of the current application site and the northern and eastern boundaries of the site are defined by Charlestown Place and St. Margaret's Road respectively.

Figure 3.1 illustrates the site location and context.

The surrounding land uses comprise a mix of commercial, light industrial and residential development with a pocket of undeveloped urban fringe lands adjoining the site to the west.

The Charlestown Centre to the north is a mixed-use retail and commercial development with 5 levels of residential accommodation above the double height commercial space and basement level car parking. A 12-storey residential tower element it located at its south eastern corner.

The undeveloped lands to the west are zoned '*GE – General Employment'*. To date no applications have been submitted for these undeveloped lands to the west of the current application site.

The McKelvey housing estate is located to the south of the site. The boundary to the McKelvey development is also the Dublin City Council / Fingal County Council administrative boundary. The existing estate comprises 2 storey terraced houses with the rear gardens of the existing houses on McKelvey Avenue backing onto the current application site. To the south west of the current application site existing land uses comprise light industrial warehouse units fronting onto the R135 Finglas Road.

The lands to the east of the current application site accommodate the Century Business Park comprising a series of elongated light industrial blocks orientated on a north south access. These blocks are generally double or triple height units with associated car parking to the foreground. Century Business Park forms part of the wider Jamestown Industrial Estate which extends to the east and south to Jamestown Road.

The Meakstown residential neighbourhood is located to the north east of the current application site. Centred around a large landscaped park the existing residential units comprise a mix of 2 storey terraced houses and 3/ 4 storey apartment blocks within a large neighbourhood bound by St. Margaret's Road to the west, the M50 to the north, Jamestown Road to the east and Melville Road to the south.

Site Description

The current application site (c.3.9ha) comprises an existing surface car park (567no. spaces) and undeveloped lands located to the south of the Charlestown Centre and Charlestown Place and west of St. Margaret's Road, Finglas, Dublin 11.

Figure 3.2 illustrates an aerial view of the site.

The site currently comprises a temporary surface car park associated with the Charlestown Centre to the north and undeveloped greenfield areas. The temporary surface car park was constructed in 2007 as a temporary measure for customer convenience and as the planning and construction programmes for the Charlestown Centre Phase 1 and Phase 2 below podium works were being finalised.

The site is accessed via an existing access road and signalised junction from Charlestown Place. This access road also serves McKelvey Celtic AFC clubhouse and playing pitch located to the southeast of the subject site.

Plates 3.1 to 3.10 comprise photographs of the site and surroundings illustrating the principal features of the application site and adjoining sites.

Planning History

Permission was granted on the current application site under Reg. Ref. F07A/0121 for a temporary (3 years) surface car park accommodating 567no. car parking spaces and associated pedestrian crossing with vehicular access from the permitted junction off Charlestown Place. Permission was subsequently granted for an additional 5 years in 2009 and again in 2014 under Reg. Refs. F09A/0542 and F14A/0304.

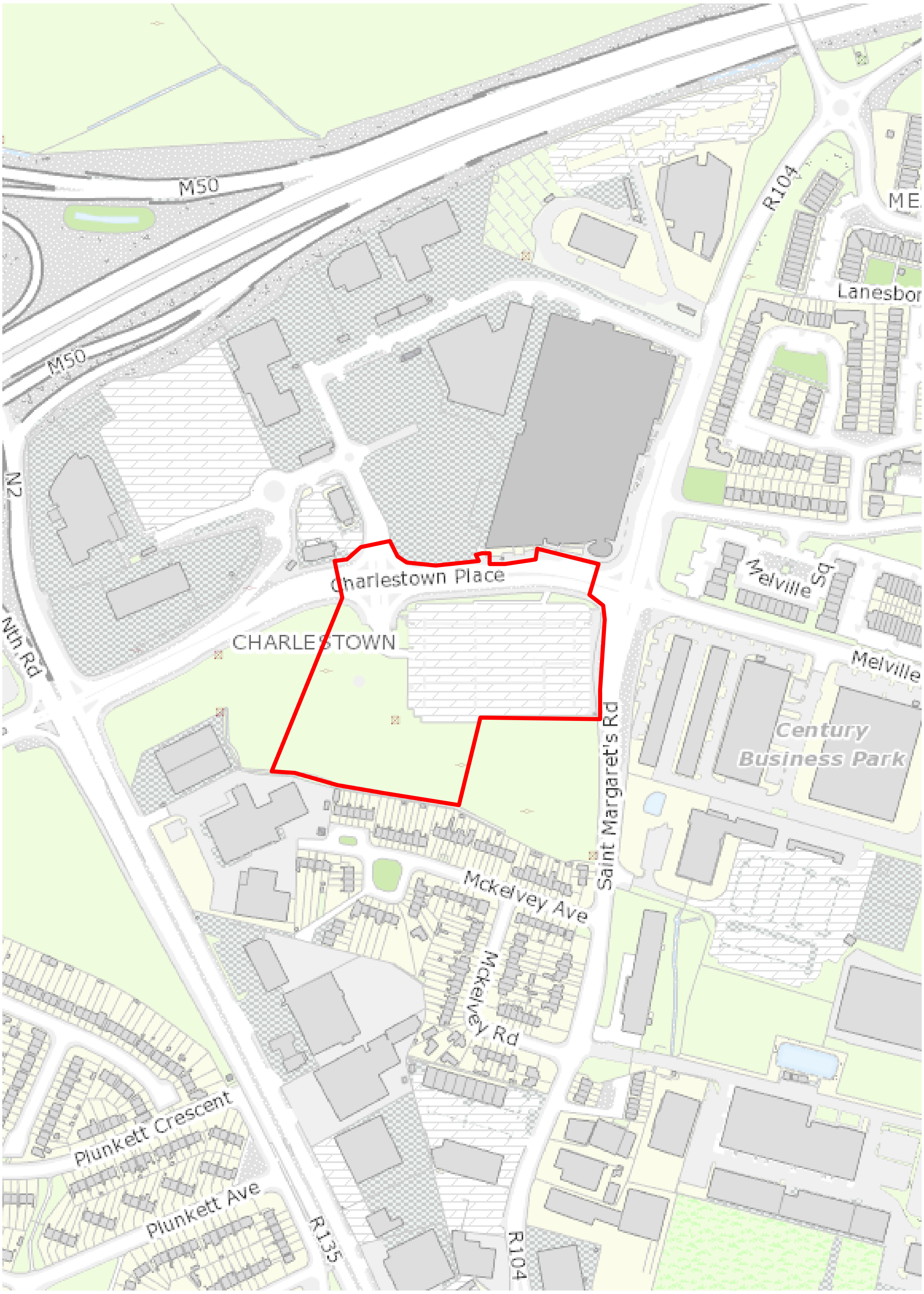

Figure 3.1: Site Location and Context

Figure 3.2 Site Aerial View (Source: Googlemaps)

Plate 3.1: View North Towards the Site from the South on St. Margaret's Road

Plate 3.2: View North West Across the Site from St. Margaret's Road

Plate 3.3: View South Towards the Site from St. Margaret's Road

Plate 3.4: View South West Towards the Site from St. Margaret's Road

Plate 3.5: View West Towards the Site from Melville Road

Plate 3.6: View West Towards the Site from Melville Road and St. Margaret's Road Junction

Plate 3.7: View East Towards the Site from Charlestown Place

Plate 3.8: View South East Across the Site from Charlestown Place

Plate 3.9: View North from the Centre of the Site

Plate 3.10: View South From the Centre of the Site

3.3 PROPOSED DEVELOPMENT

The development will consist of 590no. apartment units comprising of 234no. 1 bed apartments, 316no. 2 bed apartments and 40no. 3 bed apartments. The proposed apartments are arranged in 4no. 2 to 10 storey blocks (Blocks 1 to 4).

Permission is also sought for non residential uses at ground floor level within Blocks 1 and 2 comprising 2no. retail/ commercial units totalling 350sq.m, a creche of 542sq. with external play area, 4no. office suites of 224sq.m and a health/ medical centre of 526sq.m

The proposed development also includes a central landscaped public open space - labelled Public Open Space No. 1 - extending to c.4,737sq.m and a linear public open space - labelled Public Open Space No. 2 - extending to 1848sq.m. The proposed central public open space is linked to a north south pedestrian boulevard connecting to the Charlestown Centre to the north of the site. Communal open spaces are provided within the courtyard areas at the ground floor levels of Blocks 1 to 4 and roof gardens within Blocks 1, 2 and 4.

The central landscaped public open space is also the site of an attenuation tank permitted under Reg. Ref. F19A/0146. This attenuation tank was designed to accommodate surface water outflow from the Phase 1 Charlestown Shopping Centre, the adjoining Phase 2 apartment scheme and the current application site. Construction of the attenuation tank permitted under Reg. Ref. F19A/0146 will be completed in 2021. Surface water from the current application site will be intercepted and redirected to this attenuation tank.

Vehicular access to the proposed development will be from the existing signalised junction on Charlestown Place. Amendments to the southern arm of this junction to facilitate the proposed development include removal of the existing pedestrian islands and reductions to the junction radii.

Provision is also made for vehicular access from Charlestown Place through the site to McKelvey Celtic AFC at the south eastern corner of the site and a future access to the undeveloped greenfield site to the west. Cycle and pedestrian access routes are provided from the northern boundary with Charlestown Place and eastern boundary with St. Margaret's Road.

Pedestrian access from the current application site to the Charlestown Centre to the north will be via a relocated pedestrian crossing aligning with the proposed pedestrian boulevard.

515no. car parking spaces are proposed within the current application including 351no. spaces within a shared basement level within Blocks 1 and 2 and 81no. spaces at basement level within Block 4. An additional 83no. spaces are provided at surface level. A total of 474no. spaces are provided for the proposed residential accommodation at a ratio of 0.8 spaces per unit. The remaining 41no. spaces are provided to cater for the proposed non residential uses and Go Car provision and are located at basement level within Blocks 1 and 2 and at surface level.

Permission is also sought for bin storage and cycle parking (1,068no. spaces), hard and soft landscaping, ESB substations, public lighting, boundary treatments, surface water drainage infrastructure and all associated site development and infrastructure works.

Table 3.1 below provides a summary of the proposed development, outlining the residential and non-residential floorspace, block by block.

Figure 3.3 is an extract from the proposed site layout prepared by MCORM Architects.

TABLE 3.1 SUMMARY OF PROPOSED DEVELOPMENT			
BLOCK	**HEIGHT (STOREYS)**	**UNITS**	**GFA (SQM)**
Block 1	2 to 10		
• Apartments		211	18,949
• Retail/ Commercial		1	170
• Office Suites		3	160
• Creche		1	542
Block 2	2 to 7		
• Apartments		184	17,439
• Retail/ Commercial		1	180
• Office Suite		1	64
• Health Centre		1	526
Block 3	8		
• Apartments		95	8,021
Block 4	2 to 6		
• Apartments		100	9,472
Total			
• Apartments		590	53,881
• Non Residential Floorspace		8	1,642
• **GFA**			**55,523**

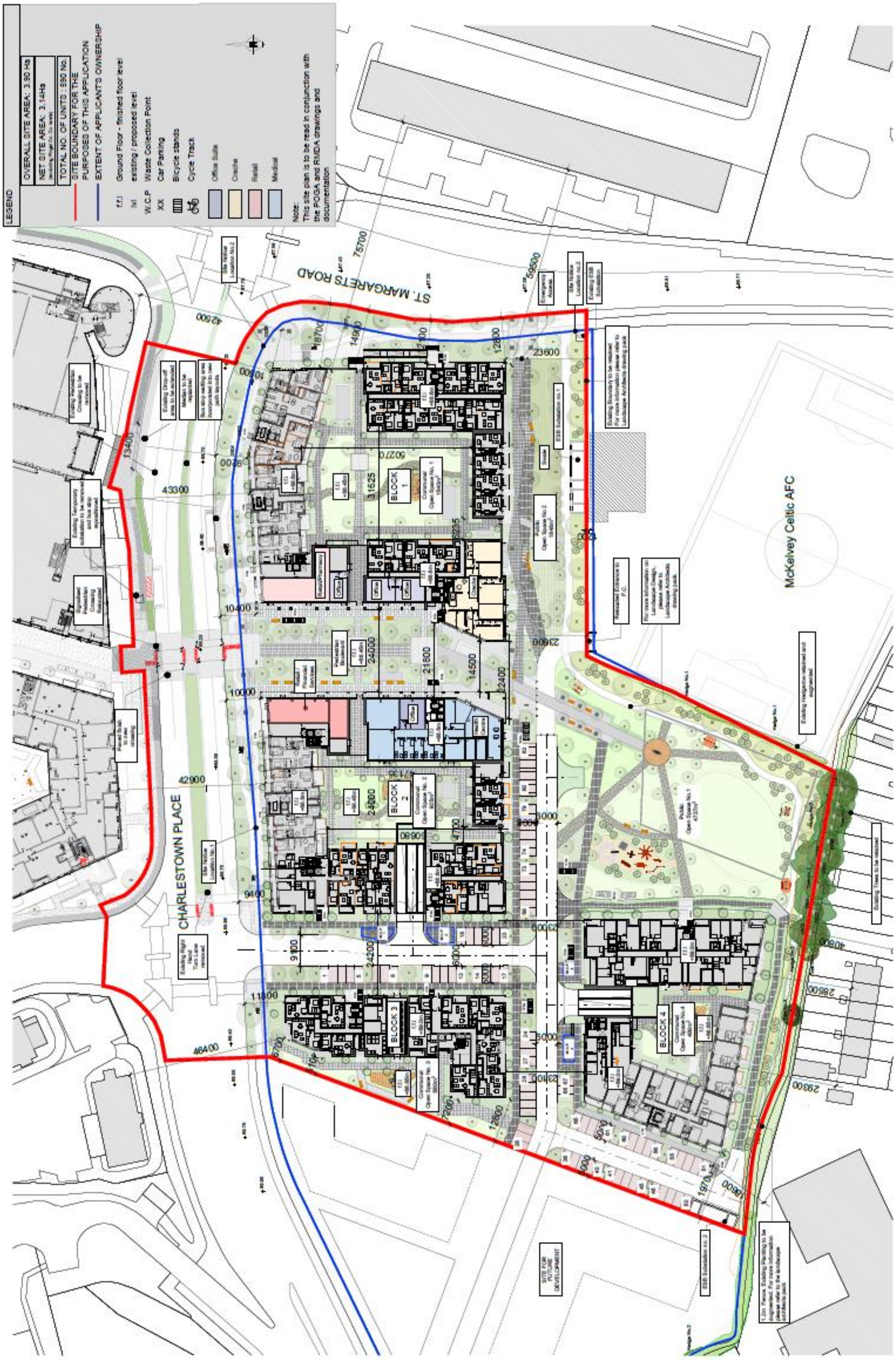

Figure 3.3 Proposed Site Layout Plan

3.4 RELATED PROJECTS AND CULMULATIVE EFFECTS

The following are the main related projects. Each of these projects has or will be required to undertake their own environmental assessments, considering the effects of these projects on the environment and the cumulative effects with other relevant projects.

The cumulative effects of the project with the other projects listed below, if any, are considered in the relevant Chapters of this EIAR and summarised in Chapter 15.

- Charlestown Centre Residential Development: - Permission granted by Fingal County Council under planning Reg. Ref. F19A/0146 for a total of 374no. residential units on lands directly to the north of the current application site and Charlestown Place and west of the Charlestown Centre. This development is currently under construction.

- R135 Finglas Road and Charlestown Place Junction Upgrade: - As a condition of the above permission under Reg. Ref. F19A/0146, details are to be agreed in relation to an upgrade to the junction of the R135 Finglas Road and Charlestown Place. This upgrade includes an additional right turn lane on the Charlestown Place arm of the junction allowing improved overall junction operation. This project will be completed in tandem with the above development permitted under Reg. Ref. F19A/0146.

3.5 CONSTRUCTION ACTIVITIES

This section contains a description of the construction process as it is known at this pre-consent stage and ahead of detailed design development.

The description has considered the outermost or “not to exceed” parameters where full details of the construction process is not known or available at this stage. It is considered that the description of the construction phase activities provides a sufficient level of detail for planning permission / EIA purposes.

Certain assumptions are made in the OCMP based on the information available at this time and, for the avoidance of doubt, it is not proposed, or intended, that the applicant/ contractor(s) are bound by these proposals which may change depending on the timing and circumstances pertaining at the time of construction.

The OCMP contains further detail on the construction programme and construction related activities outlined below. It also addresses issues relating to volumes of materials, traffic and environmental controls, health and safety etc. On receipt of a grant of permission, the appointed contractor(s) will prepared a Construction and Environmental Management Plan to comply with and implement the requirements and mitigation and monitoring measures set out in this EIAR and any conditions imposed as part of the granted planning approval.

3.5.1 Land Use Requirements

Site Access

The appointed contractor will prepare a Construction Traffic Management Plan (CTMP) for the site prior to commencement and the provisions of this plan including erection of signage on public roads, will be agreed with Fingal County Council in advance of commencement on site. The construction traffic management plan shall be updated appropriately to ensure coordinated and effective traffic management practices and arrangements are in place throughout the construction period.

External to the site, traffic will include construction workers travelling to site, and material deliveries which will include small delivery vans, large rigid trucks, articulated trucks and trailers, and concrete trucks. Excavated material will be removed off site during the first few months of the project as bulk excavation.

The Contractor will organise deliveries to minimise congestion on public roads by avoiding peak traffic periods where possible. During particularly busy periods such as during concrete pours, trucks will be queued up inside the site.

Deliveries will be on a “just in time” basis and this system will be strictly controlled between the Site Supervisors and the Purchasing Manager who will organise the deliveries. The Purchasing Manager will provide the Site Supervisors with contact details for suppliers who will make contact to ensure drivers are made aware of the site location and the correct route to site in accordance any Local Authority requirements.

Site Parking, Compound & Access Control

While parking will be available in the compound area of the site, workers will be encouraged to use public transport where possible to reduce congestion on public roads. Dublin Bus services are readily available in the immediate vicinity.

Controlled access to the site, in the form of gates will be monitored by site personnel, while site access to the existing football grounds will be maintained during the works. These will be locked and secured to prevent unauthorised access during periods when these are not monitored by site personnel. (e.g., outside working hours). CCTV will also be used for periods outside working hours to prevent unauthorised site access.

The compound shall be constructed using a clean permeable stone finish. Site accommodation to be provided will include suitable-washing / dry room facilities for construction staff, sanitary facilities, office accommodation etc. Refer to **Figure 3.4** below.

Figure 3.4 Proposed Site Setup

The compound will contain an area for containment of all construction-related fuel and oils, it is proposed to use specially bunded HDPE tanks for all fuel stored on site.

On completion of the works all construction materials, debris, temporary hardstanding's, etc. from the site compound will be removed off site and the site compound area reinstated in full.

3.5.2 Site Layout and Preparation

The exiting topography of the site is relatively flat and there is limited need to reshape the existing ground to allow for the construction activities. Site roads, storage areas, contractors parking and office will be finished with 200-300mm of broken stone 6F2 granular material for the duration of the construction. Repairs will be made during the construction period as necessary. Refer to **Figure 3.4** for site set up plan.

Site Clearance and Demolition

The subject site comprises in the main a large open area of part temporary carpark (now closed) and part open field. There are no existing buildings on the site. Part of the site, however, is used as a temporary carpark which is finished with a macadam surface. The intention is for the macadam surface to the temporary carpark to be taken up and removed off-site for recycling, the granular stone under the macadam will be reused on site as site fill for haul roads, etc. The topsoil will be stripped from the grassed area and stored on site for reuse for the landscaping work later on. Any imported topsoil will be screened for invasive species and sourced from reputable landscape suppliers.

Hoarding and Compound set up

The site area will be enclosed with hoarding, final details of which will be agreed with Fingal County Council. This will involve providing a 2.4m high hoarding around the proposed site perimeter in line with the extent of the finished development. Hoarding panels will be maintained and kept clean for the duration of the works.

The size of the site will enable the Contractor to set up the site compound within the site boundary. Refer to **Figure 3.4** for site setup plan. The exact location of the construction compound, access and egress will be confirmed in advance of commencement of the works (and agreed with Fingal County Council).

The Contractor will be responsible for the security of the site. The Contractor will be required to:

- Install adequate site hoarding to the site boundary;
- Maintain site security at all times;
- Separate public pedestrian access from construction vehicular traffic.

As with all construction being carried out within the Fingal local authority area, activities associated with the construction compounds will be subject to restrictions to the nature and timing of operations so that they do not cause undue disturbance to neighbouring areas and communities.

Cut, Fill, Staging and Disposal Areas

The development requires the construction two single storey basements located under blocks 1&2 and block 4. It is estimated the total excavation volumes will be approximately 86,000 m3 of material. The site investigation report shows the materials to be excavated is mainly medium dense clay.

The excavation will start in block 4 and blocks 1&2 at the same time, however block 4 being much smaller, this will finish first. It's estimated the block 4 basement excavations will take 16 weeks, and blocks 1 and 2 will take 32 weeks. Where possible the excavated material will be moved straight off site and it's not expected to be stored on site. This will avoid double handling of the material.

Drainage Diversions

There is an existing surface water pipe located to the East of the permanent access road that is to be diverted; this diversion is approximately 100m in length. Refer to drawing 1723-103 enclosed with the application.

3.5.3 Construction Activities

This section of the EIAR summaries the construction activities associated with the proposed development. The Outline Construction Management Plan submitted separately in the planning application, and the Construction and Demolition Waste and By-Product Management Plan should also be consulted.

Working Hours & Staff

For the duration of the proposed building works the working hours shall be 07:00 to 18:00 Monday to Friday (excluding bank holidays) and 08:00 to 14:00 Saturdays, subject to any restrictions or relaxations imposed by the local authorities. No working will be allowed on Sundays and Public Holidays. All working hours are subject to agreement with Fingal County Council. Out of hours working may be required occasionally for the watermain and drainage connections and final junction/road upgrades, as well as finishing of concrete.

Lighting

A power supply will be obtained from ESB Networks to power both the compound and the construction site to avoid the use of diesel generators to prevent noise and odors pollution. Temporary site lighting will be installed to provide safe and well lighted walkways around the site compound and task lighting to the construction site.

Delivery and Storage

The Contractor will ensure that the delivery of materials is coordinated to minimise the impacts on the surrounding local communities. The Contractor will ensure that all materials are adequately stored and secured in their site compound. The Contractor will ensure the roads adjacent to the site are kept clean and free of debris.

Traffic Management Procedures / Generation

The contractor will prepare a site specific Construction Traffic Management Plan (CTMP) prior to the construction works commencing. The contractor will be responsible for the implementation of all agreements between the developer and Fingal County Council with the objective that the transportation needs for the proposed development will have a minimal impact on the road network and local communities.

Site signage will be provided as per Chapter 8 of the Traffic Signs Manual on approach to the proposed site entrance location advising of the presence of a ‘site access ahead’ and ‘construction traffic ahead’. To minimise the impact on surrounding road network, all entry locations will be numbered so deliveries can be directed to particular entrance. The signage described above shall be removed following completion of the construction phase.

Disposal of water, wastewater and sewage

All site facilities during construction will be located within the site boundary. The construction compound will include site staff welfare facilities such as washrooms, drying rooms, canteen and first aid areas, as well as foul drainage and potable water supply. It is envisaged that these facilities will be connected to the Irish Water wastewater system. This will require an application to Irish Water and approval of same before connections are made**.** Throughout the works, all surface water (water from excavations etc.) will be directed to on site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge at a controlled rate. Visual checks of the pumping and settlement system will be carried out on a routine basis. The location of the outfall from any temporary pumping for the construction activities will be agreed with the Local Authority prior to construction.

Air Quality

There is the potential for a number of emissions to the atmosphere during the construction stage of the project. In particular, activities may generate quantities of dust. Construction vehicles, generators etc. will also give rise to some exhaust emissions. Vehicular movements to and from the site will make use of existing roads.

The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the possibility for nuisance dust. The proposed development is moderate in scale and thus the potential for dust soiling 50m from the source is possible.

Construction dust tends to be deposited within 200m of a construction site, but the majority of the deposition occurs within the first 50m. In order to minimise dust emissions through construction, a series of mitigation measures are proposed within the OCMP and Chapter 8 Air and Climate of this EIAR.

Emissions & Energy Efficiency

Lowering emissions & energy efficiency requires less energy to perform the same task – that is, eliminating energy waste and reduce emissions. Energy efficiency brings a variety of benefits: reducing greenhouse gas emissions, reducing demand for energy imports, and lowering costs of construction. Reduction of emissions and increased energy efficient will be achieved by implementing the measures contained within the Construction & Demolition Waste and By-Product Management Plan and the OCMP.

Health & Safety

The Safety, Health and Welfare at Work (Construction) Regulations 2013 apply to all construction works in Ireland. As part of these Regulations, the Client, The Project Supervisor

Design Designers (PSDP), Contractors and the Project Supervisor Construction Stage (PSCS) have various responsibilities for health and safety at design and construction stages.

Once the project moves onto site the contractor and PSCS is responsible for implementing health and safety legislation. The construction of works should be monitored to ensure compliance with relevant local authority requirements, and health and safety legislation.

Community Liaison Officer

The Contactors Construction and Environmental Management Plan will identify a Community Liaison Officer (CLO). The CLO's role will include keeping the local community informed of site operations, through regular meetings, mail drops and newsletters, etc. The CLO can also be contacted directly by local residents / members of the public with concerns / complaints.

3.5.4 Construction Type and Quantities

The proposed development is described within Section 3.3 above.

As part of the development, two single storey basements will be provided under Blocks 1, 2 and 4. The basements will accommodate 501 parking spaces to service the apartments and ancillary uses.

It is proposed that the basement will be constructed using waterproofed concrete retaining walls and basement slab with deepening at the edges and under internal columns and walls to support the building above. Design to be undertaken to IS EN 1992-1. Block 3 doesn't have a basement so this is likely to be supported on Continuous Flight Auger (CFA) piles extending under the building. The design will be untaken to IS EN 1997-1:2004 (EC7) and the Irish National Annex.

There is sufficient space around the basement to allow the excavation embankment to the battered back at a safe slope without the need for side temporary works. Temporary dewatering will be required to facilitate the basement construction; the methodology for temporary dewatering is discussed and described in chapter 6 of the EIAR. The proposed method of construction will not affect neighbouring structures and roads as adequate support is maintained at all times. A Ground Anchor Installation License (GAIL) will not be required.

Above basement level the buildings will be constructed in a mixture of insitu or precast concrete floors and walls, and clad in brick, render and/or stone as noted on the Architects drawings. The use of precast floor and wall has the benefit of utilising off-site construction and minimising waste. Table 3.2 below gives the summary of the expected excavation volume and some of the building materials to be used. All materials used as part of the construction will be locally sourced and natural materials where possible and practical.

Element	Type	Quantity
Construction Quantities		
	Concrete	33,000m^3
	Reinforcement	3,900 tons
	Structural Steelwork	124 tons
	Masonry	10,900sqm

	Precast Walls	43,000sqm
	Precast Slabs	54,000sqm
	Piling	117 No
	Structural Fill	9,800m^3
Demolition Quantities		
	Car Park gravel/hardstand	2,700m^3
	Excavation volumes	83,000m^3

Table 3.2 Approximate Construction Quantities

3.5.5 Environmental Protection Measures

It is anticipated that the primary environmental effects will arise during the construction phase of the project. After the development is completed and operational, and all the mitigation measures listed in EIAR have been carried out, it is expected to operate without creating any significant additional environmental impacts. The range of anticipated activities, materials/natural resources used, and effects/emissions are not expected to result in a significant impact on the baseline environment.

All major environmental impacts of the operation phase of the development have been addressed in the EIAR. These relate to Population and Human Health, Landscape and Visual Impact and Noise and Air impacts associated with the traffic generated.

3.5.6 Changes & Secondary Developments

The potential for the specific proposed development as described to grow is considered to be limited within the residential area. The potential for the apartments to expand or increase in scale is limited to the confines of the permission sought and new planning permission will be required for amendments to the blocks.

The potential for alternative uses within the blocks would be subject to further planning permissions.

3.6 ALTERNATIVES

The consideration of Alternatives is an important part of the EIA process. By outlining alternatives considered, it is possible to reduce or minimise environmental impacts and ensure that better solutions are not overlooked.

In the first instance, the proposed development is considered relative to the “Do-Nothing’ scenario.

The “Do-Nothing” Scenario

The “Do-Nothing” scenario describes the situation or environment that would exist if no development were carried out. It is considered in each of the assessment chapters of this EIAR.

Alternative Locations

The location of the project has been determined by the zoning of the site for '*TC – Town and District Centre'* and local and national planning policy support for the redevelopment of underutilised infill sites for higher density development. On that basis, no alternative sites were considered in this EIAR.

This approach is in line with the EPA Guidelines (2002 and 2017 Draft Guidelines) which recognises that it is not realistic to consider alternative options for projects which have been previously determined in a higher plan.

> *"Hierarchy*
> *EIA is only concerned with projects. Many projects, especially in the area of public infrastructure, arise on account of plans, strategies and policies which have previously been decided upon. It is important to acknowledge that* ***in some instances neither the applicant nor the competent authority can be realistically expected to examine options which have already been previously determined by a higher authority*** *(such as a national plan or regional programme for infrastructure or a spatial plan)."*
>
> (Source: EPA *Guidelines on the information to be contained in Environmental Impact Statements,* Section 2.4.3 Alternatives, page 12)

Alternative Layout

The key structuring principles for the proposed layout are devised from the site context and the need to facilitate improve access to and permeability through the site. The site context is framed by the high density residential and commercial development within the Charlestown Centre to the north, hard urban edges provided by Charlestown Place and St. Margaret's Road to the north and east and the low-density residential development within McKelvey Avenue to the south. Regarding permeability and access, the primary objective is to improve access for all modes from Charlestown Place and St. Margaret's Road and in so doing creating a sense of place within the site.

Alternative layouts for the site were considered and developed by the project team, with input from the engineers, landscape architect. The main alternative layouts considered, and the main reasons for the option chosen, included: -

- An alternative, low density layout was considered for 162no. residential dwellings comprising a mix of houses, duplexes and apartments. This alternative layout was not developed further on the basis that the density of development under-utilised the zoned and serviced lands with access to existing facilities and public transport.

- A further alternative layout involving surface car parking and a cul-de-sac arrangement was proposed to the south of Block 1. Following consultations with the planning authority it was agreed that surface car parking and vehicular access would be removed from this area to create a more pedestrian friendly public space to the south of Block 1.

Alternative Designs

The following design alternatives were considered in the design development of the project:-

- An alternative design was initially developed that involved residential accommodation fronting onto the internal streets between Blocks 1 and 2 with surface car parking also located at street level. This design was replaced with a the current concept incorporating a north south pedestrian street between Blocks 1 and 2 linking the Charlestown Centre and the proposed central open space within the site. This street is now lined with active frontage including retail/ commercial units, office suites, a health facility and a creche.

- Alternative buildings heights were considered on Charlestown Place and St. Margaret’s Road and within Block 4 adjacent to the south boundary of the site. The current building heights within Blocks 1, 2 and 3 where developed on the basis that they create a strong urban edge to Charlestown Place and St. Margaret’s Road and follow the buildings lines established by the Charlestown Centre. Building heights within the southern elevation of Block 4 were reduced to 2 storeys to safeguard residential amenity within McKelvey Avenue.

Alternative Processes

This is an urban residential/ commercial development and therefore there are no alternative processes to be considered.

Conclusion on Assessment of Alternatives

On the basis of the foregoing, it is considered that all reasonable alternatives to the proposed development are considered and no alternatives have been overlooked which would significantly reduce or further minimise environmental effects.

This assessment of alternatives also provides the main reasons for the developer selecting the proposed development as the chosen project.

4.0 POPULATION AND HUMAN HEALTH

4.1 INTRODUCTION

This chapter was prepared by John Murphy BA MRUP MIPI of BMA Planning and addresses impacts on 'Population and Human Health' as required under the 2014 EIA Directive.

Impacts on population include impacts on the social and economic environment arising from the development such as impacts on population change, demographic trends, employment and economic activity, implications for land use patterns and, impacts on social and community infrastructure.

According to European Commission's *Environmental Impact Assessment of Projects: Guidance on the Preparation of the Environmental Impact Assessment Report* (2017), human health would relate to matters such as release of toxic substances, health risks arising from major hazards, changes in disease vectors, changes in living conditions, effects on vulnerable groups and exposure to traffic noise or air pollutants. These would impact on workers on the Project and surrounding population associated with commissioning, operation, and decommissioning of a Project.

The Environmental Protection Agency (EPA) *Guidelines on the Information to be Contained in Environmental Impact Assessment Reports* - Draft (2017) acknowledge that *"..the assessment of impacts on population and human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in this EIAR e.g. under the environmental factors of air, water, soil etc."* (EPA, 2017, Section 3, page 29).

In this regard, potential impacts of this Project on population and human health are also addressed in the following Chapters of this EIAR: -

- Air and Climate (Chapter 8)
- Noise and Vibration (Chapter 9)
- Material Assets: Transportation (Chapter 11)
- Landscape (Chapter 14)

4.2 ASSESSMENT METHODOLOGY

A site visit was undertaken on 8th June 2020 as part of this assessment. The application site and surroundings were visited to examine the receiving environment insofar as people and communities are concerned and, in particular, to identify the people most likely to be affected by the proposed development.

The study area was identified and the nearest sensitive receptors were identified.

The presentation of the receiving environment is based on site visits and a desk-based study. The study area profile is based on official Census data by the Central Statistics Office (CSO) (www.cso.ie). Ordnance Survey maps and aerial photography were examined and the policy sources referred to in Chapter 2 were also consulted. Existing social and community infrastructure in the vicinity is identified and the nearest sensitive receptors (individual or grouped) are listed to assist in the identification of people and communities who would be most affected by the proposed development. This assessment is also informed by a Social Infrastructure Audit by Future Analytics which is included with the application documentation.

Based on this baseline presentation of the receiving environment, the likely significant adverse impacts on population and human health were considered and are presented under the following headings: -

- Land Use
- Population Change and Demographic Trends
- Employment and Economic Activity
- Amenity
- Health and Safety

The impact assessment section of this chapter follows the terminology (where applicable) used in the EPA Guidelines as set out in Chapter 1 of this EIAR.

4.3 RECEIVING ENVIRONMENT

4.3.1 Study Area Profile

The primary study area is the application site, i.e. the lands shaded red in **Figure 4.1**.

The secondary study area is its immediate environs i.e. lands south of the site comprising McKelvey Avenue and McKelvey Celtic AFC playing pitches, the lands east of the site comprising Century Business Park and the Lanesborough, Melville and Charlestown residential estates, the lands north of the Charlestown Place comprising the Charlestown Centre and associated commercial uses to the west and north including McDonalds, KFC and the Joe Duffy Motor Group and the lands to the west comprising an undeveloped greenfield site zoned ‘GE – General Employment’ and ‘Z6 – Employment/ Enterprise’ in the *Fingal Development Plan 2017 – 2023* and the *Dublin city Development Plan 2016 – 2022* respectively.

The wider area is defined by the following Electoral Divisions (EDs) which are wholly or partially contained within the receiving environment: -

- Finglas North A
- Finglas North B
- Finglas North C
- Finglas South A
- Finglas South B
- Finglas South C
- Finglas South D
- Ballymun A
- Ballymun F
- Ballygall A
- Ballygall B
- Ballygall D
- Dubber (ED containing the application site

Figure 4.1 identifies the site (coloured red) and the EDS within the wider study area (coloured orange) in the site context.

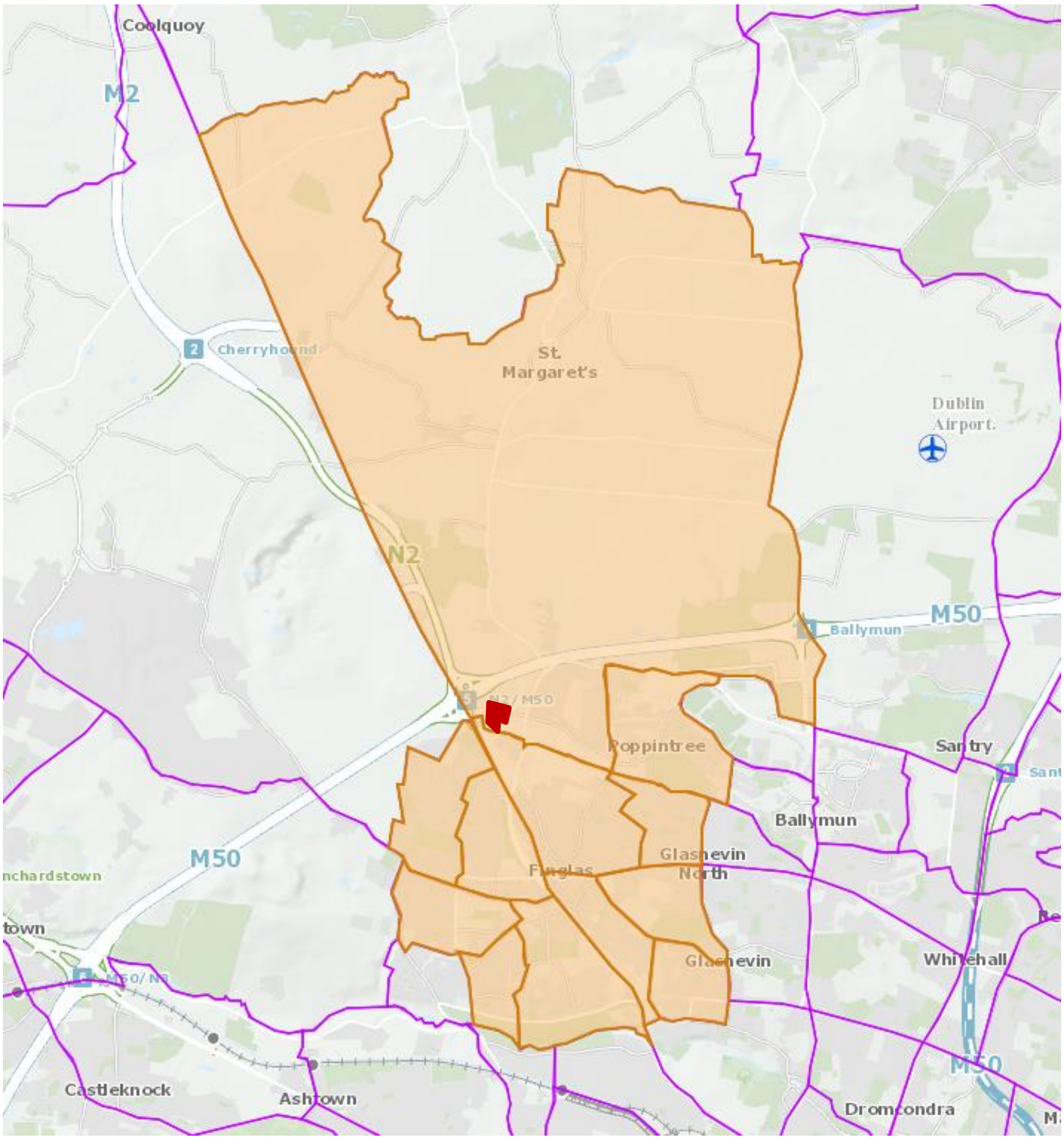

Figure 4.1 Study Areas

The application site is located within the Dubber ED and is surrounded by the Ballygall (A, B, D), Ballymun (A, F), Finglas North (A, B, C) and Finglas South (A. B, C) ED's. Table 4.1 below identifies the total population, deprivation score and population change for each of these ED's over the period 2006 to 2016 as identified by the Census.

Regarding population, it is evident from Table 4.1 that the combined ED's within the study area have experienced very significant population increase in the period 2006 to 2016. The overall population within the study area increased from 33,994 to 41,923 within the ten year period. The population change figures illustrate that the period up to 2006 and between 2006 and 2011 were the principle periods of growth with population growth declining significantly within the study area between 2011 and 2016.

The Dubber ED was a principle location for population growth in the period to 2006 and the period between 2006 and 2011 with percentage increases of 347% and 70% respectively. This compares with population changes within the state of 8% in the period 2002 – 2006, 8% between 2006 – 2011 and 4% between 2011 – 2016. The population increase within the

Dubber ED reflects the significant additional housing development within the Meakstown area in the period 2000 to 2008.

Table 4.1: Population Change (Source: Pobal Maps 2020)

ED Name	ED ID	Total Population 2006	Total Population 2011	Total Population 2016	Population Change 2006	Population Change 2011	Population Change 2016
Ballygall A	2011	3355	3442	3606	17.55	2.59	0.06
Ballygall B	2012	1809	1805	1887	3.55	-0.22	0.05
Ballygall D	2014	2469	2494	2531	3.15	1.01	0.02
Ballymun A	2015	2101	3678	4765	33.40	75.06	0.37
Ballymun F	2020	2474	2323	2350	-6.71	-6.10	0.02
Dubber	4020	3746	6359	7372	347.14	69.75	0.15
Finglas North A	2051	3472	3227	3319	-1.92	-7.06	0.02
Finglas North B	2052	2955	2809	2874	0.58	-4.94	0.04
Finglas North C	2053	3057	3247	3464	-2.30	6.22	0.07
Finglas South A	2054	2634	2783	2904	1.04	5.66	0.05
Finglas South B	2055	3322	3868	4206	0.39	16.44	0.13
Finglas South C	2056	2600	2507	2645	-6.07	-3.58	0.06
TOTAL		**33994**	**38542**	**41923**	**389.80**	**154.83**	**1.03**

4.3.2 Land Use and Receptors

The site is a primarily a brownfield site and also includes areas of undeveloped urban fringe comprising dry grassland. The existing surface car park has been in operation since 2007 and was constructed as a temporary measure for customer convenience and as the planning and construction programmes for the Charlestown Centre Phase 1 and Phase 2 below podium works were being finalised. The adjoining greenfield areas to the south and east of the car park within the application site are vacant.

The site is located within the Charlestown area which comprises a mixed-use area of commercial, residential and light industrial land uses. In addition to the land uses described within the secondary study area within Section 4.3.1 above other notable features include the North Road, located to the west of the site and is a key thoroughfare for traffic from Dublin City Centre connecting to the N2 national primary route. The M50 motorway and associated Junction 5 is located to the north and north west of the site. St. Margaret's Road is another north-south route located directly to the east of the site and connects Finglas Village to the south with the lands north of the M50 via the R122 and Ballymun to the east via the R102. Dublin Airport is located c.5kms to the north east and is accessible via both the North Road/ M50 or via St. Margaret's Road/ the R122.

The EPA Guidelines (2002) and Advice Notes (2003)[3] identify receptors as neighbouring landowners, local communities and other parties which are likely to be directly affected by the project.

The most sensitive population receptors in the area are the communities and properties identified below within Table 4.2 and geographically presented on Figure 4.2.

Table 4.2 Receptors

R1	**McKelvey Estate**: - The McKelvey Estate is a residential estate adjoining part of the southern boundary of the application site and comprises a mix of 2 storey terraced, semi-detached and detached houses. McKelvey Avenue directly adjoins the southern boundary of the site and the rear gardens of houses on McKelvey Avenue abut the boundary of the site.
R2	**McKelvey Celtic AFC: -** Located directly to the south of the site and west of St. Margaret's Road, the McKelvey Celtic AFC facility comprises a playing pitch, a single storey building accommodating changing facilities, ancillary storage containers and a car park with associated access road.
R3	**Century Business Park**: - Situated to the east of the site and east of St. Margaret's Road the Century Business Park comprises light industrial uses in a series of double and triple height units with access provided from Melville Road. An ESB Networks depot is located further to the south east and south on St. Margaret's Road.
R4	**Meakstown:** - The Meakstown areas comprises the Melville, Lanesborough and Charlestown residential estates to north-east incorporating a mix of 3 and 4 storey apartment blocks and 2 storey houses arranged around public open spaces and car parking.
R5	**Charlestown Shopping Centre: -** Located to the north of the site and comprises a mix of retail, leisure and residential accommodation within a double height shopping centre with five storeys of residential accommodation all over two levels of basement car parking. Six residential blocks were permitted directly to west of the existing Charlestown Centre and are currently under construction. A cinema and leisure block is located further to the north.
R6	**Charlestown Commercial:** - This comprises an area of commercial uses located north and west of the Charlestown Centre and south of the M50 and includes the Gas Networks Ireland Service Centre, Balfour Beatty offices, 3no. car sales show rooms within the Joe Duffy Motor Group, McDonalds and KFC drive thru restaurants, McElvaney Motors and a Windsor Motor Mall outlet with office accommodation over.
R7	**Charlestown Place South: -** These lands comprise undeveloped urban fringe lands zoned GE – General Employment and Z6 – Employment/ Enterprise in the *Fingal Development Plan 2017 – 2023* and the *Dublin City Development Plan 2016 – 2022* respectively. The lands are vacant and comprise dry grassland. There are currently no proposals for the development of these lands.
R8	**R135 Finglas Road Light Industrial: -** These lands are located to the south-west of the site and comprise two industrial units with additional light industrial and commercial uses extending further to the south along the

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[3] Including the updated Guidelines and Advice Notes printed in Draft in 2017 and 2015 respectively

	North Road. The Northway and Plunkett residential estates are located further to the south west across the R135 Finglas Road with North City Business Park located to the west of the North Road.

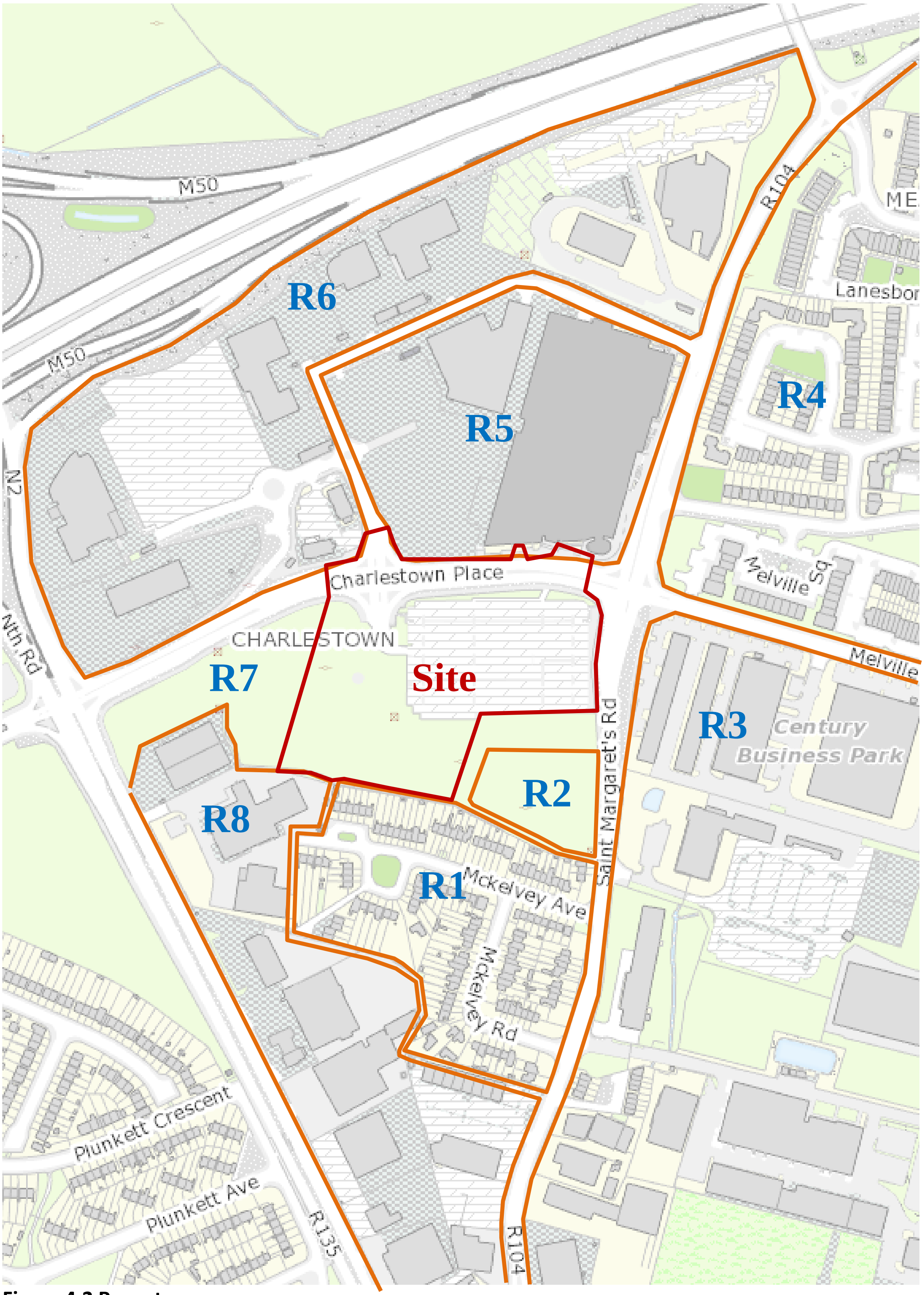

Figure 4.2 Receptors

4.4 CHARACTERISTICS OF PROPOSED DEVELOPMENT

The proposed development is described in Chapter 3. The following elements are relevant to the assessment of effects in this Chapter.

The development will involve the construction of significant new buildings which will transform the receiving residential environment to an urban space.

The proposed residential accommodation will facilitate the development of a new residential community. Employment generators including retail/ commercial, office, creche and medical uses proposed in the development will attract people to the site during business hours. The proposed public open space and pedestrian streets will also attract users to the site for social and recreational uses.

As the permission is a 5 year permission, some level of construction activity could take place over a period of up to 5 years. However, the main construction activities which have most potential to impact on the population and human health will happen in the early phases with the majority of latter stages being internal works and fit-out.

To facilitate this development, the existing car park will be demolished and site clearance will take place. No dwellings or habitable structures will be demolished to make way for the development.

4.5 CONSTRUCTION IMPACTS, MITIGATION AND MONITORING

4.5.1 Construction Impacts

The main likely significant effects of the proposed development are as follows: -

Land Use

The effect on land use during the construction phase will be to change the use of the site from existing car park and greenfield to a construction site. Effects will include the use of the site for site compounds, haul routes/ construction vehicles etc. all of which will be within the site boundaries, re-locating within the site as the development progresses. Removal of the car park and greenfield areas will have a moderate negative effect by altering the character of the existing environment in a manner that is consistent with the existing trends in the wider Charlestown area. These effects will be confined to the site and will be a once off occurrence as the site is transformed from a car park and greenfield to a mixed use urban development. The effects will be short-term, 1 to 3 years, and secondary as they arise a consequence of the project.

Population Change and Demographic Trends

The effects on population and demography during the construction phase will be an inward flow of workers to the site each day during working hours. These effects will be neutral and imperceptible on the basis that the addition of construction workers to the Charlestown area will not affect the quality or have a noticeable consequence for the existing environment. Again, these effects will be short term and secondary as they relate to the construction phase of the development.

Employment and Economic Activity

There will be a moderate positive impact during the construction phase in terms of employment and further multiplier effects to the wider economy. The number of construction workers on site will vary but will likely average between 300 - 450. The effects will be short term in duration.

Amenity and Human Health

The construction phase of the project will cause a certain amount of loss of amenity, disruption, nuisance and inconvenience to the local community, particularly the residents who are located closest to the project including those within the McKelvey Estate (R1), Meakstown (R4) and the Charlestown Centre (R5). The effects will be negative but with the implementation of mitigation measures the effects will be imperceptible. The effects will be short term in duration.

The main human health impact areas associated with construction activities are assessed in detail in the Air and Climate, Noise and Vibration, Material Assets: Transportation and Landscape chapters of this EIAR. They are summarised below as follows:-

- **Air Quality**: - Air borne dust, along with other air pollutants, arising from construction activities including the demolition phase, will be managed to minimise the generation of emissions at source. The impact to human health will be short-term and imperceptible, with the mitigation measures ensuring the EU ambient air quality legislative limit values, which are based on the protection of human health, are complied with. (Refer to Chapter 8 Air and Climate).

- **Noise**: - The potential health impacts relating to noise during the construction phase are deemed to be not significant given the short-term duration of construction phase. The noise limit values set for this phase allow a higher ambient noise level than long term operations on the basis that people can tolerate higher noise emissions over shorter time periods and particularly when the nature of the source is known. In addition, health impacts relating to noise are linked closer to sleep disturbance. Given the works associated with the proposed development will take place during the daytime and defined working hours, issues relating to sleep disturbance and associated health impacts are not associated with the development (Refer to Chapter 9 Noise and Vibration).

- **Vibration**: - Vibration levels associated with demolition, excavation and piling activities are expected to be below a level that would cause disturbance to the nearest receptors (R1, R4 and R5) and are therefore considered to be imperceptible. (Refer to Chapter 9 Noise and Vibration).

- **Water**: - As outlined in Chapter 7, water, the construction phase of the proposed development has the potential to alter the water quality and hydrological regime temporarily in the study area. Any effect on water quality has the potential to give rise to human health effects. Leaks from the waste may contaminate soils and water streams, and produce air pollution through contamination, creating health hazards. Subject to adherence to best practice construction measures, such impacts are not considered to be likely in this instance.

- **Waste**: - Waste generated during the construction phase of the proposed development will be segregated at source and disposed of appropriately. No potential effects on human health are therefore likely if waste is managed correctly. (Refer to Chapter 12 Material Assets: Resource and Waste Management).

- **Traffic**: - There will be no significant disruption to traffic flows on Charlestown Place or St. Margaret’s Road as a result of the construction of the development and no diversions are envisaged. Some minor diversions to footpaths on the southern edge of Charlestown Place and the western edge of St. Margaret's Road may be required for service connections but these will have a brief or temporary effect only. A local internal diversion will be required within the site to maintain access to the McKelvey Celtic AFC playing pitch. The effect of this diversion will be moderate and short term. (Refer to Chapter 11 Material Assets: Transportation).

- **Visual Impacts**: - Visual effects will be localised at periods in time. The likely significance, duration and frequency of effects will vary from imperceptible to moderate and brief to short term as phases progress and works are undertaken in different areas of the site. Likely moderate negative visual effects are expected for north facing properties within the McKelvey Estate (R1) and south facing properties within the Charlestown Centre (R5). These effects will be short term.

- **Accidents**: - The construction of any project of this nature has potential to give rise to unplanned events or accidents, including fire, which impact on health and safety of human beings if such activities are not managed appropriately. Measures to address such health and safety considerations are addressed in the OCMP and will be subject to Regulations under the relevant Health and Safety codes. No significant negative impacts are anticipated.

The level of disturbance and impacts to human health are predicted to be commensurate with the normal disturbance associated with the construction industry where a site is efficiently and properly managed having regard to neighbouring activities. These negative impacts will cumulatively be moderate but short term. Measures to address such human health considerations will be mitigated through the implementation of a Contractor's Construction and Environmental Management Plan (CEMP) and will be subject to Regulations and the relevant Health and Safety codes.

The mitigation measures outlined in Section 4.5.2, and relevant sections of the Chapters listed above, are proposed to reduce the impacts of disruption, nuisance and inconvenience during the construction phase of the development.

4.5.2 Mitigation Measures

PPH-C1	**Construction Management -** In order to mitigate potential temporary community disturbance during construction, an Outline Construction Management Plan (OCMP) has been prepared and is included in as a separately bound document with this application. If the proposed development is approved and implemented, the appointed contractor will prepare a Construction and Environmental Management Plan (CEMP) for the agreement of the Planning Authority prior to development commencing on site. The CEMP addresses the following construction stage issues: - • Land Use Requirements • Site Layout and Preparation • Construction Activities • Types and Quantities of Materials & Residues • Construction Management • Environmental Protection Measures.

4.5.3 Monitoring

No monitoring measures are proposed with respect to population and human health.

4.5.4 Cumulative Impacts of Other Construction Projects

It is likely that other projects will be under construction in the area at the same time as the project being assessed in this EIAR. The cumulative impacts caused by the overlapping of these projects in the vicinity of this project (see Section 3.5) are considered in Chapter 15.

4.6 OPERATIONAL IMPACTS, MITIGATION AND MONITORING

4.6.1 Operational Impacts

The main areas of impact are as follows: -

Land Use
The proposed development will deliver a new residential community with supporting land uses which will change the character of the existing landscape within Charlestown and on Charlestown Place and St. Margaret's Road. As has occurred following the development of the Charlestown lands to the north of Charlestown Place, this project may also act as a catalyst for further development/ investment in the area and there is likely to be a positive impact on existing property and land values as a result. This change is consistent with planning policy and is a long-term positive effect.

Population
The residential population of the proposed housing units will be in excess of 1400 persons. The impact on the population is considered to be a long-term moderate effect insofar as it reflects the established trend in the area south of the M50 and north of Finglas and Ballymun. New residential units will contribute to the delivery of a critical mass of population which will support a wide range of additional local businesses, services, transport infrastructure and employment opportunities focused on the Charlestown Centre.

Economy
The project will have a slight to moderate long-term positive impact on the local economy through the provision of employment in the retail/ commercial, creche and community units and indirectly in relation to support services to the new residential population.

Human Health
The main impacts on human health, associated with air quality, noise and traffic and transportation, are considered elsewhere in this EIAR (Chapters 8 Air and Climate, 9 Noise and Vibration and 11 Materials Assets: Transportation) and mitigation measures proposed where relevant. Subject to implementation of these measures, any negative impacts of the development during the operational phase are typical of any urban development and are considered to be slight.

The proposed development has been designed in accordance with best practice and all relevant guidance to provide high quality residential accommodation which will facilitate a healthy population. Mitigation through design has considered effects on daylight/ sunlight and overshadowing, wind, noise, air quality and waste management. Landscaping and open space proposals have a potential positive impact on human health in the new population.

The development will have a positive significant effect on the overall landscape character and visual appearance of the area, replacing an existing surface car park and grassland with modern urban edges to Charlestown Place and St. Margaret's Road. Moderate visual effects will occur for some of the identified receptors due to the presence of new buildings in the landscape and the potential for blocking / limiting certain views and features on the horizon. The greatest level of impact will be experienced by the residents at the McKelvey Estate (R1) and the Charlestown Centre (R5) however these effects alter the existing environment in a manner that is consistent with existing and emerging trends in the area. Visual impacts are considered in detail within Chapter 14 Landscape.

The risk of accidents / unplanned events is addressed through the Building Regulations (Fire Safety) and is therefore addressed through primary mitigation in the design process. Residual risks of fire and road traffic accidents will be managed by emergency services as per their standard procedures.

4.6.2 Mitigation Measures

Mitigation measures relating to those factors under which population and human health effects might occur have been addressed elsewhere in this EIAR, under the relevant environmental factors. Other than the mitigation measures outlined in these Chapters, no further mitigation measures have been proposed with respect to population and human health for the operational phase.

4.6.2 Monitoring

No monitoring measures are proposed with respect to population and human health.

4.6.4 Cumulative Impacts of Other Construction Projects

It is likely that other projects will be under construction in the area at the same time as the project being assessed in this EIAR. The cumulative impacts caused by the overlapping of these projects in the vicinity of this project (see Section 3.5) are considered in Chapter 15.

4.7 RESIDUAL IMPACTS

These are the effects on the environment, on population and human health, which occur after the mitigation measures outlined above, are implemented.

4.7.1 Construction Phase

The residual effects of the construction stage of the project, are identified as follows:-

- The construction phase will cause a certain amount of loss of amenity, disruption, nuisance and inconvenience to the local community, particularly the residents who are located closest to the project. The mitigation measures in Section 4.5.2 will reduce the significance of these impacts. Significant effects will remain for those closest to the project (McKelvey Estate R1 and Charelstown Centre R5) but the effects will be short-term and the frequency will vary during the stages of construction. The effects will also vary during the phases of development.
- The residual impacts of dust emissions on air quality human health and air quality, when the dust minimisation measures are implemented, will be short term and not significant. (Refer to Chapter 8 Air and Climate).
- 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 this phase will ensure noise impacts are controlled to within the adopted criteria for human health. (Refer to Chapter 9 Noise and Vibration).

- Vibration impacts will be controlled to within strict limit values at the nearest sensitive buildings. (Refer to Chapter 9 Noise and Vibration).
- There will be no significant disruption by the movement of construction vehicles. Access and egress routes and restrictions will be guided by the OCMP and working hours (Mitigation measure PPH-C1 above) and a detailed Construction Traffic Management Plan, to be prepared post planning by the appointed contractor(s) (Mitigation measure MA:T-C1). (Refer to Chapter 11 Material Assets: Transportation for further details).

4.7.2 Operational Phase

The residual effects of the project, are identified as follows:-

- An existing, underutilised, brownfield site with access to established services and public transport at the Charlestown Centre will be redeveloped for urban uses in keeping with the surrounding environment.
- The project will provide new services, facilities and amenities to the local population.
- The proposals will provide improved off road routes for pedestrians and cyclists travelling between Charlestown Place and the St. Margaret's Road.
- The development will facilitate the implementation of the TC – Town and District Centre zoning objective for the lands as set out within the Fingal Development Plan 2017 – 2023.
- The volumes of traffic generated from the project, which can be considered within the norms for urban development, will have a slight effect on the road network traffic volumes.
- The public realm / landscaping mitigation measures will further enhance the project. Views from Charlestown Place west, St. Margaret's Road north and south and Melville Road east as well as views from adjoining sites on these routes will be altered however these effects are considered to be moderate on the basis that they alter the existing environment in a manner that is consistent with existing and emerging trends in the area. (Refer to Chapter 14 Landscape).

4.8 'DO-NOTHING' SCENARIO

In the event that the proposed development does not proceed, no new residential units would be provided in the area and the positive benefits to the community arising from implementing the Development Plan proposals and the development of the site for residential uses would not materialise. An opportunity would be missed to consolidate this area in accordance with national, regional and local planning policy guidance.

4.9 INTERACTIONS

Population and Human Health interactions are primarily linked to the environmental factors listed below. These interactions, and the impacts being considered, are identified in the relevant Chapters.

- Air and Climate (Chapter 8)
- Noise and Vibration (Chapter 9)
- Material Assets: Transportation (Chapter 11)
- Landscape (Chapter 14)

4.10 REFERENCE LIST

- Fingal Development Plan 2017 - 2023
- Census (2016) www.cso.ie (Date Accessed – June 2020)
- Pobal (2019) https://maps.pobal.ie/ (Date Accessed - June 2020)
- EPA (2017) *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports.* Dublin, Ireland.
- EPA (2015) *Revised Guidelines on the Information to be Contained in Environmental Impact Statements*. Dublin, Ireland.
- EPA (2015) *Advice Notes for Preparing Environmental Impact Statements*. Dublin, Ireland.
- EPA (2003) *Advice Notes on Current Practice in the Preparation of Environmental Impact Statements*. Dublin, Ireland.
- European Commission (2017) *Environmental Impact Assessment of Projects - Guidance on the preparation of the Environmental Impact Assessment Report.* Brussels, Belgium.

5.0 BIODIVERSITY

5.1 INTRODUCTION

This section of the EIAR has been prepared by Pádraic Fogarty of OPENFIELD Ecological Services. Pádraic Fogarty has worked for 25 years in the environmental field and in 2007 was awarded an MSc from Sligo Institute of Technology for research into Ecological Impact Assessment (EcIA) in Ireland. OPENFIELD is a full member of the Institute of Environmental Management and Assessment (IEMA) and an affiliate member of the Chartered Institute of Ecology and Environmental Management (CIEEM).

Under the EIA Directive as well as best practice methodology from the EPA, the analysis of impacts to biodiversity is an essential component of the EIA process, and so is a required chapter in any EIAR.

Under Article 6(3) of the Habitats Directive an ‘appropriate assessment’ of projects must be carried out to determine if significant effects are likely to arise to the integrity of Natura 2000 sites. An Appropriate Assessment Screening Report has been prepared as a separate stand-alone report with this planning application.

5.2 ASSESSMENT METHDOLOGY

The assessment was carried out in accordance with the following best practice methodology: ‘Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland’ by the Institute of Ecology and Environmental Management (IEEM, 2016) and ‘Guidelines on the information to be contained in Environmental Impact Assessment Reports by the Environmental Protection Agency (EPA, 2018).

A site visit was carried out on the 29th of May 2020 in fair weather. The site was surveyed in accordance with the Heritage Council’s Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2010). Habitats were identified in accordance with Fossitt’s Guide to Habitats in Ireland (Fossitt, 2000).

The nomenclature for vascular plants is taken from *The New Flora of the British Isles* (Stace, 2010) and for mosses and liverworts *A Checklist and Census Catalogue of British and Irish Bryophytes* (Hill et al., 2009).

May lies within the optimal survey period for general habitat surveys (Smith et al., 2010) and so it was possible to classify all habitats on the site to Fossitt level 3. May lies within the season for surveying breeding birds, amphibians and Badgers.

A dedicated bat survey was carried out by Altemar in July 2020, well within the optimal flight period. This report is presented in full as Appendix 5A of the EIAR however its findings are incorporated in the main body of this chapter.

5.3 RECEIVING ENVIRONMENT

5.3.1 Zone of Influence

Best practice guidance suggests that an initial zone of influence be set at a radius of 2km for non-linear projects (IEA, 1995). However, some impacts are not limited to this distance and so sensitive receptors further from the project footprint may need to be considered as this assessment progresses. This is shown in Figure 5.1.

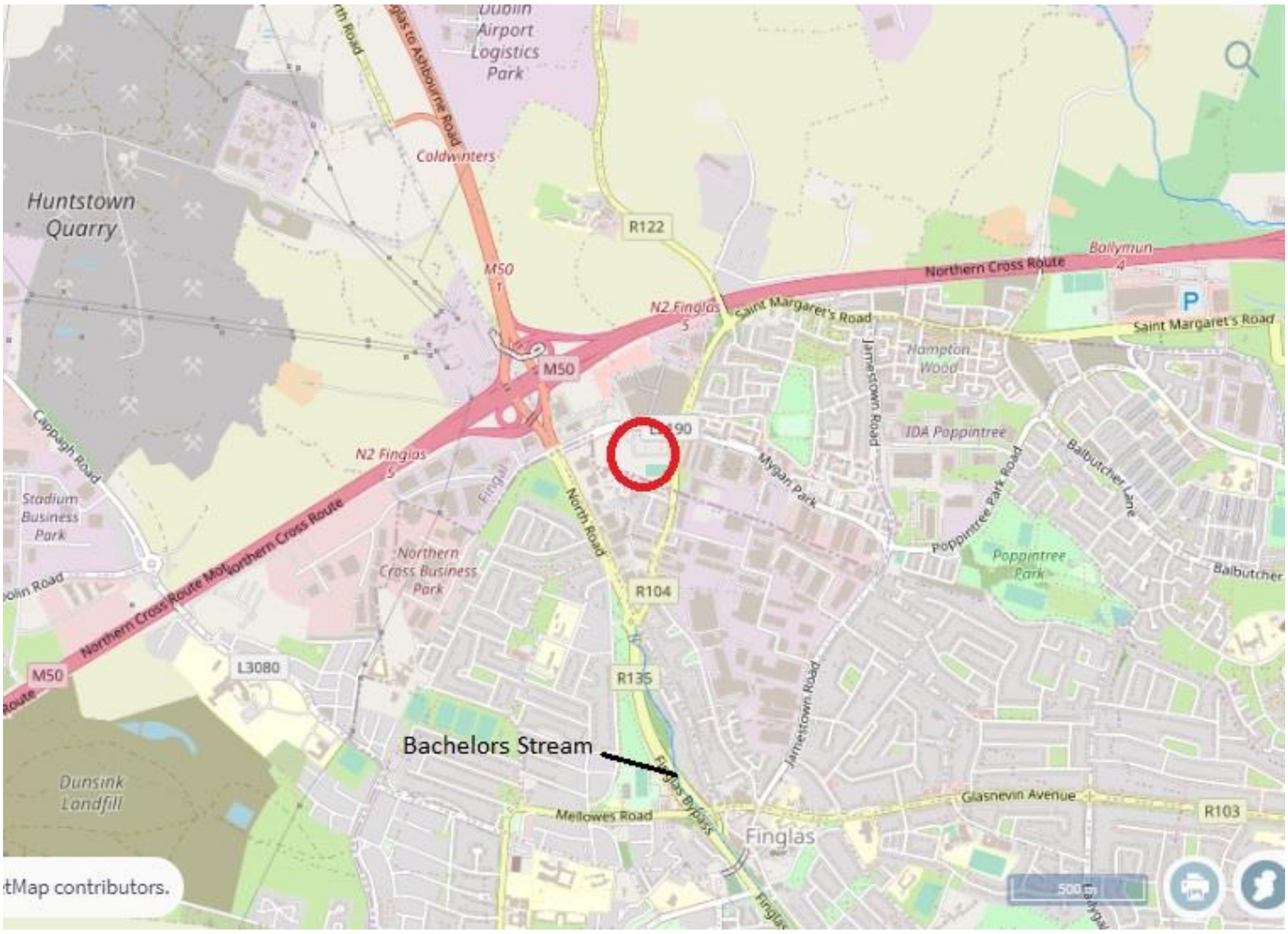

Figure 5.1 – Site location showing nearby water courses. There are no areas designated for Nature conservation in this view (www.epa.ie)

There are a number of designations for nature conservation in Ireland including National Park, National Nature Reserve, RAMSAR site, UNESCO Biosphere reserves, Special Protection Areas (SPA – Birds Directive), Special Areas of Conservation (SAC – Habitats Directive); and Natural Heritage Areas. The mechanism for these designations is through national or international legislation. Proposed NHAs (pNHA) are areas that have yet to gain full legislative protection. They are generally protected through the relevant County Development Plan. There is no system in Ireland for the designation of sites at a local, or county level. There are no such areas within the vicinity of the development site while the following areas were found to be located within the hydrological catchment:

South Dublin Bay SAC (side code: 0210) is concentrated on the intertidal area of Sandymount Strand. It has one qualifying interest (i.e. feature which qualifies the area as being of international importance) which is mudflats and sandflats not covered by seawater at low tide. A site synopsis is available at http://www.npws.ie/en/media/Media,3896,en.pdf.

South Dublin Bay and Tolka Estuary SPA (side code: 4024) is largely coincident with the SAC boundary with the exception of the Tolka Estuary. The North Bull Island SPA (site code: 0206) is largely coincident with the North Dublin Bay SAC with the exception of the terrestrial portion of Bull Island. Table 5.1 lists the features of interest for these SPAs.

Table 5.1: Features of interest for the South Dublin Bay and Tolka Estuary SPAs in Dublin Bay (EU code in square parenthesis)

Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]
Oystercatcher (*Haematopus ostralegus*) [A130]
Ringed Plover (*Charadrius hiaticula*) [A137]
Grey Plover (*Pluvialis squatarola*) [A140]
Knot (*Calidris canutus*) [A143]
Sanderling (*Calidris alba*) [A144]
Dunlin (*Calidris alpina*) [A149]
Bar-tailed Godwit (*Limosa lapponica*) [A157]
Redshank (*Tringa totanus*) [A162]
Black-headed Gull (*Croicocephalus ridibundus*) [A179]
Roseate Tern (*Sterna dougallii*) [A192]
Common Tern (*Sterna hirundo*) [A193]
Arctic Tern (*Sterna paradisaea*) [A194]
Wetlands & Waterbirds [A999]

Bird counts form BirdWatch Ireland are taken from Dublin Bay as a whole and are not separated between the two SPAs in this area.

Dublin Bay is recognised as an internationally important site for water birds as it supports over 20,000 individuals. Table 5.2 shows the most recent count data available (Crowe et al., 2011).

Table 5.2 – Annual count data for Dublin Bay from the Irish Wetland Birds Survey (IWeBS)

Year	2010/11	2011/12	2012/13	2013/14	2014/15	Mean
Count	27,931	30,725	30,021	35,878	33,486	31,608

There were also internationally important populations of particular birds recorded in Dublin Bay (i.e. over 1% of the world population): Light-bellied brent geese *Branta bernicula hrota*; Black-tailed godwit *Limosa limosa*; Knot *Calidris canutus* and Bar-tailed godwit *L. lapponica*.

North Dublin Bay pNHA (site code: 0206). This are stretches north along the Dublin coast as far at Howth Head and east to the waters around (but not including) Bull Island. Much of the pNHA is now within the North Dublin Bay SAC (site code: 0206) while that portion that falls within the Tolka estuary is within the aforementioned SPA.

The NPWS web site (www.npws.ie) contains a mapping tool that indicates historic records of legally protected species within a selected Ordnance Survey (OS) 10km grid square. The Charlestown site is located within the square O13 and six species of protected flowering plant are highlighted. These species are detailed in Table 5.3. It must be noted that this list cannot be seen as exhaustive as suitable habitat may be available for other important and protected species.

Table 5.3: Known records for protected species within the O13 10km square

Species	Habitat[4]	Current status[5]
Groenlandia densa Opposite-leaved Pondweed	Rivers, canals and estuarine mud	Current
Galeopsis angustifolia Red Hemp-nettle	Calcareous gravels	Record pre-1970
Hordeum secalinum Meadow Barley	Upper parts of brackish marshes, chiefly near the sea	
Puccinellia fasciculata Borrer's salt-marsh grass	Muddy inlets on the coast	
Hypericum hirsutum Hairy St. John's-wort	Woods and shady places	Current
Viola hirta Hairy Violet	Sand dunes, grasslands, limestone rocks	

In summary it can be seen that of the six species only three records remain current. Opposite-leaved Pondweed was recorded as being 'common in the Grand Canal' in the *Flora of County Dublin* (Doogue et al., 1998). This source elaborates that the plant was *"scattered along the Grand Canal at Dolphin's Barn from Portobello to Charlemont Bridge, and between Drimnagh and Kilmainham."*

Water quality in rivers, canals and estuaries is monitored on an on-going basis by the Environmental Protection Agency (EPA). The subject lands are within the catchment of the River Tolka, which drains a particularly urbanised watershed. The Bachelor's Stream is a short tributary of the Tolka found close to the development site but is extensively culverted along the Fingal Road until its confluence with the Tolka. The Tolka in this location is 'poor' status for the 2013-2018 reporting period. The Tolka Estuary meanwhile is 'moderate'. These data are taken from the ENVision mapping tool on www.epa.ie.

5.3.2 Site Survey

Aerial photography from the OSI and historic mapping shows that this area has long been a part of the built environment of Dublin City. Built development in recent decades has seen substantial construction works in this vicinity, including new housing projects and the Charlestown Shopping Centre.

5.3.2.1 Flora

A large portion of the development site is used as a car park and is an **artificial surface – BL3**. The remaining area to the south of the car park is an ungrazed **dry meadow – GS2**. There are grasses, Yorkshire Fog *Holcus lanatus,* False Oat *Arrhenatherum elatius* and Cock's-foot *Dactylis glomerata.* Broad-leaved species include Meadow Buttercup *Ranunculus acris,* Clovers

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[4] Parnell et al., 2012

[5] Preston et al., 2002

Trifolium sp., Vetches *Vicia sp.,* Ribwort Plantain *Plantago lanceolata* and Creeping Thistle *Cirsium arvense.*

The southern boundary is characterised by a mature **treeline – WL2** with tall Ash *Fraxinus excelsior,* Hawthorn *Crataegus monogyna,* Brambles *Rubus fruticosus agg.* and Ivy *Hedera helix.* This treeline is accompanied by a **drainage ditch – FW4**. The direction if flow is presumed to be towards the south where is it likely to enter the Bachelor's Stream, a tributary of the River Tolka. This treeline is a remnant of a townland boundary and so is likely to be of considerable age. For this reason this feature is assessed as 'higher significance' under methodology set out by the Heritage Council (Foulkes et al, 2013).

There are no bodies of open water on the development site or habitats which could be classified as wetlands. There are no alien invasive plant species under S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011.

5.3.3.2 Fauna

The site survey included incidental sightings or proxy signs (prints, scats etc.) of faunal activity, while the presence of certain species can be concluded where there is suitable habitat within the known range of that species. This included an inspection of the external surfaces (walls and roof space) and internal spaces which may be accessible (e.g. basement areas or roof cavities). Table 5.4 details those mammals that are protected under national or international legislation in Ireland. Cells are greyed out where suitable habitat is not present or species are outside the range of the study area.

Table 5.4 – Protected mammals in Ireland and their known status within the zone of influence[6]. Those that are greyed out indicate either that suitable habitat is not present or that there are no records of the species from the National Biodiversity Date Centre

Species	Level of Protection	Habitat[7]
Otter *Lutra lutra*	Annex II & IV Habitats Directive; Wildlife (Amendment) Act, 2000	Rivers and wetlands
Lesser horseshoe bat *Rhinolophus hipposideros*		Disused, undisturbed old buildings, caves and mines
Grey seal *Halichoerus grypus*	Annex II & V Habitats Directive; Wildlife (Amendment) Act, 2000	Coastal habitats
Common seal *Phocaena phocaena*		
Whiskered bat *Myotis mystacinus*	Annex IV Habitats Directive; Wildlife (Amendment) Act, 2000	Gardens, parks and riparian habitats
Natterer's bat *Myotis nattereri*		Woodland
Leisler's bat *Nyctalus leisleri*		Open areas roosting in attics

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[6] From the National Biodiversity Data Centre, excludes marine cetaceans

[7] Harris & Yalden, 2008

Brown long-eared bat *Plecotus auritus*		Woodland
Common pipistrelle *Pipistrellus pipistrellus*		Farmland, woodland and urban areas
Soprano pipistrelle *Pipistrellus pygmaeus*		Rivers, lakes & riparian woodland
Daubenton's bat *Myotis daubentonii*		Woodlands and bridges associated with open water
Nathusius' pipistrelle *Pipistrellus nathusii*		Parkland, mixed and pine forests, riparian habitats
Irish hare *Lepus timidus hibernicus*	Annex V Habitats Directive; Wildlife (Amendment) Act, 2000	Wide range of habitats
Pine Marten *Martes martes*		Broad-leaved and coniferous forest
Hedgehog *Erinaceus europaeus*	Wildlife (Amendment) Act, 2000	Woodlands and hedgerows
Pygmy shrew *Sorex minutus*		Woodlands, heathland, and wetlands
Red squirrel *Sciurus vulgaris*		Woodlands
Irish stoat *Mustela erminea hibernica*		Wide range of habitats
Badger *Meles meles*		Farmland, woodland and urban areas
Red deer *Cervus elaphus*		Woodland and open moorland
Fallow deer *Dama dama*		Mixed woodland but feeding in open habitat
Sika deer *Cervus nippon*		Coniferous woodland and adjacent heaths

A number of mammals are known to be present in urban areas of Dublin, most notably Fox *Vulpes vulpes*. There are no buildings which might be suitable for roosting bats however tall trees may provide potential roosting features (Hundt, 2011). Although the level of semi-natural vegetation in this area is low, and is subject to high levels of artificial lighting, the treeline provides some suitable foraging habitat for bats in this area – should they be present.

A dedicated bat survey was undertaken by Altemar on July 28th 2020, within the optimal flight period. No evidence of bat roosting was found. It noted that "A single bat (soprano pipistrelle) was noted foraging on site along the southern field boundary […] No bats were detected emerging from any of the onsite trees" although "several trees on the southern boundary were seen to have bat roosting potential. This includes several large Ash (Fraxinus excelsior) and in particular No. 303. No works are proposed in this area and tree protection measures will be in place. It is not proposed to remove any trees of bat roosting potential."

A site visit took place in May 2020 and included a survey of the lands for breeding/nesting birds. Two species were noted: Blue Tit *Parus caeruleus* and House Sparrow *Passer domesticus.* These are both listed by BirdWatch Ireland as of 'low conservation concern' (Colhoun & Cummins, 2013). Nesting birds were found along the treeline only. Elsewhere, suitable nesting habitat is very limited and no birds were recorded in areas of open grassland.

There are no suitable habitats on the site for fish while the drainage ditch may provide habitat for spawning Common Frog. Very little water was present in the ditch on the day of survey and no frog spawn was noted.

Most habitats, even highly altered ones, are likely to harbour a wide diversity of invertebrates. In Ireland only one insect is protected by law, the Marsh Fritillary butterfly *Euphydryas aurinia,* and this is not to be found on built-up sites. Other protected invertebrates are confined to freshwater and wetland habitats and so are not present on this site.

5.3.5 Overall Evaluation of the Context, Character, Significance and Sensitivity of the Proposed Development Site

In summary, it has been seen that the application site is within a built-up area of Dublin city. There are no examples of habitats listed on Annex I of the Habitats Directive or records of rare or protected plants. There are no plant species listed as alien invasive as per SI 477 of 2011.

The treeline is a habitat of high local value however other habitats are of low, or negligible, biodiversity value.

Significance criteria are available from guidance published by the National Roads Authority (NRA, 2009). These are reproduced in Table 5.5. From this an evaluation of the various habitats and ecological features on the site has been made and this is shown in Table 5.6.

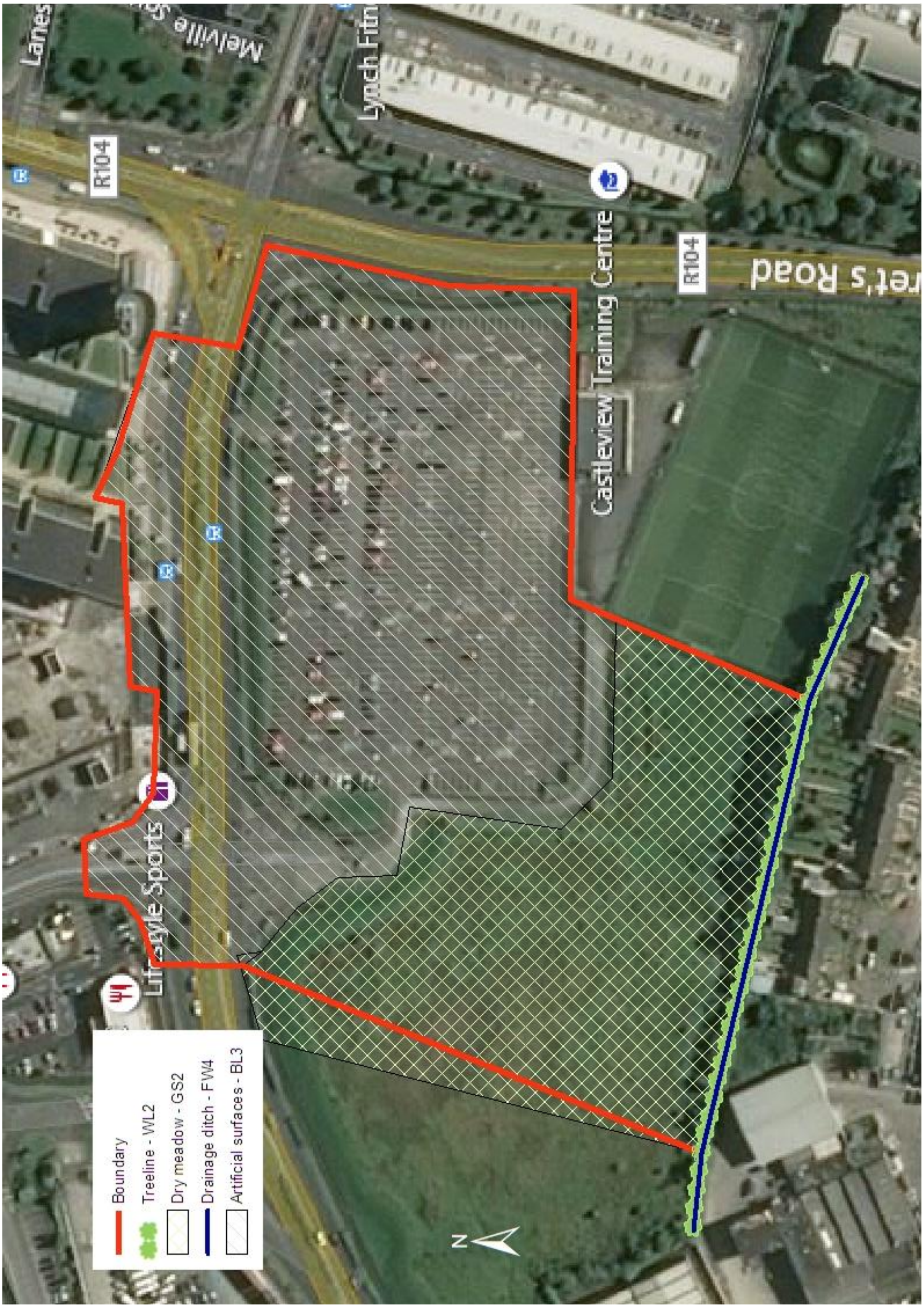


Figure 5.2 – Site boundary and habitats of the subject site

Table 5.5 Site evaluation scheme taken from NRA guidance 2009

Site Rating	***Qualifying criteria***
A - International importance	SAC, SPA or site qualifying as such. Sites containing 'best examples' of Annex I priority habitats (Habitats Directive). Resident or regularly occurring populations of species listed under Annex II (Habitats Directive); Annex I (Birds Directive); the Bonn or Berne Conventions. RAMSAR site; UNESCO biosphere reserve; Designated Salmonid water
B - National importance	NHA. Statutory Nature Reserves. Refuge for Flora and Fauna. National Park. Resident or regularly occurring populations of species listed in the Wildlife Act or Red Data List 'Viable' examples of habitats listed in Annex I of the Habitats Directive
C - County importance	Area of Special Amenity, Tree Protection Orders, high amenity (designated under a County Development Plan) Resident or regularly occurring populations (important at a county level, defined as >1% of the county population) of European, Wildlife Act or Red Data Book species Sites containing semi-natural habitat types with high biodiversity in a county context, and a high degree of naturalness, or populations of species that are uncommon in the county
D - Local importance, higher value	Sites containing semi-natural habitat types with high biodiversity in a county context, and a high degree of naturalness, or populations of species that are uncommon in the locality Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
E - Local importance, lower value	Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; Sites or features containing non-native species that are of some importance in maintaining habitat links.

Table 5.6 Evaluation of the importance of habitats on the Charlestown site

Artificial surfaces – BL3	Negligible biodiversity value
Dry meadow – GS2	Low local biodiversity value
Treeline – WL2	High local biodiversity value

5.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in Chapter 3.0. The following elements are relevant to the assessment of effects in this Chapter.

The proposed development will see clearance of artificial and grassland habitats and a construction phase. Connections to the combined foul and surface water drainage will be made. The proposal will provide for a separate foul and surface water connection to the drainage networks serving the area. Trees on site will be removed.

The potential impacts to biodiversity arise from the loss of habitats, the disturbance to nesting birds during the construction phase and the increase in loading to the wastewater sewer resulting in the change of activity on the site.

5.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

This section provides a description of the potential impacts that the proposed development may have on biodiversity in the absence of mitigation. Table 3.3 of the EPA guidance note sets out the criteria for determining the significance of impacts. This based on the valuation of the ecological feature in question and the scale of the predicted impact. In this way it is possible to assign an impact significance in a transparent and objective way. Table 5.7 summaries the nature of the predicted impacts.

5.5.1 Construction Phase

The following potential impacts are likely to occur during the demolition and construction phase in the absence of mitigation:

1. The removal of artificial surface and grassland habitats.
   The removal of habitats including the loss of dry meadow and artificial surfaces. These habitats are of low or negligible biodiversity value. The loss of these habitats will remove resources for a range of common plants and animals, none of which is of conservation concern.

   The treeline is of high local biodiversity value and is to be retained.
   Offset planting will occur as part of the landscaping scheme which will provide additional habitat for common plants and animals.

   This impact of the loss of artificial surfaces and dry meadow assessed as negative, slight, likely and permanent.

2. The direct mortality of species during site clearance.
   This impact is most acute during the bird breeding season which can be assumed to last from March to August inclusive. The treeline is to be retained and so no bird nesting habitats is to be removed.

   The following is taken from the bat survey report:

   “There is no evidence of a current or past bat roost on site, therefore no significant negative impacts on roosting animals are expected to result from the proposed redevelopment. However, several trees on site may be of bat roosting potential. It is not proposed to fell these trees."

This impact is assessed as negative, imperceptible, unlikely and permanent.

3. Pollution of water courses through the ingress of silt, oils and other toxic substances.
   The drainage ditch on the site provides a direct pathway to the River Tolka. The Tolka holds populations of Brown Trout Salmo trutta and this species is highly sensitive to pollutants (Hendry & Craig-Hine, 2003). The potential for pollution effects to rise is therefore assessed as moderate.

   This impact is assessed as negative, significant, likely and medium-term.

5.5.2 Operational Phase

The following potential impacts are likely to occur during the operational phase in the absence of mitigation:

4. Pollution of water from foul wastewater arising from the development.
   The Ringsend plant is licenced to discharge treated effluent by the EPA (licence number D0034-01) and is managed by Irish Water. It treats effluent for a population equivalent (P.E.) on average of 1.65 million however weekly averages can spike at around 2.36 million. This variation is due to under-capacity as well as storm water inflows during periods of wet weather as this is not separated from the foul network for much of the older quarters of the city. The Annual Environmental Report for 2018, the most recent available, indicated that there were a number of exceedances of the emission limit values set under the Urban Wastewater Treatment Directive. In April 2019 Irish Water was granted planning permission to upgrade the Ringsend plant. This will see improved treatment standards and will increase network capacity by 50%. According to the Engineering Planning Report prepared by POGA Consulting Engineers the proposed development will result in an additional loading Dry Weather Flow to the sewer of 1.01l/s or 87.26m^3 per day.

   This impact is assessed as negative, imperceptible, likely and permanent.

5. Pollution of water from surface water run-off.
   The Greater Dublin Strategic Drainage Study (2005) identified issues of urban expansion leading to an increased risk of flooding in the city and a deterioration of water quality. This arises where soil and natural vegetation, which is permeable to rainwater and slows its flow, is replaced with impermeable hard surfaces. The site is currently partly of hard standing with no surface water attenuation in place. According to the Engineering Planning Report prepared by POGA Consulting Engineers the development will be fully compliant with the GDSDS. Sustainable Drainage Systems (SUDS) will be employed and include attenuation storage.

   This impact is assessed as negative, imperceptible, likely and permanent.

6. Bats
   There is a risk that additional artificial lighting will negative affect bat activity although this must be considered in the context of an existing baseline, which is subject to high levels of artificial lighting from the car park, roads and adjacent residential housing. According to the bat report:

> "Discussions took place between the lighting designer and Altemar Limited in relation to the design of the proposed lighting strategy. As can be seen from Figure 4 lights within the vicinity of the southern hedgerows contain louvres to contain light spill and are classed as a warm white (3000oK). Light spill in the vicinity of the hedgerow is maintained less that 3lux, and is 1 lux in across much of the site. This would not be seen to significantly impact on bat foraging. It would be expected that bat foraging activity would not reduce in the vicinity of the hedgerow. The light spill from the proposed development would not be seen to significantly affect the foraging population of bats in the vicinity of the proposed development."

This impact is assessed as negative, imperceptible, likely and permanent.

7. Impacts to protected areas.
   No impacts are predicted to occur to any site designated for nature conservation. Impacts to Natura 2000 sites (SACs or SPAs) in Dublin Bay are not predicted to occur, principally due to the separation distance between the site and these areas. A full assessment of potential effects to these areas is contained within a separate Screening Report for Appropriate Assessment.

   This impact is assessed as negative, imperceptible and unlikely.

Table 5.7: Significance level of likely impacts in the absence of mitigation

Impact		Significance
Construction phase		
1	Loss of negligible or low local value habitat	negative, slight, likely and permanent
2	Mortality to animals during construction	negative, imperceptible, unlikely and permanent
3	Pollution of water during construction phase	negative, significant, likely and permanent
4	Wastewater pollution	negative, imperceptible, likely and permanent
5	Surface water pollution	negative, imperceptible, likely and permanent
6	Bats	negative, significant, likely and permanent
7	Protected areas	negative, imperceptible and unlikely

Overall, it can be seen that one potential significant impact is predicted to occur as a result of this project in the absence of mitigation.

5.5.2 Cumulative impacts

A number of the identified impacts can also act cumulatively with other impacts from similar developments in this area of Dublin. These primarily arise through the additional loading to the Ringsend Wastewater Treatment Plant. It is considered that this effect is not significant as there is no evidence that current pollution is resulting in negative effects to high-value biodiversity features in Dublin Bay. Upgrading works which are currently underway will bring it in line with the requirement of the Urban Wastewater Treatment Directive.

In this instance the incorporation of separate foul and surface water drainage systems and SUDS attenuation measures into an urban brown-field site is contributing to the cumulative positive effective of reducing rainwater run off to the municipal treatment plant.

There are no other effects which could act in a cumulative way to result in significant impacts to biodiversity.

5.6 DO NOTHING IMPACT

In the absence of this project there will be little change to the biodiversity value of the site in the short- to medium-term. Habitats on the site are mostly of negligible or low biodiversity value This will not change in the absence of this project.

Water quality may improve throughout the Tolka catchment with the implementation of the Water Framework Directive however its target of ‘good ecological status’ for all water bodies by 2016 was not been met. In 2018 a second River Basin Management Plan was published which highlights 190 ‘priority areas for action’ where resources will be focussed during the 2018-2021 period. The Tolka and Dodder, as well as the upper Liffey are among those areas where improvements are expected.

5.7 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

These measures include avoidance, reduction and constructive mitigation measures as set out in Section 4.7 of the Development Management Guidelines. Under the EIA Directive, where significant negative effects are predicted to arise from a project then mitigation measures are required.

This chapter has identified two impacts that were assessed as ‘negative, significant, likely and permanent’ and therefore mitigation is needed to reduce the severity of these potential effects.

5.7.1 Mitigation Measures Proposed

The following mitigation measures are proposed for the development.

Construction Phase

BIOD-C1 Pollution to water courses

Measures are recommended in accordance with guidance from Inland Fisheries Ireland (2016) on the prevention of pollution during construction projects. These are included in the Outline Construction Management Plan which is included as a separate document with this application. Measures include:

- Storage of dangerous substances in bunded areas at all times
- No refuelling of machinery on the site
- An ample quantity of ‘spill kits’ (absorbent material for tackling spills of dangerous substances) will be stored on site.
- All construction personnel will be trained in the importance of preventing pollution.
- Silt-laden water will not be permitted to leave the site. Silt traps will be constructed at a location that intercepts run-off. The silt trap will

not be constructed immediately adjacent to the coastline and a buffer zone will remain between the silt trap and the watercourse with natural vegetation left intact. The southern site boundary will be protected by a robust silt-fence

- The site manager will be responsible for the prevention of pollution and the implementation of these measures.

BIOD-C2 Bats

According to the bat survey report:

"Light spill from the public lighting will follow the Bat Conservation Ireland "Bats & Lighting Guidance. Notes for: Planners, engineers, architects and developers".

The bat ecologist has worked with the lighting engineer to ensure that no negative effects to bats will arise.

5.8 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

This section allows for a qualitative description of the resultant specific direct, indirect, secondary, cumulative, short, medium and long-term permanent, temporary, positive and negative effects as well as impact interactions which the proposed development may have, assuming all mitigation measures are fully and successfully applied.

According to the bat survey report:

"Lighting in the vicinity of the hedgerows has been sensitively prepared to ensure foraging activity is maintained within the area and the hedgerow is not impacted by light spill. Light spill from the proposed development would not be seen to impact on foraging activity. No significant impact on bats foraging or roosting is foreseen from the proposed development."

No significant negative effects to biodiversity are predicted to arise from this development subject to the mitigation measures outlined above.

5.9 MONITORING

Monitoring is required where the success of mitigation measures is uncertain or where residual impacts may in themselves be significant. Table 5. summarises the likely impacts arising from this project.

Monitoring is required to ensure that pollution prevention measures remain effective throughout the construction phase.

Table 5.8: Significance level of likely impacts in the absence of mitigation

Impact		Significance
Construction phase		
1	Loss of habitat	negative, slight, likely and permanent
2	Mortality to animals during construction	negative, imperceptible, unlikely and permanent

3	Pollution of water during construction phase	negative, imperceptible, likely and permanent
4	Wastewater pollution	negative, imperceptible, likely and permanent
5	Surface water pollution	negative, imperceptible, likely and permanent
6	Bats	negative, imperceptible, likely and permanent
7	Protected areas	negative, imperceptible and unlikely

5.10 REINSTATEMENT

No reinstatement works are required for ecological features.

5.11 INTERACTIONS

This section provides a description of impact interactions together with potential indirect, secondary and cumulative impacts

The key environmental interaction with Biodiversity is Water. A series of mitigation measures are proposed in Chapter 7 – Water of this EIAR document to ensure the quality (pollution and sedimentation) and quantity (surface run-off and flooding) is of an appropriate standard.

The Outline Construction Management Plan, which is included as a standalone report with this application, is also of relevance to this Chapter of the EIAR.

5.12 DIFFICULTIES ENCOUNTERED IN COMPILING

This section provides an indication of any difficulties encounters by the environmental specialist in compiling the required information.

The site survey was carried out at an appropriate time of year for general habitat and breeding bird survey and access to all buildings was facilitated.

5.13 REFERENCES

Bullock C., Kretch C. & Candon E. 2008. The Economic and Social Aspects of Biodiversity. Stationary Office.

Colhoun K. & Cummins S. 2013. Birds of Conservation Concern in Ireland 2014 – 2019. Irish Birds. Volume 9 Number 4 pg523-541.

Cooney R. & Dickson B. 2005. Biodiversity and the Precautionary Principle. Earthscan.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

Council Directive 97/11/EEC of 3rd March 1997 amending Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment

Council Directive 2000/60/EC of the European Parliament and of the Council establishing a framework for the Community action in the field of water policy – more commonly known as the Water Framework Directive

Curtis T.G.F.& McGough H.N. 1988. The Irish Red Data Book 1: Vascular Plants. Stationary Office.

Department of Arts, Heritage and the Gaeltacht. 2011. Actions for Biodiversity 2011 – 2016. Ireland’s National Biodiversity Plan.

DG Environment. 2010. Natura 2000 European Commission Nature and Biodiversity Newsletter. Number 28. June 2010. ISSN: 1026-6151.

Doogue D., Nash D., Parnell J., Reynolds S., & Wyse Jackson P. 1998. Flora of County Dublin. The Dublin Naturalists’ Field Club.

EPA. 2002. Guidelines on the information to be contained in Environmental Impact Statements.

EPA, 2003. Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)

Fitter R., Fitter A. & Farrer A. 1984. Grasses, sedges, rushes and ferns of Britain and Northern Europe. Collins.

Fossitt J. 2000. A Guide to Habitats in Ireland. Heritage Council.

Harris S. & Yalden D.W. 2008. Mammals of the British Isles: Handbook, 4th Edition. The Mammal Society.

Heritage Council. 2002. Draft Habitat Survey Guidelines. The Heritage Council.

Hill M.O., Blackstock T.H., Long D.G. and Rothero G.P 2008. A Checklist and Census Catalogue of British and Irish Bryophytes. British Bryological Society.

Hundt L. 2012. Bat Surveys: Good Practice Guidelines. 2nd Edition. Bat Conservation Trust.

IEEM. 2016. Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland. Institute of Ecology and Environmental Management.

Institute of Environmental Assessment, 1995. Guidelines for Baseline Ecological Assessment’

Johnson O. & More D., 2004. Tree Guide’, Collins

Mason C.F. 1996. Biology of Freshwater Pollution. Longman.

Morris P. & Therivel R., 2001. Methods of Environmental Impact Assessment, Spon Press

NRA. 2009. Guidelines for Assessment of Ecological Impacts of National Road Schemes. National Roads Authority.

Parnell J. & Curtis T. 2012. Webb’s An Irish Flora. Cork University Press.

Preston C.D., Pearman D.A. & Dines T.D. 2002. New Atlas of the British & Irish Flora. Oxford University Press.

Rich C. & Longcore T. Editors. 2006. Ecological Consequences of Artificial Night Lighting. Island Press.

Sargent G. & Morris P. 2003. How to Find & Identify Mammals. The Mammal Society.

Smith G. F., O’Donoghue P., O’Hora K. and Delaney E. 2010. Best Practice Guidance for Habitat Survey and Mapping. Heritage Council.

Stace C. 2010. New Flora of the British Isles. Cambridge University Press

Statutory Instrument No. 94 of 1999. Flora (Protection) Order

Treweek J., 1999. Ecological Impact Assessment’, Blackwell Science.

United Nations. 1992. Convention on Biological Diversity

6.0 LAND AND SOILS

6.1 INTRODUCTION

This chapter assesses the impact of the project on the surrounding land, soil and geological environment. The objectives of this chapter are as follows:

- Produce a study of the existing geological landscape (land, soil and geology) within the site boundary.
- Identify the possible effects of the development on the surrounding land and soils over the lifetime of the project (Construction phase and Operational phase).
- Propose measures to mitigate, eliminate or remediate any possible impacts from this development.

The EIAR is carried out in accordance with the relevant EIA legislation and guidance.

This chapter was prepared by Eamonn Mahon BEng (hons), MSc, CEng, MIStructE, MIEI and reviewed and approved by Paul Moran BEng (hons), CEng, MIEI, Eur Ing, RConsEI of POGA Consulting Engineers.

6.2 ASSESSMENT METHODOLOGY

6.2.1 Desktop Study

A desk study of the subject site and the surrounding study area was largely completed in advance of undertaking a site survey. The desk study involved collecting all the relevant geological data for the project and study area. This included the following:

- Environmental Protection Agency database (www.epa.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Bedrock Geology 1:100,000 Scale Map Series, Geological Survey of Ireland (GSI, 2003);
- Geological Survey of Ireland – 1:25,000 Field Mapping Sheets; and,
- General Soil Map of Ireland 2nd edition (www.epa.ie).
- OPW Flood Mapping (www.floodinfo.ie)

6.2.2 Site Investigation

Geotechnical investigations were carried out from May to June 2020 by Irish Ground Surveying Limited (IGSL) and the final report was issued in July 2020. A copy of this report is enclosed at Appendix 6A.

A Waste Characterisation Assessment was also undertaken in February 2021 utilising the samples arising from the geotechnical investigations. A copy of this report is enclosed at Appendix 6B.

The following investigation works were carried out;

- Field works

- Laboratory Testing (Geotechnical)
- Laboratory testing (Environmental)

Field Works

- Boreholes were constructed in a total of 23 locations, using light cable tool techniques.
- Rotary techniques were employed at selected boreholes in which boreholes were terminated, and to ascertain the presence, depth and condition of the bedrock.
- 9 No. Trial Pits
- 4 No. Plate bearing tests
- 3no. Groundwater monitoring Standpipes

Laboratory Testing (Geotechnical)

- Particle Size Distribution
- Index Properties
- Rock Testing

Laboratory Testing

- No Samples in accordance with the RIALTA Suite

6.2.3 Site Visits

A number of site visits were undertaken by POGA Consulting Engineers throughout 2020 to assist with the commissioning of the Geotechnical site investigation and to assess the subject site in terms of items of geological interest and on the geological environment.

6.3 RECEIVING ENVIRONMENT

6.3.1 Site Description and Topography

The subject site is approximately 3.9 Hectares in size and is located off the Finglas Road close to the M50, at Charlestown Place Road/St Margaret’s Road (R104) junction. The site is shown with a red boundary in Figure 6.1 below. The site currently contains a carpark used as an overflow from the adjacent Charlestown Shopping Centre. The site is bounded to the North by Charlestown Place Road, to the South by a mixture of residential and recreational lands (McKelvey Celtic Football Club), to the East by an undeveloped green field site and to the West by St Margaret’s Road (R104).

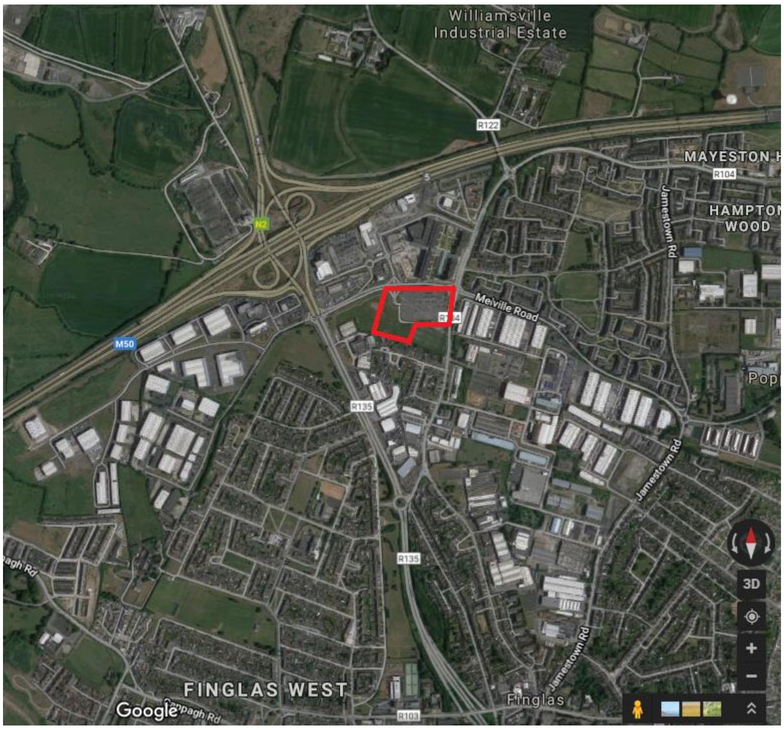


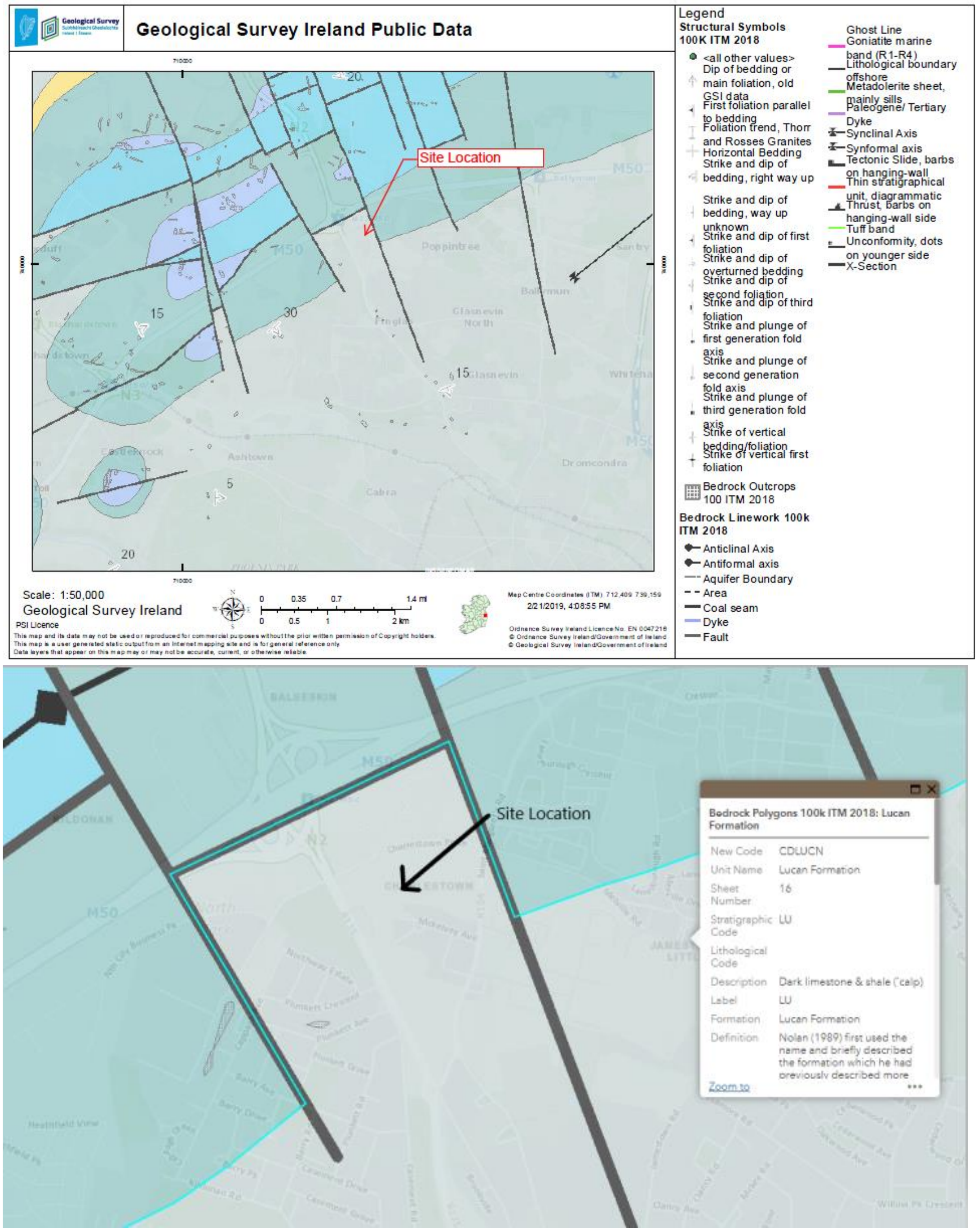
Figure 6.1 – Site location map (Extract from www.google.com)

In relation to topography, the current use of the site as a car park and the adjacent football pitch hints at a relatively flat site. This is indeed the case as the site moderately slopes from the North West corner adjacent to the link road to the South East corner; with levels dropping from approximately 70.00m AOD to 67.50m AOD. This represents a fall of approximately 1:100. There are no significant surface features or outcrops.

6.3.2 Bedrock Geology

The bedrock geological map given on the website of the geological survey of Ireland (www,gsi.ie), indicates the site is overlain by Dark limestone & shale (calp). The underlying bedrock is classified as the Lucan Formation, Impure Limestones. The formation comprises dark-grey to black, fine-grained, occasionally cherty, micritic limestones that weather paler, usually to pale grey. There are rare dark coarser grained calcarenitic limestones, sometimes graded, and interbedded dark-grey calcar.

Rotary coring undertaken as part of the site investigation works established dark/grey fine-grained limestone with zones of weathered mudstone/shale. This is largely in agreement with the GSI mapping. The rock testing recorded a wide range of UCS (Uniaxial Compression Test) values, reflecting the variations in rock strength between the various layers.



Bedrock Polygons 100k ITM 2018: Lucan Formation

New Code CDLUCN
Unit Name Lucan Formation
Sheet Number 16
Stratigraphic Code LU
Lithological Code
Description Dark limestone & shale ('calp)
Label LU
Formation Lucan Formation
Definition Nolan (1989) first used the name and briefly described the formation which he had previously described more

Zoom to

Figure 6.2: Bedrock Geology (www.gsi.ie)

6.3.3 Soils and Subsoils

Soils

Based on GSI mapping (www.gsi.ie), the site is dominated by Till derived from Limestones as shown in Figure 6.3 below.

The trial pits excavated as part of the site investigation uncovered firm brown gravelly clay overlying stiff to very stiff black/grey gravelly clay. However, made ground was identified in some locations.

The borehole findings identified *firm* Clay to a variety of depths ranging from 1.3m to 3.1m. In the deeper deposits of *firm* clay greater than 2.0m the transition was directly to *very stiff to hard* black/grey clay. Under the shallower deposits of *firm* clay less than 2.0m deep an intermediate layer of *stiff to very stiff* brown clay was encountered over the aforementioned black/grey clay. Bedrock was encountered at depths ranging from 4.1 to 7.6m

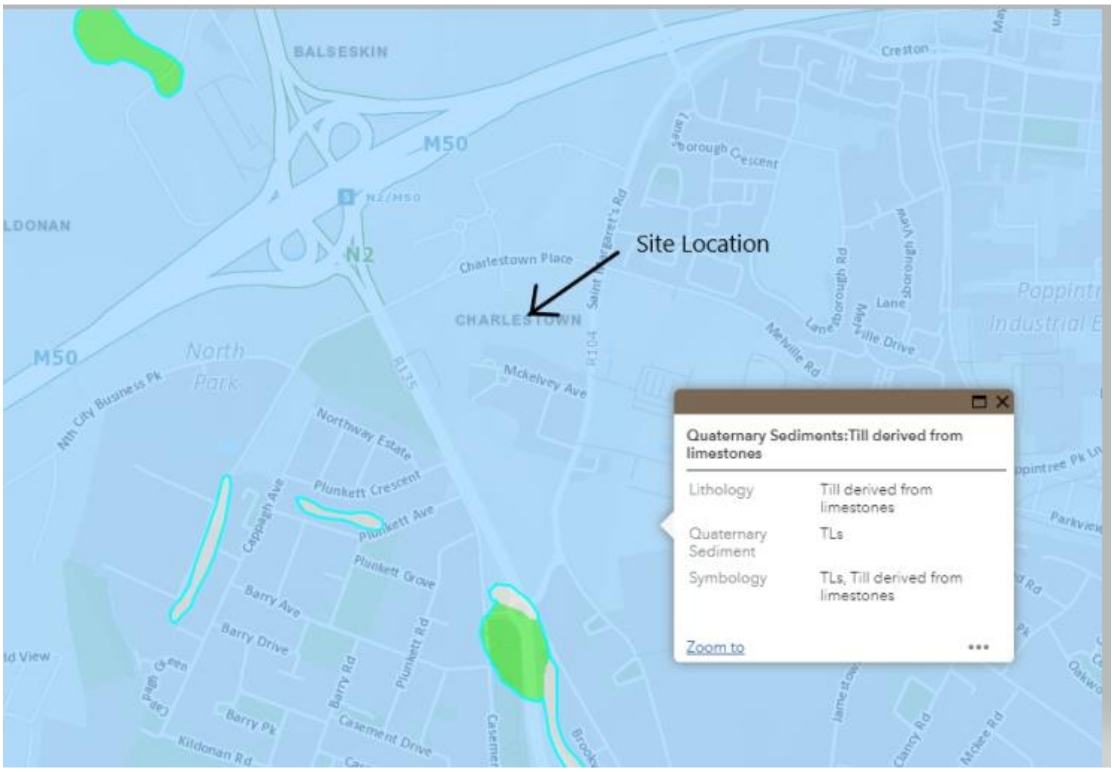


Figure 6.3: Subsoil Classification Map (www.gsi.ie)

Environmental/ Contamination Analysis

Environmental testing was carried out by IGSL. The RIALTA suite of tests measures the Heavy Metal, Hydrocarbons, and Total Organic Carbon on dry soil samples. Also included is leachate analysis tested for recognised contaminants including Dissolved Organic Carbon and Total Dissolved Solids. An asbestos screen is also included in the RILTA suite. The results of the testing indicted that most of the samples satisfied the criteria for inert waste as stipulated by the European Landfill Directive. Exceptions to this occurred in two of the trial pits where elevated levels Dissolved Sulphate and Total dissolved solids and slightly elevated levels of Dissolved Selenium were detected.

6.3.4 Hydrogeology

Aquifer Classification

The site is located on an unnamed Groundwater Body (GWB) in which the flow regime is classified in the GSI database as Locally Important Aquifer- Bedrock which is Moderately Productive only in Local Zones as illustrated in Figure 6.4.

Recharge Classification

The GSI groundwater recharge map is derived from existing hydrogeological and meteorological spatial datasets (Figure 6.5). The effective rainfall over the site area is 411 mm/year. The site area has an annual recharge cap of 103 mm/year, based on a recharge co-efficient of 25% from low permeability subsoil.

Aquifer Vulnerability

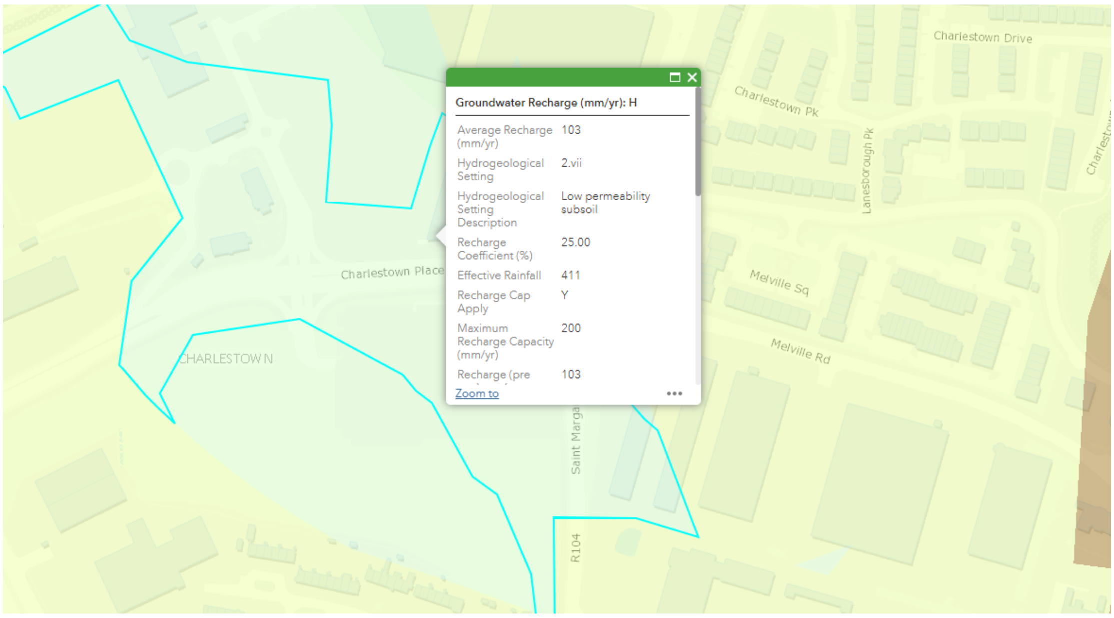
Groundwater vulnerability is dictated by the nature and thickness of the material overlying the uppermost groundwater. This means that vulnerability relates to the permeability and thickness of the subsoils. A detailed description of the groundwater vulnerability categories can be found in the Groundwater Protection Schemes document (EPA/GSI, 1998).

The aquifer vulnerability rating for the site is mapped by the GSI as high (H) for the entire site as the subsoils overlying the bedrock are likely to be >3m (see Figure 6.6). In high vulnerability areas bedrock is likely to be overlain by 3-10m of relatively permeable subsoil such as sandy till or 3-5m of low permeability subsoil such as clayey till or clay. This is broadly in agreement with the borehole data as described in section 6.2.3.1 which found Clay subsoil 4.1-7.6m deep.

Groundwater Abstraction

The GSI database shows that there are a number of wells within 1- 2km of the subject site (Figure 6.7). Many of these are utilised for Agricultural and industrial as well as domestic use.

Figure 6.4: Aquifer Classification Map (www.gsi.ie)



Groundwater Recharge (mm/yr): H

Average Recharge (mm/yr)	103
Hydrogeological Setting	2.vii
Hydrogeological Setting Description	Low permeability subsoil
Recharge Coefficient (%)	25.00
Effective Rainfall	411
Recharge Cap Apply	Y
Maximum Recharge Capacity (mm/yr)	200
Recharge (pre	103

Figure 6.5: Recharge Classification Map (www.gsi.ie)

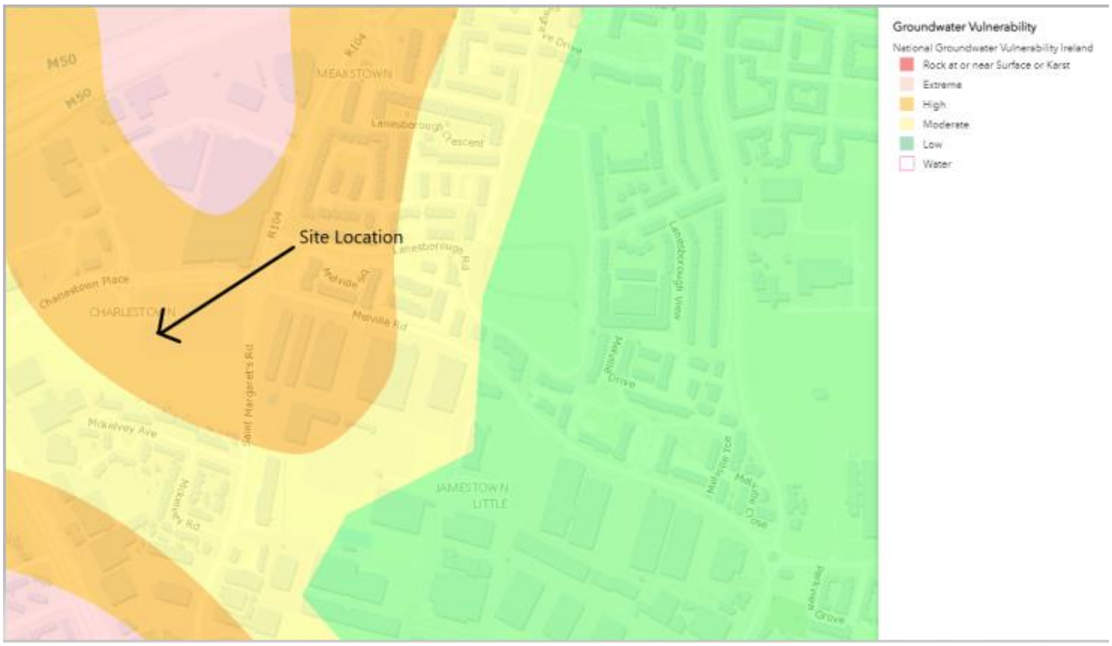


Figure 6.6: Groundwater Vulnerability Map (www.gsi.ie)

Figure 6.7: Groundwater Abstraction Map (www.gsi.ie)

6.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The following elements address the elements of the construction works which are relevant to the assessment of effects on the local geology and hydrogeology.

The elements of the works which will have the greatest impact on the lands and soils are the excavation for the basement, civil engineering siteworks, the piling works and the construction of the underground carpark.

Deep excavation will be prevalent throughout the site with the significant basements founded on bedrock where possible. This element of construction will have the greatest single impact on the soils and hydrogeology. The extent of the basement is proposed over part of the site as shown in Figure 6.8. The displacement depth of the basement in the subsoil over bedrock is demonstrated in a selection of sections across the site contained in Figure 6.9

It is proposed that the basement will be constructed using a waterproofed concrete retaining walls and basement slab with deepening at the edges and under internal columns and walls to support the building above.

Piling works will be required to bring loads down to suitable bearing strata in blocks without a basement. This will have a slight negative impact on the existing geology and will entail the disturbance of the existing subsoil geology and bedrock to anticipated depths of 6-8m across the site. The piling works will not be prevalent in a significant proportion of the site as the basement construction directly onto bedrock is the more extensive solution. Furthermore, the volume and distribution of the piling works is small relative to the subsurface area. Special care will be required to ensure the pile arisings are contained locally to the piling works.

Excavation associated with the foul, storm and watermain to serve the development will also impact existing geology with widespread shallow excavation across the site.

The superstructure predominately consists of reinforced concrete framing with structural steel and facades placed on site.

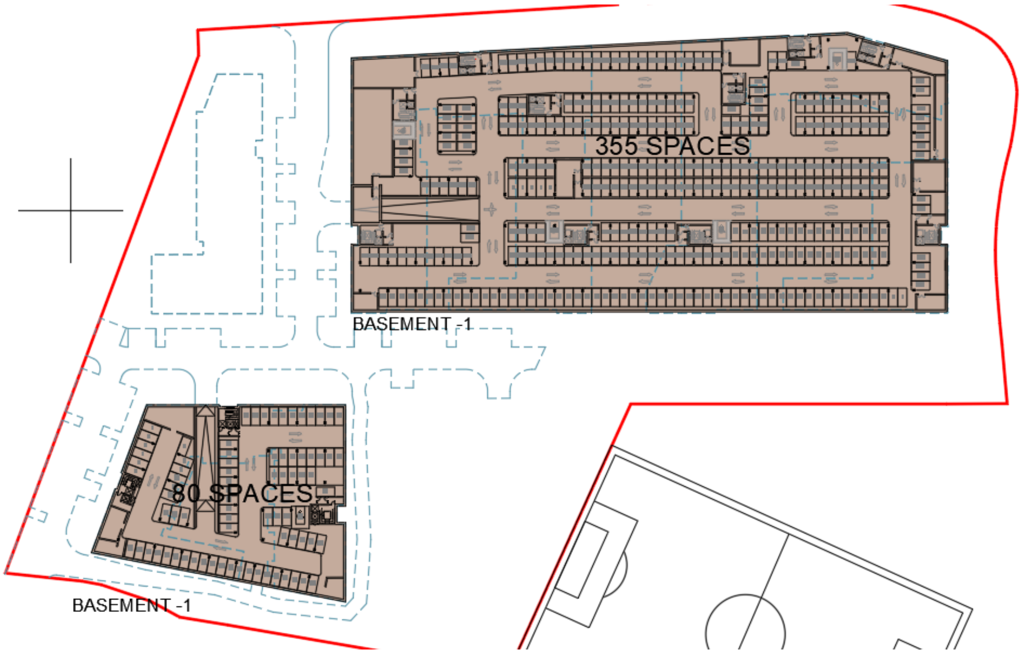


Figure 6.8: Extent of Basement Construction

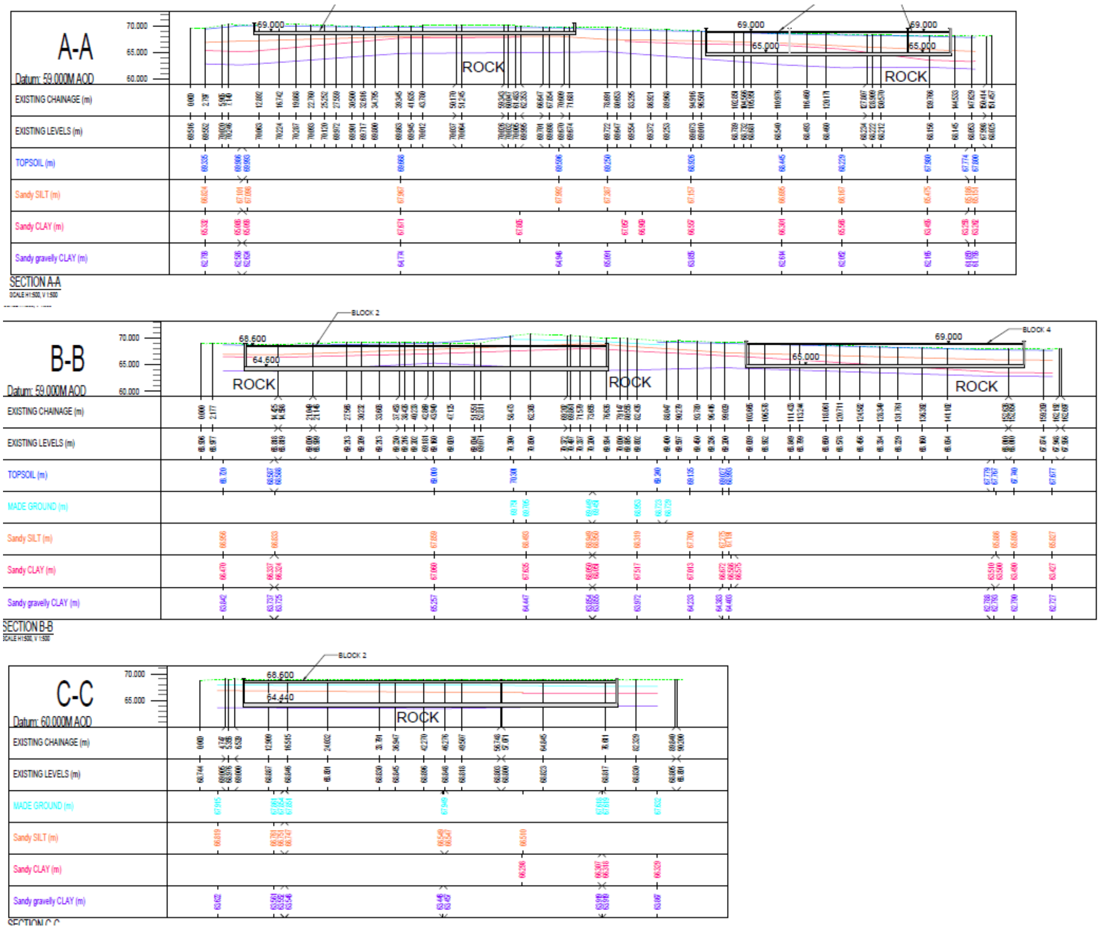


Figure 6.9: A Selection of Site Sections

6.5 CONSTRUCTION EFFECTS, MITIGATION & MONITORING

6.5.1 Effects

The section below outlines the potential impacts the development may have on the surrounding lands and soils during construction.

Initially the demolition and removal of the surface carpark will be required. While the area covered is large the material thickness is small and it is anticipated that this work will not generate substantial amounts of demolition material, with neutral effects of a not significant nature on the environment, and short term duration.

The initial siteworks will involve striping the topsoil and excavating for the basement. These works will involve excavation, transport and deposition of large quantities of soil material and artificially lowering the groundwater to facilitate construction. This effect with be neutral and not significant on the environment and short term in duration.

The excavation of large quantities of native material will result in disturbance of the subsoil geology to anticipated depths of approximately 5m across the site to a maximum depth of 63.5 AOD. The construction works will expose subsoil layers to the effects of weathering and may result in the erosion of soil, particularly in times of adverse weather conditions. This effect with be neutral and not significant on the environment and short term in duration.

Based on ground water monitoring via standpipes it is anticipated that the level is stable circa 66.9m. This will mean that up to 3.4m of groundwater will be intercepted during basement construction creating the potential for negative effect on hydrogeological. The significance of this effect is not significant and short term in duration .

Dust and debris as well as spillages of fuels, oils and greases from machinery are the main potential sources of contamination on the proposed site. Mitigation measures as noted in Chapter 9 of the EIAR and sourced from the Outline Construction Management Plan by POGA and the Site Specific Construction & Demolition Waste and By-Product Management Plan by Byrne Environmental will be applied to address potential sources of contamination.

The main potential pathway for contamination from spillages to occur is via infiltration to the soil. As outlined above the aquifer is Locally Important and vulnerability is classified as high (H) so this should be considered the receptor of primary significance. Contamination instances during construction will likely occur in localised areas only causing a negative effects, however and the permeability of the Clay subsoil is low, therefore the significance of the effects is not significant and short term in duration.

The piling works on site will involve drilling and removal of sections of the subsoil and bedrock to facilitate the construction of the piles. The piling works will involve the disturbance to the subsoil and bedrock down to formation level circa 8.0m. below ground level. This effect of this will be natural with imperceptible significance and short term in duration.

The provision of foul, surface water and watermain services will generate widespread shallow excavation which will impact on the subsoil closest to the surface approximately 2.0 to 2.5m below ground level. This will mean that up to 1.4 m of the ground water may be intercepted. This effect of this will be natural with imperceptible significance and short term in duration.

6.5.2 Mitigation

Construction impact mitigation measures are primarily based on the implementation of part or all of the *Outline Construction Management Plan* by POGA and the *Site Specific Construction & Demolition Waste and By-Product Management Plan* by Byrne Environmental. Set out below are mitigations measures related to construction effects.

LS-C1. A construction and demolition Waste Manager should be appointed who will have overall responsibility on site. All demolition material should be sorted to distinguish reusable material suitable for recycling. Since a large proportion of the demolition material will be bituminous car park surfacing and associated granular material it may be considered a hazardous waste and should be disposed of in a licenced disposal facility if recycling is not considered viable. All waste control measures are set out in the Site-Specific Construction & Demolition Waste and by-Product Management Plan.

LS-C2. Reusable excavated soils and rock will be retained on-site for backfilling purposes to reduce the total volume of imported material where possible. It is envisaged however that due to the large volumes of excavation required to construct the basements on site a large portion of the excavated material will be removed off site.

LS-C3. All excavated soil and pile arisings shall be stockpiled and tested to determine the soil classification in accordance with the waste acceptance criteria for Inert, Non-Hazardous and Hazardous Waste Landfills pursuant to Article 16 of the EU Landfill Directive 1999/31/EC Annex II and applied by landfill operators.

LS-C4. A dewatering strategy should be developed to be applied to the construction of all excavations that encroach on groundwater. Given the substantial volumes involved recharge of the adjacent aquifer to ground downgradient of temporary dewatering points should be employed to avoid excessively loading the surrounding drainage system. All ground water and rainwater collected in the excavation is to be pumped to a settlement tank before being used to recharge ground water. Where recharge points are not feasible however, calculations and an analysis of groundwater discharge to sewers should be included for review by the Planning Authority with pumping surface water sewer at an agreed location and pumping rate.

LS-C5. It is proposed to use a Secant pile wall to construct the basement consisting of an alternative soft and hard pile drilled around the full perimeter of the excavation. The primary (or soft) pile is drilled first on a hit a miss basis and extends to below the basement excavation line and are normally unreinforced, the secondary (or hard) pipe is then drilled between the soft piles and removes part of this pile forming a continuous wall. The wall will be designed by specialist design to support earth pressures from the adjoining ground both inside and outside the site boundary. By providing a secant pile wall around the perimeter of the construction of the basement it is not expected to result in any significant ground movement. Once the secant pile is in place this will exclude groundwater for the excavation and significantly reduce the dewatering required to facilitate the basement construction. Once the final basement walls retaining walls and base are cast no additional ground water dewatering will be required.

LS-C6. Mitigation measures will be required to control the migration of dust and debris. This will include dust suppression techniques such as water spraying, sweeping of hard surface roads, and the use of tarpaulin coverings and wheel washing for site traffic and delivery vehicles. All dust control measures noted in the Outline Construction Management Plan to be followed.

LS-C7. An emergency spill kit with oil boom, absorbers etc will be kept on-site for use in the event of an accidental spill to prevent any contaminants entering the subsoils and the underling aquifer. A specific team of staff shall be trained in the use of spill containment.

LS-C8. Highest standards of site management will be maintained, and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the site and surrounding environment during construction. A named person will be given the task of overseeing the pollution prevention measures agreed for the site to ensure that they are operating safely and effectively.

6.5.3 Monitoring

LS-C9 Monitoring of groundwater levels pre, during and post construction of basement works will be carried out. Trigger water levels will be established for management of temporary dewatering works. Ground water monitoring will continue until the basement is complete.

A discharge monitoring inspection programme will be put in place and agreed with the local authority. This methodology safeguards water quality and provides a solution for catching suspended solids and sediment prior to discharge to the groundwater aquifer of storm sewer system.

Execution of the Construction & Demolition Waste and By-Product Management Plan during the construction phase will be monitored by the Construction Supervisor to local authority requirements. The monitoring should include dust management and monitoring, storage of hazardous materials and transport and removal of soil.

During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken for the holding/settlement tank, and specifically following heavy rainfall events (i.e. weekly, monthly, and event-based monitoring is proposed).

Movement monitoring of basement retaining walls forms an important part of the overall basement construction. Monitoring is used for the following:

- To validate the basement design and any movement calculations
- To provide an early warning system if greater than expected movements occur as the excavation proceeds.
- To record actual movements so that data is available in relation to neighbouring structures and services.

Movement monitoring is generally carried out in three methods, these are:

- Inclinometers
- Tiltmeters
- Standard surveying equipment with targets, etc.

All temporary support systems should be installed in accordance with best practice in order to minimise the ground movements. Under Irish standard practice the contractor is responsible for designing and implementing the temporary works, so it is considered essential that the contractor employed for these works should have completed similar schemes successfully. For this reason, only carefully pre-selected contractors will be invited to tender for these works.

6.6 OPERATIONAL EFFECTS, MITIGATION & MONITORING

6.6.1 Effects

It is anticipated that there will be no significant long-term impact on the soils and hydrogeology. The operational phase of the development is therefore considered to have a neutral effect in relation to land and soil on the subject site.

Currently, predevelopment a large proportion of the site is covered with impermeable surface car parking. The proposed development contains a significant area of permeable surfacing materials such as Grasscrete, Permeable Paving, Swales and grassed areas. Recharge to the Aquifer therefore, will not be affected significantly by the development as the surface areas contributing to groundwater will be largely maintained; essentially resulting in a neutral effect.

The hydrogeological impact on the receiving environment is dependent on the quality and quantity of the discharge at the outfall location. This impact will be minimized by robust design and careful maintenance of stormwater system as proposed in section 6.5.2.

6.6.2 Mitigation

The mitigation measures outlined below should be implemented during the operational phase:

LS-O1 The stormwater drainage system will include for a swale to offer a level of treatment to run-off from the roads in the development reducing the level of pollutants and hydrocarbons in the out flow.

LS-O2 The stormwater drainage system will include for a bypass separator, to be located upstream of the outfall location, thus reducing potential impact to the receiving environment in the event of oil or fuel spillages.

LS-O3 The stormwater will be directed to the Attenuation tank constructed as part of the phase 2B stormwater drainage solution which has been sized to cater for the subject site. A Vortex Flow Control device will be incorporated to ensure the controlled release of runoff waters at the outfall location.

6.6.3 Monitoring

Monitoring of the operation of the finished development is not considered a requirement during the operational phase.

6.7 REFERENCES

IGSL (2020) Ground Investigation Report_ Ref 22495 – see Appendix 6A
O'Callaghan Moran Waste (2021) Characterisation Assessment - see Appendix 6B
POGA Consulting Engineers (2021) Site Specific Flood Risk Assessment (submitted with this planning application)

POGA Consulting Engineers (2021) Engineering Services Report (submitted with this planning application)
GSI On Line Mapping
EPA On Line Mapping

7.0 WATER

7.1 INTRODUCTION

This chapter of the Environmental Impact Statement addresses the issues of water, (including existing watercourses, surface water drainage, wastewater, and water supply) and hydrogeology of the subject lands and assesses the impact of the proposed development on these aspects of the existing environment.

This chapter was prepared by Noel Mahon MEng, MIEI, and reviewed and approved by Eamonn Mahon BEng (hons), MSc, CEng, MIStructE, MIEI, of POGA Consulting Engineers.

7.2 RECEIVING ENVIRONMENT

7.2.1 Hydrology

The Bachelors Stream, also known as the Finglas River, is located 600m to the South of the subject site. The stream flows southwards and discharges into the Tolka River. The level of the Bachelors Stream is approximately 4m below the lowest level of the subject site. The Santry River flows from West to East and is located over 2.6km to the East of the site.

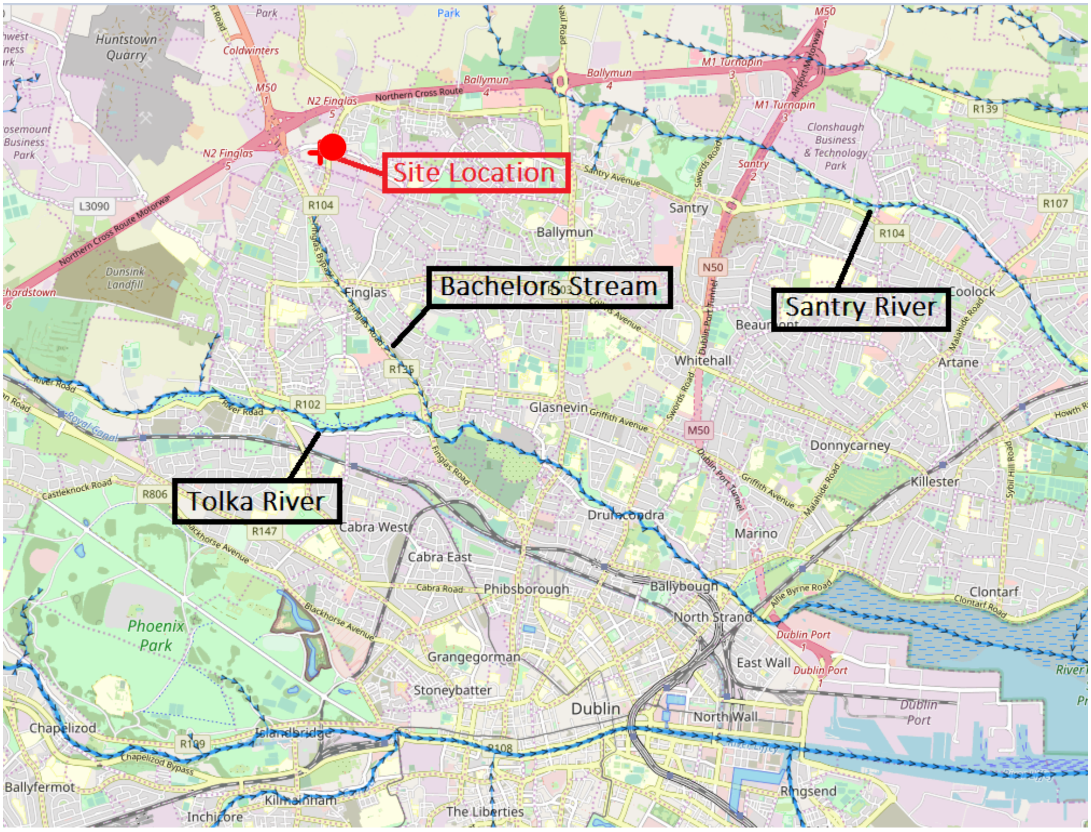


Figure 7.1 - Existing Waterbodies (Extract from www.gis.epa.ie)

According to the PFRA Flood extent mapping the subject site is situated outside the predicted 1:100 flood fluvial zone, meaning it is located in flood zone C, please refer to the Site-Specific Flood Risk Assessment provided as part of the Planning Application for the report which considers all of the flooding matters.

7.2.2 Hydrogeology

There is no history of groundwater flooding in the area according to the OPW National Flood Hazard Mapping, please refer to Section 3.2.5 of The Site-Specific FRA.

Please refer to Chapter 6 for an in-depth assessment of the hydrogeological impacts of the proposed development.

7.2.3 Existing Surface Water Sewers

There is an existing 750mm diameter surface water pipe running along the Eastern and Southern boundary. This surface water pipe was constructed as part of the existing Charlestown development. The surface water from this proposed development is discharged into this 750mm diameter pipe that in turn discharges in an existing 1.2m diameter culvert on the subject lands to the South-East.

The surface water outflow from Phases 1 & 2 flows to the attenuation tank constructed as part of the existing Charlestown Shopping Centre development (permitted under planning reference F19A/0146 and F18A/0718). The attenuation tank is connected to the existing 750mm diameter pipe to the South of the site which drains the combined attenuated outflow. This pipe is ultimately connected to the 1.2m diameter culvert to the Bachelors Stream (Finglas River). It is proposed that this development will be connected to the permitted attenuation tank.

7.2.4 Existing Wastewater Sewers

It is proposed that the foul effluent generated by the development will drain by a 225mm diameter gravity system before discharging into the existing 750mm diameter Meakstown Foul Sewer (also known as the North Fringe Foul sewer) which lies adjacent to the Northern boundary of the site, beneath the link road.

7.2.5 Water Supply

There is an existing 850mm diameter trunk watermain which is within the applicant’s land running under the Charlestown Place Road, please refer to Drawing 1726-105 for details. As part of the Phase 1 construction a new 250mm diameter watermain was constructed either side of this distributor Road and connected into the trunk main with the agreement of the Water Department of Dublin City Council (the authority responsible for the 850mm diameter watermain). It is proposed to connect the subject site off the nearest (Southern) 250mm diameter watermain via a 150mm diameter HDPE watermain looping around the development.

7.3 DRAINAGE FOR THE PROPOSED DEVELOPMENT

7.3.1 Drainage for the proposed Development

A schematic for the drainage for the proposed development is shown in Figure 7.3.

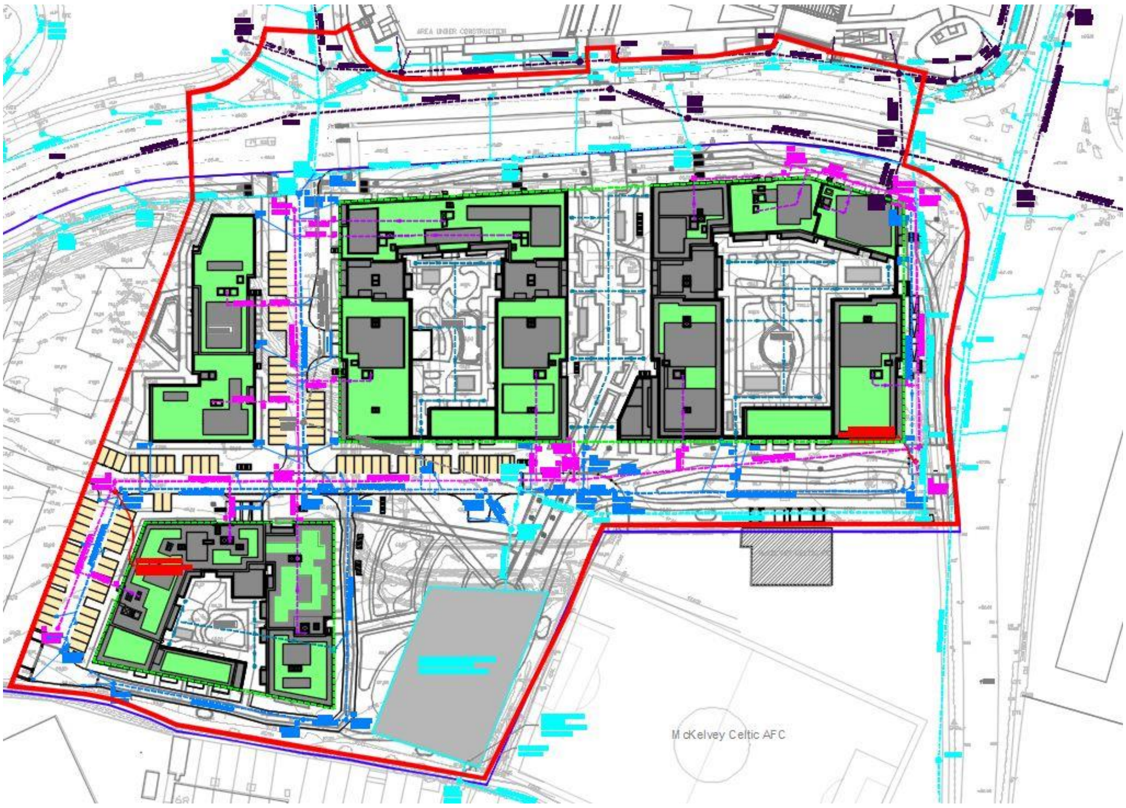


Fig 7.3: Wastewater and Surface water drainage schematic

7.3.2 Wastewater Drainage

It is proposed to connect to the existing wastewater network at the North Eastern site boundary. It is proposed to drain the surface water run-off at basement level in the underground carparks (under Blocks 1, 2, & 4) into a vertical pumping station which then outfalls into the proposed wastewater network via a discharge manhole.

7.3.3 Proposed Surface Water Drainage

The proposed surface water drainage within the development will comprise a combination of traditional piped drainage systems with attenuation and SuDS techniques. It is proposed to use four surface water treatment systems at the site, they include; a green roof system, a podium retention system, an open swale, and permeable paving. It is proposed to intercept, treat and attenuate the rainfall water falling on the site using the methods mentioned in the Engineering Planning Report Section 4.1. It is proposed to construct a new 225mm diameter surface water network flowing towards the underground attenuation tank located at the South Eastern site boundary. The attenuated surface water run-off outfalls into the existing 525mm diameter surface water network flowing Eastwards towards the 1200mm diameter surface water culvert located under St Margaret's Road. The culvert outfalls into the Finglas River please see drawings 1726-103 & 104 for details.

The sizes of the storm water attenuation facilities will be determined in accordance with the Greater Dublin Strategic Drainage Study. All surface water pipes sizes and gradients are designed in accordance with the Department of Environment Recommendation for Site Development Works, Building Regulations and Irish Water Standards.

7.3.4 Water Supply

It is proposed to connect to the existing 250mm diameter watermain located at the Northern boundary of the site. A 150mm diameter HDPE pipe network will service the subject site. A bulk flow meter will be fitted at the main entrance of the site. Individual connections will be provided to both retail units, the Creche, and the 4No. apartment blocks. A manifold box will be provided for each apartment block to provide separate metered connections to each dwelling and commercial unit.

7.3.5 Hydrogeology

Please refer to Section 6.3.4 for an in-depth assessment of the site-specific hydrogeology.

7.4 EVALUATION OF POTENTIAL EFFECTS TO SURFACE WATER AND GROUNDWATER

7.4.1 Construction Phase

Surface Water - Surface water runoff during construction activities may contain increased silt levels or become polluted from construction activities. Waterborne silt can arise from dewatering excavations, exposed ground, stockpiles and site roads. Construction materials such as concrete and cement are alkaline and corrosive and can cause pollution in watercourses. The effect of water emissions from the construction phase of the proposed site development works is negative. The consequence of this effect is not significant and shot term in duration.

Hydrogeology – There is potential to impact on the groundwater environment during construction from deep excavations exposing subsoil layers (4m deep). The potential impact from the construction phase of the development will require a dewatering strategy to be developed during the construction of all excavations, refer to Section 6.4 for the effect and significance of this effect.

Wastewater Sewerage - The development would require the removal of topsoil and earthworks to facilitate the construction of wastewater sewers. The effect of construction of the wastewater sewerage is neutral. The consequence of this effect is imperceptible and shot term in duration.

Surface Water Drainage - The development would require the removal of topsoil and earthworks to facilitate the construction of the surface water Drainage Systems. There is a potential for the discharge of pollutants (can commonly include suspended solids, oil, chemicals, cement, cleaning materials and paints) which can enter waters in various ways, such as directly into a watercourse; via drains or public sewers; via otherwise dry ditches; via old field drains; through seepage into groundwater systems; through excavation into underlying aquifers and through disturbance of an already contaminated site. The effect of surface water drainage from the construction phase is negative. The consequence of this effect is not significant and shot term in duration.

Water Supply - The watermain supply network would involve earthworks activities within the subject lands. The effect of construction of the water supply network is neutral. The consequence of this effect is imperceptible and shot term in duration.

7.4.2 Construction Mitigation measures

It will be necessary for the contractor to implement measures to mitigate potential impacts to the existing surface water network. Such measures would include:

W-C1 Surface water storage in excavations etc. will be directed to on-site settlement tanks, where silt removal will be facilitated prior to discharge to the surface water system at a controlled rate. Periodic testing of the surface water discharge might also be undertaken.

W-C2 If concrete mixing is carried out on site, the mixing plant will be sited in a designated area with an impervious surface.

W-C3 To minimise any impact on the water environment from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas or chemstore containers.

W-C4 In the anticipated event of groundwater being encountered during the construction phase, mitigation measures will include dewatering by pumping the excess water to a settlement tank before being used to recharge the ground water.

W-C5 A contingency plan for pollution emergencies should also be developed and regularly updated, which would identify the actions to be taken in the event of a pollution incident.

These measures will be addressed in the *Outline Construction Management Plan* by POGA and the *Site Specific Construction & Demolition Waste and By-Product Management Plan* by Byrne Environmental

Any necessary construction connections to the existing foul sewer network will be undertaken in agreement with and approval of Irish Water and appropriate procedures will be followed to ensure that there is no impact on the operation of the existing foul sewer system.

7.4.3 Operational Phase

Surface Water - The proposed development will result in an increase in surface water runoff from the subject site, due to the development creating approximately 39% impermeable surface area. However, the implementation of attenuation and SUDS measures will result in the potential impact on surface water receiving waters being neutral with an imperceptible consequence.

Hydrogeology - It is not envisaged that there would be significant long-term impact on the underlying hydrogeology of the site. However, careful management of the stormwater system will be required. Refer to Section 6.5 for the operational phase effect on hydrogeology and significance of this effect.

Surface Water Drainage - The proposed development has the potential to increase surface water runoff from the site, due to the increase in impermeable surface area. The potential impact on surface water drainage is neutral with an imperceptible consequence and long term in duration.

Water Supply - Development of residential units on the subject lands would generate a negative effect on the public water supply system. However the effect is not significant and long term in duration.

Wastewater - Development of residential units on the site would increase the quantity of wastewater discharged to the existing wastewater sewer. There could be the possibility of leakage from foul sewers underground. This leakage could result in possible contamination of groundwater in the area. The effect of wastewater is negative; however the significance is not significant and long term in duration.

7.4.4 Operational Mitigation measures

The construction management of the building project will incorporate mitigation measures to minimise as far as possible the risk of surface and groundwater contamination.

W-O1 All pipes to be tested prior to allowing foul effluent to discharge to them in accordance with the requirements of the Irish Water and/or the local authority.

W-O2 All watermains to be tested and chlorinated in accordance with the requirements of the Irish Water and/or the local authority.

W-O3 The SuDS proposed for the development would facilitate discharge of run-off to ground, thereby reducing discharge to surrounding watercourses etc. The proposed SUDS strategy also includes the limiting of flow from the site to Greenfield runoff levels and the storage of same within detention basins etc.

W-O4 Surface water storage systems would include permeable pavements, and the open swale featuring an unsealed permeable base. While the infiltration capacity of the subsoil is relatively limited this would enable some surface water infiltration to the ground and thus facilitating the natural recharge of groundwater.

W-O5 In order to reduce the risk of defective or leaking sewers, all new sewers would be pressure tested and CCTV surveyed to ascertain any possible defects, in accordance with Irish Water Requirements. Such defects if they arise would be repaired prior to the connection of any future development to the sewers.

W-O6 Given the sensitive nature of the receiving environment, a Class I bypass petrol interceptor will also be inserted on the storm line upstream of the outfall. This will provide an additional level of protection from petrol, oils and hydrocarbons and is designed to achieve a concentration of less than mg/l of oil during 99% of all rainfall events.

7.4 RESIDUAL IMPACTS

It is anticipated that there will be no significant residual impacts on the surface water and ground water.

7.5 DO NOTHING SCENARIO

A 'Do nothing' scenario will result in the subject site remaining undeveloped and in brown field state.

7.6 WORST CASE SCENARIO

In the event that the proposed development was to proceed, and the proposed mitigation measures substantially fail then it is likely that there would be a significant impact on the hydrology and water services with the potential for an increase in flood risk and contamination of local watercourses.

7.7 MONITORING & REINSTATEMENT

Monitoring of the surface water discharge is not deemed necessary. A bypass separator will be fitted on the surface water outfall. This will reduce the likelihood of hydrocarbons being discharged into the surface water system. Maintenance of the proposed surface water drainage network will be carried out as part of the overall maintenance programme for the proposed development. Normal post construction reinstatement of trenches for drains and watermains will take place after pipe laying.

Monitoring of foul effluent discharges is not deemed necessary.

Monitoring of the water supply will be implemented via a bulk meter located at the connection point of the water supply to the proposed development.

7.8 INTERACTIONS

The key interactions with water and hydrogeology would be Land and Soils (chapter 6) and Biodiversity (Chapter 5).

8.0 AIR AND CLIMATE

8.1 INTRODUCTION

Byrne Environmental Consulting Ltd have assessed the potential air quality and climatic impacts that the project may have on the receiving environment during the construction and operational phases of the project. The assessment includes a comprehensive description of the existing air quality in the vicinity of the subject site; a description and assessment of how construction activities and the operation of the development may impact existing air quality; the mitigation measures that will be implemented to control and minimise the impact that the development may have on local ambient air quality and reduce the impact on the local micro climate; and, finally, a description as to how the development will be constructed and operated in an environmentally sustainable manner.

8.2 IMPACT ASSESSMENT METHODOLOGY

The general assessment methodology of the potential impact of the project on air quality and climate has been conducted in accordance with:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, August 2018)
- Guidelines on information to be contained in Environmental Impact Assessment Reports (EPA, Draft 2017).
- Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).
- Revised Guidelines on the Information to be Contained in Environmental Impact Statements (EPA 2015).
- Planning and Development Regulations 2001, as amended, in particular by the European Union (Planning & Development)(Environmental Impact Assessment) Regulations 2018 (SI No. 296 of 2018).
- Environmental Impact Assessment of Projects – Guidance on the preparation of the EIAR, European Commission, 2017.
- Climate Action and Low Carbon Development Act 2015

8.2.1 Legislation and Guidance

Air quality standards and guidelines are available from a number of sources. The guidelines and standards referenced in this report include those from Ireland and the European Union.

In order to reduce the risk to health from poor air quality, National and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or "Air Quality Standards" are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (Ref Table 8.1).

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the National Air Quality

Standards Regulations 2011 (S.I No. 180 of 2011), which incorporate European Commission Directive 2008/50/EC which has set limit values for the pollutants SO2, NO2, PM10, benzene and CO Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC). Provisions are also made for the inclusion of new ambient limit values relating to PM2.5. The European 2008/50/EC Clean Air for Europe (CAFÉ) Directive is the current air quality directive for Europe which supersedes the European Directives 1999/30/EC and 2000/69/EC.

In order to assess a wider range of air pollutants in the development area it is necessary to review current air quality monitoring data from published sources such as the most recent EPA's 2019 Annual report entitled Air Quality in Ireland. This EPA report provides detailed monitoring data collected from a number of monitoring locations throughout Ireland on an annual basis to assess national compliance with National Air Quality Regulations. Given the location of the site within. Dublin city it is characterised as a Zone A area as defined by the EPA.

EU legislation on air quality requires that Member States divide their territory into zones for the assessment and management of air quality. The zones currently in place in Ireland in are as follows:

- Zone A is the Dublin conurbation,
- Zone B is the Cork conurbation
- Zone C comprising 23 large towns in Ireland with a population >15,000.
- Zone D is the remaining area of Ireland.

The air quality in each zone is assessed and classified with respect to upper and lower assessment thresholds based on measurements over the previous five years. Upper and lower assessment thresholds are prescribed in the legislation for each pollutant. The number of monitoring locations required is dependent on population size and whether ambient air quality concentrations exceed the upper assessment threshold, are between the upper and lower assessment thresholds, or are below the lower assessment threshold. A summary of the EPA's Annual report entitled Air Quality in Ireland 2019 is detailed below in Table 8.3

Table 8.1 – Air Quality Standards Regulations 2011 (based on EU Council Directive 2008/50/EC)

Pollutant	Regulation	Limit Criteria	Tolerance	Limit Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for the protection of human health – not to be exceeded more than 18 times/year Annual limit for the protection of human health Annual limit for the protection of vegetation	40% until 2003 reducing linearly to 0% by 2010 40% until 2003 reducing linearly to 0% by 2010 None	200 µg/m3 40 µg/m3 400 µg/m3 NO & NO2
Lead	2008/50/EC	Annual limit for the protection of human health	100%	0.5 µg/m3
Sulphur Dioxide	2008/50/EC	Hourly limit for protection of human health – not to be exceeded more than 24 times/year	150 µg/m3 None	350 µg/m3 125 µg/m3

Pollutant	Regulation	Limit Criteria	Tolerance	Limit Value
		Daily limit for protection of human health – not to be exceeded more than 3 times/year Annual and Winter limit for the protection of ecosystems	None	20 µg/m3
Particulate Matter PM10	2008/50/EC	24-hour limit for protection of human health – not to be exceeded more than 35 times/year Annual limit for the protection of human health	50% 20%	50 µg/m3 40 µg/m3
Particulate Matter PM2.5 Stage 1	2008/50/EC	Annual limit for the protection of human health	20% from June 2008. Decreasing linearly to 0% by 2015	25 µg/m3
Particulate Matter PM2.5 Stage 2	2008/50/EC	Annual limit for the protection of human health	None	20 µg/m3
Benzene	2008/50/EC	Annual limit for the protection of human health	20% until 2006. Decreasing linearly to 0% by 2010	5 µg/m3
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health	60%	10 mg/m3
Dust Deposition	German TA Luft Air Quality Standard Note 1	30 Day Average	None	350 mg/m2/day

Note 1 Dust levels in urban atmospheres can be influenced by industrial activities and transport sources. There are currently no national or European Union air quality standards with which these levels of dust deposition can be compared. However, a figure of 350 mg/m^2-day (as measured using Bergerhoff type dust deposit gauges as per German Standard Method for determination of dust deposition rate, *VDI 2129*) is commonly applied to ensure that no nuisance effects will result from industrial or construction activities.

Table 8.2 World Health Organisation Air Quality Guidelines (non mandatory)

Pollutant	Limit Parameter	Value
Nitrogen Dioxide	Hourly Limit	200 µg/m3
	Annual Limit	40 µg/m3
Sulphur Dioxide	24-hour limit	20 µg/m3
	10-minute limit	500 µg/m3
Particulate Matter PM_{10}	24-hour limit	50 µg/m3
	Annual Limit	20 µg/m3
Particulate Matter $PM_{2.5}$	24-hour limit	25 µg/m3
	Annual Limit	10 µg/m3

Table 8.3 – EPA 2019 Assessment Zone A Classification

Pollutant (Annual Mean)	EPA 2019 Assessment Classification
NO_2 Zone A	Above lower assessment threshold (St John Rd Dublin)
SO_2 Zone A	Below lower assessment threshold
CO Zone A	Below lower assessment threshold
Ozone Zone A	Below long term objective
PM_{10} Zone A	Below lower assessment threshold
$PM_{2.5}$ Zone A	Below lower assessment threshold
Benzene Zone A	Below lower assessment threshold
Heavy Metals (As, Ni, Cd, Pb) Zone A	Below lower assessment threshold
Poly Aromatic Hydrocarbons (PAH) Zone A	Below lower assessment threshold

8.2.2 Construction Impact Assessment Criteria

Transport Infrastructure Ireland's 'Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes' (Revision 1, 2011) states that "it is very difficult to accurately quantify dust emissions arising from construction activities" and that "it is thus not possible to easily predict changes to dust soiling rates or PM_{10} concentrations." The guidance advises the use of a semi-quantitative approach to determine the likelihood of a significant impact which should be combined with an assessment of the proposed mitigation measures.

The construction assessment criteria, reproduced from the TII guidance, are set out in Table 8.4 below.

Table 8.4 – Assessment criteria for the impact of duct emissions from construction activities with standard mitigation in place (TII 2011)

Source		Potential distance for significant effects (distance from source)		
Scale	Description	Soiling	PM_{10}	Vegetation effects
Major	Large construction sites, with high use of haul routes	100m	25m	25m
Moderate	Moderate sized construction sites, with moderate use of haul routes	50m	15m	15m
Minor	Minor construction sites, with limited use of haul routes	25m	10m	10m

The impact of construction related dust emissions is assessed by estimating the area over which there is a risk of significant impacts as per the TII guidance. The significance of impact is assessed in terms of the significance criteria outline in the EPA's 2017 Guidelines on the information to be contained in Environmental Impact Assessment Reports.

In relation to construction related traffic, air quality significance criteria are assessed on the basis of compliance with the appropriate standards air limit values. The Air Quality Standards Regulations 2011 replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999

8.2.3 Operational Impact Assessment Criteria

Once operational, the proposed residential development at Charlestown Place may impact on local air quality as a result of the requirements of new buildings to be heated and with the increased traffic movements associated with the development.

Air quality significance criteria are assessed on the basis of compliance with the national air quality limit values. The Air Quality Standards Regulations 2011 replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

8.2.4 Climate Assessment Methodology

Climate has implications for many aspects of the environment from soils to biodiversity and land use practices. The proposed development may impact on both the macro-climate and micro-climate. The macro-climate is the climate of a large geographic area such as Ireland. The micro-climate refers to the climate in the immediate area.

With respect to microclimate, green areas are considered to be sensitive to development. Development of any green area is generally associated with a reduction in the abundance of vegetation including trees and a reduction in the amount of open, undeveloped space. The removal of vegetation or the development of man-made structures in these areas can intensify the temperature gradient.

To assess the impacts of converting vegetative surfaces to hard-standing with residential buildings and its significance, the amount of vegetative surfaces associated with the proposed development that will be converted to residential buildings and hard-standing has been considered.

The impact of the proposed scheme upon the macro-climate is assessed through the consideration of the change in CO_2 emissions that will occur due to the changes in traffic flow that occur in response to the proposed scheme.

The Conference of the Parties to the Convention (COP23) occurred in November 2017 and focussed on advancing the implementation of the Paris Agreement. The Paris Agreement was established at COP21 in Paris in 2015 and is an important milestone in terms of international climate change agreements. The "Paris Agreement", agreed by 200 nations, has a stated aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to greenhouse gas emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress has also been made on elevating adaption onto the same level as action to cut and curb emissions. The EU, on the 23/24th of October 2014, agreed the "2030 Climate and Energy Policy Framework" (EU, 2014). The European Council endorsed a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the ETS and non-ETS sectors amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all Member States will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under "Renewables and Energy Efficiency", an EU binding target of at least 27% for the share of renewable energy consumed in the EU in 2030.

European Commission Directive 2001/81/EC, the National Emissions Ceiling Directive (NECD) (2014), prescribes the same emission limits as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005 (DEHLG, 2007a; 2004). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO2, VOCs and NH3 but failed to comply with the ceiling for NOX (EEA, 2012). Directive (EU) 2016/2284 "On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC" was published in December 2016.The Directive will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO2, NOX, NMVOC, NH3, PM2.5 and CH4. In relation to Ireland, 2020-29 emission targets are for SO2 (65% below 2005 levels), for NOX (49% reduction), for VOCs (25% reduction), for NH3 (1% reduction) and for PM2.5 (18% reduction). In relation to 2030, Ireland's emission targets are for SO2 (85% below 2005 levels), for NOX (69% reduction), for VOCs (32% reduction), for NH3 (5% reduction) and for PM2.5 (41% reduction).

The following guidelines and EU Directives relating to Climate Change aspects of EIA reports have been applied to this assessment in order to determine the potential impacts that the proposed development may have on climate change.

- 2017 EPA Guidelines on information to be contained in Environmental Impact Assessment Reports
- European Union (Planning & Development)(Environmental Impact Assessment) Regulations 2018 (SI No. 296 of 2018)
- European EIA Directive 2014/52/EU
- The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings amended in 2017 includes requirements for all residential dwellings to be "Nearly Zero Energy Buildings" (NZEB's) by 31st December 2020.

8.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

Charlestown is located c.1.5kms to the north of Finglas Village, east of the N2/ North Road, south of the M50, north of Charlestown Place and west of St. Margaret's Road. The Charlestown Centre Shopping Centre is located directly to the north of the current application site and the northern and eastern boundaries of the site are defined by Charlestown Place and St. Margaret's Road respectively. The McKelvey estate is located to the south with McKelvey Celtic AFC playing pitches to the south east.

Refer to the detailed description in Section 3.2 of this EIAR.

The general area surrounding the subject site is currently comprised of residential, retail and commercial developments which will generate emissions to air associated with heating. The local road and Motorway network and Dublin Airport will also have an impact on local air quality arising from combustion engine emissions.

8.3.1 Description of Existing Climate

The nearest synoptic meteorological station to the subject site is at Dublin Airport which is located approximately 2km north of the Charlestown site and as such, long-term measurements of wind speed/direction and air temperature for this location are representative of prevailing conditions experienced at the subject site. Recent meteorological data sets for Dublin Airport were obtained from Met Éireann for the purposes of this assessment study.

Rainfall
Precipitation data from the Dublin Airport meteorological station for the period 2011-2019 indicates a mean annual total of about 762 mm. This is within the expected range for most of the eastern half of the Ireland which has between 750 mm and 1000 mm of rainfall in the year.

Temperature
The annual mean temperature at Dublin Airport (2011-2019) is 9.5ºC with a mean maximum of 15.3ºC and a mean minimum of 4.0ºC. Given the relatively close proximity of this meteorological station to the proposed development site, similar conditions would be observed. Table 8.4 sets out meteorological data for Dublin Airport from 2011-2019.

Table 8.5 – Meteorological Data for Dublin Airport 2011-2019

Year	Period	Rainfall (mm)	Maximum mean Temperature (^{0}C)	Minimum mean Temperature (^{0}C)	Mean Temperature (^{0}C)
2011	Annual Mean	672	16.7	3.1	9.4
2012	Annual Mean	850	15.3	5.4	9.3
2013	Annual Mean	764	14.0	3.6	9.9
2014	Annual Mean	870	15.8	5.4	10.6
2015	Annual Mean	766	14.0	4.0	9.0
2016	Annual Mean	725	15.7	4.4	10.1
2017	Annual Mean	661	15.0	5.3	9.9
2018	Annual Mean	709	14.8	4.8	9.7
2019	Annual Mean	886	15.9	5.1	9.6
Mean		767	15.3	4.0	9.5

Note : Data supplied by Met Eireann

Wind

Wind is of key importance for both the generation and dispersal of air pollutants. Meteorological data for Dublin Airport indicates that the prevailing wind direction, in the Dublin area, is from the West and Southwest and blows Northeast across the proposed development. The mean annual wind speed in the Dublin area between 2009 - 2019 is 5.7 m/s.

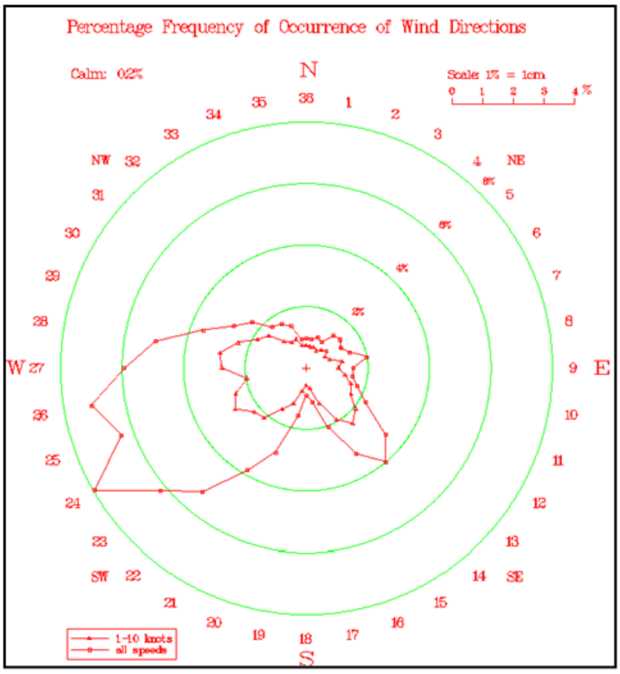


Figure 8.1 – Windrose for Dublin Airport

8.3.2 Description of existing air quality

The existing ambient air quality in the vicinity of the site has been characterised with information obtained from a number of sources as follows:

- Environmental Protection Agency's Annual Air Quality in Ireland 2019 Report;

- Site specific air quality monitoring surveys;

The ambient air quality data collected and reviewed for the purpose of this study focused on the principal substances (dust, vehicle exhaust emissions and boiler emissions) which may be released from the site during the construction and operation phases and which may exert an influence on local air quality.

The existing ambient air quality at and in the vicinity of the site is typical of an urbanised urban location and as such, domestic and commercial heating sources and road traffic are identified as the dominant contributors of hydrocarbon, combustion gases and particulate emissions to ambient air quality.

Trends in air quality

Annual air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality "Air Quality in Ireland 2019 (Published September 2020) details the range and scope of monitoring undertaken throughout Ireland. The Dublin Conurbation is categorised as Zone A.

The most recent 2019 EPA publication includes a number of Zone A monitoring locations which would be comparable to the expected air quality at the subject site at Charlestown. The various Zone A air quality monitoring stations within Dublin provide a comprehensive range of air quality monitoring data sets which have been selected as part of this assessment to describe the existing ambient air quality at the subject site.

Nitrogen Dioxide

The Air Quality Standards Regulations 2011 specify a limit value of 40 µg/m3, for the protection of human health, over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term NO2 monitoring was carried out at three Zone C locations in 2019. The NO2 annual mean in 2019 for these sites ranged from 15 - 43 µg/m3 compared against the annual average limit of 40 µg/m3.

The monitoring of NO2 during 2019 at St John Road located <1km from the Charlestown site, reported an exceedance (43ug/m3) of the EU Air Quality Annual Limit of 40ug/m3. The EPA 2019 Reports states that heavy road traffic along St John Road was the cause of the elevated concentrations of NO2.

Sulphur Dioxide

The Air Quality Standards Regulations 2011 specify a daily limit value of 125 µg/m3 for the protection of human health. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term SO2 monitoring was carried out at four Zone A locations in 2019. The daily SO2 daily means in 2019 for these sites ranged from 0.8 – 2.5 µg/m3. Therefore, long term averages were below the daily limit of 125 µg/m3.

The annual mean SO2 concentrations in Ireland have being declining since 2003. This trend is reflective in the shift in fuel choice across Ireland in both residential heating and the energy production sector.

Carbon Monoxide
The Air Quality Standards Regulations 2011 specify an 8-hour limit value (on a rolling basis) for the protection of human health of 10,000 µg/m3. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term CO monitoring was carried out at one Zone A location in 2019. The 8-hour CO concentrations was 0.2 – 0.3mg/m3 which is below the 8-hour limit value (on a rolling basis) of 10 mg/m3.

Particulate Matter PM10
The Air Quality Standards Regulations 2011 specify a PM10 limit value of 40 µg/m3 over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term PM10 monitoring was carried out at thirteen Zone A locations in 2019. The PM10 annual mean in 2019 for these sites ranged from 11 - 19µg/m3. Therefore, long term averages were below the annual average limit of 40 µg/m3.

Particulate Matter PM2.5
The Air Quality Standards Regulations 2011 specify a PM2.5 limit value of 25 µg/m3 over a calendar year.

Long term PM2.5 monitoring was carried out at ten Zone locations in 2019. The PM2.5 average in 2018 for these sites ranged from 8 - 11µg/m3. Therefore, long term averages were below the target value 25 µg/m3.

Table 8.6 – Summary of the 2019 Air Quality data obtained from Zone A area

Pollutant	Regulation	Limit type	Limit value	EPA monitoring data 2019
Nitrogen dioxide	2008/50/EC	Annual limit for protection of human health	40 µg/m^3	15 – 43* µg/m^3
Sulphur dioxide	2008/50/EC	Daily limit for protection of human health (not to be exceeded more than 3 times per year)	125 µg/m^3	0.8 – 2.5 µg/m^3
Carbon monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health (Zone C)	10,000 µg/m^3	300 µg/m^3
Particulate matter (as PM$_{10}$)	2008/50/EC	Annual limit for protection of human health	40 µg/m^3	11 – 19 µg/m^3
Particulate matter (as PM$_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3	8 - 11 µg/m^3
Benzene	2008/50/EC	Annual limit for protection of human health	5 µg/m^3	< 0.21µg/m^3

8.3.3 Baseline air quality monitoring

A site-specific short-term monitoring study was conducted for Nitrogen Dioxide and dust deposition measured at the site using passive diffusion tubes over a two-week period and dust deposition gauges for a 30 day period. Figure 8.2 identifies the monitoring locations. The baseline survey was conducted during February 2020.

These locations were chosen in order to obtain representative short-term sample concentrations for the identified parameters.

The survey was indicative only and results obtained cannot be used to demonstrate compliance with short-term or annual limit values detailed in Table 8.1 above. The survey does, however, aid in identifying the influence of sources in the vicinity of the proposed development site. The results from the monitoring surveys are presented in Table 8.6.

The concentrations of NO2, and dust deposition levels measured during the short-term measurement survey were significantly below their respective annual limit values and comparable with levels reported by the EPA.

Table 8.7 – Results of passive diffusion tube monitoring at Charlestown development site

Pollutant	Sampling period	Measured Concentration A1 & A2	Assessment criteria
Nitrogen dioxide	March 2020	A1 31.3 µg/m^3	40 µg/m^3 (as annual average)
Dust Deposition	March 2020	A1 287 mg/m^2-day	350 mg/m^2-day (as monthly average)

Note 1: Gradko Environmental Test Certificate 006445R
Note 2: City Analysts Test Certificate 2074577

Review of EPA modelled NO_2, PM_{10} and $PM_{2.5}$ along M50 Motorway

The EPA's unified GIS Framework provides traffic emission data based on traffic volumes and the proximity of receptors to the source, in this case the M50 Motorway which is located c.330m from the Charlestown site and the North Road to the west and Charlestown Place to the north.

The following Figures demonstrate the 2017 EPA modelled concentration contours for NO_2, PM_{10} and $PM_{2.5}$ with an associated concentration for each at the Charlestown site.

The EPA data indicates that air quality at the Charlestown site is below the Air Quality Standards for NO_2, PM_{10} and $PM_{2.5}$.

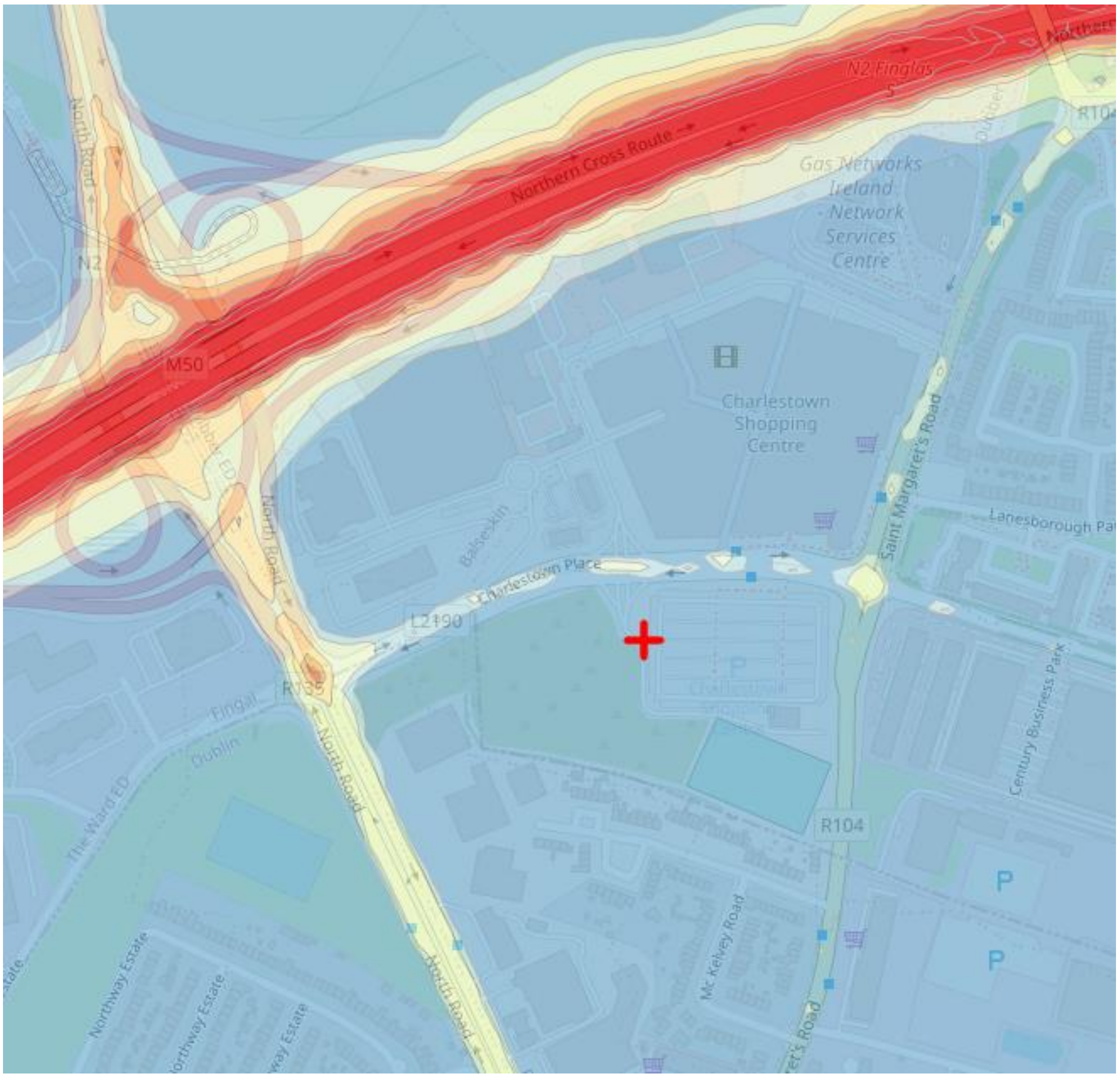


Figure 8.2 NO$_2$ <28 µg/m3

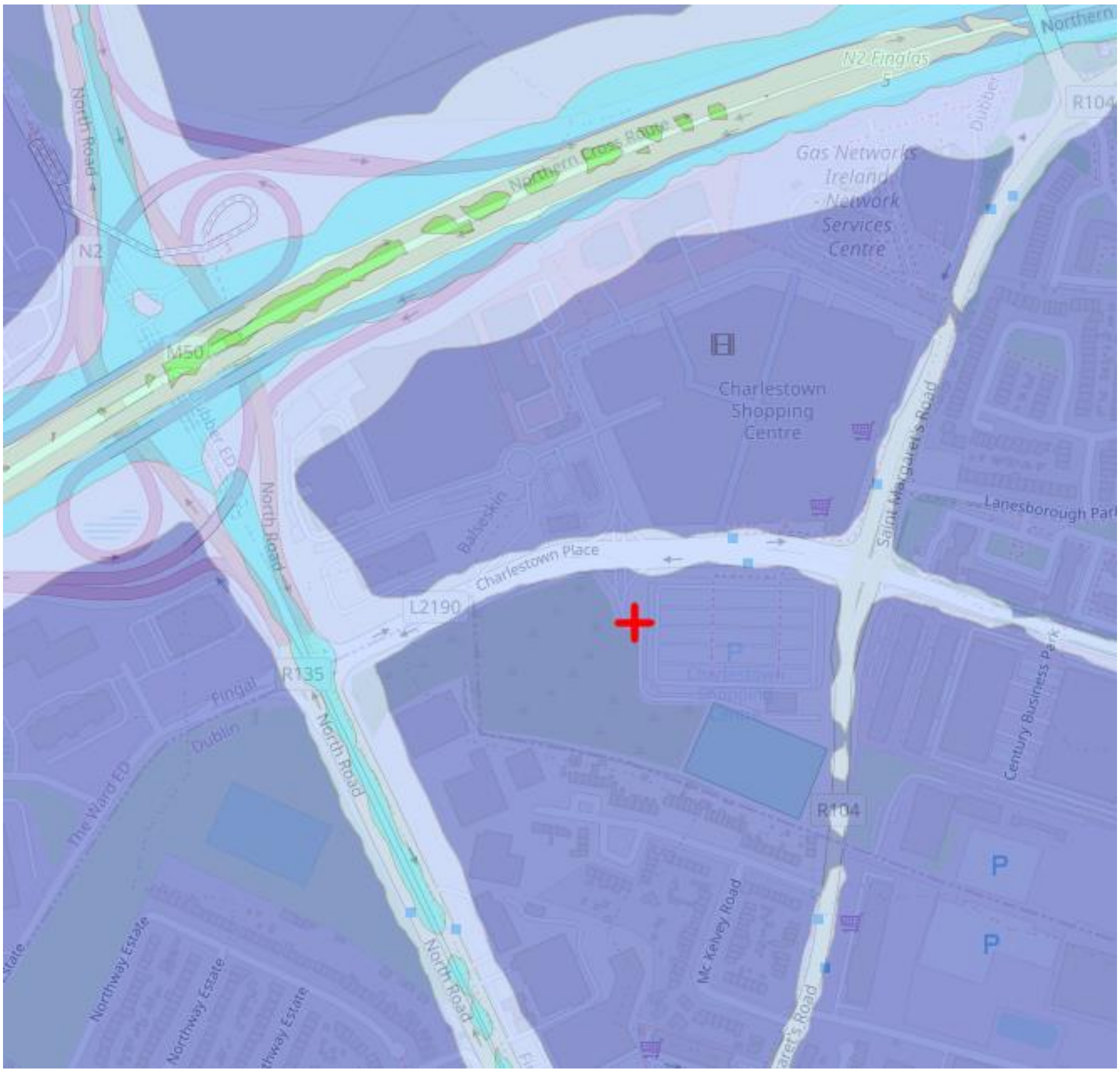


Figure 8.3 PM_{10} <12 μg/m3

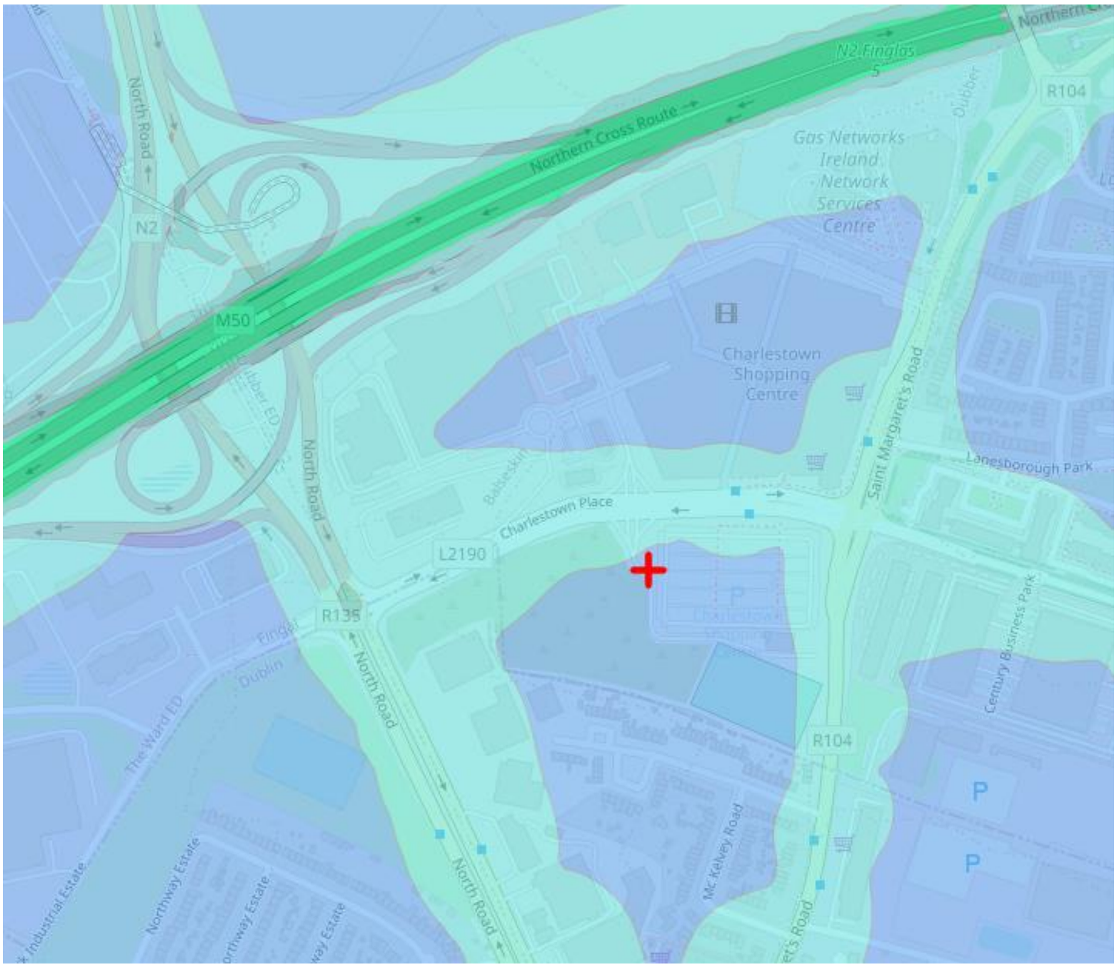


Figure 8.4 PM$_{2.5}$ 7-8 µg/m3

8.3.4 Significance

Based on published 2019 EPA air quality data for the Zone A (Dublin) area in which the subject site is located together with site specific monitoring data and a review of the EPA's GIS Framework 2017 modelling data, it may be concluded that the existing baseline air quality at the subject site may be characterised as being good with no exceedances of the National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011) limit values of individual pollutants. There is therefore currently sufficient atmospheric budget to accommodate the development without adversely impacting existing ambient air quality. The quality of existing air quality at the subject site must be maintained and improved where possible as a result of the proposed development to ensure that local human health and the ecological environment is not adversely affected.

8.3.5 Sensitivity

The subject site shall be developed by ground clearance and site preparation works, basement excavation and the subsequent construction of the apartment buildings, a creche and open landscaped areas. The principal local receptors that may be impacted by the development are existing Mckelvey residential area to the south and the Charlestown Centre apartments (currently under construction) located to the north of the site.

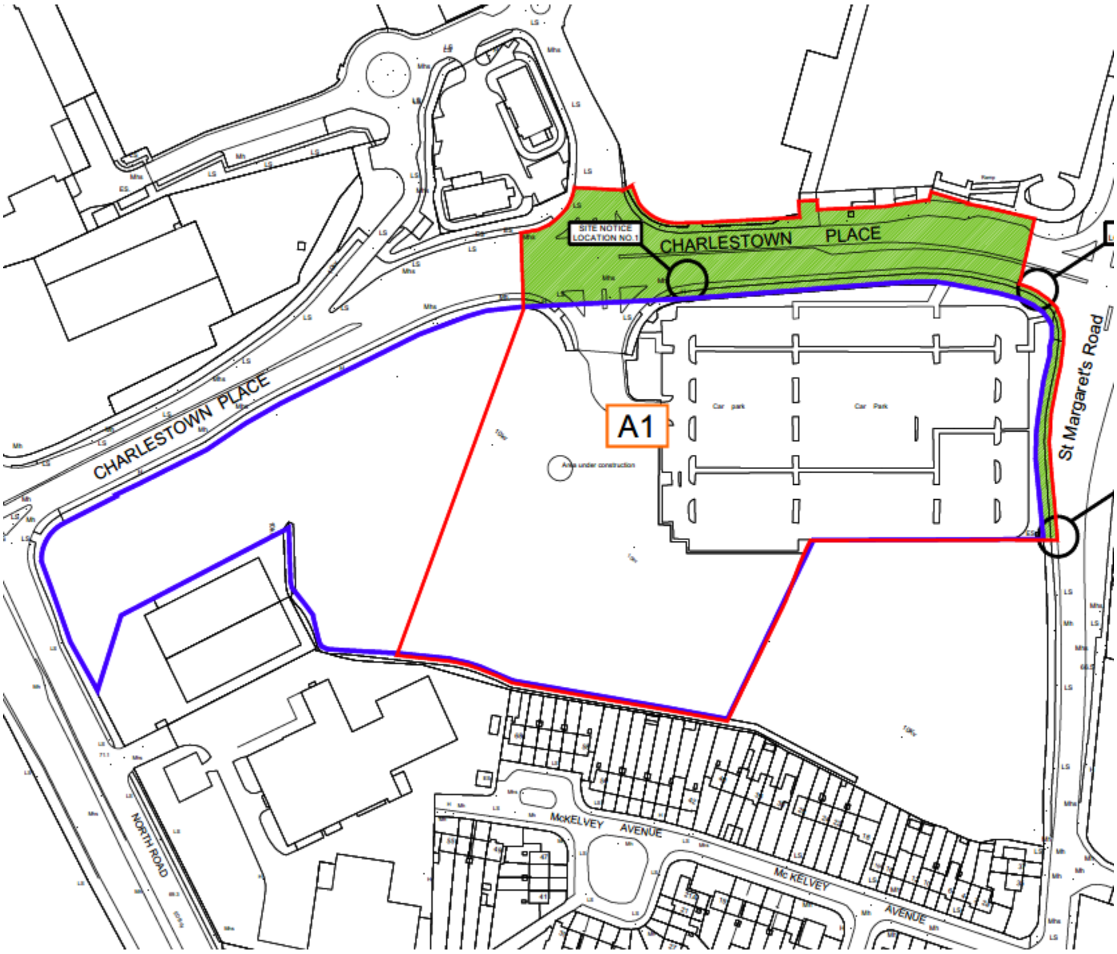


Figure 8.5 – Baseline Air Quality Location A1

8.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in Section 3.3 of this EIAR.

When considering a development of this nature, the potential impact on air quality and climate must be considered for each distinct stage: the short term (1-7 years) impact of the construction phase and the longer term impact of the operational phase.

8.4.1 Potential Impacts of the Proposed Development

Various elements of both the construction and operational phases of the proposed development have the potential to impact on the local receiving environment, on adjacent residential properties and on human health which are considered with regard to National Air Quality Standards designed to protect human health. The likely potential impacts for both construction and operation of the proposed scheme prior to mitigation are described in this section of the EIAR. The mitigation measures are described in Section 8.8 and the predicted impacts in Section 8.9.

8.4.2 Potential Construction Phase Impacts

Air quality
The development of the site will be conducted in the following phased stages:

- Enabling works - Site set up and Site clearance
- Construction works including site infrastructure, houses, apartments commercial buildings and landscaping

Construction impacts associated with both of these phased stages are considered below.

Enabling works - Site Set Up and Clearance
Works activities associated with the 'Site set up' will be undertaken prior to construction works commencing in each sub-phase. The setting up of the site shall involve the construction of site security hoarding and site compounds, site offices, materials and waste storage areas and staff welfare facilities. These temporary activities will have a minimal potential to generate fugitive dust emissions or combustion gas emissions.

Site clearance and ground excavation works will be undertaken in separate phases and these activities have the potential to generate fugitive windblown dust emissions rising from the operation of mechanical plant such as dozers, excavators and tipper trucks and the movement of these vehicles on exposed surfaces at the site. Infrastructural works will be required to facilitate site services.

With regard to the volume of waste material (top and sub soils) generated during site clearance, there will be a requirement for HGV trucks to remove the material from the site. Stripped top-soils shall be stockpiled and covered on site for re-use during final landscaping works. Trucks shall be loaded with material on-site by mechanical excavators and loading shovels which will generate fugitive dust emissions as a result of the transfer of the excavated materials comprised principally of soils and stones from stockpile to truck.

The movements of construction vehicles on the site shall also generate windblown dust emissions. Where dusty waste material is loaded onto exposed open trucks, fine dusts may be released as the truck travels along public roads.

Building and Site Infrastructure Construction Works
During the construction phase there will be extensive site works, involving construction machinery, construction activities on site which have the potential to generate fugitive windblown dust emissions.

Construction equipment including generators and compressors will also give rise to diesel and petrol engine exhaust emissions.

Construction traffic to and from the site shall result in a short-term increase in the volume of diesel fuelled HGV's along the local road network which will generate additional hydrocarbon and particulate emissions from the vehicle exhausts.

Climate
During the construction phase CO_2 will be released into the atmosphere as a result of the movement of construction vehicles and the use of construction plant including generators and cranes.

8.4.3 Potential Operational Phase Impacts

Air quality

The operational phase of the proposed development has the potential to have a slight impact on local air quality as a result of the requirements for new buildings to be heated and with the increased traffic movements associated with the development.

Traffic movements associated with the development have been evaluated and assessed as part of the Traffic Impact Assessment for the development up to 2036 (Opening Year + 15) which includes parking for vehicles which will enter and exit the site. The split in am and pm peak traffic movements may increase the impact on local air quality at the junctions.

Climate

The overall site area of the development lands is c. 3.9 hectares will include open space, and landscaped areas. The overall development includes the construction of buildings and roadways which may have the potential effect of marginally raising localised air temperatures, especially in summer.

The proposed development includes apartment structures which may impact on the local micro-climate by means of wind sheer effects.

Motor vehicles are a major source of atmospheric emissions which contribute to climate change and vehicle exhaust emissions may have a potential to impact the macro-climate.

8.5 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

This section provides the measures that shall be implemented during the construction and operational phases of the development and into the design of the development to minimise the impacts on ambient air quality in the receiving environment, on local population and human health, on local flora and fauna and on climate.

8.5.1 Construction Phase

In order to ensure that adverse air quality impacts are minimised during the construction phase of the project and that the potential for soiling of property and amenity and local public roads is minimised, the following mitigation measures shall be implemented during the course of all construction activities:

AC-C1 Construction Management

- Avoid unnecessary vehicle movements and manoeuvring, and limit speeds on site so as to minimise the generation of airborne dust.
- Use of rubble chutes and receptor skips during construction activities.
- During dry periods, dust emissions from heavily trafficked locations (on and off site) will be controlled by spraying surfaces with water and wetting agents.
- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic only.
- Re-suspension in the air of spillages material from trucks entering or leaving the site will be prevented by limiting the speed of vehicles

within the site to 10kmh and by use of a mechanical road sweeper.

- The overloading of tipper trucks exiting the site shall not be permitted.
- Aggregates will be transported to and from the site in covered trucks.
- Where the likelihood of windblown fugitive dust emissions is high and during dry weather conditions, dusty site surfaces will be sprayed by a mobile tanker bowser.
- Wetting agents shall be utilised to provide a more effective surface wetting procedure.
- Exhaust emissions from vehicles operating within the construction site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised by routine servicing of vehicles and plant, rather than just following breakdowns; the positioning of exhausts at a height to ensure adequate local dispersal of emissions, the avoidance of engines running unnecessarily and the use of low emission fuels.
- All plant not in operation shall be turned off and idling engines shall not be permitted for excessive periods.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- Material stockpiles containing fine or dusty elements including top soils shall be covered with tarpaulins.
- Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system.
- A programme of air quality monitoring shall be implemented at the site boundaries for the duration of construction phase activities to ensure that the air quality standards relating to dust deposition and PM_{10} are not exceeded. Where levels exceed specified air quality limit values, dust generating activities shall immediately cease and alternative working methods shall be implemented.
- A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated.
- Dust netting and site hoarding shall be installed along the north, south, east and western site boundaries to minimise the propagation of fugitive windblown dust emissions falling on third party lands and existing residential areas.

8.5.2 Operational Phase

The Operational Phase of the Charlestown site will not generate air emissions that would have an adverse impact on local ambient air quality or local human health.

The operational phase includes mitigation by design of the development to minimise the impact of the operational phase of the development on air quality and climate are as follows:

AC-O1	Climate Impact Mitigation Measures by Design • Energy Efficiency – All residential units shall be designed and constructed in accordance with The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings amended in 2017 includes requirements for all residential dwellings to be "Nearly Zero Energy Buildings" (NZEB's) by 31st December 2020. • Energy Consumption - The following key design features have been integrated into the design and construction of the residential units to reduce energy consumption: − Photovoltaic Cells will be installed on all roofs − The use of green building materials: low embodied energy & recycled materials will be utilised where possible − Energy efficient window units and frames with certified thermal performance shall be used − Building envelope air tightness will reduce the loss of warm air to the external environment − Installation of Exhaust Air Heat Pump systems in all units which operate by extracting warm air from kitchens and bathrooms, cleaning it and distributing it to other rooms in the unit. − Thermal insulation of walls and roof voids of all units
AC-O2	Air Quality Mitigation Measures • Natural Gas heating in all units • Inclusion of electric car charging points to encourage electric vehicle ownership • Proximity of Public Transport • Provision of open landscaped areas, to encourage residents to avail of active lifestyle options and which will contribute albeit in a minor way to the adsorption of Carbon Dioxide from the atmosphere and the release of Oxygen into the atmosphere.

8.6 RESIDUAL IMPACTS

8.6.1 Construction Phase

Various elements associated with the construction phase of the proposed development have the potential to impact local ambient air quality, human health and climate. However, the potential construction phase impacts shall be mitigated as detailed above to ensure there is no adverse impact on ambient air quality for the duration of all construction phase works. It is predicted that the operational phase of the development will not generate air emissions that would have an adverse impact on local ambient air quality or on local human health or on the local micro-climate or the wider macro-climate. The predicted construction phase residual impacts on air quality will be negative, not-significant and short-term.

8.6.2 Operational Phase

The sustainable features that are incorporated into the design of all residential units will ensure that the operational phase of the development will not have an adverse impact on human health, local air quality or on local or global climate patterns. The residential units will be designed to ensure that they can withstand the potential changes in climate which may generate more extreme and prolonged meteorological events in the future.

It is predicted that fossil fuel combustion gas emissions including Carbon Dioxide, Sulphur Dioxide, Nitrogen Oxides, Carbon Monoxide and hydrocarbon particulate emissions will be slight and will not have an adverse significant impact on the existing ambient air quality in the vicinity of the proposed development site.

Greenhouse gases occur naturally in the atmosphere (e.g. carbon dioxide, water vapour, methane, nitrous oxide and ozone) and in the correct balance, are responsible for keeping the lower part of the atmosphere warmer than it would otherwise be. These gases permit incoming solar radiation to pass through the Earth’s atmosphere, but prevent most of the outgoing infrared radiation from escaping from the surface and lower atmosphere into the upper levels. However, human activities are now contributing to an upward trend in the levels of these gases, along with other pollutants with the net result of an increase in temperature near the surface.

Motor vehicles are a major source of atmospheric emissions which contribute to climate change, however, vehicle exhaust emissions generated from vehicles associated with the development will have a negligible impact on the macro-climate given modern technological developments in cleaner and more efficient vehicle engines. Current trends suggest that vehicle manufacturers are ceasing the manufacture of large diesel engines for private cars and instead adopting hybrid engine and all electric technologies which will contribute to the reduction of engine exhaust emissions including particulate matter, Nitrogen Oxides, Sulphur Dioxide, Carbon Dioxide and Carbon Monoxide.

The traffic projections for the development up to 2036 (Opening Year +15) predict that the maximum increase at any of the 3 modelled junctions (R135 / Charlestown Place junction, the Development / Charlestown Place junction and the St Margaret’s Road / Charlestown Place junction) will be 9.4% AM Peak at the Development / Charlestown Place junction.

The UK DMRB guidance (UK Highways Agency, 2020), on which the TII Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes is based, states that road links meeting one or more of the following criteria can be defined as being ‘affected’ by a proposed development and should be included in the local air quality assessment:

- Road alignment change of 5 metres or more;
- Daily traffic flow changes by 1,000 AADT or more;
- HDV flows change by 200 vehicles per day or more;
- Daily average speed changes by 10 km/h or more; or
- Peak hour speed changes by 20 km/h or more.

There will be a negligible impact on local air quality as a result of increased traffic movements associated with the proposed development as none of the above criteria will be reached or exceeded.

To further reduce the climatic impact of the operational phase of the development, electric vehicle charging points shall be installed in dedicated parking spaces to facilitate residents who own electric vehicles and to encourage other residents to purchase electric vehicles.

The scheme has been designed to provide thermally efficient buildings which will reduce the consumption of fossil fuels within each individual dwelling. This will reduce the impact the operational phase of the development will have on the micro and macro climate. In particular, there will be no “traditional” passive air vents in the apartments which are both thermally and acoustically inefficient. Exhaust Air Heat Pump systems shall be incorporated into the design of all units. These efficient energy reducing systems together with thermally rated window sets will reduce the potential future impacts that the external climate will have in terms of wind and changing temperatures on the internal environment within the residential units. These design features will ensure the units are thermally efficient thus reducing the use of fossil fuels leading to a reduction of the impact on the micro and macro climate.

The thermal efficiency of the buildings will ensure that the development will be sustainable and will be protected against the impacts of future climate change which may include storm events and prolonged colder periods during the winter season. These factors will contribute to reducing the impact the operational development has on the local and global climate which will ultimately contribute in a positive manner in reducing the impact on local and further afield human health.

The predicted operational phase residual impacts on air quality will be imperceptible and long-term.

8.7 CULMULATIVE IMPACTS

This section has considered the cumulative impact of the proposed development in conjunction with future and current developments in the vicinity of the subject site.

The cumulative air quality impact of the proposed Charlestown development, on other developments and existing local transport infrastructure is assessed with regard to having established the baseline air quality and then predicting the impact that the proposed development will have on the baseline air quality. Together the combined impact can be assessed to determine if there is sufficient “atmospheric budget” to facilitate the proposed development.

It is considered that, in the absence of mitigation measures, there will be the potential for a short term slight negative cumulative impact associated with the construction phase of the subject development and other local developments on ambient air quality and climate.

Should the construction phase of the proposed Charlestown development coincide with the construction phase of the under-construction Charlestown Centre development to the north of the site, there is the potential for cumulative dust emissions to impact the nearby sensitive receptors. The dust and air quality mitigation measures outlined above will be applied throughout the construction phase of the proposed development and similar best practice mitigation measures are also required for the construction phase of the Charlestown Centre Strategic Housing Development which will avoid significant cumulative impacts on air quality.

With appropriate mitigation measures in place, the predicted cumulative impacts on air quality and climate associated with the construction phase of the proposed development are deemed short-term and slight.

8.7.1 Do Nothing Impact

The subject site is currently comprised of a hardstanding carpark and undeveloped grassed area. If the site is not developed it will continue to have no adverse impact on existing ambient air quality or on the local micro-climate.

8.7.2 Risk To Human Health

Construction Phase
Best practice mitigation measures are proposed for the construction phase of the proposed development which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health. Therefore, the impact of construction of the proposed development is likely to be negative, short-term and imperceptible with respect to human health.

Operational Phase
Operational traffic emissions as a result of the proposed development are compliant with all National and EU ambient air quality limit values which are set for the protection of human health and therefore, will not result in an adverse or harmful impact on human health.

8.8 MONITORING

8.8.1 Construction Phase

This section describes the dust monitoring methodologies that shall be implemented at the site during the construction phases to ensure that dust, particulate matter (PM_{10} and $PM_{2.5}$) and construction vehicle exhaust emissions as NO_2 generated by site activities does not cause nuisance or cause adverse health effects to residential areas and other receptors located in the vicinity of the site boundaries.

AC-C2	Dust Deposition Monitoring Methodology Dust deposition levels will be monitored to assess the impact that site construction site activities may have on the local ambient air quality and to demonstrate that the environmental control measures in place at the site are effective in minimising the impact of construction site activities on the local receiving environment including existing residential developments and lands bordering the site. The following procedure shall be implemented at the site on commencement of site activities: The dust deposition rate will be measured by positioning Bergerhoff Dust Deposit Gauges at strategic locations near the boundaries of the site for a

period of 30 +-2 days. Monitoring shall be conducted on a monthly basis during the construction phase. The proposed monitoring locations (D1 – D4) are presented below in Figure 8.3.

The selection of sampling point locations will be completed after consideration of the requirements of Method VDI 2119 with respect to the location of the samplers relative to obstructions, height above ground and sample collection and analysis procedures. The optimum locations will be determined by a suitably qualified air quality expert to ensure that the dust gauge locations are positioned in order to best determine potential dust deposition in the vicinity of the site boundaries and existing on-site buildings.

After each (30 +-2 days) exposure period, the gauges will be removed from the sampling location, sealed and the dust deposits in each gauge will be determined gravimetrically by an accredited laboratory and expressed as a dust deposition rate in mg/m2-day in accordance with the relevant standards.

Technical monitoring reports detailing all measurement results, methodologies and assessment of results shall be subsequently prepared and maintained by the Site Manager. Monitoring reports shall be made available to the Local Authority as requested.

A dust deposition limit value of 350 mg/m^2-day (measured as per German Standard Method VDI 2119 – Measurement of Particulate Precipitations – Determination of Dust Precipitation with Collecting Pots Made of Glass (Bergerhoff Method) or Plastic. is commonly specified by Local Authorities and by the EPA to ensure that no nuisance effects will result from specified activities and it is to this Best Practice standard method that this programme of dust monitoring and control has been prepared.

The German Federal Government Technical Instructions on Air Quality Control - TA Luft specifies an emission value for the protection against significant nuisances or significant disadvantages due to dustfall. This limit value is 350 mg/m^2-day and it is to this limit value that all measured dust deposition levels shall be assessed. This limit value is commonly specified by Local Authorities at construction sites.

AC-C3

NO_2 Monitoring Methodology

In order to assess the impact on existing air quality that vehicle and plant exhaust emissions associated with the construction phase of the development may have, it is proposed that a programme of Nitrogen Dioxide monitoring shall be undertaken for a 2 year period at air quality location A1 as shown in Figure 8.6 below. The purpose of this monitoring programme will be to verify the effectiveness of the various construction phase mitigation measures and to quantify by measurement, the concentration of NO_2 in the ambient air to allow for the assessment of measured NO_2 levels against levels measured in EPA Zone A areas over a similar period. NO_2 levels shall also be assessed against the annual limit value NO_2 as defined in National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011) which specify an annual limit value of 40 µg/m3, for the protection of human health, over a calendar year.

AC-C4 PM$_{10}$ & PM$_{2.5}$ Monitoring Methodology

Fine particulate matter as PM$_{10}$ and PM$_{2.5}$ shall be monitored using continuous data logging air quality monitoring instrumentation during the stripping and excavation of soils at the site. The monitoring system shall be located at the boundary of the Mckelvey residential area to the south of the site at location PM as shown in Figure 8.6 below.

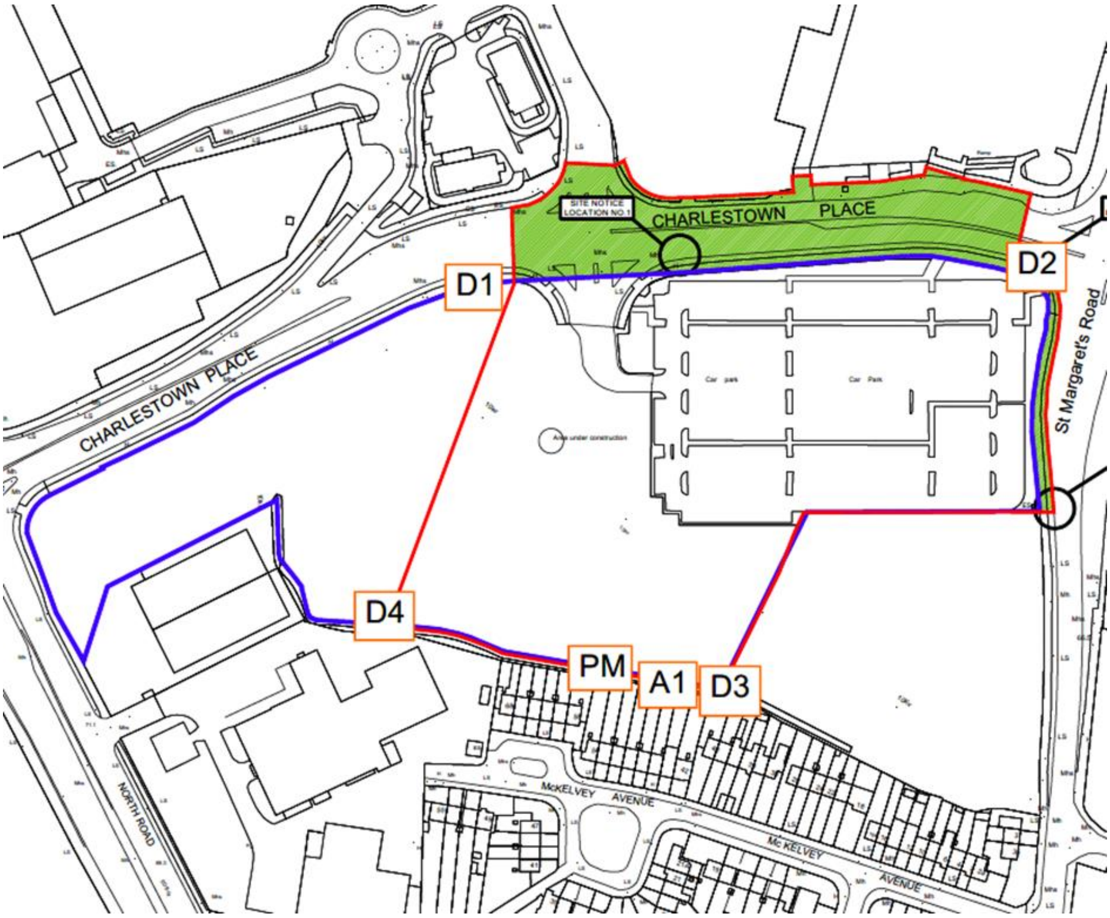


Figure 8.6 – Dust Monitoring (D1 – D4), NO$_2$ Monitoring (A1) and PM$_{10}$ & PM$_{2.5}$ Monitoring (PM) Locations

8.8.2 Operational Phase

Air quality monitoring is not proposed for the operational phase of the proposed development.

8.9 REINSTATEMENT

Reinstatement issues are not relevant to this Chapter of the EIAR, with regard to the construction and operational phases.

8.10 INTERACTIONS

The interaction between human beings and ambient air quality will vary between the construction and operational phases of the development. The construction phase may cause nuisance to the existing local population including the soiling of properties with dust, however, provided that the construction phase air quality control and mitigation measures are implemented, it is predicted that the impact on humans and air quality will be short-term and minor.

The interaction between human beings and air quality during the operational phase of the development will be minimal with a relatively low quantum of combustion engine vehicles at the proposed development, once fully occupied. Although there will be an increase in traffic movement on the existing road network as a result of the operational phase, the predicted impact will be long-term and imperceptible.

The Appropriate Assessment Screening Report prepared as part of this EIAR concludes that the proposed development will not have any significant impacts on European Sites, therefore the interaction between air quality and the receiving natura environment is predicted to be long-term and imperceptible.

8.11 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

There were no difficulties encountered in compiling this Chapter of the EIAR.

8.12 REFERENCES

- Air Quality Regulations 2011, SI 180 of 2011
- European Union (Planning & Development)(Environmental Impact Assessment) Regulations 2018 (SI No. 296 of 2018).
- Environmental Impact Assessment of Projects – Guidance on the preparation of the EIAR, European Commission, 2017.
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, August 2018).
- Environmental Protection Agency, 2017 Draft Guidelines on information to be contained in Environmental Impact Assessment Reports.
- Environmental Protection Agency, 2002, 2015. Guidelines on the Information to be Contained in Environmental Impact Statements
- Environmental Protection Agency, 2017. Air Quality in Ireland 2016 – Key Indicators of Ambient Air Quality
- European Union Directive (2008/50/EC).
- German Federal Government Technical Instructions on Air Quality Control - TA Luft 2002
- German Standard Method for determination of dust deposition rate, VDI 2129.
- Greater London Authority – The Control of dust emissions from construction and demolition – Best Practice Guidelines, Nov 2006.
- Transport Infrastructure Ireland (TII) 2011 Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes Revision 1.
- The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings
- EPA 2019 Air Quality in Ireland

9.0 NOISE AND VIBRATION

9.1 INTRODUCTION

This section of the EIAR has been prepared by Byrne Environmental Consulting Ltd to identify and assess the potential noise and vibrational impacts associated with the proposed Charlestown Place development during both the Construction and Operational Phases.

This document includes a comprehensive description of the receiving ambient noise climate in the vicinity of the subject site; a description of how the construction and operational phases may impact the existing ambient noise climate, the mitigation measures that shall be implemented to control and minimise the impact that the development may have on ambient noise levels and the proposed acoustic design features required to minimise the impact of external noise sources on the residential units.

9.2 STUDY METHODOLOGY

The general assessment methodology of the potential noise and vibrational impacts that the proposed development will have on the receiving environment has been prepared in accordance with and with reference to:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, August 2018).
- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2017 Draft)
- Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).
- Advice Notes for Preparing Environmental Impact Statements (EPA, 2015, Draft)
- Development Management Guidelines (DoEHLG, 2007).
- Planning and Development Regulations 2001, as amended by European Union (Planning & Development)(Environmental Impact Assessment) Regulations 2018.
- IOA/ANC ProPG:Planning & Noise-New Residential Development, May 2017

9.2.1 Noise Assessment Methodology

Baseline Environment
The existing ambient noise climate in the vicinity of the site has been characterised with information obtained from site specific baseline noise surveys conducted in the vicinity of the closest noise sensitive receptors to the subject site. Baseline noise surveys were conducted in accordance with ISO 1996-1: 2017: Acoustics – Description, measurement and assessment of environmental noise and with regard to the EPA's 2016 Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).

The EPA' Round 3 2017 Strategic Noise Mapping of Aircraft, Road and Rail was reviewed to establish the specific impact that transportation related noise sources have on the Charlestown site.

9.2.2 Impact Assessment Methodology

The impact of the proposed development has been determined through prediction of future noise levels associated with the scheme using established calculation techniques.

Construction noise and vibration impacts have been assessed in accordance with Transport Infrastructure Irelands (TII) guidance document Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014). Indicative construction noise calculations have been undertaken using the methodology set out in BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise 2009+A1 2014.

Impacts associated with road traffic movements on the development when operational have been assessed with regard to the NRA's Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014). UK Department of Transport (Welsh Office) - Calculation of Road Traffic Noise [CRTN] and the Highways Agency Design Manual for Roads and Brides Part 7 HD 213/11 – Revision 1 Noise and Vibration.

The operational phase of the development has been assessed with regard the Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound. Acoustic design of apartments refers to the 2018 Ministerial Guidelines "Sustainable Urban Housing – Design Standards for New Apartments. Paragraph 1.18 of the document refers specifically to the Building Regulations Technical Guidance Documents and states that the construction of the apartment building shall comply with all relevant requirements.

9.2.3 Construction Impact Assessment Criteria

The construction noise limits which are presented in Table 9.1 are specified in *British Standard BS 5228 – 1:2009+A1 2014 Code of practice for noise and vibration control on open sites: Part 1 Noise* and are based on the noise measured at the external façade of a receptor.

BS5228 states that noise sensitive receptors (houses) are designated a category based on existing ambient noise levels. Each category is then assigned with a noise limit value.

Category A	Threshold values when ambient noise levels are less than these values
Category B	Threshold values when ambient noise levels are the same as the Category A values
Category C	Threshold values when ambient noise levels are higher than the Category A values

Table 9.1 Threshold of Potential Significant Effect at Dwelling

Category and Threshold Value Period LAeq dB(A)	Category A	Category B	Category C
Night 23:00 – 07:00	**45**	**50**	**55**
Evening 19: - 23:00 & Weekends	**55**	**60**	**65**
Day 07:00 – 19:00 & Sat 07:00 – 13:00	**65**	**70**	**75**

Table 9.2 – Permissible Noise Level at the façade of dwellings during construction

Construction Phase	**Noise Limit Criteria**	
Location / Day	**Assessment Period**	**External Noise Limit Criteria**
All Receptors Monday to Friday Daytime	07:00 – 19:00hrs	70dB(A), $L_{Aeq,\ 1hr}$
All Receptors Monday to Friday Evening	19:00 – 23:00hrs	60 dB(A), $L_{Aeq,\ 1hr}$
All Receptors Saturday Daytime	08:00 – 16:30hrs	65 dB(A), $L_{Aeq,\ 1hr}$
All Receptors Sundays and Public Holidays Nightime	08:00 – 16:30hrs	60 dB(A), $L_{Aeq,\ 1hr}$

9.2.4 Operational Impact Assessment Criteria

Relative impact assessment criteria associated with road traffic noise is set out in Table 9.3 below.

Table 9.3 – Likely impact associated with change in traffic noise level

Change in sound level (L_{10})	**Subjective reaction**	**Impact**
<3	Inaudible	Imperceptible
3-5	Perceptible	Slight
6-10	Up to a doubling of loudness	Moderate
11-15	Over a doubling of loudness	Significant
>15		Profound

A change in traffic noise of less than 2dBA is generally not noticeable to the human ear whilst a change of 3dBA is generally considered to be just perceptible. Changes in noise levels of 3 to 5 dBA would however be noticeable and, depending on the final noise level, there may be a slight or moderate noise impact. Changes in noise level in excess of 6dBA would be clearly noticeable, and depending on the final noise level, the impact may be moderate or significant. However, a significant change in traffic volumes or traffic category i.e. increase in the use of a road by HGVs, would be required to result in such increases.

The UK Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, Part 7) states that a change in noise level of 1dB LA10,18h is equivalent to a 25% increase or a 20% decrease in traffic flow, assuming other factors remain unchanged and a change in noise level of 3dB LA10,18h is equivalent to a 100% increase or a 50% decrease in traffic flow.

Traffic noise levels in excess of 60dBA (L_{den}) are considered to be potentially intrusive. L_{DEN} is the day-evening-night composite noise indicator for assessing overall noise annoyance. For new roads projects the National Roads Authority design goal is to mitigate when predicted levels exceed 60dB L_{den}. However, for existing roads the Dublin Agglomeration, within the Noise Action Plan, have set a level of 70dB (L_{day}) and 55dB (L_{night}) above which mitigation measures should be considered.

The World Health Organisation (WHO) in their 2018 publication entitled Environmental Noise Guidelines for the European Region has proposed new guidelines for community noise. In this guidance, a L_{den} threshold daytime noise limit of 53dB is suggested to protect against adverse health effects. L_{night} Levels of 45dB or less are proposed at night-time to protect against adverse effects on sleep.

The operational phase of the development shall be assessed with regard to the 2018 WHO guidelines and appropriate acoustic design of residential units to ensure that they comply with the *Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound.*

Professional Practice Guidance on Planning & Noise: New Residential Developments (ProPG) is considered in the assessment of the operational phase of the residential development in terms of ensuring that each residential unit in the Charlestown development will not be adversely impacted by external related noise sources

9.2.5 Vibration Assessment Methodology

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).

Construction impacts have been assessed in accordance with *BS 7385-2:1993 – Evaluation and Measurement for Vibration in Buildings: Part 2 – Guide to Damage Levels from Groundborne Vibration and BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration 2009+A1 2014.*

Operational impacts have been assessed in accordance with the Transport Infrastructure Ireland, TII Guidelines for the Treatment of Noise & Vibration in National Road Schemes, 2014.

9.2.6 Construction Impact Assessment Methodology

Table 9.4 details the limits above which cosmetic damage could occur for transient vibration. Minor damage is possible at vibration magnitudes which are greater than twice those shown in Table 9.4, and major damage to a building structure would only generally occur at values greater than four times the tabulated values. These values only relate to transient vibration. If there is a continuous vibration, the guide values shown in Table 9.4 shall be reduced by up to 50%.

This guidance is reproduced from *BS 5228-2:2009+A1 2014 – Code of Practice for Noise and Vibration Control on Construction and Open Sites: Part 2 – Vibration and BS 7385-2:1993 – Evaluation and Measurement for Vibration in Buildings: Part 2 – Guide to Damage Levels from Groundborne Vibration.*

Table 9.4 – Transient vibration guide values for cosmetic damage

Type of building	**PPV (mm/s) in frequency range of predominant pulse**	
	4-15Hz	**15Hz and above**
Reinforced or framed structures. Industrial and heavy commercial buildings.	50mm/s at 4Hz and above.	50mm/s at 4Hz and above.

Unreinforced or light framed structures. Residential or light commercial buildings.	15mm/s at 4Hz increasing to 20mm/s at 15Hz.	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above.

Table 9.5, reproduced from *BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration 2009+A1 2014* outlines the vibration levels (in terms of PPV) from construction activities and their likely effect on humans.

Table 9.5 – Guidance on the effect of construction vibration levels on humans

Vibration Level (PPV)	**Effect**
0.14mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.30mm/s	Vibration might be just perceptible in residential environments.
1.0mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

9.2.7 Operational Impact Assessment Methodology

It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5mm/s and may become disturbing or annoying at higher magnitudes.

Ground vibrations produced by road traffic are unlikely to cause perceptible structural vibration in properties located near to well-maintained and smooth road surfaces. Vibration impacts associated with road traffic can therefore be largely avoided by good maintenance of the road surface.

9.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

The site is located in an area which includes, retail, commercial and residential development and with a high volume of road traffic along the local road network and on the M50 Motorway further north of the site throughout the day. Ambient noise levels reflect the nature of the existing noise climate which is typical of a busy urban environment.

9.3.1 Baseline environmental noise survey

Baseline noise data in the vicinity of the closest residential receptors to the proposed development site boundaries has been obtained from noise monitoring surveys conducted by Byrne Environmental Consulting Ltd during December 2020 during periods when normal ambient noise sources were prevalent. The survey period was conducted when Covid19 restrictions were lifted for the Christmas period thus are representative of normal traffic movements and ambient noise levels.

9.3.2 Noise Measurement locations

Baseline noise measurement surveys were conducted at site boundaries, N1 & N4 as described in Table 9.6 and as shown in Figure 9.1 between 14th – 16th December 2020 during suitably dry and calm (<5mm/sec) wind conditions.

Baseline surveys were conducted under free-field conditions at a height of approximately 3m above ground and approximately away from reflecting surfaces for a period of 3-hours during the daytime period and for 1-hour periods during the nightime period at each on-site location in order to obtain detailed noise data and assess the existing noise climate at the locations accurately.

Table 9.6 – Baseline noise measurement locations

Location	Description
N1	Western site boundary along Charlestown Place
N2	Northeastern site boundary along Charlestown Place
N3	Eastern site boundary opposite St.Margarets Road
N4	Southern site boundary adjacent Mcelvey Avenue houses

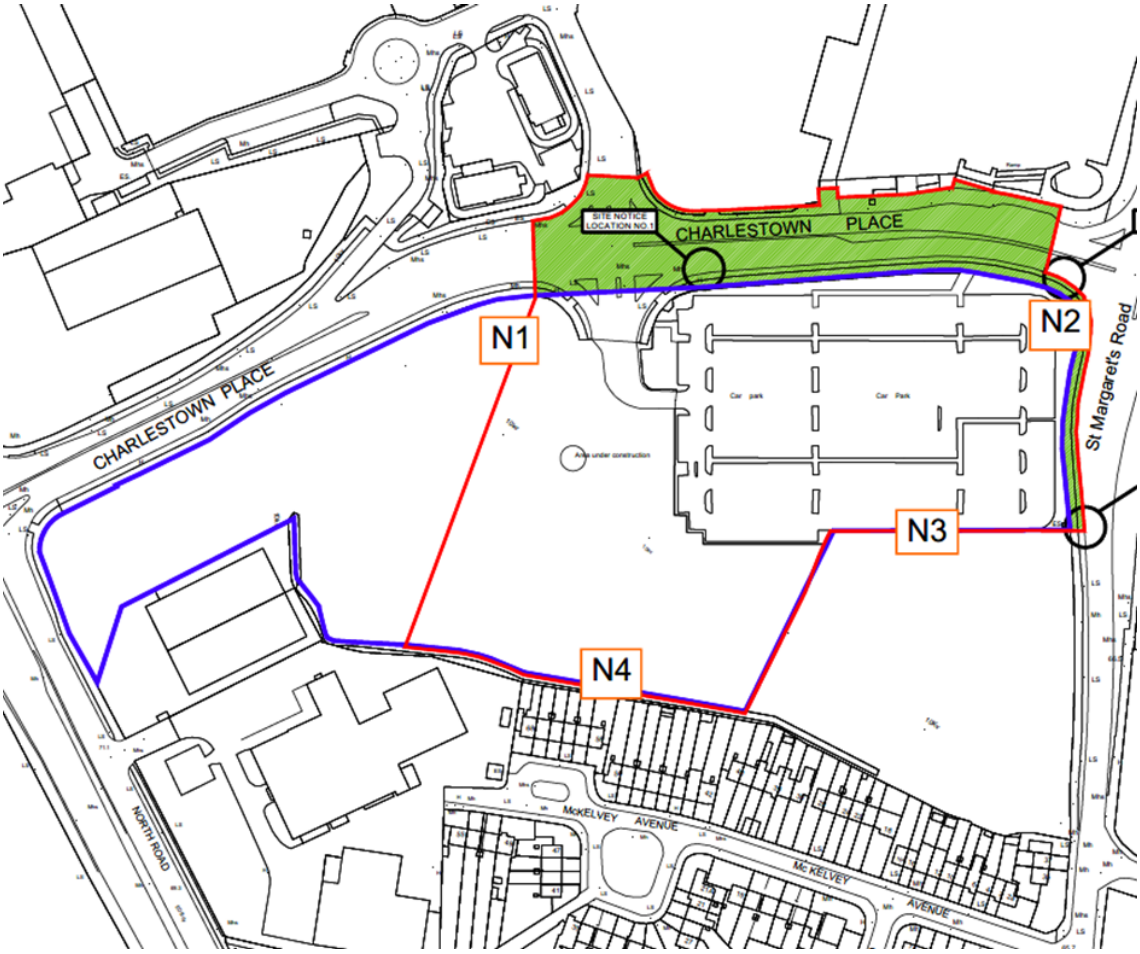


Figure 9.1 – Baseline Noise Monitoring Locations N1 – N4

It is noted that vibration surveys were also conducted during the baseline noise survey locations N1 – N4. It was established that there are no existing inherent sources of vibration at the development site.

The noise parameters used to describe the existing ambient noise climate are described as follows:

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

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

L_{Amax}: The instantaneous maximum sound level measured during the sample period.

1/3 Octave band analysis The frequency analysis of a sound such that the frequency spectrum is subdivided into bands of one-third of an octave each. Used to determine tonal components of a sound source.

Noise levels are measured using a logarithmic noise scale (decibel) and are denoted dBA. The "A" indicates that a frequency weighting has been applied to allow for the variation in the sensitivity of the human ear.

9.3.3 Baseline noise measurement results

Table 9.7 – Location N1 Western site boundary

Period 14.12.20 **N1**	**Measured sound pressure levels dBA (re 20µPa)**			
	$L_{Aeq,}$	L_{A10}	L_{A90}	L_{AMax}
Daytime period 09:20 – 12:20hrs 3-hr period	64	66	61	75
Nightime period 23:00 – 00:00hrs 1-hr period	60	62	58	75

The noise climate at N1 is dominated by traffic on Charlestown Place. No tonal or impulsive noise sources were observed.

Recorded vibration were negligible <0.125mm/sec PPV during the survey period at Location N1.

Table 9.8 – Location N2 Northeastern site boundary

Period 14.12.20 **N2**	**Measured sound pressure levels dBA (re 20µPa)**			
	$L_{Aeq,}$	L_{A10}	L_{A90}	L_{AMax}
Daytime period 11:40 – 14:40hrs 3-hr period	66	68	62	77
Nightime period 00:30 – 01:30hrs 1-hr period	63	65	60	78

The noise climate at N2 is is dominated by traffic on Charlestown Place and St. Margarets Road. No tonal or impulsive noise sources were observed.

Recorded vibration were negligible <0.125mm/sec PPV during the survey period at Location N2.

Table 9.9 – Location N3 Eastern site boundary opposite St. Margarets' Road

Period 15.12.20 **N3**	**Measured sound pressure levels dBA (re 20µPa)**			
	$L_{Aeq,}$	**L_{A10}**	**L_{A90}**	**L_{AMax}**
Daytime period 10:15 – 13:15hrs 3-hr period	64	65	60	77
Nightime period 00:05 – 01:05hrs 1-hr period	63	64	59	76

The noise climate at N3 is dominated by traffic on St. Margarets Road. No tonal or impulsive noise sources were observed.

Recorded vibration were negligible <0.125mm/sec PPV during the survey period at Location N3.

Table 9.10 – Location N4 Southern site boundary adjacent Mcelevey Ave. houses

Period 16.12.20 **N4**	**Measured sound pressure levels dBA (re 20µPa)**			
	$L_{Aeq,}$	**L_{A10}**	**L_{A90}**	**L_{AMax}**
Daytime period 13:50 – 16:450rs 3-hr period	60	62	57	72
Nightime period 23:30 – 00:30hrs 1-hr period	56	57	53	70

The noise climate at N4 is influenced by traffic on St. Margaret's Road and local traffic movements within Mcelevey Avenue estate. No tonal or impulsive noise sources were observed.

Recorded vibration were negligible <0.125mm/sec PPV during the survey period at Location N4

Dublin Agglomeration Environmental Noise Plan 2018 - 2023 & EPA Round 3 Road Noise Mapping Assessment

In order to further establish existing background noise levels associated with the identified dominant noise source identified as being road traffic, the EPA's noise mapping data was reviewed to assess L_{den} and L_{night} road traffic noise indicators.

The EPA's Round 3 Transport Noise Maps has been reviewed as part of this assessment.

Figures 9.2 and 9.3 present the daytime L_{den} and nighttime L_{night} Noise Maps for road traffic relative to the location of the subject Charlestown development site.

The L_{den} parameter is a descriptor of noise level based on energy equivalent noise level (L_{eq}) over a whole day with a penalty of 10dB(A) for nightime noise (23:00 – 07:00hrs) and an additional penalty of 5dB(A) for evening noise (19:00 – 23:00hrs).

The L_{night} parameter is a descriptor of noise level based on energy equivalent noise level (L_{eq}) over an 8-hour night period between (23:00 – 07:00hrs).

The Noise Action Plan for Fingal County 2019-2023 specifies desirable and undesirable sound levels are defined as follows:

Desirable Levels 24-hour Day-Evening-Night Noise Value	<70dB(A) L_{den}
Desirable Nightime Noise Value	<55 dB(A) L_{night}

Table 9.11 Strategic Noise Mapping Results at Charlestown site

Source	EPA Round 3 L_{den} dB(A)	Limit Criteria L_{den} dB(A)	EPA Round 3 L_{night} dB(A)	Limit Criteria L_{night} dB(A)
Road Traffic	65 - 69	<70	60 - 64	<55

The Road Noise Mapping assessment concludes that the Charlestown development site is within the desirable 70dB(A) L_{den} level and outside the nightime 55 dB(A) L_{night}.

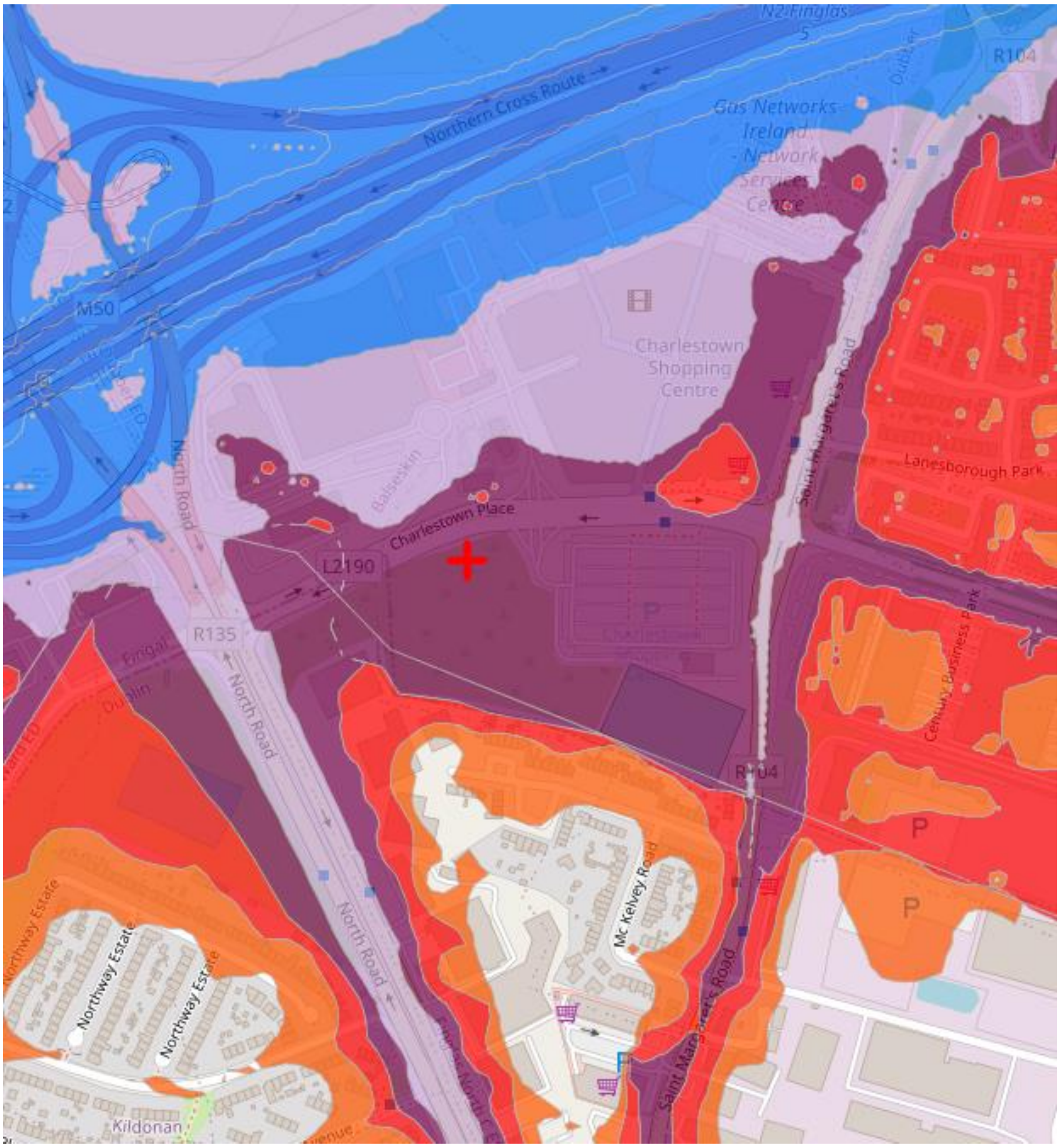


Figure 9.2 Charlestown Site Road Traffic Lden noise map 65-69dB contour

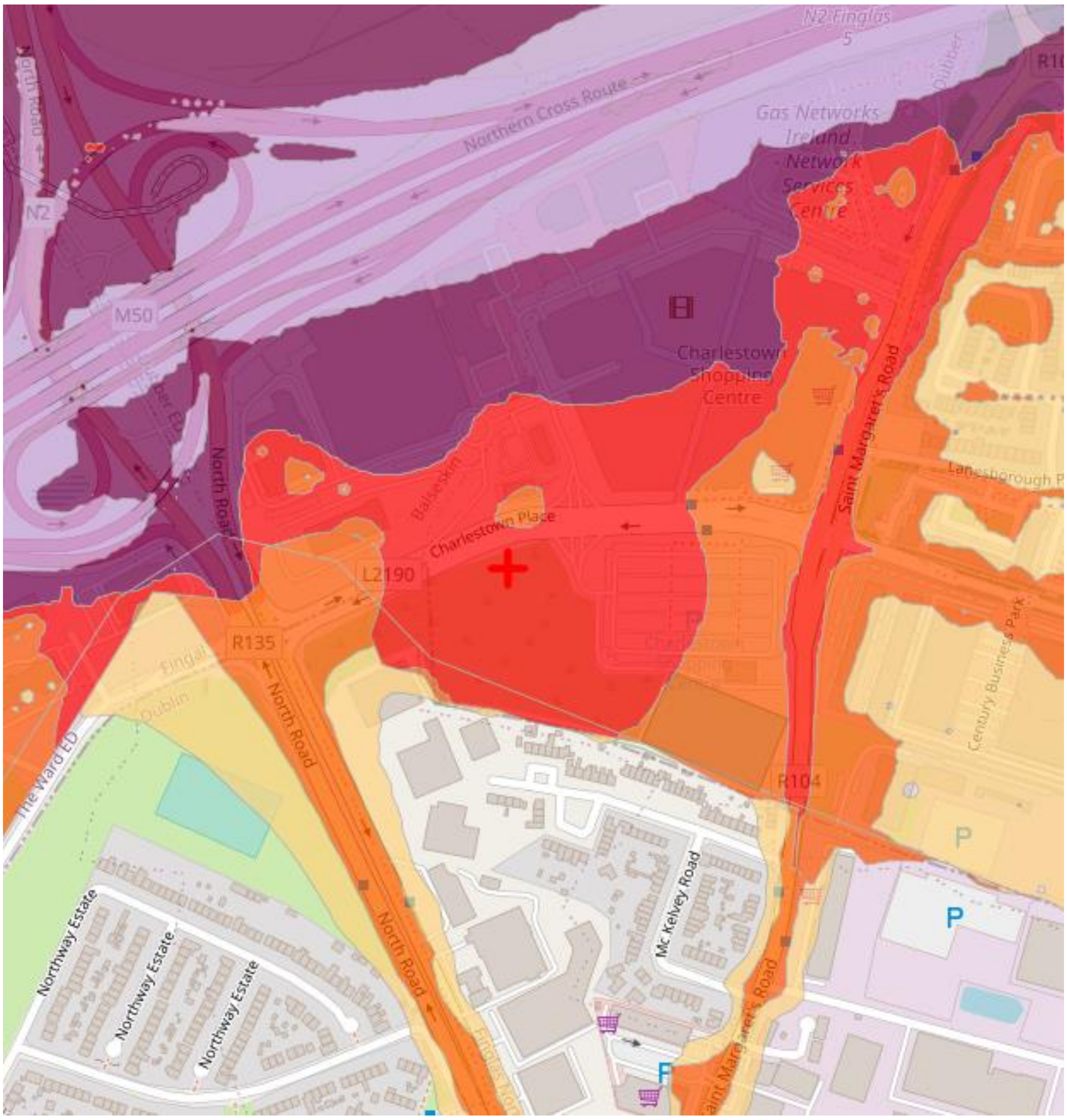


Figure 9.3 Charlestown Site Road Traffic Lnight noise map 60-64dB contour

Figures 9.3 and 9.4 present the daytime L_{den} and nighttime L_{night} Noise Maps for air traffic relative to the location of the subject Charlestown development site.

The air traffic noise mapping assessment concludes that the Charlestown development site is within the desirable 70dB(A) L_{den} level and within the nightime 55 dB(A) $L_{night.}$

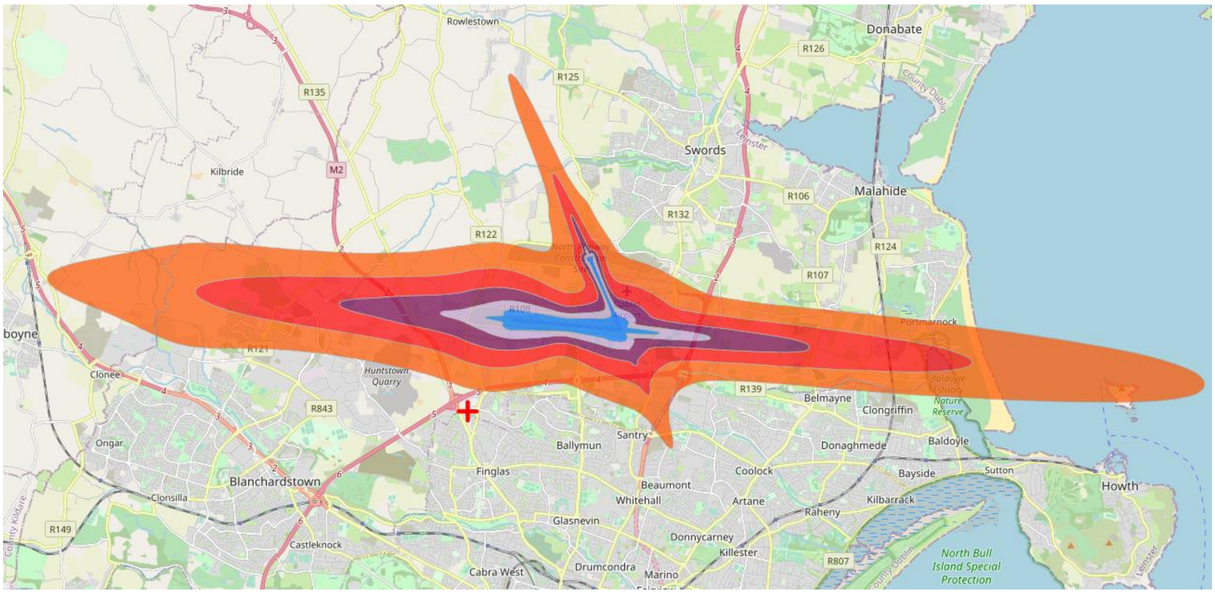


Figure 9.4 Charlestown Air Traffic Lden noise map <55dB contour

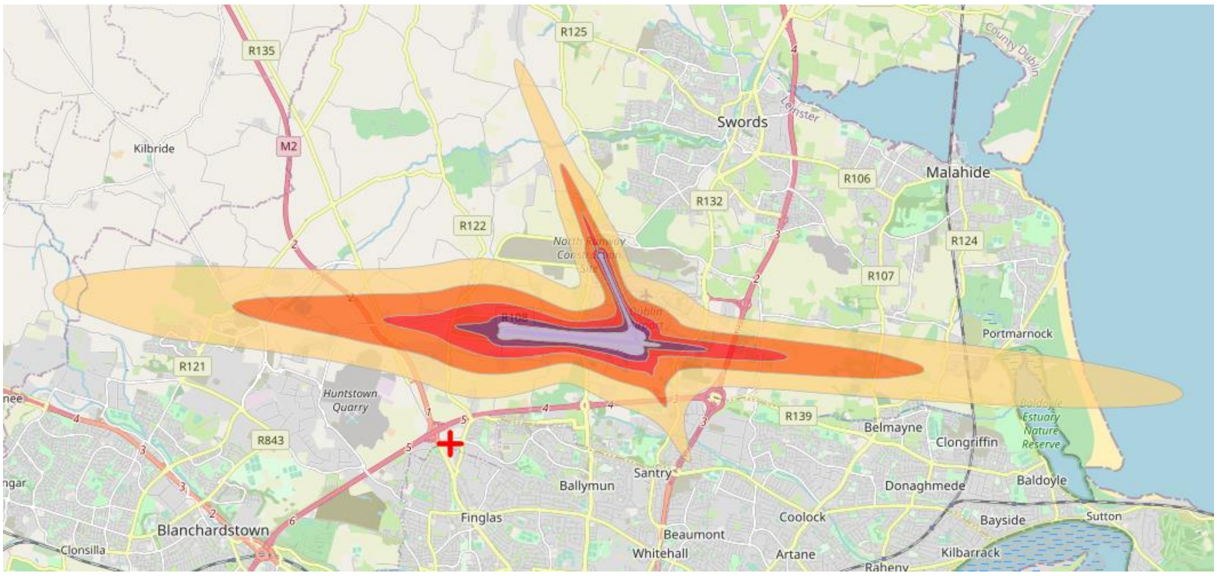


Figure 9.5 Charlestown Air Traffic Lnight noise map <50dB contour

9.3.4 Significance

It may be concluded that the impact of road traffic noise on the proposed development is above the L_{night} desirable noise limit criteria as specified in the Noise Action Plan for Fingal County 2019-2023 and is within the L_{day} and L_{night} desirable noise limit criteria for Dublin aircraft noise. The design of the development will require acoustic insulation design features to mitigate against the inward noise impact of road traffic noise.

9.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in Section 3.3 of this EIAR.

When considering a development of this nature, the potential impacts of noise and vibration must be considered for each distinct stage: the short-term impact of the construction phase and the ongoing long-term impact of the operational phase.

Short term noise exposure during the construction phase must be managed and controlled to acceptable levels. There are a number of existing residential noise sensitive receptors located in proximity to the development site southern boundary. It is fundamental that the proposed development or any aspect of the proposed development must not adversely impact the existing noise levels experienced at these receptors over the long term.

The operation of the proposed development and noise associated with its operation will be limited to normal domestic activities such as internal residential vehicle movements, children playing, pedestrians, bin collections and occasional delivery van movements. These normal residential activities are not considered “noise” as they are part of everyday living.

9.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

Various elements of both the construction and operational phases of the proposed development have the potential to impact on the receiving on the local receiving noise environment, on adjacent residential properties and on human health. The likely potential impacts for both construction and operation of the proposed scheme prior to mitigation are described in this chapter of the EIAR. The mitigation measures are described in Section 9.7 and the predicted impacts with the development in place and the mitigation measures incorporated in Section 9.9.

9.5.1 Potential Construction Noise Impacts

The development of the site will be conducted in the following phased stages:

- Enabling works - Site set up and Site clearance
- Construction works including infrastructure and building construction and landscaping

Enabling works - Site Set Up and Clearance
Works activities associated with the ‘Site set up’ will be undertaken prior to construction works commencing. The setting up of the site shall involve the construction of site security hoarding and site compounds, site offices, materials and waste storage areas and staff welfare facilities. These short-term activities will have a minimal potential to generate excessive noise levels.

The proposed development involves the ground clearance of the existing site to facilitate the proposed development including buildings, internal roads and hard standing areas, services and landscaped areas.

Site clearance, levelling and an element of ground excavation shall also occur at this stage. A variety of items of plant will be in use during site clearance and ground excavation. These will include excavators, dump trucks, compressors and generators, pneumatic breakers and piling plant. The operation of these items of plant has the potential to generate short term elevated noise levels beyond the site boundary.

During the site clearance works and the basement bulk dig, the movement of trucks to and from the site shall result in an increase in the volume of HGV’s within the immediate area and along the proposed haul routes which will generate additional noise levels.

General Construction Works
During the construction phase there will be extensive site works, involving construction machinery, construction activities on site, and construction traffic, which will all generate noise. The highest noise levels will be generated during the general construction activities. The construction noise levels will be of relatively short-term duration and will only occur during daytime hours which will serve to minimise the noise impacts at local existing receptors.

There is potential that the construction phases shall result in a short-term moderate increase in noise levels in the area as well as introducing tonal and impulsive noise as a result of construction activities such as pneumatic breaking, cutting, excavating, vehicle movements and general manual construction activities.

The proposed construction phase noise mitigation measures as detailed in Section 9.7 shall ensure that all construction activities are controlled and managed and audited by an independent acoustic consultant to confirm that the mitigation measures are implemented throughout the construction phase.

9.5.2 Potential Operational Noise Impacts

The potential noise aspects to be considered for the completed operational development will be limited to traffic noise associated with the development and the operation of the retail/commercial aspects of the development.

9.5.3 LUAS Brrombridge to Charlestown (proposed)

The proposed LUAS Cross City extension line route between Broombridge and Charlestown may be located along St. Margaret’s Road to the east of the development. Should the LUAS extension line proceed, the operation of the LUAS may have a noise impact on the development.

9.6 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

9.6.1 Construction Phase

General Construction Site Management

The following noise management measures shall be implemented at the site from the outset of site activities to control and manage noise levels during the construction phase of the proposed development:

NV-C1 General Noise Management Measures

An independent acoustic consultant shall be engaged by the contractor prior to the commencement of site activities to ensure that all noise mitigation measures as specified in this Section of the EIAR are implemented and to prepare a site-specific Construction Phase Noise Management Plan. The Plan shall include all relevant noise and vibration control measures as specified in this Chapter of the EIAR and specify the noise monitoring locations. The Plan shall be submitted to FCC for approval as required.

The nominated contractor shall appoint a designated person to manage all environmental complaints including noise and vibration.

A noise complaint procedure shall be implemented in which the details of any noise related complaint are logged, investigated and where required, measures are taken to ameliorate the source of the noise complaint.

Appropriate signage shall be erected on all internal roads within the site the site to inform HGV drivers that engines shall not be left idling for prolonged periods and that the use of horns shall be banned at all times.

NV-C2

- A strictly enforced noise management programme shall be implemented at the site from the outset of construction activities.
- The acoustic consultant shall conduct routine noise audit surveys which shall be conducted at the baseline noise monitoring locations throughout the construction phase of the development to assess compliance with the construction noise limit criteria detailed in Section 8.2.3 above and to assess the effectiveness and implementation of the specific Construction Phase noise mitigation measures detailed in this document.
- The principal of controlling noise at source shall be implemented at the site. Best practice mitigation techniques as specified in BS 5228:2009+A1 2014 – Noise and Vibration Control on Construction and Open Sites shall be implemented during the construction phase and are detailed in this Section.
- Noisy stationary equipment shall be sited away from sensitive site boundaries as far as practicable.
- Where reasonable practicable, noisy plant or activities shall be replaced by less noisy alternatives if noise breaches and/or complaints occur.
- Proper use of plant with respect to minimising noise emissions and regular maintenance will be required.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and will be maintained in good efficient order

- Where noisy plant is required to operate in works areas next to residential houses low noise plant options will be used wherever practicable.
- Dumpers and any plant used for moving materials around the site will have high performance exhaust silencers.
  - Selected use of rubber-tyred equipment over steel track equipment where practicable.
- The use of inherently quiet plant is required where appropriate – all compressors and generators will be “sound reduced” or “super silent” models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use, and all ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers.
- All compressors, generators and pumps shall be silenced models fitted with properly lined and sealed acoustic covers or enclosures, which will be kept closed whenever the machines are in use.
- All pneumatic percussive tools such as pneumatic hammers shall be fitted with dampers, mufflers or silencers of the type recommended by the manufacturer.
  - Fixed items of plant shall be electrically powered in preference to being diesel or petrol driven.
- Vehicles and mechanical plant utilised on site for any activity associated with the works shall be fitted with effective exhaust silencers and shall be maintained in good working order and operated in a manner such that noise emissions are controlled and limited as far as reasonably practicable.
- Any plant, equipment or items fitted with noise control equipment found to be defective in shall not be operated until repaired / replaced.
- Machines in intermittent use shall be shut down in the intervening periods between works or throttled down to a minimum during periods when not in use.
- Static noise emitting equipment operating continuously shall be housed within suitable acoustic enclosure, where appropriate.
- All excavator mounted pneumatic breakers used for demolition and ground breaking activities shall be fitted with effective dampeners and /or enclosed within a noise adsorbing blanket structure to minimise noise emissions.
- Site activities shall be staggered when working in proximity to any receptor, that is concrete cutting and rock breaking should where possible. This proposed method of working will provide effective noise management of site activities to ensure that any receptor is not exposed to unacceptably high levels of noise over extended periods.
  - Excessive reviving of all vehicles shall be avoided.
  - Unnecessary dropping of heavy items onto ground surfaces shall be banned.
- The use of an excavator bucket to break up slabs of concrete or tarmacadam shall not be permitted.
- The dragging of materials such as steel covers, plant or excavated materials along ground surfaces shall not be permitted.
- The use of acoustic screens to attenuate noise at source shall be implemented as deemed necessary.

- Plant Reversing Alarms: Where reasonably practicable and deemed safe by risk assessment, taking into account onsite hazards and working environment, the tonal reversing alarms of mobile plant shall be replaced with broadband alarms.
- A nominated person from the Project Management team will be appointed to liaise with local residents and businesses regarding noise nuisance events.
- In the event of the requirement for out of hours work to occur which will involve the generation of noise levels that are predicted to exceed out of hours noise limit criteria, DCC shall be immediately notified prior to the works commencing.
- A nominated person from the Project Management team will be appointed to liaise with and inform local residents and DCC regarding out of hours works.
- An independent acoustic consultant shall review the implementation of the recommended mitigation measures on a monthly basis.

NV-C3 Vibration Mitigation Measures

The following specific vibration mitigation and control measures shall be considered during the construction phase:

- Breaking out concrete elements using low vibration tools
- Choosing alternative, lower-impact equipment or methods wherever possible
- Scheduling the use of vibration-causing equipment, such as jackhammers, at the least sensitive time of day
- Routing, operating or locating high vibration sources as far away from sensitive areas as possible
- Sequencing operations so that vibration causing activities do not occur simultaneously
- Isolating the equipment causing the vibration on resilient mounts
- Keeping equipment well maintained.
- Confining vibration-generating operations to the least vibration-sensitive part of the day which could be when the background disturbance is highest
- A nominated person from the Project Management team will be appointed to liaise with local residents and businesses regarding vibrational nuisance events.
- An independent acoustic consultant shall review the implementation of the recommended mitigation measures on a monthly basis.

The images below describe the use of noise screens for construction activities under NV-C2.

Double height acoustic blanket enclosure

Acoustic blankets screening piling and excavations

3 sided Acoustic enclosure for surrounding breaking, cutting works

9.6.2 Operational Phase Noise Impact Mitigation

Outward Noise Impact Mitigation Measures

As set out in Section 9.5.1 the operational phase of the development is predicted not to have an adverse noise impact on the receiving environment or on existing residential developments adjacent to the site during the operational phase. Therefore, no outward noise mitigation measures are proposed.

Inward Noise Impact Mitigation Measures

NV-O1	Acoustic Design requirements for residential buildings External noise can enter rooms within dwellings through windows, ventilators, walls, roof and doors. In most cases, however, windows provide the main path and therefore, mitigation by design has focussed on this building element to ensure that their insulation is adequate.

Windows

In order to ensure a sufficient level of sound insulation is provided for all dwellings within the development, the following lists the minimum sound insulation performance of windows and window frame sets in terms of the in-situ weighted sound reduction index (Rw):

40dB Rw for Living rooms & Bedrooms
37dB Rw for Kitchen, Bathroom & Dining Rooms.

The acoustic performance specifications detailed are the *in-situ* minimum requirements which shall apply to the overall glazing system when installed on site. 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. All exterior wall and door frames should be sealed tight to the exterior wall construction.

NV-O2 Internal Noise Control – Apartments

At the earliest stage during the construction phase, test apartment units shall be constructed to their finished level and shall be tested by a suitably qualified independent Acoustic Engineer to ensure that they comply with *Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound. Table 9.15* provides detail on the recommended sound insulation values that shall be achieved to ensure acoustic privacy between adjoin apartment units

Table 9.15 – Recommended sound insulation values for internal party walls / floors

Dwellings	Airborne Sound Insulation D_{nTw} (dB)	Impact Sound Insulation L_{nTw} (dB)
Floors and Stairs	53	58
Walls	53	N/A

For other non-traffic related sources appropriate guidance on internal noise levels for dwellings is contained within BS 8233: 2014: Guidance on Sound Insulation and Noise Reduction for Buildings. This British Standard sets out recommended noise limits for indoor ambient noise levels in dwellings as detailed in Table 9.16.

Table 9.16 – Recommended Indoor Ambient Indoor Noise Levels from BS 8233: 2014

Typical situations	Design Range, $L_{Aeq,T}$ dB	
	Daytime $L_{Aeq,16hr}$ (07:00 to 23:00hrs)	Night-time $L_{Aeq, 8hr}$ (23:00 to 07:00hrs)
Living / Dining Rooms	35 / 40	n/a
Bedrooms	35	30

NV-O3 Ventilation Systems

The ventilation strategy for the development will be in accordance with *Part F of the Building Regulations*. The apartment units shall include mechanical heat recovery ventilation systems which will negate the requirement for passive wall vents in bedrooms and living spaces which would otherwise allow the transfer of external noise into the building through the air gaps in the passive vents. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice.

NV-O4	Wall Construction The wall construction typically provides the highest level of sound insulation performance to a residential building. The residential dwellings will be built using either masonry or a timber framed construction. The minimum sound insulation performance of the chosen wall construction will be 55dB Rw.
NV O5	Roof Construction The insulated roof constructions proposed across the site will provide an adequate level of sound insulation to the properties within the development site. A minimum sound insulation value of 55dB Rw should be used for roof spaces.

As set out in Section 9.5.1 the operational phase of the development is predicted not to have an adverse noise impact on the receiving environment or on existing residential developments adjacent to the site during the operational phase of the scheme. Therefore, no mitigation measures additional to those set out above are proposed.

9.6.3 'Worst-case' scenario

The worst-case scenario would be that the attributes and mitigation measure were not carried out.

The main potential for adverse impacts on local quality will occur during the construction phase. The worst-case scenario, therefore, corresponds to the situation where the mitigation measures for construction activities fail or are not implemented. Should noise mitigation measures not be implemented during the construction phase, significant noise nuisance is likely in areas close to the construction site. There would be significant adverse effect on human health in the absence of such mitigation measures.

9.7 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

9.7.1 Construction phase noise impacts

The predicted construction noise levels that will be experienced at the nearest residential receptors as a result of construction activities have been calculated using the activity LAeq method outlined in BS 5228 1:2009+A1 2014 – Code of Practice for noise and vibration control on construction and open sites – Part 1 Noise.

Tables 9.11 to 9.12 detail assumed plant items during the key phases of construction with the associated source reference from BS 5228: 2009+A1 2014. The closest residential properties to the proposed development site are located at distances ranging from approximately 10-50m. Construction noise calculations have therefore been conducted both with and without noise mitigation at distances of 10 to 50m from the works for the Site Clearance and Main Construction phases, representing the nearest properties to the works.

Table 9.11 – Predicted construction noise predictions associated with Site Enabling works

Plant Item	BS 5228 Reference	Calculated sound pressure levels L_{Aeq} dB at distances from receptors	
		Closest distance 20m	Average distance 50m
Generator (enclosed)	C.4 Ref 84	58	48
Compressor (enclosed)	D.6 Ref 19	61	51
Tracked Excavator	C.2 Ref 3	67	56
HGV	C.4 Ref 19	65	55
Dozer	C.2 Ref 11	65	59
Dumper	C.2 Ref 30	67	57
$L_{Aeq,period}$		69	59

The predictions are based on the operation of all plant simultaneously at the specified distances from the closest noise sensitive receptors located south of the site at McKelvey Ave.

Table 9.12 – Predicted construction noise predictions associated with Piling works

Plant Item	BS 5228 Reference	Calculated sound pressure levels L_{Aeq} dB at distances from receptors	
		Closest distance 40m	Average distance 50m
Rotary Piling	C.3 Ref 14	70	68
Concrete Pump	DC.3 Ref 25	65	63
$L_{Aeq,period}$		70	67

The predictions are based on the operation of all plant simultaneously at the specified distances from the closest noise sensitive receptors located south of the site at McKelvey Ave.

Table 9.13 – Predicted construction noise predictions associated with building construction works

Plant Item	BS 5228 Reference	Calculated sound pressure levels L_{Aeq} dB at distances from receptors	
		Closest distance 20m	Average distance 50m
Generator (enclosed)	C.4 Ref 84	58	48
Compressor (enclosed)	D.6 Ref 19	61	51
Tracked Excavator	C.2 Ref 3	67	56
HGV	C.4 Ref 19	65	55
Teleporter	C.2 Ref 35	61	65
Concrete Truck & pump	C.4 Ref.	69	59
$L_{Aeq,period}$		69	60

The calculation are based on the operation of all plant simultaneously for 75% of the time at the specified distances from the closest noise sensitive receptors located south of the site at McKelvey Ave.

The results of the assessment conclude that in general, at distances of greater than 20m from the works site provided all mitigation measures including site hoarding are implemented, the construction day time noise limit of 70dB LAeq, 1hr can be complied with during site enabling, piling and general construction works. It is also important to note that the impact due to construction activities will be transient in nature and the noise levels detailed in Tables 9.11 and 9.13 represent worst case scenarios when all items of plant are operating simultaneously.

The proposed construction phase noise mitigation measures as detailed in Section 9.9 shall ensure that all construction activities are controlled and managed and audited by an independent acoustic consultant to confirm that the mitigation measures are implemented throughout the construction phase.

Construction Traffic Noise

Based on the assumption of up to 60 HGV movements per day on the haul routes to and from the site along public roads, the resulting average predicted traffic noise level at the closest receptors is calculated as follows:

> The predicted noise levels at any receptor located within 5m of the haul route road has been calculated using a standard international acoustical formula as described below.

$$LAeq, T = SEL + 10\log10(N) - 10\log10(T) + 20\log10(r1/r2)\ dB$$

where

LAeq, T	is the equivalent continuous sound level over time period (T) (3600 sec);
SEL	is the A weighted Sound Exposure Level of the noise event (77dB);
N	is the number of events over the time period T (60);
r1	is the distance at which SEL is assessed (5m)
r2	is the closest distance to the receptor from the road (10m)

The calculations assumed a maximum scenario of 8 truck movements per hour based on a 10-hour working day a maximum Sound Exposure Level of 77dBA for the trucks and the minimum distance between the local road passing by each of the nearest noise sensitive receptors to the public road (10m). No attenuation, above geometric spreading, has been considered within these calculations may be considered the worst case scenario.

The maximum predicted LAeq, period values as a result of the HGV traffic movements at the nearest noise sensitive receptors located along the haul route roads is predicted to be 44 dBA, LAeq, period.

It is not expected that the predicted short-term increase in HGV movements associated with the construction phase of the development will have an adverse impact on the existing noise climate of the wider area or on local receptors.

Construction generated vibration

The most significant potential sources of ground borne vibrations that may be generated during the construction phase of the development will be generated by the following practices:

- Ground preparation excavation activities that require the use of pneumatic rock breakers
- Movement of site vehicles bulldozers, tracked excavators and dump trucks on ground surfaces
- Hard core surfaces and haul road compaction with vibro-rolling vehicles
- Road construction surface vibro-rolling

Vibration impacts have been considered from any particular plant items that have the potential to generate perceptible levels of vibration.

The closest residential receptors will be c. 20m from construction works. Depending on the methods of construction, there is the possibility of construction related vibration impacts on human beings as a result of ground preparation and concrete foundation excavation activities. However, such sources of vibration shall be temporary and intermittent.

Construction Vibration

It is predicted that vibration levels associated with construction activities at distances greater than 20m from third party buildings will not exceed 1mm/sec PPV and will have a negligible short-term impact on the structures of the buildings or structures. Human response to groundbourne vibrations will be perceptible at levels between 0.14 to 1.0 mm/sec PPV.

9.7.2 Operational Phase

The operational noise aspects associated with the completed development can be classified as follows:

- Outward noise impacts on the built environment and existing receptors
- Inward noise impacts on the development from other external noise sources

Outward Traffic Noise Impact
The main potential for altering the noise environment once the development is operational, and thus impacting neighbouring residential receptors, will be associated with increased traffic movement in the area.

The *Traffic Impact Assessment* [Atkins] submitted with this application includes a detailed assessment of the traffic impact associated with the proposed development. As part of this assessment, detailed traffic flow information as Annual Average Daily Traffic flows (AADT) has been derived for the existing road network junctions up to the 2036 Design Year. The % increases in traffic associated with the 3 junction that will serve the development are presented below in Tables 9.13 and 9.14.

Table 9.13 Maximum % Increase in AM Peak Traffic Movements

AM Peak	R135/Charlestown Place	Development/Charlestown Place	St Margarets Rd/Charlestown Place junction
Opening Year OY 2021	OY	OY+5	OY+15
	1.51%	8.47%	1.76%
Increase dB(A)	<1	<1	<1
Impact	Imperceptible	Imperceptible	Imperceptible

Table 9.14 Maximum % Increase in PM Peak Traffic Movements

PM Peak	R135/Charlestown Place	Development/Charlestown Place	St Margarets Rd/Charlestown Place junction
Opening Year OY 2021	OY	OY+5	OY+15
	1.11%	5.34%	1.12%
Increase dB(A)	<1	<1	<1
Impact	Imperceptible	Imperceptible	Imperceptible

The UK Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, Part 7) states that it takes a 25% increase or a 20% decrease in traffic flows in order to get a 1dBA change in traffic noise levels. On this basis, the traffic flow increases associated with the fully completed development to the design year of 2036 will result in an increase of <1dB(A) over existing traffic noise levels. This increase in operational traffic will result in a long-term imperceptible impact.

On-Site Noise Sources

Internal Residential Traffic Noise
The development includes the provision of basement level car parking spaces for the residential units. Vehicles within the residential areas will generally travel at speeds <20kmph as a result of speed limit signage and speed reducing ramps throughout the development which result in relatively low noise levels being generated by internal vehicle movements.

Neighbourhood Noise
Within the proposed development, sounds generated by everyday domestic activities including waste collection activities, pedestrians, children, and use of open spaces, are part of everyday living, and are not considered “noise” in the sense of a potential nuisance. These activity noises would not have any potential to cause an adverse noise impact beyond the boundaries of the site or within the site itself.

Commercial / Non Residential Uses
The proposed commercial and non residential uses associated with the development will be located at ground floor level within the apartment block structures. These units will be acoustically isolated and insulated to ensure that noise generated by activities conducted within does not transfer into the apartment structure in which they are located.

It is predicted that the operation of any non residential unit will not result in adverse noise levels at any receptor within the development or beyond the site boundaries.

Operational Vibration
As a vehicle travels along a road, vibration can be generated in the road and subsequently propagate towards nearby buildings. Such vibration is generated by the interaction of a vehicle’s wheels and the road surface and by direct transmission through the air of energy waves. Some of these waves arise as a function of the size, shape and speed of the vehicle, and others from pressure fluctuations due to engine, exhaust and other noises generated by the vehicle.

Ground vibrations produced by residential road traffic are unlikely to cause perceptible, cosmetic or structural vibration in properties located near to well-maintained and smooth road surfaces. Vibration impacts associated with road traffic in particular commercial van and trucks can therefore be largely avoided by good maintenance of the road surface.

It has been assessed that vibration levels related to road traffic movements would be significantly lower than those levels required to lead to disturbance of occupiers or to cause cosmetic or structural damage to buildings and the vibrational impact will be negligible.

Inward Noise Impact

The Professional Guidance on Planning & Noise (ProPG) document May 2017 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) 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

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 9.6 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.

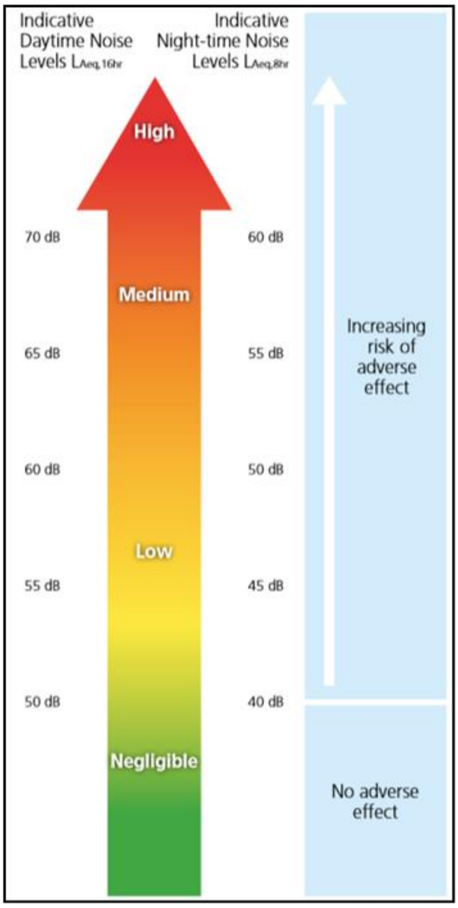


Figure 9.6 ProPG Stage 1 Initial Risk Assessment
A site should not be considered a negligible risk if more than 10dB(A) LAFmax events exceed 60 dB during the night period and the site should be considered a high risk if the LAFmax events exceed 80 dB more than 20 times a night.

The subject site at Charlestown may be classifies as a medium risk site and requires the acoustic design mitigation measures as detailed in Section 9.6.2 above.

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 9.15 and are based on annual average data levels.

Activity	Location	(07:00 to 23:00hrs)	(23:00 to 07:00hrs)
Resting	Living Room	35 dB $L_{Aeq, 16hr}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq, 16hr}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq, 16hr}$	30 dB $L_{Aeq, 8hr}$ 45 dB L_{AFmax}

Table 9.15 ProPG Internal Noise Levels

Road Traffic Noise

Existing road traffic noise has been established from a combination of on-site noise surveys and the review of published EPA Round 3 Road Noise Mapping data. The proposed development will be located within the Lden noise map 65-69dB contour which is within the desirable <70dB(A) Lden level. The development is located within the Lnight 60 - 64 dB contour which exceeds the desirable nightime 55 dB(A) $L_{night.}$ value. The impact of road traffic noise on the development will be slight and long-term. Mitigation in the form of acoustic insulation is required to be incorporated into the design of the development to reduce the impact to not-significant and long-term.

Aircraft Noise

The impact of Dublin airport aircraft noise has been established from a combination of on-site baseline noise surveys and a review of the Fingal Noise Action Plan Dublin Airport Aircraft Mapping data. The proposed development will be outside the 55 dB L_{den} noise contour and outside the 50dB L_{night} noise contour as described above in Section 9.3, therefor the impact from aircraft noise on the development will be not significant and long-term.

Proposed Broombridge to Charlestown LUAS

The predicted impact of the proposed LUAS line along St. Margaret's road has been determined through a combination of LUAS noise measurement data and prediction methods to establish the noise impact on the development should the proposed LUAS project proceed. Based on the current preferred route, the LUAS tram line will be c. 50m from the closest façade of the proposed development.

The sound level of a passing LUAS tram expressed as an $L_{Aeq,T}$ value can range between 73 – 76 dB(A) at a distance of 1m. The calculated noise level at the closest façade of the development is calculated to range between $L_{Aeq,T}$ 39 - 42 dB(A). It is therefore predicted that the impact of LUAS tram noise will be slight and long-term should the LUAS Broombridge – Charlestown extension proceed in the future.

9.7.3 Residual Impacts

9.7.3.1 Construction Phase

It is predicted that the construction phase noise impact with mitigation will be negative, slight to moderate and short-term at local residential receptors.

It is predicted that the construction phase vibrational impact with mitigation will be negative, not-significant and short-term at local residential receptors.

9.7.3.2 Operational Phase

Outward Noise Impact

It is predicted that the operational noise impact will be neutral, imperceptible and long-term at local residential receptors.

Inward Noise Impact

It is predicted that the inward noise impact with mitigation will be neutral , not-significant and long-term.

9.7.4 Risks to Human Health

Construction phase noise and vibration emissions will be temporary and transient and will be managed so as to minimise impact to population and human health by complying with all relevant guidance, as such the impact will be short-term and have a slight impact overall.

Operational phase noise will also be managed to achieve relevant noise limit values and is predicted to meet all such requirements. No operational phase vibration impacts are predicted. Therefore, the operational phase noise impacts will be neutral for the life of the development.

9.8 MONITORING

9.8.1 Construction Phase

This section describes the noise and vibration monitoring methodologies that shall be implemented at the site to ensure that construction site activities do not cause excessive nuisance or cause cosmetic or structural damage to properties or structures in the vicinity of the site.

NV-C4 Proposed Noise Monitoring Programme During Site Construction

Prior to the commencement of the site construction activities, a programme of continuous noise monitoring at site boundary locations shall be undertaken to assess and manage the impact that site activities may have on ambient noise levels at local receptors.

These surveys will establish the noise impact of site activities at the closest noise sensitive receptors to the north, northeast and south of the site, to assess compliance with the specified construction noise limit criteria and to ensure that mitigation and control measures are being implemented as required.

All noise monitoring data will be compiled into a monthly technical monitoring report which will include a full assessment of the potential noise impacts arising from site construction activities.

The environmental noise measurements will be completed in accordance with the requirements of *ISO 1996-1: 2017: Acoustics – Description, measurement and assessment of environmental noise* and with regard to the *EPA's 2016 Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).* The measurement parameters to be recorded include wind speed, temperature, L_{Aeq}, L_{A90}, L_{A10} and L_{Amax} , 1/3 Octave Frequency analysis and impact noise analysis.

Noise Monitoring Locations

The construction noise monitoring locations (CN1 – CN3) in proximity to the closest residential receptors are shown below in Figure 9.7.

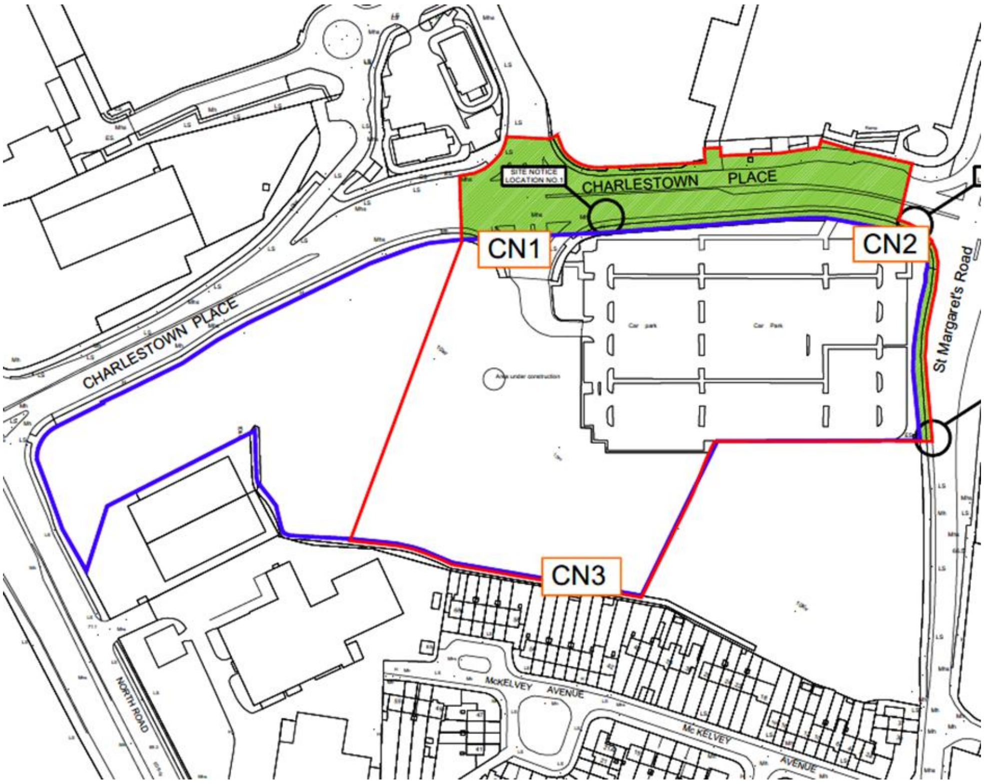


Figure 9.7 Construction Noise & Vibration Monitoring Locations (CN1-CN3, V)

NV-C5 Proposed Vibration Monitoring Programme During Site Construction

In order to ensure that site construction activities are conducted to minimise the vibration impacts on the receiving environment, it is proposed that structural vibration monitoring may be implemented during the course of the construction phase as required. It is proposed that vibration monitoring will be conducted at the closest residential properties opposite the southern site boundary at Mckelvey Avenue as required using calibrated vibration monitors and geophones with live text and email alert functionality to ensure that if vibration levels approach or exceed specified warning and limit values, site personnel will be alerted to cease at the earliest instance and appropriate mitigation measures may then be implemented to minimise the vibrational impacts of protected structures.

Vibration Monitoring Locations

The monitoring points chosen for locating the geophone of the vibration measuring instrument will be chosen according to the guidelines in *British Standard BS 7385:, Evaluation and measurement for vibration in buildings, Part1 1990 Guide for measurement of vibrations and evaluation of their effects on buildings and Part 2 1993 Guide to damage levels arising from groundborne vibration.*

9.8.2 Operational Phase

No monitoring required.

9.9 REINSTATEMENT

Reinstatement issues are not relevant to this Chapter of the EIAR, with reference to the construction and operational phase.

9.10 INTERACTIONS

The principal interactions between Noise & Vibration impacts and Human Beings have been addressed in this report which describes in detail the mitigation measures that shall be implemented to ensure that human health and residential amenity are not adversely impacted by any aspect of the construction or operational phases of the development.

9.11 DIFFICULTIES ENCOUNTERED IN COMPILING

There were no difficulties encountered in compiling this Chapter of the EIAR.

9.12 REFERENCES

- Dublin Agglomeration Noise Action Plan 2018 – 2023 (NAP).
- Design Manual for Roads & Bridges – Volume 11 Section 3.
- Professional Guidance on Planning & Noise (ProPG), (IoA, 2017).
- British Standard BS 5228 (2009 +A1 2014): Code of Practice for Control of Noise and Vibration on Construction and Open Sites Part 1: Noise & Part 2: Vibration.
- British Standard BS 7385 (1993): Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.
- British Standard BS 8233: 2014: Guidance on sound insulation and noise reduction for buildings.
- British Standard BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound
- Calculation of Road Traffic Noise, Department of Transport Welsh Office, HMSO, 1988.
- ISO 1996-2: 2017: Acoustics – Description, measurement and assessment of environmental noise.
- ISO 9613 (1996): Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation.
- EPA Guidelines on the Information to be contained in Environmental Impact Statements, (EPA, 2002).
- EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), (EPA, 2003).
- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017).
- EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015).

10.0 MATERIAL ASSETS: BUILT SERVICES

10.1 INTRODUCTION

This chapter evaluates the impact of the proposed development on the existing services and material assets of the subject site and its surrounding. Material assets relate to the infrastructure and services alongside the subject site and are either human or natural in nature, a value may arise from either human or cultural reasons. This chapter deals mainly with physical assets from human origin, natural assets are addressed elsewhere in the EIAR.

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10.2 ASSESSMENT METHODOLOGY

The Guidelines on information to be contained in an Environment Impact Statement (EPA 2002), the advice notes on current practice and Draft EPA guidelines published in 2017 all require assessment of ‘economic assets of human origin’ to be included in the impact study as a desktop study of material assets associated with the development.

A desktop study was carried out in relation to the material assets associated with the proposed development and their capacities. Projections of the assets were made for the construction and operational phase of the development.

The impacts of the development are assessed in terms of their scale, duration and significance to the site context. During the construction phase, assessments are undertaken on the impact of the proposal to determine likelihood of incurring loss or disturbance to material assets due to the construction phase. It is unlikely that there will be any major impacts during the operation phase of the development. Economic assets of natural origin that include Biodiversity, Land and Soil and Water are addressed specifically in the chapters 5, 6 and 7 respectively.

10.2.1 Consultations

Consultations were held with the following for the purposes of preparing this chapter:

- A pre-application enquiry was made to Irish Water in April 2020 and a response was received in May 2020 stating that “Based upon the details that you have provided with your pre-connection enquiry and on the capacity currently available in the network(s), as assessed by Irish Water, we wish to advise you that, subject to a valid connection agreement being put in place, your proposed connection to the Irish Water network(s) can be facilitated”.
- The applicant met with Fingal County Council (FCC) in formal pre-application meetings and at a number of other in person and online meetings to discuss the proposed scheme in terms of drainage, services and road access.
- The applicant met with ESB Networks and Gas Networks Ireland on several occasions to agree the strategy to serve the development.
- Details of existing Telecoms services were also obtained from Eir and Virgin Media to plan the incoming ICT and Telecoms connections.

10.2.2 List of Abbreviations

The following abbreviations are specific to this chapter of the EIAR.

IW	Irish Water
FCC	Fingal County Council
ESB	Electrical Supply Board
GNI	Gas Networks Ireland
ICT	Information and Communications Technology
SuDS	Sustainable urban Drainage Systems
TTA	Traffic and Transport Assessment

10.3 RECEIVING ENVIRONMENT

In relation to the receiving environment, the context, character, significance and sensitivity of the baseline receiving environment into which the proposed development will be constructed is assessed. This takes account of any nearby developments that are likely to proceed in the short or medium future.

10.3.1 Built Environment / Land

The development site comprises vacant land that is zoned Town Centre. The Subject Site is located c.1.5kms to the north of Finglas Village, east of the N2/ North Road, south of the M50, south of Charlestown Place and west of St. Margaret's Road. The Charlestown Centre Shopping Centre is located directly to the North of the current application site and the Northern and Eastern boundaries of the site are defined by Charlestown Place and St. Margaret's Road respectively. The McKelvey estate is located to the south with McKelvey Celtic AFC playing pitches to the South East.

10.3.2 Access

Vehicular access and egress to and from the development will be provided via the existing signalised junction located on Charlestown Place. The junction will be upgraded as part of the proposed development.

The TTA prepared by Atkins Consulting Engineers which is submitted with this application addresses the impact of the proposed development on the surrounding road network.

10.3.3 Transport Infrastructure

The proposed development is well served by the local road network and is bounded to the north by the M50, to the east by St. Margaret's Road, to the north by Charlestown Place and to the west by the R135. Additional roads of relevance are the N2 / M2 which approaches the site from the North via M50 Junction 5 and Melville Road which approaches the site from the East. A summary description of these routes is as follows:

- **M50:** The M50 is an orbital bypass route for strategic traffic around Dublin, whilst also acting as the hub of the National Roads network and providing direct access to Dublin Port and Dublin Airport. In doing so, the M50 facilitates local, inter-urban, business and freight trips. The road has an Annual Average Daily Traffic (AADT) in excess of 120,000 vehicles per day on the section between the N2 and M1 and operates with a posted speed limit of 100km/h.

- **R104 St Margaret's Road:** St Margaret's Road is a single carriageway regional road which runs in an East West direction from its intersection with the R108 Ballymun Road to its intersection with the R135 Finglas Road directly South of Charlestown. It provides local access to multiple housing estates. The road has adequate footpath, cycling, bus and crossing facilities along its length, particularly as it passes by the Charlestown Centre and the Mayston and Hampton Woods developments on approach to Ikea.
- **Charlestown Place:** Charlestown Place is a local road of approximately 500m length generally consisting of two lanes in both directions. The road facilitates access to the Charlestown Centre. It's intersections with both the R135 Finglas Road and R104 St. Margaret's Road are accommodated through traffic signalisation, generally consisting of a straight through lane, right turn lane and left slip lane. The road accommodates adequate pedestrian, cycling, bus and crossing facilities.
- **R135 Finglas Road:** The Finglas Road extends from M50 Junction 5 at Charlestown for approximately 5km to its intersection with the R108 Botanic Road / Ballymun Road at Phibsborough. The road is generally a dual carriageway with one traffic lane and one bus lane in both directions. The road accommodates adequate pedestrian, cycling, bus and crossing facilities.
- **N2 / M2:** The N2 / M2 is a National Road / Motorway which provides national strategic linkage to Derry, whilst also providing access to towns due North of Dublin such as Ratoath and Ashbourne.
- **Melville Road:** Melville Road is a single carriageway local road which provides access for multiple industrial business and residential housing estates. It extends from its traffic signal junction with St Margaret's Road to its roundabout junction with Jamestown Road. The road accommodates adequate pedestrian, cycling, bus and crossing facilities.

The subject site is currently well served by both bus stop facilities and routes. There are 6 No. Bus stops located directly beside the site on Charleston Place, St Margaret's Road. These are illustrated in Figure 10.1 below.

Figure 10.1. (Source Atkins Consulting Engineers)

The existing Dublin Bus routes servicing the site are Route 9, Route 40, Route 40B, Route 83 and Route 140. The frequency Saturday and Sunday are detailed in Table 10.1 below.

Dublin Bus Route	Route Description	Weekdays	Saturday	Sunday
Route 140	From Palmerston Park Towards Ballymun (Ikea)	Every 8-10 minutes during peaks and 15 minutes during off peaks. 74 services daily.	Every 20 minutes until 9am, every 15 minutes until 7pm, thereafter 30 minute services. 58 Services Daily.	30 minute services until 12. 20 minute services until 8pm. 30 minute services thereafter. 37 services daily.
Route 140	From Ballymun (Ikea) Towards Palmerston Park	Every 10 minutes during peaks and 15 minutes during off peaks. 65 services daily.	Every 20 minutes until 9am, every 15 minutes until 7pm, thereafter 30 minute services. 55 Services Daily.	30 minute services until 12. 20 minute services until 8pm. 30 minute services thereafter. 34 services daily.
Route 83	Harristown to Kimmage via Charlestown and City Centre	Every 10mins in the am peak. Every 15 to 20 minutes thereafter. 70 services daily	Every 15 to 20 minutes until 8:20pm and every 30 minutes thereafter. 63 services.	Every 20 minutes until 7:20pm and every 30 minutes thereafter. 55 services
Route 83	Kimmage to Harristown via City Centre and Charlestown	Every 15 minutes until 8pm and every 20 minutes thereafter. 67 services daily.	Every 15 to 20 minutes until 8pm and every 30 minutes thereafter. 62 services.	Every 40 minutes before 11am and then every 20 minutes until 8pm and then every 30 minutes thereafter. 54 services.
Route 40	Charlestown Centre to Liffey Valley Centre via City Centre	4 services before 6:20am, then every 10 to 12 minutes until 6:30pm and then every 15 to 20 minutes thereafter. Approximately 90 services daily.	4 services before 7:10pm, then every 10 to 15 minutes until 7:10pm and then every 15 to 20 minutes thereafter. Approximately 70 services daily.	Every 30 minutes until 10am, and then every 15 to 20 minutes thereafter. 52 services.
Route 40	Liffey Valley Centre to Charlestown Centre via City Centre	4 services before 6:20am, then every 10 to 12 minutes until 6:30pm and then every 15 to 20 minutes thereafter. Approximately 90 services daily.	4 services before 7:05pm, then every 10 to 15 minutes until 7pm and then every 15 to 20 minutes thereafter. Approximately 70 services daily	Every 30 minutes until 10:10am, and then every 15 to 20 minutes thereafter. 51 services.
Route 40B	Parnell St. to Toberburr	6 services daily	5 Services	4 Services
Route 40B	Toberburr to Parnell St.	6 services daily	5 Services	4 Services
Route 9	Charlestown to Limekiln Avenue via City Centre	Every 15 to 20 minutes. 67 services daily	Every 15 to 20 minutes until 9pm and every 30 minutes thereafter. 57 services.	Every 30 minutes. 43 services.

Route 9	Limekiln Avenue to Charlestown via City Centre	Every 15 to 20 minutes. 70 services daily.	Every 15 to 20 minutes until 8:15pm and every 30 minutes thereafter. 56 services.	Every 15 to 20 minutes until 7:30 and then every 30 minutes thereafter. 44services.

Table 10.1 (Source Atkins Consulting Engineers)

The TTA addresses the impact of the proposed development on the surrounding road network.

10.3.4 Wastewater Disposal

There is an existing 300mm diameter wastewater sewer located within the site boundary close to the junction of Charlestown Place and St Margaret's Road. This sewer in turn connects to the 750mm diameter trunk sewer location at the same junction. The 300mm diameter tail was provided at the time of the construction of Charlestown Place to service this proposed site.

The site was subject to a Pre-Connection Enquiry to IW, and the response from IW has indicated that a connection is possible at this location. This response is included in the Engineering Report submitted with the application.

Further detail and information in relation to wastewater can be found in Chapter 7.

10.3.5 Surface Water Disposal

There is an existing 750mm diameter surface water pipe running along the Eastern and Southern boundary. This surface water pipe was constructed as part of the existing Charlestown development.

It is proposed to intercept the surface water from this proposed development and discharge via new SuDS features and an existing attenuation tank into this pipe. The attenuation tank is connected to the existing 750mm pipe to the South of the site and will be used to drain the combined attenuated outflow from this development and previous phases. This pipe is ultimately connected via a 1.2m culvert to the Bachelors Stream (Finglas River).

Further detail and information on surface water can be found in Chapter 7.

10.3.6 Potable Water Supply

It is proposed to connect to an existing 250mm diameter watermain located at the Northern boundary of the site. A 150mm diameter HDPE pipe network will service the subject site. A bulk flow meter will be fitted at the main entrance of the site. Individual connections will be provided to commercial and Medical Facility, Creche, and the 4 separate apartment blocks. A number of basement storage tanks with will be provided for storage of potable water. Water will be provided to the apartments via a manifold box with separate metered connections to each unit.

The site was subject to Pre Connection Enquiry to IW, and the response from IW indicated that a connection is possible at this location; this response is included in the Engineering Report submitted with the application.

Further detail and information on water supply can be found in Chapter 7.

10.3.6 Potable Water Supply

There is an existing 180 PE 4 bar gas main located on Charlestown Place which runs adjacent to the Northern boundary of the proposed development. It is proposed that the residential element of this development's energy will be supplied via Electricity and not Natural Gas however.

There will be a connection to this Natural Gas main brought into the basement area as a future utility provision for the Retail and Commercial Units – it is estimated that a line size of 65mm gas connection will be provided for Retail and Commercial purposes.

10.3.7 Electrical Supply

The new incoming ESB supply to the development will originate from the main ESB Networks 10kV distribution located on St. Margaret's Road.

It is proposed that the development will be supplied from this main via a 10kV to 4No. 1000kVa substations located around the development.

10.3.8 Waste Management

Fingal County Council is the Local Authority responsible for administering waste management activities in this area. The Eastern-Midlands Region (EMR) Waste Management Plan 2015-2021 sets out the requirements for waste management and recycling targets in the region. There are several waste licensed facilities located in the Eastern-Midlands Waste Region for management of waste from the construction industry as well as municipal sources.

Further information on waste management is included in Chapter 12.

10.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in Chapter 3. The following elements are relevant to the assessment of effects in this Chapter.

A vehicular, pedestrian and bicycle connection to the scheme is provided via an existing junction on Charlestown Place. This junction is to be upgraded as part of the proposed development. Pedestrian and cyclist access points will also be provided at key locations on Charlestown Place and St Margaret's Rd. In addition, the development will provide for all associated site development works and services provisions including bin storage areas, substations/switch rooms, plant areas, open spaces, boundary treatments, landscaping and all services required to facilitate the proposed development.

10.5 POTENTIAL EFFECTS

The potential effects of the proposed development are assessed below with respect to the impacts of the development during the construction and operational phases. The effects assess the characteristics of the receiving baseline environment and characteristics of the proposed development.

The potential impacts are addressed under the following headings:

- Built Environmental/Land
- Access & Ownership
- Transport & Infrastructure
- Water Supply, Wastewater and Surface Water
- Natural Gas Supply
- Electrical Supply
- Information and Communications Technology (ICT)
- Waste Management

10.5.1 Built Environment/Land

Construction Phase

Construction activities may cause some temporary local impacts including increase in noise, traffic, dust etc. to the surrounding built environment. Providing a 2.4m high solid hoarding along the Northern and Eastern boundary will reduce the impact of construction activities on the adjacent residential community and public roads. The existing tree and hedge on the Southern boundary, in addition to the 2.4m hoarding will further mitigate these impacts on the McKelvey estate to the south. The effect of this is negative, however the consequence is not significant and short term in duration.

These construction impacts will be localized and can be further mitigated appropriately as per the measures outlined in chapters 7, 8, 9, 11 and 14 of this EIAR. In constructing the development, the existing land will be subject to topsoil removal, removal of the temporary car park and associated land works as outlined and mitigated for in Chapter 6 of this EIAR. Where possible an area will be left intact until construction is ready to begin. Stripping of existing surfaces will not be undertaken until absolutely necessary to avoid any uncontrolled surface water runoff. Where possible all topsoil strips and demolitions will not take part during extreme dry or windy weather to aid with dust control. The effect of this is negative, however the consequence is not significant and short term in duration.

Operational Phase

This proposed development comprising 590 No. apartments within 4 No. blocks. Refer to Chapter 3 of the EIAR for full description. Parking will mainly be provided in two underground basement carparks located under Blocks 1/2 and 4. A small amount of parking will be provided at surface level.

Under the Fingal Development Plan 2017-2023, the site is zoned TC, Town and District Centre with an objective to protect and enhance the special physical and social character of the town and district centres and provide and/or improve urban facilities. The proposed scheme is in compliance with this zoning.

The effect of this is positive and long term in duration. The development strikes an appropriate balance between respecting amenities/properties and providing a quantum and design quality that accords with local and national residential planning policy.

10.5.2 Access & Ownership

Construction Phase

The development site will remain in the ownership of the applicant/developer during the construction phase. A road opening license will be utilised to carry out the road works and connections to public water services, modification to the junction on Charlestown Place, relocated pedestrian crossing and all works outside the site boundary.

Construction access to the site will be provided in three locations. This includes the existing junction on Charlestown Place, a new temporary access at the location of the pedestrian crossing on Charlestown Place and a temporary access of St Margaret's Road. A temporary access will be provided to McKelvey Celtic AFC playing pitch. Refer to Figure 10.2 below. This access will be managed in accordance with the Outline Construction Management Plan (OCMP) as submitted in outline with this application and will ensure minimal impact on access for the public along the public road and footpaths. The effect of this is neutral and short term in duration.

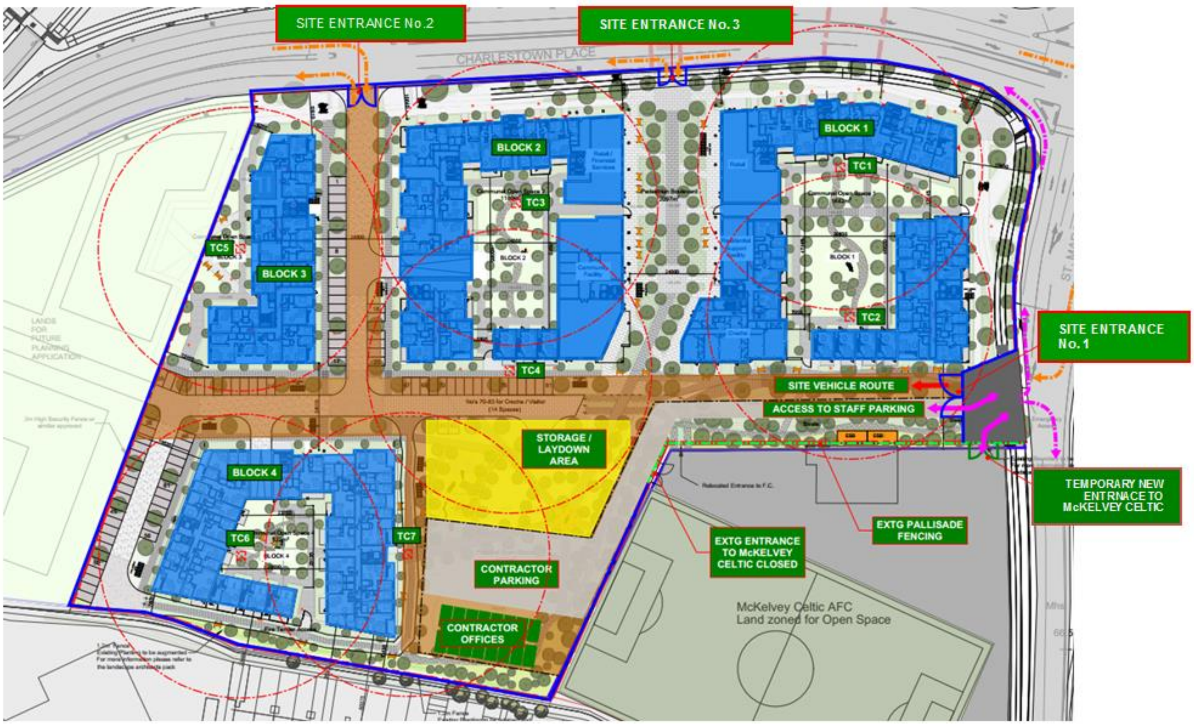


Figure 10.2 Construction site access

Operational Phase

The completed development will be accessed by vehicular, pedestrian and bicycle connection to the scheme via an existing junction on Charlestown Place. This junction is to be upgraded as part of the proposed development. Pedestrian and cyclist access points will also be provided at key locations on Charlestown Place and St Margaret's Road. Access to McKelvey Celtic AFC playing pitch will be provided.

The internal streets in the development have been designed in accordance with DMURS (Design Manual for Urban Roads and Streets) and pedestrian and cycle permeability through the site has been at the forefront of the design.

As some of the development is completed, a phased handover may be implemented by the developers. Some of the units may be purchased by private clients, and the Local Authority will assume a proportion of units for the provision of social housing. Vehicular and bicycle parking will be handed over on a pro rata basis.

The internal roads within the development will be completed to 'taking in charge' standard and will come under the control of the Local Authority as indicated on the drawings submitted with the planning application.

10.5.3 Transport & Infrastructure

Construction Phase

The construction phase of the development will contribute to increased construction traffic along Charlestown Place and St Margret's Road. However, this impact will be short-term, and a series of mitigations are outlined in Chapter 11 of the EIAR and the OCMP submitted with the application.

Operational Phase

The operation of the development will result in additional levels of traffic coming into and out of the development via Charlestown Place. The increase in the traffic levels have been allowed for in the junction upgrade on the Charlestown Place/North Road, granted under planning permission F19A/0146. The traffic impact on the road network has also been assessed in Chapter 11 of the EIAR and is found to be acceptable.

10.5.4 Water Supply, Wastewater and Surface Water

Construction Phase

The water supply, wastewater and surface water connections are available within the site boundary, therefore it is not anticipated any road opening license will be required to make these connections. These services connection will be controlled and managed by Irish Water and FCC.

Temporary water services on site to facilitate the construction of the development (i.e. water supply and toilets) will be provided by temporary connection to the available service. Temporary connection will be applied for to Irish Water by the contractor. The low volumes associated with temporary construction connection are unlikely to have any impact the public network. These services will also be properly managed in accordance with the OCMP.

Operational Phase

The demand on water services from the proposed residential development has been detailed and agreed with Irish Water and FCC in advance of the lodgment of the application. Connection to the public network is agreed in principle subject to the additional works required as included in this application. As a result, there is neutral or negative effect on the established infrastructure network; however the consequence is imperceptible or not significant and long term in duration.

The full implications and requirements for the water supply, wastewater and surface water infrastructure are outlined in Chapter 7 of the EIAR.

10.5.5 Natural Gas Supply

Construction Phase

The proposed development may connect to the gas network in the wider area. Consultation with Gas Networks Ireland will occur post-planning to determine whether there is sufficient capacity in the area to serve the development. If the development is connected to the network, then this will be carried out by Gas Networks Ireland under its powers as a statutory undertaker. The effect of this is neutral, imperceptible and short term in duration.

Operation Phase

The completed development will result in neutral effects to the gas network in the area.

10.5.6 Electrical Supply

Construction Phase

Temporary local suspension of the power will occur in the short term when power is provided to the site. However, this will be controlled ESB Networks as the statutory undertaker and in accordance with standard protocols. The effect of this is neutral, imperceptible and short term in duration.

Operational phase

The Operation Phase of the development will see an increase in demand and usage of electricity supply, but it is anticipated that this can be facilitated by the local network. The effect of this is neutral and long term in duration.

10.5.7 Information and Communications Technology (ICT)

Construction Phase

Fixed telecoms will not be operational during the construction phase. The potential impact from the construction phase of the proposed development on the local telecoms / broadband network is likely to be negative, not significant and short term in duration.

Operational phase

The Operation Phase of the development will see an increase in demand and usage of local telecoms and broadband network, but it is anticipated that this can be facilitated by the local network. The effects will be negative, not significant and long term in duration.

10.6 POTENTIAL CUMULATIVE IMPACTS

The potential cumulative impacts from the proposed development on the material assets of the subject site and its environs has been considered in this and related chapters of the EIAR and, subject to the range of mitigation measures proposed, are not thought to be significant.

10.7 MITTIGATION MEASURES

Construction Phase

MA:BS-C1 Connections to the existing electricity, water services, gas and telecommunications networks will be coordinated with the relevant utility provider and carried out by approved contractors under the control of the service provider.

Operational Phase

No additional mitigation measures to those outlined in other chapters are considered necessary during the operational phase of the development as it is considered to have a negative, neutral or positive effect on material assets including services and infrastructure.

10.8 PREDICTED IMPACTS

Construction Phase

On the basis that the specified mitigation measures are incorporated during the construction of the proposed development, the predicted impact will be neutral.

Operational Phase

Whilst the demand on water services, power, telecommunications and transport infrastructure will all increase due to the development, on the basis that the specified mitigation measures are incorporated the operation of the proposed development is predicted to have a neutral-long term impact on material assets.

10.9 “DO NOTHING” SCENARIO

A ‘Do nothing’ scenario will result in the subject site remaining undeveloped and in brown field state.

10.10 WORSE CASE SCNARIO

Worst case scenarios for individual material assets are outlined in individual chapters of the EIAR. In relation to power and telecommunications the worst case scenario would be if the works involved in the construction phase resulted in an extended outage for existing properties in the area due to unforeseen delays on site.

10.11 MONITORING & REINSTATMENT

No monitoring is required in addition to those specifically noted in other chapters of the EIAR.

10.12 DIFFICULTIES IN COMPLING INFORMATION

There were no significant difficulties in compiling the information.

11.0 MATERIAL ASSETS: TRANSPORTATION

11.1 INTRODUCTION

This chapter of the EIAR has been prepared by Chris Fay of WS Atkins and reviews the current receiving environment in terms of existing road traffic characteristics and quantifies the associated baseline scenario whist undertaking an assessment of the proposed development to identify its likely effects on the traffic environment.

In identifying the scope of this Material Assets: Transportation Chapter, consultations were undertaken with the Transport planning Section of Fingal County Council. The Traffic and Transport Assessment scoping document, which outlined the proposed content and methodology of the full Traffic and Transport Assessment process, was issued to and agreed with Fingal County Council in August 2019. Further consultation and liaison as required through the Strategic Housing Development process has subsequently been undertaken. This document has thus been formed on the basis of the traffic and transport assessment as agreed with the Fingal County Council.

In general terms the scope of this assessment covers all transport related issues including private vehicles, pedestrian, cyclist and public transport access.

11.2 ASSESSMENT METHODOLOGY

This Material Assets: Transportation Chapter and associated assessment has been carried out in accordance with European Union and National level policy. It has also been carried out in accordance with the following local level policy documents and best practice guidance documents.

- Fingal County Council - Development Plan 2017 – 2023;
- Environmental Protection Agency – Guidelines on the information to be contained in Environmental Impact Assessment Reports Draft August 2017;
- Transport Infrastructure Ireland - Traffic and Transport Assessment Guidelines 2014;
- Transport Infrastructure Ireland – Project Appraisal Guidelines 2016, 2019 and 2020.

The methodology for the traffic and transport impact is consistent with the 2014 Transport Infrastructure Ireland (TII) Traffic and Transport Assessments Guidelines. The methodology is summarised as follows:

- Assess surrounding road and transport infrastructure;
- Identify plans for future road infrastructure and transport upgrades;
- Undertake traffic counts to quantify the base line traffic scenario;
- Determine trip generation, distribution and assignment associated with proposed development;
- Establish future years and associated traffic flows;
- Quantify the predicted traffic impact of the proposed development.

11.3 RECEIVING ENVIRONMENT

Site Location

The proposed development site is located to the south east of the existing M50 / N2 interchange also known as M50 Junction 5. The site lies south of the Charlestown Centre. A full description of the Site Location is provided in Chapter 3.

The proposed development is bounded to the north by Charlestown Place, to the east by St. Margaret's Road, to the south by McKelvey Avenue and to the west by the R135. Additional roads of relevance are the M50, which runs in a south/west to north/east direction just north of the subject site, the N2 / M2 which approaches the site from the north and Melville Road which approaches the site from the east. A summary description of these routes is provided in Chapter 10, Section 10.3.3.

Pedestrian and Cycle Network

In general, all roads in vicinity of the subject site consist of adequate pedestrian facilities with well-maintained footpaths on both sides of the road and formal crossing facilities on approach roads to junctions. In terms of existing cycling facilities, the current provisions are as follows:

- R104 St Margaret's Road: There are no cycle track or lane facilities south of the Charlestown Place junction. There is a 400m section of raised one-way cycle track from the Charlestown Place junction to the Lanesborough Road junction along the western roadside. There is also a raised one-way cycle track on both sides of the road from the Seagrave residential development to the junction with the R108 Ballymun Road;
- Charlestown Place: Consists of one-way raised cycle track on both sides of the road over its extents from St Margaret's Road to the R135. Also consists of some minor sections of shared use pedestrian and cycle path. Toucan crossings provided at its junction with the R135;
- Melville Road: Consists of one-way raised cycle track on both sides of the road over its extents from Charlestown to the Jamestown Road.

Walking Distances

In terms of walking distances, a desirable walking distance is 200m, the acceptable walking distance is 400m, whilst the preferred maximum walking distance is 800m. These distances correspond to approximately 2.5 minutes, 5 minutes and 10 minutes respectively. These are shown in the below figure. These distances equate to a walking speed of 1.4m/s.

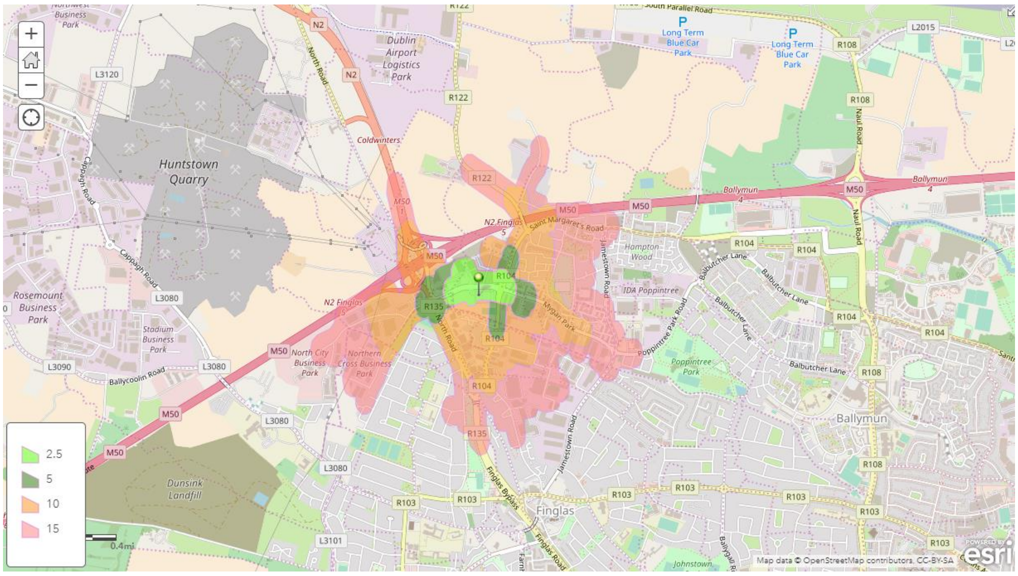


Figure 11.1 Walking Isochrones

In terms of employment opportunities for residents of the development, the proposed development is suitable located close to industrial, commercial and office developments to the south west and south east of the site such as Jamestown Business Park, Northern City Business Park and Century Business Park.

There are also a number of bus stops within desirable walking distance that are served by several key bus routes.

Cycling Distances

In terms of cycling distances, the figure below displays varying distances achievable over a 5 to 25 minute period. These distances are based on a cycling speed of 3.3m/s. As such a distance of approximately 1km can be covered in 5 minutes and a distance of approximately 5km can be covered in 25 minutes.

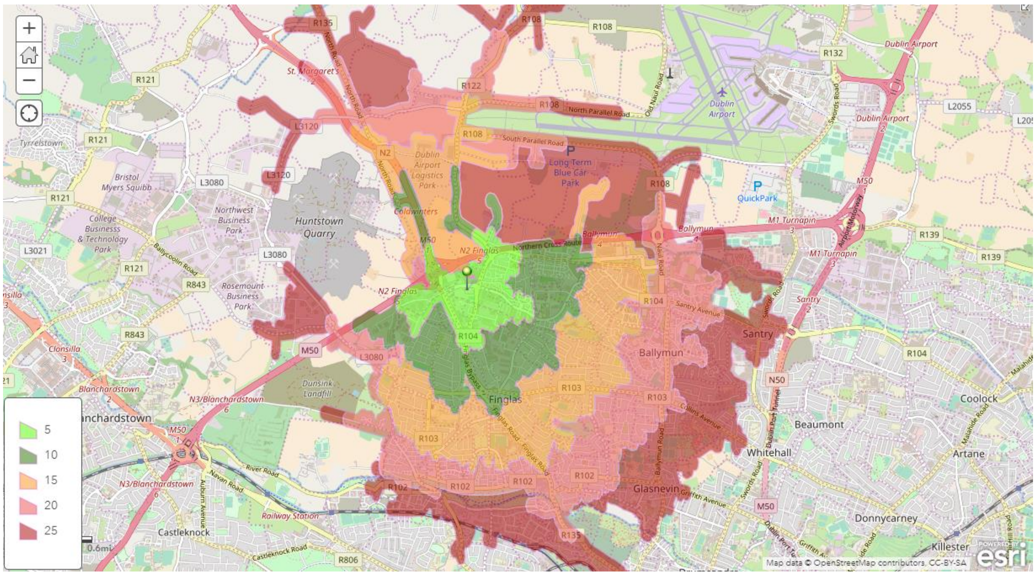


Figure 11.2 Cycling Isochrones

The above assessment indicates that there is a wide catchment area that residents of the proposed development can avail of cycling as a preferred mode of transport for employment opportunities within the City Centre and its immediate northern metropolitan area.

Public Transport Network

The subject site is currently well served by both bus stop facilities and routes. There are 6 no. bus stops located directly beside the site on Charlestown Place, St Margaret's Road and Melville Road. Full Details reading public transport stops, routes and services is provided in Chapter 10, Section 10.3.3.

Traffic Count Surveys

Traffic counts at the key junctions of the R135 Finglas Road / Charlestown Place / temporary car park and R104 St Margaret's Road / Charlestown Place were undertaken by Tracsis on behalf of the Applicant in 2016. The counts were undertaken on Saturday October 15th and Tuesday October 18th over a 12 hour period from 07:00 hours to 19:00 hours. The counts are fully classified and are tabulated at intervals of 15 minutes throughout each recorded hour.

It is acknowledged that this 2016 data is approaching its appropriate lifespan for use within the Traffic and Transport Assessment. However, it is not appropriate nor possible to undertake new surveys due to the restrictions associated with the Covid-19 Pandemic, which has significantly altered traffic patterns and behaviours globally.

A validity check has been undertaken of the 2016 traffic surveys to determine what level of increase, if any, has occurred since 2016 to the same survey period in the last normal year of traffic prior to Covid-19 which is 2019. The review of traffic volume data from between 2016 and 2019 indicates there has been little change in the AM and PM peak hour flows occurring in the general area with flows seen to slightly increase either side of the peaks.

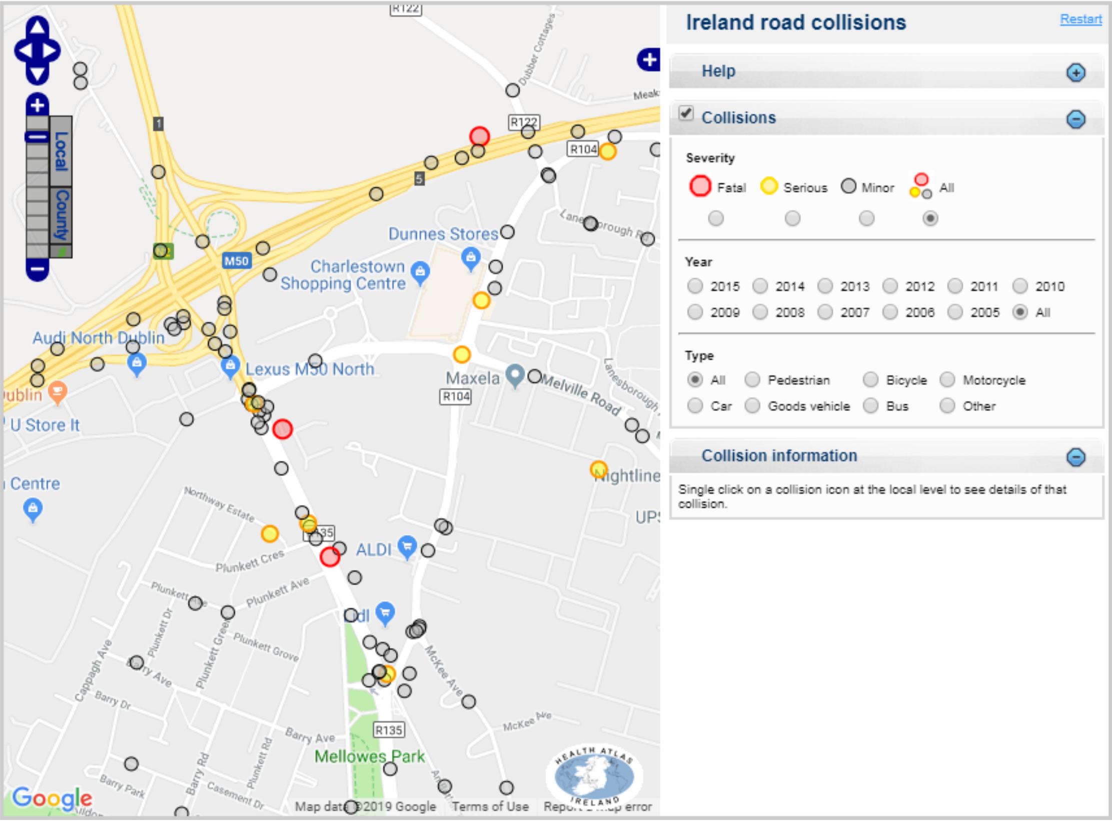
As such it is considered that the 2016 traffic surveys utilised represent the most appropriate and robust set of data available upon which to utilise as the basis for the Traffic and Transport Assessment.

Notwithstanding, it is noted that The Transport Planning Section of Fingal County Council have concern with the use of this data. In consultation held in December with The Transport Planning Section a compromise has been mutually agreed, wherein the 2016 traffic counts have been grown to the 2021 Opening Year using high growth rates to account for the potential that traffic in the intervening years, prior to Covid-19, may have grown.

Whilst this provides some evidence that this is not the case, in order to provide a robust assessment to the requirements of the Transport Planning Section, this request has been incorporated into this Material Assets: Transportation Chapter. For full details reference should be made to Atkins Traffic and Transportation Assessment document 5152288DG017 and associated appendices.

Collision History

Review of available road collision data from the Road Safety Authorities collision viewer has been carried out with the area reviewed shown in the figure below.



Ireland road collisions

Restart

Help

☑ Collisions

Severity

○ Fatal ○ Serious ○ Minor ● All

Year

○ 2015 ○ 2014 ○ 2013 ○ 2012 ○ 2011 ○ 2010
○ 2009 ○ 2008 ○ 2007 ○ 2006 ○ 2005 ● All

Type

● All ○ Pedestrian ○ Bicycle ○ Motorcycle
○ Car ○ Goods vehicle ○ Bus ○ Other

Collision information

Single click on a collision icon at the local level to see details of that collision.

Figure 11.3 Road Collision Data

The available information from the RSA collision viewer describes the collision history between 2005 – 2015. At this location there have been:

- 25 no. collisions on the R135 between its junction with Charlestown Place and its junction with the R104. Of these 2 no. of these have been serious involving single vehicles and 2 no. fatal involving pedestrians;
- 14 no. collisions on the R104 St Margaret's between its junction with Lanesborough Road and its junction with the R135. Of these, 2 no. of these have been serious involving single vehicles;
- 22 no. collisions in vicinity of M50 Junction 5, all of a minor severity;
- 3 no. minor severity collision on the Melville Road approach;
- 1 no. minor severity collisions on Charlestown Place approach.

The review has shown that the occurrence of collisions is relatively higher at M50 Junction 5 and along the R135 when compared to the local road network specifically Charlestown Place, Melville Road and St. Margaret's Road. This is as would be expected given the high volumes of traffic which are catered for by the M50 and R135.

Notwithstanding, the low occurrence of serious and fatal accidents over the 10 year period indicates that the local road network and in particular the junctions of R135 / Charlestown Place and R104 / Charlestown Place are operating satisfactorily in road safety terms

R135 / Charlestown Place Junction Upgrade

A condition of the Charlestown Centre Phase 2B development (Reg. Ref. F19A/0146) references the agreement of details associated with the junction improvements to the R135 / Charlestown Place junction as identified within the Traffic and Transport Assessment prepared for that development.

The improvements include the introduction of an additional right turning lane on the Charlestown Place arm. The current lane configuration of this arm consists of a combined straight-ahead right turn lane and a left turn lane. The proposed configuration of this arm is to provide a right turn lane, a straight-ahead right turn lane and a left turn lane. This proposal can be delivered within the footprint of the existing road corridor.

The benefit to be obtained from this configuration is that it will allow a greater throughput of right turn movements on the Charlestown Place arm which in turn will allow extra greentime to be afforded to other arms, particularly the N2 northern arm during the AM peak and the R135 southern arm during the PM peak, thereby improving overall junction operation. All future year assessments undertaken as part of this TTA utilise the proposed layout of those improvements.

The junction improvements have been agreed with Fingal City Council and Dublin City Council. The approved works are due to go to site Q2 2021. The below figure illustrates the agreed design principle.

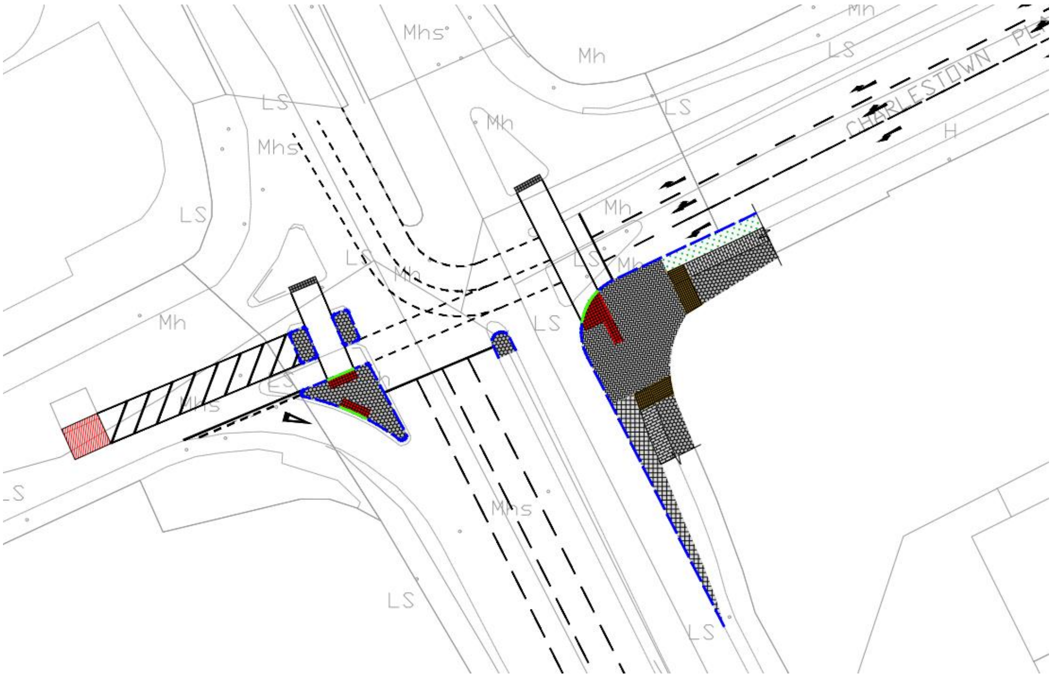


Figure 11.4 R135 / Charlestown Place Junction Upgrade

Please refer to Atkins Traffic and Transport Assessment and associated appendices for detailed general arrangement of the works.

Luas Cross City Finglas Extension

The Luas Cross City opened full service operation in December 2017. The route extends from St Stephens Green to Broombridge and connects the existing red and green lines. The Transport Strategy is to extend the Luas Cross City route from its terminus at Broombridge to the north of Finglas. This will provide a high-capacity radial service from the large suburb of Finglas into the city centre. The Transport Strategy also identifies the need to provide a strategic park and ride facility at the terminus of this line on the N2 National Road close to the M50.

This extension will be circa 4.0km long, will incorporate 4 no. stops and will incorporate a new terminus at Charlestown together with the Park and Ride facility.

Since the SHD Stage 2 submission was submitted in May 2020, the Luas Finglas project has been announced by Transport Infrastructure Ireland (TII). The project announcement in July 2020, included the terminus of the route at Charlestown on St. Margaret's Road opposite the current application site. The preliminary proposals also indicate a potential Park + Ride facility at Charlestown. The initial public consultation closed on the 17th September 2020 and TII and the NTA are currently reviewing submissions and will be undertaking on going amendments. In the period since the TII Luas Finglas announcement the applicant, Puddenhill Property Limited, has held a number of meetings with TII regarding the Luas Finglas project, which included a detailed financial feasibility appraisal of the subject site. While the applicant is fully supportive of the Luas Finglas project, it is understood that TII have discounted the suitability of the subject site for a Park & Ride on cost grounds and TII are currently considering a number of alternative options for the route of the Luas and the location of the park + ride facility to serve any future Luas project.

The current application does not in any way impact on the outline route or preliminary location of the Luas line or terminus as illustrated in the TII proposals published to date. The applicant will continue to work with TII insofar as they can assist with the delivery of the Luas Finglas project.

Bus Connects

Bus Connects is currently being progressed by the NTA and represents the delivery of the Core Bus Corridor Network outlined in the Transport Strategy. Bus Connects aims to implement a number of initiatives to overhaul the current bus system in Dublin. These initiatives consist of the flowing key elements.

- Core Bus Corridor Project: The Core Bus Corridor Project is identified in the Transport Strategy. A first round of public consultation concluded at the end of May 2019. A second round of public consultation closed on Friday the 17th April 2020. However, this round was restricted due to the COVID-19 pandemic, and it was decided that an additional third round of public consultation would take place in the latter part of 2020. This third round of consultation concluded in December 2020. Submissions are being reviewed and considered as part of the design process, in preparation for the planning application to An Bord Pleanála later in 2021.

  The route most relevant to the proposed development at Charlestown, namely Route 4 Finglas to Phibsborough, which ends /commences at the St. Margaret's Road (R135) / North Road (R104) roundabout junction and to the south at the R108 – R135 junction where it ties in with Route 3 Ballymun to City Centre.

- Bus Network Redesign: The existing bus network is undergoing a redesign to accommodate the growth of Dublin City. This redesign will also reduce the complexity of the network and provide higher frequency services along the core bus corridors.

  The network will be broken into sections with the proposed development falling within the confines of the Inner North Network.

  Within the inner network there are 7 routes connecting from Charlestown Shopping Centre directly adjacent the proposed development, leading to the city centre which consist of spine routes, orbitals routes, and secondary radial routes. These are shown in the following figure and described thereafter.

  Three rounds of public consultation have taken place between 2017 and 2019. The implementation of the initiative will take place on a phased basis over a number of years commencing in 2021 subject to funding.

  The routes most relevant to the Charlestown are
  Spines: F Spine Charlestown Shopping Centre to Kimmage
    - F1/F2 via Finglas. This branch will provide direct service every 15 minutes (10 minutes at peak) through Finglas South, Finglas West, Finglas Village and along McKee Avenue, similar to existing Route 40.
    - F3 via Finglas bypass directly along Core Bus Corridor 4. This branch would provide direct service to Charlestown Shopping Centre via the Finglas bypass, similar to existing Route 140, however at a higher frequency every 15 minutes off peak and every 10minutes at peak. It would be more frequent than today's Route 140 in the middle of the day.
    - E2 via the R104 St Margaret's Road and Balbutcher Lane to link the Charlestown Terminus with the E Spine along the R108 Ballymun Road which is designated as Corridor 3 as a part of the Core Bus Corridor Project. This route will provide a direct service every 10 to 15 minutes to Charlestown from Dun Laoghaire via the city centre.

Orbitals: In terms of Charlestown there is one orbital route.

- N6 Charlestown Shopping Centre to Howth Junction which will operate every 10 minutes, passing by Ballymun Civic Centre and along Beaumont Road close to the hospital.
- Secondary Radials: In terms of Charlestown there is one secondary radial.
- Route 23 Charlestown Shopping Centre to Merrion Square which will operate every 20 minutes.

There are also a number of orbital and local routes which service Blanchardstown, Swords and the Airport. The following figure is an extract of the bus network redesign in vicinity of the Public Transport Hub at Charlestown.

Cycle Network

The Greater Dublin Area Cycle Network Plan proposes to expand the urban cycle network to over 1,485 kilometres in length and will provide over 1,300 kilometres of new connections between towns in the rural areas of the GDA. The network is intended to provide a quality of service sufficient to attract new cyclists, as well as catering for the increasing numbers of existing cyclists. The proposed routes of relevance to the proposed development are as follows;

- Secondary Route NO5 – Ballycoolin Industrial Estate (ultimately to Clonsilla) via Charlestown to Santry: The proposed Route NO5 is a secondary route running in a predominantly orbital east to west direction connecting to the Rosemount Business Park and Ballycoolin Industrial Estate west of Finglas
- Secondary / Primary Route 3B – Charlestown to Phibsborough. This route commences as a secondary route to the north in vicinity of Charlestown and runs in southerly direction along the R104 St Margaret's Road before proceeding onto the R135 Finglas Road. At this point it becomes a primary route proceeding directly towards the City Centre which will also form part of Corridor 4 of the Core Bus Corridor Project.

11.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in Chapter 3. The following elements are relevant to the assessment of effects in this Chapter.

Vehicular Access Arrangements

Vehicular access to the proposed development will be provided via the southern arm of the existing junction on Charlestown Place. The junction arm will be reconfigured to incorporate geometry more appropriate to the context of a residential development and in line with DMURS. This will include for a 10m long right turn lane and a combined straight / left turn lane. Existing entry and exit slip lanes on the arm will be removed.

Pedestrian and Cycle Access Arrangements

Pedestrian access to the site from Charlestown Place and St Margaret's Road is provided via the pedestrian footpaths toward the block entrances to the north and east of the development and via the permeability of the site boundary. Throughout the development, the comprehensive network of pedestrian footpaths is to be facilitated with crossings. Further information with regards to the site layout is provided in Architectural and Engineering reports.

Charlestown is currently well served by the three modes of walking, cycling and public transport. The proposed development will be appropriately connected with the existing local road network through the provision of two. pedestrian / cycle access points onto Charlestown Place and one onto St. Margaret's Road.

A pedestrianised street, i.e. the central boulevard, between Blocks 1 and 2 routes directly through the proposed development linking the retail, commercial and community uses with the main open space provision but will also facilitate direct linkage with the Charlestown Centre to the north via a new toucan crossing across Charlestown Place. This crossing will replace the existing crossing located to the east.

These accesses will provide direct linkages to key desire lines towards the Charlestown Centre, adjacent bus stops, as well as access to existing cycle routes.

Cyclists are catered for by the central boulevard which leads from the proposed crossing on Charlestown Place through the development towards the main open space provision. Furthermore, the design of the internal streets, i.e. narrow streets, compact junctions, appropriate vertical and horizontal deflections etc, is such that a low speed environment is encouraged so as to facilitate cyclist to cycle in lane with traffic. This is all in line with the National Cycle Manual and the Design Manual for Urban Roads and Streets. These provisions all tie-in with the external pedestrians and cyclist network which are easily accessed via appropriately design dropped kerbs at crossing points adjacent the proposed development access and the works associated with the proposed pedestrian and cycle crossing across Charlestown Place incorporate tie ins with the existing cycle infrastructure on Charlestown Place and these have been designed in accordance with the National Cycle Manual.

Charlestown Place Pedestrian Crossing

As noted, a new toucan crossing will be provided across Charlestown Place which will replace the existing crossing to the east. In order to further enhance the proposed pedestrian crossing, the westbound right turning lane along the eastern arm of the Charlestown Place/ development access junction is to be removed and reallocated for public realm and landscaping usage. The removal of this lane will provide benefit to the overall public realm by reducing the visual dominance of the road, thereby encouraging lower vehicle speeds, providing greater comfort and safety to pedestrians and improving the overall landscape and attractiveness of the streetscape between the shopping centre and the development site.

The new crossing is located so as to cater for the strong desire line between Charlestown Centre and the proposed development. The crossing acts as a spine intrinsically connecting the two development sites. To the north of the crossing the desire line leads onto the pedestrianised street that leads into the heart of Charlestown Centre facilitating direct linkage to existing and soon to be occupied residential areas, the local leisure centre and to one of the main entrances into the Centre shopping area itself. To the south of the pedestrian crossing facilitates linkage to the pedestrianised street between Blocks 1 and 2 of the proposed development allowing connections with the retail, commercial and community uses whilst linking further south to the main open space provision with the proposed development.

The design of the crossing has been undertaken in line with DMURS so as to provide pedestrians and cyclists with a strong connection between both sites and confirm their priority across Charlestown Place. The crossing is 4m wide and incorporates contrasting pavement so as to reinforce this priority and indicate to drivers approaching the crossing to change their driving behaviour in terms of speed. The active street frontage afforded to the proposed development will also lend to this and influence driver behaviour adjacent the development. In order to enhance the existing active frontage on the northern side of Charlestown Place adjacent Charlestown Centre, the design of the crossing has been increased to extend and tie in with the existing footpath, cycle track and taxi bay areas. Where required such as the interaction with bus stops, cycle tracks have been designed in accordance with the National Cycle Manual. The removal and reinstatement of the existing crossing has been sensitively undertaken so as to ensure that the new desire line is apparent and that errant pedestrians do not try to cross at this location anymore. In addition, appropriate landscape planting has been incorporated to act as a soft edge to prevent this. This will tie in with the planting and landscaping on both sides of Charlestown Place. The proposed Layout is illustrated on Traffic Engineers Drawing 5152288/SK/009 Rev C and Landscape Architects Drawings pack. The crossing and internal street layout has been subject of a Stage 1 Road Safety and Walking/ Cycling Audit. The findings of which have been updated in the planning drawings as per the Road Safety Audit report 515228DG030.

Connection to Public Transport

Public Transport connectivity is provided via existing stops adjacent the subject site on Charlestown Place, however there is also strong is connectivity towards the public transport stops located towards the rear of Charlestown Shopping Centre. The internal pedestrian network which supports these public transport facilities and connection to surrounding areas is shown in the figure below.

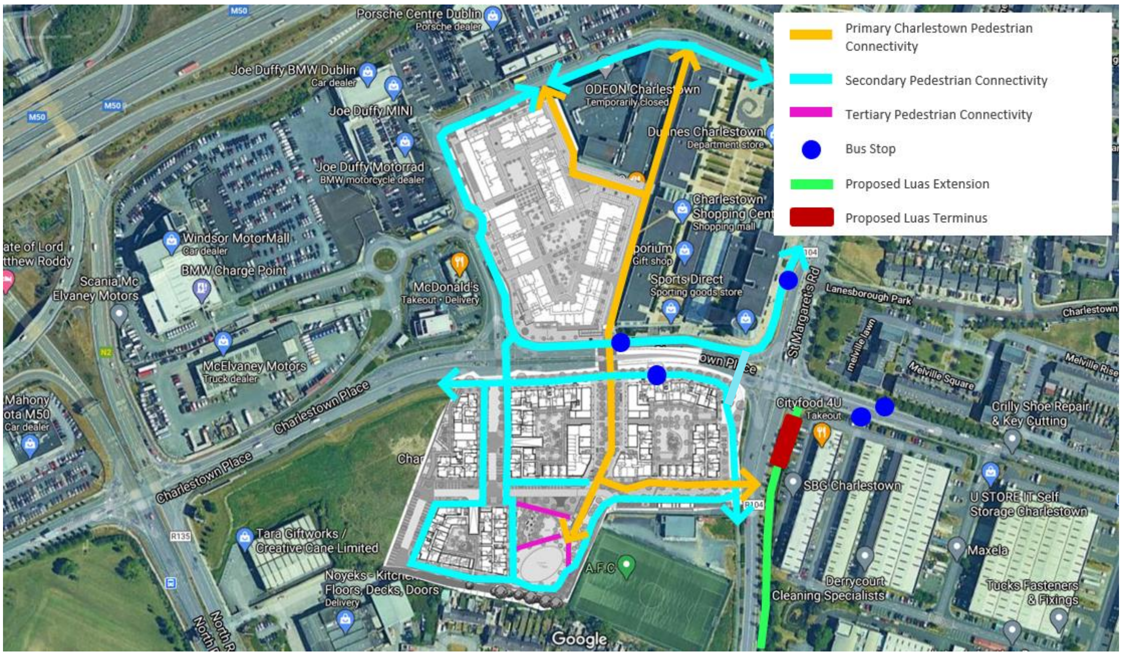


Figure 11.5 Pedestrian Network in the Context of Public Transport Facilities

Car Parking

Due to the location of the proposed development, it is broadly defined as an intermediate urban location. As a result, Planning Authorities are recommended to consider an appropriate overall car parking standard relevant to the proposed site and development context and apply an appropriate maximum car parking standard.

Based on comparison with the available CSO data, and the promotion of national polices to reduce dependency on the private car, it is deemed appropriate to provide a car parking ratio of 0.80. It is therefore proposed to provide 464no. residential car parking spaces which equates to an overall ratio of 0.79. In overall terms it is proposed to provide a total of 515 no. car parking spaces on site, satisfying the proposed parking ratio with a number of spaces provided for non-residential uses.

In terms of parking allocation this is presented on the relevant drawing in the Architects Drawing pack.

Visitor spaces will be shared with customer parking associated with the non-residential uses including the retail medical centre units. It is considered that there is sufficient variation in hourly parking between these two parking requirements. The non-residential land-uses proposed typically attract the need for customer parking during the day, whilst the residential visitor related parking typically occurs during the evening period. This form of shared parking is considered to be a very flexible and efficient use of car parking spaces. The Go-Car spaces will not be shared as these will be dedicated towards that purpose.

In summary, the following car parking provision is proposed.

Table 11.1 Car Park Breakdown

Type	Land Use	Unit	Area	Car Standard	No. of Car Spaces
Residential	Residential	No. Units	590	0.79	464
Non - Residential	Visitor Spaces	n/a			26 (shared visitor / non-resi customer)
	Creche	Sq.m	542 (6 classrooms)	0.5 per classroom	3 staff (5 set down)
	Office	Sq.m	224	1 per 30 sqm (Max)	4 staff (customer shared with resi-visitor)
	Retail	Sq.m	350	1 per 30 sqm (Max)	2 staff (+customer shared with resi visitor)
	Medical Facility	Sq.m	525 (7 consulting room)	2 per consulting room (Max)	7 staff (+customer shared with resi-visitor)
	GoCar	n/a			4
Total					515

For full details reference should be made to Atkins Traffic and Transportation Assessment document 5152288DG017.

Cycle Parking

It is proposed to provide a total of 1068 no. bicycle parking spaces. In total 886 no. of these are allocated to residents, whilst 169 no. spaces are allocated to visitors. Whilst the proposed amount falls slightly short of that recommended in the Design Standards for New Apartments, it is significantly higher than that of the Fingal Development Plan standard. This level of cycle parking is of the highest order that can be practically accommodated on the site without locating cycle parking in inappropriate locations that would not best serve users nor the visual attractiveness of the development and which may compromise accessibility and security. It is also considered that this level of cycle parking is of an order that will facilitate and encourage future residents to significantly uptake cycling for utility and recreational purposes. All other cycle parking provision is per the Fingal Development Plan.

In summary the following cycle parking provision is proposed.

Table 11.2 Cycle Park Breakdown

Land Use	No. Unit / GFA	Cycle Standard	No. of Cycle Spaces
Residential Units	590 units	1.5 per unit	886
Visitor Spaces	590 units	1 space per 3.5 units	169
Creche	542 Sq.m (6 classrooms)	0.5 per classroom	3
Office	224 Sq.m	1 per 60 sqm	4
Retail	350 Sq.m	1 per 100 sqm	4
Medical Facility	525 Sq.m (7 consulting rooms)	1 per 4 consulting rooms	2
Total			1068

For full details reference should be made to Atkins Traffic and Transportation Assessment document 5152288DG017

Mobility Management

An Outline Mobility Management Plan has been prepared for the proposed development and is enclosed within the submitted Traffic and Transport Assessment. The objectives of the Mobility Management Plan are set with the overall aim of keeping the number of single occupancy car trips associated with the employment and residential elements of the development below agreed levels. The objectives set out in this Outline MMP in support of the Charlestown Place SHD are as follows:

- To reduce the use of the private car as a means of travel to and from the development;
- To increase and facilitate the number of people choosing to walk, cycle, car share, car pool, or utilise public transport to the development.
- To promote national policy and to support and encourage resident and staff up take, and
- To integrate the development with the available, existing and future transport network and facilitate it to accommodate future transport infrastructure.

A range of measures for each of the key sustainable modes of travel have been proposed. These measures are based on existing infrastructure and public transport facilities. These measures are outline only and will be further developed subject to ongoing annual surveys and monitoring of resident and staff travel behaviour as the proposed development becomes occupied. For full details reference should be made to Atkins Traffic and Transportation Assessment document 5152288DG017 and associated appendices.

11.5 CONSTRUCTION IMPACTS, MITIGATION & MONITORING

This section of the Chapter deals with the traffic impacts of construction of the proposed development. As such this section will provide an overview of the construction duration, the likely routing of construction vehicles, details regarding construction access and parking, the anticipated construction traffic generation and a non-exhaustive list of some key construction traffic management measures.

Construction Access, Routes and Parking

In terms construction access there are 3 no. access points proposed. A separate access to McKelvey Celtic is also proposed. A drawing illustrating the locations of these proposed Construction Access Points is shown in the Figure provided below.

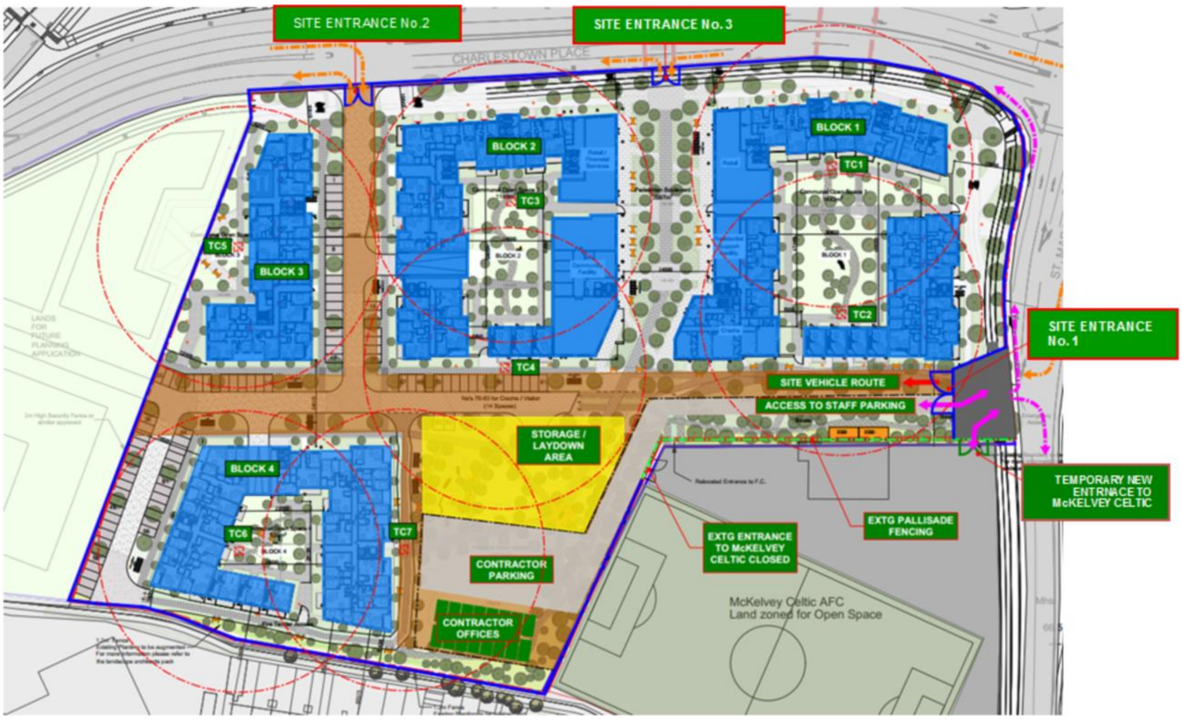


Figure 11.5 Proposed Construction Access Layout

A brief description of each proposed construction access in terms of its location and requirement is provided following:

- **Access No. 1:** Access No. 1 is located on the eastern perimeter of the site accessing off St Margaret's Road. This access will facilitate HGV construction vehicles to access the site in a way that enables a one way system to be implemented through the site to cater for deliveries and removals which can then route towards the other access points on the northern perimeter of the site onto Charlestown Place. In particular, this will significantly streamline the access and egress of HGV vehicles being loaded with bulk excavations from the proposed basement which will then conveniently exit the site at Access No. 3.
- **Access No. 2:** Access No. 2 will be the primary access point to the construction site and will be required throughout the duration of the construction works, a period currently envisaged to be in the order of 3 years. This access is the current access to the existing temporary car park and operates under traffic signal control facilitating all movements and incorporating left turn slips in and out of the access. As such all movements, as they currently are, will be facilitated at this access point during construction. The current arrangement and lane widths are suitable for all types of construction vehicles and their movements.
- **Access No. 3:** Access No. 3 is primarily required to facilitate the bulk excavations associated with the proposed large basement which will accommodate the car parking under Blocks 1 and 2. Upon entry from Access No. 1, Access No. 3 will allow for construction vehicles to route towards the loading area and exit the site immediately, thereby allowing the construction vehicles to take the shortest route through the site and minimising the interaction between these vehicles and the rest of the site. This access will cater for left turn exits only.

  It is envisaged that once the bulk excavations are complete the requirement for this access will be reduced and therefore it is envisaged that this access will only be required for a period of 8-12 months.
- **McKelvey Celtic Temporary Access:** Currently the grounds of McKelvey Celtic are accessed from the existing access to the temporary car park off Charlestown Place. From this access point a separate access route is provided to the grounds that hugs

the boundary of the existing temporary car park. This current access arrangement, including access through what will become Construction Access No 2, cannot be maintained through the construction period as it will lead to road safety, traffic management and security issues.

Therefore, a temporary access off St Margaret's Road is proposed in order to facilitate access to the grounds of McKelvey Celtic. This access will remove this public traffic from any interaction with construction site traffic, thereby reducing conflict, increasing road safety and enabling the contractor to implement best practice traffic management to the full extent of their control.

A new access to McKelvey Celtic will therefore be provided in vicinity of Construction Access Point 1. A shared hardstanding area will be provided with the main gates associated with this access point will be set back from St Margarete's Road to ensure that the security of the site can be appropriately managed.

In terms of Construction traffic routes, all vehicles will utilise the adjacent strategic motor way network to gain access to the R135 Regional Road. HGVs will utilise the following routes when accessing specific Construction Access:

- **Construction Access No. 1:** Upon travelling to the subject site, HGVs will route onto the R135 and straight through the R135 / Charlestown Place traffic signal junction. They will keep travelling along the R135 down to the St Margaret's Roundabout turning left at this junction to head north along St Margaret's Road. On approach to the site they will then turn left into Access 1. No HGV will exit at this Access Point.
  Construction Operatives and their LGVs will also access via Access Point 1 via the same route as HGVs. However, they will use this access to exit. The route they will take will be to turn left onto the R108 St Margarete's Road and approach the Charlestown Place / St Margarete's Road traffic signal junction. They will avail of a route at this junction to suit their desired destination.
- **Construction Access No. 2:** Upon travelling to the subject site, HGV will route onto the R135 and approach the R135 / Charlestown Place traffic signal junction. HGVs will then turn left onto Charlestown Place before using the existing right turn lane at the existing Charlestown Place / Development Site Access junction to gain entry to the site. Exiting vehicles will take the same route back to the strategic motorway network.
- **Construction Access No. 3:** This Access Point will be for exit only. HGV will turn left out of the access onto Charlestown Place and will route towards the route the R135 / Charlestown Place traffic signal junction. They will then turn right at this junction and progress north along the R135 to gain access to the Strategic Motorway Network.

The Figure**Error! Reference source not found.** below details the HGV Construction Access R outes.

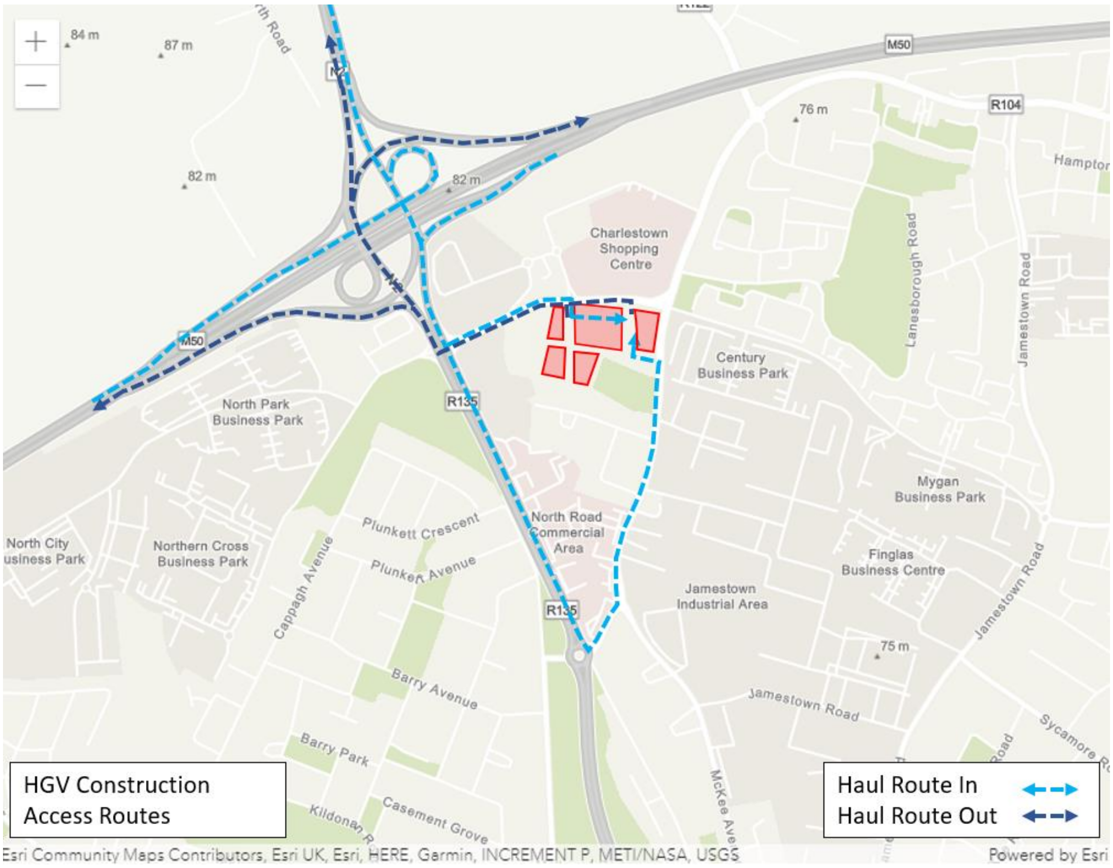


Figure 11.6 HGV Construction Access Routes

The Figure**Error! Reference source not found.** below details the Contractor Construction A ccess Routes.

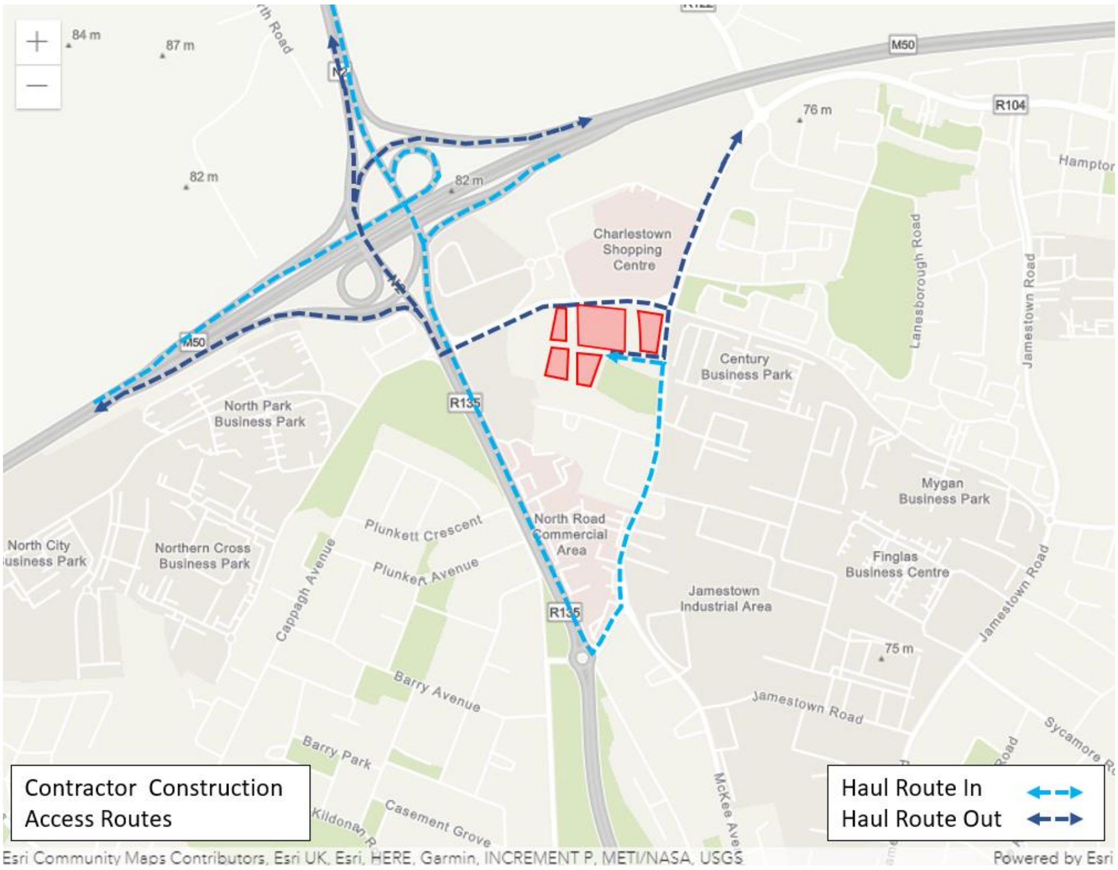


Figure 11.7 Contractor Construction Access Routes

All contractors' vehicles will park within the development site area in a designated parking area on a hard-standing surfacing. There will be no contractor parking on the public roads.

For full details reference should be made to Atkins Traffic and Transportation Assessment document 5152288DG017.

Construction Traffic Generation

The overall traffic generation for the construction phase of the proposed development has been devised with the anticipated volumes of excavation of the site from the prospective Contractor. For the purpose of this assessment, the following assumptions have been applied:

- The primary construction activities (i.e. demolition, excavation and construction) will take place over approximately 36 months during which the majority of truck movements will occur.
- The greatest number of HGV movement will occur during the enabling and excavation works stage.
- The anticipated volume of material to be removed during the enabling and excavation works is approximately 83,000 m3.
- A bulking factor of 10% has been applied to the excavation volume.
- The enabling and excavation works stage is assumed to take place over a period of time in the range of 6 – 8 months. A period of 6 months has been utilised to represent a worst case scenario from a traffic perspective.
- An average peak level of site operatives has been assumed to be in the order of 350.
- An average occupancy level of 3 operatives per vehicle is assumed.
- It is assumed that 25% of site operatives will utilise public transport.

- It is assumed that the average peak level of site operatives will coincide with the peak level of HGV movements during the enabling and excavation works. In reality this will not occur as the enabling / excavation works will occur during the first year of the 3 year construction period, whilst the peak level of site operatives will occur during the third year. However, for the purpose of assessment this scenario has been considered so as to represent a robust assessment of the potential construction impacts.
- It is envisaged that the works required to implement the development shall only be carried out between the hours of:
  - Monday to Friday – 07:00 to 18:00;
  - Saturday – 08:00 to 14:00;
  - Sunday and Public Holidays – No activity on site.
- It is assumed that a Rigid HGV carries up to 20 tonnes in terms of payload and a articulated HGV can carry a payload of up to 30 tonnes. A combination of both is envisaged to be utilised by the contactor. Therefore, an average payload of 25 tonnes is assumed. It is also assumed that there will be 20 working days in each month, as such the average two way HGV movements per day will be 60 HGV.
- It is envisaged that construction phase activities will require 350 site operatives. It has been assumed that 25% of staff will access the site via public transport. The remainder will be comprised of site operatives travelling via LGVs. It has been assumed that vehicle occupancy for the construction staff is typically 3 persons per vehicle. As such the average two way HGV movements per day will be 175 LGV.
- It is assumed that the 60 no. 2 way movements associated with HGVs will arrive and depart the site evenly throughout the day.
- In terms of the site operative traffic movements it is assumed that in the order of 80% of these will arrive to the site between the hours of 07:00 and 08:00, with the remaining 20% arriving during the period 08:00 to 09:00. In terms of departures it is assumed that 30% will depart during 16:00 and 17:00, 20% between 17:00 – 18:00hrs and 50% between18:00 – 19:00hrs.

The profiles have been quantified against the peak daily number of site operative and HGV traffic and are presented in the table below.

Table 11.3 Anticipated Hourly Profile of Movements during the Day

Peak Hour	HGV Movements	Site Operative Movements	Total Movements
07:00 - 08:00	5	70	75
08:00 - 09:00	5	17	22
09:00 - 10:00	5	-	5
10:00 - 11:00	5	-	5
11:00 - 12:00	5	-	5
12:00 - 13:00	5	-	5
13:00 - 14:00	5	-	5
14:00 - 15:00	5	-	5
15:00 -	5	-	5

16:00			
16:00 - 17:00	5	26	31
17:00 - 18:00	5	17	22
18:00 - 19:00	5	44	49
Total	60	175	235

The above construction traffic volumes have been reviewed with the baseline flows on the adjacent road network and the resulting percentage impact is shown in the table below.

Table 11.4 Percentage Impact during the Construction Phase of the Proposed Development

Junction	Peak Period	Opening Year	Site Operative Traffic During Peak Hour	HGV Traffic During Peak Hour	Total Two Way Flow	% Impact
Develop-ment Access Junction	AM (08:00 – 09:00)	1318	17	5	22	1.7%
	PM (17:00 – 18:00)	1539	17	5	22	1.4%

Table 11.4 demonstrates that the increase in traffic volumes at the main site access (Access No. 2) is below 5% during the AM peak hour and PM peak hours of the adjacent road network. It is therefore considered that the level of traffic impact during the construction stage is of an acceptable level in the short term. The above report impacts represent a short term slight negative impact due to construction traffic.

Mitigation – Construction Traffic Management Measures
The Construction Stage Mitigation measure is as follows:

MA-T-C1: The preparation of a Construction Traffic Management Plan. It will be the appointed contractor's responsibility to prepare a detailed Construction Traffic Management Plan to be agreed with and approved by the Planning Authority prior to commencement of construction. An Outline Construction Traffic Management Plan is provided within the Traffic and Transportation Assessment (TTA). Below is a list of outline traffic management measures contained within the TTA, that may form part of the Construction Traffic Management Plan and adopted during the construction works. Note that this is not an exhaustive list:

- Warning signs / Advanced warning signs will be installed at appropriate locations in advance of the construction access.
- Construction and delivery vehicles will be instructed to use only the approved and agrees means of access and movement of construction vehicles will be restricted to these designated routes.
- Appropriate vehicles will be used to minimise environmental impacts from transporting construction material, for example the use of dust covers on trucks carrying dust producing material.
- Speed limits of construction vehicles to be managed by appropriate signage, to promote low vehicular speeds within the site.
- Parking of site vehicles will be managed, and will not be permitted on public roads, unless proposed within that designated area that is subject to traffic management measures.

- A road sweeper will be employed to clean the public roads adjacent to the site of any residual debris that may be deposited on the public road leading away from the construction site.
- On site wheel washing will be undertaken for construction trucks and vehicles to remove any debris prior to leaving the site, to remove any potential debris on the local roads.
- All vehicles will be suitably serviced and maintained to avoid leaks or spillage of oil, petrol or diesel. Spill kits will be available on site. All scheduled maintenance carried out off site will not be carried out on the public highway.
- Safe and secure pedestrian facilities are to be provided where construction works obscure any existing pedestrian footway. Alternative pedestrian facilities will be provided in these instances, supported by physical barriers to segregate traffic and pedestrian movements, and to be identified by appropriate signage. Pedestrian facilities will cater for vulnerable users and mobility impaired persons.

The above mitigation measure, the Construction Traffic Management Plan, will minimise any significant environmental degradation or safety concerns in the vicinity of the proposed works, due to the presence of construction traffic. Furthermore, it is in the interest of the construction programme that deliveries, particularly concrete deliveries are not unduly hampered by traffic congestion, and as a result continuous review of haulage routes, delivery timings and access arrangements will be undertaken as construction progresses to ensure smooth operation.

11.6 OPERATIONAL IMAPCTS, MITIGATION & MONITORING

Assessment Years

To determine the impact of the proposed development site and to demonstrate that it can operate sustainably within the local road network, the following assessment years have been identified:

Base Year:	2016
Opening Year:	2021
Opening plus five:	2026
Opening plus fifteen:	2036

Traffic Growth

Traffic growth has been undertaken using the TII Project Appraisal Guidelines Unit 5.3 ‘Travel Demand Projections’. As has been agreed with the local authority, the recorded traffic data for the baseline 2016 flows has been factored up to the 2021 opening year using ‘High’ growth factors to account for the age of the survey data and the 2026 opening year plus five and the 2036 opening year plus fifteen data have been grown with ‘Low’ growth factors as appropriate to the urban area in question.

Proposed Traffic Generation

The trip rates associated with the residential apartment units of the proposed development have been calculated based on the traffic count data collected at the entry and exit points to residential basement car parks of the adjacent Charlestown Centre. This survey was undertaken on the 6th of February 2019.

This data has been correlated with current total residential units of the Charlestown Centre to determine the trip generation arrival and departure rates during the peak AM and PM periods. In turn these trip rates have be applied to the proposed total residential units to estimate the predicted trip volume for the proposed development. This has enabled the application of very accurate site-specific trip rate data to the proposed development.

In terms of the crèche and non residential elements, these are considered to be of a small scale that would serve the existing development and attract footfall from patrons of the Charlestown Centre. Thus, they would not attract new trips and thus no traffic generation is assumed.

Trip Rates

A parking survey was undertaken by Atkins on the 6th February 2019 at the entry and exit to the residential car parking areas in the Charlestown Centre Basement parking in order to update and verify the localised trip rates of such residential apartment units. These trip rates are shown in the table below. Please note that the trips rates are based on the more accurate calculation of per bedroom and not per unit.

Please refer to Atkins Traffic and Transport Assessment and associated appendices for further information reading trip rates.

Table 11.5 Proposed Development Trip Rates

Land Use	**Calc Factor**	**Area / No**	**Weekday**			
			AM Peak		**PM Peak**	
			ARR	**DEP**	**ARR**	**DEP**
Phase 2B	Note; Trip volumes taken from permitted Charlestown Phase 2B – Revised Application (377 units)					
Charlestown Place (Phase 1): Residential	Per Bed	590 No. of units (986 no. Bedrooms)	0.009	0.120	0.068	0.027

Traffic Generation

The proposed development will generate the following predicted volumes of traffic:

Table 11.7 Proposed Development Traffic Generation

Land Use	**Area / No**	**Weekday**			
		AM Peak		**PM Peak**	
		ARR	**DEP**	**ARR**	**DEP**
Phase 2B: Charlestown Centre Note; Generation taken from permitted 377 scheme		78	51	85	74
Charlestown Place (Phase 1): Residential (986 no. Bedrooms)		9	120	68	27
Charlestown Place (Phase 2): Residential (328 no. Bedrooms)		3	39	22	9
Total		90	210	175	110

Trip Distribution and Assignment

It has been assumed that traffic to and from the proposed development will be distributed onto the local road network based on the current traffic patterns as determined from the traffic surveys.

Traffic has been assigned to the network based on traffic movements at each junction as per the traffic surveys.

Table 11.8 Trip Distribution

Zone	**Weekday**			
	AM Peak		**PM Peak**	
	In	**Out**	**In**	**Out**
N2	9%	4%	5%	7%
M50 (N)	12%	14%	6%	18%
R104 (N)	17%	8%	12%	13%
Melville Road	9%	14%	11%	12%
R104 (S)	7%	18%	13%	11%
R135 (S)	22%	30%	35%	20%
M50 (S)	25%	12%	18%	19%
Total:	100%	100%	100%	100%

It should be noted that the movements of traffic entering and exiting the northern arm of the R135 Finglas Road / Charlestown Place junction have been estimated by obtaining data from the TII traffic counters located to the east and west of M50 Junction 5 along the M50 and to the north of this junction along the N2 / M2. This ensures that development traffic can be appropriately distributed to assist in quantifying traffic impact to these strategic roads.

Traffic Impact on National Road Network

The proposed development will result in additional movements on the both the M50 and N2 / M2 mainline carriageways.

To assess the proportion of additional development traffic which is likely to use the strategic motorway and national road network relevant to the proposed development, mainline flows for the N2/M2 and the M50 were obtained from the TII Traffic Data Site (https://www.nratrafficdata.ie). The percentage increase in traffic has been calculated as follows.

Table 11.9 Percentage Increase On National Road Network

Road	**Direction**	**Weekday AM**		**Weekday PM**	
		Dev Vol / Back-ground Vol	**Percentage Increase**	**Dev Vol / Back-ground Vol**	**Percentage Increase**
M50 North	SB	16/4302	0.37%	14/6189	0.23%
	NB	29/6085	0.48%	33/5919	0.56%
M50 South	SB	24/4140	0.58%	33/5355	0.62%
	NB	32/6053	0.53%	36/5900	0.61%
N2 /M2	SB	12/2243	0.53%	10/1749	0.57%
	NB	8/1519	0.53%	12/2196	0.55%

The increase in movements on the mainline carriageways in both the weekday AM and PM peak hours are minimal and as such are considered to have a negligible impact in terms of traffic safety and operation on the N2 / M2 and M50.

Junction Modelling Terminology

The R135 / Charlestown Place junction, Development Access Junction and the R104 / Charlestown Place junction are traffic signal junctions and as such has been modelled using JCT's LINSIG V3.2. The following terminology should be referenced when interpreting the assessment results:

Traffic Signal Junctions:

- DOS: This is the ratio of demand flow to capacity on a link. The saturation level is normally 90%. A degree of saturation below 90% represents a junction that is operating in an efficient and stable condition. If a link has a degree of saturation of between 90% and 100% it may still be operating to an adequate standard depending on the acceptability of queuing and delay. A degree of saturation of above 100% is considered to be over-capacity;
- Mean Maximum Queue: The sum of the maximum queue on a link (including uniform, random and oversaturation queues) averaged over all the cycles in the modelled time period;
- Average Delay: The average delay for each passenger car unit (pcu) on the lane averaged over the modelled time period.

All traffic signal junctions were observed to operate under vehicle actuation. In general, this form of control assesses the optimal signal timings for the available stages using information transmitted via detector loops embedded in the road surface. Signal timings can therefore vary notably, depending on traffic conditions. As such, for the purpose of the LinSig assessment, a cycle time of 120 seconds was assumed with the model optimised for practical reserved capacity based on the traffic flows recorded from the surveys and the phases and stages observed on-site.

A summary of the junction assessment results for the base year and design opening years, supported by a short narrative for each junction is presented below.

Traffic Impact at Key Junctions

An assessment of the operational performance of the key local road junctions following the implementation of the proposed residential scheme in the 'Do Something' scenarios is summarised in the below table. Junction references are as follows:

- Junction 1: Charlestown Place / R135 Junction (upgraded junction layout);
- Junction 2: Charlestown Place / Development Access Junction (upgraded junction layout);
- Junction 3: Charlestown Place / R108 Junction (existing junction layout).

Table 11.10 Operational Traffic Impact

Assessment Year	**Junction 1**		**Junction 2**		**Junction 3**	
	AM	**PM**	**AM**	**PM**	**AM**	**PM**
2021	86.6%	84.0%	61.4%	59.1%	69.5%	72.4%
2026	90.9%	88.1%	66.9%	64.3%	73.2%	76.0%
2036	99.4%	92.5%	67.0%	64.9%	77.6%	79.4%
2036 Sensitivity Test	88.9%	78.6%	n/a	n/a	n/a	n/a

The **Development Access / Charlestown Place** junction is expected to operate sufficiently during all periods while queuing and delay are acceptable and do not impact adjacent junctions. The maximum queue associated with the Charlestown Place eastern arm will not be impacted by nor impact on the proposed siting of a new direct pedestrian crossing located 70m from the junction. The above reported impact represents a long term not significant negative effect on this junction.

The **R104 / Charlestown Place** junction continues to operate sufficiently during all peak periods and queueing and delay are acceptable and do not impact of adjacent junctions. The above reported impact represents a long term not significant negative effect on this junction.

The **R135 / Charlestown Place** junction is a large signalised junction that experiences a high volume of vehicle throughput in an urban location, and thus it is normally considered acceptable for junctions of this nature to operate at or somewhat above saturation levels for short periods of time such as during morning and evening peak hours.

The upgraded intersection layout proposed for the Charlestown Centre (Reg. Ref. F19A/0146) development is shown to provide significant additional capacity.

The assessment has shown that junction capacity is generally operating satisfactorily in most assessment scenarios except for the N2 northern approach arm and Charlestown Place approach arm which are operating above saturation levels during the weekday morning peak during the 2036 with development scenario only. The evening peak is expected to generally operate within or around saturation levels.

It should however be noted that given this is an urban junction, with enhanced facilities for pedestrians, it is generally considered acceptable, as promoted in DMURS, for there to be an element of congestion experienced at such junctions. The above reported impact represents a long term moderate negative effect.

A sensitivity analysis of the 2036 assessment year wherein the impact of remote working patterns that have developed from the Covid19 restrictions will be continued to a substantial degree in the post Covid19 scenario has been undertaken.
The analysis considers a scenario wherein background traffic is reduced to take account of a reduction in people travelling long distances to work and instead choosing to work from home or in local e-working hubs.

The CSO COVID19 Survey April 2020 shows that working from home has increased to 34%, up from a level of 5% based on the 2016 Census data. The Remote Working National Survey Report May 2020 showed that 30% of respondents indicated there are no challenges for them to continue working remotely after the pandemic is over. As such, this sensitivity analysis assumes that 10% of people will work remotely as the new normal post COVID19.

It should be noted that this is a very conservative assumption, particularly given that the Governments Strategy outlines a target of 20% for Public Sector Workers which would be a level anticipated to be exceeded in the private sector.

In this Post COVID Scenario, it is demonstrated that the Charlestown Place / R135 junction will perform below capacity during both the with and without development scenario.
It is considered that this is the most likely sustainable scenario that will occur. In overall terms this longer-term change in working patterns will help achieve a longer-term fundamental change in travel behaviour by reducing the need travel to work on a daily basis.

It is considered, based on the sensitivity analysis, that the junction operation during the Opening +15 Year scenario is acceptable for a typical urban junction. Thus, the above reported impact represents a long term slight negative effect.

For full details reference should be made to Atkins Traffic and Transportation Assessment document 5152288DG017 and associated appendices.

Mitigation
The proposed development is consistent with all national, regional and local policies. In particular those policies and objectives aligned with active and sustainable travel and

transportation. Specific mitigation measures proposed include the following: -

- **MA-T-O1:** The proposed Luas Terminus Station is located on the eastern site boundary. Careful planning and design has been undertaken to ensure that the proposed development does not impact on the preferred route identified for Luas.
- **MA-T-O2:** The proposed Bus Terminus identified as part of the BusConnects Plan is located to the northern site boundary.
- **MA-T-O3:** The entire site is within immediate walking distance of existing bus stops and bus corridors.
- **MA-T-O4:** The site is adjacent and accessible to Routes N05 and 3B of the NTA Cycle Network Plan.
- **MA-T-O5:** The proposed development facilitates the upgrade of cycle tracks adjacent its northern and eastern boundary which are associated with Routes 3B, NO5 and F9 of the NTA Cycle Network Plan.
- **MA-T-O6:** The development incorporates a permeable internal layout for pedestrians and cyclist that link the site to the eternal pedestrian, cycling and public transport network whilst also facilitating strong connections across Charlestown Pace to the Charlestown District Centre and its related facilities, services and amenities.
- **MA-T-O7:** The site is planned in the context of a Mobility Management Plan based on the physical infrastructure provisions of walking and cycling links and access to public transport bus and future Luas services.
- **MA-T-O8:** Demand Management is also underpinned by the co-location of residential, education, local retail and leisure and amenity facilities.
- **MA-T-O9:** The propensity for car ownership and car use is managed through measures that include reduced residential parking provision and increased cycle parking provision in line with the 'Design Standards for New Apartments'. The provision of car club parking spaces will facilitate a lower level of car ownership.
- **MA-T-O10:** The development contains the required infrastructure to provide electric charging to all car parking spaces.

11.7 CULMULATIVE IMPACTS

With the exception of the upgrade works to the R135 / Charlestown Place junction, there are no known impending permitted transport schemes proposed for the Charlestown area.

A desktop study of the Fingal County Council Planning Applications search tool 'ePlan' was undertaken in the vicinity of the proposed development site to assess any cumulative impacts from granted or committed applications.

With the exception of the Phase 2B (Reg. Ref. F19A/0146) of the Charlestown Centre site, which is currently being constructed and which has been included in the operational stage assessments, planning applications found that may have a cumulative impact to traffic or to the proposed development are of a low number such that they are negligible in terms of traffic impact.

In addition, it is considered that the growth rates applied for the 2021 opening year, 2026 opening + 5 year and 2036 opening + 15 year will take account of traffic growth due to development of committed and future developments in Charlestown and its surrounding area of influence.

1.8 RESIDUAL IMPACTS

Construction Stage

There will be a slight negative impact due to construction traffic. However, this impact will be short term. This will be mitigated by the introduction of a Construction Traffic Management Plan (CTMP). The CTMP will manage these potential impacts but will remain as a short term slight negative impact on the adjacent local and strategic road network.

Operational Stage

During the operation of the proposed development (Opening Year) there will be a long term not significant negative impact due to increased traffic flows. This will be mitigated by the transportation measures integrated into the development as previously noted.

Additionally, during operation there will be an increase in pedestrian and cyclist movements, due to developments proximate location to the district centre and its services, amenities and public transport facilities and the upgrade of the crossing link from the proposed development to the town centre. This will positively impact the proposed development and will assist in reducing dependency on car travel.

Worst Case Impact

The worst-case scenario is that the proposed development is fully built and occupied at the opening year of 2021. In reality the construction of the proposed development will be phased out over a longer 3 year period with occupation dependant on market conditions.

This worst-case full development build out scenario has been modelled in the opening year and subsequent plus 5 and plus 15 year assessments and it is demonstrated that there is sufficient capacity within the local road network to cater for the associated additional traffic generated.

11.9 DO NOTHING SCENARIO

In the absence of the proposed development, the operational performance of the existing junctions on the surrounding road network will remain relatively unchanged with the exception of the impact caused by the forecast network traffic growth. The table below outlines the resultant capacity of the relevant local road network.

Table 11.11 Do-Nothing Traffic Impact

Assessment Year	**Junction 1**		**Junction 2**		**Junction 3**	
	AM	**PM**	**AM**	**PM**	**AM**	**PM**
2021	85.5%	82.3%	n/a	n/a	69.1%	70.4%
2026	89.8%	86.3%	n/a	n/a	72.9%	73.9%
2036	94.4%	90.7%	n/a	n/a	76.3%	77.2%

As can be seen from the above table, the local road network with no development in place is operating to a satisfactory level during all assessment years. It should however be note that during the 2036 opening +15 assessment year, the degree of saturation (DOS) associated with Junction 1, the Charlestown Place / R135 junction, is operating above its theoretical capacity of 90% indicating that the main capacity issues associated with the junction relate to the background traffic on the network and not the traffic generated by the proposed development.

Please refer to Atkins Traffic and Transport Assessment and associated appendices for further information.

11.10 INTERACTIONS

Traffic interacts with a wide range of environmental parameters and therefore impacts upon a number of disciplines.

All interactions with traffic during both Construction and Operational Phases have been identified in the relevant Chapters and where appropriate, mitigation measures have been applied. The following provides a summary of the identified interactions:

Air and Climate

During the construction stage, on site construction works will contribute to a temporary decrease in air quality. In the development operational stage traffic generation associate with the development will contribute to increased traffic volumes on the surrounding network which in turn will decrease air quality. Further details in relation to direct impacts are addressed in Chapter 8.

Noise and Vibration

During the construction stage, development of the site will result in a short term increase of construction traffic related noise and vibration. In the development operational stage, traffic generation associated with the development will contribute to increased noise levels on the surrounding local road network. Further details in relation to direct impacts are addressed in Chapter 9.

12.0 MATERIAL ASSETS: RESOURCE AND WASTE MANAGEMENT

12.1 INTRODUCTION

Byrne Environmental Consulting Ltd have assessed the potential impacts that construction and operational wastes associated which the proposed development may have on the receiving environment and how wastes generated shall be managed in accordance with the *Eastern-Midlands Region Waste Management Plan 2015-2021*.

The assessment includes a comprehensive description of the types and quantities of wastes that will be generated, how wastes will be managed and how the principals of reduce-reuse and recycle shall be implemented into the design of the development to ensure that the development will be constructed and operated in an environmentally sustainable manner.

12.2 ASSESSMENT METHODOLOGY

The proposed *Site Specific Construction and Demolition and By-Product Waste Management Plan(C&DWMP)* [prepared by Byrne Environmental Consulting Ltd] demonstrate**s** how the Construction Phase will comply with the following relevant legislation and relevant Best Practice Guidelines. A copy of the C&DWMP is included with the planning application documentation.

- Waste Management Acts 1996
- Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007)
- Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008)
- Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (Department of the Environment, Heritage and Local Government, 2006).
- Guidance on Soil and Stone By-Products in the context of Article 27 of the European Communities (Waste Directive) Regulations – (EPA, Version 3 June 2019)
- Fingal County Council Development Plan 2017 – 2023-Construction & Demolition Waste Management Objectives

OBJ WM18 Ensure that construction and demolition Waste Management Plans meet the relevant recycling/recovery targets for such waste in accordance with the national legislation and regional waste management policy.

The proposed *Operational Waste Management Plan (OWMP)* [prepared by Byrne Environmental Consulting Ltd] accompanying this application has been prepared to demonstrate how the Operational Phase will comply with the following relevant regulations and Fingal County Council design standards for waste management in residential developments. A copy of the OWMP is included with the planning application documentation.

- Waste Management Acts 1996.
- Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007).
- Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008).
- Eastern-Midlands Region Waste Management Plan 2015-2021.

- Sustainable Urban Housing : Design Standards for New Apartments – Guidelines for Planning Authorities(Department of Housing, Planning and Local Government, Section’s

The *Operational Waste Management Plan* has been prepared with regard to relevant waste management policies and objectives of the *Fingal County Council Development Plan 2017 – 2023.*

OBJ DMS 26 Ensure all new residential schemes include appropriate design measures for refuse storage areas, detail of which should be clearly shown at pre-planning and planning application stage. Ensure refuse storage areas are not situated immediately to the front door or groundfloor window, unless adequate screened alcoves or other such mitigation measures are proved.

OBJDMS37 Ensure the maximum distance between the front door to a communal bin area does not exceed 50 meters.

OBJ DMS146 Ensure all new largescale residential and mixed-use developments include appropriate facilities for source segregation and collection of waste.

OBJ DMS147 Ensure all new developments include well designed facilities to accommodate the three bin collection system.

The waste management strategies’ included in this Chapter of the EIAR present the potential environmental impacts, proposed monitoring methodologies, limit values where applicable, based on the concept of Best Practice and the proposed mitigation measures to be implemented at the development site. Reference to National and International Standards are also included where relevant.

The projection of material assets of human origin was conducted and resource use and management of wastes generated were assessed for both the constructional and operational phases of the proposed development and their associated impacts assessed. Mitigation and best practice waste management are proposed where appropriate.

12.3 RECEIVING ENVIRONMENT

The construction and operation of the proposed residential and commercial development will introduce new volumes of waste into the local area in terms of the short-term generation of construction waste and the longer-term generation of domestic waste when the development is occupied.

There are a number of recycling centres and local bring banks in the greater Finglas area within 5km of the Charlestown site and a range of domestic and commercial waste collection operators that will serve the proposed development.

12.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in Section 3.3 of this EIAR.

Various construction waste streams will arise during the construction phase. General domestic waste will arise during the operational phase and commercial waste will be generated by the commercial and retail units when operational.
Site-Specific Waste Management Plans shall be implemented throughout the construction phase and operational stage of the development to ensure the following:

- That all site activities are effectively managed to minimise the generation of waste and to maximise the opportunities for on-site reuse and recycling of waste materials.
- To ensure that all waste materials generated by site activities are removed from site by appropriately permitted waste haulage contractors and that all wastes are disposed of at approved waste licensed / permitted facilities in compliance with the Waste Management Act 1996 and all associated Waste Management Regulations.
- The Operational Waste Management Plan for the development will ensure that users of the development are provided with sufficient infrastructure and facilities to store, segregate and recycle waste.

12.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

12.5.1 Construction Phase

The development of the subject site will initially require the stripping of hard-surfaces, top and subsoils and the excavation of ground to basement level. The range of works required for the Construction Phases are summarised in Table 12.1. The expected construction wastes that will be generated throughout the course of the development are described in Table 12.2.

Construction wastes if not managed and segregated on-site will have the potential to be difficult to separate into different waste streams to allow for further processing, recovery, re-use or to be recycled.

The following tables present the nature of the proposed construction works and the potential waste types and quantities that shall be generated during the construction phase.

Activity Sequence	General Description
Identification of Existing Utility Services	Set up bunting, mark location of live services, including E.S.B., Gas etc.
Removal of Vegetation	e.g. Trees and vegetation
Site Preparation	Soil stripping, hard surfaces, utilities removal
Infrastructure installation	Drainage, Utility ducts, power
Substructure	Piling works
Substructure	Basement excavation Rebar, Formwork
Superstructure	Rebar, Formwork and Pour
Roof	Rebar, Formwork and Pour and Waterproof
External Envelope	Place façade to superstructure
Internal Finishes	Mechanical & Electrical etc.
External Landscaping	Hard and soft landscaping

Table 12.1 – Sequence of Construction Works

➢ ➢ Description of Waste	%
Soils & Stones	76.7
Mixed C&D	7.0
Metals	3.0
Concrete Bricks Tiles, Gypsum	12.0
Wood, Glass, Plastic	0.3
Bitumen Waste	1.0
Totals	100

Table 12.2– Typical Construction Waste Composition – Source EPA 2018

Waste Type	Predicted tonnage to be produced	Re-Use		Recyclable		Disposal	
		Tonnage	%	Tonnage	%	Tonnage	%
Car Park Area							
Gravels	4590	400	40	1250	100	0	
Bulk Excavation							
Soils	127,500	0	0	0	0	127,500	100

Table 12.3 – Predicted Demolition Waste Generation

Waste Type	Predicted tonnage to be produced	Re-Use		Recyclable		Disposal	
		Tonnage	%	Tonnage	%	Tonnage	%
Mixed C&D	1202	-	-	601	50	601	50
Metals	515	-	-	515	100	-	-
Concrete, Blocks, Gypsum	2060	1030	80	-	-	1030	20
Wood Glass Plastic	52	-	-	5.2	10	46.8	90
Bitumen	172			172	100	-	-
Total	4000	1030		1293.2		1676.8	

Table 12.4 – Predicted Construction Waste Generation

12.5.2 Soil Excavation and Disposal

The Project Engineers have estimated that c. 83,000m^3 of soils will be exported from the site.

Soils at the site have been previously (February 2021) classified following WAC testing by IGSL and the completion of a Waste Classification Assessment (dated 08.02.21) by O'Callaghan Moran & Associates – See Appendices 6A and 6B for copies of these assessment. The assessments concluded that on-site soils are classified with LoW Codes 17 09 04 and 17 05 04 may be classified as non-hazardous.

Excavated soils may be suitable for re-use in other construction sites and may be declared as a by-product in accordance with *Article 27 of the European Communities (Waste Directive) Regulations 2011* and the EPA publication *"Guidance on Soil and Stone By-Products in the context of Article 27 of the European Communities (Waste Directive) Regulations – Version 3 June 2019.*

Soils may be re-used within the proposed scheme as engineering fill or for landscaping.

Where excess soils may not be re-used within the proposed development, the Contractor will export the soils for authorised recovery, recycling or disposal. All construction phase waste soils generated from the proposed development will only be exported to authorised waste facilities holding a valid Waste Licence, Waste Facility Permit or Certificate of Registration.

12.5.3 Operational Phase

The Operational Phase of the development will result in the generation of mixed domestic and mixed commercial and retail waste streams.

If waste infrastructure and appropriate waste management systems are not integrated into the design and the operation of the proposed development, there is the potential that domestic and non-domestic waste will not be segregated at source or appropriately managed on-site and the operation of the development will not function in accordance with the waste management policies of Fingal County Council or comply with the waste reduction and recycling and re-use targets defined in the Eastern-Midlands Region Waste Management Plan 2015-2021.

Operational Phase Waste Types & Quantities

Waste generated during the operational phase will arise from the following aspects of the development.

- Residential units comprised of apartments
- Retail and Commercial units
- Creche

The 2014 EPA Publication, National Waste Prevention Programme, 2013 Annual Report, states:

"The household waste per person in Ireland has been decreasing over the period 2006 to 2012 from 470 kg/person in 2006 to 344 kg/person in 2012. This indicates success in national campaigns and awareness as regards waste minimisation – though effects of reduced consumption are also likely to have contributed. In addition, it suggests an economy and society that are improving the efficiency of consumption patterns with respect to waste generation."

A value of 0.942Kg of waste generated per person per day has been therefore assumed for the purposes of this report to estimate the volume of waste to be generated at the development as detailed below in Tables 12.4 – 12.5.

House Type	# Units	Waste/Day	Waste/week
	No.	Kg	Kg
Residential Units	590	1816	12713

Retail / commercial 350sq.m	2	357	2500
Creche 542 sq.m	1	350	1750
Office Space 224 sq.m	1	100	500
Medical Facility 525 sq.m	1	200	1200
Total for development	n/a	2,823	18,663

Table 12.5 Calculated waste generation at Charlestown

Waste Type	**% Waste**	**Kg/week**	**Kg/day**
Organic waste	30.6	3890	556
Paper	12.5	1589	227
Cardboard	3.6	458	65
Composites	1	127	18
Textiles	15.5	1971	282
Plastics	13.6	1729	247
Glass	3.4	432	62
Metals	3.1	394	56
Wood	1.2	153	22
Hazardous municipal waste	0.9	114	16
Unclassified combustables	1.4	178	25
Unclassified incombustables	1.2	153	22
Fines	11.7	1487	212
Bulky Waste & WEEE	0.3	38	5
Totals	***100***	***12713***	***1816***

Table 12.1 – Calculated domestic waste composition Residential Development

12.6 DO NOTHING SCENARIO

Should the site not be developed for residential use it will continue not to have any impact or demand on local waste services or on the receiving environment. A vacant site may however be subject to unauthorised illegal dumping or fly-tipping.

12.7 CUMULATIVE IMPACTS

With regard to other currently under construction residential developments within the Charlestown area including the Charlestown Place development, there will be a greater demand on existing local waste management services and on waste acceptance facilities. It is necessary that the subject development in addition to others are operated in a sustainable manner that reduces the generation and disposal of un-segregated domestic mixed waste and that provide the infrastructure and management services to assist residents to segregate domestic waste at source and to maximise recycling of wastes.

12.8 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

The Site Specific Construction and Operational Waste Management Plans have been designed to ensure that the construction and operational phases of the proposed development will be managed to reduce the generation of unsegregated wastes, to maximise the potential for recycling, recovery and re-use and to demonstrate how the development will operate in a sustainable manner in terms of waste management and contribute to the achievement of the Regions compliance with the waste reduction targets specified in The *Eastern-Midlands Region Waste Management Plan 2015-2021* (and any subsequent future revisions).

The general principles and key aspects of the Site Specific Construction and Demolition Waste and By-Product Management Plan and the Operational Waste Management Plan detail how the potential waste impacts associated with the development shall be mitigated through both design and management.

12.9 SITE SPECIFIC CONSTRUCTION & DEMOLITION WASTE MANAGEMENT PLAN

The *Site Specific Construction & Demolition Waste Management Plan* prepared by Byrne Environmental (and included with the planning application) specifically addresses the following points:

MA:RWM-C1 Waste materials generated by construction activities will be managed according to the Department of the Environment, Heritage and Local Government's 2006 Publication - Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects

- Analysis of waste arisings / material surpluses
- Specific Waste Management objectives for the Project including the potential to re-use existing on-site materials for further use in the construction phase.
- Methods proposed for Prevention, Reuse and Recycling
- Waste Handling Procedures
- Waste Storage Procedures
- Waste Disposal Procedures
- Record Keeping

MA:RWM-C2 Waste minimisation and prevention shall be the primary responsibilities of the Construction Project Manager who shall ensure the following:

- Materials will be ordered on an "as needed" basis to prevent over supply
- Materials shall be correctly stored and handled to minimise the generation of damaged materials
- Materials shall be ordered in appropriate sequence to minimise materials stored on site
- Sub contractors will be responsible for similarly managing their wastes

12.9.1 Programme of Waste Management for Construction Works

It is proposed that the construction Contractor as part of regular site inspection audits will determine the effectiveness of the waste management statement and will assist the project manager in determining the best methods for waste minimisation, reduction, re-use, recycling and disposal as the construction phase progresses and waste materials are generated.

12.9.2 Construction Waste Disposal Management

It is proposed that from the outset of construction activities, a dedicated and secure compound containing bins, and/or skips, and storage areas, into which all waste materials generated by construction site activities, will be established within the active construction phase of the development site.

In order to ensure that the construction contractor correctly segregate waste materials, it is the responsibility of the site construction manager to ensure all staff are informed by means of clear signage and verbal instruction and made responsible for ensuring site housekeeping and the proper segregation of construction waste materials.

It will be the responsibility of the Project Construction Manager to ensure that a written record of all quantities and natures of wastes exported -off site are maintained on-site in a Waste File at the Project office.

It is the responsibility of the Project Manager or his/her delegate that all contracted waste haulage drivers hold an appropriate Waste Collection Permit for the transport of waste loads and that all waste materials are delivered to an appropriately licenced or permitted waste facility in compliance with the following relevant Regulations:

- Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007)
- Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008)
- Waste Management (Facility Permit and Registration) Regulations S.I.821 of 2007 and the Waste Facility Permit under the Waste Management (Facility Permit and Registration) Amendment Regulations S.I.86 of 2008.

Prior to the commencement of the Project, the Construction / Project Manager shall identify and nominate a permitted Waste Contractor who shall be employed to collect and dispose of all wastes arising from the project works. In addition, the Construction / Project Manager shall identify and all waste licensed / permitted facilities that will accept all expected waste exported off-site and will maintain copies of all relevant Waste Permits / Licences as required.

All waste soils prior to being exported off-site, shall be classified as inert, non-hazardous or hazardous in accordance with the EPA's Waste Classification Guidance – List of Waste & Determining if Waste is Hazardous or Non-Hazardous document dated 1st June 2015 to ensure that the waste material is transferred by an appropriately permitted waste collection permit holder and brought to an appropriately permitted or licensed waste facility.

12.9.3 On-Site Waste Reuse and Recycling Management

Construction waste material such as soils, damaged or broken concrete slabs, blocks, bricks and tiles generated that is deemed by the Project Engineer to be suitable for reuse on the Project site for ground-fill material and landscaping. This initiative shall provide a positive environmental impact to the construction phase as follows:

- Reduction in the requirement for virgin aggregate materials from quarries
- Reduction in energy required to extract, process and transport virgin aggregates
- Reduced HGV movements associated with the delivery of imported aggregates to the site

- Reduced noise levels associated with reduced HGV movements
- Reduction in the amount of landfill space required to accept C&D waste
- Reduction in the volume of soils to be exported off-site

12.9.4 Waste Storage Compound

A waste storage compound shall be set up on-site from the commencement of site activities. The compound shall include the following:

- Separate waste skips labelled with signage stating the nature of waste materials that can only be placed in the skips.
- Waste oils / containers shall be placed in dedicated mobile bunds units.
- Soils contaminated by accidental on-site spillages of oils / construction hydrocarbons shall be stored in clearly identified hazardous waste storage containers.
- Spill kits with instructions shall be located in the waste storage compound.

12.9.5 Waste Soils

As the subject development site is currently greenfield and in agricultural use with no evidence of historic dumping or industrial use, it is predicted that the top and subsoils will be characterised as being inert in accordance with Landfill Directive (2003/33/EC).

Top and subsoils shall be re-used on-site for landscaping purposes to minimise the volume of soils to be exported off-site

Excess soils estimated to be c.127,500 tonnes shall be exported to an appropriately waste permitted/licenced facility.

The construction project manager shall inform FCC of the volume of excess soils generated and the permitted / licenced waste facility they shall be exported to.

Excess soils shall be removed off-site throughout the duration of the construction phase. Prior to being removed off-site the excess soils shall be characterised as being inert, non-hazardous or hazardous in accordance with Landfill Directive (2003/33/EC). The classification of the soils shall be established by WAC testing which shall occur throughout the construction phase.

Excavated excess soils that are required to be exported off-site shall be tested to determine their classification as hazardous or non-hazardous in accordance with EPA Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous. Non-Hazardous soils may be suitable for re-use in other construction sites and may be declared as a by-product in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011. Article 27 requires that the material classified not a waste but a by-product must meet specific criteria and that that a declaration of a material as a by-product is notified to the EPA.

12.9.6 Contaminated Soils

Where contaminated soils/materials are discovered or occur as a result of accidental spillages of oils or fuels during the construction phase, these areas of ground will be isolated and tested in accordance with the 2002 Landfill Directive (2003/33/EC) for contamination, and pending the results of laboratory WAC testing, will be excavated and removed to an appropriately licenced waste facility.

12.9.7 Construction Waste Record Keeping

It is the responsibility of the Construction Project Manager or his/her delegate that a written record of all quantities and natures of all wastes reused / recycled and exported off-site and Article 27 declarations during the project are maintained in a Waste File at the Project office.

The following information shall be recorded for each load of waste exported off-site:

- Waste Type EWC Code and description
- Volume of waste collected
- Waste collection contractor's Waste Collection Permit Number and collection receipt including vehicle registration number
- Destination of waste load including Waste Permit / Licence number of facility
- Description of how waste at facility shall be treated : disposal / recovery / export
- The waste records shall be issued to DCC as required / requested.

12.9.8 Waste Management Auditing

In order to ensure that construction wastes generated during the course of the development are being effectively managed and recorded, a waste management audit shall be conducted on a routine basis by an independent waste management consultant to determine compliance with the Construction Phase Waste Management Strategy.

12.10 OPERATIONAL WASTE MANAGEMENT PLAN

An *Operational Waste Management Plan* (OWMP) has been prepared by Byrne Environmental as a stand-alone report to accompany this application and has been prepared to demonstrate how the required infrastructure will be incorporated into the design and operational management of the development to ensure that domestic wastes will be managed and monitored with the objective of maximizing the quantity of waste segregated at source and maximizing the volume of clean recyclable materials generated by the residents of the development.

The Goal of the OWMP is to achieve a compliance with The Eastern-Midlands Region Waste Management Plan 2015-2021 which defines the following Waste Targets:

- 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.
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill.

The Operational Waste Management Strategy has been prepared with regard to the strategy, policy and objectives of the Fingal County Council.

Key Aspects of the OWMP to achieve Waste Targets:

- All residential units shall be provided with information on the segregation of waste at source and how to reduce the generation of waste by the Facilities Management Company.

- All waste handling and storage activities shall occur in the dedicated communal apartment waste storage areas.
- The development's Facility Management Company shall appoint a dedicated Waste Services Manager to ensure that waste is correctly and efficiently managed throughout the development.

The OWMP is defined by the following stages of waste management for both the residential and commercial aspects of the development:

Stage 1	Occupier Source Segregation
Stage 2	Occupier Deposit and Storage
Stage 3	Bulk Storage and On-Site Management
Stage 4	On-site treatment and Off-Site Removal
Stage 5	End Destination of wastes

The OWMP has been prepared with regard to *British Standard BS 5906:2005 Waste Management in Buildings-Code of Practice which provides guidance on methods of storage, collection, segregation for recycling and recovery for residential building.*

The apartments and houses which will include a 3-bin waste segregation at source system together with the communal waste storage areas have been designed with regard to *Section's 4.8 and 4.9 Refuse Storage of The Department of Housing, Planning and Local Government – Sustainable Urban Housing : Design Standards for New Apartments – Guidelines for Planning Authorities. 2018.*

MA:RWM-O1	The proposed development shall be designed and managed to provide residents with the required waste management infrastructure to minimise the generation of un-segregated domestic waste and maximise the potential for segregating and recycling domestic waste fractions.
MA:RWM-O2	The Objective of the OWMP is to maximise the quantity of waste recycled by residents by providing sufficient waste recycling infrastructure, waste reduction initiatives and waste collection and waste management information services to the residents of the development.
MA:RWM-O3	The Goal of the OWMP is to achieve a residential recycling rate of 50% of managed municipal waste by 2020 (and future targets in subsequent Eastern-Midlands Regional Waste Management Plans).
MA:RWM-O4	All apartments will have a 3-bin system (non-recyclable, organic and recyclable) in each kitchen to encourage residents to segregate waste at source.
MA:RWM-O5	Apartment residents will be provided with waste recycling and waste disposal information by the development's Facility Management Company who will be responsible for providing clean, safe and mobility impaired accessible communal waste storage areas for the apartment blocks.
MA:RWM-O6	The Facility Management Company shall maintain a register of all waste volumes and types collected from the development each year including a break-down of recyclable waste and where necessary, shall introduce initiatives to further encourage residents to maximise waste segregation

at source and recycling. They shall also provide an annual bulky waste and WEEE collection service for all residents.

The development shall be designed to provide adequate domestic waste storage areas for each apartment blocks. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development. Communal waste bin storage areas shall be designed in a manner to ensure that appropriate signage for the correct disposal and recycling of waste is available for residents.

12.11 PREDICTED IMPACTS

12.11.1 Construction Phase

The management of wastes generated during the construction of the proposed development will be in accordance with a Site-Specific Construction Phase Waste Management Plan. With regard to how it has been demonstrated how construction wastes will be managed through design, management and waste reduction and recycling initiatives at the proposed development, it is predicted that the impact of the construction phase of the development will not have an adverse impact on the receiving environment, existing material assets and local and regional waste management services.

12.11.2 Operational Phase

The development shall be designed to provide adequate domestic waste infrastructure and storage areas for common residential areas (apartments) and non-domestic spaces. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development and thus reduce the potential for the generation of mixed un-recyclable domestic waste streams.

12.11.2 Worst Case Scenario

There are no worst-case impacts associated with the proposed development as sufficient capacity and waste storage space will be provided for both the construction and operational phases.

12.12 RESIDUAL IMPACT

12.12.1 Construction Phase

The residual impact associated with the construction phase with mitigation will generate a small quantity of unrecyclable and non-reusable construction wastes which will result in a negative, not significant and short-term impact.

12.12.3 Operational Phase

The residual impact associated with the operational phase with mitigation, will generate a small quantity of unrecyclable and non-reusable domestic and commercial waste which will result in a negative, not significant and long-term impact.

12.13 MONITORING

MA:RWM-C3	The Construction Project Manager shall maintain a register of all construction wastes generated and shall compile a monthly report detailing the types and quantities of construction wastes generated at the site and the destinations that the wastes were exported to.
MA:RWM-07	The Facility Management Company shall prepare an annual report for FCC and residents of the development on the quantities of waste generated within the development to demonstrate how waste reduction and recycling targets are being achieved with regard to the targets defined in The *Eastern-Midlands Region Waste Management Plan 2015-2021* (and subsequent revisions).

12.14 REINSTATEMENT

Reinstatement is not applicable for this Chapter.

12.15 REFERENCES

- Waste Management Acts 1996;
- Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007);
- Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008);
- Eastern-Midlands Region Waste Management Plan 2015-2021;
- European Communities (Waste Directive) Regulations 2011;
- Fingal Development Plan 2017 – 2023;
- Department of the Environment, Heritage and Local Government – Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects – July 2006;
- Sustainable Urban Housing : Design Standards for New Apartments – Guidelines for Planning Authorities(2018 Department of Housing, Planning and Local Government, Section’s 4.8 and 4.9 Refuse Storage.
- British Standard BS 5906:2005 Waste Management in Buildings-Code of Practice which provides guidance on methods of storage, collection, segregation for recycling and recovery for residential building.

13.0 CULTURAL HERITAGE

13.1 INTRODUCTION

This chapter consists of an appraisal of a proposed residential development at Charlestown Place and St Margaret's Road, Dublin 11 under the heading of archaeological and cultural heritage (Figure 13.1, ITM 712709/740461). The chapter was undertaken by Faith Bailey and Ross Waters of IAC Archaeology.

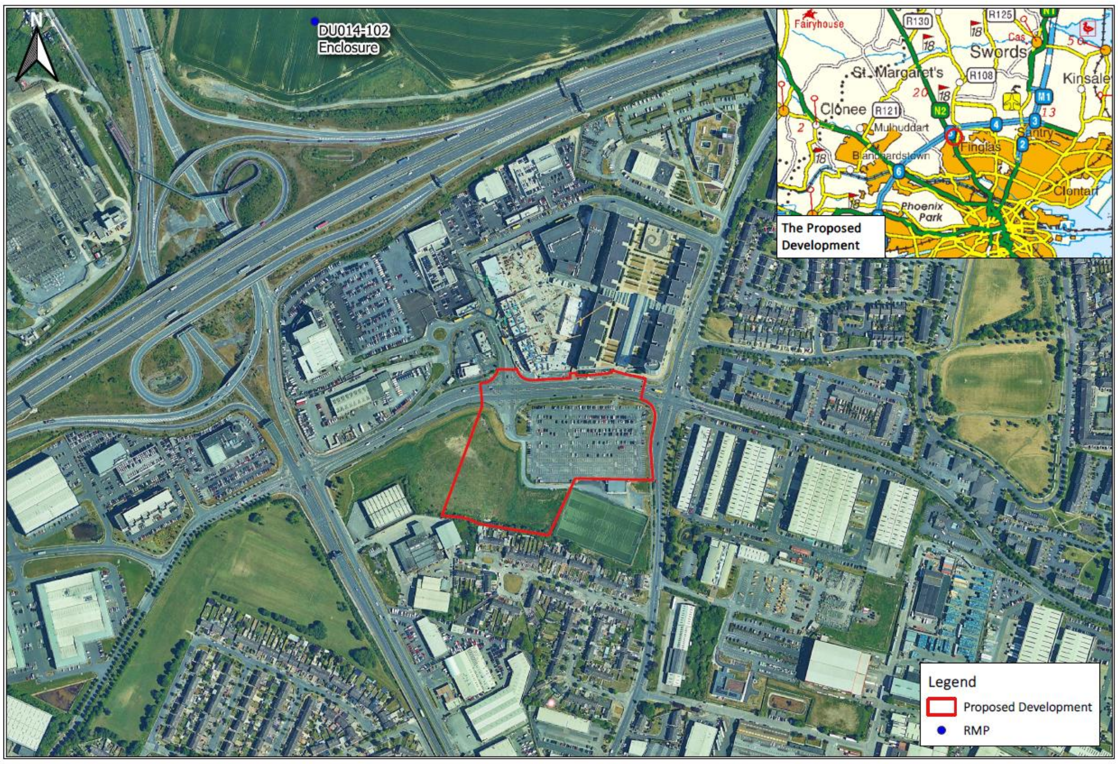


Figure 13.1 Location of proposed development and nearest recorded monument

This study determines, as far as reasonably possible from existing records, the nature of the archaeological and cultural heritage resource in and within the vicinity of the proposed development using appropriate methods of study. Desk-based assessment is defined as a programme of study of the historic environment within a specified area or site that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic, and electronic information in order to identify the likely heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage assets (CIfA 2014). This leads to the following:

- determining the presence of known archaeological assets that may be affected by the proposed development;
- assessment of the likelihood of finding previously unrecorded archaeological remains during the construction programme;
- determining the impact upon the setting of known cultural heritage sites in the surrounding area; and
- suggested mitigation measures based upon the results of the above research.

The study involved detailed interrogation of the archaeological and historical background of the proposed development area. This included information from the Record of Monuments and Places of County Dublin, the Fingal County Development Plan, the topographical files of the National Museum of Ireland, and cartographic and documentary records. Inspection of the aerial photographic coverage of the proposed development area held by the Ordnance Survey, Bing Maps, and Google Earth has also been carried out. A field inspection has been carried out in an attempt to identify any known archaeological and cultural heritage sites and previously unrecorded features, structures, and portable finds within the proposed development area.

An impact assessment and a mitigation strategy have been prepared. The impact assessment is undertaken to outline potential adverse impacts that the proposed development may have on the cultural heritage resource, while the mitigation strategy is designed to avoid, reduce, or offset such adverse impacts.

The receiving environment is defined as an area measuring c. 500m from the edge of the proposed development boundary.

13.1.1 Legislation and Guidelines

The following legislation, standards and guidelines were consulted as part of the assessment.

- National Monuments Act 1930 to 2014;
- The Planning and Development Acts 2000 to 2017;
- Heritage Act, 1995, as amended;
- Draft Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), 2015, EPA;
- Draft Guidelines on the Information to be Contained in Environmental Impact Statements. Dublin. Government Publications Office, 2017, EPA; and
- Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, (formerly) Department of Arts, Heritage, Gaeltacht, and Islands.

13.1.2 Consultation

During scoping and research for the assessment and EIAR, a number of statutory and voluntary bodies were consulted to gain further insight into the cultural background of the receiving environment and study area, as follows:

- Department of Culture, Heritage, and the Gaeltacht – the Heritage Service and Policy Unit, National Monuments and Historic Properties Section: Record of Monuments and Places; Sites and Monuments Record; Monuments in State Care Database; Preservation Orders; Register of Historic Monuments;
- National Museum of Ireland, Irish Antiquities Division: topographical files of Ireland; and
- Fingal County Council: Planning Section

13.1.3 Definitions

In order to assess, distil and present the findings of this study, the following definitions apply:

'Cultural Heritage' where used generically, is an over-arching term applied to describe any combination of archaeological, architectural, and cultural heritage features, where –

- the term 'archaeological heritage' is applied to objects, monuments, buildings, or landscapes of an (assumed) age typically older than AD 1700 (and recorded as archaeological sites within the Record of Monuments and Places).

- the term ‘cultural heritage’, where used specifically, is applied to other (often less tangible) aspects of the landscape such as historical events, folklore memories and cultural association.

13.2 ASSESSMENT METHODOLOGY

Research for this report was undertaken in two phases. The first phase comprised a paper survey of all available archaeological, historical, and cartographic sources. The second phase involved a field inspection of the site.

13.2.1 Deskstop Study

The following sources were examined and a list of areas of archaeological, architectural and cultural heritage potential were complied.

- Record of Monuments and Places for County Dublin;
- Sites and Monuments Record for County Dublin;
- National Monuments in State Care Database;
- Preservation Orders List;
- Register of Historic Monuments;
- Topographical files of the National Museum of Ireland;
- Cartographic and written sources relating to the study area;
- Fingal County Development Plan, 2017–2023;
- Place name analysis;
- Aerial photographs; and
- Excavations Bulletin (1970–2019);

Record of Monuments and Places (RMP) is a list of archaeological sites known to the National Monuments Section, which are afforded legal protection under Section 12 of the 1994 National Monuments Act and are published as a record.

Sites and Monuments Record (SMR) holds documentary evidence and field inspections of all known archaeological sites and monuments. Some information is also held about archaeological sites and monuments whose precise location is not known e.g. only a site type and townland are recorded. These are known to the National Monuments Section as ‘un-located sites’ and cannot be afforded legal protection due to lack of locational information. As a result, these are omitted from the Record of Monuments and Places. SMR sites are also listed on a website maintained by the Department of Culture, Heritage, and the Gaeltacht (DoCHG) – www.archaeology.ie.

National Monuments in State Care Database is a list of all the National Monuments in State guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of the remains of each Monument.

The Minister for the DoCHG may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Preservation Orders List contains information on Preservation Orders and/or Temporary Preservation Orders, which have been assigned to a site or sites. Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

Register of Historic Monuments was established under Section 5 of the 1987 National Monuments Act, which requires the Minister to establish and maintain such a record. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

The topographical files of the National Museum of Ireland are the national archive of all known finds recorded by the National Museum. This archive relates primarily to artefacts but also includes references to monuments and unique records of previous excavations. The find spots of artefacts are important sources of information on the discovery of sites of archaeological significance.

Cartographic sources are important in tracing land use development within the Proposed development area as well as providing important topographical information on areas of archaeological potential and the development of buildings. Cartographic analysis of all relevant maps has been made to identify any topographical anomalies or structures that no longer remain within the landscape.

- William Petty, Down Survey Map, *Barony of Nethercross, Parish of Finglasse*, c. 1656;
- John Rocque, *Map of County Dublin*, 1760;
- John Taylor, *Map of Dublin City, and its Environs*, 1816; and
- Ordnance Survey maps of County Dublin, 1843-1909.

Documentary sources were consulted to gain background information on the archaeological and cultural heritage landscape of the proposed development area.

Development Plans contain a catalogue of all the Protected Structures and archaeological sites within the county. The Fingal County Development Plan (2017–2023) was consulted to obtain information on cultural heritage sites in and within the immediate vicinity of the proposed development area.

Aerial photographic coverage is an important source of information regarding the precise location of sites and their extent. It also provides initial information on the terrain and its likely potential for archaeology. A number of sources were consulted including aerial photographs held by the Ordnance Survey, Google Earth, and Bing Maps.

Excavations Bulletin is a summary publication that has been produced every year since 1970. This summarises every archaeological excavation that has taken place in Ireland during that year up until 2010 and since 1987 has been edited by Isabel Bennett. This information is vital when examining the archaeological content of any area, which may not have been recorded under the SMR and RMP files. This information is also available online (www.excavations.ie) from 1970–2019.

Place Names are an important part in understanding both the archaeology, history, and cultural heritage of an area. Place names can be used for generations and in some cases have been found to have their root deep in the historical past. The main reference used for the place name analysis is *Irish Local Names Explained* by P.W Joyce (1870) and the Place Names Database of Ireland.

13.2.2 Field Inspection

Field inspection is necessary to determine the extent and nature of archaeological and historical remains and can also lead to the identification of previously unrecorded or suspected sites and portable finds through topographical observation and local information.

The archaeological field inspection entailed –

- walking the proposed development and its immediate environs;
- noting and recording the terrain type and land usage;
- noting and recording the presence of features of archaeological or historical significance;
- verifying the extent and condition of any recorded sites or structures (RMPs); and
- visually investigating any suspect landscape anomalies to determine the possibility of their being anthropogenic in origin and of archaeological or cultural heritage significance.

13.3 RECEIVING ENVIRONMENT

13.3.1 Archaeological and Historical Background

The area of proposed development is located in the townland of Charlestown within the Parish of Finglas and Barony of Castleknock. The site is bordered to the north by Charlestown Place, to the east by St Margaret's Road and to the south by McKelvey Celtic A.F.C and the houses of McKelvey Avenue. The townland boundary between Charlestown and Stockens forms the southern limit of the site.

The site is currently occupied by a car park and part of an open field that continues to the west. There are no recorded monuments located within 500m of the proposed development, the nearest consists of an enclosure (DU014-102), c. 525m to the north-northwest in the townland of Balseskin (Figure 13.1).

Prehistoric Period

Mesolithic Period (8000–4000 BC)

Although recent discoveries may provide evidence for human occupation of Ireland in the Upper Palaeolithic (Dowd and Carden 2016), the Mesolithic Period is the earliest time for which there is clear evidence of prehistoric activity in Ireland. During this period people hunted, foraged, and gathered food and appear to have had a mobile lifestyle. The most common evidence indicative of Mesolithic activity at a site comprises of scatters of worked flint material; a by-product from the production of flint implements (Stout and Stout 1997). Outside of the coastal areas, County Dublin has so far yielded little archaeological evidence dating to the Mesolithic period. Nonetheless, it has been suggested that the riverine landscapes of the Liffey were likely to have been inhabited towards the early part of the Mesolithic period (Kador 2007).

Neolithic Period (4000–2500 BC)

The Neolithic period saw the introduction and adoption of agriculture to Ireland. To facilitate farming, the landscape was altered dramatically, with forest clearance and the construction of field boundaries. Settlement become more permanent and pottery was produced, possibly for the first time. A concern for territory on which to farm, contributed to the construction of megalithic tombs. These communal burial places would have required great planning and cooperation to construct and were likely also served as a focus of ceremonial activities for the communities that built them. There are four types of megalithic tomb; court cairn, portal, passage, and wedge tombs.

While the uplands of Dublin feature a number of megalithic tombs there are no sites of this type, or recorded habitation sites, located within the vicinity of the proposed development area.

Bronze Age (2500–800 BC)

The Bronze Age is marked for the production and use of metal in Ireland of the first time. Megalithic tombs were replaced in favour of individual, subterranean cist or pit burials that were either created in isolation or in small cemeteries. These burials contained inhumed or cremated remains and were often, but not always, accompanied by a pottery vessel. Different forms of burial barrows were being constructed during this period, as well as large scale ceremonial monuments such as henges.

Bronze Age activity is often clearly identifiable in the landscape by the presence of *fulachta fiadh* or burnt mounds. Over 4,500 *fulachtaí fiadh* have been recorded in Ireland making them the most common prehistoric monument in Ireland. These sites were used to heat water using hot stones. They have been interpreted as places where cooking, dyeing, brewing, or bathing took place (O' Kelly 1954, Quinn and Moore 2009). There are no definite examples in the immediate area of Charlestown.

A circular pit containing a rim of coarse late Bronze Age pottery was identified in an excavation carried out c. 990m to the northeast of the proposed development area (Licence 05E0644). In the wider landscape, a host of Bronze Age artefacts have been recovered including an axehead (NMI Ref.: 1962:259) c. 2.6km to the north, a flat axehead and awl (NMI Ref.: 2003:81/2) c. 2.8km to the south-southwest and a socketed axehead and unlooped palstave (NMI Ref.: 1977-2184-5) c. 2.96km to the south-southeast.

Iron Age (800 BC–AD 500)

The Iron Age is period is traditionally known as a period for which we have little evidence. However, there is increasing evidence for Iron Age settlement and activity in recent years as a result of development-led excavations as well as projects such as LIARI (Late Iron Age and Roman Ireland). Large defensive structures and earthworks known as promontory or hill forts are characteristic of the period. The former is a banked and ditched structure located above a steep cliff or bluff and often found in coastal areas. Whilst a number of promontory forts are located along the coast of north County Dublin, there are no known Iron Age sites located within the vicinity of the proposed development area.

Early Medieval Period (AD 500–1100)

Ireland at this time was a patchwork of larger and smaller kingdoms known as *túath* and *trícha cét* respectively. During this period, Ireland is depicted in the surviving historical sources as entirely rural. Charlestown and its parish Finglas were part of territory of Brega and earliest historical records note that the *Síl nÁedo Sláine*, a dynasty of the southern *Uí Néill*, were the dominant rulers during the early medieval period (Byrne 1973, 88). They likely paid tribute and gave fealty to the King of Tara.

Secular habitation sites in the early medieval period include *crannógs*, cashels and ringforts, which are largely defined as circular enclosures surrounded by banks and ditches. In addition to these, there is some evidence for unenclosed settlements which are more difficult to identify in the archaeological record. An early medieval habitation site (DU014-115) comprising a cluster of a ditch and cess pits was excavated c. 1km to the northeast (Licence 05E0644). The ringfort or *ráth* is considered to be the most common indicator of settlement during the early medieval period. Ringforts are strongly associated with agricultural land and, as such, are rarely situated at higher altitudes. Ringforts and potential ringforts - often recorded as enclosures - are the most common archaeological sites recorded across the Irish landscape. The nearest enclosure (DU014-102) is situated c. 525m to the north-northwest, this has the potential to represent a ringfort. An enclosure and a corn-drying kiln (DU014-122001/2) were identified c. 895m to the west of the proposed development area during testing (Licence 10E0462).

Medieval Period (AD 1100–1600)

The Anglo-Norman's arrived in Ireland in 1169, to support the deposed king of Leinster, Diarmuid MacMurchadha. By the end of the 12th century the Anglo-Normans had succeeded in gaining control over much of the country (Stout & Stout 1997, 53). Leinster, including Dublin and Meath, was 'sub-infeudated', meaning that great swathes of land were parcelled out among the Anglo-Norman elites. The Anglo-Norman tenurial system more or less appropriated the older established land units known as *túaths* in the early medieval period but described the territories as manors (MacCotter 2008). In 1208, the Lordship of Fingal was granted to Walter de Lacy by King John of England. The initial stage of the invasion of the country was marked by the construction of Motte and Bailey castles, followed at a later stage by the masonry castles traditionally associated with the Anglo-Normans. This time period is also synonymous with the creation of new towns and enlargement of older urban centres. A medieval domestic and agricultural habitation site (DU014-113) was excavated c. 795m to the northeast of the proposed development area in 2005 (Licence 05E044 ext.). A large assemblage of 1,003 sherds of Dublin and Leinster ware pottery were recovered.

During the later medieval period, tower houses emerged in Ireland. In the Dublin area, especially along the 'frontier zone' there are a substantial number of tower houses and fortified buildings. This may be in part due to the presence of The Pale, which was defined as a hinterland around the centre of Anglo-Norman rule based in Dublin. During the 15th century the 'Subsidised Castles Act' provided grants of ten pounds to encourage the construction of castles to defend the Pale against the native Irish. Dubber Castle (DU014-018), thought to have been constructed between 1582 and 1611, is likely to represent such a building. It is located c. 1.3km north of the proposed development area to the immediate north of Dubber House.

Post-Medieval Period (AD 1600–1800)

The 17th century witnessed the systematic reduction of all of Ireland to English authority, largely through conflicts and the forced settlements, 'The Plantations'. As part of the process of achieving colonial dominion a number of surveys and mapping programmes were completed throughout the post-medieval period. Simington's Civil Survey of 1654–56, was an inquisition that visited each barony (land division) and took depositions from landholders based on parish and townland, with written descriptions of their boundaries to facilitate the transfer of lands. Subsequent to the Civil Survey, a project known as the Down Survey 1656–58, used the collected cadastral information to map all forfeited lands. This survey was overseen by the surgeon-general of the English army, William Petty, and a number of former soldiers. It was not just a project of mapping but of social engineering that was underpinned by a massive transfer in landownership from Irish Catholics to English Protestants. This survey is the first ever detailed land survey on a national scale anywhere in the world and gives great insight in Ireland at this time, although the townland of Charlesland is not depicted within this mapping.

The 18th century saw a dramatic rise in the establishment of large residential houses around the country. The large country house was only a small part of the overall estate of a large landowner and provided a base to manage often large areas of land that could be located nationwide. Lands associated with the large houses were generally turned over to formal gardens, which were much the style of continental Europe. By the mid-18th century more natural parkland landscapes were in favour although the creation of these required considerable effort, including moving earth, removal of field boundaries, culverting streams to form lakes and quite often roads were completely diverted to avoid travelling anywhere near the main house or across the estate. The site of Charlestown House is depicted c. 60m to the east of the proposed development area on the first edition OS map, but it no longer survives.

13.3.2 Summary of Previous Archaeological Investigations

A review of the Excavations Bulletin (1970–2019) has revealed that no previous archaeological investigations have taken place within the proposed development; however, three investigations have been carried out within the study area, a 500m radius of the proposed development.

Testing for a residential development c.55m to the northeast (Licence 05E0058, Bennett 2005:486) along with testing c.300m to the west (Licence 96E0023, Bennett 1996:119) and testing for an upgrade to the M50, c. 235-405m to the northwest (Licence 05E0063, Bennett 2006:568), did not identify anything of archaeological significance.

13.3.3 Fingal Development Plan 2017-2023

The Fingal Development Plan 2017–2023 recognises the statutory protection afforded to archaeological sites included within the Record of Monuments and Places and seeks to protect those monuments, to including their setting, access, views, and prospects. Fingal County Council recognises the value and significance of the county’s archaeological heritage, and the importance of fostering a greater public appreciation of this heritage. Through policies contained in this Development Plan, they seek to ensure the effective protection, conservation and enhancement of archaeological sites, monuments, and their settings (Appendix 13.1).

There are no recorded archaeological sites within a 500m buffer of the proposed development. The nearest recorded monument comprises an enclosure (DU014-102), c. 525m to the north-northwest in the townland of Balseskin (Figure 13.1).

13.3.4 National Museum of Ireland (NMI): Topographical Files

Information on artefact finds from the study area in County Dublin has been recorded by the National Museum of Ireland since the late 18th century. Location information relating to these finds is important in establishing prehistoric and historic activity in the study area.

A review of the topographical files revealed that no stray finds have been recovered from the study area of the proposed development.

13.3.5 Cartographic Sources

William Petty, Down Survey Map, Barony of Nethercross, Parish of Finglasse, c. 1656
The townland of Charlestown is not annotated on this mapping and the area of the proposed development was located within the Parish of ‘Finglasse’ at this time. The nearby townlands

of 'Jamestonne' (Jamestown) and 'Kilronan' (Kildonan) are both depicted. No detail relating to the proposed development is depicted.

John Rocque, Map of County Dublin, 1760 (Figure 13.2)

This map shows the proposed development area within an open agricultural landscape to the immediate west of Charlestown House and a north-south orientated road (the modern St Margaret's Road). A northwest-southeast orientated road traverses the northeast corner of the site connecting the north-south road to 'Killodin' (Kildonan) House in the west.

John Taylor, Map of Dublin City and its Environs, 1816 (Figure 13.2)

The general area containing the proposed development area is still depicted at the junction of two roads next to Charlestown House. There are no changes of note aside from the construction of the 'Great Slane Road and to Londonderry' to the west of the site.

First Edition Ordnance Survey Map, 1843, scale 1:10,560 (Figure 13.3)

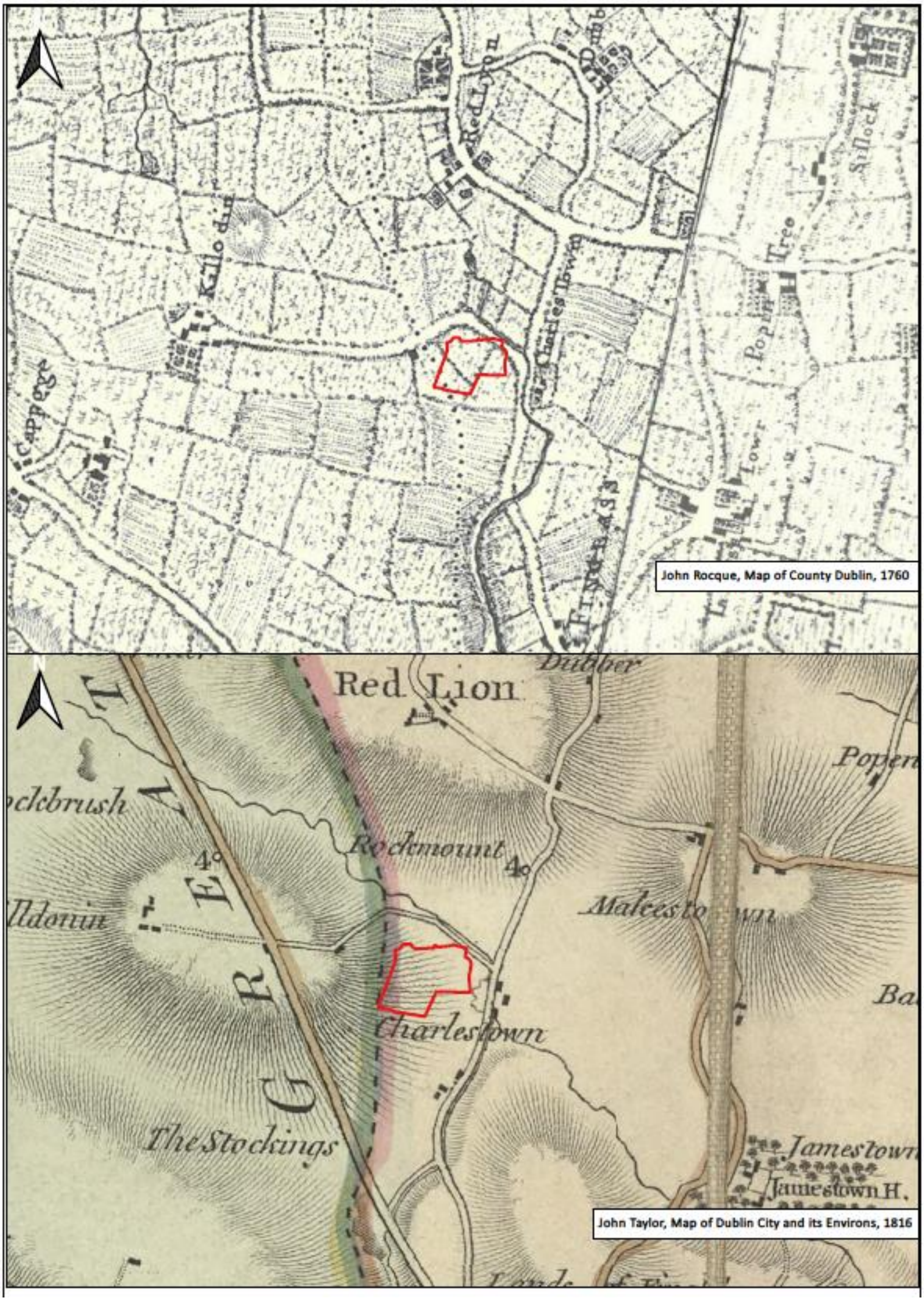
This is the first accurate historic mapping coverage of the area containing the proposed development, which is contained within the townland of Charlestown. This map depicts the proposed development area within a rural landscape, largely unchanged from Taylor's map. The site is situated within five agricultural fields to the west of the two structures of Charlestown House. The road to Kildonan House is still located within the northeast corner of the site. The southern boundary of the site is formed by the townland boundary between Charlestown and Stockens.

Second Edition Ordnance Survey Map, 1871, scale 1:10,560

There are no major changes to note within the cartography of this map that relate to the proposed development area.

Ordnance Survey Map, 1909, scale 1:2,500 (Figure 13.3)

There are few significant changes to the proposed development area by the time of this map in 1909. The road that traverses the northeast corner has been removed as have the majority of the field boundaries, the site is now situated in two fields. Charlestown House to the east has been redeveloped and now comprises eight structures.



John Rocque, Map of County Dublin, 1760

John Taylor, Map of Dublin City and its Environs, 1816

Figure 13.2 Extract from Rocque (1760) and Taylor (1816) showing the approximate location of the development

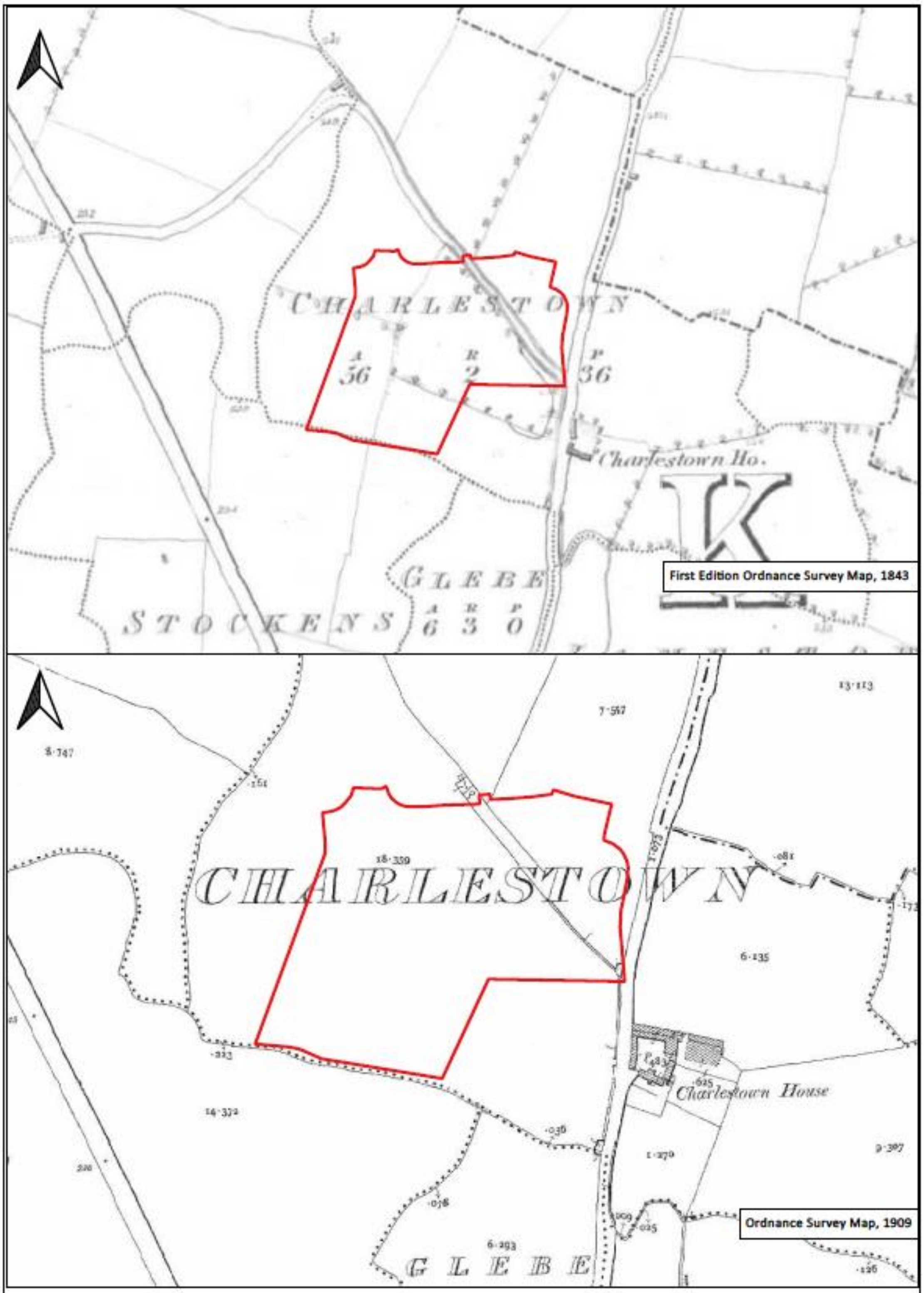


Figure 13.3 Extract from the 1843 and 1909 OS maps showing the proposed development

13.3.6 Aerial Photographic Analysis

Inspection of the aerial photographic coverage of the proposed development area held by the Ordnance Survey (1995-2013), Google Earth (2002-2019), and Bing Maps revealed that between 1995 and 2008 there was significant development to the north and east of the proposed development.

Charlestown House, to the east of the site, was removed and built over prior to 1995. The road that borders the site to the north, Charlestown Place, was constructed between 2000 and 2005. The car park that occupies the northeast of the site was built by 2008 and the football pitch to the south was laid in 2012. No previously unknown archaeological features were identified. A small section of the south-westerly part of the site remains as greenfield, but it appears that some debris has been deposited in this area.

13.3.7 Townlands

The townland is an Irish land unit of considerable longevity as many of the units are likely to represent much earlier land divisions. However, the term townland was not used to denote a unit of land until the Civil Survey of 1654. It bears no relation to the modern word ‘town’ but like the Irish word *baile* refers to a place. It is possible that the word is derived from the Old English *tun* land and meant ‘the land forming an estate or manor’ (Culleton 1999, 174).

Gaelic land ownership required a clear definition of the territories held by each sept and a need for strong, permanent fences around their territories. It is possible that boundaries following ridge tops, streams or bog are more likely to be older in date than those composed of straight lines (*ibid*. 179).

The vast majority of townlands are referred to in the 17th century, when land documentation records begin. Many of the townlands are mapped within the Down Survey of the 1650s, so called as all measurements were carefully ‘laid downe’ on paper at a scale of forty perches to one inch. Therefore, most are in the context of pre-17th century landscape organisation (McErlean 1983, 315).

In the 19th century, some demesnes, deer parks or large farms were given townland status during the Ordnance Survey and some imprecise townland boundaries in areas such as bogs or lakes, were given more precise definition (*ibid*.). Larger tracks of land were divided into several townlands, and named Upper, Middle or Lower, as well as Beg and More (small and large) and north, east, south, and west (Culleton 1999, 179). By the time the first Ordnance Survey had been completed a total of 62,000 townlands were recorded in Ireland.

The proposed development area is located within the townland of Charlestown, Parish of Finglas and Barony of Castleknock, County Dublin. The townland boundary between Charlestown and Stockens forms the south-western limit of the site. The field inspection confirmed that the townland boundary is extant and made-up of mature trees and vegetation. This is the only cultural heritage feature within the study area of the site.

13.3.8 Place name Analysis

Townland and topographic names are an invaluable source of information on topography, land ownership and land use within the landscape. They also provide information on history; archaeological monuments and folklore of an area. A place name may refer to a long-forgotten site and may indicate the possibility that the remains of certain sites may still survive below the ground surface. The Ordnance Survey surveyors wrote down townland names in the 1830’s and 1840's, when the entire country was mapped for the first time. Some of the townland names in the study area are of Irish origin and through time have been anglicised. The main references used for the place name analysis are Irish Local Names Explained by P.W Joyce (1870) and www.logainm.ie.

Name	**Derived From**	**Meaning**
Charlestown	*Charlestowne (Anglo)*	Town of Charles
Stockens	*Stokkyn/Stocáin*	Stakes or stumps
Glebe	*Glebe (Anglo)*	Refers to a glebe house
Jamestown Little	*Jameston (Anglo)*	Town of James
Kildonan	*Cill Dónáin*	Donan's church
Cardiffscastle	*Kardiff's Castle*	Castle of the Cardiff family
Meakstown	*Mayoweston*	Meake is a family name
Dubber	*A dtobar*	A well
Balseskin	*Baile Seiscinn*	Town of the moor
Finglas	*Finnglaissi*	Clear/white stream
Santry	*Seantruibh*	Old tribe
St. Margaret's	*St. Margaret*	St. Margaret of Dowaner
Castleknock	*Caisleán Cnucha*	The old castle on the small hill
Coolock	*Coologe*	Little corner or angle

Table 13.1 Townlands, parishes, and baronies within the study area of the proposed development

13.3.9 Field Inspection

The field inspection sought to assess the site, its previous and current land use, the topography, and any additional information relevant to the report. During the course of the field investigation the proposed residential development site and its immediate surrounding environs were inspected (Figure 13.1).

The eastern portion of the site consists of a flat, tarmacked car park lined by metal fences and slightly raised up above the surrounding area to the north, east and south (Plates 13.1 and 13.2). It is bordered by Charlestown Place to the north, St Margaret's Road to the east, and the entrance road to the car park and to the football club to the west and south (Plates 13.3 and 13.4).

The south-western portion of the proposed development consists of an overgrown, uneven field (Plate 13.5). It is bounded by grass covered berms to the north and east. The townland boundary between Charlestown and Stockens, consisting of mature vegetation and trees, is still extant and forms the south-western border of the site. Along the southern border there is an enclosed square area of lawn, marked as private property, which appears to contain a modern pet grave and some garden furniture (Plate 13.6). No previously unrecorded sites or areas of archaeological potential were noted during the field inspection.

Plate 13.1 Car park, facing northwest

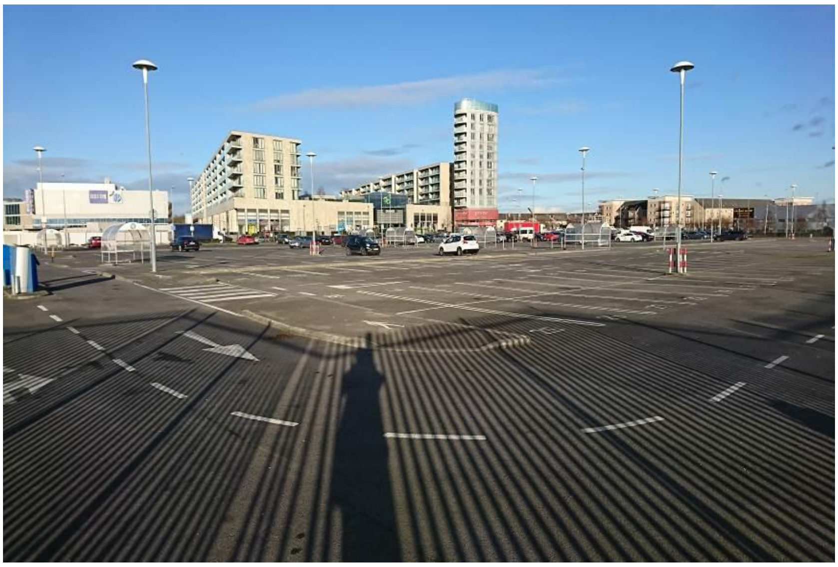


Plate 13.2 Car park, facing northeast

Plate 13.3 Road to car park and berm in western portion, facing southeast

Plate 13.4 Road to football club, facing east

Plate 13.5 South-western portion, facing southeast

Plate 13.6 Enclosed area, facing southwest

13.3.10 Conclusions

The proposed residential development is located within a highly developed area and contains a car park and a portion of disturbed open field within the townland of Charlestown, Parish of Finglas, and Barony of Castleknock. There are no recorded monuments within 500m of the site and none of the previous archaeological works in the surrounding area have encountered anything of archaeological significance. The nearest recorded monument comprises an enclosure (DU014-102), c. 525m to the north-northwest in the townland of Balseskin. The townland boundary between Charlesland and Stockens to the immediate south is the only cultural heritage feature within the proposed development and its study area.

An inspection of the cartographic sources revealed that the site remained a series of open fields at a Y-junction and beside Charlestown House throughout the post-medieval period. A review of the aerial photography did not identify anything of archaeological significance and noted that a portion of the site, as well as lands to the north and east of the site underwent significant development throughout the late 1990s and 2000s. The field inspection did not identify any previously unrecorded sites or archaeological or cultural heritage significance.

13.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in Chapter 3.

13.5 CONSTRUCTION IMPACTS, MITIGATION & MONITORING

13.5.1 Construction Impacts

It is possible that ground disturbances associated with the proposed development may have a direct negative impact on archaeological remains that may survive beneath the current ground level in the south-western part of the site. No negative impacts are predicted in the area where the existing car park is located, as ground disturbances here are likely to have resulted in the removal of any archaeological features or deposits.

13.5.2 Mitigation Measures

In order to mitigate these potential impacts, the following mitigation measure applies:-

CH-C1	All topsoil stripping in the south-western portion of the site will be monitored by a suitably qualified archaeologist. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation *in-situ* or by record. Any further mitigation will require approval from the National Monuments Service of the DoCHG.

13.6 OPERATIONAL IMPACTS, MITIGATION & MONITORING

No impacts are predicted upon the archaeological or cultural heritage resource as a result of the operation of the proposed development.

13.7 RESIDUAL IMAPCTS

Following the implementation of the above mitigation strategies in relation to the predicted impacts at construction stage, there will be no residual impacts upon the archaeological or cultural heritage resource.

13.8 'DO NOTHING' SCENARIO

If the proposed development were not to proceed, there would be no impacts upon the archaeological or cultural heritage resource.

13.9 INTERACTIONS

No interactions between archaeology and cultural heritage and any other discipline have been identified during the course of this assessment.

13.10 REFERENCE LIST

Documentary Sources

- Bennett, I. (ed.) 1987–2010 *Excavations: Summary Accounts of Archaeological Excavations in Ireland*. Bray. Wordwell.
- Byrne, F. J. 1973. *Irish kings and high-kings*. London: Batsford.
- Chartered Institute for Archaeologists 2014a *Standards & Guidance for Field Evaluation*.
- Chartered Institute for Archaeologists 2014b *Standards & Guidance for Archaeological Excavation*.
- Chartered Institute for Archaeologists 2014c *Standards & Guidance for an Archaeological Watching Brief (Monitoring)*.
- Culleton, E. 1999 *Celtic and early Christian Wexford*, Dublin: Four courts Press.
- Curl, J. S. 1997 *Encyclopaedia of Architectural Terms.* London. Donhead Publishing.
- Department of Arts, Heritage, Gaeltacht, and the Islands. 1999a *Framework and Principles for the Protection of the Archaeological Heritage*. Dublin. Government Publications Office.
- Department of Arts, Heritage, Gaeltacht, and the Islands. 1999b *Policy and Guidelines on Archaeological Excavation*. Dublin. Government Publications Office.
- Dowd, M. and Carden, R. 2016 First evidence of a Late Upper Palaeolithic human presence in Ireland. *Quaternary Science Reviews* 139, 158–63.
- Environmental Protection Agency. 2015 *Draft Advice Notes on Current Practice (in the preparation of Environmental Impact Statements)*. Dublin. Government Publications Office.
- Environmental Protection Agency. 2017 *Draft Guidelines on the Information to be Contained in Environmental Impact Statements*. Dublin. Government Publications Office.
- *Fingal County Development Plan, 2017-2023*.
- Kador, T. 2007 'Where are we going? Movement and mobility in Mesolithic research'. *Internet Archaeology*, (22).
- Lewis, S. 1837 (online edition) *Topographical Dictionary of Ireland*.
- MacCotter, P. 2008. *Medieval Ireland: Territorial, Political and Economic Divisions*. Four Courts Press, Dublin.

- McErlean, T., 1983 ‘The Irish townland system of landscape organisation’, in Reeves-Smyth, T. Hamond, F. *Landscape Archaeology in Ireland*. BAR British Series 116. pp. 315–39.
- National Monuments Service, Department of Culture, Heritage, and the Gaeltacht. *Sites and Monuments Record*, County Dublin.
- National Museum of Ireland. *Topographical Files*, County Dublin.
- O’ Kelly, M.J. 1954 Excavations and experiments in ancient Irish cooking places. *Journal of the Royal Society of Antiquaries of Ireland* 84, 105–55.
- Quinn, B. and Moore, D. 2009 Fulachta fiadh and the beer experiment. In M. Stanley, E. Danaher, and J. Eogan (eds) *Dining and Dwelling: Proceedings of a public seminar on archaeological discoveries on national road schemes, August 2008. National Roads Authority Monograph Series* No.6. Dublin. National Roads Authority, 43–53.
- Stout, G and Stout, M 1997 ‘Early Landscapes: from Prehistory to Plantation’ In Aalen, F.H.A et al (eds) 1997 *Atlas of the Irish Rural Landscape* Cork University Press.

Cartographic Sources

- William Petty, *Down Survey Map, Barony of Nethercross, Parish of Finglasse*, c. 1656.
- John Rocque, *Map of County Dublin*, 1760.
- John Taylor, *Map of Dublin City, and its Environs*, 1816.
- Ordnance Survey maps of County Dublin, 1843, 1871, 1909.

Electronic Sources

- www.excavations.ie – Summary of archaeological excavation from 1970-2019.
- www.archaeology.ie – DoCHG website listing all SMR/RMP sites.
- www.osiemaps.ie – Ordnance Survey aerial photographs dating to 1995-2013 and 6-inch/25-inch OS maps.
- www.heritagemaps.ie – The Heritage Council web-based spatial data viewer which focuses on the built, cultural, and natural heritage.
- www.googleearth.com – Satellite imagery of the proposed development area.
- www.bingmaps.com – Satellite imagery of the proposed development area
- www.booksulster.com/library/plnm/placenamesC.php - Contains the text from Irish Local Names Explained by P.W Joyce (1870).
- www.logainm.ie – Place names Database of Ireland launched by Fiontar agus Scoil na Gaelige and the DoCHG.

14.0 LANDSCAPE

14.1 INTRODUCTION

This chapter assesses the potential effects of the proposed development on the landscape character and views/visual amenity in the receiving environment. It should be read in conjunction with the verified photomontages contained in Appendix 14A of the EIAR.

The Landscape and Visual Impact Assessment (LVIA) was prepared by Richard Butler of Model Works Ltd. Richard has degrees in Landscape Architecture and Town Planning, is a member of the Irish Landscape Institute and the Irish Planning Institute and has over 20 years' experience in development and environmental planning, specialising in LVIA.

14.2 ASSESSMENT METHODOLOGY

The assessment was carried out with reference to:

- *Guidelines for Landscape and Visual Impact Assessment*, 3rd edition, 2013 (GLVIA), published by the Landscape Institute;
- *Technical Information Note on Townscape Character Assessment*, 2016, published by the Landscape Institute;
- *Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*, 2017, published by the EPA;
- *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment*, 2018, published by the Department of Housing, Planning and Local Government.

The draft EPA guidelines provide a general methodology and impact ratings for all environmental topics covered in an EIAR; the GLVIA provides specific guidelines for landscape and visual impact assessment. Therefore, a combination of the draft EPA guidelines and the GLVIA has informed the methodology for this assessment.

The GLVIA requires that effects on views and visual amenity be assessed separately from the effects on townscape, although the two topics are inherently linked.

'Landscape' (or 'townscape' in built up areas) results from the interplay between the physical, natural and cultural components of our surroundings. Different combinations and spatial distribution of these elements create variations in landscape/townscape character. Landscape/townscape impact assessment identifies the changes to this character which would result from the proposed development, and assesses the significance of those effects on the landscape/townscape as a resource.

Visual impact assessment is concerned with changes that arise in the composition of available views, the response of people to these changes and the overall effects on the area's visual amenity - with particular focus on public views and public visual amenity.

14.2.1 Methodology for Assessment of Townscape Effects

Assessment of potential townscape effects involves (a) classifying the sensitivity of the townscape resource, (b) classifying the magnitude of townscape change which would result from the development, and (c) combining these factors to arrive at a classification of significance of the effects.

Townscape Sensitivity

The sensitivity of the townscape is a function of its land use, patterns and scale, visual enclosure and the distribution of visual receptors, and the value placed on the townscape. The nature and scale of the proposed development is also taken into account, as are any trends of change, and relevant policy. Five categories are used to classify sensitivity (Table 14.1).

Table 14.1: Categories of Townscape Sensitivity

Sensitivity	Description
Very High	Areas where the townscape exhibits very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness and harmony. The townscape character is such that its capacity to accommodate change is very low. These attributes are recognised in policy or designations as being of national or international value and the principle management objective for the area is protection of the existing character from change.
High	Areas where the townscape exhibits strong, positive character with valued elements, features and characteristics. The character is such that it has limited/low capacity to accommodate change. These attributes are recognised in policy or designations as being of national, regional or county value and the principle management objective for the area is conservation of the existing character.
Medium	Areas where the townscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong, or has evidence of alteration, degradation or erosion of elements and characteristics. The townscape character is such that there is some capacity for change. These areas may be recognised in policy at local or county level and the principle management objective may be to consolidate townscape character or facilitate appropriate, necessary change.
Low	Areas where the townscape has few valued elements, features or characteristics and the character is weak. The character is such that it has capacity for change; where development would make no significant change or would make a positive change. Such townscapes are generally unrecognised in policy and the principle management objective may be to facilitate change through development, repair, restoration or enhancement.
Negligible	Areas where the townscape exhibits negative character, with no valued elements, features or characteristics. The character is such that its capacity to accommodate change is high; where development would make no significant change or would make a positive change. Such townscapes include derelict industrial lands, as well as sites or areas that are designated for a particular type of development. The principle management objective for the area is to facilitate change in the townscape through development, repair or restoration.

Magnitude of Townscape Change

Magnitude of change is a factor of the scale, extent and degree of change imposed on the townscape by a development, with reference to its key elements, features, characteristics and any affected surrounding character areas (collectively known as ‘townscape receptors’). Five categories are used to classify magnitude of change (Table 14.2).

Table 14.2: Categories of Townscape Change

Sensitivity	Description
Very High	Change that is large in extent, resulting in the loss of or major alteration to key elements, features or characteristics of the townscape, and/or introduction of large elements considered totally uncharacteristic in the context. Such development results in fundamental change in the character of the townscape.
High	Change that is moderate to large in extent, resulting in major alteration to key elements, features or characteristics of the townscape, and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the townscape.
Medium	Change that is moderate in extent, resulting in partial loss or alteration to key elements, features or characteristics of the townscape, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape.
Low	Change that is moderate or limited in scale, resulting in minor alteration to key elements, features or characteristics of the townscape, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape.
Negligible	Change that is limited in scale, resulting in no alteration to key elements features or characteristics of the townscape, and/or introduction of elements that are characteristic of the context. Such development results in no change to the townscape character.

Significance of Effects

To classify the significance of effects the magnitude of change is measured against the sensitivity of the townscape using the guide in Table 14.3 below. This matrix is only a guide. The assessor also uses professional judgement informed by their expertise, experience and common sense to arrive at a classification of significance that is reasonable and justifiable.

Table 14.3: Guide to Classification of Significance of Townscape and Visual Effects

		Sensitivity of the Townscape/View				
		Very High	High	Medium	Low	Negligible
Magnitude of Townscape/ Visual Change	Very High	Profound	Profound to Very Significant	Very Significant to Significant	Moderate	Slight
	High	Profound to Very Significant	Very Significant	Significant	Moderate to Slight	Slight to Not Significant
	Medium	Very Significant to Significant	Significant	Moderate	Slight	Not Significant
	Low	Moderate	Moderate to Slight	Slight	Not significant	Imperceptible
	Negligible	Slight	Slight to Not Significant	Not significant	Imperceptible	Imperceptible

14.2.2 Methodology for Assessment of Visual Effects

Assessment of visual effects involves identifying a number of key/representative viewpoints in the receiving environment, and for each of these: (a) classifying the viewpoint sensitivity, (b) classifying the magnitude of change which would result in the view (informed by verified photomontages), and (c) combining these factors to arrive at a classification of significance of the effects on the view.

Sensitivity of the Viewpoint/Visual Receptor

Viewpoint sensitivity (see five categories in Table 14.4) is a function of two main considerations:

- Susceptibility of the visual receptor to change. This depends on the occupation or activity of the people experiencing the view, and the extent to which their attention is focussed on the views or visual amenity they experience at that location. Visual receptors most susceptible to change include residents at home, people engaged in outdoor recreation focused on the landscape (e.g. trail users), and visitors to heritage attractions and places of congregation where the setting contributes to the experience. Visual receptors less sensitive to change include travellers on road, rail and other transport routes (unless on recognised scenic routes), people engaged in outdoor recreation where the surrounding landscape does not influence the experience, and people in their place of work or shopping.
- Value attached to the view. This depends to a large extent on the subjective opinion of the visual receptor but also on factors such as policy and designations (e.g. scenic routes, protected views), or the view or setting being associated with a heritage asset, visitor attraction or having some other cultural status (e.g. by appearing in arts).

Table 14.4: Categories of Viewpoint Sensitivity

Sensitivity	Description
Very High	Iconic viewpoints (views towards or from a townscape feature or area) that are recognised in policy or otherwise designated as being of national value. The composition, character and quality of the view are such that its capacity for change is very low. The principle management objective for the view is its protection from change.
High	Viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (e.g. views from houses or outdoor recreation amenities focused on the townscape). The composition, character and quality of the view may be such that its capacity to accommodate change may or may not be low. The principle management objective for the view is its protection from change that reduces visual amenity.
Medium	Views that may not have features or characteristics that are of particular value, but have no major detracting elements, and which thus provide some visual amenity. These views may have capacity for appropriate change and the principle management objective is to facilitate change to the composition that does not detract from visual amenity, or which enhances it.
Low	Views that have no valued feature or characteristic, and where the composition and character are such that there is capacity for change. This category also includes views experienced by people involved in activities with no particular focus on the landscape. For such views the principle management objective is to facilitate change that does not detract from visual amenity or enhances it.

Negligible	Views that have no valued feature or characteristic, or in which the composition may be unsightly (e.g. in derelict landscapes). For such views the principle management objective is to facilitate change that repairs, restores or enhances visual amenity.

Magnitude of Change to the View

Classification of the magnitude of change takes into account the size or scale of the intrusion of development into the view (relative to the other elements and features in the composition, i.e. its relative visual dominance), the degree to which it contrasts or integrates with the other elements and the general character of the view, and the way in which the change will be experienced (e.g. in full view, partial or peripheral view, or in glimpses). Five categories are used to classify magnitude of visual change to a view (Table 14.5):

Table 14.5: Categories of Magnitude of Visual Change

Sensitivity	**Description**
Very High	Full or extensive intrusion of the development in the view, or partial intrusion that obstructs valued features or characteristics, or introduction of elements that are completely out of character in the context, to the extent that the development becomes dominant in the composition and defines the character of the view and the visual amenity.
High	Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.
Medium	Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.
Low	Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.
Negligible	Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.

Significance of Visual Effects

As with townscape effects, to classify the significance of visual effects the magnitude of change to the view is measured against the sensitivity of the viewpoint using the guide in Table 14.3 above.

14.2.3 Quality of Effects

In addition to predicting the significance of the effects, EIA methodology [draft EPA guidelines Table 3.3, p.50] requires that the quality of the effects be classified as positive/ beneficial, neutral, or negative/ adverse. For townscape to a degree, but particularly for visual effects, this is an inherently subjective exercise. This is because townscape and visual amenity are perceived by people and are therefore subject to variations in the attitude and values - including aesthetic preferences - of the receptor. One person's attitude to a development may differ from another person's, and thus their response to the effects of a development on a townscape or view may vary.

Additionally, in certain situations there might be policy encouraging a particular development in an area, in which case the policy is effectively prescribing townscape and visual change. If a development achieves the objective of the policy the resulting effect might be considered positive, even if the townscape character or views are profoundly changed. The classification of quality of townscape and visual effects should seek to take these variables into account and provide a reasonable and robust assessment.

14.2.4 Photomontage Methodology

The photomontages were produced by Model Works Ltd. The photomontage methodology is based on the Landscape Institute advice note 01/11 Photography and Photomontage in Landscape and Visual Impact Assessment and 20 years' experience in photomontage production. The method has five main steps:

- Photography
- Survey
- 3D Modelling and Camera Matching
- Rendering and Finishing of Photomontages
- Presentation

Photography

- Date, Time and Conditions: The photography is timed so that the scene conditions, weather conditions and sun position allow - as far as possible - for a clear and representative baseline photograph to be captured. The objective is to ensure that all key elements of the view are clearly visible and unobscured by, for example, vehicular or pedestrian traffic in the foreground, precipitation, darkness/shade, sun glare, etc. The date and time of each photograph are recorded so that the sun position can be accurately portrayed in the 3D model ultimately montaged into the baseline photograph.
- Camera and Camera Set-up: The photographs are taken using a Canon EOS5D Mark II camera with a 21 mega pixel sensor and image resolution of 5616 x 3744 pixels. At each viewpoint the camera is positioned on a tripod with the lens 1.65m above ground level (the level of the average adult's eyes), directed at the site and levelled in the horizontal and vertical axes.
- Lenses: Prime lenses (fixed focal length with no zoom function) are used as this ensures that the image parameters for every photograph are the same and that all photographs taken with the same lens are comparable. For the close-up to middle distant views a 24mm prime lens is normally used. This lens captures a field of view of 73 degrees. This relatively wide field of view is preferred for the purpose of Landscape and Visual Impact Assessment as it shows more of the context landscape/townscape surrounding a site. For distant viewpoints a 50mm prime lens may be used, capturing a 39 degree horizontal field of view.

Survey

The coordinates of each viewpoint/camera position, including the elevation, are recorded using a survey grade GPS receiver, the Trimble Geo7X, which is accurate to within 1cm. For each viewpoint, the coordinates of several static objects in the view are also surveyed (e.g. lamp posts, bollards, corners of buildings, etc.). The coordinates of these 'markers' are used as reference points later in the process, to ensure that the direction of view of the cameras in the 3D model matches the direction of view of the photographs.

3D Model and Camera Matching

- <u>Creation of 3D Model</u>: An Autodesk Revit model of the proposed development was supplied by the architect for the production of the photomontages. Model Works exported the Revit model into the software package Autodesk 3DS Max, in which materials were applied to the model's buildings and surfaces. Model Works built a 3D model of the proposed public realm/landscaping based on AutoCAD drawings provided by the landscape architect.
- <u>3D Camera Positions</u>: The surveyed camera positions and the markers for each view are inserted into the 3D model, with information on the focal length of the lens attributed to each camera. For each camera/view, the date and time is set to match those of the original photograph. This ensures that the direction of sunlight and shadows in the 3D model match those of the photographs.
- <u>Camera Matching</u>: The photographs are then inserted as backdrops to the views of each camera in the 3D model. The direction of view of the cameras in the 3D model are matched with the direction of view of the photographs using the surveyed markers. This ensures that the camera positions, the direction of the views and the focal length of the cameras in the 3D model are accurate, so that the proposed development appears in the correct position and scale when montaged into the photographs.

Rendering of 3D Model and Finishing of Photomontages

For each view a render of the development is generated. This is the process of creating a photo-realistic image of the 3D model, as seen from each camera position, with sunlight and shadow applied to the model. The render of the development is then montaged into the photograph to create the photomontage.

Presentation and Viewing

The individual photomontages are presented on A3 pages in landscape format in Appendix 14A. For each photomontage, the viewpoint number, location description, and the date and time of photography are provided on the page.

14.3 RECEIVING ENVIRONMENT

14.3.1 The Site

The site is a 3.9ha land parcel comprised of a large surface parking area and an area of undeveloped grassland. It is located in the centre of Charlestown, a rapidly developing urban core at the northern edge of Dublin City, bound by the M50 to the north and the N2/ North Road to the west. The site has c. 220m frontage to Charlestown Place to the north, and c. 100m frontage to St Margaret's Road to the east. These are the two main thoroughfares serving Charlestown.

Charlestown is designated a *'Town and District Centre'* in the Fingal County Development Plan 2017-2023 (FCDP), and the entire site is zoned *'TC – Town and District Centre'*. Charlestown is also classified as a *'Consolidation Area Within the Gateway'*. Therefore, Objectives SS15 and SS16 apply to the site. These seek to 'strengthen and consolidate urban areas adjoining Dublin City in order to maximise the efficient use of existing infrastructure and services', and 'achieve higher densities where such an approach would be in keeping with the character and form of existing residential communities, or would otherwise be appropriate in the context'.

The site is thus a part-brownfield site of strategic scale, centrally located in the evolving town centre of Charlestown with frontage to the two main streets, zoned for town centre development with an objective to achieve higher densities.

14.3.2 Evolution of the Charlestown Townscape

Late 20th Century

The Ordnance Survey aerial photograph from 1995 (Figure 14.1) shows Charlestown to have been peri-urban in character, the landscape comprised of both urban generated and rural elements. The Northway and McKelvey residential estates at the northern edge of Finglas bordered on areas of agricultural fields. There was a corridor of industrial development emerging along North Road. Most notably, the M50 was in the process of construction, including the N2/ North Road junction and the St Margaret's Road overpass.

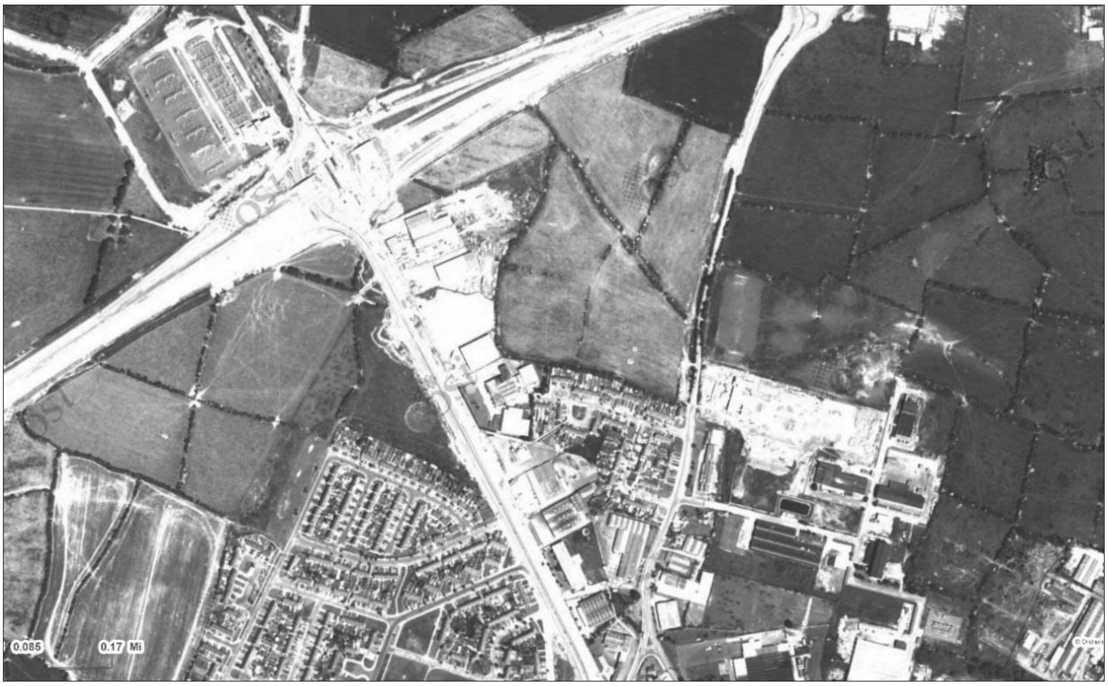


Figure 14.1: 1995 Aerial photograph

21st Century

The 2005 aerial photograph (Figure 14.2) shows that development had begun to fill in the previously agricultural lands between the former urban edge and the M50. Extensive industrial development had taken place to the east of Charlestown/ St Margaret's Road (the Century and Jamestown Business Parks) and to the west of North Road (North Park). A significant development in this phase was the construction of the Charlestown and Lanesborough residential estates to the east of St Margaret's Road and north of Melville Road. Lanesborough Park can be seen, enclosed within the new estates. These developments reinforced the local urban/ townscape character, which remained dominated by low density residential use and industry.

A large area of agricultural land remained in Charlestown, between St Margaret's Road to the east and the commercial/ industrial strip along North Road to the west. Charlestown Place (in the process of construction at that time) would open this area up to a new phase of development.

Figure 14.2: 2005 Aerial photograph

In the mid-2000s the Charlestown Centre was built on a part of this land parcel, fronting Charlestown Place and St Margaret's Road. This was a mixed use, high density development of distinctly urban character and appreciably high design and material quality. It employed urban design principles such as the use of strong building lines, active frontage and building height to define streets and generate place-identity, improving legibility. The buildings are mostly five residential storeys above a two storey commercial base, and there is also a landmark residential tower of 12 storeys beside the central junction. The quality of the development, in combination with the mix of uses (introducing convenience and comparison retail) were such that they changed the character and raised the quality of the Charlestown townscape generally.

Other notable additions to the area included the McKelvey Celtic Football Club (beside the subject site), the Gas Networks Ireland headquarters to the north of the Charlestown Centre, and a strip of motor dealerships along the M50 frontage. A cinema complex was added to Charlestown Centre and in the last number of years construction has progressed on the Phase 2 apartment scheme adjoining (to the west of) the original centre. This will complete the urban built frontage to Charlestown Place opposite the site, forming one side of a wide city boulevard.

The result of the evolution described above is a mixed use, mixed density townscape of diverse character. It includes elements of urban character and high quality (Charlestown Centre, Gas Networks Ireland), as well as elements which detract from the townscape (the industrial complexes – although these are a part of the area's identity, and are centres of employment). Importantly, Charlestown has established a clear identity, due in part to its strong core but also to its location beside the M50, the landmark tower, the distinctive strip of motor dealerships, etc. There is also a large, lower density residential component to the townscape, which combines with the higher density core to form an urban area of diversity and substance.

The townscape will remain incomplete however until the subject site is developed. This has the potential to (a) enlarge and strengthen the urban structure of the town centre, and (b) combine with Charlestown Centre Phases 1 and 2 to complete the formation of a main street in the centre of the town.

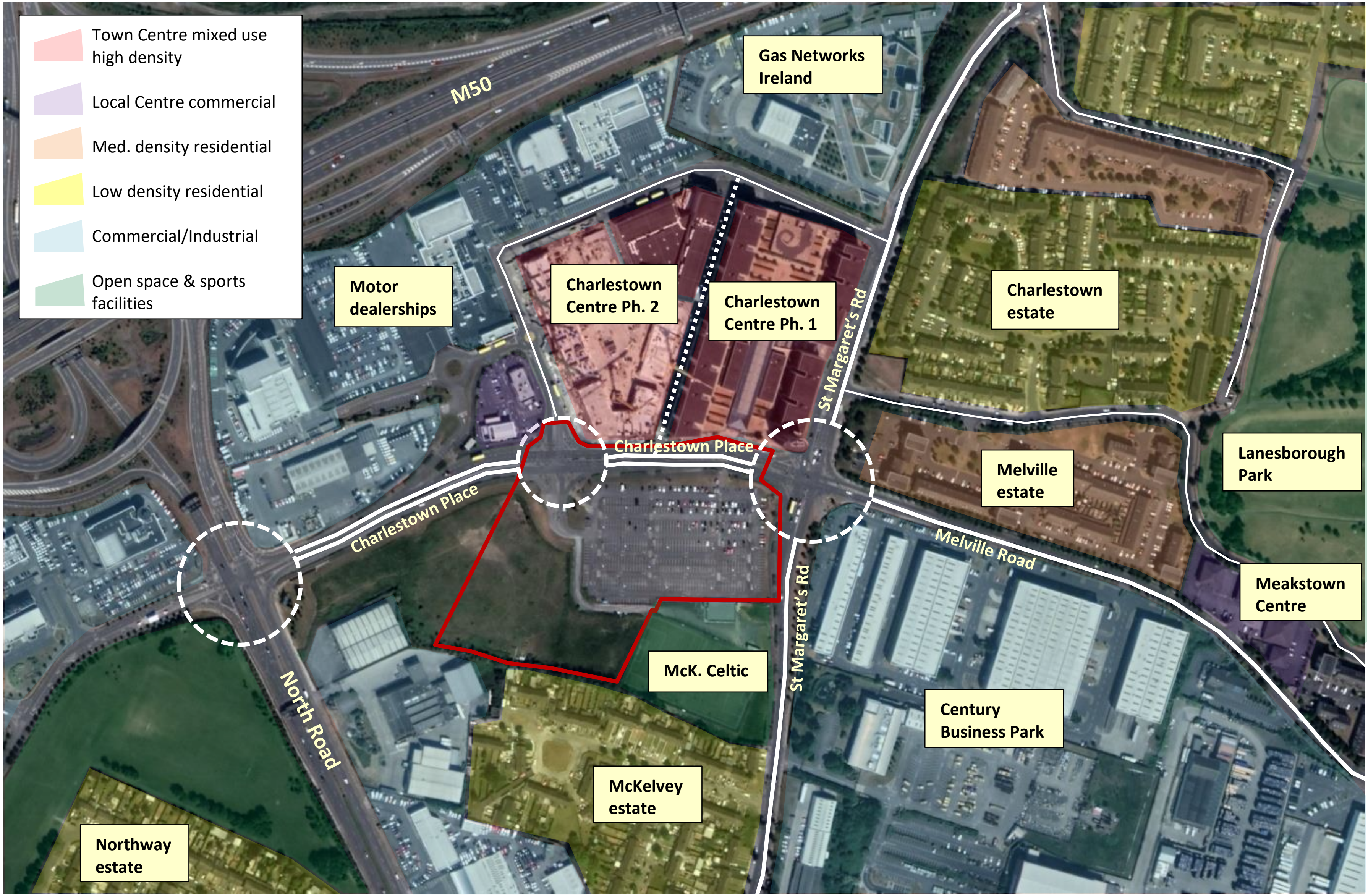


Figure 14.3: Key Townscape Elements, Features and Character Areas in the Receiving Environment

14.3.3 Townscape Elements and Character Areas in the Receiving Environment

The key elements and character areas in the receiving environment, i.e. the potential receptors of townscape and visual change on the site, are as follows (refer to Figure 14.3 above):

- <u>Charlestown Centre</u>: This is a large urban block of modern, mixed use development incorporating a shopping centre with active frontage to the streets, an entertainment/ leisure centre (Odeon) and higher density residential use. The buildings are up to seven storeys fronting Charlestown Place and St Margaret's Road, with a 12 storey tower beside the junction, marking the town centre. An important feature of Charlestown Centre is the pedestrian street that traverses the block north to south between Phases 1 and 2. This terminates at Charlestown Place currently, and has potential to extend across the wide street onto the subject site.
- <u>Melville Estate</u>: To the east of St Margaret's Road opposite the Charlestown Centre is a mixed density residential neighbourhood comprised of small apartment buildings (four storeys), duplex terraces and townhouses. The Melville Lawn apartment building is closest to the site, diagonally across the town centre junction. It is somewhat buffered from change on the site by the estate's open space at the corner. This features numerous maturing trees inside the roadside boundary.
- <u>Charlestown Estate</u>: The Charlestown estate lies to the north east of the site, east of St Margaret's Road and north of the Melville estate. The estate is comprised of mostly semi-detached houses although there are several duplex terraces (e.g. fronting Lanesborough Park and Lanesborough Road). The estate is mostly inwardly orientated (i.e. the houses face the internal streets and green areas) and there are no open/ unobstructed vistas towards the site. However, development of 'urban scale' on the site may be visible from parts of the estate. The 12 storey tower across the road from the site already features in these views, functioning as a landmark as intended.
- <u>Lanesborough Park</u>: The large open space of Lanesborough Park lies to the east of the Charlestown estate. The park features a playing field and extensive parkland areas with a network of footpaths around the perimeter. The absence of buildings/ structures in the park allows for panoramic views in places, and development on the site may be visible from the park despite the separation distance of 375m.
- <u>McKelvey Estate</u>: The McKelvey estate is a mature, low density housing estate that predated the development of Charlestown town centre (the estate was originally an outer suburb of Finglas village). Several of the estate terraces, along McKelvey Avenue, share a boundary with the site. These house are particularly exposed to the site, although there is an overgrown hedgerow/ tree line along the site boundary which provides a vegetation screen (if retained).
- <u>Charlestown Place</u>: Charlestown Place is a very wide, busy urban thoroughfare, of 2-3 lanes in each direction with a central median and dedicated pedestrian and cycle paths on both sides. The street (as a 'place' in the townscape) is only partly realised due to it being enclosed on only one side for only a portion of its length (by Charlestown Centre, opposite the site). It would benefit from further streetscape development, including pedestrian crossings to overcome its severing effect.
- <u>Melville Road</u>: Melville Road is the eastward extension of Charlestown Place beyond the St Margaret's Road junction. The Melville estate and a neighbourhood centre (Meakstown) are on one side of the road and Century Business Park on the other.
- <u>St Margaret's Road</u>: St Margaret's Road is an important thoroughfare in the urban structure, providing a connection to Finglas village to the south and Dublin airport to the north. It widens as it approaches Charlestown Place so that together the two streets form a wide junction in the town centre.
- <u>M50</u>: The M50 passes some 350m to the north of the site, and the M50-N2/ North Road junction beside Charlestown is one of the gateways into Dublin City. As the motorway

passes Charlestown it is elevated, providing views across the evolving urban area, including the site.

The other elements and areas making up the townscape surrounding the site (including Century Business Park, Gas Networks Ireland, the strip of motor dealerships fronting the M50, the industrial premises along North Road, and North Road itself) are not sensitive to development of the type proposed on the site. The McKelvey Celtic Football Club also falls into this category of low sensitivity receptors. Users of the club are generally focussed on their sporting activity (as opposed to their surroundings), although the facility would benefit from landscape improvement in its setting.

Two notable characteristics of the townscape surrounding the site are (1) the relatively poor pedestrian permeability, and (2) the relative paucity of tree cover and other green infrastructure. Both of these characteristics are related to the large proportion of commercial and industrial land use in the area. Such areas typically have a coarse urban grain with few public pedestrian routes across the large, fenced off plots, and minimal landscaping. The townscape would benefit from an extended and improved pedestrian and open space networks.

Figure 14.4: A view from the site towards the existing Charlestown Centre

Figure 14.5: A view from the end of the pedestrian street through Charlestown Centre towards the site

Figure 14.6: A view from Melville Road towards the town centre showing the diverse character of the evolving townscape

Figure 14.7: A view from St Margaret's Road approaching the town centre with the McKelvey Celtic football club and the site in the foreground to the left. Note the urban character and the architectural and material quality of the Charlestown Centre buildings

Figure 14.8: A view from St Margaret's Road at the entrance to the McKelvey estate

Figure 14.9: A view from within the Charlestown estate towards the town centre

Figure 14.10: A view from Lanesborough Park towards the town centre

14.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposed development is described in detail in the architectural and landscape design statements submitted with the planning application, and in Chapter 3 of the EIAR. The key aspects of the proposal with regard to its potential townscape and visual effects are (1) the layout, (2) massing and height, (3) the façade treatments, and (4) the landscape proposals. These are discussed briefly below.

14.4.1 Layout

The proposed development is comprised of four blocks of buildings (Blocks 1, 2, 3 and 4) divided by a grid of internal streets and linear green spaces, and a large public open space (see Figure 14.11 overleaf).

Blocks 1, 2 and 3 are arranged in a row fronting Charlestown Place, together presenting a continuous building line to the street (broken by the two entrances to the scheme from Charlestown Place).

Blocks 1, 2 and 4 are of the perimeter block typology. This typology has the dual benefit of (a) enclosing internal courtyards for communal use, and (b) providing built frontage/ enclosure to the adjacent streets (external and internal to the site). Block 3 is 'L' shaped in plan form, and could in future form a perimeter block with a complementary building on the neighbouring site.

The layout has been determined by several key spatial factors and urban design objectives:

- The alignment of the surrounding roads (Charlestown Place and St Margaret's Road) and the objective to urbanise these streetscapes by the provision of built frontage on the site.
- The alignment of the pedestrian street across Charlestown Centre, and the objective to extend this pedestrian route across Charlestown Place and onto/across the site, thereby linking the two sides of the designated town centre across the main street.
- The objective to provide an anchor at the southern end of this new 'pedestrian boulevard', in the form of a new public park – co-located with the McKelvey Celtic football grounds to form substantial, multi-functional open space in the town centre.
- The objective to green the site, not only by the provision of the park but also by generous tree planting on the streets and in the courtyards of the perimeter blocks.
- The objective to complement the north-south aligned pedestrian route with an east-west aligned route across the site, to (a) establish a grid layout, reinforcing the urban character, and (b) to increase pedestrian permeability in the town centre.
- The objective to activate the main/central pedestrian boulevard, by locating active/public uses in the ground floors fronting the boulevard, contributing further to the extension of the 'town centre' across Charlestown Place and onto the site.

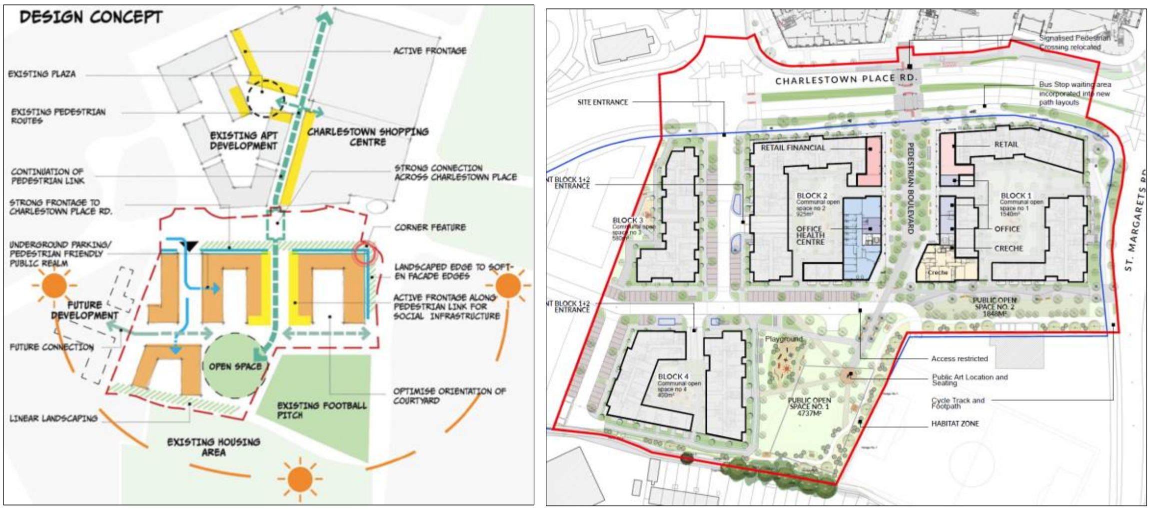


Figure 14.11 a & b: Proposed Layout in response to context and urban design objectives

14.4.2 Massing and Height

The proposed height of the buildings was determined by (a) their position with respect to conditions and sensitivities, and (b) the national and local policy of compact growth.

Blocks 1, 2 and 3 fronting Charlestown Place are relatively unconstrained by sensitive receptors to height. The urban design objective informing their height is to complement the Charlestown Centre buildings in providing built enclosure to the street, in order to generate urban character. This portion of the site (the strip alongside Charlestown Place) provides an opportunity to achieve Objectives SS15 and SS16 of the FCDP, i.e. to 'strengthen and consolidate' the urban area, and 'achieve higher densities where this would be in keeping with the context character and form'.

Block 2 is thus seven storeys, while Block 3 is eight storeys and Block 1 steps up to an accent volume of 10 storeys at the town centre junction (opposite the existing 12 storey tower). The southern sides of the Block 1 and 2 perimeter blocks are two storeys, to allow sunlight to enter the courtyards.

Figure 14.12: Proposed height of Blocks 1, 2 and 3 fronting Charlestown Place

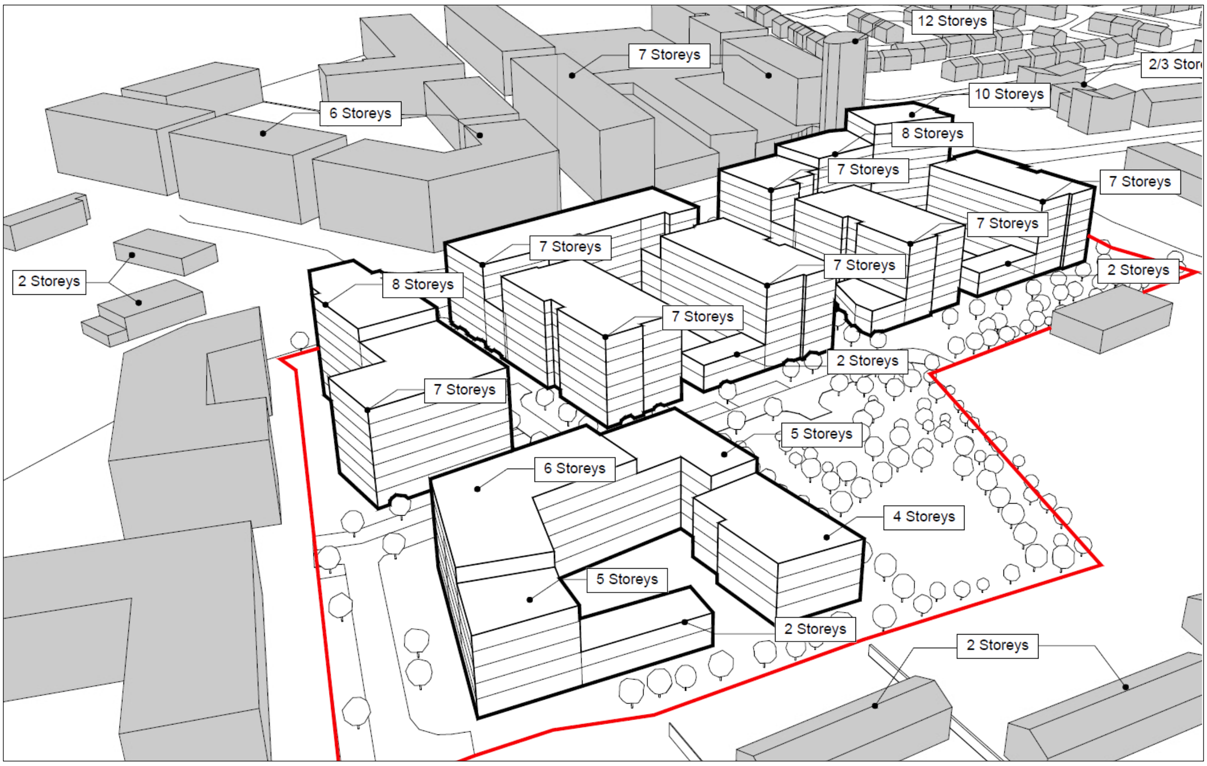


Figure 14.13: Proposed massing and height across the site

Whereas Blocks 1-3 respond principally to the town centre density/ height opportunity, Block 4 responds principally to the sensitivity of McKelvey Park adjacent to the south. The southern side of the perimeter block is two storeys, the southern ends of the east and west sides are four and five storeys respectively, and the north site steps up to six storeys. The responsiveness of the built form to the McKelvey Park sensitivity is evident in the diagram above.

14.4.3 Façade Treatments

The principal material of the buildings facades is brick (buff in colour). This is complemented by areas of render, areas of stone cladding (drawing on the success of the cladding in the Charlestown Centre development),areas of metal cladding (penthouse levels of Blocks 1 and 2), with metal detailing and glass balustrades to the balconies. The materials palette is intended to complement the existing town centre buildings, introducing brick to reflect the predominantly residential use while maintaining the quality level.

The facades borrow other successful elements from the Charlestown Centre development (in addition to the stone cladding), including a horizontal/ linear balcony design, and recessed balconies to lend the buildings a solid form. The windows however have a vertical emphasis, again intended to reflect the buildings; residential use.

Figure 14.14: Proposed cladding – predominantly brick - of the facades fronting Charlestown Place and the pedestrian boulevard

Figure 14.15: Proposed palette of stone cladding, metal cladding and render to the facades facing the park

14.4.4 Landscape Proposals

The following are the key elements and aspects of the landscape masterplan with respect to the proposal's potential townscape and visual effects:

- Charlestown Place and St Margaret's Road streetscapes. The proposed Blocks 1, 2 and 3 are set back 10m+ from the road edge. In these linear spaces in front of the buildings it is proposed to provide dedicated off-street cycle paths and footpaths and green verges with a large number of street trees. Smaller trees and privacy planting are proposed in front of the ground floor apartments.
- Pedestrian boulevard. One of the main features of the proposal is the pedestrian boulevard. This is aligned to connect to the pedestrian street of the Charlestown Centre across Charlestown Place. The pedestrian boulevard is 24m wide and features one central and two lateral footpaths separated by wide beds of low ornamental planting and a dense arrangement of trees. The boulevard contribute a wide corridor of green infrastructure to the town centre.
- Public park. At the southern end of the pedestrian boulevard, alongside the McKelvey Celtic football grounds, is the proposed principal open space. This substantial new park incorporates a playground, several smaller and larger areas of lawn (the largest big enough to function as a kickabout area), exercise equipment, a network of footpaths catering fall all desire lines across the space, and a large number of trees.

Figure 14.16: Proposed landscape plan

- Linear public open space. Extending to the east from where the pedestrian boulevard meets the park, is a wide (c. 25m) linear open space, which runs along the side the football grounds to connect to St Margaret's Road. This provides another corridor of green infrastructure and pedestrian and cycle movement, and would function as a green buffer between the seven storey Block 1 and the football club.

- Courtyards. Each of the blocks has a courtyard space containing lawn areas, beds of ornamental shrub planting, footpaths, seating areas and a small playground as well as scattered trees.
- Internal streets. The internal streets are comprised of the vehicular surface with blocks of perpendicular parking divided by street trees, segregated footpaths and strips of shrub planting and small trees along the fronts of the buildings. While serving the principal function of access/circulation, the streetscapes will contribute to the greening of the scheme and the wider town centre environment.
- Green roofs. 25% of the roof area is proposed to be green roof, providing biodiversity and water management benefits. The green roofs are generally located on the lower roof levels so that they are overlooked by the apartments of the upper floors.
- McKelvey Avenue boundary treatment. The south boundary of the site runs inside a ditch and hedgerow with mature trees, which marks a former field boundary and the townland boundary of Charlestown. It is proposed to retain these features (with the hedgerow and trees augmented by new planting) for their biodiversity, cultural heritage, visual amenity and screening value – particularly for the residential properties of McKelvey Avenue which back onto the site along this boundary.

The landscape proposals would provide a high level of recreation and visual amenity for the residents of the new neighbourhood, as well as making a substantial contribution to the public realm and green infrastructure network of the town centre.

Figure 14.17: Proposed courtyard space in Block 1

14.5 CONSTRUCTION IMPACTS, MITIGATION & MONITORING

The construction process would entail the following:

- Set up site perimeter hoarding;
- Set up site construction compound, tree and biodiversity protection measures, internal transport routes;
- Site clearance;
- Excavation;
- Site services installations;
- Construction of new buildings, frames and envelopes;
- Interior fit-out of buildings;
- External and internal streetscapes, landscaping and site boundary works.

During construction the site would be disturbed by the above activities and the incremental growth of the buildings. This would have unavoidable impacts on the context townscape and views from the surroundings. The magnitude of change would be high in the immediate vicinity of the site (e.g. Charlestown Place, St Margaret's Road, the residential neighbourhood of McKelvey Avenue and McKelvey Celtic football club, with the magnitude of change reducing with increased distance from the site. Overall, the sensitivity of the townscape can be considered medium (refer to 14.6.1). Therefore, the effects on the townscape and views would be 'moderate to significant' and negative in the immediate vicinity of the site (with the effects on the McKelvey Avenue houses of greatest significance), reducing in significance with distance from the site. The effects would be temporary.

14.5.1 Mitigation and Monitoring

Townscape and visual impacts are inevitable with the development of a large site in an established urban area. Standard best practice construction site management measures (e.g. erection and maintenance of site hoarding, orderly storage of materials and vehicles, etc.) will reduce these as far as possible, but there would be some residual negative impacts, e.g. the visual effect of buildings under construction intruding in views from the McKelvey Avenue houses.

An important mitigation measure would be the protection (by fencing around the defined root protection areas) and monitoring of the hedgerow and trees along the southern boundary during construction. The monitoring programme should extend beyond the construction period to ensure the vegetation survives in a healthy condition into the operational phase of the development.

L-C1	Implement the Tree Protection Strategy and Tree Protection Plan contained within the Arborist Associates Ltd. Aboricultural Assessment dated July 2020.

14.6 OPERATIONAL IMAPCTS, MITIGATION & MONITORING

14.6.1 Townscape Effects

Townscape Sensitivity

The classification of townscape sensitivity takes account of the existing condition of the receiving environment, but also (a) the trends of change in the area, (b) the development policy applying to the affected area, and (c) the nature of the development proposed.

The receiving environment is an urban core in the process of plan-led transformation into a town centre. Charlestown is designated a *'Town and District Centre'* in the FCDP, and the site is zoned *'TC – Town and District Centre'*. Charlestown is also classified as a *'Consolidation Area Within the Gateway'*. Therefore, Objectives SS15 and SS16 of the FCDP apply to the site. These seek to 'strengthen and consolidate urban areas adjoining Dublin City in order to maximise the efficient use of existing infrastructure and services', and 'achieve higher densities where such an approach would be in keeping with the character and form of existing residential communities, or would otherwise be appropriate in the context'.

The only potentially sensitive receptor of townscape effects in the receiving environment is the residential neighbourhood of McKelvey Avenue.

Taking account of the nature of the proposal, the relevant policy and the existing condition of the site context (an area in a state of transition towards a town centre environment), the sensitivity of the receiving environment overall can be classified 'low' (definition: *Areas where the townscape has few valued elements, features or characteristics and the character is weak. The character is such that it has capacity for change; where development would make no significant change or would make a positive change. Such townscapes are generally unrecognised in policy and the principal management objective may be to facilitate change through development, repair, restoration or enhancement*).

Magnitude of Townscape Change

<u>The magnitude of townscape change which would result from the proposed development can be classified 'high'</u> (definition: *Change that is moderate to large in extent, resulting in major alteration to key elements, features or characteristics of the townscape, and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the townscape*).

The high magnitude classification arises not from the proposal being uncharacteristic in the context (it is a development of town centre character in a designated town centre area), but rather from the potential for the development to change certain key elements and characteristics of the receiving environment. These changes include:

- <u>The introduction of buildings of urban character and scale to the streetscapes of Charlestown Place and St Margaret's Road</u>, resulting in town centre-type enclosure of the streets and strengthening/reinforcing the urban structure. This would make a significant positive contribution to townscape legibility (by appreciably defining Charlestown Place as the main street, and marking the junctions with St Margaret;s Road as the 'centre').
- <u>The expansion of the town centre across Charlestown Place</u>, with the new high density residential neighbourhood complementing the existing Charlestown Centre to collectively form a distinct urban core of scale (in terms of spatial extent, built form, population, etc.)

and diversity. The development would make a significant contribution to the realisation of the FCDP Objectives SS15 and SS16 as they apply to Charlestown.

- The completion and improvement of the Charlestown Place and St Margaret's Road streetscapes along the frontage of the site, most notably by the provision of a major pedestrian crossing over Charlestown Place, the provision of improved pedestrian and cycle paths on the site-side of the streets, and the introduction of a large number of street trees in green verges.
- The extension of the public realm, the pedestrian and cycle circulation network and the green infrastructure network across the site, significantly improving the permeability and navigability of the town centre. The most notable elements of the proposal in this regard are the pedestrian boulevard (which is aligned to function as an extension of the pedestrian street in the existing Charlestown Centre) and the linear open space connecting the boulevard to St Margaret's Road.
- The provision of a new public park at the southern end of the pedestrian boulevard, functioning as an anchor/attraction in the public realm and green infrastructure network. The co-location of the park the McKelvey Celtic football grounds means that together they would form a substantial, multi-functional open space in the town centre.
- A significant increase in the number and variety of shrubs and trees on the site and in the town centre generally, by the generous planting proposed in the streetscapes of Charlestown Place and St Margaret's Road, in the new public park and the linear open space, on the internal streets and in the courtyards. This would have significant positive effects on the site's biodiversity, landscape and visual amenity value.
- The retention (and augmentation) of the site's one valued landscape and biodiversity feature, the ditch, hedgerow and tree line just outside the southern site boundary. This is valuable not only as an historic and structural element of the landscape, but also as a buffer/ screen between the town centre area and the McKelvey Avenue residential neighbourhood.

Significance of Townscape Effects

Measuring the magnitude of change against the townscape sensitivity (refer to Table 14.3 above) the significance of the effects is predicted to be 'moderate' (definition: *An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends*). Based on the analysis above the townscape effects are predicted to be positive; no negative effects have been identified.

14.6.2 Visual Effects

To assess the proposed development's potential visual effects on the receiving environment 18 no. viewpoints were selected for detailed assessment informed by verified photomontages (refer to the viewpoint map, Figure 14.18 overleaf). The viewpoints were selected to address all the key elements and character areas around the site (see Section 14.3.3 above), and to show the proposal from a range of angles and distances.

The viewpoints are assessed in Table 14.6 below. The assessment should be read in conjunction with the baseline views (photographs) and verified photomontages provided in Appendix 14A. For the methodology and the criteria and terms used in the assessments, refer to Section 14.2.2 above.

Figure 14.18: Viewpoints for Visual Effects Assessment

Table 14.6: Visual Effects Assessment

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change	Significance of Effects
1	M50 off-ramp	The users of the M50 are one of the largest cohorts of potential visual receptors. These viewers are of low sensitivity to change. However, as a gateway view the sensitivity is classified medium. The elevation of the motorway as it passes Charlestown affords a panoramic view south over Charlestown, Finglas and the wider cityscape. The foreground is occupied by the parking areas of the motor dealerships and the middle distance by large, low industrial buildings. The Charlestown Centre Phase 2 apartments and the landmark tower in the town centre are the only built elements of value in the composition, and the distant Dublin Mountains add some visual amenity to the otherwise unsightly view.	Medium	The development would introduce a cluster of buildings of contemporary urban character and scale to the composition (screening the middle distant industrial area from view), expanding the town centre - so that it becomes the dominant/defining element of the townscape in view. The quality of the design and materials of the buildings would be appreciable, counteracting the negative effect of the foreground elements. There gradation of scale from the town centre (identified by the existing tower) towards the edge of the development is noticeable, enhancing the legibility of the emerging urban core. Overall, the townscape character and visual amenity would be improved.	Medium	Moderate positive
2	North Road-Charlestown Place junction	This junction is one of the main gateways to Charlestown. The foreground is cluttered with road infrastructure and signage and the commercial-industrial premises along North Road are unsightly. As in View 1, the Charlestown Centre Phase 2 apartments and the tower marking the town centre are the only built elements of value in the composition.	Medium	The development would introduce a cluster of buildings of contemporary urban character and scale to the composition, expanding the town centre - so that it becomes the dominant/defining element of the townscape in view. Although from this vantage point the existing tower in the town centre would be hidden by the new buildings, the urban structure and legibility would be strengthened overall (the legibility of the new east-west corridor across the site is significant in this regard).	Medium	Moderate positive

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change	Significance of Effects
				The articulated forms and facades of the buildings and the high quality materials would elevate the quality of the built form overall, counteracting the negative effect of the foreground elements and improving visual amenity.		
3	Charlestown Place approaching the town centre	The dominant elements of the view are the wide road corridor and the Charlestown Centre buildings which initiate the street's enclosure and the establishment of a town centre character. However, with the absence of built form on the site these urban design objectives are not fully realised. The townscape appears unfinished. The industrial buildings beyond the site also detract from the area's visual amenity.	Medium	The development would introduce a row of buildings of contemporary urban character and scale, and appreciably high design and material quality, to the composition. The strong building line and built enclosure would complement the existing buildings across Charlestown Place, strengthening the urban structure and legibility. This angle of view shows that the height of the buildings (existing and proposed) is commensurate with the width of the street. The development would achieve urban-type built enclosure without being excessive. The new street trees would add valuable greenery to the townscape and soften the interface between the buildings and the street. No valuable element or characteristic of the view would be lost or compromised.	High	Significant positive
4	Southern end of pedestrian street in Charlestown Centre	The pedestrian street across Charlestown Centre is narrow, enclosed by tall buildings on both sides. Where it terminates at Charlestown Place the vista opens up and the car park on the subject site across the street is the defining element of the view. The houses of McKelvey avenue beyond the site are visible. Although the distant Dublin Mountains form a low, undulating	Medium	The pedestrian boulevard across the site, aligned with the pedestrian street, would be the defining element of the view - the wide green corridor enclosed by buildings of contemporary urban scale and character. Charlestown Place would also benefit from the built enclosure. From this proximity the quality of design (for example the recessed balconies, giving the buildings a clean form) and materials of buildings would be appreciable.	Very High	Very significant positive

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change	Significance of Effects
		horizon the townscape in view appears unfinished and unsightly – especially considering the town centre location.		The generous quantity of low planting and trees, as well as public realm space, would also contribute to a dramatically enhanced townscape.		
5	Main entrance to Charlestown Shopping Centre	The dominant elements of the view are the wide road corridor and the Charlestown Centre buildings which initiate the street's enclosure and the establishment of a town centre character. However, with car park on the site – and the absence of built form on that side of the street – prevent the realisation of the vision for the town centre and detract from the area's visual amenity.	Medium	The row of buildings of contemporary urban character and scale, and appreciably high design and material quality, would dramatically change the character and quality of the street. The strong building line and built enclosure would complement the existing Charlestown Centre buildings, strengthening the urban structure and legibility. The width of the entrance to the pedestrian boulevard (between Blocks 1 and 2) is a notable feature of the proposal. This angle of view shows that the height of the buildings (existing and proposed) is commensurate with the width of the street. The development would achieve urban-type built enclosure without any sense of excessive enclosure. The new street trees would add valuable greenery to the townscape and soften the interface between the buildings and the street.	Very High	Very significant positive
6	St Margaret's Road approaching the town centre from the north	This viewpoint represents the view from the northern gateway to Charlestown. The distinctive Gas Networks Ireland building is in the foreground, and the Charlestown Centre buildings indicate the arrival of St Margaret's Road in the town centre. The arrangement of the houses to the left of the road, presenting their rear facades to the public realm and largely hidden by roadside vegetation, is unfortunate. This	Medium	Block 1 would be visible in the middle distance. Although having only a minor presence in the composition it would complement the Charlestown Centre buildings and form a more substantial and therefore more legible urban core.	Low	Slight positive

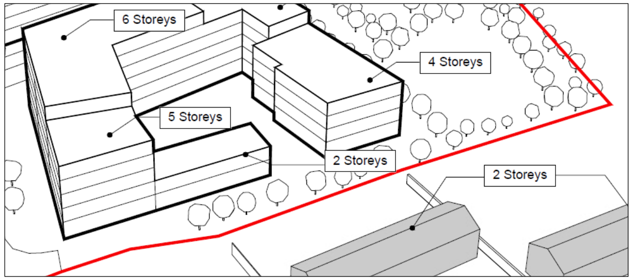
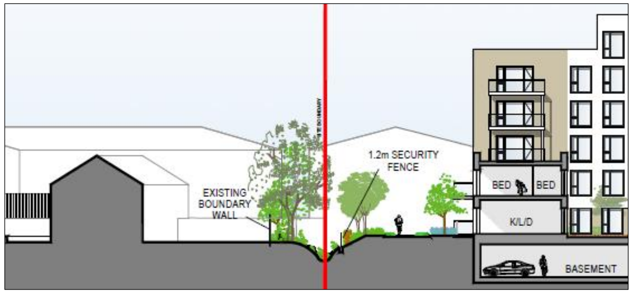
No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change	Significance of Effects
		counteracts the urbanising effect of the buildings to the right.				
7	St Margaret's Road approaching Charlestown Place junction	St Margaret's Road widens to four lanes as it enters the town centre. The Charlestown Centre retail frontage to the street contributes further to the urban character, which is amplified by the tower at the junction. However, the absence of buildings on the site prevents the full realisation of the town centre vision. The townscape appears incomplete and unbalanced.	Medium	Block 1 on the far side of Charlestown Place would be a significant addition to the view. The strong building line and built enclosure to St Margaret's Road would strengthen the urban structure, and the step up in height towards the town centre junction would complement the existing tower in marking the centre. The development would make the town centre more substantial and diverse, and would improve the balance of the composition.	Medium	Moderate positive
8	Lanesborough Park (Charlestown estate)	The view is taken from Lanesborough Park, a road in the Charlestown estate. The viewpoint represents the nearest houses (i.e. the most exposed to change on the site) in the low density estate beside the town centre. Directly across the road is a four storey apartment building in the Melville estate. To the right, across St Margaret's Road, is the Charlestown Centre, a building of five residential floors above a two storey commercial base, and at the corner is the 12 storey tower. Similar to View 7, the absence of built form on the site, across the road from the tower, causes the townscape to appear incomplete.	Medium	Block 1 on the far side of the Charlestown Place - St Margaret's Road junction, would be a significant addition to the view. The strong building line and built enclosure to both streets would strengthen the urban structure, and the step up in height towards the town centre junction would complement the existing tower in marking the centre. (It is notable that the existing tower would retain its primacy as the landmark identifying the centre.) The development would fill a gap in the townscape, making the town centre more substantial and diverse, improving legibility considerably (by improving the definition of both Charlestown Place and St Margaret's Road). There would be no loss of any valued feature or characteristic of the view (and no sense of excessive enclosure), only a strengthening of the urban character and legibility.	Medium	Moderate positive
9	Charlestown Court	The view is taken from a position near the centre of the estate, where the alignment	Medium	No change.	None	No effect

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change	Significance of Effects
		of Charlestown Court frames a view towards the town centre. In the existing view the tower at the junction of Charlestown Place and St Margaret’s Road achieves its objective as a landmark, protruding sufficiently above the foreground roofline to be visible and identifiable. It marks the town centre in the otherwise enclosed landscape of the estate, improving legibility.		The proposed development does not have the height to protrude above the foreground roofline.		
No	**Viewpoint Location**	**Baseline View**	**Sensitivity**	**Proposed Change**	**Magnitude of Change**	**Significance of Effects**
10 & 11	Lanesboroug Park (open space)	View 10 is taken from the central footpath traversing the park. The path is aligned with Charlestown Road so that the view towards the town centre is framed by the duplex and small apartment buildings around the park. The Charlestown Centre buildings are the focal point of the view, the tower performing its landmark function as intended. Even from this distance the design and material quality of the buildings are appreciable. View 11 is from the eastern edge of the park, representing the views from the many houses, duplex and apartment buildings that face the park. As in View 10, the Charlestown Centre buildings are visible in the distance, marking the town centre and contributing positively to the	Medium	In View 10 Block 1 would be visible to the left of the existing tower, along the axis framed by the foreground buildings. It would contribute to the quantity and diversity of built form in the town centre, suggesting a more substantial urban core. There would be no significant change in visual amenity or townscape legibility however. In View 11 Block 1 would be barely discernible through the canopies of the trees in the park – in winter only. In summer the development would be screened.	Negligible-Low	Not significant neutral

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change	Significance of Effects
		character and quality of the townscape in view.				
12	Melville Road at Meakstown neighbourhood centre	Melville Road is the eastern approach/ gateway to Charlestown. At this point c. 400m from the St Margaret's Road junction the Melville Cove apartments are to the right and the Century Business Park buildings to the left of the street, framing the view towards the town centre. The Charlestown Centre residential tower functions well as a landmark, identifying the town centre ahead along the road. The mixed urban character of the townscape is evident in this view.	Medium	Block 1 would be discernible through the bare canopies of the Melville Road street trees – in winter only. In summer the development would be screened. When visible, it would contribute to the quantity and diversity of built form along the townscape corridor of Melville Road and in the town centre, complementing the Charlestown Centre buildings and suggesting a more substantial urban core. The effect would be slight, but it would contribute positively to townscape character and legibility.	Negligible-Low	Slight positive
No	**Viewpoint Location**	**Baseline View**	**Sensitivity**	**Proposed Change**	**Magnitude of Change**	**Significance of Effects**
13	Melville Road approaching the St Margaret's Road junction	Melville Road widens as it approaches the town centre junction. The Charlestown Centre buildings to the right beyond the junction initiate the enclosure of Charlestown Place and the establishment of a town centre character. However, with the absence of built form on the site the town centre is not fully realised. The townscape appears unfinished. The business park building in the foreground to the left also detracts from the area's visual amenity. (This viewpoint also represents views from the nearest apartments in the Melville Lawn building (outside the field of view to the right), although there is a line of trees	Medium	Block 1 would be a prominent addition to the view, the 10 storey corner volume complementing the existing tower across the street in forming an appreciable gateway to the town centre. The gap in the east side of Block 1 gives emphasis to the accent volume, which has an attractive, slender form. The materials of the building – particularly the stone cladding - contribute to its quality and complement the existing buildings across the street. The perimeter block adds enclosure and definition to both Charlestown Place and St Margaret's Road, strengthening the urban structure and legibility. The view illustrates that the proposed building height is suitable for the street width. The development would achieve urban-character without any sense of excessive enclosure.	High	Significant positive

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change	Significance of Effects
		in front of the building, part-screening the view.)		The new street trees would add greenery to the townscape and soften the interface between the building and the street.		
14	St Margaret's Road approaching Charlestown from the south	The view is taken from St Margaret's Road approaching Charlestown from Fingal village. The McKelvey estate is to the left of the road and a commercial/industrial premises to the right. This reduces the quality of the St Margaret's Road corridor The Charlestown Centre buildings including the tower function well as a landmark, identifying the town centre ahead along the road, and elevating the quality of the townscape overall.	Medium	Block 1 would be visible, protruding marginally above the McKelvey estate roofscape and filtered by the street trees. The development would contribute to the quantity and diversity of built form around the town centre junction, complementing the Charlestown Centre buildings and suggesting a more substantial urban core. The effect would be slight, but it would contribute positively to townscape character and legibility.	Low	Slight positive
No	**Viewpoint Location**	**Baseline View**	**Sensitivity**	**Proposed Change**	**Magnitude of Change**	**Significance of Effects**
15	St Margaret's Road approaching Charlestown Place junction	The view is taken from a position alongside the McKelvey Celtic football grounds. There is a distinct change in character between the foreground, with an industrial premises to the right and the car park on the site to the left, and the town centre ahead across the junction. The Charlestown Centre buildings initiate the enclosure of Charlestown Place and St Margaret's Road and the establishment of a town centre character. However, with the absence of built form on the site the town centre is not fully realised. The townscape appears unfinished.	Medium	Block 1 would be prominent in the foreground, the St Margaret's Road frontage providing built enclosure and strengthening the urban character of the street, and stepping up towards the junction where the 10 storey accent volume complements the landmark tower across the road. To the left the two storey height of the south façade of Block 1 allows a view into centre of the perimeter block. This avoids the potential for any perception of excessive massing, and adds visual interest to the built form. The articulated form is complemented by the variations in materials. The building also provides a built frontage(and therefore legibility) to the broad new linear open space entering the site from St Margaret's Road along the side of the football grounds.	High	Significant positive

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change	Significance of Effects
				Overall the development would strengthen the urban structure, character and legibility, expanding and diversifying the town centre and significantly improving visual amenity.		
16	McKelvey Road	This viewpoint represents a mid-distant view from within the McKelvey estate. McKelvey Road is so aligned that it frames a view directly towards the town centre junction and the proposed 10 storey building. Currently, the 12 storey tower in Charlestown Centre protrudes above the roofline at the end of the street, filtered by the foreground trees (and largely screened in summer). The slender form and the materials of the building contribute to its benign presence in the view despite its difference in character from the foreground landscape.	Medium	The proposed Block 1 would protrude marginally above the roofline at the end of the street, in front of – but below - the Charlestown Centre tower. The development would slightly increase the quantity of buildings of urban character and scale in the view, but the effect on the character and quality of the view would be minimal.	Low	Slight neutral
17 & 17a	McKelvey Avenue	Two positions were selected for assessment of the visual effects on McKelvey Avenue, where the town centre-zoned site interfaces with a low density neighbourhood. View 17 is further back, allowing greater perspective, and 17a is from directly in front of a terrace of houses that backs onto the site's southern boundary. The terraced houses generate a high degree of visual enclosure despite their modest height. Only at the western end of McKelvey Avenue (visible to the left in	Medium	The two photomontages show that the stepping down in height of Block 4 towards the southern site boundary (and the McKelvey Avenue houses) is effective in avoiding excessive intrusion into views. Only the western side of the building (five storeys at its southern end) protrudes above the roofline in both Views 17 and 17a. It should be noted that the part of Block 4 directly north of the houses, i.e. the part that would be most visible from the rear windows of the houses, is lower – stepping from two to four storeys across a gap in the south elevation.	Low-Medium	Slight - Moderate neutral

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change	Significance of Effects
		both views) is there a gap where a large shed can be seen on the neighbouring industrial premises. This detracts somewhat from visual amenity locally. It should be noted that only one terrace of 6 no. houses (the western-most terrace on the north side of McKelvey Aamenity grassland, shrub and tree cover venue) can be considered highly exposed to the proposed development. The neighbouring terrace to the east (and the houses further east) benefits from particularly long back gardens (c. 25m), and the proposed park is located directly behind that terrace. A notable feature of View 17a is the mature tree visible between the terraces. This is part of the remnant hedgerow just outside of the site boundary.		  Also to mitigate the potential visual impact, it is proposed to retain and augment the existing hedgerow and tree line outside the site boundary, and supplement this with another row of trees inside the boundary in front of Block 4. The visual effects on the public realm of McKelvey Avenue itself (as shown in the photomontage for View 17) would be of slight to moderate significance and neutral (if not positive, considering the policy for the site). The visible part of Block 4 would be no more prominent than the existing neighbouring industrial shed, and the building would be a high quality addition to the townscape, reflecting McKelvey Avenue's location adjacent to the town centre.		

No	Viewpoint Location	Baseline View	Sensitivity	Proposed Change	Magnitude of Change	Significance of Effects
				The views from the most affected houses would be changed by the introduction of a building of contemporary urban character to the site c.26m to the rear of the houses. However, given the site's town centre zoning and the associated policy driving its development, and the mitigation measures employed, including (a) the stepping down of massing/ height towards the boundary, and (b) the vegetation screen both sides of the boundary, the potential negative effects have been minimised.		
18	Northway estate open space	The Northway estate is internally orientated, with views of the surrounding townscape limited. A panoramic view east is however afforded from the large area of open space that wraps around the estate. Views from the open space are comprised of (a) the wide area of green space in the foreground, (b) the strip of commercial/ industrial development on the far side of North Road, and (c) the expanding Charlestown urban core in the distance, including the landmark tower marking the town centre.	Medium	The proposed development would expand the area of contemporary urban development in the view, introducing a cluster of buildings of similar scale and complementary architecture to the existing Charlestown Centre buildings. Although the balance of the composition would be slightly altered, with the modern urban core becoming more prominent than the commercial/ industrial strip, there would be no significant change in visual amenity.	Low	Slight neutral

14.6.3 Mitigation and Monitoring

The townscape and visual effects on all receptors are predicted to be neutral or positive for the operational life of the development. Therefore, no mitigation measures other than those built into the proposal are considered necessary.

14.7 RESIDUAL IMPACTS

14.7.1 Townscape Effects

The sensitivity of the townscape can be classified 'low' (definition: *Areas where the townscape has few valued elements, features or characteristics and the character is weak. The character is such that it has capacity for change; where development would make no significant change or would make a positive change. Such townscapes are generally unrecognised in policy and the principal management objective may be to facilitate change through development, repair, restoration or enhancement*).

The classification of townscape sensitivity takes account of the existing condition of the receiving environment, but also (a) the trends of change in the area, (b) the development policy applying to the affected area, and (c) the nature of the development proposed. The only potentially sensitive receptor of townscape effects in the receiving environment is the residential neighbourhood of McKelvey Avenue.

The magnitude of townscape change which would result from the proposed development can be classified 'high' (definition: *Change that is moderate to large in extent, resulting in major alteration to key elements, features or characteristics of the townscape, and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the townscape*).

The high magnitude classification arises not from the proposal being uncharacteristic in the context (it is a development of town centre character in a designated town centre area), but rather from the potential for the development to change certain key elements and characteristics of the receiving environment. These changes include:

- The introduction of buildings of urban character and scale to the streetscapes of Charlestown Place and St Margaret's Road, resulting in town centre-type enclosure of the streets and strengthening/reinforcing the urban structure. This would make a significant positive contribution to townscape legibility (by appreciably defining Charlestown Place as the main street, and marking the junctions with St Margaret's Road as the 'centre').
- The expansion of the town centre across Charlestown Place, with the new high density residential neighbourhood complementing the existing Charlestown Centre to collectively form a distinct urban core of scale (in terms of spatial extent, built form, population, etc.) and diversity. The development would make a significant contribution to the realisation of the FCDP Objectives SS15 and SS16 as they apply to Charlestown.
- The completion and improvement of the Charlestown Place and St Margaret's Road streetscapes along the frontage of the site, most notably by the provision of a major pedestrian crossing over Charlestown Place, the provision of improved pedestrian and cycle paths on the site-side of the streets, and the introduction of a large number of street trees in green verges.
- The extension of the public realm, the pedestrian and cycle circulation network and the green infrastructure network across the site, significantly improving the permeability and

navigability of the town centre. The most notable elements of the proposal in this regard are the pedestrian boulevard (which is aligned to function as an extension of the pedestrian street in the existing Charlestown Centre) and the linear open space connecting the boulevard to St Margaret's Road.

- The provision of a new public park at the southern end of the pedestrian boulevard, functioning as an anchor/attraction in the public realm and green infrastructure network. The co-location of the park the McKelvey Celtic football grounds means that together they would form a substantial, multi-functional open space in the town centre.
- A significant increase in the number and variety of shrubs and trees on the site and in the town centre generally, by the generous planting proposed in the streetscapes of Charlestown Place and St Margaret's Road, in the new public park and the linear open space, on the internal streets and in the courtyards. This would have significant positive effects on the site's biodiversity, landscape and visual amenity value.
- The retention (and augmentation) of the site's one valued landscape and biodiversity feature, the ditch, hedgerow and tree line along the southern site boundary. This is valuable not only as an historic and structural element of the landscape, but also as a buffer/ screen between the town centre area and the McKelvey Avenue residential neighbourhood.

Measuring the magnitude of change against the townscape sensitivity, the significance of the effects is predicted to be 'moderate' (definition: *An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends*). Based on the analysis above the townscape effects are predicted to be positive; no negative effects have been identified.

14.7.2 Visual Effects

To assess the proposed development's potential visual effects on the receiving environment 18 no. viewpoints were selected for detailed assessment informed by verified photomontages. The visual effects assessment is summarised in Table 14.7 below.

Table 14.7: Summary of Visual Effects Assessment

No	Viewpoint Location	Sensitivity	Magnitude of Change	Significance of Effects		
				Construction (Temporary)	Operation (Permanent)	Residual (Permanent)
1	M50 off-ramp	Medium	Medium	Moderate negative	Moderate positive	Moderate positive
2	North Road-Charlestown Place junction	Medium	Medium	Moderate negative	Moderate positive	Moderate positive
3	Charlestown Place approaching the town centre	Medium	High	Significant negative	Significant positive	Significant positive
4	Southern end of pedestrian street in Charlestown Centre	Medium	Very High	Very significant negative	Very significant positive	Very significant positive
5	Main entrance to Charlestown Shopping Centre	Medium	Very High	Very significant negative	Very significant positive	Very significant positive
6	St Margaret's Rd approaching town centre from the north	Medium	Low	Slight negative	Slight positive	Slight positive

No	**Viewpoint Location**	**Sensitivity**	**Magnitude of Change**	**Significance of Effects**		
				Construction (Temporary)	**Operation (Permanent)**	**Residual (Permanent)**
7	St Margaret's Rd approaching Charlestown Place junction	Medium	Medium	Moderate negative	Moderate positive	Moderate positive
8	Lanesborough Park (Charlestown estate)	Medium	Medium	Moderate negative	Moderate positive	Moderate positive
9	Charlestown Court	Medium	None	No effect	No effect	No effect
10 & 11	Lanesborough Park (open space)	Medium	Negligible-Low	Not significant negative	Not significant neutral	Not significant neutral
12	Melville Road at Meakstown neighbourhood centre	Medium	Negligible-Low	Slight neutral	Slight positive	Slight positive
13	Melville Road approaching the St Margaret's Road junction	Medium	High	Significant negative	Significant positive	Significant positive
14	St Margaret's Rd approaching Charlestown from the south	Medium	Low	Not significant negative	Slight positive	Slight positive
15	St Margaret's Rd approaching Charlestown Place junction	Medium	High	Significant negative	Significant positive	Significant positive
16	McKelvey Road	Medium	Low	Not significant negative	Slight neutral	Slight neutral
17 & 17a	McKelvey Avenue	Medium	Low-Medium	Moderate negative	Slight - Moderate neutral	Slight - Moderate neutral
18	Northway estate open space	Medium	Low	Not significant negative	Slight neutral	Slight neutral

The most significant findings of the visual effects assessment are as follows:

- <u>Views from within and adjacent to Charlestown town centre (Viewpoints 3, 4, 5, 7, 8, 13, 15) would be significantly improved</u>. In all of these views the development would introduce buildings of high design and material quality to the townscape, generating urban-type street enclosure along Charlestown Place and St Margaret's Road without any sense of excessive enclosure. By expanding the town centre across Charlestown Place a critical mass of contemporary urban development would be achieved, reversing the existing situation in which the town centre appears incomplete and un-balanced. The streetscapes would also be improved by the introduction of green verges and a large number of street trees.
- <u>Views from the approaches to the town centre (Viewpoints 1, 2, 6, 12, 14) would be improved</u>. In these views the development would complement the existing Charlestown

Centre buildings, forming a more substantial and diverse urban core, thereby improving townscape legibility.

- The visual effects on McKelvey Avenue (the public realm) would be of slight to moderate significance and neutral (if not positive, considering the policy for the site). Due to its considered massing/ height the visible part of Block 4 would be no more prominent than the existing neighbouring industrial shed, and the building would be a high quality addition to the townscape, reflecting McKelvey Avenue’s location adjacent to the town centre.
- The composition and character of views from the nearest McKelvey Avenue houses to the site would be changed by the introduction of a building (Block 4) of contemporary urban character to the site c.26m to the rear of the houses. However, given the site’s town centre zoning and the associated policy driving its development, and the mitigation measures employed, including (a) the stepping down of massing/ height towards the houses, and (b) the existing/ proposed vegetation screen on both sides of the boundary, the potential negative effects have been minimised.

14.8 DO NOTHING SCENARIO

The site would remain as a large surface car park and remnant field occupying a prominent position in the designated town centre of Charlestown. It would continue to (a) detract from the character and quality of the townscape and views/visual amenity in the area, (b) contribute to a lack of pedestrian permeability in the town centre, (c) contribute to a paucity of green infrastructure in the town centre, and (d) prevent the realisation of the town centre development objectives for Charlestown contained in the FCDP – most notably Objectives SS15 and SS16.

14.9 INTERACTIONS

Biodiversity

The landscape proposals would result in a significant increase in the amenity grassland, shrub and tree cover on the site (and in the wider town centre, which is characterised by a relative lack of green infrastructure currently), resulting in greater biodiversity despite the site’s high density residential use. The landscape proposals have been informed by the principles of green infrastructure planning, including connectivity (e.g. the inter-connectivity of the pedestrian boulevard, the linear open space and the public park) and multi-functionality (e.g. the inclusion of swales/SUDs measures in the linear open space).

Air and Climate

The introduction of a large number of trees to the site would have positive effects on air quality, microclimate and carbon sequestration.

Material Assets: Transportation

The proposed development would make a significant contribution to the network of pedestrian and cycle paths in the town centre, improving permeability and thereby encouraging the use of non-polluting transport methods. The development would also improve the quality of the Charlestown Place and St Margaret’s Road streetscapes by introducing wide green verges and numerous street trees, thus enhancing the environmental quality of the road network.

Cultural Heritage

The proposed development includes measures to protect and augment the hedgerow/ tree line just outside the southern site boundary. As well as being a feature of landscape, visual and biodiversity value this hedgerow is a cultural heritage asset being (a) a remnant of the area's former agricultural use, and (b) a townland boundary hedgerow. Its preservation and enhancement would have positive cultural heritage effects.

15. SIGNIFICANT EFFECTS, INTERACTIONS AND OTHER IMPACTS

15.1 INTRODUCTION

Schedule 6 of the Planning and Development Regulations 2001 as amended, details the information to be contained in an Environmental Impact Assessment Report, all of which have been complied with, where appropriate, in the relevant chapters of this EIAR.

This chapter of the EIAR identifies the significant effects of the project, including cumulative and in-combination effects. It also summarises the interactions between impacts by different environmental factors previously discussed in the assessment chapters.

From the description of the project and assessment of effects outlined in the previous chapters, the significant effects of the proposed development are considered under the chapter headings used in this EIAR. Where appropriate, the relevant impact areas are considered in grouped form.

15.2 SUMMARY OF PRINCIPAL INTERACTIONS OF EFFECTS

Schedule 6 Item 2(d) of the Planning and Development Regulations, 2001 as amended requires that projects are examined with regard to the inter-relationship of aspects referred to in Item 2(d) of Schedule 6.

The matrix incorporated in Table 15.1 inter-relates the various chapters of the EIAR to the various impact headings referred to in Schedule 6 Item 2(d) of the Planning and Development Regulations, 2001, As Amended. This matrix does not represent a form of relative assessment of impacts, but merely identifies and amalgamates areas of principal interaction.

15.3 SIGNIFICANT EFFECTS

Population and Human Health (Chapter 4)

All environmental factors interact with Population and Human Health. The key areas of interactions are:-

- Air and Climate
- Noise and Vibration
- Material Assets: Transportation
- Landscape

There are no significant negative effects for Population and Human Health.

The cumulative impacts of the project in combination other planned projects has also been considered. The nearby receptors and, in particular, the residential areas at McKelvey Estate (R1) and the Charlestown Centre (R5), will experience some temporary to short term negative effects during the construction stage in relation to Air (dust), Noise and Vibration and Landscape (visual). If best practice construction procedures and practices are adhered to, these cumulative effects of the Charlestown Place project are not likely to be significant.

During the operational phase, the cumulative effects will include a mix of positive (economy, land use, landscape and public realm improvements) and adverse effects (noise, traffic and visual impacts). These effects are long term and moderate. These effects should be considered in light of the urban location of the proposed development; the existing use and the TC – Town and District Centre zoning of the site; and the national policy context supporting increased densities of development on existing underutilised sites.

Similarly, the in-combination effects with the other planned projects in the vicinity, including the Charlestown Centre residential development is not likely to be significant once the appropriate mitigation measures identified are implemented. The enhanced integration with Charlestown Shopping Centre, improvements to the local road network at the R135 Finglas Road and Charlestown Place and improved permeability between St. Margaret's Road and Charlestown Place will have long term positive effects for the Charlestown area and its inhabitants.

Biodiversity (Chapter 5)

Impacts to biodiversity are strongly related to water quality and impacts which may affect the aquatic environment during both the construction and operation phases. Interactions with the following chapters are therefore relevant:

- Water

No significant negative effects to biodiversity are predicated to arise from this development subject to the mitigation measures outlined in Chapter 5.

A number of the identified impacts within Chapter 5 can act cumulatively with other impacts from similar developments in this area of Dublin. These primarily arise through the additional loading to the Ringsend Wastewater Treatment Plant. It is considered that this effect is not significant as there is no evidence that current pollution is resulting in negative effects to high-value biodiversity features in Dublin Bay. Upgrading works which are currently underway will bring it in line with the requirement of the Urban Wastewater Treatment Directive.

In this instance the incorporation of separate foul and surface water drainage systems and SUDS attenuation measures into an urban brown-field site is contributing to the cumulative positive effective of reducing rainwater run off to the municipal treatment plant.

There are no other effects which could act in a cumulative way to result in significant impacts to biodiversity.

Land and Soils (Chapter 6)

Effects to land and soils are related to water quality, dust and waste. Interactions with the following chapters are therefore relevant:

- Water
- Air and Climate
- Material Assets: Resource and Waste Management

With the implementation of the recommended mitigation measures, there are no significant effects on Land and Soils or cumulatively with the other factors.

The cumulative impact of the project and the adjacent developments proceeding at the same time are likely to be not significant, subject to the mitigation measures being implemented.

Water (Chapter 7)

Effects on Water interact particularly with the following Chapters:-

- Biodiversity
- Land and Soils
- Material Assets: Built Services

The potential for contamination of water bodies during construction could have adverse effects on the water quality within watercourses. Dewatering during the excavation of basements could also impact the hydrogeological environment. By developing a dewatering strategy and implementing best practice mitigation measures, no significant adverse effects are considered likely for water, biodiversity and land and soils.

Air and Climate (Chapter 8)

The main interaction with respect to air quality and climate is with respect to traffic and transportation (used as an input for the air quality and climate assessment of the operational phase). Other key interactions relate to health impacts, dust nuisance and atmospheric emissions (which have the potential to impact on biodiversity). These impacts are considered in the following chapters :

- Material Assets: Transportation
- Population and Human Health
- Biodiversity

The dust mitigation measures that will be put in place on-site during construction will ensure that the impact of the development complies with all ambient air quality legislative limits and therefore the predicted impact on air quality and human health is not significant. There is no likely change in significance for the in combination effects with the other planned projects, such as the Charlestown Centre development to the north, as best practice and mitigation measures will also apply to the other projects.

During the operational phase concentrations of ambient air pollutants will be compliant with all ambient air quality limit values which are based on the protection of human health and therefore are not significant.

There may be some cumulative effects during the construction stage for close receptors in relation to Noise and Vibration (construction activities), Transportation (construction traffic) and Landscape (visual). The effects, which are typical of an urban development project of this nature, will be short term and not significant.

Noise and Vibration (Chapter 9)

The effects associated with Noise and Vibration relate to human health, biodiversity and transport and interact with the following Chapter:-

- Population and Human Health

Subject to the implementation of the recommended best practice mitigation measures, the project is not likely to result in significant adverse impacts during the construction phase; the changes in noise levels at operational phase are imperceptible. There may be some cumulative effects during the construction stage for close receptors in relation to Air (dust), Transportation (construction traffic) and Landscape (visual). But the effects will be short term and not significant.

The cumulative impact of the project and the adjacent developments proceeding at the same time will not alter these effects, subject to best practice being applied in the construction of the other projects and the implementation of their mitigation measures (where relevant) being put into practice.

Material Assets: Built Services (Chapter 10)

The impacts of Built Services, interacts with the following Chapters:

- Population and Human Health
- Land and Soils
- Water

Subject to the implementation of the recommended mitigation measures, the project is not predicted to result in any significant negative impacts on the environment. There are no significant cumulative effects predicted by the addition of other effects.

The in-combination effect of the project proceeding at the same time neighbouring project at the Charlestown Centre and Charlestown Place is unlikely to give rise to a significant impact.

Material Assets: Transportation (Chapter 11)

The impacts of Transportation interact with the following Chapters:-

- Population and Human Health
- Air and Climate
- Noise and Vibration

The implementation of a Construction Traffic Management Plan during the construction phase of the proposed development, will minimise any significant environmental degradation or safety concerns in the vicinity of the proposed works, due to the presence of construction traffic. During the operation of the proposed development (Opening Year) there will be a long term not significant negative impact due to increased traffic flows. This will be mitigated by the transportation measures integrated into the development as previously noted.

Material Assets: Resource and Waste Management (Chapter 12)

The effects of the use of resources and waste management interact with the following Chapters:-

- Population and Human Health
- Land and Soils
- Water
- Material Assets: Transportation

Adherence to the best practice mitigation measures, including the requirements of the Site Specific Construction & Demolition and By-Product Waste Management Plan and the Operational Waste Management Plan, will ensure that there are no significant impacts on resource or waste management from the project.

There are no significant cumulative effects.

There are no likely significant in-combination effects arising where the project is undertaken concurrently with the adjoining on Charlestown Place as there is sufficient contractors available in the Dublin Region to handle waste generated from a large number of these sites simultaneously, if required. Similarly, there is sufficient contractors available to collect and handle waste for the operational phase.

Cultural Heritage (Chapter 13)

It is possible that ground disturbances associated with the proposed development may have a direct negative impact on archaeological remains that may survive beneath the current ground level in the south-western part of the site. No negative impacts are predicted in the area where the existing car park is located, as ground disturbances here are likely to have resulted in the removal of any archaeological features or deposits. Following implementation of the proposed mitigation measure, monitoring of topsoil stripping by a qualified archaeologist, there will be no residual impacts upon the archaeological, architectural or cultural heritage resource.

No impacts are predicted on the archaeological or cultural heritage resource as a result of the operation of the proposed development.

No interactions between archaeology and cultural heritage and any other discipline have been identified during the course of the assessment under Chapter 13.

Landscape (Chapter 14)

In terms of interactions, the impact on the landscape relates to many of the impact areas considered. In the current context, the most significant interactions are considered in the following Chapters:

- Biodiversity
- Air and Climate
- Material Assets: Transportation
- Cultural Heritage.

In terms of townscape, the significance of the effects is predicted to be ‘moderate’ (definition: An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends). The townscape effects are predicted to be positive; no negative effects have been identified.

Regarding visual effects the findings of the assessment are that the development would introduce buildings of high design and material quality to the townscape, generating urban-type street enclosure along Charlestown Place and St Margaret’s Road without any sense of excessive enclosure. The streetscapes would also be improved by the introduction of green verges and a large number of street trees. Due to its considered massing/ height the visible part of Block 4 would be no more prominent than the existing neighbouring industrial shed, and the building would be a high-quality addition to the townscape, reflecting McKelvey Avenue’s location adjacent to the town centre. The composition and character of views from the nearest McKelvey Avenue houses to the site would be changed by the introduction of a building (Block 4) of contemporary urban character to the site c.26m to the rear of the houses. However, given the site’s town centre zoning and the associated policy driving its development, and the mitigation measures employed, including (a) the stepping down of massing/ height towards the houses, and (b) the existing/ proposed vegetation screen on both sides of the boundary, the potential negative effects have been minimised.

15.4 OTHER EFFECTS

Schedule 6 Item 2(e) of the Planning and Development Regulations, 2001 as amended requires that an EIAR contains a description of the likely significant effects (including direct, indirect, secondary, cumulative, transboundary, short, medium and long-term, permanent and temporary, positive and negative) of the project on the environment resulting from the following:-

- ***the Use of Natural Resources***

  No likely significant effects on the environment are expected to arise from the use of natural resources in the construction / operation of the project.

- ***the emission of pollutants, the creation of nuisances and the disposal and recovery of waste.***

  No likely significant effects on the environment are expected to arise from the emission of pollutants, the creation of nuisances or the elimination of waste associated with this project.

- ***the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)***

  The likely significant effects of risks due to major accidents or disasters are described in Section 1.5 of this EIAR and in the Assessment Chapters, where relevant.

- ***The technologies and the substances used.***

This is an urban residential development and there are no technologies or substances associated with the project which would adversely affect the environment.

15.5 CONCLUSION

The EIAR has considered the likely, significant, adverse effects of the proposed project on the receiving environment. Mitigation measures are included, to avoid and / or reduce impacts on the environment where considered necessary. This includes mitigation measures incorporated into the design of the proposed development.

The EIAR concludes that there are no material or significant environmental issues arising from the project.

15.6 RESIDUAL EFFECTS

Residual impacts can be defined as the final impacts that occur after proposed mitigation measures have taken effect. Many of the findings of the EIAR have been incorporated into the design of the development and have contributed to the reduction or amelioration of potential impacts. Where residual impacts arise, they are detailed in the relevant chapters.

15.7 ENVIRONMENTAL COMMITMENTS AND MITIGATION MEASURES

Mitigation and monitoring measures to be adopted during the construction and operational phases of the project are detailed within each chapter and collated in Appendix 1A under each chapter heading.

These measures should be implemented through planning conditions imposed by the planning authority.

Mitigation and monitoring measures will be managed by the contractor(s) during the Construction Phase and by the developer/ landowners thereafter.

Table 15.1 Summary of Interactions

√ Area of Principal Interaction

	Population and Human Health	Biodiversity	Land and Soils	Water	Air and Climate	Noise and Vibration	Material Assets: Built Services	Material Assets: Transportation	Material Assets: Resource and Waste Management	Cultural Heritage	Landscape
Population and Human Health					√	√	√	√			√
Biodiversity				√		√					√
Land and Soils				√	√				√		
Water		√	√				√				
Air and Climate	√		√					√			
Noise and Vibration	√	√						√			
Material Assets: Built Services	√		√	√							
Material Assets: Transportation	√				√	√					
Material Assets: Resource and Waste Management	√		√	√				√			
Cultural Heritage											
Landscape		√			√			√		√	

APPENDICES

APPENDIX 1A - TABLE OF MITIGATION AND MONITORING MEASURES

	POPULATION AND HUMAN HEALTH
PPH-C1	**Construction Management -** In order to ensure the protection of the amenities of adjoining residents and other land users, the appointed contractor will prepare an updated Construction and Environmental Management Plan prior to development commencing on site.
PPH-C2	**Liaison Officer** - The contractor(s) will appoint a liaison officer to ensure that any issues from the local community are dealt with promptly and efficiently during construction. These details will be included in the Contractor(s) CMP prepared prior to construction commencing.
PPH-C3	**Working Hours -** Typically, construction working hours will be limited to 7am – 7pm Monday to Friday and 8am to 2pm on Saturday. It is anticipated that there will be times, due to exceptional circumstances, that construction work will be necessary outside these standard hours i.e. large concrete pours. Deviations from these standard times will be agreed in advance with the Planning Authority.
	BIODIVERSITY
B-C1	Pollution to water courses Measures are recommended in accordance with guidance from Inland Fisheries Ireland (2016) on the prevention of pollution during construction projects. These are included in the Outline Construction Management Plan which is included as a separate document with this application. Measures include: • Storage of dangerous substances in bunded areas at all times • No refuelling of machinery on the site • An ample quantity of 'spill kits' (absorbent material for tackling spills of dangerous substances) will be stored on site. • All construction personnel will be trained in the importance of preventing pollution. • Silt-laden water will not be permitted to leave the site. Silt traps will be constructed at a location that intercepts run-off. The silt trap will not be constructed immediately adjacent to the coastline and a buffer zone will remain between the silt trap and the watercourse with natural vegetation left intact. The southern site boundary will be protected by a robust silt-fence • The site manager will be responsible for the prevention of pollution and the implementation of these measures.
B-C2	Bats According to the bat survey report: "Light spill from the public lighting will follow the Bat Conservation Ireland "Bats & Lighting Guidance. Notes for: Planners, engineers, architects and developers". The bat ecologist has worked with the lighting engineer to ensure that no negative effects to bats will arise.
	LAND AND SOILS
LS-C1	LS-C1. A construction and demolition Waste Manager should be appointed who will have overall responsibility on site. All demolition material should be sorted to distinguish reusable material suitable for recycling. Since a large proportion of the demolition material will be bituminous car park surfacing and associated granular material it may be considered a hazardous waste and should be disposed of in a licenced disposal facility if recycling is not considered viable. All waste control measures are set out in the Site-Specific Construction & Demolition Waste and by-Product Management Plan.
LS-C2.	Reusable excavated soils and rock will be retained on-site for backfilling purposes to reduce the total volume of imported material where possible. It is envisaged however that due to the large volumes of excavation required to construct the basements on site a large portion of the excavated material will be removed off site.
LS-C3.	All excavated soil and pile arisings shall be stockpiled and tested to determine the soil classification in accordance with the waste acceptance criteria for Inert, Non-Hazardous and Hazardous Waste Landfills pursuant to Article 16 of the EU Landfill Directive 1999/31/EC Annex II and applied by landfill operators.

LS-C4	A dewatering strategy should be developed to be applied to the construction of all excavations that encroach on groundwater. Given the substantial volumes involved recharge of the adjacent aquifer to ground downgradient of temporary dewatering points should be employed to avoid excessively loading the surrounding drainage system. All ground water and rainwater collected in the excavation is to be pumped to a settlement tank before being used to recharge ground water. Where recharge points are not feasible however, calculations and an analysis of groundwater discharge to sewers should be included for review by the Planning Authority with pumping surface water sewer at an agreed location and pumping rate.
LS-C5	It is proposed to use a Secant pile wall to construct the basement consisting of an alternative soft and hard pile drilled around the full perimeter of the excavation. The primary (or soft) pile is drilled first on a hit a miss basis and extends to below the basement excavation line and are normally unreinforced, the secondary (or hard) pipe is then drilled between the soft piles and removes part of this pile forming a continuous wall. The wall will be designed by specialist design to support earth pressures from the adjoining ground both inside and outside the site boundary. By providing a secant pile wall around the perimeter of the construction of the basement it is not expected to result in any significant ground movement. Once the secant pile is in place this will exclude groundwater for the excavation and significantly reduce the dewatering required to facilitate the basement construction. Once the final basement walls retaining walls and base are cast no additional ground water dewatering will be required.
LS-C6	Mitigation measures will be required to control the migration of dust and debris. This will include dust suppression techniques such as water spraying, sweeping of hard surface roads, and the use of tarpaulin coverings and wheel washing for site traffic and delivery vehicles. All dust control measures noted in the Outline Construction Management Plan to be followed.
LS-C7	An emergency spill kit with oil boom, absorbers etc will be kept on-site for use in the event of an accidental spill to prevent any contaminants entering the subsoils and the underling aquifer. A specific team of staff shall be trained in the use of spill containment.
LS-C8	Highest standards of site management will be maintained, and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the site and surrounding environment during construction. A named person will be given the task of overseeing the pollution prevention measures agreed for the site to ensure that they are operating safely and effectively.
LS-C9	Monitoring of groundwater levels pre, during and post construction of basement works will be carried out. Trigger water levels will be established for management of temporary dewatering works. Ground water monitoring will continue until the basement is complete.
LS-O1	The stormwater drainage system will include for a swale to offer a level of treatment to run-off from the roads in the development reducing the level of pollutants and hydrocarbons in the out flow.
LS-O2	The stormwater drainage system will include for a bypass separator, to be located upstream of the outfall location, thus reducing potential impact to the receiving environment in the event of oil or fuel spillages.
LS-O3	The stormwater will be directed to the Attenuation tank constructed as part of the phase 2B stormwater drainage solution which has been sized to cater for the subject site. A Vortex Flow Control device will be incorporated to ensure the controlled release of runoff waters at the outfall location.
	WATER
W-C1	Surface water storage in excavations etc. will be directed to on-site settlement tanks, where silt removal will be facilitated prior to discharge to the surface water system at a controlled rate. Periodic testing of the surface water discharge might also be undertaken.
W-C2	If concrete mixing is carried out on site, the mixing plant will be sited in a designated area with an impervious surface.
W-C3	To minimise any impact on the water environment from material spillages, all oils, solvents and paints used during construction will be stored within temporary bunded areas or chemstore containers.

W-C4	In the anticipated event of groundwater being encountered during the construction phase, mitigation measures will include dewatering by pumping the excess water to a settlement tank before being used to recharge the ground water.
W-C5	A contingency plan for pollution emergencies should also be developed and regularly updated, which would identify the actions to be taken in the event of a pollution incident.
W-O1	All pipes to be tested prior to allowing foul effluent to discharge to them in accordance with the requirements of the Irish Water and/or the local authority.
	All watermains to be tested and chlorinated in accordance with the requirements of the Irish Water and/or the local authority.
W-O2	The SuDS proposed for the development would facilitate discharge of run-off to ground, thereby reducing discharge to surrounding watercourses etc. The proposed SUDS strategy also includes the limiting of flow from the site to Greenfield runoff levels and the storage of same within detention basins etc.
W-O3	Surface water storage systems would include permeable pavements, and the open swale featuring an unsealed permeable base. While the infiltration capacity of the subsoil is relatively limited this would enable some surface water infiltration to the ground and thus facilitating the natural recharge of groundwater.
W-O4	In order to reduce the risk of defective or leaking sewers, all new sewers would be pressure tested and CCTV surveyed to ascertain any possible defects, in accordance with Irish Water Requirements. Such defects if they arise would be repaired prior to the connection of any future development to the sewers.
W-O5	Given the sensitive nature of the receiving environment, a Class I bypass petrol interceptor will also be inserted on the storm line upstream of the outfall. This will provide an additional level of protection from petrol, oils and hydrocarbons and is designed to achieve a concentration of less than mg/l of oil during 99% of all rainfall events.
	AIR AND CLIMATE
AC-C1	Construction Management • Avoid unnecessary vehicle movements and manoeuvring, and limit speeds on site so as to minimise the generation of airborne dust. • Use of rubble chutes and receptor skips during construction activities. • During dry periods, dust emissions from heavily trafficked locations (on and off site) will be controlled by spraying surfaces with water and wetting agents. • Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic only. • Re-suspension in the air of spillages material from trucks entering or leaving the site will be prevented by limiting the speed of vehicles within the site to 10kmh and by use of a mechanical road sweeper. • The overloading of tipper trucks exiting the site shall not be permitted. • Aggregates will be transported to and from the site in covered trucks. • Where the likelihood of windblown fugitive dust emissions is high and during dry weather conditions, dusty site surfaces will be sprayed by a mobile tanker bowser. • Wetting agents shall be utilised to provide a more effective surface wetting procedure. • Exhaust emissions from vehicles operating within the construction site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised by routine servicing of vehicles and plant, rather than just following breakdowns; the positioning of exhausts at a height to ensure adequate local dispersal of emissions, the avoidance of engines running unnecessarily and the use of low emission fuels. • All plant not in operation shall be turned off and idling engines shall not be permitted for excessive periods. • Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods. • Material stockpiles containing fine or dusty elements including top soils shall be

	covered with tarpaulins. • Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system. • A programme of air quality monitoring shall be implemented at the site boundaries for the duration of construction phase activities to ensure that the air quality standards relating to dust deposition and PM_{10} are not exceeded. Where levels exceed specified air quality limit values, dust generating activities shall immediately cease and alternative working methods shall be implemented. • A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated. Dust netting and site hoarding shall be installed along the north, south, east and western site boundaries to minimise fugitive windblown dust emissions falling on third party lands and existing residential areas.
AC-C2	Dust Deposition Monitoring Methodology Dust deposition levels will be monitored to assess the impact that site construction site activities may have on the local ambient air quality and to demonstrate that the environmental control measures in place at the site are effective in minimising the impact of construction site activities on the local receiving environment including existing residential developments and lands bordering the site. The following procedure shall be implemented at the site on commencement of site activities: The dust deposition rate will be measured by positioning Bergerhoff Dust Deposit Gauges at strategic locations near the boundaries of the site for a period of 30 +-2 days. Monitoring shall be conducted on a monthly basis during the construction phase. The proposed monitoring locations (D1 – D3) are presented in Figure 8.6. The selection of sampling point locations will be completed after consideration of the requirements of Method VDI 2119 with respect to the location of the samplers relative to obstructions, height above ground and sample collection and analysis procedures. The optimum locations will be determined by a suitably qualified air quality expert to ensure that the dust gauge locations are positioned in order to best determine potential dust deposition in the vicinity of the site boundaries and existing on-site buildings. After each (30 +-2 days) exposure period, the gauges will be removed from the sampling location, sealed and the dust deposits in each gauge will be determined gravimetrically by an accredited laboratory and expressed as a dust deposition rate in mg/m2-day in accordance with the relevant standards. Technical monitoring reports detailing all measurement results, methodologies and assessment of results shall be subsequently prepared and maintained by the Site Manager. Monitoring reports shall be made available to the Local Authority as requested. A dust deposition limit value of 350 mg/m2-day (measured as per German Standard Method VDI 2119 – Measurement of Particulate Precipitations – Determination of Dust Precipitation with Collecting Pots Made of Glass (Bergerhoff Method) or Plastic. is commonly specified by Local Authorities and by the EPA to ensure that no nuisance effects will result from specified activities and it is to this Best Practice standard method that this programme of dust monitoring and control has been prepared. The German Federal Government Technical Instructions on Air Quality Control - TA Luft specifies an emission value for the protection against significant nuisances or significant disadvantages due to dustfall. This limit value is 350 mg/m2-day and it is to this limit value that all measured dust deposition levels shall be assessed. This limit value is commonly specified by Local Authorities at construction sites.

AC-C3	NO_2 Monitoring Methodology In order to assess the impact on existing air quality that vehicle and plant exhaust emissions associated with the construction phase of the development may have, it is proposed that a programme of Nitrogen Dioxide monitoring shall be undertaken for a 2 year period at the baseline air quality locations, A1 & A2. The purpose of this monitoring programme will be to verify the effectiveness of the various construction phase mitigation measures and to quantify by measurement, the concentration of NO2 in the ambient air to allow for the assessment of measured NO2 levels against levels measured in EPA Zone A areas over a similar period. NO2 levels shall also be assessed against the annual limit value NO2 as defined in National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011) which specify an annual limit value of 40 µg/m3, for the protection of human health, over a calendar year.
AC-C4	PM_{10} & $PM_{2.5}$ Monitoring Methodology Fine particulate matter as PM10 and PM2.5 shall be monitored using continuous data logging air quality monitoring instrumentation during the stripping and excavation of soils at the site. The monitoring system shall be located at the boundary with the Mcalevey Avenue residential area
AC-O1	Climate Impact Mitigation Measures by Design • Energy Efficiency – All residential units shall be designed and constructed in accordance with The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings amended in 2017 includes requirements for all residential dwellings to be "Nearly Zero Energy Buildings" (NZEB's) by 31st December 2020. • Energy Consumption - The following key design features have been integrated into the design and construction of the residential units to reduce energy consumption: – Photovoltaic Cells will be installed on all roofs – The use of green building materials: low embodied energy & recycled materials will be utilised where possible – Energy efficient window units and frames with certified thermal performance shall be used – Building envelope air tightness will reduce the loss of warm air to the external environment – Installation of Exhaust Air Heat Pump systems in all units which operate by extracting warm air from kitchens and bathrooms, cleaning it and distributing it to other rooms in the unit. Thermal insulation of walls and roof voids of all units
AC-O2	Air Quality Mitigation Measures • Natural Gas heating in all units • Inclusion of electric car charging points to encourage electric vehicle ownership • Proximity of Public Transport including Bus Eireann services Provision of open landscaped areas, to encourage residents to avail of active lifestyle options and which will contribute albeit in a minor way to the adsorption of Carbon Dioxide from the atmosphere and the release of Oxygen into the atmosphere.
	NOISE AND VIBRATION
NV-C1	General Noise Management Measures An independent acoustic consultant shall be engaged by the contractor prior to the commencement of site activities to ensure that all noise mitigation measures as specified in this Section of the EIAR are implemented and to prepare a site specific Construction Phase Noise Management Plan. The Plan shall include all relevant noise and vibration control measures as specified in this Chapter of the EIAR and specify the noise monitoring locations.. The Plan shall be submitted to DCC for approval as required. The nominated contractor shall appoint a designated person to manage all environmental complaints including noise and vibration.

	A noise complaint procedure shall be implemented in which the details of any noise related complaint are logged, investigated and where required, measures are taken to ameliorate the source of the noise complaint. Appropriate signage shall be erected on all internal roads within the site the site to inform HGV drivers that engines shall not be left idling for prolonged periods and that the use of horns shall be banned at all times.
NV-C2	• A strictly enforced noise management programme shall be implemented at the site from the outset of construction activities. • The acoustic consultant shall conduct routine noise audit surveys which shall be conducted at the baseline noise monitoring locations throughout the construction phase of the development to assess compliance with the construction noise limit criteria detailed in Section 8.2.3 above and to assess the effectiveness and implementation of the specific Construction Phase noise mitigation measures detailed in this document. • The principal of controlling noise at source shall be implemented at the site. Best practice mitigation techniques as specified in BS 5228:2009+A1 2014 – Noise and Vibration Control on Construction and Open Sites shall be implemented during the construction phase and are detailed in this Section. • Noisy stationary equipment shall be sited away from sensitive site boundaries as far as practicable. • Where reasonable practicable, noisy plant or activities shall be replaced by less noisy alternatives if noise breaches and/or complaints occur. • Proper use of plant with respect to minimising noise emissions and regular maintenance will be required. • All vehicles and mechanical plant will be fitted with effective exhaust silencers and will be maintained in good efficient order • Where noisy plant is required to operate in works areas next to residential houses low noise plant options will be used wherever practicable. • Dumpers and any plant used for moving materials around the site will have high performance exhaust silencers. − Selected use of rubber-tyred equipment over steel track equipment where practicable. • The use of inherently quiet plant is required where appropriate – all compressors and generators will be “sound reduced” or “super silent” models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use, and all ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers. • All compressors, generators and pumps shall be silenced models fitted with properly lined and sealed acoustic covers or enclosures, which will be kept closed whenever the machines are in use. • All pneumatic percussive tools such as pneumatic hammers shall be fitted with dampers, mufflers or silencers of the type recommended by the manufacturer. − Fixed items of plant shall be electrically powered in preference to being diesel or petrol driven. • Vehicles and mechanical plant utilised on site for any activity associated with the works shall be fitted with effective exhaust silencers and shall be maintained in good working order and operated in a manner such that noise emissions are controlled and limited as far as reasonably practicable. • Any plant, equipment or items fitted with noise control equipment found to be defective in shall not be operated until repaired / replaced. • Machines in intermittent use shall be shut down in the intervening periods between works or throttled down to a minimum during periods when not in use. • Static noise emitting equipment operating continuously shall be housed within suitable acoustic enclosure, where appropriate.

	• All excavator mounted pneumatic breakers used for demolition and ground breaking activities shall be fitted with effective dampeners and /or enclosed within a noise adsorbing blanket structure to minimise noise emissions. • Site activities shall be staggered when working in proximity to any receptor, that is concrete cutting and rock breaking should where possible. This proposed method of working will provide effective noise management of site activities to ensure that any receptor is not exposed to unacceptably high levels of noise over extended periods. − Excessive reviving of all vehicles shall be avoided. − Unnecessary dropping of heavy items onto ground surfaces shall be banned. • The use of an excavator bucket to break up slabs of concrete or tarmacadam shall not be permitted. • The dragging of materials such as steel covers, plant or excavated materials along ground surfaces shall not be permitted. • The use of acoustic screens to attenuate noise at source shall be implemented as deemed necessary. • Plant Reversing Alarms: Where reasonably practicable and deemed safe by risk assessment, taking into account onsite hazards and working environment, the tonal reversing alarms of mobile plant shall be replaced with broadband alarms. • A nominated person from the Project Management team will be appointed to liaise with local residents and businesses regarding noise nuisance events. • In the event of the requirement for out of hours work to occur which will involve the generation of noise levels that are predicted to exceed out of hours noise limit criteria, DCC shall be immediately notified prior to the works commencing. • A nominated person from the Project Management team will be appointed to liaise with and inform local residents and FCC regarding out of hours works. An independent acoustic consultant shall review the implementation of the recommended mitigation measures on a monthly basis.
NV-C3	Vibration Mitigation Measures The following specific vibration mitigation and control measures shall be considered during the construction phase: • Breaking out concrete elements using low vibration tools • Choosing alternative, lower-impact equipment or methods wherever possible • Scheduling the use of vibration-causing equipment, such as jackhammers, at the least sensitive time of day • Routing, operating or locating high vibration sources as far away from sensitive areas as possible • Sequencing operations so that vibration causing activities do not occur simultaneously • Isolating the equipment causing the vibration on resilient mounts • Keeping equipment well maintained. • Confining vibration-generating operations to the least vibration-sensitive part of the day which could be when the background disturbance is highest • A nominated person from the Project Management team will be appointed to liaise with local residents and businesses regarding vibrational nuisance events. • An independent acoustic consultant shall review the implementation of the recommended mitigation measures on a monthly basis.
NV-C4	Proposed Noise Monitoring Programme During Site Construction Prior to the commencement of the site construction activities, a programme of continuous noise monitoring at site boundary locations shall be undertaken to assess and manage the impact that site activities may have on ambient noise levels at local receptors. These surveys will establish the noise impact of site activities at the closest noise sensitive receptors to the north, northeast and south of the site, to assess compliance with the specified construction noise limit criteria and to ensure that mitigation and control measures are being implemented as required.

	All noise monitoring data will be compiled into a monthly technical monitoring report which will include a full assessment of the potential noise impacts arising from site construction activities. The environmental noise measurements will be completed in accordance with the requirements of *ISO 1996-1: 2017: Acoustics – Description, measurement and assessment of environmental noise* and with regard to the *EPA's 2016 Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).* The measurement parameters to be recorded include wind speed, temperature, L_{Aeq}, L_{A90}, L_{A10} and L_{Amax} , 1/3 Octave Frequency analysis and impact noise analysis. Noise Monitoring Locations The construction noise monitoring locations (CN1 – CN3) in proximity to the closest residential receptors are shown in Figure 9.7.
NV-C5	Proposed Vibration Monitoring Programme During Site Construction In order to ensure that site construction activities are conducted to minimise the vibration impacts on the receiving environment, it is proposed that structural vibration monitoring may be implemented during the course of the construction phase as required. It is proposed that vibration monitoring will be conducted at adjacent properties opposite the site boundaries as required using calibrated vibration monitors and geophones with live text and email alert functionality to ensure that if vibration levels approach or exceed specified warning and limit values, site personnel will be alerted to cease at the earliest instance and appropriate mitigation measures may then be implemented to minimise the vibrational impacts of protected structures. Vibration Monitoring Locations The monitoring points chosen for locating the geophone of the vibration measuring instrument will be chosen according to the guidelines in *British Standard BS 7385:, Evaluation and measurement for vibration in buildings, Part1 1990 Guide for measurement of vibrations and evaluation of their effects on buildings and Part 2 1993 Guide to damage levels arising from groundborne vibration.*
NV-O1	Acoustic Design requirements for residential buildings External noise can enter rooms within dwellings through windows, ventilators, walls, roof and doors. In most cases, however, windows provide the main path and therefore, mitigation by design has focussed on this building element to ensure that their insulation is adequate. Windows In order to ensure a sufficient level of sound insulation is provided for all dwellings within the development, the following lists the minimum sound insulation performance of windows and window frame sets in terms of the in-situ weighted sound reduction index (Rw): 40dB Rw for Living rooms & Bedrooms 37dB Rw for Kitchen, Bathroom & Dining Rooms. The acoustic performance specifications detailed are the *in-situ* minimum requirements which shall apply to the overall glazing system when installed on site. 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. All exterior wall and door frames should be sealed tight to the exterior wall construction.

<table>
<tr><td>NV-02</td><td>Internal Noise Control – Apartments
At the earliest stage during the construction phase, test apartment units shall be constructed to their finished level and shall be tested by a suitably qualified independent Acoustic Engineer to ensure that they comply with <i>Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound. Table 9.15</i> provides detail on the recommended sound insulation values that shall be achieved to ensure acoustic privacy between adjoin apartment units
Table 9.15 – Recommended sound insulation values for internal party walls / floors
<table>
<tr><th>Dwellings</th><th>Airborne Sound Insulation D_{nTw} (dB)</th><th>Impact Sound Insulation L_{nTw} (dB)</th></tr>
<tr><td>Floors and Stairs</td><td>53</td><td>58</td></tr>
<tr><td>Walls</td><td>53</td><td>N/A</td></tr>
</table>
For other non-traffic related sources appropriate guidance on internal noise levels for dwellings is contained within BS 8233: 2014: Guidance on Sound Insulation and Noise Reduction for Buildings. This British Standard sets out recommended noise limits for indoor ambient noise levels in dwellings as detailed in Table 9.16.
Table 9.16 – Recommended Indoor Ambient Indoor Noise Levels from BS 8233: 2014
<table>
<tr><th rowspan="2">Typical situations</th><th colspan="2">Design Range, $L_{Aeq,T}$ dB</th></tr>
<tr><th>Daytime $L_{Aeq,16hr}$ (07:00 to 23:00hrs)</th><th>Night-time $L_{Aeq, 8hr}$ (23:00 to 07:00hrs)</th></tr>
<tr><td>Living / Dining</td><td>35 / 40</td><td>n/a</td></tr>
<tr><td>Bedrooms</td><td>35</td><td>30</td></tr>
</table>
</td></tr>
<tr><td>NV-03</td><td>Ventilation Systems
The ventilation strategy for the development will be in accordance with <i>Part F of the Building Regulations</i>. The apartment units shall include mechanical heat recovery ventilation systems which will negate the requirement for passive wall vents in bedrooms and living spaces which would otherwise allow the transfer of external noise into the building through the air gaps in the passive vents. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice.</td></tr>
<tr><td>NV-O4</td><td>Wall Construction
The wall construction typically provides the highest level of sound insulation performance to a residential building. The residential dwellings will be built using either masonry or a timber framed construction. The minimum sound insulation performance of the chosen wall construction will be 55dB Rw.</td></tr>
<tr><td>NV-05</td><td>Roof Construction
The insulated roof constructions proposed across the site will provide an adequate level of sound insulation to the properties within the development site. A minimum sound insulation value of 55dB Rw should be used for roof spaces.</td></tr>
<tr><td></td><td>MATERIAL ASSETS: BUILT SERVCIES</td></tr>
<tr><td>MA:BS-C1</td><td>Connections to the existing electricity, water services, gas and telecommunications networks will be coordinated with the relevant utility provider and carried out by approved contractors under the control of the service provider.</td></tr>
<tr><td></td><td>MATERIAL ASSETS: TRANSPORTATION</td></tr>
<tr><td>MA:T-C1</td><td>The preparation of a Construction Traffic Management Plan. It will be the appointed contractor's responsibility to prepare a detailed Construction Traffic Management Plan to be agreed with and approved by the Planning Authority prior to commencement of construction. An Outline Construction Traffic Management Plan is provided within the Traffic and Transportation Assessment (TTA). Below is a list of outline traffic management measures contained within the TTA, that may form part of the Construction Traffic Management Plan and adopted during the construction works. Note that this is not an exhaustive list:
• Warning signs / Advanced warning signs will be installed at appropriate locations in advance of the construction access.</td></tr>
</table>

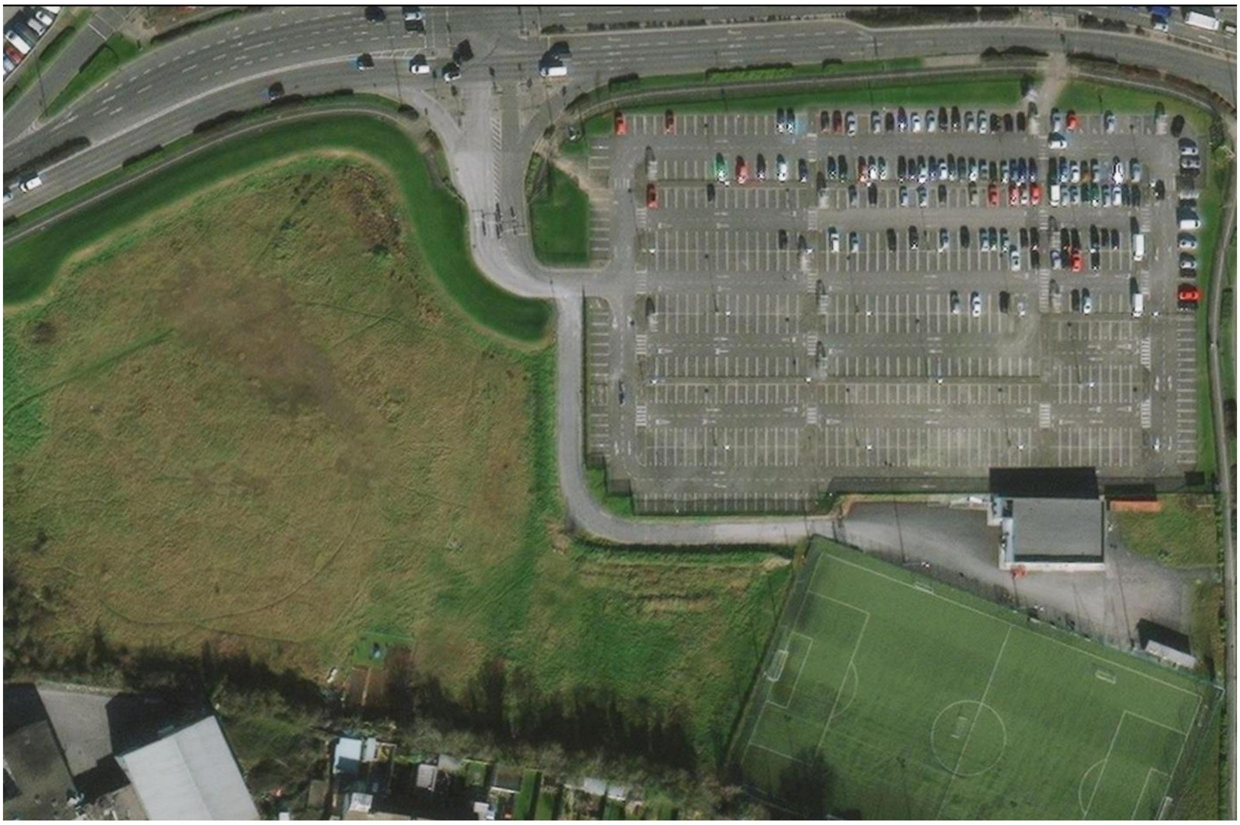
	• Construction and delivery vehicles will be instructed to use only the approved and agrees means of access and movement of construction vehicles will be restricted to these designated routes. • Appropriate vehicles will be used to minimise environmental impacts from transporting construction material, for example the use of dust covers on trucks carrying dust producing material. • Speed limits of construction vehicles to be managed by appropriate signage, to promote low vehicular speeds within the site. • Parking of site vehicles will be managed, and will not be permitted on public roads, unless proposed within that designated area that is subject to traffic management measures. • A road sweeper will be employed to clean the public roads adjacent to the site of any residual debris that may be deposited on the public road leading away from the construction site. • On site wheel washing will be undertaken for construction trucks and vehicles to remove any debris prior to leaving the site, to remove any potential debris on the local roads. • All vehicles will be suitably serviced and maintained to avoid leaks or spillage of oil, petrol or diesel. Spill kits will be available on site. All scheduled maintenance carried out off site will not be carried out on the public highway. • Safe and secure pedestrian facilities are to be provided where construction works obscure any existing pedestrian footway. Alternative pedestrian facilities will be provided in these instances, supported by physical barriers to segregate traffic and pedestrian movements, and to be identified by appropriate signage. Pedestrian facilities will cater for vulnerable users and mobility impaired persons.
MA:T-O1	The proposed Luas Terminus Station is located on the eastern site boundary. Careful planning and design has been undertaken to ensure that the proposed development does not impact on the preferred route identified for Luas.
MA:T-O2	The proposed Bus Terminus identified as part of the BusConnects Plan is located to the northern site boundary.
MA:T-O3	The entire site is within immediate walking distance of existing bus stops and bus corridors.
MA:T-O4	The site is adjacent and accessible to Routes B05 and 3B of the NTA Cycle Network Plan.
MA-T-O5	The proposed development facilitates the upgrade of cycle tracks adjacent its northern and eastern boundary which are associated with Routes 3B, NO5 and F9 of the NTA Cycle Network Plan.
MA:T-O6	The development incorporates a permeable internal layout for pedestrians and cyclist that link the site to the eternal pedestrian, cycling and public transport network whilst also facilitating strong connections across Charlestown Pace to the Charlestown District Centre and its related facilities, services and amenities.
MA:T-O7	The site is planned in the context of a Mobility Management Plan based on the physical infrastructure provisions of walking and cycling links and access to public transport bus and future Luas services.
MA:T-O8	Demand Management is also underpinned by the co-location of residential, education, local retail and leisure and amenity facilities.
MA:T-O9	The propensity for car ownership and car use is managed through measures that include reduced residential parking provision and increased cycle parking provision in line with the 'Design Standards for New Apartments'. The provision of car club parking spaces will facilitate a lower level of car ownership.
MA:T-O10	The development contains the required infrastructure to provide electric charging to all car parking spaces.

	MATERIAL ASSETS: RESOURCE AND WASTE MANAGEMENT
MA:RWM-C1	Waste materials generated by construction activities will be managed according to the Department of the Environment, Heritage and Local Government's 2006 Publication - Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects • Analysis of waste arisings / material surpluses • Specific Waste Management objectives for the Project including the potential to re-use existing on-site materials for further use in the construction phase. • Methods proposed for Prevention, Reuse and Recycling • Waste Handling Procedures • Waste Storage Procedures • Waste Disposal Procedures Record Keeping
MA:RWM-C2	Waste minimisation and prevention shall be the primary responsibilities of the Construction Project Manager who shall ensure the following: • Materials will be ordered on an "as needed" basis to prevent over supply • Materials shall be correctly stored and handled to minimise the generation of damaged materials • Materials shall be ordered in appropriate sequence to minimise materials stored on site • Sub contractors will be responsible for similarly managing their wastes
MA:RWM-C3	The Construction Project Manager shall maintain a register of all construction wastes generated and shall compile a monthly report detailing the types and quantities of construction wastes generated at the site and the destinations that the wastes were exported to.
MA:RWM-O1	The proposed development shall be designed and managed to provide residents with the required waste management infrastructure to minimise the generation of un-segregated domestic waste and maximise the potential for segregating and recycling domestic waste fractions.
MA:RWM-O2	The Objective of the OWMP is to maximise the quantity of waste recycled by residents by providing sufficient waste recycling infrastructure, waste reduction initiatives and waste collection and waste management information services to the residents of the development.
MA:RWM-O3	The Goal of the OWMP is to achieve a residential recycling rate of 50% of managed municipal waste by 2020 (and future targets in subsequent Eastern-Midlands Regional Waste Management Plans).
MA:RWM-O4	All residential units will have a 3-bin system (non-recyclable, organic and recyclable) in each kitchen to encourage residents to segregate waste at source.
MA:RWM-O5	Apartment residents will be provided with waste recycling and waste disposal information by the development's Facility Management Company who will be responsible for providing clean, safe and mobility impaired accessible communal waste storage areas for the apartment blocks.
MA:RWM-O6	The Facility Management Company shall maintain a register of all waste volumes and types collected from the development each year including a break-down of recyclable waste and where necessary, shall introduce initiatives to further encourage residents to maximise waste segregation at source and recycling. They shall also provide an annual bulky waste and WEEE collection service for all residents. The development shall be designed to provide adequate domestic waste storage areas for each apartment blocks. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development. Communal waste bin storage areas shall be designed in a manner to ensure that appropriate signage for the correct disposal and recycling of waste is available for residents.
MA:RWM-07	The Facility Management Company shall prepare an annual report for FCC and residents of the development on the quantities of waste generated within the development to

	demonstrate how waste reduction and recycling targets are being achieved with regard to the targets defined in The *Eastern-Midlands Region Waste Management Plan 2015-2021* (and subsequent revisions).
	CULTURAL HERITAGE
CH-C1	All topsoil stripping in the south-western portion of the site will be monitored by a suitably qualified archaeologist. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation *in-situ* or by record. Any further mitigation will require approval from the National Monuments Service of the DoCHG.
	LANDSCAPE
L-C1	Implement the Tree Protection Strategy and Tree Protection Plan contained within the Arborist Associates Ltd. Aboricultural Assessment dated July 2020.

APPENDIX 5A – BAT FAUNA ASSESSMENT

Bat fauna assessment for the Charlestown Place SHD.



24th November 2020

Prepared by: Bryan Deegan (MCIEEM) of Altemar Ltd.
On behalf of: Puddenhill Property Limited

Altemar Ltd., 50 Templecarrig Upper, Delgany, Co. Wicklow. 00-353-1-2010713. info@altemar.ie
Directors: Bryan Deegan and Sara Corcoran
Company No.427560 VAT No. 9649832U
www.altemar.ie

Document Control Sheet			
Client	Puddenhill Property Limited		
Project	Bat fauna assessment for the Charlestown Place SHD.		
Report	Bat Fauna Assessment		
Date	24th November 2020		
Project No:		Document Reference: PPL-2001	
Version	Author	Reviewed	Date
Draft 01	Bryan Deegan	Sara Corcoran	24th November 2020
Draft 02			
Draft 03			

SUMMARY

Structure: No structures on site.

Location: The subject site is located in Charlestown, Finglas, Dublin 11.

Bat species present: None Roosting.

Proposed work: The development will consist of construction of c.590 no. apartment units in 4no. 2 to 10 storey blocks.

Impact on bats: Foraging areas may be lost. Mitigation is proposed in relation to landscaping and bat sensitive lighting plan.

Survey by: Bryan Deegan MCIEEM

Survey date: 28th July 2020

Contents

Introduction

Site location
The proposed development site is located Charlestown, Finglas, Dublin 11. The subject site is a greenfield and brownfield area with no buildings present on site. area located approximately 200m to the south of Charlestown Shopping centre.

Proposed Development
The development will consist of construction of c.590no. apartment units in 4no. 2 to 10 storey blocks (Blocks 1 to 4) over basement car parking on a site comprising an existing surface car park and adjoining lands located south of Charlestown Place, west of St. Margaret's Road, north of McKelvey Avenue and McKelvey Celtic AFC playing pitches and west of an undeveloped greenfield site. Non residential uses include a creche and associated external play area retail / commercial units and a community facility. The development is described in full within the application public notices.

Bat survey
This report presents the results of site visit by Bryan Deegan (MCIEEM) on the 28th July 2020 during which all on site hedgerows were inspected for signs of bat use or presence and a bat emergent/detector survey was carried out. No buildings are present on site. At dusk, a bat detector survey was carried out onsite using a *Batbox Duet* heterodyne/frequency division detector to determine bat activity.

Tree Roosting Potential Survey
Following the onsite visit and a review of the Arboricultural Assessment Report carried out by Arborist Associates Ltd. several trees on the southern boundary were seen to have bat roosting potential. This includes several large Ash (Fraxinus excelsior) and in particular No. 303. No works are proposed in this area and tree protection measures will be in place. It is not proposed to remove any trees of bat roosting potential.

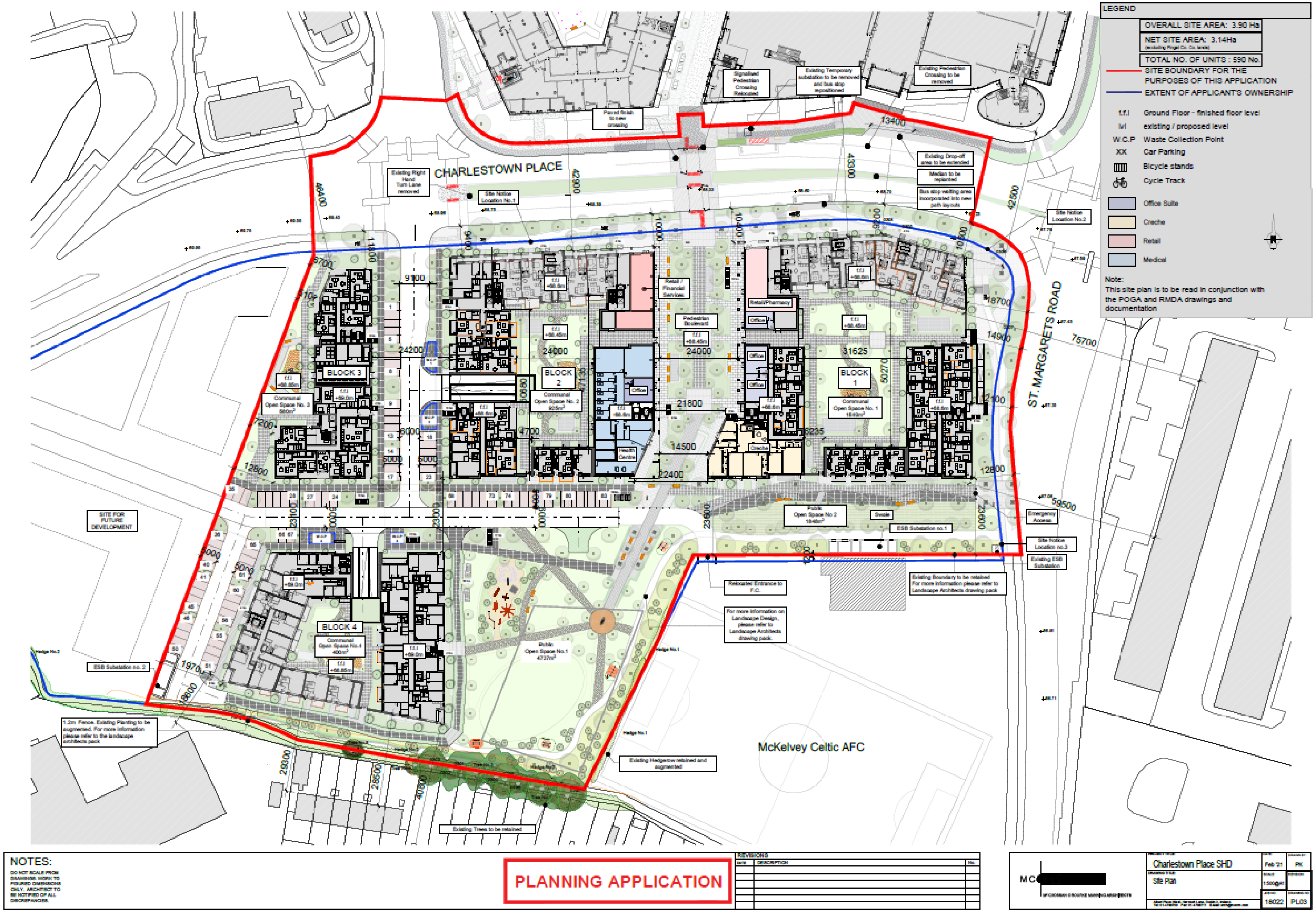


Figure 1: Site outline (proposed development).

Figure 2. Landscape Masterplan

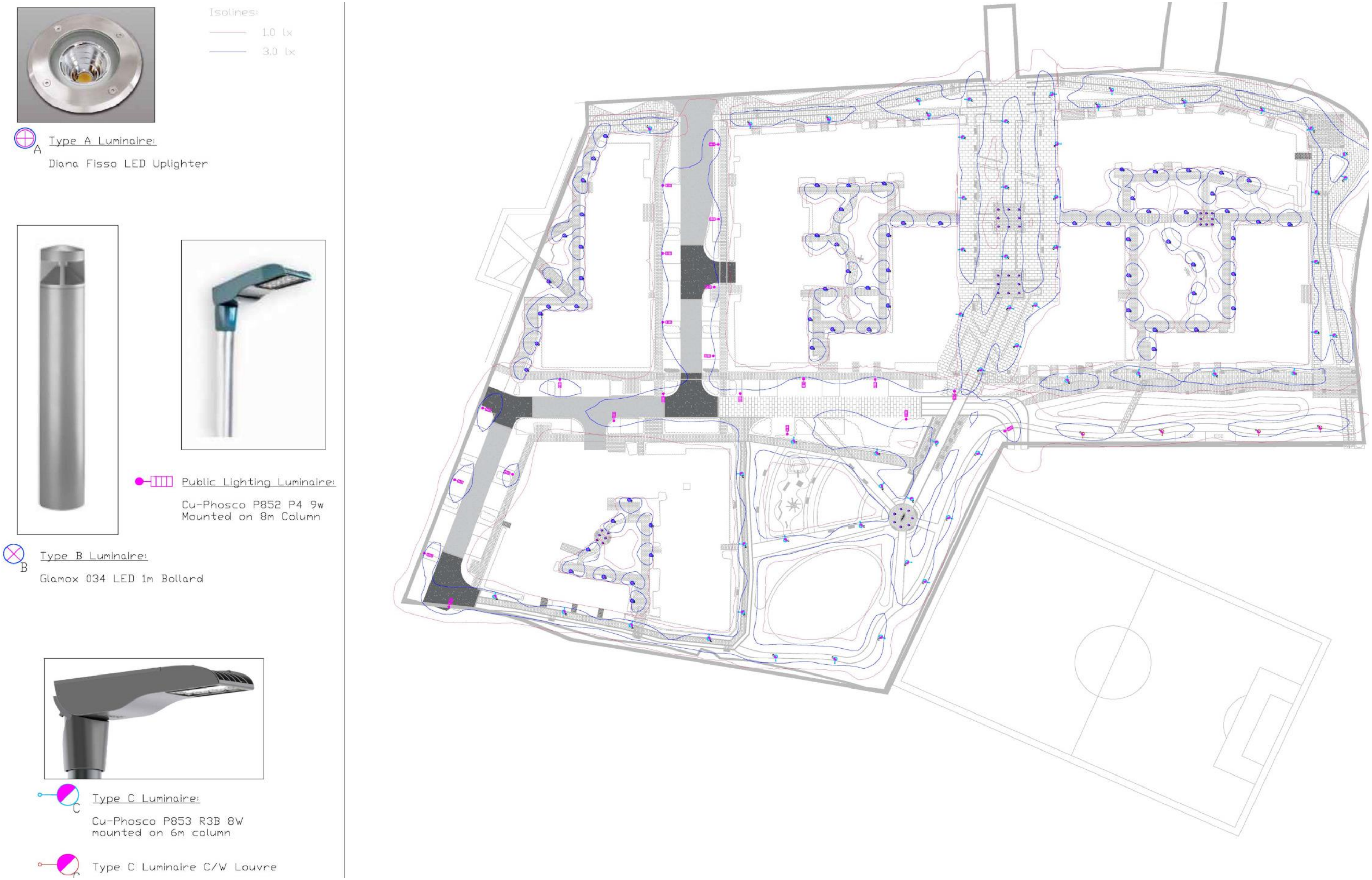


Figure 3. Lighting Plan and light spill model (1 Lux-red & 3 Lux blue)

Survey constraints

The detector survey was undertaken during the active bat season. Weather conditions were good with mild temperatures of 14°C after sunset (21.27). Winds were light and there was no rainfall during the survey. Flying insects and foraging bat activity was noted on site. There were no constraints in relation to the survey.

Review of local bat records

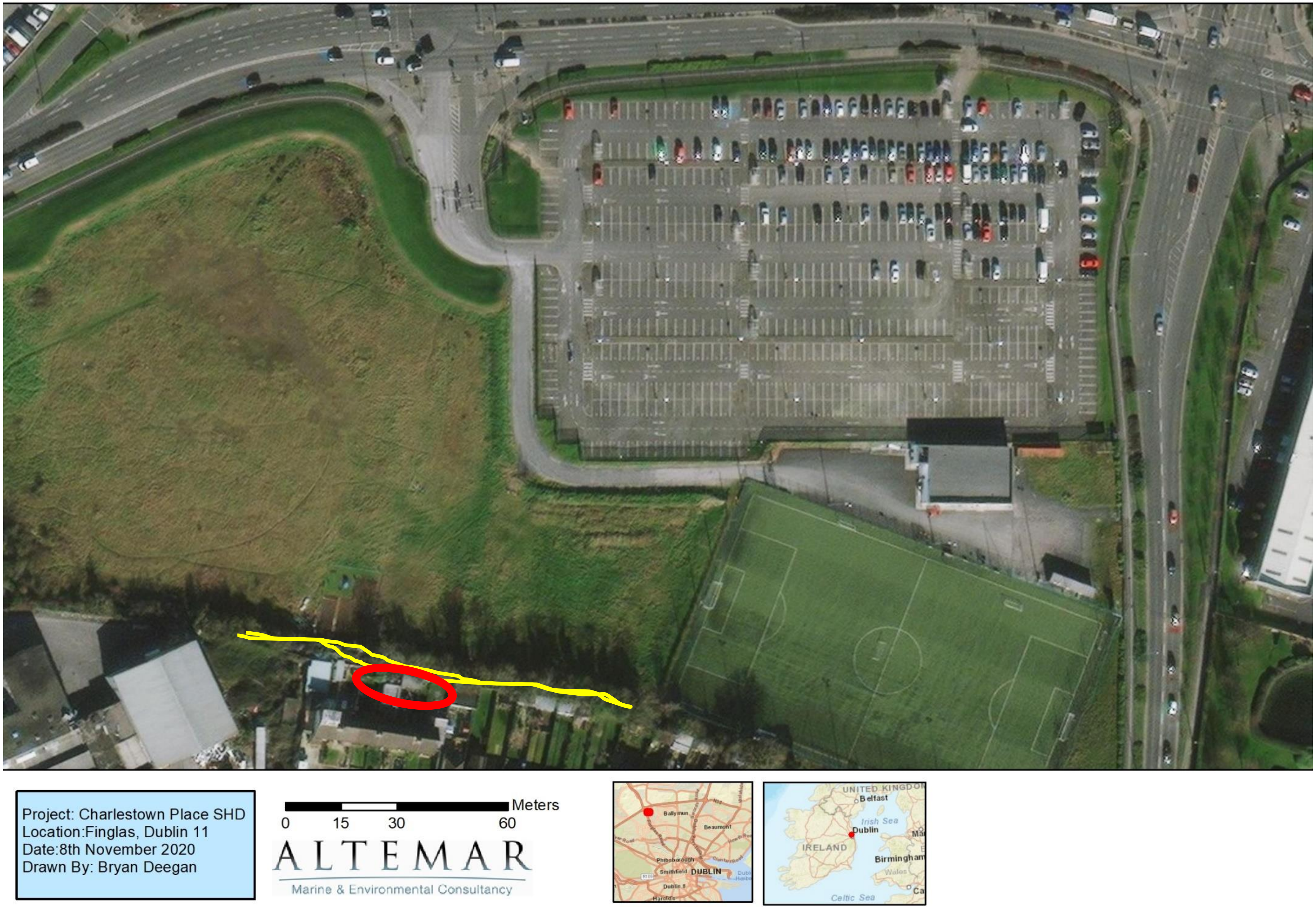
The review of existing bat records (sourced from *Bat Conservation Ireland's* National Bat Records Database) within the 2km grid of the study area reveals that none of the nine known Irish species have been observed locally. However, a pipistrelle bat (*Pipistrellus pipistrellus sensu lato*) and Soprano Pipistrelle (*Pipistrellus pygmaeus*) were noted 1km to the east 30/08/2011. Based on NBDC/NPWS records, bats have not been seen on site.

Structure /Roost survey

No buildings or structures of roosting potential were present within the development site. In relation to bat roosting potential, the site comprised of one large field surrounded by mature hedgerows and treelines to the south. The hedgerows were of poor roosting potential due to the small size of the trees. However, some larger trees (Ash) on site have potential for bat roosts. This is primarily as a result of the trees being covered in ivy and/or crevices being present. All of these trees are to be retained. A derogation licence is not required for the proposed project.

Detector survey

A single bat (soprano pipistrelle) was noted foraging on site along the southern field boundary seen in Figure 1. No bats were detected emerging from any of the onsite trees.



Project: Charlestown Place SHD
Location:Finglas, Dublin 11
Date:8th November 2020
Drawn By: Bryan Deegan

ALTEMAR
Marine & Environmental Consultancy

Figure 4. Bat activity observed on site. Soprano Pipistrelle foraging activity (yellow). Trees of bat foraging potential (heavily clad in ivy) (red outline)

Potential impacts of proposed redevelopment on bats

No buildings are noted on site. No bats emerging onsite trees were observed. The hedgerows on site have few features that would act as potential roosting areas. However, the boundary features on site would form foraging corridors for bat species and several ash trees on the southern boundary are clad in ivy which could form potential roosing sites for individual bats.

Discussions took place between the lighting designer and Altemar Limited in relation to the design of the proposed lighting strategy. As can be seen from Figure 4 lights within the vicinity of the southern hedgerows contain louvres to contain light spill and are classed as a warm white (3000ºK). Light spill in the vicinity of the hedgerow is maintained less that 3lux, and is 1 lux in across much of the site. This would not be seen to significantly impact on bat foraging. It would be expected that bat foraging activity would not reduce in the vicinity of the hedgerow. The light spill from the proposed development would not be seen to significantly affect the foraging population of bats in the vicinity of the proposed development.

Mitigation measures

Light spill from the public lighting will follow the Bat Conservation Ireland "Bats & Lighting Guidance. Notes for: Planners, engineers, architects and developers"[8]

Predicted and residual impact of the proposal

There is no evidence of a current or past bat roost on site, therefore no significant negative impacts on roosting animals are expected to result from the proposed redevelopment. However, several trees on site may be of bat roosting potential. It is not proposed to fell these trees. Lighting in the vicinity of the hedgerows has been sensitively prepared to ensure foraging activity is maintained within the area and the hedgerow is not impacted by light spill. Light spill from the proposed development would not be seen to impact on foraging activity. No significant impact on bats foraging or roosting is foreseen from the proposed development.

References

Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention) 1982
Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention) 1979
EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive) 1992
European Communities (Birds and Natural Habitats) Regulations 2011 Government of Ireland, Dublin
Kelleher, C. and Marnell, F. 2007 *Bat Mitigation Guidelines for Ireland – Irish Wildlife Manuals No. 25*. National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin
Marnell, F., Kingston, N. and Looney, D. 2009 *Ireland Red List No. 3: Terrestrial Mammals.* National Parks and Wildlife Service, Department of the Environment, Heritage and Local Government, Dublin
Wildlife Act 1976 and Wildlife Amendment Acts 2000 and 2010. Government of Ireland.

Legal status and conservation issues – bats

All Irish bat species are protected under the Wildlife Act (1976) and Wildlife Amendment Acts (2000 and 2010). Also, the EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive 1992), seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken. All Irish bats are listed in Annex IV of the Habitats Directive and the lesser horseshoe bat *Rhinolophus hipposideros* is further listed under Annex II. Across Europe, they are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions.

All Irish bats are listed in Annex IV of the Habitats Directive and the lesser horseshoe bat is further listed under Annex II.

The current status and legal protection of the known bat species occurring in Ireland is given in the following table.

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[8] https://www.batconservationireland.org/wp-content/uploads/2013/09/BCIrelandGuidelines_Lighting.pdf

Common and scientific name	**Wildlife Act 1976 & Wildlife (Amendment) Acts 2000/2010**	**Irish Red List status**	**Habitats Directive**	**Bern & Bonn Conventions**
Common pipistrelle *Pipistrellus pipistrellus*	Yes	Least Concern	Annex IV	Appendix II
Soprano pipistrelle *P. pygmaeus*	Yes	Least Concern	Annex IV	Appendix II
Nathusius pipistrelle *P. nathusii*	Yes	Not referenced	Annex IV	Appendix II
Leisler's bat *Nyctalus leisleri*	Yes	Near Threatened	Annex IV	Appendix II
Brown long-eared bat *Plecotus auritus*	Yes	Least Concern	Annex IV	Appendix II
Lesser horseshoe bat *Rhinolophus hipposideros*	Yes	Least Concern	Annex II Annex IV	Appendix II
Daubenton's bat *Myotis daubentonii*	Yes	Least Concern	Annex IV	Appendix II
Natterer's bat *M. nattereri*	Yes	Least Concern	Annex IV	Appendix II
Whiskered bat *M. mystacinus*	Yes	Least Concern	Annex IV	Appendix II
Brandt's bat *M. brandtii*	Yes	Data Deficient	Annex IV	Appendix II

Also, under existing legislation, the destruction, alteration or evacuation of a known bat roost is a notifiable action and a derogation licence has to be obtained from the *National Parks and Wildlife Service* before works can commence.

It should also be noted that any works interfering with bats and especially their roosts, including for instance, the installation of lighting in the vicinity of the latter, may only be carried out under a licence to derogate from Regulation 23 of the Habitats Regulations 1997, (which transposed the EU Habitats Directive into Irish law) issued by NPWS. The details with regards to appropriate assessments, the strict parameters within which derogation licences may be issued and the procedures by which and the order in relation to the planning and development regulations such licences should be obtained, are set out in Circular Letter NPWS 2/07 "*Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997 - strict protection of certain species/applications for derogation licences*" issued on behalf of the Minister of the Environment, Heritage and Local Government on the 16th of May 2007. Furthermore, on 21st September 2011, the Irish Government published the European Communities (Birds and Natural Habitats) Regulations 2011 which include the protection of the Irish bat fauna and further outline derogation licensing requirements re: European Protected Species.

APPENDIX 6A – GROUND INVESTIGATION REPORT

IGSL Limited

POGA Consulting Engineers

Charlestown Shopping Centre Finglas

Ground Investigation Report

Project No. 22485

June 2020

Report

M7 Business Park
Naas
Co. Kildare
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Project: Charlestown Shopping Centre, Finglas

Project No. 22485

Revision	**Date**	**Title**		
Rev 0	03/07/2020	Preliminary Ground Investigation Report		
	Copies	Document Format	Prepared By	Reviewed By
		PDF	Brian Green	David Green
	To	POGA Consulting Engineers		
Revision	**Date**	**Title**		
	18/07/2020	Ground Investigation Report		
	Copies	Document Format	Prepared By	Reviewed By
		PDF	Brian Green	David Green
	To	POGA Consulting Engineers		
Revision	**Date**	**Title**		
	Copies	Document Format	Prepared By	Reviewed By
	To			

Report on a Site investigation
For
Charlestown Shopping Centre
Finglas
On behalf of
POGA Consulting Engineers
Report No. 22485

Contents

Appendices

Identity Code BG

FOREWORD

The following conditions and notes on the geotechnical site investigation procedures should be read in conjunction with this report.

Standards

The ground investigation works for this project Charlestown Shopping Centre) have been carried out by IGSL in accordance with Eurocode 7 - Part 2: Ground Investigation & Testing (EN 1997-2:2007). This has been used together with complementary documents such as BS 5930 (1999), BS 1377 (Parts 1 to 9) and Engineers Ireland Specification & Related Documents for Ground Investigation in Ireland (2006). A new National Annex for use in the Republic of Ireland is currently in circulation for comment and will be adopted in the near future. In the mean time, the following Irish (IS) and European Standards or Norms are referenced:

- IS EN 1997-2 Eurocode 7: 2007 – Geotechnical Design – Part 2: Ground Investigation & Testing
- IS EN ISO 22475-1:2006 Geotechnical Investigation and Sampling – Sampling Methods & Groundwater Measurements
- IS EN ISO 14688-1:2002 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 1: Identification and Description
- IS EN ISO 14688-2:2004 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 2: Classification Principles
- IS EN ISO 14689-1:2004 Geotechnical Investigation and Testing - Identification & Classification of Rock, Part 1: Identification & Description

Reporting

Recommendations made and opinions expressed in this report are based on the strata observed in the exploratory holes, together with the results of in-situ and laboratory tests. No responsibility can be held by IGSL Ltd for ground conditions between exploratory hole locations.

The engineering logs provide ground profiles and configuration of strata relevant to the investigation depths achieved and caution should be taken when extrapolating between exploratory points. No liability is accepted for ground conditions extraneous to the investigation points.

This report has been prepared POGA Consulting Engineers and the information should not be used without prior written permission. The recommendations developed in this report specifically relate to the proposed development. IGSL Ltd accepts no responsibility or liability for this document being used other than for the purposes for which it was intended.

Boring Procedures

Unless otherwise stated, ‘shell and auger' or cable percussive boring technique has been employed as defined by Section 6.3 of IS EN ISO 22475-1:2006. The boring operations, sampling and in-situ testing complies with the recommendations of IS EN 1997-2:2007 and BS 1377:1990 and EN ISO 22476-3:2005. The shell and auger boring technique allows for continuous sampling in clay and silt above the water table and sand and gravel below the water table (Table 2 of IS EN ISO 22475-1:2006).

It is highlighted that some disturbance and variations is unavoidable in particular ground (e.g. blowing sands, gravel / cobble dominant glacial deposits etc). Attention is drawn to this condition, whenever it is suspected. Where cobbles and boulders are recorded, no conclusion should be drawn concerning the size, presence, lithological nature, or numbers per unit volume of ground.

Rotary Drilling Procedures

Rotary drilling methods have been used to recover bedrock samples in line with Section 3.5 of IS EN 1997-2:2007 and IS EN ISO 22475-1. Where cable percussive boreholes terminated prematurely on an obstruction within overburden, open hole drilling methods (odex or symmetrix) were utilized to advance the drillholes through the superficial deposits with coring in bedrock. The key objectives of the rock sampling were to obtain high core recovery (TCR), minimize sample disturbance and facilitate accurate identification of strength, weathering and discontinuity characteristics.

In-Situ Testing

Standard penetration tests were conducted strictly in accordance with Section 4.6 of IS EN 1997-2:2007. The SPT equipment (hammer energy test) has been calibrated in accordance with EN ISO 22476-3:2005 and the Energy Ratio (E_r). A calibration certificate is available upon request. The E_r is defined as the ratio of the actual energy E_{meas} (measured energy during calibration) delivered to the drive weight assembly into the drive rod below the anvil, to the theoretical energy (E_{theor}) as calculated from the drive weight assembly. The measured number of blows (N) reported on the engineering logs are uncorrected. In sands, the energy losses due to rod length and the effect of the overburden pressure should be taken into account (see IS EN ISO 22476-3:2005).

Groundwater

The depth of entry of any influx of groundwater is recorded during the course of boring operations. However, the normal rate of boring does not usually permit the recording of an equilibrium level for any one water strike. Where possible drilling is suspended for a period of twenty minutes to monitor the subsequent rise in water level. Groundwater conditions observed in the borings or pits are those appertaining to the period of investigation. It should be noted however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions, tidal variations etc.

Engineering Logging

Soil and rock identification has been based on the examination of the samples recovered and conforms with IS EN ISO 14688-1:2002 and IS EN ISO 14689-1:2004. Rock weathering classification conforms to IS EN ISO 14689-1:2003 while discontinuities (bedding planes, joints, cleavages, faults etc) are classified in accordance with 4.3.3 of IS EN ISO 14689-1:2003. Rock mechanical indices (TCR, SCR, RQD) are defined in accordance with IS EN ISO 22475-1:2006.

Retention of Samples

Samples shall be retained for a period of 60 days following approval of the final factual report, as detailed in the Scope of Works.

Report on a Site Investigation
For
Charlestown Shopping Centre Finglas
On behalf of
POGA Consulting Engineers

Report No. 22485 Date July 2020

1.0 Introduction

The proposed development will entail the construction of buildings ranging in height from 4 to 10 storeys. In addition, the most southerly block will incorporate a single level basement.

An investigation of ground conditions was carried out to ascertain foundation requirements. The programme of the investigation included the following fieldworks.

- Boreholes were constructed in a total of 23 locations, using light cable tool techniques.
- Rotary techniques were employed at selected borehole locations to identify the soils in which the boreholes were terminated, and to ascertain the presence, depth, and condition of bedrock to the scheduled depths.
- Trial pits were excavated to facilitate close examination of the upper soils and to permit the recovery of bulk samples for geotechnical and environmental analysis.

This report contains the field records and the results of associated geotechnical and environmental tests. Also included is a discussion of ground conditions in relation to foundation requirements.

2.0 Fieldwork

2.1 Boreholes

Boreholes were constructed in the locations indicated on the site plan enclosed in Appendix 7 while the descriptions and depths of the various soils encountered are shown on the boring records enclosed in Appendix 1. Also shown on these records are the depths at which samples were recovered, the results of in-situ Standard Penetration Tests (SPT), and the groundwater conditions observed during the course of boring operations.

The boreholes revealed surface layers of topsoil and made ground overlying brown sandy clay with occasional gravel. This material was generally in a firm condition, and was present to depths ranging from 1.2 metres to 3.1 metres. In most locations the firm brown clay was directly underlain by very stiff to hard black/grey gravelly clay. However, in places there was evidence of a layer of stiff to very stiff brown gravelly clay between the upper and lower deposits. The boreholes were terminated on obstructions, at depths ranging from 4.1 metres to 7.6 metres. With the exception of BH10, which encountered rapid water ingress at a depth of 4 metres, the boreholes remained dry.

The borehole findings are summarised in Table 1.

Location	Depth of firm clay	Stiff to very stiff brown clay		Very stiff to hard black/grey clay	
	(m bgl)	from	to	from	to
BH01	3.10	3.10	5.10	5.10	7.60
BH02	2.00	2.00	2.50	2.50	5.10
BH03	2.10			2.10	5.30
BH04	2.50			2.50	5.60
BH05	2.20			2.20	5.20
BH06	2.30			2.30	4.50
BH07	1.90	1.90	2.20	2.20	5.10
BH08	2.10			2.10	3.90
BH09	2.30			2.30	5.40
BH10	2.50			2.50	4.40
BH11	2.20			2.20	7.10
BH12	2.50			2.50	5.40
BH13	2.10			2.10	4.10
BH14	1.20	1.20	2.10	2.10	6.30
BH15	2.10	2.10	2.50	2.50	4.90
BH16	2.20			2.20	4.50
BH17	* 2.5			2.50	6.30
BH18	1.30	1.30	2.60	2.60	4.90
BH19	1.90	1.90	2.50	2.50	5.50
BH20	2.00	2.00	2.60	2.60	4.80
BH21	1.90	1.90	2.20	2.20	6.20
BH22	3.30			3.30	6.80
BH23	2.10			2.10	5.20

* Possibly made ground

Table 1

2.2 Rotary Drilling/Coring

Rotary techniques were employed in selected borehole locations to ascertain the presence, depth, composition and condition of bedrock. Symmetrix open hole techniques were used to penetrate the overburden soils, identifying the drilled material from the flush returns. On first indications of bedrock, coring techniques were employed.

To provide an indication of the condition of the drilled soils, SPT tests were performed at regular intervals between the bored depths and the rock horizon

The coring records include a detailed description of the bedrock including the rock structure, strength, and degree of weathering. In accordance with BS 5930: 1999, the records include the total core recovery (TCR), solid core recovery (SCR) and the rock quality designation (RQD). Also shown graphically is the fracture spacing. Standpipes were installed in three rotary holes to facilitate monitoring of groundwater levels.

A summary of the drilling and coring operations is presented in Table 2.

The bedrock was identified as dark grey/black fine grained limestone with zones of weathered mudstone/shale

Location	Boreholes		Rotary Drilling/Coring		
	Very stiff to hard black/grey clay		Depth to rock (m bgl)	Cored Depth (m bgl)	Standpipe
	from	to			
BH01	5.10	7.60	10.50	12.50	
BH02	2.50	5.10			
BH03	2.10	5.30	10.90	14.00	
BH04	2.50	5.60			
BH05	2.20	5.20	9.80	12.50	
BH06	2.30	4.50			
BH07	2.20	5.10			
BH08	2.10	3.90	> 11.2		S
BH09	2.30	5.40			
BH10	2.50	4.40			
BH11	2.20	7.10			
BH12	2.50	5.40	8.20	12.30	S
BH13	2.10	4.10	11.70	13.70	
BH14	2.10	6.30	10.30	12.30	
BH15	2.50	4.90			
BH16	2.20	4.50	7.70	11.10	
BH17	2.50	6.30			
BH18	2.60	4.90	11.50	13.50	
BH19	2.50	5.50			
BH20	2.60	4.80			
BH21	2.20	6.20	8.80	10.80	S
BH22	3.30	6.80	13.20	14.70	
BH23	2.10	5.20			

Table 2

2.3 Trial Pits

Trial pits were excavated in nine locations to facilitate close examination of the upper soils, and to permit the recovery of bulk samples for environmental testing. The trial pit records are enclosed in Appendix 3.

The trial pits generally revealed firm brown gravelly clay overlying stiff to very stiff black/grey gravelly clay. However, made ground was identified in some locations.

2.4 Plate Bearing Tests

Plate bearing tests were performed in four locations to obtain a measure of the CBR values. A 450 mm diameter plate was used, and tests were performed at a depth of 0.5 metres below existing ground level. Tests were performed in accordance with BS 1377 Part 9: 1990. "In-situ Tests". The incremental loading test (4.1.6.4.2) was used.

The maximum applied load was estimated on the basis of obtaining an accumulative displacement of at least 1.25 mm. The load was then applied in five approximately equal increments to the design load. To measure recovery the load was removed in three increments. A second phase of loading and unloading was performed to assess the benefits of further compaction.

The settlement under each increment was measured against time until movement had effectively ceased and the results are presented as graphs of applied pressure against settlement. Calculation of Modulus of Sub-grade Reaction (k) and CBR values are in accordance with NRA HD25-26/10 Volume7: Pavement Design and Maintenance.

The test records from the initial and reload stages are enclosed in Appendix 4, while the calculated CBR values are shown in Table 3

Location	Test Depth (m bgl)	CBR %	
		First Cycle	Second Cycle
PBT01	0.5	18.3	62.9
PBT02	0.5	4.1	11.5
PBT03	0.5	3.7	20.7
PBT04	0.5	3.3	38.4

2.5 Groundwater Monitoring

Standpipes were installed in coreholes RC08, 12 and 21 in order to permit long term monitoring of groundwater levels.

The site was revisited post-fieldwork in order to take readings from the standpipes. These are summarised on Table 4.

Location	Hole Depth (m BGL)	Top of Response Zone (m BGL)	Base of Response Zone (m BGL)	Groundwater Depth 03/07/2020 (m BGL)
RC08	11.2	1.0	10.8	2.29
RC12	12.3	1.0	12.3	Inaccessible (parked car)
RC21	10.8	1.0	10.8	1.55

Table 4 – Summary of Groundwater Monitoring

3.0 Laboratory Testing (Geotechnical)

3.1 Particle Size Distribution

The results of PSD tests show that the gravelly clay soils are well graded, exhibiting typical “straight line” grading curves. Fines (silt/clay) contents ranged between 24 and 35%.

3.2 Index Properties

Atterberg Limits tests classified the cohesive soils as predominately low plasticity CLAY (CL).

3.3 Rock Testing

In view of the thinly bedded rock structure, point load tests were performed to obtain equivalent UCS values.

The Point Load Index Test provides a rapid, and accurate, strength index from rock fragments unlike the Uniaxial Compression test (UCS) which requires careful preparation of intact lengths of core. The test specimen is compressed between two cones loaded from a hydraulic hand pump. The core fails due to the tensile forces over the diametral area between the points. The strength at failure is expressed as the point load index Is. For purposes of comparison the Is values are corrected to give the equivalent strength for a 50 mm diameter specimen. This is the Is50 value. From research by several workers relationships have been formulated, relating the Is values to UCS.

The tests recorded a wide range of UCS values, reflecting the variations in rock strength between the limestone and the mudstone layers.

4.0 Laboratory Testing (Environmental)

Environmental testing was scheduled on 5 no. soil samples recovered from the trial pits in order to screen for inherent contamination and to assess their suitability for disposal to an inert landfill.

Samples were tested in accordance with the RILTA Suite, which is used to determine the suitability of soils for disposal to a landfill. The RILTA suite includes Heavy Metals, Polycyclic Aromatic Hydrocarbons (PAH), TPH-CWG, BTEX, PCB and Total Organic Carbon (TOC) carried out on dry soil samples. Also included are leachate analyses, whereby leachate is generated in accordance with CEN 10:1 specification and this is tested for the presence of recognised contaminants including Heavy Metals, Dissolved Organic Carbon (DOC) and Total Dissolved Solids (TDS). An Asbestos Screen is also included in the RILTA Suite.

5.0 Discussion

It is understood that the proposed development will entail the construction of a number of buildings, ranging in height from 4 to 10 storeys, with a single height basement under the most southerly block.

5.1 Structural Foundations

The boreholes revealed topsoil and made ground overlying a layer of firm brown sandy clay with occasional gravel. This material was present to depths ranging from 1.2 metres to 3.1 metres. In most borehole locations, these deposits were directly underlain by black/grey gravelly clay which was in a very stiff condition, becoming hard with depth. In some locations the upper and lower deposits were separated by a layer of stiff brown gravelly clay

While the boreholes were terminated on obstructions at depths ranging from 4.1 metres to 7.6 metres, the results of SPT tests in conjunction with examination of flush returns from the rotary holes suggest that very stiff to hard gravelly clay and very dense granular deposits are present to depths ranging from 7.7 metres to 13.2 metres. Coring below these depths revealed black/grey fine grained limestone with zones of weathered mudstone/shale.

The black/grey gravelly clay is basal till, known locally as Black boulder Clay. The upper horizon is weathered, resulting in the brown coloration. The near-surface deposits are weaker and finer due to more recent weathering.

The upper sandy clay is considered unsuitable as a founding medium for heavy structures in view of its variability and presumed bearing resistance of 75 to 100 kPa. Where the underlying stiff deposits are brown in places, they will support foundation pressures of approximately 200 kPa.

Where foundations are placed on the very stiff to hard black/grey deposits, a bearing resistance of 300 to 350 kPa can be assumed. Although this implies founding depths, generally between 2.0 and 2.5 metres over much of the site, these depths should be close to the proposed basement levels.

Where high point loads are envisaged, consideration can be given to the use of piles, embedded in the bedrock.

5.2 Groundwater

No groundwater ingress was observed during drilling of the cable percussive boreholes. However, this would not be unexpected due to the very low permeability of the clay soils, which would restrict the flow of water into the borehole.

Water ingress was observed in all rotary coreholes, although ingresses were confined to depths in the range 6 to 11 m BGL. In most instances, the water levels rose during the subsequent 20-minute monitoring period. A shallowest water level of 2.7 m BGL was measured at the end of drilling at RC22.

Subsequent groundwater monitoring has shown water in the standpipes at depths in the range 1.5 to 2.3 m BGL. It would be prudent to adopt the shallowest observed water level for design. This will have particular relevance when constructing the proposed attenuation tank, which should be designed with consideration to the potential long term buoyancy effects due to hydraulic uplift beneath the base of the tank.

It is strongly recommended that monitoring of standpipes remains ongoing until construction commences. Readings should also be taken after periods of heavy rainfall to determine the effect of prolonged precipitation on the groundwater table.

5.3 Environmental Considerations

The results of WAC analyses showed that most samples satisfy the criteria for inert waste as stipulated in the European Landfill Directive. Therefore, it would be expected that these samples would be accepted by a licensed inert landfill.

Exceptions included trial pits TP5 and TP6, where the samples contained elevated levels of Dissolved Sulphate and Total Dissolved Solids. In addition, TP6 contained a slightly elevated level of Dissolved Selenium. Consultation with the landfill would be advised with regard to their ability to accept these levels. If not acceptable, then disposal to a non-hazardous facility may be required.

It should be noted that the chosen landfill should be furnished with the WAC results in advance of any soils being removed from site. Depending on the extent and depth of excavation, the landfill may require additional testing to achieve the frequency of analysis (i.e. number of samples per unit volume of excavation) that meets their license requirements.

If required, the results of the RILTA Suite can also be used to carry out a full Waste Characterisation Assessment (WCA). This assessment is undertaken by an environmental specialist and determines whether the soils are hazardous or non-hazardous in advance of being dispatched to landfill.

Appendix 1 Boring Records

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH01**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,628.12 E 740,476.71 N	**RIG TYPE**	DANDO 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (mOD)	69.99	**BOREHOLE DEPTH (m)**	7.60
		DATE COMMENCED	08/06/2020
		DATE COMPLETED	08/06/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
		BORED BY	W.Butler
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		69.79	0.20						
	Firm brown sandy SILT/CLAY with occasional fine gravel									
1					AA135014	B	1.00		N = 15 (2, 2, 2, 6, 4, 3)	
2					AA135015	B	2.00		N = 15 (3, 2, 2, 3, 3, 7)	
3			66.89	3.10	AA135016	B	3.00		N = 17 (7, 3, 3, 4, 5, 5)	
	Stiff to very stiff brown sandy SILT/CLAY with some gravel									
4					AA135017	B	4.00		N = 44 (9, 6, 7, 10, 12, 15)	
5			64.89	5.10	AA135018	B	5.00		N = 50/225 mm (7, 9, 10, 21, 19)	
	Very stiff black/grey sandy gravelly CLAY with occasional cobbles		63.99	6.00						
6	Hard black sandy gravelly CLAY with cobbles				AA135019	B	6.00		N = 50/150 mm (15, 10, 22, 28)	
7			62.39	7.60	AA135020	B	7.00		N = 50/75 mm (25, 50)	
8	Obstruction End of Borehole at 7.60 m									
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
6.30	6.60	0.75	
7.40	7.60	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH02**
		SHEET	Sheet 1 of 1

CO-ORDINATES	712,692.23 E 740,517.02 N	**RIG TYPE**	DANDO 2000		
		BOREHOLE DIAMETER (mm)	200	**DATE COMMENCED**	15/06/2020
GROUND LEVEL (mOD)	69.26	**BOREHOLE DEPTH (m)**	5.10	**DATE COMPLETED**	15/06/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**		**BORED BY**	W.Butler
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**		**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		69.01	0.25						
	Light brown sandy SILT/CLAY		68.46	0.80						
1	Firm mottled dark brown and grey sandy SILT/CLAY with some gravel		67.26	2.00	AA135041	B	1.00		N = 12 (2, 1, 2, 3, 4, 3)	
2	Firm to stiff brown sandy gravelly CLAY		66.76	2.50	AA135042	B	2.00		N = 13 (2, 2, 3, 3, 4, 3)	
3	Very stiff black very sandy gravelly CLAY with occasional cobbles				AA135043	B	3.00		N = 38 (4, 5, 9, 8, 10, 11)	
4					AA135044	B	4.00		N = 50 (6, 10, 11, 12, 14, 13)	
5			64.16	5.10	AA135045	B	5.00		N = 50/75 mm (25, 50)	
	Obstruction End of Borehole at 5.10 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
5.00	5.20	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH03**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,730.90 E 740,517.81 N	**RIG TYPE**	DANDO 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (mOD)	68.83	**BOREHOLE DEPTH (m)**	5.30
		DATE COMMENCED	03/06/2020
		DATE COMPLETED	03/06/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
		BORED BY	W.Butler
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TARMACADAM		68.63	0.20						
	MADE GROUND (Comprised of CL.804 stone fill)		67.83	1.00						
1	Firm light brown sandy SILT/CLAY with occasional gravel		66.73	2.10	AA130044	B	1.00		N = 14 (1, 2, 2, 3, 5, 4)	
2					AA130045	B	2.00		N = 12 (2, 2, 3, 3, 3, 3)	
	Very stiff to hard black sandy gravelly CLAY with occasional cobbles		63.53	5.30						
3					AA130046	B	3.00		N = 37 (3, 6, 7, 9, 10, 11)	
4					AA130047 AA131709	B B	4.00 4.00		N = 32 (7, 7, 6, 8, 8, 10)	
5									N = 50/75 mm (18, 32, 50)	
	Obstruction End of Borehole at 5.30 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.20	4.40	0.5	
5.10	5.30	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend

D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH04**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,757.03 E 740,525.36 N	**RIG TYPE**	DANDO 2000
GROUND LEVEL (mOD)	68.77	**BOREHOLE DIAMETER (mm)**	200
		BOREHOLE DEPTH (m)	5.60
DATE COMMENCED	29/05/2020	**DATE COMPLETED**	02/06/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
BORED BY	W.Butler	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		68.62	0.15						
	Light brown sandy SILT/CLAY with occasional fine gravel		68.07	0.70						
	Soft to firm black sandy SILT/CLAY									
1					AA130039	B	1.00		N = 9 (1, 2, 2, 1, 3, 3)	
2			66.27	2.50	AA130040	B	2.00		N = 13 (2, 2, 3, 2, 4, 4)	
	Stiff to very stiff black gravelly CLAY with some cobbles									
3					AA130041	B	3.00		N = 25 (3, 4, 4, 5, 8, 8)	
4					AA130042	B	4.00		N = 47 (7, 9, 8, 13, 14, 12)	
5			63.17	5.60	AA130043	B	5.00		N = 50/75 mm (25, 50)	
	Obstruction End of Borehole at 5.60 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.60	3.70	0.5	
5.40	5.60	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

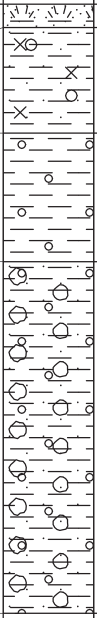
REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out. Vehicles obstructing rig movement - Standing 4hrs.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH05**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,791.15 E 740,526.71 N	**RIG TYPE**	DANDO 2000
GROUND LEVEL (mOD)	68.74	**BOREHOLE DIAMETER (mm)**	200
		BOREHOLE DEPTH (m)	5.20
		DATE COMMENCED	28/05/2020
		DATE COMPLETED	28/05/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
BORED BY	W.Butler	**PROCESSED BY**	F.C



Depth (m)	Description	Legend	Elevation	Depth (m)	Samples Ref. Number	Samples Sample Type	Samples Depth (m)	Samples Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		68.54	0.20						
	Brown very sandy SILT/CLAY with occasional fine gravel (Possibly Made Ground)		67.64	1.10	AA130035	B	1.00		N = 7 (2, 1, 2, 1, 2, 2)	
1	Firm black SILT/CLAY with gravel		66.54	2.20	AA130036	B	2.00		N = 11 (2, 3, 3, 2, 3, 3)	
2	Stiff to very stiff black sandy gravelly CLAY with some cobbles				AA130037	B	3.00		N = 24 (3, 4, 4, 5, 7, 8)	
3					AA130038	B	4.00		N = 31 (8, 5, 7, 7, 7, 10)	
4			63.54	5.20	AA131710	B	5.00		N = 50/225 mm (9, 10, 15, 20, 15)	
5	Obstruction End of Borehole at 5.20 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
5.00	5.20	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out. Vehicles obstructing rig movement 1.5hrs delay.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER	22485
CONTRACT	Charlestown , Finglas , Dublin 11
BOREHOLE NO.	**BH06**
SHEET	Sheet 1 of 1
CO-ORDINATES	712,844.67 E 740,502.22 N
GROUND LEVEL (mOD)	67.96
RIG TYPE	DANDO 2000
BOREHOLE DIAMETER (mm)	200
BOREHOLE DEPTH (m)	4.50
DATE COMMENCED	27/05/2020
DATE COMPLETED	27/05/2020
CLIENT	Puddenhill Property Ltd.
ENGINEER	POGA Consulting Engineers
SPT HAMMER REF. NO.	
ENERGY RATIO (%)	
BORED BY	W.Butler
PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		67.81	0.15						
	Brown sandy SILT/CLAY with some gravel and occasional cobbles (Possibly Made Ground)		66.86	1.10						
1	Firm dark brown sandy SILT/CLAY with occasional fine gravel				AA130031	B	1.00		N = 12 (2, 2, 3, 3, 3, 3)	
2			65.66	2.30	AA130032	B	2.00		N = 13 (3, 2, 2, 2, 4, 5)	
3	Stiff to very stiff black very gravelly sandy CLAY with occasional cobbles				AA130033	B	3.00		N = 22 (5, 4, 6, 6, 5, 5)	
4			63.46	4.50	AA130034	B	4.00		N = 50/75 mm (9, 12, 50)	
	Obstruction End of Borehole at 4.50 m									
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.30	4.50	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

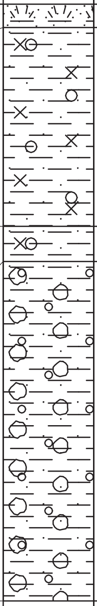
REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend

- D - Small Disturbed (tub)
- B - Bulk Disturbed
- LB - Large Bulk Disturbed
- Env - Environmental Sample (Jar + Vial + Tub)
- UT - Undisturbed 100mm Diameter Sample
- P - Undisturbed Piston Sample
- W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER	22485
CONTRACT	Charlestown , Finglas , Dublin 11
BOREHOLE NO.	**BH07**
SHEET	Sheet 1 of 1
CO-ORDINATES	712,627.75 E 740,476.95 N
GROUND LEVEL (mOD)	70.04
RIG TYPE	DANDO 2000
BOREHOLE DIAMETER (mm)	200
BOREHOLE DEPTH (m)	5.20
DATE COMMENCED	12/06/2020
DATE COMPLETED	12/06/2020
CLIENT	Puddenhill Property Ltd.
ENGINEER	POGA Consulting Engineers
SPT HAMMER REF. NO.	
ENERGY RATIO (%)	
BORED BY	W.Butler
PROCESSED BY	F.C



Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		69.84	0.20						
	Firm brown sandy SILT/CLAY with occasional fine gravel									
1					AA135036	B	1.00		N = 12 (2, 3, 3, 3, 2, 4)	
			68.14	1.90						
2	Firm to stiff dark brown/blacksandy SILT/CLAY with some gravel		67.84	2.20	AA135037	B	2.00		N = 13 (2, 2, 3, 3, 2, 5)	
	Stiff to very stiff black sandy gravelly CLAY with occasional cobbles									
3					AA135038	B	3.00		N = 20 (2, 3, 5, 5, 4, 6)	
4					AA135039	B	4.00		N = 50 (6, 7, 9, 11, 15, 15)	
5			64.94	5.10	AA135040	B	5.00		N = 50/75 mm (25, 50)	
	Obstruction End of Borehole at 5.20 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.40	5.20	0.75	
5.00	5.20	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT Charlestown , Finglas , Dublin 11

BOREHOLE NO. BH08
SHEET Sheet 1 of 1

CO-ORDINATES 712,687.06 E
740,485.90 N
GROUND LEVEL (mOD) 69.34

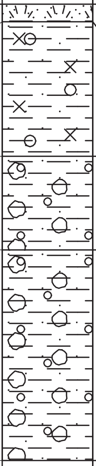
RIG TYPE DANDO 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 3.90

DATE COMMENCED 20/05/2020
DATE COMPLETED 20/05/2020

CLIENT Puddenhill Property Ltd.
ENGINEER POGA Consulting Engineers

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY W.Butler
PROCESSED BY F.C



Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		69.19	0.15						
	Firm brown sandy SILT/CLAY with occasional gravel									
1					AA130009	B	1.00		N = 14 (3, 2, 3, 4, 3, 4)	
			68.04	1.30						
	Firm light brown sandy gravelly CLAY with occasional cobbles									
2			67.24	2.10	AA130010	B	2.00		N = 45 (3, 4, 10, 11, 12, 12)	
	Very stiff to hard black sandy gravelly CLAY with occasional cobbles									
3					AA130011	B	3.00		N = 50/150 mm (5, 17, 24, 26)	
			65.44	3.90						
4	Obstruction End of Borehole at 3.90 m									
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.60	2.80	0.5	
3.70	3.90	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH09**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,725.52 E 740,484.59 N	**RIG TYPE**	DANDO 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (mOD)	68.84	**BOREHOLE DEPTH (m)**	5.40
		DATE COMMENCED	21/05/2020
		DATE COMPLETED	21/05/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
		BORED BY	W.Butler
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	TARMACADAM		68.64	0.20						
	MADE GROUND (Comprised of CL.804 stone fill)		67.94	0.90						
1	Firm light brown sandy SILT/CLAY with some gravel				AA130012	B	1.00		N = 10 (2, 2, 2, 2, 3, 3)	
2			66.54	2.30	AA130013	B	2.00		N = 9 (2, 1, 2, 2, 3, 2)	
	Stiff to very stiff black sandy gravelly CLAY with occasional cobbles									
3					AA130014	B	3.00		N = 26 (3, 2, 6, 7, 7, 6)	
4					AA130015	B	4.00		N = 34 (8, 7, 9, 8, 8, 9)	
5			63.44	5.40	AA131711	B	5.00		N = 50/75 mm (16, 9, 50)	
	Obstruction End of Borehole at 5.40 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.30	4.50	0.75	
5.20	5.40	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

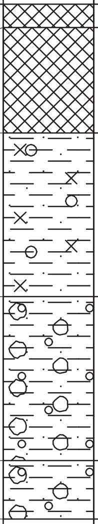
REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH10**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,749.81 E 740,485.03 N	**RIG TYPE**	DANDO 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (mOD)	68.65	**BOREHOLE DEPTH (m)**	4.40
		DATE COMMENCED	22/05/2020
		DATE COMPLETED	22/05/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
BORED BY	W.Butler	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TARMACADAM		68.45	0.20						
	MADE GROUND (Comprised of CL.804 stone fill)		67.55	1.10						
1	Firm light brown sandy SILT/CLAY with occasional gravel				AA130016	B	1.00		N = 12 (2, 2, 2, 3, 3, 4)	
2			66.15	2.50	AA130017	B	2.00		N = 12 (2, 3, 2, 3, 3, 4)	
3	Stiff black sandy gravelly CLAY with occasional cobbles		64.75	3.90	AA130018	B	3.00		N = 24 (3, 4, 6, 6, 4, 8)	
4	Hard black sandy gravelly CLAY with some cobbles		64.25	4.40	AA130019	B	4.00		N = 50/75 mm (25, 50)	
	Obstruction End of Borehole at 4.40 m									
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.70	3.80	0.5	
4.20	4.40	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
4.00	4.00	Yes	2.00	20	Rapid

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend
- D - Small Disturbed (tub)
- B - Bulk Disturbed
- LB - Large Bulk Disturbed
- Env - Environmental Sample (Jar + Vial + Tub)
- UT - Undisturbed 100mm Diameter Sample
- P - Undisturbed Piston Sample
- W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH11**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,796.24 E 740,484.99 N	**RIG TYPE**	DANDO 2000
GROUND LEVEL (mOD)	68.21	**BOREHOLE DIAMETER (mm)**	200
		BOREHOLE DEPTH (m)	7.10
DATE COMMENCED	26/05/2020	**DATE COMPLETED**	26/05/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
BORED BY	W.Butler	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TARMACADAM		68.01	0.20						
	MADE GROUND (Comprised of CL.804 stone fill)		67.01	1.20	AA130024	B	1.00		N = 10 (1, 2, 2, 3, 2, 3)	
1	Firm light brown sandy SILT/CLAY with occasional fine gravel		66.01	2.20	AA130025	B	2.00		N = 13 (3, 2, 2, 3, 4, 4)	
2	Stiff to very stiff black sandy gravelly CLAY with occasional cobbles		63.41	4.80	AA130026	B	3.00		N = 20 (4, 3, 3, 6, 5, 6)	
					AA130027	B	4.00		N = 28 (3, 3, 4, 5, 9, 10)	
5	Very stiff to hardblack very gravelly sandy CLAY with some cobbles		61.11	7.10	AA130028	B	5.00		N = 42 (6, 8, 7, 8, 14, 13)	
					AA130029	B	6.00		N = 50/75 mm (12, 14, 50)	
7	Obstruction End of Borehole at 7.10 m				AA130030	B	7.00		N = 50/75 mm (25, 50)	
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
6.30	6.30	0.75	
6.90	7.10	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend

D - Small Disturbed (tub)	UT - Undisturbed 100mm Diameter Sample
B - Bulk Disturbed	P - Undisturbed Piston Sample
LB - Large Bulk Disturbed	W - Water Sample
Env - Environmental Sample (Jar + Vial + Tub)	

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH12**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,837.09 E 740,483.41 N	**RIG TYPE**	DANDO 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (mOD)	67.81	**BOREHOLE DEPTH (m)**	5.40
		DATE COMMENCED	25/05/2020
		DATE COMPLETED	25/05/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
		BORED BY	W.Butler
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TARMACADAM		67.61	0.20						
	MADE GROUND (Comprised of CL.804 stone fill)		66.81	1.00						
1	Firm light brown sandy SILT/CLAY with occasional gravel				AA130020	B	1.00		N = 11 (2, 2, 3, 2, 3, 3)	
2			65.31	2.50	AA130021	B	2.00		N = 12 (2, 2, 2, 4, 3, 3)	
3	Stiff to very stiff black sandy gravelly CLAY with occasional cobbles				AA130022	B	3.00		N = 26 (3, 2, 6, 8, 5, 7)	
4					AA130023	B	4.00		N = 47 (7, 8, 9, 11, 12, 15)	
5			62.41	5.40	AA131712	B	5.00		N = 50/225 mm (8, 12, 18, 17, 15)	
	Obstruction End of Borehole at 5.40 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.10	4.30	1	
5.20	5.40	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out. Rig moved delayed by proximity of parked carks

Sample Legend

D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH13**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,618.65 E 740,452.96 N	**RIG TYPE**	DANDO 2000
GROUND LEVEL (mOD)	69.67	**BOREHOLE DIAMETER (mm)**	200
		BOREHOLE DEPTH (m)	4.10
DATE COMMENCED	05/06/2020	**DATE COMPLETED**	05/06/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
BORED BY	W.Butler	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples				Field Test Results	Standpipe Details
					Ref. Number	Sample Type	Depth (m)	Recovery		
0	TOPSOIL		69.47	0.20						
	Light brown sandy SILT/CLAY with occasional gravel		68.87	0.80						
1	Firm light brown sandy SILT/CLAY with some gravel				AA135010	B	1.00		N = 11 (2, 2, 3, 2, 3, 3)	
			67.57	2.10						
2	Stiff to very stiff lack sandy gravelly CLAY with occasional cobbles				AA135011	B	2.00		N = 26 (4, 3, 4, 4, 8, 10)	
3					AA135012	B	3.00		N = 46 (9, 12, 13, 12, 10, 11)	
			65.57	4.10						
4	Obstruction End of Borehole at 4.10 m				AA135013	B	4.00		N = 50/75 mm (25, 50)	
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.00	4.10	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH14**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,691.92 E 740,447.32 N	**RIG TYPE**	DANDO 2000
GROUND LEVEL (mOD)	69.09	**BOREHOLE DIAMETER (mm)**	200
		BOREHOLE DEPTH (m)	6.30
		DATE COMMENCED	19/05/2020
		DATE COMPLETED	19/05/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
BORED BY	W.Butler	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	MADE GROUND (Comprised of gravel)		68.69	0.40						
	MADE GROUND (Comprised of CL.804 stone fill)		68.39	0.70						
1	Firm light brown SILT/CLAY with occasional gravel		67.89	1.20	AA130005	B	1.00		N = 17 (2, 2, 3, 5, 4, 5)	
2	Stiff to very stiff light brown sandy SILT/CLAY with some gravel		66.99	2.10	AA130006	B	2.00		N = 41 (5, 8, 9, 11, 10, 11)	
3	Very to hard stiff black sandy gravelly CLAY with occasional cobbles				AA130007	B	3.00		N = 38/225 mm (9, 16, 15, 11, 12)	
4					AA130008	B	4.00		N = 50/75 mm (25, 50)	
5					AA131713	B	5.00		N = 45 (5, 9, 9, 9, 11, 16)	
6			62.79	6.30	AA131714	B	6.00		N = 50/75 mm (18, 17, 50)	
	Obstruction End of Borehole at 6.30 m									
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.10	3.30	1	
4.20	4.40	0.75	
6.10	6.30	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend

D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH15**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,722.47 E 740,452.15 N	**RIG TYPE**	DANDO 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (mOD)	68.90	**BOREHOLE DEPTH (m)**	4.90
		DATE COMMENCED	24/03/2020
		DATE COMPLETED	24/03/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
BORED BY	W.Butler	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TARMACADAM		68.50	0.40						
	MADE GROUND (Comprised of sandy pea gravel)		68.00	0.90						
1	MADE GROUND (Comprised of black clay fill with large angular cobbles)		67.70	1.20	AA130090	B	1.00		N = 18 (4, 4, 4, 5, 4, 5)	
	Firm to stiff brown gravelly SILT/CLAY with occasional cobbles (Possibly Made Ground)		66.80	2.10						
2	Stiff brown sandy SILT/CLAY with some gravel and occasional cobbles (Possibly Made Ground)		66.40	2.50	AA130091	B	2.00		N = 34 (4, 5, 5, 10, 9, 10)	
	Very stiff black sandy gravelly CLAY with occasional cobbles		64.00	4.90						
3					AA130092	B	3.00		N = 50 (5, 13, 10, 17, 16, 7)	
4					AA130093	B	4.00		N = 48 (5, 5, 7, 11, 12, 18)	
5	Obstruction End of Borehole at 4.90 m								N = 50/75 mm (12, 25, 50)	
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.00	4.20	1	
4.70	4.90	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend

D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH16**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,767.12 E 740,452.27 N	**RIG TYPE**	DANDO 2000
GROUND LEVEL (mOD)	68.50	**BOREHOLE DIAMETER (mm)**	200
		BOREHOLE DEPTH (m)	4.50
		DATE COMMENCED	02/03/2020
		DATE COMPLETED	25/03/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
		BORED BY	W.Butler
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TARMACADAM		68.20	0.30						
	MADE GROUND (Comprised of sandy pea gravel)		67.90	0.60						
	MADE GROUND (Comprised of black clay fill with large angular cobbles)		67.70	0.80						
	Firm brown sandy SILT/CLAY with occasional gravel (Possibly Made Ground)		67.50	1.00						
1	Firm to stiff grey/brown sandy SILT/CLAY with some gravel				AA130094	B	1.00		N = 19 (2, 2, 3, 4, 5, 7)	
2			66.30	2.20	AA130095	B	2.00		N = 29 (5, 5, 6, 7, 6, 10)	
	Very stiff black sandy gravelly CLAY with occasional cobbles									
3					AA130096	B	3.00		N = 50/225 mm (8, 11, 13, 26, 11)	
4			64.00	4.50	AA130097	B	4.00		N = 31 (5, 6, 8, 8, 7, 8)	
	Obstruction End of Borehole at 4.50 m									
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.00	4.10	1	
4.30	4.50	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH17**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,794.83 E 740,452.39 N	**RIG TYPE**	DANDO 2000
GROUND LEVEL (mOD)	68.25	**BOREHOLE DIAMETER (mm)**	200
		BOREHOLE DEPTH (m)	6.30
		DATE COMMENCED	26/03/2020
		DATE COMPLETED	26/03/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
BORED BY	W.Butler	**PROCESSED BY**	F.C

Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
TARMACADAM		68.05	0.20						
MADE GROUND (Comprised of sandy pea gravel)		67.75	0.50						
MADE GROUND (Comprised of black clay fill with large angular cobbles)		67.45	0.80						
Firm to stiff brown sandy SILT/CLAY with occasional gravel (Possibly Made Ground)				AA130098	B	1.00		N = 18 (1, 2, 2, 3, 7, 6)	
		65.75	2.50	AA130099	B	2.00		N = 30 (3, 5, 5, 7, 9, 9)	
Very stiff black sandy gravelly CLAY with occasional cobbles				AA130100	B	3.00		N = 50/225 mm (6, 15, 22, 20, 8)	
				AA130101	B	4.00		N = 38 (7, 8, 6, 8, 10, 14)	
				AA130102	B	5.00		N = 52 (7, 9, 11, 15, 14, 12)	
		61.95	6.30	AA130103	B	6.00		N = 50/150 mm (12, 18, 27, 23)	
Obstruction End of Borehole at 6.30 m									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.80	5.00	1	
6.10	6.30	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend
- D - Small Disturbed (tub)
- B - Bulk Disturbed
- LB - Large Bulk Disturbed
- Env - Environmental Sample (Jar + Vial + Tub)
- UT - Undisturbed 100mm Diameter Sample
- P - Undisturbed Piston Sample
- W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH18**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,824.58 E 740,451.84 N	**RIG TYPE**	DANDO 2000
GROUND LEVEL (mOD)	68.00	**BOREHOLE DIAMETER (mm)**	200
		BOREHOLE DEPTH (m)	4.90
DATE COMMENCED	18/05/2020	**DATE COMPLETED**	18/05/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
BORED BY	W.Butler	**PROCESSED BY**	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	MADE GROUND (Comprised of gravel)		67.60	0.40						
	MADE GROUND (Comprised of CL.804 stone fill)		67.20	0.80						
1	Firm light brown sandy SILT/CLAY with occasional gravel		66.70	1.30	AA130001	B	1.00		N = 15 (1, 2, 3, 2, 5, 5)	
2	Stiff to very stiff light brown sandy SILT/CLAY with gravel		65.40	2.60	AA130002	B	2.00		N = 25 (3, 4, 5, 5, 8, 7)	
3 4	Very stiff to hard black sandy gravelly CLAY with occasional cobbles		63.10	4.90	AA130003 AA130004	B B	3.00 4.00		N = 50/225 mm (8, 17, 19, 22, 9) N = 61 (12, 14, 14, 16, 15, 16)	
5	End of Borehole at 4.90 m								N = 50/75 mm (25, 50)	
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.80	3.00 4.00	1.5	
4.10	4.30	0.75	
4.70	4.90	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS Set up Mobile Welfare Unit - 2hrs. Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend

D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT Charlestown , Finglas , Dublin 11

BOREHOLE NO. BH19
SHEET Sheet 1 of 1

CO-ORDINATES 712,615.43 E
740,432.35 N
GROUND LEVEL (mOD) 69.30

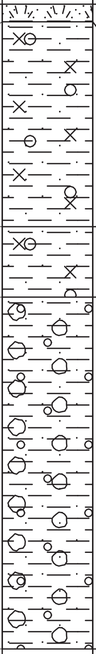
RIG TYPE DANDO 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 5.50

DATE COMMENCED 02/06/2020
DATE COMPLETED 02/06/2020

CLIENT Puddenhill Property Ltd.
ENGINEER POGA Consulting Engineers

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY W.Butler
PROCESSED BY F.C



Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		69.15	0.15						
	Firm light brown sandy SILT/CLAY with occasional gravel		67.40	1.90						
1					AA135005	B	1.00		N = 14 (2, 6, 6, 3, 2, 3)	
2	Stiff dark brown sandy SILT/CLAY with some gravel		66.80	2.50	AA135006	B	2.00		N = 26 (3, 4, 4, 10, 6, 6)	
	Stiff becoming very stiff black very gravelly sandy CLAY with some cobbles		63.80	5.50						
3					AA135007	B	3.00		N = 22 (3, 5, 5, 3, 6, 8)	
4					AA135008	B	4.00		N = 55 (9, 9, 12, 15, 18, 10)	
5					AA135009	B	5.00		N = 50/75 mm (11, 14, 50)	
	Obstruction End of Borehole at 5.50 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.60	4.70	0.5	
5.30	5.50	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

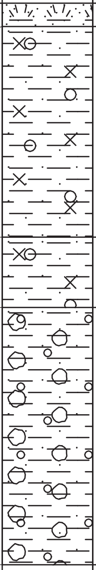
REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH20**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,683.35 E 740,409.06 N	**RIG TYPE**	DANDO 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (mOD)	68.54	**BOREHOLE DEPTH (m)**	4.90
		DATE COMMENCED	10/06/2020
		DATE COMPLETED	10/06/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
		BORED BY	W.Butler
		PROCESSED BY	F.C



Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		68.34	0.20						
	Firm brown sandy SILT/CLAY with occasional fine gravel									
1					AA135027	B	1.00		N = 10 (2, 2, 3, 2, 3, 2)	
			66.54	2.00						
2	Stiff brown very sandy SILT/CLAY with some gravel				AA135028	B	2.00		N = 38 (3, 2, 3, 10, 15, 10)	
			65.94	2.60						
	Stiff black sandy gravelly CLAY with occasional cobbles									
3					AA135029	B	3.00		N = 18 (3, 2, 4, 5, 4, 5)	
4					AA135030	B	4.00		N = 35 (5, 4, 4, 9, 12, 10)	
			63.74	4.80						
5	Obstruction End of Borehole at 4.90 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.20	2.30	0.5	
4.70	4.90	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

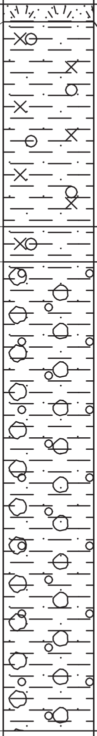
Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH21**
		SHEET	Sheet 1 of 1

CO-ORDINATES	712,658.42 E 740,399.86 N	**RIG TYPE**	DANDO 2000	**DATE COMMENCED**	09/06/2020
GROUND LEVEL (mOD)	68.40	**BOREHOLE DIAMETER (mm)**	200	**DATE COMPLETED**	09/06/2020
		BOREHOLE DEPTH (m)	6.30		
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**		**BORED BY**	W.Butler
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**		**PROCESSED BY**	F.C



Depth (m)	Description	Legend	Elevation	Depth (m)	Samples Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		68.25	0.15						
	Firm brown sandy SILT/CLAY with some gravel									
1					AA135021	B	1.00		N = 12 (2, 2, 1, 2, 4, 5)	
			66.50	1.90						
2	Stiff dark brown sandy SILT/CLAY with some gravel		66.20	2.20	AA135022	B	2.00		N = 14 (4, 3, 3, 2, 3, 6)	
	Very stiff black sandy gravelly CLAY with occasional cobbles									
3					AA135023	B	3.00		N = 41 (3, 4, 7, 9, 12, 13)	
4					AA135024	B	4.00		N = 47 (4, 4, 10, 11, 12, 14)	
5					AA135025	B	5.00		N = 50/225 mm (17, 8, 15, 16, 19)	
6			62.20	6.20	AA135026	B	6.00		N = 50/75 mm (25, 50)	
	Obstruction End of Borehole at 6.30 m									
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
6.10	6.30	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

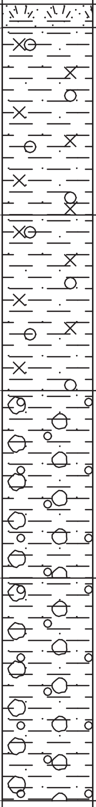
REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH22**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,611.00 E 740,402.33 N	**RIG TYPE**	DANDO 2000
GROUND LEVEL (mOD)	68.55	**BOREHOLE DIAMETER (mm)**	200
		BOREHOLE DEPTH (m)	6.80
		DATE COMMENCED	03/06/2020
		DATE COMPLETED	04/06/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
BORED BY	W.Butler	**PROCESSED BY**	F.C



Depth (m)	Description	Legend	Elevation	Depth (m)	Samples Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		68.35	0.20						
	Soft brown sandy SILT/CLAY with occasional gravel		66.75	1.80						
1					AA130048	B	1.00		N = 9 (2, 2, 2, 3, 2, 2)	
2	Firm mottled black and grey sandy SILT/CLAY with occasional gravel		65.25	3.30	AA130049	B	2.00		N = 10 (2, 2, 2, 2, 4, 2)	
3					AA130050	B	3.00		N = 11 (2, 2, 2, 3, 3, 3)	
	Stiff black sandy gravelly CLAY with occasional cobbles		63.65	4.90						
4					AA130051	B	4.00		N = 17 (3, 4, 4, 5, 4, 4)	
5	Very stiff to hard black sandy gravelly CLAY with cobbles		61.75	6.80	AA130052	B	5.00		N = 43 (7, 6, 8, 10, 11, 14)	
6					AA130053	B	6.00		N = 50/150 mm (10, 5, 20, 30)	
	Obstruction End of Borehole at 6.80 m				AA130054	B	6.80		N = 50/75 mm (25, 50)	
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
6.60	6.80	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**BOREHOLE NO.**	**BH23**
		SHEET	Sheet 1 of 1
CO-ORDINATES	712,678.66 E 740,376.32 N	**RIG TYPE**	DANDO 2000
GROUND LEVEL (mOD)	67.89	**BOREHOLE DIAMETER (mm)**	200
		BOREHOLE DEPTH (m)	5.20
		DATE COMMENCED	11/06/2020
		DATE COMPLETED	11/06/2020
CLIENT	Puddenhill Property Ltd.	**SPT HAMMER REF. NO.**	
ENGINEER	POGA Consulting Engineers	**ENERGY RATIO (%)**	
		BORED BY	W.Butler
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		67.64	0.25						
1	Soft brown sandy SILT/CLAY with occasional gravel		66.39	1.50	AA135031	B	1.00		N = 8 (2, 1, 1, 2, 2, 3)	
	Soft to firm black sandy slightly gravelly CLAY		65.79	2.10	AA135032	B	2.00		N = 7 (3, 2, 1, 1, 2, 3)	
2 3 4	Stiff black very gravelly sandy CLAY		63.39	4.50	AA135033 AA135034	B B	3.00 4.00		N = 15 (1, 1, 2, 2, 4, 7) N = 52/225 mm (9, 10, 13, 17, 22)	
5	Dense angular COBBLES and BOULDERS		62.69	5.20	AA135035	B	5.00		N = 50/75 mm (25, 50)	
	Obstruction End of Borehole at 5.20 m									
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
5.00	5.20	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS Erection of Covid 19 Safe Working Area - 1hr. CAT scanned location and hand dug inspection pit carried out.

Sample Legend
- D - Small Disturbed (tub)
- B - Bulk Disturbed
- LB - Large Bulk Disturbed
- Env - Environmental Sample (Jar + Vial + Tub)
- UT - Undisturbed 100mm Diameter Sample
- P - Undisturbed Piston Sample
- W - Water Sample

Appendix 2 Rotary Records

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT Charlestown , Finglas , Dublin 11

DRILLHOLE NO **RC01**
SHEET Sheet 1 of 2

CO-ORDINATES 712,628.12 E
740,476.71 N
GROUND LEVEL (mOD) 69.99

RIG TYPE GEO405
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 80

DATE COMMENCED 09/06/2020
DATE COMPLETED 09/06/2020

CLIENT Puddenhill Property Ltd.
ENGINEER POGA Consulting Engineers

DRILLED BY IGSL
LOGGED BY D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								Hole Opened by Shell & Auger - see log BH01				
1												
2												
3												
4												
5												
6												
7									7.50	62.49		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of cobbly GRAVEL				
8												
9												N = 80/145 mm (4, 15, 30, 25, 25)

REMARKS

Hole cased 0.00-10.50m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
8.20	8.20	N/S			Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**DRILLHOLE NO**	**RC01**
		SHEET	Sheet 2 of 2
CO-ORDINATES	712,628.12 E 740,476.71 N	**DATE COMMENCED**	09/06/2020
GROUND LEVEL (mOD)	69.99	**DATE COMPLETED**	09/06/2020
RIG TYPE	GEO405	**DRILLED BY**	IGSL
FLUSH	Air/Mist	**LOGGED BY**	D.O'Shea
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	80		
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	10.50							SYMMETRIX DRILLING: No recovery, observed by driller as returns of cobbly GRAVEL *(continued)*	10.50	59.49		
11	12.00	100	7	0				Possible ROCK FAULT ZONE - Non-intact - recovered as angular gravel and cobbles of limestone with abundant calcite-veining				N = 25/10 mm (25, 25)
12	12.50	100	0	0					12.50	57.49		
								End of Borehole at 12.50 m				

REMARKS

Hole cased 0.00-10.50m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
8.20	8.20	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
09-06-20	12.50	10.50	3.70	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**DRILLHOLE NO**	**RC03**
		SHEET	Sheet 1 of 2
CO-ORDINATES	712,730.90 E 740,517.81 N	**DATE COMMENCED**	15/06/2020
GROUND LEVEL (mOD)	68.83	**DATE COMPLETED**	16/06/2020
RIG TYPE	Knebel	**DRILLED BY**	IGSL
FLUSH	Air/Mist	**LOGGED BY**	D.O'Shea
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	80		
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								Hole Opened by Shell & Auger - see log BH03	4.40	64.43		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of COBBLE	4.60	64.23		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black gravelly CLAY	6.60	62.23		N = 26 (2, 3, 5, 5, 7, 9)
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black sandy gravelly CLAY	8.40	60.43		N = 27 (2, 2, 6, 6, 7, 8)
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black clayey sandy GRAVEL				N = 38 (3, 4, 7, 9, 11, 11)

REMARKS

Hole cased 0.00-11.30m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
11.00	11.00	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT Charlestown , Finglas , Dublin 11

DRILLHOLE NO **RC03**
SHEET Sheet 2 of 2

CO-ORDINATES 712,730.90 E
740,517.81 N
GROUND LEVEL (mOD) 68.83

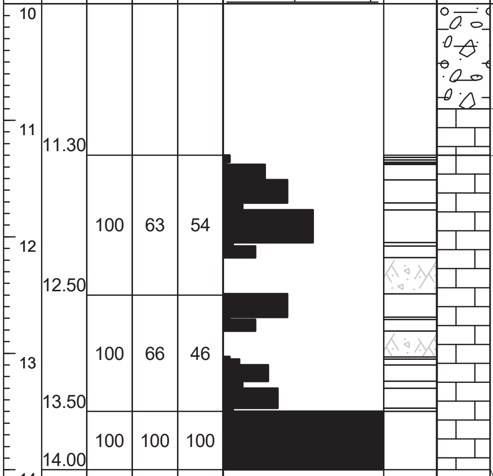
RIG TYPE Knebel
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 80

DATE COMMENCED 15/06/2020
DATE COMPLETED 16/06/2020

CLIENT Puddenhill Property Ltd.
ENGINEER POGA Consulting Engineers

DRILLED BY IGSL
LOGGED BY D.O'Shea

Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%
11.30			
12.50	100	63	54
13.50	100	66	46
14.00	100	100	100



Description	Depth (m)	Elevation	SPT (N Value)
SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black clayey sandy GRAVEL *(continued)*	10.90	57.93	N = 94/180 mm (2, 5, 16, 28, 50)
SYMMETRIX DRILLING: No recovery, observed by driller as returns of possible weathered ROCK	11.30	57.53	
Strong to locally weak, medium to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.80m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately/highly weathered at fissile mudstone/shale zones at (12.18-12.49m & 12.81-13.03m). Many incipient fractures throughout. Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, locally calcite-veined (up to 40mm thick) locally slightly iron-oxide stained. Dips are subhorizontal to 45° & locally 70°.	14.00	54.83	

End of Borehole at 14.00 m

REMARKS

Hole cased 0.00-11.30m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
11.00	11.00	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
16-06-20	14.00	11.30	9.20	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

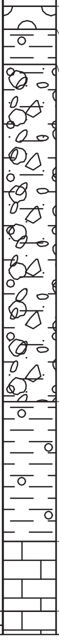
IGSL RC FI 10M 22485.GPJ IGSL.GDT 7/7/20

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**DRILLHOLE NO**	**RC05**
		SHEET	Sheet 1 of 2
CO-ORDINATES	712,791.15 E 740,526.71 N	**DATE COMMENCED**	18/06/2020
GROUND LEVEL (mOD)	68.74	**DATE COMPLETED**	18/06/2020
CLIENT	Puddenhill Property Ltd.	**DRILLED BY**	IGSL
ENGINEER	POGA Consulting Engineers	**LOGGED BY**	D.O'Shea

RIG TYPE	Knebel
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	80



Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								Hole Opened by Shell & Auger - see log BH05				
									4.60	64.14		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of COBBLE	4.80	63.94		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black gravelly CLAY	5.10	63.64		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black clayey sandy GRAVEL with occasional cobbles	8.00	60.74		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black gravelly CLAY	9.20	59.54		
	9.80							SYMMETRIX DRILLING: No recovery, observed by driller as returns of possible weathered ROCK	9.80	58.94		

REMARKS

Hole cased 0.00-9.80m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
9.00	9.00	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

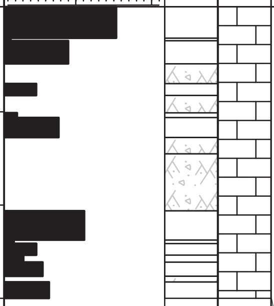
Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**DRILLHOLE NO**	**RC05**
		SHEET	Sheet 2 of 2
CO-ORDINATES	712,791.15 E 740,526.71 N	**DATE COMMENCED**	18/06/2020
GROUND LEVEL (mOD)	68.74	**DATE COMPLETED**	18/06/2020
RIG TYPE	Knebel	**DRILLED BY**	IGSL
FLUSH	Air/Mist	**LOGGED BY**	D.O'Shea
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	80		
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	10.90	100	65	55	Strong to locally weak, medium to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.70m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately/highly weathered at clay/gravel-filled zones. Many incipient fractures throughout. Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay/gravel-filled (at 10.49-10.67m, 10.76-10.91m & 11.26-11.75m), commonly calcite-veined (up to 50mm thick) locally slightly iron-oxide stained. Dips are subhorizontal to 45° & locally 70°. *(continued)*				
11	11.70	100	15	15					
12	12.50	100	67	48		12.50	56.24		
13					End of Borehole at 12.50 m				
14									
15									
16									
17									
18									
19									



REMARKS

Hole cased 0.00-9.80m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
9.00	9.00	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
18-06-20	12.50	9.80	7.50	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**DRILLHOLE NO**	**RC08**
		SHEET	Sheet 1 of 2
CO-ORDINATES	712,687.06 E 740,485.90 N	**DATE COMMENCED**	09/06/2020
GROUND LEVEL (mOD)	69.34	**DATE COMPLETED**	10/06/2020
CLIENT	Puddenhill Property Ltd.	**DRILLED BY**	IGSL
ENGINEER	POGA Consulting Engineers	**LOGGED BY**	D.O'Shea

RIG TYPE	Knebel
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	80

Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%
9.00 – 9.40	100	0	0
9.40 – 10.00	100	0	0

Description	Depth (m)	Elevation	SPT (N Value)
Hole Opened by Shell & Auger - see log BH08	3.70	65.64	
SYMMETRIX DRILLING: No recovery, observed by driller as returns of COBBLE	4.00	65.34	
SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black gravelly CLAY	4.50	64.84	N = 85 (4, 8, 15, 20, 23, 27)
SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black clayey sandy GRAVEL	5.60	63.74	
SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black gravelly CLAY	6.40	62.94	N = 46 (5, 4, 7, 10, 14, 15)
SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black clayey sandy GRAVEL	8.70	60.64	N = 30 (3, 3, 5, 6, 8, 11)
SYMMETRIX DRILLING: No recovery, observed by driller as returns of COBBLE	9.00	60.34	N = 47 (2, 5, 10, 11, 13, 13)

REMARKS

Hole cased 0.00-9.00m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
6.80	6.80	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
10-06-20	10.80	1.00	10.80	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT Charlestown , Finglas , Dublin 11

DRILLHOLE NO **RC08**
SHEET Sheet 2 of 2

CO-ORDINATES 712,687.06 E
740,485.90 N
GROUND LEVEL (mOD) 69.34

RIG TYPE Knebel
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 80

DATE COMMENCED 09/06/2020
DATE COMPLETED 10/06/2020

CLIENT Puddenhill Property Ltd.
ENGINEER POGA Consulting Engineers

DRILLED BY IGSL
LOGGED BY D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10		42	0	0				Returns of stiff black slightly sandy gravelly CLAY with occasional cobbles. Sand is fine. Gravel is angular to subrounded fine to coarse of various lithologies predominantely limestone. Cobbles are subrounded of limestone. *(continued)*				
11	11.20								11.20	58.14		
								End of Borehole at 11.20 m				
12												
13												
14												
15												
16												
17												
18												
19												

REMARKS

Hole cased 0.00-9.00m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
6.80	6.80	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
10-06-20	11.20	9.00	3.80	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
10-06-20	10.80	1.00	10.80	50mm SP

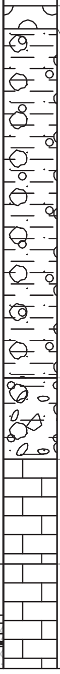
GEOTECHNICAL CORE LOG RECORD

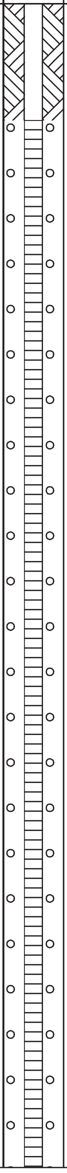
REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**DRILLHOLE NO**	**RC12**
		SHEET	Sheet 1 of 2
CO-ORDINATES	712,837.09 E 740,483.41 N	**DATE COMMENCED**	12/06/2020
GROUND LEVEL (mOD)	67.81	**DATE COMPLETED**	12/06/2020
CLIENT	Puddenhill Property Ltd.	**DRILLED BY**	IGSL
ENGINEER	POGA Consulting Engineers	**LOGGED BY**	D.O'Shea

RIG TYPE	Knebel
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	80

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								Hole Opened by Shell & Auger - see log BH12	4.30	63.51		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of COBBLE	4.50	63.31		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black gravelly CLAY with occasional cobbles	7.50	60.31		N = 103 (8, 10, 16, 23, 31, 33) N = 106 (6, 14, 19, 27, 29, 31)
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black clayey sandy GRAVEL with occasional cobbles	8.20	59.61		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of possible weathered ROCK	9.10	58.71		N = 50/20 mm (25, 50)
9	9.10	100	58	40								





REMARKS

Hole cased 0.00-9.10m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
8.60	8.60	N/S			Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
12-06-20	12.30	1.00	12.30	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

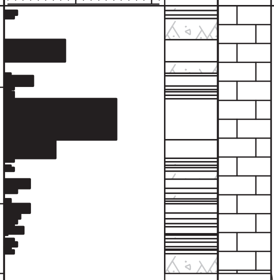
GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**DRILLHOLE NO**	**RC12**
		SHEET	Sheet 2 of 2
CO-ORDINATES	712,837.09 E 740,483.41 N	**DATE COMMENCED**	12/06/2020
GROUND LEVEL (mOD)	67.81	**DATE COMPLETED**	12/06/2020
RIG TYPE	Knebel	**FLUSH**	Air/Mist
INCLINATION (deg)	-90	**CORE DIAMETER (mm)**	80
CLIENT	Puddenhill Property Ltd.	**DRILLED BY**	IGSL
ENGINEER	POGA Consulting Engineers	**LOGGED BY**	D.O'Shea

Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Description	Depth (m)	Elevation
10.70				Strong to locally weak, medium to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.60m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately/highly weathered at fissile mudstone/shale zones at (9.70-9.77m, 10.48-10.58m & 11.97-12.00m) Many incipient fractures throughout. Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, locally calcite-veined (up to 8mm thick) locally slightly iron-oxide stained. Dips are subhorizontal to 20° & locally 70°. *(continued)*		
11.70	100	71	51			
12.30	100	47	0		12.30	55.51

End of Borehole at 12.30 m



REMARKS

Hole cased 0.00-9.10m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
8.60	8.60	N/S			Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
12-06-20	12.30	1.00	12.30	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
12-06-20	12.30	9.10	7.50	Water level recorded 5 mins after end of drilling.

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT Charlestown , Finglas , Dublin 11

DRILLHOLE NO **RC13**
SHEET Sheet 1 of 2

CO-ORDINATES 712,618.65 E
740,452.96 N
GROUND LEVEL (mOD) 69.67

RIG TYPE Knebel
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 80

DATE COMMENCED 03/06/2020
DATE COMPLETED 03/06/2020

CLIENT Puddenhill Property Ltd.
ENGINEER POGA Consulting Engineers

DRILLED BY IGSL
LOGGED BY D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								Hole Opened by Shell & Auger - see log BH13	3.80	65.87		
4								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black gravelly CLAY	7.50	62.17		N = 112 (19, 31, 23, 29, 32, 28) N = 101 (13, 16, 27, 22, 25, 27)
8								SYMMETRIX DRILLING: No recovery, observed by driller as returns of cobbly GRAVEL	9.00	60.67		N = 86 (4, 14, 21, 23, 19, 23)
9								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly GRAVEL				N = 91/125 mm (23, 34, 41, 25, 25)

REMARKS

Hole cased 0.00-11.70m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
8.60	8.60	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT Charlestown , Finglas , Dublin 11

DRILLHOLE NO **RC13**
SHEET Sheet 2 of 2

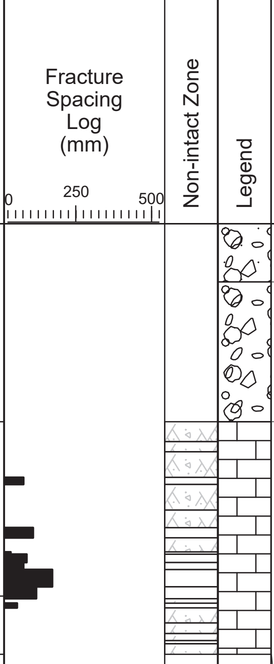
CO-ORDINATES 712,618.65 E
740,452.96 N
GROUND LEVEL (mOD) 69.67

RIG TYPE Knebel
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 80

DATE COMMENCED 03/06/2020
DATE COMPLETED 03/06/2020

CLIENT Puddenhill Property Ltd.
ENGINEER POGA Consulting Engineers

DRILLED BY IGSL
LOGGED BY D.O'Shea



Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10					SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy cobbly GRAVEL *(continued)*	10.50	59.17		
11	11.70				SYMMETRIX DRILLING: No recovery, observed by driller as returns of cobbly GRAVEL	11.70	57.97		N = 54/100 mm (19, 31, 25, 29)
12	13.20	100	15	0	Strong to locally weak, medium to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.30m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately/highly weathered at fissile mudstone/shale zones at (11.87-11.96m, 12.46-12.61m, 13.22-13.26m, 13.43-13.52m & 13.58-13.61m). Many incipient fractures throughout. Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, abundant calcite/dolomite-veining (up to 80mm thick) locally slightly iron-oxide stained. Dips are subhorizontal & locally 45° & 80°.				
13	13.70	100	24	0		13.70	55.97		
14					End of Borehole at 13.70 m				
15									
16									
17									
18									
19									

REMARKS

Hole cased 0.00-11.70m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
8.60	8.60	N/S			Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
03-06-20	13.70	11.70	4.60	Water level recorded 5 mins after end of drilling.

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**DRILLHOLE NO**	**RC14**
		SHEET	Sheet 1 of 2
CO-ORDINATES	712,691.92 E 740,447.32 N	**DATE COMMENCED**	05/06/2020
GROUND LEVEL (mOD)	69.09	**DATE COMPLETED**	08/06/2020
CLIENT	Puddenhill Property Ltd.	**DRILLED BY**	IGSL
ENGINEER	POGA Consulting Engineers	**LOGGED BY**	D.O'Shea

RIG TYPE	Knebel
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	80

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								Hole Opened by Shell & Auger - see log BH14	4.40	64.69		
	4.70							SYMMETRIX DRILLING: No recovery, observed by driller as returns of COBBLE	4.70	64.39		
5	5.30	100	0	0				Returns of brown slightly sandy gravelly CLAY with occasional cobbles. Sand is fine. Gravel is angular to subrounded fine to coarse of various lithologies predominantely limestone. Cobbles are subrounded of limestone.				
	5.90	100	0	0					5.90	63.19		
6								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black clayey sandy GRAVEL with occasional cobbles				N = 50/20 mm (27, 50)
7		0	0	0					8.00	61.09		N = 50/10 mm (40, 49, 50)
8	8.40							SYMMETRIX DRILLING: No recovery, observed by driller as returns of COBBLE	8.40	60.69		
9	9.40	60	0	0				Returns of stiff black slightly sandy gravelly CLAY with occasional cobbles. Sand is fine. Gravel is angular to subrounded fine to coarse of various lithologies predominantely limestone. Cobbles are subrounded of limestone.	9.40	59.69		
		0	0	0				SYMMETRIX DRILLING: No recovery, observed by driller as returns of angular GRAVEL	9.70	59.39		

REMARKS

Hole cased 0.00-10.30m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
6.30	6.30	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

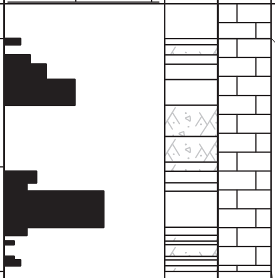
Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**DRILLHOLE NO**	**RC14**
		SHEET	Sheet 2 of 2
CO-ORDINATES	712,691.92 E 740,447.32 N	**DATE COMMENCED**	05/06/2020
GROUND LEVEL (mOD)	69.09	**DATE COMPLETED**	08/06/2020
RIG TYPE	Knebel	**DRILLED BY**	IGSL
FLUSH	Air/Mist	**LOGGED BY**	D.O'Shea
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	80		
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	10.30							SYMMETRIX DRILLING: No recovery, observed by driller as returns of possible weathered ROCK *(continued)*	10.30	58.79		
		100	46	23				Strong to locally weak, medium to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.60m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately/highly weathered at fissile mudstone/shale zones at (11.14-1.36m, 12.07-12.17m & 12.25-12.30m) Many incipient fractures throughout. Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, commonly calcite-veined (up to 100mm thick) locally slightly iron-oxide stained. Dips are subhorizontal to 45° & locally 70°.				
11	11.40											
12	12.30	100	51	32					12.30	56.79		
13								End of Borehole at 12.30 m				
14												
15												
16												
17												
18												
19												



REMARKS

Hole cased 0.00-10.30m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
6.30	6.30	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
08-06-20	12.30	10.30	4.60	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**DRILLHOLE NO**	**RC16**
		SHEET	Sheet 1 of 2
CO-ORDINATES	712,767.12 E 740,452.27 N	**DATE COMMENCED**	10/06/2020
GROUND LEVEL (mOD)	68.50	**DATE COMPLETED**	12/06/2020
RIG TYPE	Knebel	**DRILLED BY**	IGSL
FLUSH	Air/Mist	**LOGGED BY**	D.O'Shea
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	80		
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								Hole Opened by Shell & Auger - see log BH16	4.10	64.40		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of COBBLE	4.50	64.00		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black gravelly CLAY with occasional cobbles	6.40	62.10		N = 77/115 mm (10, 18, 27, 50)
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of COBBLE	6.80	61.70		
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey/black gravelly CLAY	7.70	60.80		N = 50/35 mm (13, 40, 50)
	8.30							SYMMETRIX DRILLING: No recovery, observed by driller as returns of possible weathered ROCK	8.30	60.20		
	9.50	100	49	37								

REMARKS

Hole cased 0.00-8.30m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
8.20	8.20	N/S			Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

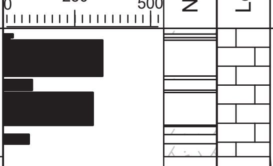
GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**DRILLHOLE NO**	**RC16**
		SHEET	Sheet 2 of 2
CO-ORDINATES	712,767.12 E 740,452.27 N	**DATE COMMENCED**	10/06/2020
GROUND LEVEL (mOD)	68.50	**DATE COMPLETED**	12/06/2020
RIG TYPE	Knebel	**DRILLED BY**	IGSL
FLUSH	Air/Mist	**LOGGED BY**	D.O'Shea
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	80		
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		



Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10 11 12 13 14 15 16 17 18 19	11.10	100	73	53				Strong to locally weak, medium to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.60m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately/highly weathered at fissile mudstone/shale zones at (9.98-10.05m, 10.41-10.44m, 10.53-10.55m & 10.83-10.84m) Many incipient fractures throughout. Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay/gravel-filled (at 8.58-8.64m & 9.24-9.31m), locally calcite-veined (up to 5mm thick) locally slightly iron-oxide stained. Dips are subhorizontal to 20° & locally 70°. *(continued)* End of Borehole at 11.10 m	11.10	57.40		

REMARKS

Hole cased 0.00-8.30m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
8.20	8.20	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
11-06-20	11.10	8.30	8.40	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**DRILLHOLE NO**	**RC18**
		SHEET	Sheet 1 of 2
CO-ORDINATES	712,824.58 E 740,451.84 N	**DATE COMMENCED**	11/06/2020
GROUND LEVEL (mOD)	68.00	**DATE COMPLETED**	11/06/2020
CLIENT	Puddenhill Property Ltd.	**DRILLED BY**	IGSL
ENGINEER	POGA Consulting Engineers	**LOGGED BY**	D.O'Shea

RIG TYPE Knebel
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 80

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								Hole Opened by Shell & Auger - see log BH18				
4.50								SYMMETRIX DRILLING: No recovery, observed by driller as returns of gravelly CLAY	4.50	63.50		
6												N = 8/225 mm (1, 1, 2, 3, 3)
7.5												N = 16 (2, 2, 3, 4, 4, 5)
9.00								SYMMETRIX DRILLING: No recovery, observed by driller as returns of cobbly CLAY	9.00	59.00		N = 12 (1, 2, 2, 4, 3, 3)

REMARKS

Hole cased 0.00-11.50m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
10.90	10.90	N/S			Slow

GROUNDWATER DETAILS

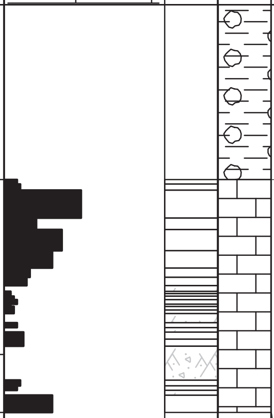
Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER	22485
CONTRACT	Charlestown , Finglas , Dublin 11
DRILLHOLE NO	**RC18**
SHEET	Sheet 2 of 2
CO-ORDINATES	712,824.58 E 740,451.84 N
GROUND LEVEL (mOD)	68.00
CLIENT	Puddenhill Property Ltd.
ENGINEER	POGA Consulting Engineers
RIG TYPE	Knebel
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	80
DATE COMMENCED	11/06/2020
DATE COMPLETED	11/06/2020
DRILLED BY	IGSL
LOGGED BY	D.O'Shea



Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10 11	11.50				SYMMETRIX DRILLING: No recovery, observed by driller as returns of cobbly CLAY *(continued)*	11.50	56.50		N = 33 (4, 6, 6, 7, 9, 11)
12	13.00	100	59	29	Strong to locally weak, medium to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-1.00m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately/highly weathered at fissile mudstone/shale zones at (12.41-12.46m & 12.77-12.81m). Many incipient fractures throughout. Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, locally calcite-veined (up to 15mm thick) locally slightly iron-oxide stained. Dips are subhorizontal & locally 45° & 80°.				
13	13.50	100	54	0		13.50	54.50		
14 15 16 17 18 19					End of Borehole at 13.50 m				

REMARKS

Hole cased 0.00-11.50m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
10.90	10.90	N/S			Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
11-06-20	13.50	11.50	8.40	Water level recorded 5 mins after end of drilling.

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**DRILLHOLE NO**	**RC21**
		SHEET	Sheet 1 of 2
CO-ORDINATES	712,658.42 E 740,399.86 N	**DATE COMMENCED**	10/06/2020
GROUND LEVEL (mOD)	68.40	**DATE COMPLETED**	10/06/2020
RIG TYPE	Knebel	**DRILLED BY**	IGSL
FLUSH	Air/Mist	**LOGGED BY**	D.O'Shea
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	80		
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								Hole Opened by Shell & Auger - see log BH21	6.30	62.10		
6								SYMMETRIX DRILLING: No recovery, observed by driller as returns of cobbly CLAY	7.50	60.90		
7	8.80							SYMMETRIX DRILLING: No recovery, observed by driller as returns of cobbly SAND	8.80	59.60		N = 115 (7, 19, 28, 27, 31, 29)
9		100	56	41								

REMARKS

Hole cased 0.00-8.80m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
6.70	6.70	N/S			Slow

GROUNDWATER DETAILS

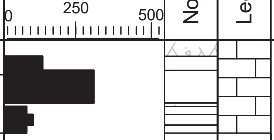
Date	Hole Depth	Casing Depth	Depth to Water	Comments

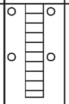
INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
10-06-20	10.80	1.00	10.80	50mm SP

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER	22485
CONTRACT	Charlestown , Finglas , Dublin 11
DRILLHOLE NO	**RC21**
SHEET	Sheet 2 of 2
CO-ORDINATES	712,658.42 E 740,399.86 N
GROUND LEVEL (mOD)	68.40
RIG TYPE	Knebel
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	80
DATE COMMENCED	10/06/2020
DATE COMPLETED	10/06/2020
CLIENT	Puddenhill Property Ltd.
ENGINEER	POGA Consulting Engineers
DRILLED BY	IGSL
LOGGED BY	D.O'Shea





Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm)	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10	10.30 10.80	100	92	62				Strong to locally weak, medium to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.60m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately/highly weathered at fissile mudstone/shale zones at (9.06-9.08m, 9.59-9.62m, 9.96-10.14m & 10.54-10.57m). Many incipient fractures throughout. Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, locally calcite-veined (up to 15mm thick) locally slightly iron-oxide stained. Dips are subhorizontal & locally 70°. *(continued)*	10.80	57.60		
11												
12												
13								End of Borehole at 10.80 m				
14												
15												
16												
17												
18												
19												

REMARKS

Hole cased 0.00-8.80m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
6.70	6.70	N/S			Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
10-06-20	10.80	1.00	10.80	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
10-06-20	10.80	8.80	6.70	Water level recorded 5 mins after end of drilling.

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**DRILLHOLE NO**	**RC22**
		SHEET	Sheet 1 of 2
CO-ORDINATES	712,611.00 E 740,402.33 N	**DATE COMMENCED**	08/06/2020
GROUND LEVEL (mOD)	68.55	**DATE COMPLETED**	08/06/2020
CLIENT	Puddenhill Property Ltd.	**DRILLED BY**	IGSL
ENGINEER	POGA Consulting Engineers	**LOGGED BY**	D.O'Shea

RIG TYPE Knebel
FLUSH Air/Mist
INCLINATION (deg) -90
CORE DIAMETER (mm) 80

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
0								Hole Opened by Shell & Auger - see log BH22				
6.80								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy GRAVEL	6.80	61.75		
7.5												N = 50/90 mm (14, 30, 25, 25)
9												N = 50/50 mm (5, 21, 25, 25)

REMARKS

Hole cased 0.00-13.20m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
7.10	7.10	N/S			Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**DRILLHOLE NO**	**RC22**
		SHEET	Sheet 2 of 2
CO-ORDINATES	712,611.00 E 740,402.33 N	**DATE COMMENCED**	08/06/2020
GROUND LEVEL (mOD)	68.55	**DATE COMPLETED**	08/06/2020
RIG TYPE	Knebel	**FLUSH**	Air/Mist
INCLINATION (deg)	-90	**CORE DIAMETER (mm)**	80
CLIENT	Puddenhill Property Ltd.	**DRILLED BY**	IGSL
ENGINEER	POGA Consulting Engineers	**LOGGED BY**	D.O'Shea

Downhole Depth (m)	Core Run Depth (m)	T.C.R.%	S.C.R.%	R.Q.D.%	Fracture Spacing Log (mm) 0 250 500	Non-intact Zone	Legend	Description	Depth (m)	Elevation	Standpipe Details	SPT (N Value)
10								SYMMETRIX DRILLING: No recovery, observed by driller as returns of sandy GRAVEL *(continued)*				N = 50/70 mm (9, 31, 25, 25)
12												N = 85/135 mm (12, 24, 35, 25, 25)
13	13.20								13.20	55.35		
14		100	78	63				Strong to locally weak, medium to thinly bedded (to thinly laminated where fissile mudstone/shale), grey/dark grey/black, fine-grained, LIMESTONE (argillaceous limestone grading regularly (every approx 0.10-0.60m) into calci-siltite limestone with subordinate MUDSTONE, local stylolites, pyrite present), slightly weathered to moderately/highly weathered at fissile mudstone/shale zones at (13.68-13.78m & 13.99-14.04m) Many incipient fractures throughout. Discontinuities are medium to closely spaced, smooth to locally rough, planar to locally curviplanar. Apertures are tight to locally open, locally clay-smeared, locally calcite-veined (up to 10mm thick) locally slightly iron-oxide stained. Dips are subhorizontal & locally 70°.				
	14.70							End of Borehole at 14.70 m	14.70	53.85		
15												
16												
17												
18												
19												

REMARKS

Hole cased 0.00-13.20m.

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
7.10	7.10	N/S			Slow

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
08-06-20	14.70	13.20	2.70	Water level recorded 5 mins after end of drilling.

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

RC01 Box 1 of 1 – 10.50-12.50m

RC03 Box 1 of 2 – 11.30-13.50m

RC03 Box 2 of 2 – 13.50-14.00m

RC05 Box 1 of 1 – 9.80-12.50m

RC08 Box 1 of 1 – 9.00-11.20m

RC12 Box 1 of 2 – 9.10-11.70m

RC12 Box 2 of 2 – 11.70-12.30m

RC13 Box 1 of 1 – 11.70-13.70m

RC14 Box 1 of 2 – 4.70-9.40m

RC14 Box 2 of 2 – 10.30-12.30m

RC16 Box 1 of 1 – 8.30-11.10m

RC18 Box 1 of 1 – 11.50-13.50m

RC21 Box 1 of 1 – 8.80-10.80m

RC22 Box 1 of 1 – 13.20-14.70m

Appendix 3 Trial Pit Records

TRIAL PIT RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**TRIAL PIT NO.**	**TP01**
		SHEET	Sheet 1 of 1
LOGGED BY	N. Scott	**DATE STARTED**	04/06/2020
CO-ORDINATES	712,630.75 E 740,491.43 N	**DATE COMPLETED**	04/06/2020
GROUND LEVEL (m)	69.82	**EXCAVATION METHOD**	7 tonne excavator
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

Scale	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	Topsoil.		0.20	69.62						
	Grey/ brown, gravelly silty clayey SAND with a high cobble content. Gravel is fine to coarse and angular to sub-rounded. Cobbles are angular to sub-rounded.					AA120845	Env	0.50-1.00		
1.0						AA120844	B	1.00		
			1.90	67.92						
2.0	Firm to stiff, grey/brown, slightly sandy gravelly silty CLAY. Gravel is fine to coarse and sub-angular to sub-rounded.					AA120846	B	2.00		
			2.40	67.42						
	Very stiff to hard, black, slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium and sub-angular to sub-rounded.					AA120847	B	2.50		
3.0	Obstruction End of Trial Pit at 3.00m		3.00	66.82						
4.0										

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental sample 0.50-1.00m.

TRIAL PIT RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**TRIAL PIT NO.**	**TP02**
		SHEET	Sheet 1 of 1
LOGGED BY	N. Scott	**DATE STARTED**	09/06/2020
CO-ORDINATES	712,751.54 E 740,525.93 N	**DATE COMPLETED**	09/06/2020
GROUND LEVEL (m)	68.82	**EXCAVATION METHOD**	3 tonne excavator
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
					Sample Ref	Type	Depth		
Topsoil.		0.20	68.62						
MADE GROUND consisting of very stiff to hard, very sandy very gravelly silty CLAY with a low cobble content containing concrete and red plastic.		0.60	68.22		AA127532	Env	0.20-0.60		
					AA127531	B	0.50		
Obstruction End of Trial Pit at 0.60m									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental sample 0.20-0.60m

TRIAL PIT RECORD

REPORT NUMBER	22485		
CONTRACT	Charlestown , Finglas , Dublin 11	**TRIAL PIT NO.**	**TP03**
		SHEET	Sheet 1 of 1
LOGGED BY	N. Scott	**CO-ORDINATES**	712,838.77 E 740,519.88 N
GROUND LEVEL (m)	68.14	**DATE STARTED**	09/06/2020
		DATE COMPLETED	09/06/2020
CLIENT	Puddenhill Property Ltd.	**EXCAVATION METHOD**	3 tonne excavator
ENGINEER	POGA Consulting Engineers		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Topsoil.		0.20	67.94						
	MADE GROUND comprising grey, very sandy silty clayey GRAVEL with a medium cobble content containing tarmacadam. Gravel is fine to coarse and angular to sub-rounded. Cobbles are sub-rounded.		1.00	67.14		AA127530 AA127529	Env B	0.20-1.00 0.50		
1.0	Obstruction End of Trial Pit at 1.00m									
2.0										
3.0										
4.0										

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental sample 0.20-1.00m

IGSL

TRIAL PIT RECORD

REPORT NUMBER 22485

CONTRACT Charlestown , Finglas , Dublin 11

TRIAL PIT NO. TP04
SHEET Sheet 1 of 1

LOGGED BY N. Scott

CO-ORDINATES 712,625.44 E
740,458.24 N

GROUND LEVEL (m) 69.85

DATE STARTED 04/06/2020
DATE COMPLETED 04/06/2020

CLIENT Puddenhill Property Ltd.
ENGINEER POGA Consulting Engineers

EXCAVATION METHOD 7 tonne excavator

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
Topsoil.		0.40	69.45						
Firm to stiff, brown, sandy gravelly silty CLAY with a low cobble content. Gravel is fine to coarse and sub-angular to sub-rounded. Cobbles are sub-angular to sub-rounded.		1.60	68.25		AA120842 AA120841	Env B	0.50-1.50 1.00		
Firm to stiff, brown/grey, slightly sandy gravelly silty CLAY with a low cobble content. Gravel is fine to coarse and sub-angular to sub-rounded. Cobbles are sub-angular to sub-rounded.		2.50	67.35		AA121709 AA120843	Env B	1.75-2.50 2.00		
Obstruction End of Trial Pit at 2.50m									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental samples 0.50-1.50m and 1.75-2.50m.

TRIAL PIT RECORD

REPORT NUMBER	22485		
CONTRACT	Charlestown , Finglas , Dublin 11	**TRIAL PIT NO.**	**TP05**
		SHEET	Sheet 1 of 1
LOGGED BY	N. Scott	**DATE STARTED**	09/06/2020
CO-ORDINATES	712,734.55 E 740,436.71 N	**DATE COMPLETED**	09/06/2020
GROUND LEVEL (m)	68.65	**EXCAVATION METHOD**	3 tonne excavator
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

Scale	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND consisting of tarmacadam.		0.20	68.45						
	Stiff to very stiff, black, slightly sandy very gravelly silty CLAY with a high cobble content. Gravel is fine to coarse and angular to sub-angular. Cobbles are sub-angular. (Possibly made ground)		0.90	67.75		AA127522 AA127523	B Env	0.50 0.50-1.50		
1.0	Firm, brown, sandy gravelly silty CLAY. Gravel is fine to coarse and sub-angular to sub-rounded.		1.50	67.15		AA127524	B	1.00		
	Firm, brown, gravelly silty very sandy CLAY. Gravel is fine to coarse and angular to sub-rounded.		2.00	66.65		AA127525	B	1.50		
2.0	Obstruction End of Trial Pit at 2.00m									
3.0										
4.0										

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental sample 0.50-1.50m.

TRIAL PIT RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**TRIAL PIT NO.**	**TP06**
		SHEET	Sheet 1 of 1
LOGGED BY	N. Scott	**DATE STARTED**	09/06/2020
CO-ORDINATES	712,789.88 E 740,436.64 N	**DATE COMPLETED**	09/06/2020
GROUND LEVEL (m)	68.18	**EXCAVATION METHOD**	3 tonne excavator
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND consisting of tarmacadam.									
	Firm, black, slightly sandy very gravelly silty CLAY with a high cobble content. Gravel is fine to coarse and angular to sub-angular. Cobbles are sub-angular. (Possibly made ground)		0.20	67.98		AA127527 AA127526	Env B	0.20-1.00 0.50		
	Stiff, grey/brown, slightly sandy gravelly silty CLAY. Gravel is fine to coarse and sub-angular to sub-rounded.		0.80	67.38		AA127528	B	1.50		
1.0										
2.0										
	Obstruction End of Trial Pit at 2.50m		2.50	65.68						
3.0										
4.0										

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental sample 0.20-1.00m.

TRIAL PIT RECORD

REPORT NUMBER	22485		
CONTRACT	Charlestown , Finglas , Dublin 11	**TRIAL PIT NO.**	**TP07**
		SHEET	Sheet 1 of 1
LOGGED BY	N. Scott	**DATE STARTED**	04/06/2020
CO-ORDINATES	712,614.39 E 740,424.35 N	**DATE COMPLETED**	04/06/2020
GROUND LEVEL (m)	69.05	**EXCAVATION METHOD**	7 tonne excavator
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Topsoil.		0.40	68.65		AA120839	Env	0.25-1.25		
1.0	Firm , brown, sandy gravelly silty CLAY with a low cobble content. Gravel is fine to coarse and sub-angular to sub-rounded. Cobbles are sub-angular to sub-rounded.		1.50	67.55		AA120838	B	1.00		
2.0	Very stiff to hard,black/grey, very sandy gravelly silty CLAY. Gravel is fine to coarse and angular to sub-rounded.		2.50	66.55		AA121710 AA120840	Env B	1.50-2.50 2.00		
3.0 4.0	Obstruction End of Trial Pit at 2.50m									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental sample 0.25-1.25m

TRIAL PIT RECORD

REPORT NUMBER
22485

CONTRACT Charlestown , Finglas , Dublin 11

TRIAL PIT NO. **TP08**
SHEET Sheet 1 of 1

LOGGED BY N. Scott

CO-ORDINATES 712,737.79 E
740,415.67 N

GROUND LEVEL (m) 68.16

DATE STARTED 04/06/2020
DATE COMPLETED 04/06/2020

CLIENT Puddenhill Property Ltd.
ENGINEER POGA Consulting Engineers

EXCAVATION METHOD 7 tonne excavator

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND consisting of a sandy GRAVEL with a medium cobble content. Gravel is fine to coarse and angular to sub-angular.		0.40	67.76						
1.0	MADE GROUND comprising firm, grey/ brown, sandy gravelly silty CLAY with a low cobble content. Gravel is fine to coarse and sub-angular to sub-rounded. Cobbles are sub-angular to sub-rounded.		1.80	66.36		AA125802 AA125803	B Env	1.00 1.00		
2.0	400 mm diameter concrete pipe (crown at 1.8m) End of Trial Pit at 1.80m									
3.0										
4.0										

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental sample 0.50-1.50m. Crown of concrete pipe (400 mm diameter) noted in corner of pit at 1.8m.

TRIAL PIT RECORD

REPORT NUMBER	22485		
CONTRACT	Charlestown , Finglas , Dublin 11	**TRIAL PIT NO.**	**TP09**
		SHEET	Sheet 1 of 1
LOGGED BY	N. Scott	**DATE STARTED**	04/06/2020
CO-ORDINATES	712,688.23 E 740,386.09 N	**DATE COMPLETED**	04/06/2020
GROUND LEVEL (m)	68.04	**EXCAVATION METHOD**	7 tonne excavator
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Topsoil.									
	Firm, grey mottled brown and orangey brown, very sandy gravelly silty CLAY. Gravel is fine to coarse and sub-angular to sub-rounded.		0.20	67.84		AA120849	Env	0.20-1.20		
1.0						AA120848	B	1.00		
	Firm to stiff, grey/brown, sandy gravelly silty CLAY. Gravel is fine to coarse and sub-angular to sub-rounded,		1.30	66.74						
2.0						AA120850	B	2.00		
	Very stiff, black, sandy gravelly silty CLAY. Gravel is fine to medium and sub-angular to sub-rounded.		2.20	65.84						
						AA125801	B	2.50		
3.0	Obstruction End of Trial Pit at 3.00m		3.00	65.04						
4.0										

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental sample 0.20-1.20m

Appendix 4 Plate Bearing Tests

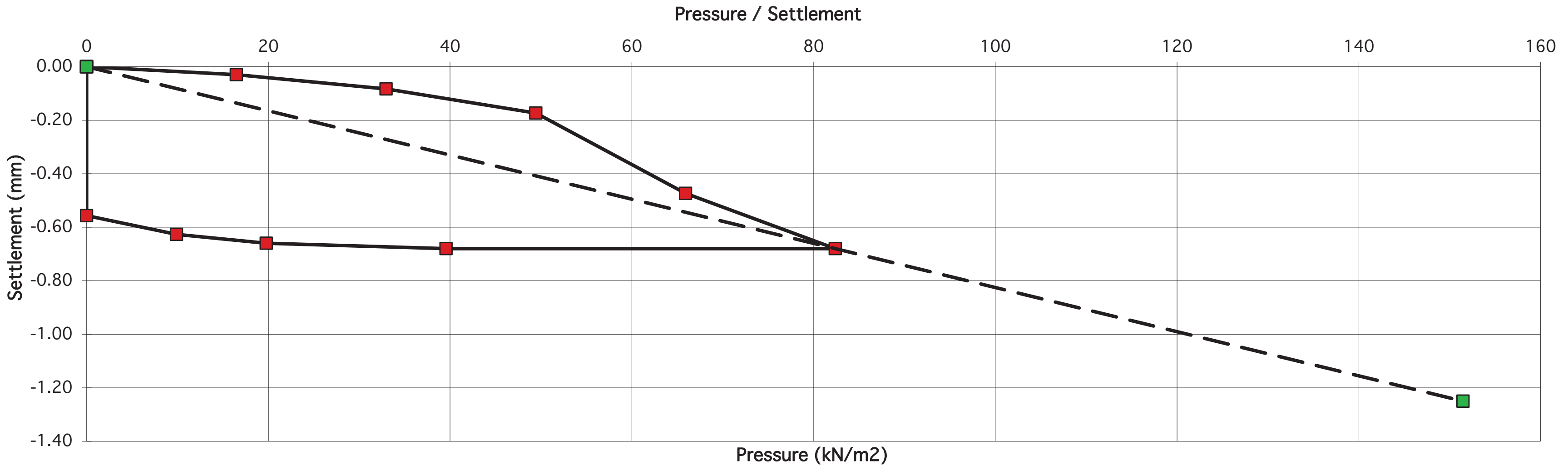
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No.	R111946
Contract	Charlestown Shopping Centre
Test No.	1 Load
Location	View Site drawing
Depth	0.5m
Client	POGA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	N. Scott
Authorised by	
Date	04/06/2020

Description of soil under test
(natural soil, placed fill, sub-base)
Brown, sandy gravelly silty clay

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 121
Modulus of subgrade reaction = 78 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 18.3 %

PLATE TEST REPORT SHEET (F3.1)

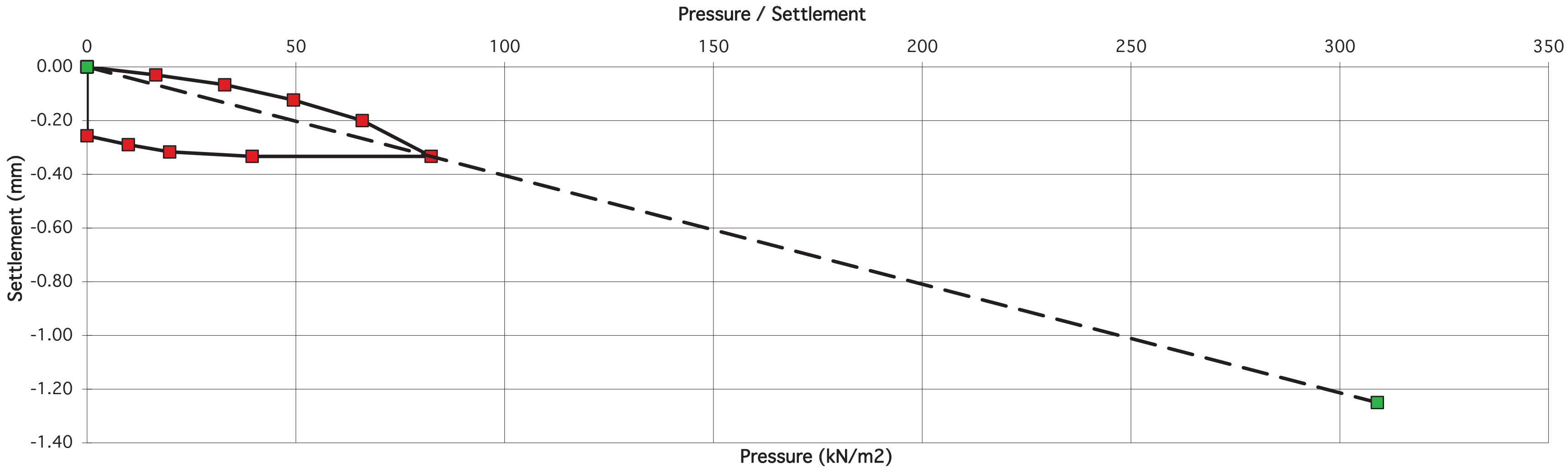
Applied Pressure/Settlement Curve

Reference No.	R111946
Contract	Charlestown Shopping Centre
Test No.	1 Reload
Location	View Site drawing
Depth	0.5m
Client	POGA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	N. Scott
Authorised by	
Date	04/06/2020

Description of soil under test
(natural soil, placed fill, sub-base)

Brown, sandy gravelly silty clay

Sample Ref No.	N/A
Depth	0.00 m bgl



Gradient at 1.25 mm settlement intersection = 247
Modulus of subgrade reaction = 159 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 62.9 %

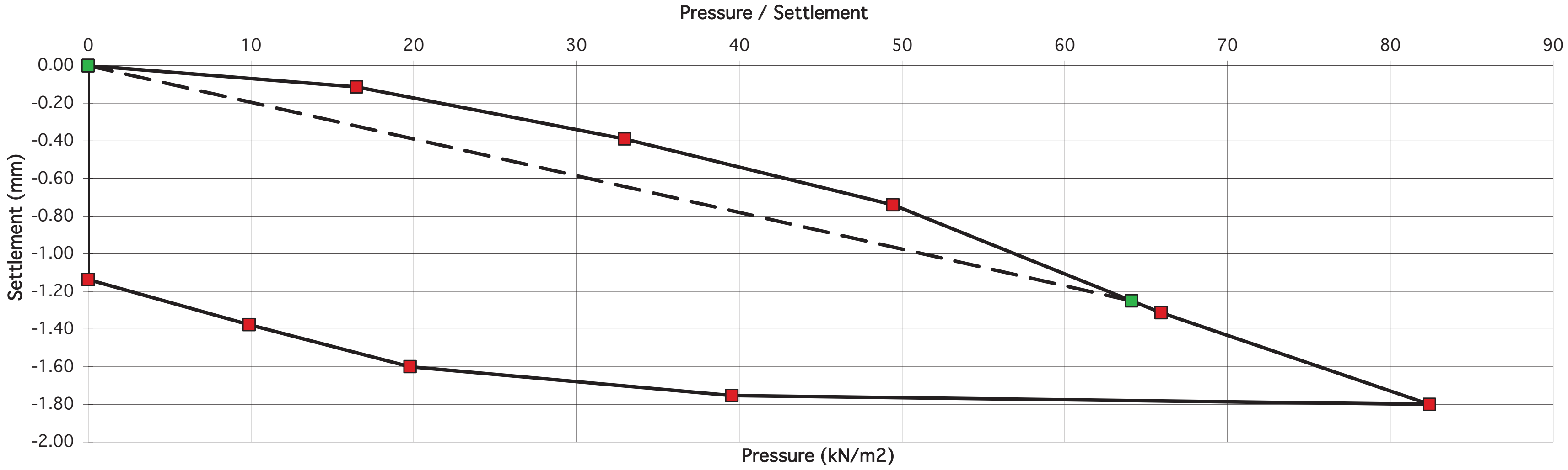
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No. R111947
Contract Charlestown Shopping Centre
Test No. 2 Load
Location View Site drawing
Depth 0.5m
Client POGA
Plate Diameter: 450 mm
Test Method BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician N. Scott
Authorised by
Date 03/06/2020

Description of soil under test
(natural soil, placed fill, sub-base)
Brown, sandy gravelly silty clay

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 51
Modulus of subgrade reaction = 33 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 4.1 %

PLATE TEST REPORT SHEET (F3.1)

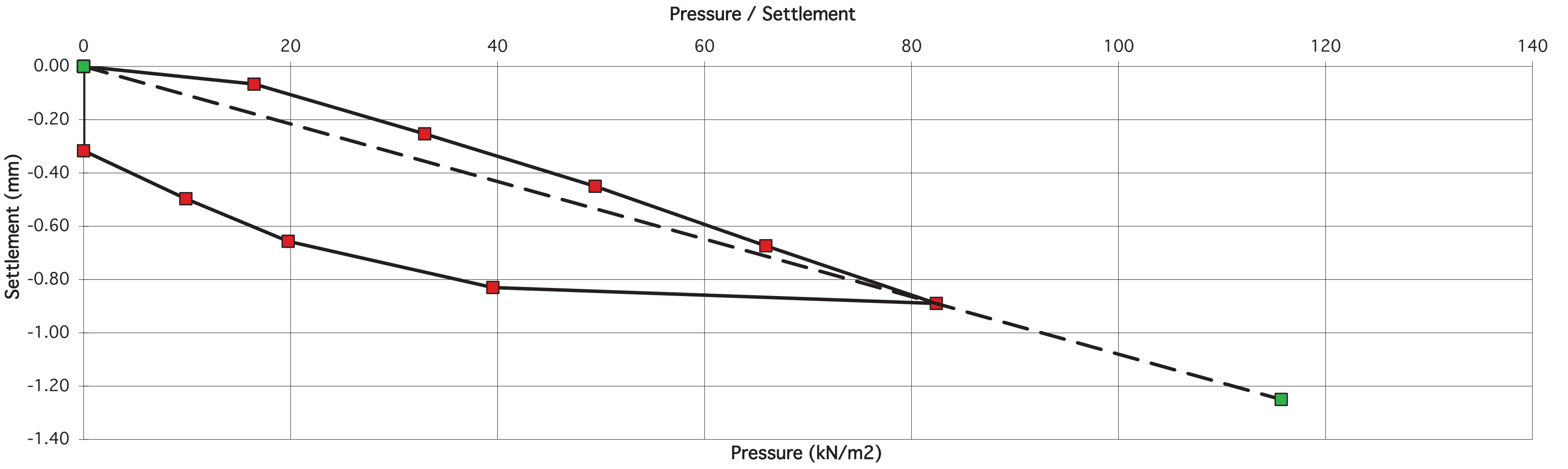
Applied Pressure/Settlement Curve

Reference No.	R111947
Contract	Charlestown Shopping Centre
Test No.	2 Reload
Location	View Site drawing
Depth	0.5m
Client	POGA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	N. Scott
Authorised by	
Date	03/06/2020

Description of soil under test
(natural soil, placed fill, sub-base)

Brown, sandy gravelly silty clay

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 93
Modulus of subgrade reaction = 60 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 11.5 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No. R111948

Contract Charlestown Shopping Centre

Test No. 3 Load

Location View Site drawing

Depth 0.5m

Client POGA

Plate Diameter: 450 mm

Test Method BS 1377: Part 9: 1990 Test4 - Incremental Loading Test

Technician N. Scott

Authorised by

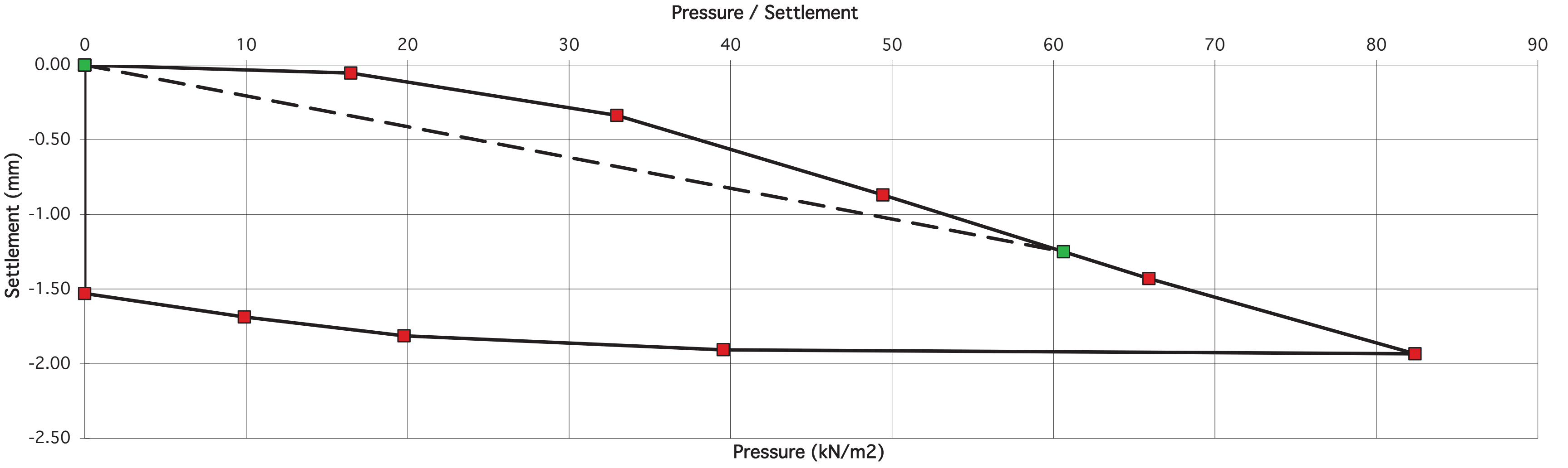
Date 03/06/2020

Description of soil under test
(natural soil, placed fill, sub-base)

Brown, sandy gravelly silty clay

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 48

Modulus of subgrade reaction = 31 MPa/m

Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.7 %

PLATE TEST REPORT SHEET (F3.1)

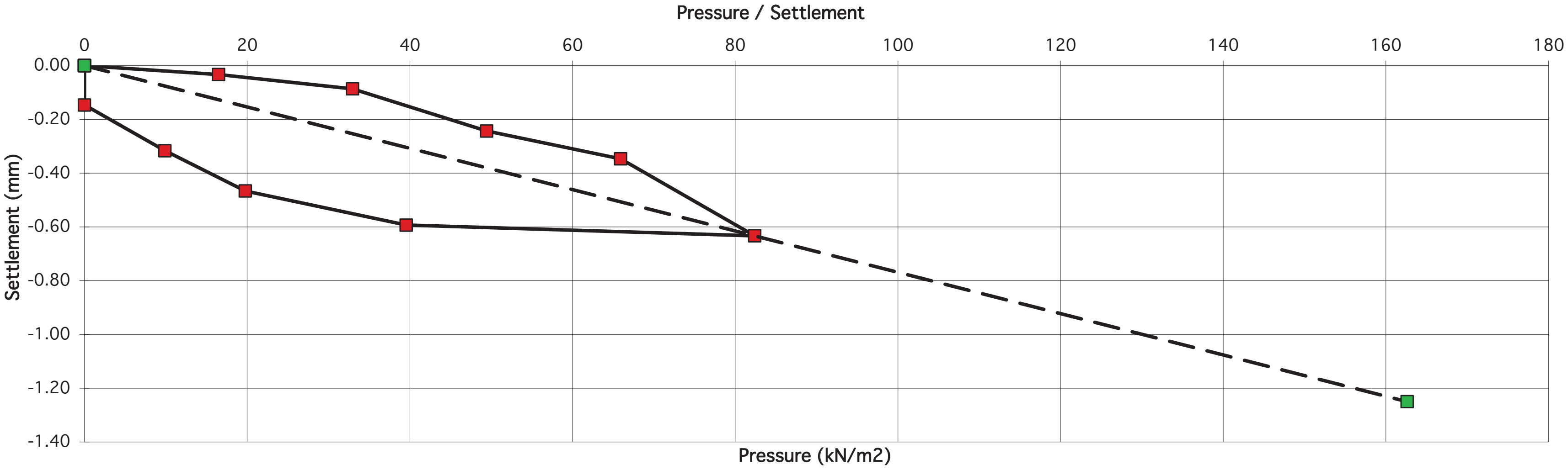
Applied Pressure/Settlement Curve

Reference No.	R111948
Contract	Charlestown Shopping Centre
Test No.	3 Reload
Location	View Site drawing
Depth	0.5m
Client	POGA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	N. Scott
Authorised by	
Date	03/06/2020

Description of soil under test
(natural soil, placed fill, sub-base)

Brown, sandy gravelly silty clay

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 130
Modulus of subgrade reaction = 84 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 20.7 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

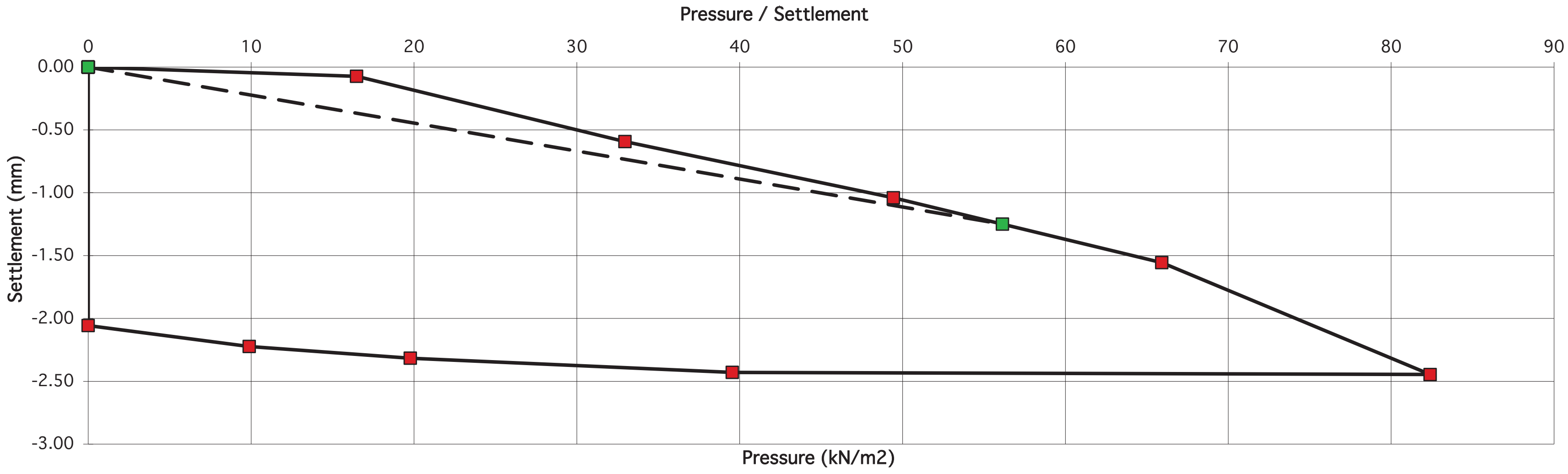
Reference No.	R111949
Contract	Charlestown Shopping Centre
Test No.	4 Load
Location	View Site drawing
Depth	0.5m
Client	POGA
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	N. Scott
Authorised by	
Date	04/06/2020

Description of soil under test
(natural soil, placed fill, sub-base)

Brown, sandy gravelly silty clay

Sample Ref No. N/A

Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 45

Modulus of subgrade reaction = 29 MPa/m

Equivalent CBR value in accordance with NRA HD25-26/10 3.3 %

Correction factor applied = 0.64 as per HD 25-26/10

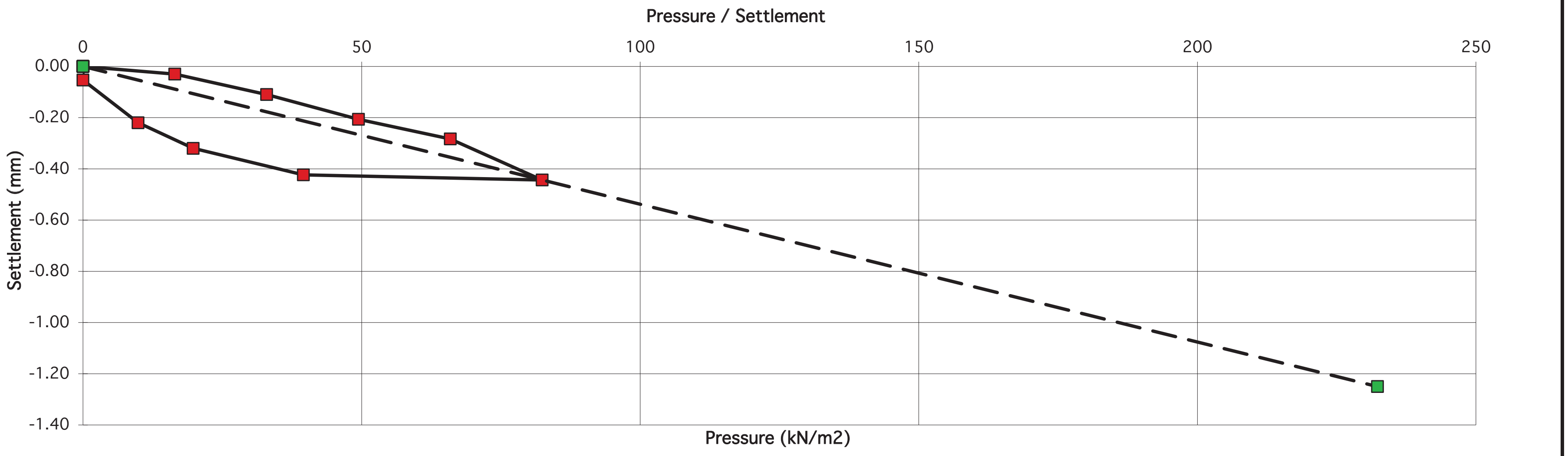
PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

Reference No. R111949
Contract Charlestown Shopping Centre
Test No. 4 Reload
Location View Site drawing
Depth 0.5m
Client POGA
Plate Diameter: 450 mm
Test Method BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician N. Scott
Authorised by
Date 04/06/2020

Description of soil under test
(natural soil, placed fill, sub-base)
Brown, sandy gravelly silty clay

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 186
Modulus of subgrade reaction = 119 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 38.4 %

Appendix 5. Laboratory Test Results (Geotechnical)

IGSL Ltd
Materials Laboratory
Unit J5, M7 Business Park
Newhall, Naas
Co. Kildare
045 846176

Test Report

Determination of Moisture Content, Liquid & Plastic Limits

Tested in accordance with BS1377:Part 2:1990, clauses 3.2*, 4.3, 4.4 & 5.3

ISO 17025 INAB ACCREDITED TESTING
DETAILED IN SCOPE REG NO.133T

Report No. **R112250** Contract No. 22485 Contract Name: Charlestown Development , Finglas , Dublin 11

Customer POGA Consulting Engineers

Samples Received: 17/06/20 Date Tested: 23/06/20

BH/TP	Sample No.	Depth (m)	Lab. Ref	Sample Type	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425μm	Preparation	Liquid Limit Clause	Classification (BS5930)	Description
BH03	AA130047	4.0	A20/2419	D	24	24	12	12	62	WS	4.4	C L	Grey slightly sandy, gravelly, CLAY
BH04	AA130040	2.0	A20/2420	D	14	31	16	15	49	WS	4.4	C L	Brown sandy gravelly CLAY
BH08	AA130010	2.0	A20/2421	D	9.4	28	16	12	52	WS	4.4	C L	Grey/brown slightly sandy, gravelly, CLAY
BH09	AA130012	1.0	A20/2422	D	31	44	20	24	51	WS	4.4	C I	Mottled grey/brown sandy gravell
BH09	AA130015	4.0	A20/2423	D	9.5	30	14	16	39	WS	4.4	C L	Grey slightly sandy, gravelly, CLAY
BH11	AA130025	2.0	A20/2424	D	15	28	14	14	52	WS	4.4	C L	Brown sandy gravelly CLAY
BH11	AA130027	4.0	A20/2425	D	11	30	14	16	52	WS	4.4	C L	Grey sandy gravelly CLAY
BH11	AA130030	7.0	A20/2426	D	10	27	12	15	46	WS	4.4	C L	Grey slightly sandy, gravelly, CLAY
BH14	AA413008	4.0	A20/2427	D	8.2	27	13	14	44	WS	4.4	C L	Grey slightly sandy, gravelly, CLAY
BH19	AA135006	2.0	A20/2428	D	12	51	23	28	59	WS	4.4	C H	Brown sandy gravelly CLAY
BH22	AA130049	2.0	A20/2429	D	5.6	33	18	15	29	WS	4.4	C L	Brown sandy gravelly CLAY
BH22	AA130053	6.0	A20/2430	D	8.8	27	13	14	48	WS	4.4	C L	Grey slightly sandy, slightly gravelly, CLAY with many cobbles

Notes:

Preparation: WS - Wet sieved
AR - As received
NP - Non plastic

Liquid Limit Clause: 4.3 Cone Penetrometer definitive method
4.4 Cone Penetrometer one point method

Sample Type: B - Bulk Disturbed
U - Undisturbed

Remarks:
Results apply to the sample as received.
NOTE: *Clause 3.2 of BS1377 is a "withdrawn" standard due to publication of ISO17892-1:2014
Opinions and interpretations are outside the scope of accreditation.
The results relate to the specimens tested. Any remaining material will be retained for one month.

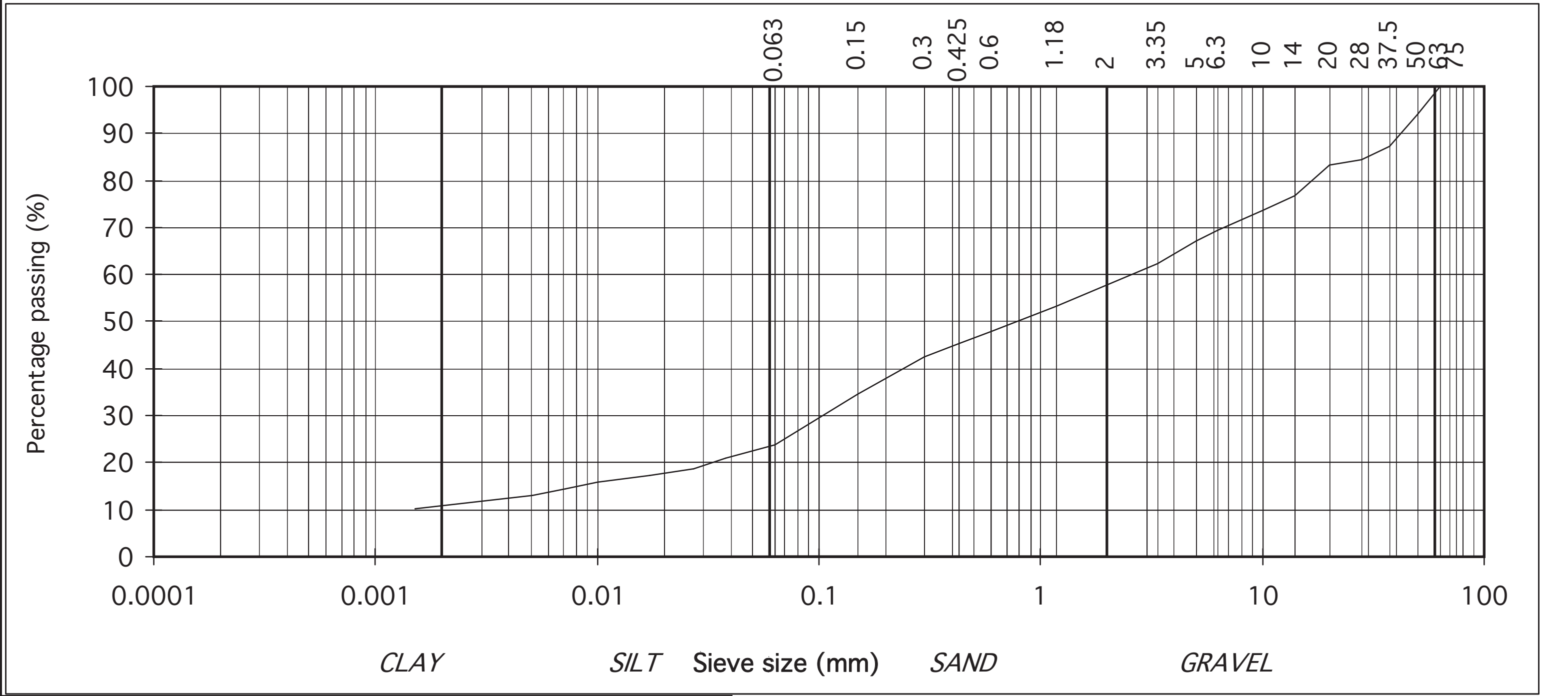
IGSL Ltd Materials Laboratory	Persons authorized to approve reports	Approved by	Date	Page
	H Byrne (Laboratory Manager)	H Byrne	02/07/20	1 of 1

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	94	GRAVEL
37.5	87	
28	85	
20	83	
14	77	
10	74	
6.3	69	
5	67	
3.35	62	
2	58	
1.18	53	SAND
0.6	48	
0.425	45	
0.3	43	
0.15	35	
0.063	24	SILT/CLAY
0.038	21	
0.027	19	
0.017	17	
0.010	16	
0.007	15	
0.005	13	
0.002	10	

Contract No.	22485	Report No.	R112251
Contract:	Charlestown Development , Finglas,Dublin 11		
BH/TP :	BH03		
Sample No.	AA130047	Lab. Sample No.	A20/2419
Sample Type:	B		
Depth (m)	4.00	Customer:	POGA Consulting Engineers
Date Received	17/06/2020	Date Testing started	23/06/2020
Description:	Grey slightly sandy, gravelly, CLAY		
Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.		



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	29/06/20	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT

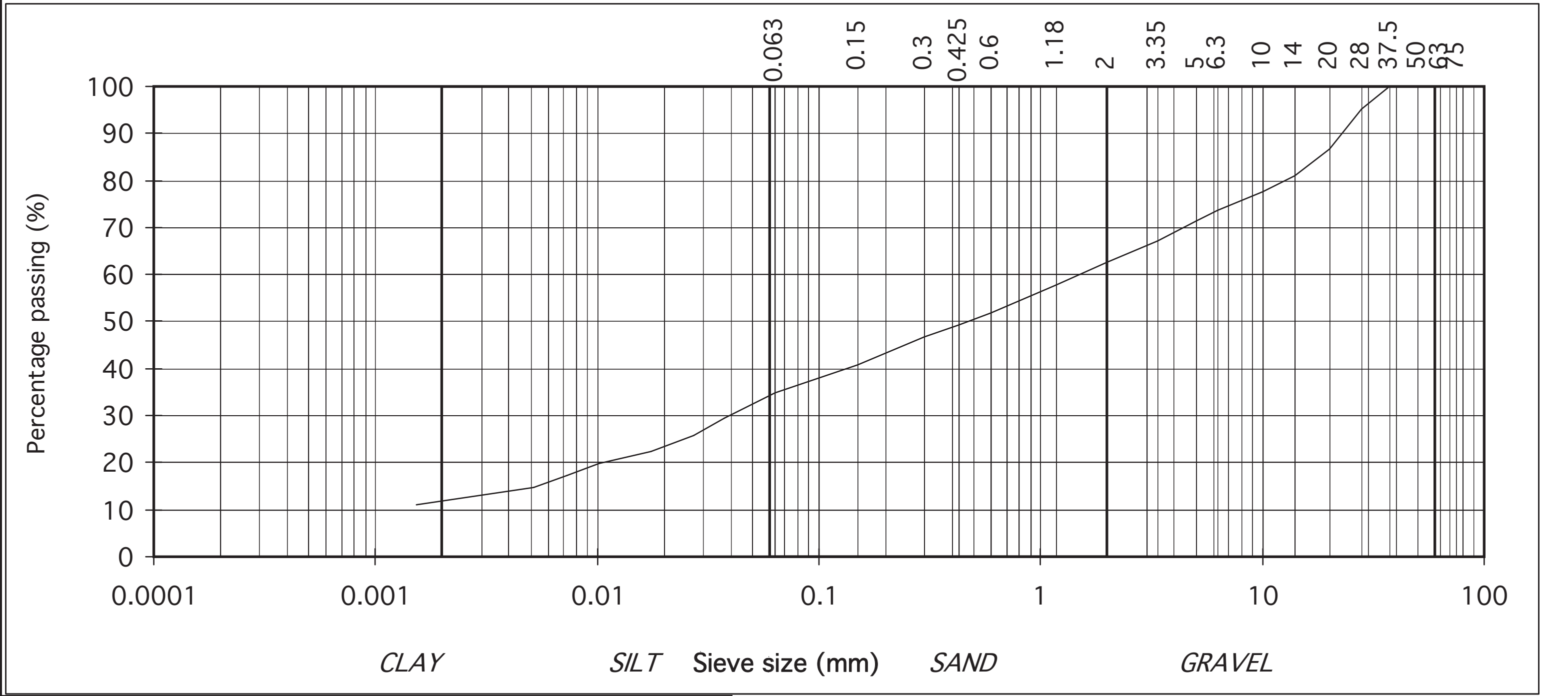
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 INAB TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	95	
20	87	
14	81	
10	78	
6.3	74	
5	71	
3.35	67	
2	62	
1.18	58	SAND
0.6	52	
0.425	49	
0.3	47	
0.15	41	
0.063	35	SILT/CLAY
0.038	29	
0.027	26	
0.017	22	
0.010	20	
0.007	17	
0.005	15	
0.002	11	

Contract No.	22485	Report No.	R112252
Contract:	Charlestown Development , Finglas,Dublin 11		
BH/TP :	BH08		
Sample No.	AA130010	Lab. Sample No.	A20/2421
Sample Type:	B		
Depth (m)	2.00	Customer:	POGA Consulting Engineers
Date Received	17/06/2020	Date Testing started	23/06/2020
Description:	Grey/brown slightly sandy, gravelly, CLAY		
Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.		



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	29/06/20	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

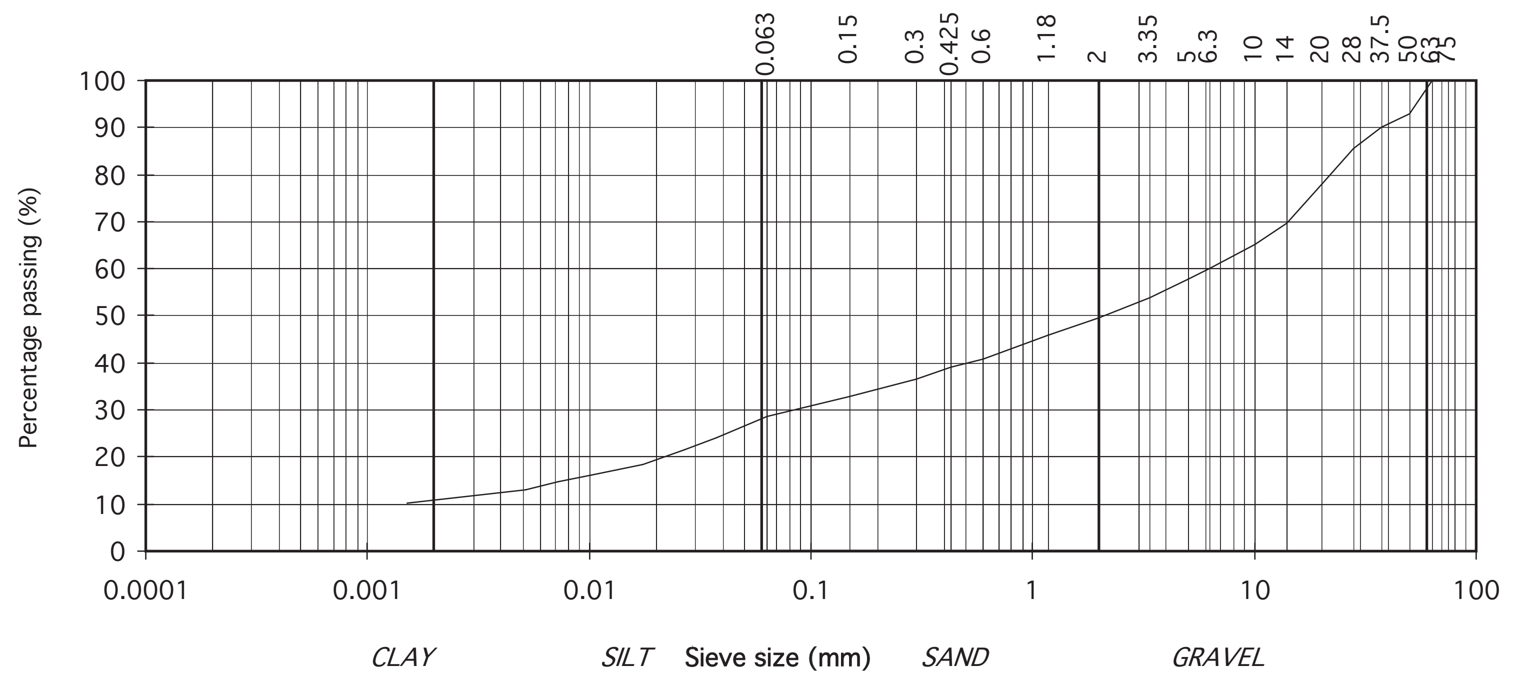
TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

Contract No. 22485 Report No. R112253
Contract: Charlestown Development , Finglas,Dublin 11
BH/TP : BH09
Sample No. AA130015 Lab. Sample No. A20/2433
Sample Type: B
Depth (m) 4.00 Customer: POGA Consulting Engineers
Date Received 17/06/2020 Date Testing started 23/06/2020
Description: Grey slightly sandy, gravelly, CLAY

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.

particle size	% passing	
75	100	COBBLES
63	100	
50	93	GRAVEL
37.5	90	
28	85	
20	78	
14	70	
10	65	
6.3	60	
5	58	
3.35	54	
2	50	
1.18	46	SAND
0.6	41	
0.425	39	
0.3	37	
0.15	33	
0.063	29	SILT/CLAY
0.038	24	
0.027	21	
0.017	18	
0.010	16	
0.007	15	
0.005	13	
0.002	10	



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
	29/06/20	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

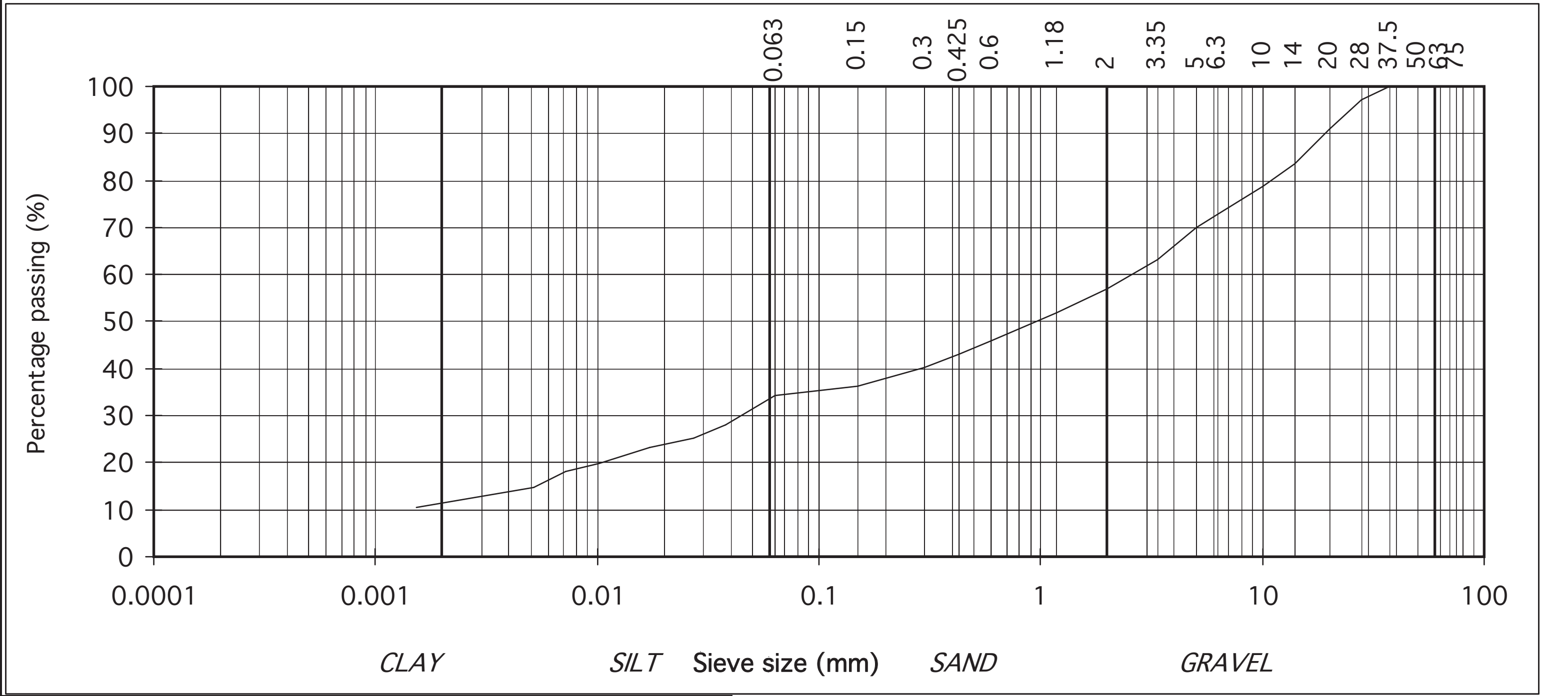
TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

Contract No. 22485 Report No. R112254
Contract: Charlestown Development , Finglas,Dublin 11
BH/TP : BH11
Sample No. AA130030 Lab. Sample No. A20/2426
Sample Type: B
Depth (m) 7.00 Customer: POGA Consulting Engineers
Date Received 17/06/2020 Date Testing started 23/06/2020
Description: Grey slightly sandy, gravelly, CLAY

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	97	
20	91	
14	83	
10	79	
6.3	73	
5	70	
3.35	63	
2	57	
1.18	52	SAND
0.6	46	
0.425	43	
0.3	40	
0.15	36	
0.063	34	SILT/CLAY
0.038	28	
0.027	25	
0.017	23	
0.010	20	
0.007	18	
0.005	15	
0.002	10	



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	29/06/20	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

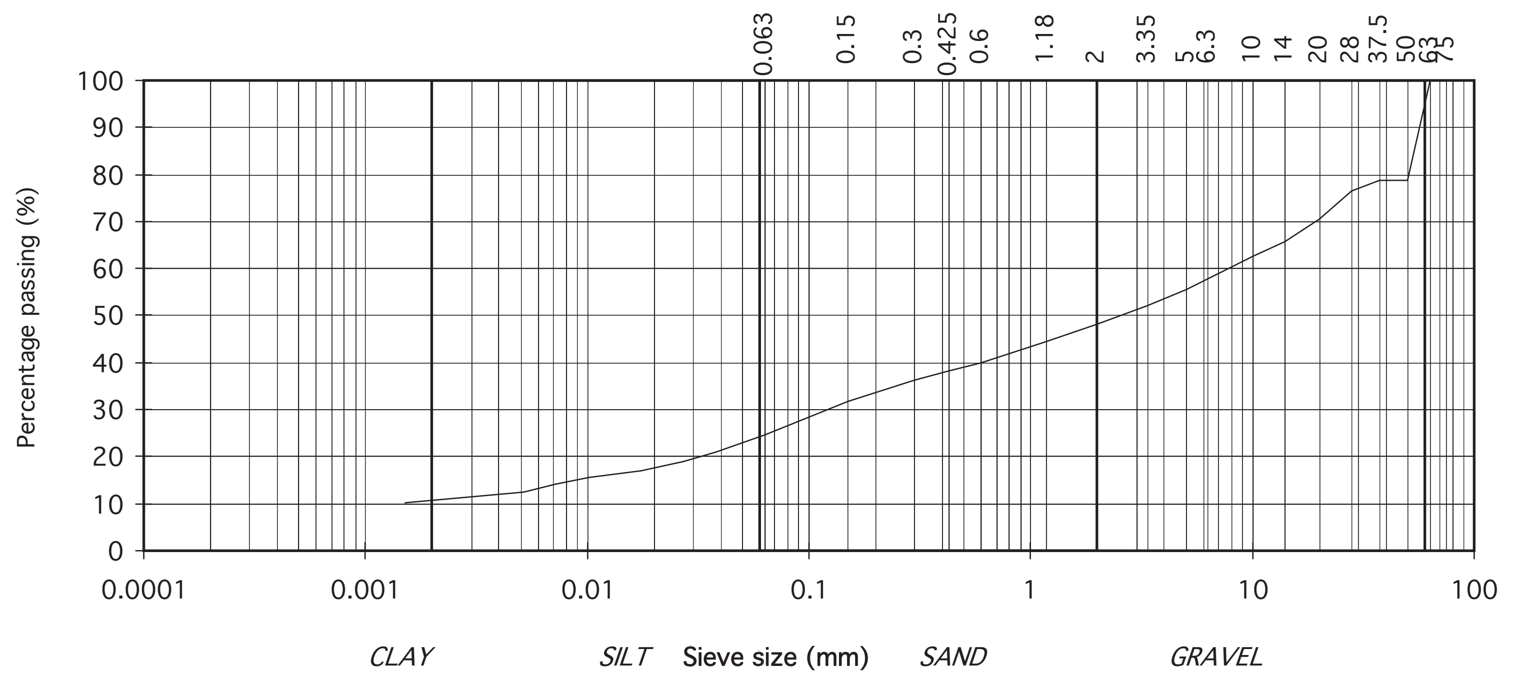
TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025
INAB
ACCREDITED
TESTING
DETAILED IN SCOPE REG NO. 133T

Contract No. 22485 Report No. R112255
Contract: Charlestown Development , Finglas,Dublin 11
BH/TP : BH14
Sample No. AA413008 Lab. Sample No. A20/2427
Sample Type: B
Depth (m) 4.00 Customer: POGA Consulting Engineers
Date Received 17/06/2020 Date Testing started 23/06/2020
Description: Grey slightly sandy, gravelly, CLAY

Remarks Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received. Sample size did not meet the requirements of BS1377

particle size	% passing	
75	100	COBBLES
63	100	
50	79	GRAVEL
37.5	79	
28	77	
20	71	
14	66	
10	63	
6.3	58	
5	56	
3.35	52	
2	48	
1.18	45	SAND
0.6	40	
0.425	38	
0.3	36	
0.15	32	
0.063	25	SILT/CLAY
0.038	21	
0.027	19	
0.017	17	
0.010	15	
0.007	14	
0.005	12	
0.002	10	



IGSL Ltd Materials Laboratory

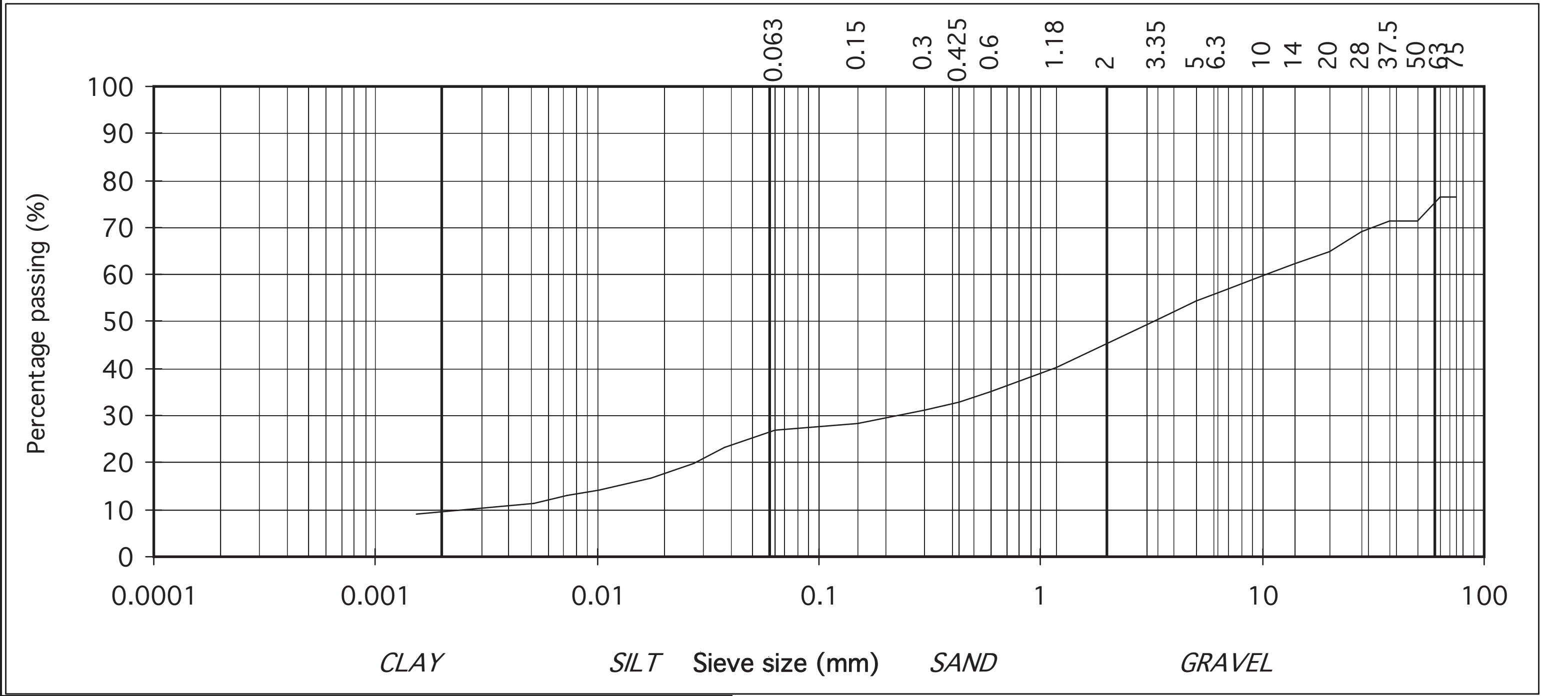
Approved by:	Date:	Page no:
H Byrne	29/06/20	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	76	COBBLES
63	76	
50	71	GRAVEL
37.5	71	
28	69	
20	65	
14	62	
10	60	
6.3	56	
5	54	
3.35	50	
2	45	
1.18	40	SAND
0.6	35	
0.425	33	
0.3	31	
0.15	28	
0.063	27	
0.038	23	SILT/CLAY
0.027	20	
0.017	17	
0.010	14	
0.007	13	
0.005	11	
0.002	9	

Contract No.	22485	Report No.	R112256
Contract:	Charlestown Development , Finglas,Dublin 11		
BH/TP :	BH22		
Sample No.	AA130053	Lab. Sample No.	A20/2430
Sample Type:	B		
Depth (m)	6.00	Customer:	POGA Consulting Engineers
Date Received	17/06/2020	Date Testing started	23/06/2020
Description:	Grey slightly sandy, slightly gravelly, CLAY with many cobbles		
Remarks	Note: Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 . Results apply to sample as received.		Sample size did not meet the requirements of BS1377



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	29/06/20	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

(Diametrial) POINT LOAD STRENGTH INDEX TEST DATA

Contract: Charlestown
Contract no. 22485
Date of test: 25/06/2020

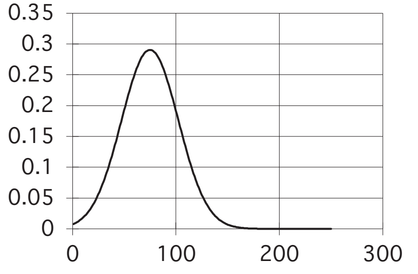
Sample Type: Core

RC No.	Depth m	D (Diameter) mm	P (failure load) kN	F	Is (index strength) Mpa	Is(50) (index strength) Mpa	*UCS MPa	Type	Orienation
RC03	11.4	78	21.0	1.222	3.45	4.22	84	d	//
	11.9	78	23.0	1.222	3.78	4.62	92	d	//
	12.6	78	19.0	1.222	3.12	3.81	76	d	//
	13.1	78	19.0	1.222	3.12	3.81	76	d	//
	13.4	78	24.0	1.222	3.94	4.82	96	d	//
RC05	10.1	78	12.0	1.222	1.97	2.41	48	d	//
	10.4	78	14.0	1.222	2.30	2.81	56	d	//
	11.9	78	22.0	1.222	3.62	4.42	88	d	//
	12.1	78	26.0	1.222	4.27	5.22	104	d	//
	12.4	78	20.0	1.222	3.29	4.02	80	d	//
RC12	9.1	78	28.0	1.222	4.60	5.62	112	d	//
	9.3	78	21.0	1.222	3.45	4.22	84	d	//
	10.4	78	24.0	1.222	3.94	4.82	96	d	//
	11.5	78	10.0	1.222	1.64	2.01	40	d	//
RC13	13.0	78	8.0	1.222	1.31	1.61	32	d	//
	13.2	78	19.0	1.222	3.12	3.81	76	d	//
RC14	10.6	78	22.0	1.222	3.62	4.42	88	d	//
	10.7	78	28.0	1.222	4.60	5.62	112	d	//
	11.6	78	7.0	1.222	1.15	1.41	28	d	//
	11.7	78	6.0	1.222	0.99	1.20	24	d	//

Statistical Summary Data	Is(50)	UCS*
Number of Samples Tested	20	20
Minimum	1.20	24
Average	3.74	75
Maximum	5.62	112
Standard Dev.	1.37	27
Upper 95% Confidence Limit	6.44	128.77
Lower 95% Confidence Limit	1.05	21.01

Comments:
*UCS taken as k x Point Load Is(50): k= 20

*UCS Normal Distribution Curve



Abbreviations

i	irregular
a	axial
b	block
d	diametral

approx. orientation to planes of weakness/bedding

U	unknown
P	perpendicular
//	parallel

(Diametrial) POINT LOAD STRENGTH INDEX TEST DATA

Contract: Charlestown
Contract no. 22485
Date of test: 25/06/2020

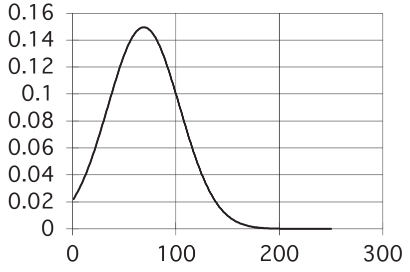
Sample Type: Core

RC No.	Depth m	D (Diameter) mm	P (failure load) kN	F	Is (index strength) Mpa	Is(50) (index strength) Mpa	*UCS MPa	Type	Orienation
RC16	9.1	78	26.0	1.222	4.27	5.22	104	d	//
	9.2	78	28.0	1.222	4.60	5.62	112	d	//
	11.0	78	19.0	1.222	3.12	3.81	76	d	//
RC18	11.7	78	15.0	1.222	2.47	3.01	60	d	//
	12.0	78	6.0	1.222	0.99	1.20	24	d	//
	12.2	78	24.0	1.222	3.94	4.82	96	d	//
RC21	9.1	78	6.0	1.222	0.99	1.20	24	d	//
	9.3	78	12.0	1.222	1.97	2.41	48	d	//
	9.5	78	21.0	1.222	3.45	4.22	84	d	//
	10.7	78	22.0	1.222	3.62	4.42	88	d	//
RC22	13.3	78	2.0	1.222	0.33	0.40	8	d	//
	14.3	78	27.0	1.222	4.44	5.42	108	d	//
	14.6	78	15.0	1.222	2.47	3.01	60	d	//

Statistical Summary Data	Is(50)	UCS*
Number of Samples Tested	13	13
Minimum	0.40	8
Average	3.44	69
Maximum	5.62	112
Standard Dev.	1.73	35
Upper 95% Confidence Limit	6.84	136.88
Lower 95% Confidence Limit	0.04	0.89

Comments:
*UCS taken as k x Point Load Is(50): k= 20

*UCS Normal Distribution Curve



Abbreviations	
i	irregular
a	axial
b	block
d	diametral

approx. orientation to planes of weakness/bedding

U	unknown
P	perpendicular
//	parallel

Appendix 6 Laboratory Test Results (Environmental)

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING 2183

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Final Report

Report No.:	20-15428-1		
Initial Date of Issue:	29-Jun-2020		
Client	IGSL		
Client Address:	M7 Business Park Naas County Kildare Ireland		
Contact(s):	Darren Keogh		
Project	22485 Charlestown Development Finglas Dublin		
Quotation No.:	Q19-18246	**Date Received:**	18-Jun-2020
Order No.:		**Date Instructed:**	19-Jun-2020
No. of Samples:	14		
Turnaround (Wkdays):	7	**Results Due:**	29-Jun-2020
Date Approved:	29-Jun-2020		

Approved By:

Details: Glynn Harvey, Technical Manager

Results - Leachate

Project: 22485 Charlestown Development Finglas Dublin

Client: IGSL	**Chemtest Job No.:**					20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428
Quotation No.: Q19-18246	**Chemtest Sample ID.:**					1019097	1019098	1019099	1019100	1019101	1019102	1019103	1019104	1019105
Order No.:	Client Sample Ref.:					120845	127530	120842	120843	127523	127527	120836	120837	125802
	Sample Location:					TP1	TP3	TP4	TP4	TP5	TP6	TP7	TP7	TP8
	Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):					1.0	0.5	0.5	1.75	0.5	0.2	0.25	1.5	0.5
	Bottom Depth (m):					1.00	0.8	1.0	2.25	1.5	1.0	1.25	2.5	1.5
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**									
pH	U	1010	10:1		N/A	8.8	9.3	8.8	9.0	8.2	8.2	8.2	8.8	8.9
Ammonium	U	1220	10:1	mg/l	0.050	0.070	< 0.050	< 0.050	< 0.050	0.10	0.10	< 0.050	< 0.050	0.050
Ammonium	N	1220	10:1	mg/kg	0.10	0.94	0.90	0.58	0.62	1.1	1.1	0.44	0.44	0.71
Boron (Dissolved)	U	1450	10:1	µg/l	20	< 20	< 20	23	< 20	< 20	< 20	< 20	< 20	< 20
Boron (Dissolved)	U	1450	10:1	mg/kg	0.20	< 0.20	< 0.20	0.23	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20

Results - Soil

Project: 22485 Charlestown Development Finglas Dublin

Client: IGSL	**Chemtest Job No.:**				20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428
Quotation No.: Q19-18246	**Chemtest Sample ID.:**				1019097	1019098	1019099	1019100	1019101	1019102	1019103	1019104	1019105
Order No.:	Client Sample Ref.:				120845	127530	120842	120843	127523	127527	120836	120837	125802
	Sample Location:				TP1	TP3	TP4	TP4	TP5	TP6	TP7	TP7	TP8
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.0	0.5	0.5	1.75	0.5	0.2	0.25	1.5	0.5
	Bottom Depth (m):				1.00	0.8	1.0	2.25	1.5	1.0	1.25	2.5	1.5
	Asbestos Lab:				LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-	-	-	-	-	-	-
Moisture	N	2030	%	0.020	6.8	14	9.7	7.6	5.9	5.6	12	11	9.2
pH (2.5:1)	N	2010		4.0									
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.40	0.41	< 0.40	< 0.40	0.46	0.43	0.44	< 0.40	0.52
Magnesium (Water Soluble)	N	2120	g/l	0.010									
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010									
Total Sulphur	M	2175	%	0.010									
Sulphur (Elemental)	M	2180	mg/kg	1.0	[A] 4.2	[A] 8.7	[A] 1.5	[A] < 1.0	[A] 22	[A] 27	[A] 1.5	[A] < 1.0	[A] 2.0
Chloride (Water Soluble)	M	2220	g/l	0.010									
Nitrate (Water Soluble)	N	2220	g/l	0.010									
Cyanide (Total)	M	2300	mg/kg	0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 5.1	[A] 9.1	[A] 7.4	[A] 6.9	[A] 8.0	[A] 5.1	[A] 4.4	[A] 6.1	[A] 2.7
Ammonium (Water Soluble)	M	2120	g/l	0.01									
Sulphate (Acid Soluble)	M	2430	%	0.010	[A] 0.048	[A] 0.055	[A] 0.017	[A] 0.026	[A] 0.59	[A] 0.24	[A] 0.040	[A] 0.028	[A] 0.073
Arsenic	M	2450	mg/kg	1.0	28	53	26	24	47	23	25	26	25
Barium	M	2450	mg/kg	10	40	84	47	65	40	34	51	87	80
Cadmium	M	2450	mg/kg	0.10	1.7	0.46	1.9	1.8	1.0	0.63	1.9	2.2	1.6
Chromium	M	2450	mg/kg	1.0	13	12	15	17	8.6	6.2	15	22	16
Molybdenum	M	2450	mg/kg	2.0	2.9	< 2.0	4.1	4.4	8.2	6.2	3.6	4.3	4.0
Antimony	N	2450	mg/kg	2.0	< 2.0	3.0	< 2.0	< 2.0	4.3	2.9	< 2.0	< 2.0	< 2.0
Copper	M	2450	mg/kg	0.50	20	17	26	24	23	18	32	32	25
Mercury	M	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.11	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	36	22	50	50	44	34	44	65	41
Lead	M	2450	mg/kg	0.50	16	26	19	18	21	19	42	27	29
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	3.8	3.3	5.2	2.9	0.38	0.70	0.73
Zinc	M	2450	mg/kg	0.50	63	52	67	64	37	29	76	87	65
Chromium (Trivalent)	N	2490	mg/kg	1.0	13	12	15	17	8.6	6.2	15	22	16
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total Organic Carbon	M	2625	%	0.20	[A] 0.98	[A] 1.0	[A] 0.28	[A] 0.41	[A] 0.73	[A] 1.9	[A] 0.49	[A] 0.28	[A] 0.71
Mineral Oil	N	2670	mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0

Results - Soil

Project: 22485 Charlestown Development Finglas Dublin

Client: IGSL	**Chemtest Job No.:**				20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428
Quotation No.: Q19-18246	**Chemtest Sample ID.:**				1019097	1019098	1019099	1019100	1019101	1019102	1019103	1019104	1019105
Order No.:	Client Sample Ref.:				120845	127530	120842	120843	127523	127527	120836	120837	125802
	Sample Location:				TP1	TP3	TP4	TP4	TP5	TP6	TP7	TP7	TP8
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.0	0.5	0.5	1.75	0.5	0.2	0.25	1.5	0.5
	Bottom Depth (m):				1.00	0.8	1.0	2.25	1.5	1.0	1.25	2.5	1.5
	Asbestos Lab:				LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10
Benzene	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Toluene	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Ethylbenzene	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
m & p-Xylene	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
o-Xylene	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Naphthalene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[j]fluoranthene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 22485 Charlestown Development Finglas Dublin

Client: IGSL	**Chemtest Job No.:**				20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428
Quotation No.: Q19-18246	**Chemtest Sample ID.:**				1019097	1019098	1019099	1019100	1019101	1019102	1019103	1019104	1019105
Order No.:	Client Sample Ref.:				120845	127530	120842	120843	127523	127527	120836	120837	125802
	Sample Location:				TP1	TP3	TP4	TP4	TP5	TP6	TP7	TP7	TP8
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.0	0.5	0.5	1.75	0.5	0.2	0.25	1.5	0.5
	Bottom Depth (m):				1.00	0.8	1.0	2.25	1.5	1.0	1.25	2.5	1.5
	Asbestos Lab:				LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Coronene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 52	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 90+101	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 118	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 153	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 138	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 180	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Results - Soil

Project: 22485 Charlestown Development Finglas Dublin

Client: IGSL	**Chemtest Job No.:**				20-15428	20-15428	20-15428	20-15428	20-15428
Quotation No.: Q19-18246	**Chemtest Sample ID.:**				1019106	1019107	1019108	1019109	1019110
Order No.:	Client Sample Ref.:				130012	130040	130025	135006	130049
	Sample Location:				BH9	BH4	BH11	BH19	BH22
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.0	2.0	2.0	2.0	2.0
	Bottom Depth (m):				1.00	2.00	2.00	2.00	2.00
	Asbestos Lab:								
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
ACM Type	U	2192		N/A					
Asbestos Identification	U	2192	%	0.001					
ACM Detection Stage	U	2192		N/A					
Moisture	N	2030	%	0.020	13	11	11	12	9.7
pH (2.5:1)	N	2010		4.0	[A] 7.6	[A] 7.9	[A] 8.0	[A] 8.0	[A] 8.2
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40					
Magnesium (Water Soluble)	N	2120	g/l	0.010	0.030	0.010	< 0.010	< 0.010	< 0.010
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.81	0.30	0.19	0.13	0.062
Total Sulphur	M	2175	%	0.010	[A] 0.23	[A] 0.087	[A] 0.070	[A] 0.045	[A] 0.047
Sulphur (Elemental)	M	2180	mg/kg	1.0					
Chloride (Water Soluble)	M	2220	g/l	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010	0.018	< 0.010	< 0.010	< 0.010	< 0.010
Cyanide (Total)	M	2300	mg/kg	0.50					
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50					
Ammonium (Water Soluble)	M	2120	g/l	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Sulphate (Acid Soluble)	M	2430	%	0.010	[A] 0.29	[A] 0.13	[A] 0.064	[A] 0.053	[A] 0.048
Arsenic	M	2450	mg/kg	1.0					
Barium	M	2450	mg/kg	10					
Cadmium	M	2450	mg/kg	0.10					
Chromium	M	2450	mg/kg	1.0					
Molybdenum	M	2450	mg/kg	2.0					
Antimony	N	2450	mg/kg	2.0					
Copper	M	2450	mg/kg	0.50					
Mercury	M	2450	mg/kg	0.10					
Nickel	M	2450	mg/kg	0.50					
Lead	M	2450	mg/kg	0.50					
Selenium	M	2450	mg/kg	0.20					
Zinc	M	2450	mg/kg	0.50					
Chromium (Trivalent)	N	2490	mg/kg	1.0					
Chromium (Hexavalent)	N	2490	mg/kg	0.50					
Total Organic Carbon	M	2625	%	0.20					
Mineral Oil	N	2670	mg/kg	10					
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0					
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0					
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0					
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0					

Results - Soil

Project: 22485 Charlestown Development Finglas Dublin

Client: IGSL	**Chemtest Job No.:**				20-15428	20-15428	20-15428	20-15428	20-15428
Quotation No.: Q19-18246	**Chemtest Sample ID.:**				1019106	1019107	1019108	1019109	1019110
Order No.:	Client Sample Ref.:				130012	130040	130025	135006	130049
	Sample Location:				BH9	BH4	BH11	BH19	BH22
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.0	2.0	2.0	2.0	2.0
	Bottom Depth (m):				1.00	2.00	2.00	2.00	2.00
	Asbestos Lab:								
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0					
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0					
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0					
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0					
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0					
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0					
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0					
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0					
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0					
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0					
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0					
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0					
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0					
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0					
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0					
Benzene	M	2760	µg/kg	1.0					
Toluene	M	2760	µg/kg	1.0					
Ethylbenzene	M	2760	µg/kg	1.0					
m & p-Xylene	M	2760	µg/kg	1.0					
o-Xylene	M	2760	µg/kg	1.0					
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0					
Naphthalene	M	2800	mg/kg	0.10					
Acenaphthylene	N	2800	mg/kg	0.10					
Acenaphthene	M	2800	mg/kg	0.10					
Fluorene	M	2800	mg/kg	0.10					
Phenanthrene	M	2800	mg/kg	0.10					
Benzo[j]fluoranthene	N	2800	mg/kg	0.10					
Anthracene	M	2800	mg/kg	0.10					
Fluoranthene	M	2800	mg/kg	0.10					
Pyrene	M	2800	mg/kg	0.10					
Benzo[a]anthracene	M	2800	mg/kg	0.10					
Chrysene	M	2800	mg/kg	0.10					
Benzo[b]fluoranthene	M	2800	mg/kg	0.10					
Benzo[k]fluoranthene	M	2800	mg/kg	0.10					
Benzo[a]pyrene	M	2800	mg/kg	0.10					
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10					
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10					

Results - Soil

Project: 22485 Charlestown Development Finglas Dublin

Client: IGSL				**Chemtest Job No.:**	20-15428	20-15428	20-15428	20-15428	20-15428
Quotation No.: Q19-18246				**Chemtest Sample ID.:**	1019106	1019107	1019108	1019109	1019110
Order No.:				Client Sample Ref.:	130012	130040	130025	135006	130049
				Sample Location:	BH9	BH4	BH11	BH19	BH22
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.0	2.0	2.0	2.0	2.0
				Bottom Depth (m):	1.00	2.00	2.00	2.00	2.00
				Asbestos Lab:					
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10					
Coronene	N	2800	mg/kg	0.10					
Total Of 17 PAH's	N	2800	mg/kg	2.0					
PCB 28	U	2815	mg/kg	0.010					
PCB 52	U	2815	mg/kg	0.010					
PCB 90+101	U	2815	mg/kg	0.010					
PCB 118	U	2815	mg/kg	0.010					
PCB 153	U	2815	mg/kg	0.010					
PCB 138	U	2815	mg/kg	0.010					
PCB 180	U	2815	mg/kg	0.010					
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10					
Total Phenols	M	2920	mg/kg	0.30					

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No: 20-15428
Chemtest Sample ID: 1019097
Sample Ref: 120845
Sample ID:
Sample Location: TP1
Top Depth(m): 1.0
Bottom Depth(m): 1.00
Sampling Date:

					Landfill Waste Acceptance Criteria Limits		
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	[A] 0.98	3	5	6
Loss On Ignition	2610	M	%	1.7	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.068	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0052	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	0.0013	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0038	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0014	< 0.50	4	50	200
Chloride	1220	U	6.7	67	800	15000	25000
Fluoride	1220	U	0.18	1.8	10	150	500
Sulphate	1220	U	3.7	37	1000	20000	50000
Total Dissolved Solids	1020	N	49	490	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	2.7	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	6.8

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-15428						
Chemtest Sample ID:	1019098						
Sample Ref:	127530						
Sample ID:							
Sample Location:	TP3						
Top Depth(m):	0.5						
Bottom Depth(m):	0.8						
Sampling Date:					**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 1.0	3	5	6
Loss On Ignition	2610	M	%	1.4	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.15	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0061	0.061	0.5	2	25
Barium	1450	U	0.017	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0016	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0074	0.074	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	0.0020	0.020	0.06	0.7	5
Selenium	1450	U	0.0020	0.020	0.1	0.5	7
Zinc	1450	U	0.0010	< 0.50	4	50	200
Chloride	1220	U	7.1	71	800	15000	25000
Fluoride	1220	U	0.37	3.7	10	150	500
Sulphate	1220	U	15	150	1000	20000	50000
Total Dissolved Solids	1020	N	57	560	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	2.7	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	14

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No:	20-15428				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1019099						
Sample Ref:	120842				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP4						
Top Depth(m):	0.5						
Bottom Depth(m):	1.0						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.28	3	5	6
Loss On Ignition	2610	M	%	2.2	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.080	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0039	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.013	0.13	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0011	< 0.50	4	50	200
Chloride	1220	U	6.1	61	800	15000	25000
Fluoride	1220	U	0.21	2.1	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	57	570	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.3	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.7

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No: 20-15428
Chemtest Sample ID: 1019100
Sample Ref: 120843
Sample ID:
Sample Location: TP4
Top Depth(m): 1.75
Bottom Depth(m): 2.25
Sampling Date:

					Landfill Waste Acceptance Criteria Limits		
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	[A] 0.41	3	5	6
Loss On Ignition	2610	M	%	2.5	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.097	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.021	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.025	0.25	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0026	0.026	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	6.4	64	800	15000	25000
Fluoride	1220	U	0.20	2.0	10	150	500
Sulphate	1220	U	2.8	28	1000	20000	50000
Total Dissolved Solids	1020	N	49	490	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	< 2.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	7.6

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No:	20-15428				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1019101						
Sample Ref:	127523				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP5						
Top Depth(m):	0.5						
Bottom Depth(m):	1.5						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.73	3	5	6
Loss On Ignition	2610	M	%	1.8	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		7.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.066	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.033	< 0.50	20	100	300
Cadmium	1450	U	0.00011	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.037	0.37	0.5	10	30
Nickel	1450	U	0.0031	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0061	0.061	0.1	0.5	7
Zinc	1450	U	0.020	< 0.50	4	50	200
Chloride	1220	U	6.4	64	800	15000	25000
Fluoride	1220	U	0.17	1.7	10	150	500
Sulphate	1220	U	670	6700	1000	20000	50000
Total Dissolved Solids	1020	N	720	7100	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	< 2.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	5.9

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No:	20-15428				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1019102						
Sample Ref:	127527				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP6						
Top Depth(m):	0.2						
Bottom Depth(m):	1.0						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 1.9	3	5	6
Loss On Ignition	2610	M	%	2.2	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		7.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.11	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.033	< 0.50	20	100	300
Cadmium	1450	U	0.00013	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.045	0.45	0.5	10	30
Nickel	1450	U	0.0029	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	0.0049	0.049	0.06	0.7	5
Selenium	1450	U	0.013	0.13	0.1	0.5	7
Zinc	1450	U	0.013	< 0.50	4	50	200
Chloride	1220	U	6.6	66	800	15000	25000
Fluoride	1220	U	0.21	2.1	10	150	500
Sulphate	1220	U	240	2400	1000	20000	50000
Total Dissolved Solids	1020	N	370	3700	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	< 2.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	5.6

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No:	20-15428				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1019103						
Sample Ref:	120836				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP7						
Top Depth(m):	0.25						
Bottom Depth(m):	1.25						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.49	3	5	6
Loss On Ignition	2610	M	%	1.7	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.0	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.080	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0026	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0058	0.058	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0012	< 0.50	4	50	200
Chloride	1220	U	6.4	64	800	15000	25000
Fluoride	1220	U	0.24	2.4	10	150	500
Sulphate	1220	U	1.8	18	1000	20000	50000
Total Dissolved Solids	1020	N	370	3700	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.4	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Chemtest
The right chemistry to deliver results

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No:	20-15428				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1019104						
Sample Ref:	120837				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP7						
Top Depth(m):	1.5						
Bottom Depth(m):	2.5						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.28	3	5	6
Loss On Ignition	2610	M	%	1.9	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.072	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0064	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.010	0.10	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0010	< 0.50	4	50	200
Chloride	1220	U	6.1	61	800	15000	25000
Fluoride	1220	U	0.22	2.2	10	150	500
Sulphate	1220	U	1.1	11	1000	20000	50000
Total Dissolved Solids	1020	N	85	840	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.1	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	11

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No:	20-15428				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1019105						
Sample Ref:	125802				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP8						
Top Depth(m):	0.5						
Bottom Depth(m):	1.5						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.71	3	5	6
Loss On Ignition	2610	M	%	2.6	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		7.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.077	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.026	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0012	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.017	0.17	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0027	0.027	0.1	0.5	7
Zinc	1450	U	0.0026	< 0.50	4	50	200
Chloride	1220	U	6.5	65	800	15000	25000
Fluoride	1220	U	0.32	3.2	10	150	500
Sulphate	1220	U	40	400	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.2	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.2

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1019097	120845		TP1		A	Amber Glass 250ml
1019097	120845		TP1		A	Plastic Tub 500g
1019098	127530		TP3		A	Amber Glass 250ml
1019098	127530		TP3		A	Plastic Tub 500g
1019099	120842		TP4		A	Amber Glass 250ml
1019099	120842		TP4		A	Plastic Tub 500g
1019100	120843		TP4		A	Amber Glass 250ml
1019100	120843		TP4		A	Plastic Tub 500g
1019101	127523		TP5		A	Amber Glass 250ml
1019101	127523		TP5		A	Plastic Tub 500g
1019102	127527		TP6		A	Amber Glass 250ml
1019102	127527		TP6		A	Plastic Tub 500g
1019103	120836		TP7		A	Amber Glass 250ml
1019103	120836		TP7		A	Plastic Tub 500g
1019104	120837		TP7		A	Amber Glass 250ml
1019104	120837		TP7		A	Plastic Tub 500g
1019105	125802		TP8		A	Amber Glass 250ml
1019105	125802		TP8		A	Plastic Tub 500g
1019106	130012		BH9		A	Amber Glass 250ml
1019106	130012		BH9		A	Plastic Tub 500g
1019107	130040		BH4		A	Amber Glass 250ml
1019107	130040		BH4		A	Plastic Tub 500g

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1019108	130025		BH11		A	Amber Glass 250ml
1019108	130025		BH11		A	Plastic Tub 500g
1019109	135006		BH19		A	Amber Glass 250ml
1019109	135006		BH19		A	Plastic Tub 500g
1019110	130049		BH22		A	Amber Glass 250ml
1019110	130049		BH22		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID

Test Methods

SOP	Title	Parameters included	Method summary
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Appendix 7 Site Plan

ExpertGPS

22485 Charlestown Place - Ground Investigation

Scale: 1 : 1100.

APPENDIX 6B – WASTE CHARACTERISATION ASSESSMENT

Unit 15
Melbourne Business Park
Model Farm Road
Cork T12 WR89

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ENVIRONMENTAL MANAGEMENT FOR BUSINESS

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Waste Characterisation Assessment

Charlestown Place

St Margaret's Road

Finglas

Dublin 11

Prepared For: -

IGSL Limited
Unit F
M7 Business Park
Naas
County Kildare

Prepared By: -

O' Callaghan Moran & Associates
Unit 15 Melbourne Business Park
Model Farm Road
Cork

February 2021

Project	Waste Characterisation: Charlestown Place, Finglas, Dublin 11			
Client	IGSL Limited			
Report No	Date	Status	Prepared By	Reviewed By
210010501	08/02/2021	Final	Austin Hynes MSc	Sean Moran B.Sc. MSc

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APPENDICES

1 INTRODUCTION

IGSL Limited requested O'Callaghan Moran & Associates (OCM) to undertake a waste characterisation assessment of samples of made ground and natural soils collected from seven (7 No.) trial pits installed at a site at Charlestown Place, Finglas, Dublin 11.

1.1 Methodology

IGSL provided a description of the ground conditions and collected samples of the soils from the trial pit locations. The samples were analysed at an accredited laboratory and the results formed the basis for a waste classification assessment, which was undertaken by OCM in accordance with the Environmental Protection Agency (EPA) Guidelines on the Classification of Waste (2015).

2 WASTE CLASSIFICATION ASSESSMENT

2.1 **Soil Sampling and Laboratory Analysis**

2.1.1 *Site Investigation*

The site investigation was completed by IGSL Limited in June 2020 and included the collection of nine composite samples from seven (7 No.) trial pits. The locations are shown on Figure 2.1. The trial pit logs are in Appendix 1.

The logs indicate that there is topsoil at the surface of TP1, TP3, TP4 and TP7. There is tarmacadam at the surface of TP5 and TP6. The surface of TP8 is comprised of Made Ground consisting of sandy GRAVEL with cobble content to 0.40 mbgl. The subsurface comprises MADE GROUND underlain by Natural Ground. The Made Ground is composed of firm to stiff, sandy gravelly CLAY with some cobble to circa. 1.50 mbgl. At TP1, the made ground consists of grey brown, clayey gravelly SAND with high cobble content to 1.90 mbgl. The Natural Ground is composed of a stiff to very stiff, sandy gravelly CLAY.

At TP3 the Made Ground consists of grey, clayey sandy GRAVEL with cobble content containing tarmacadam (>2%).

2.1.2 *Sample Collection*

IGSL collected the samples and placed them in laboratory prepared containers that were stored in coolers prior to shipment to Chemtest Ltd.

2.1.3 *Laboratory Analysis*

The samples were tested for Total Heavy Metals, Total Organic Carbon (TOC), BTEX (benzene, toluene, ethylbenzene and xylene) aliphatic and aromatic hydrocarbons, Polychlorinated Biphenyls (PCB), Mineral Oil, Polyaromatic Hydrocarbons (PAH) and asbestos. Leachate generated from the samples was tested for arsenic, barium, cadmium, chromium, copper, mercury, molybdenum, nickel, lead, antimony, selenium and zinc, chloride, fluoride, soluble sulphate, phenols, dissolved organic carbon (DOC), total dissolved solids (TDS).

This parameter range facilitates an assessment of the hazardous properties of the waste, and also allows a determination of appropriate off-site management options based on the Waste Acceptance Criteria (WAC) applied by landfill operators.

The analytical methods were all ISO/CEN approved and the method detection limits were below the relevant guidance/threshold values. The full laboratory report is in Appendix 2.

2.2 Waste Classification

The Haz Waste Online Classification Engine, developed in the UK by One Touch Data Ltd, was used to determine the waste classification. This tool was developed specifically to establish whether waste is non-hazardous or hazardous and has been approved for use in Ireland by the Environmental Protection Agency.

The full Waste Classification Report is in Appendix 3 and the results are summarised in Table 2.1.

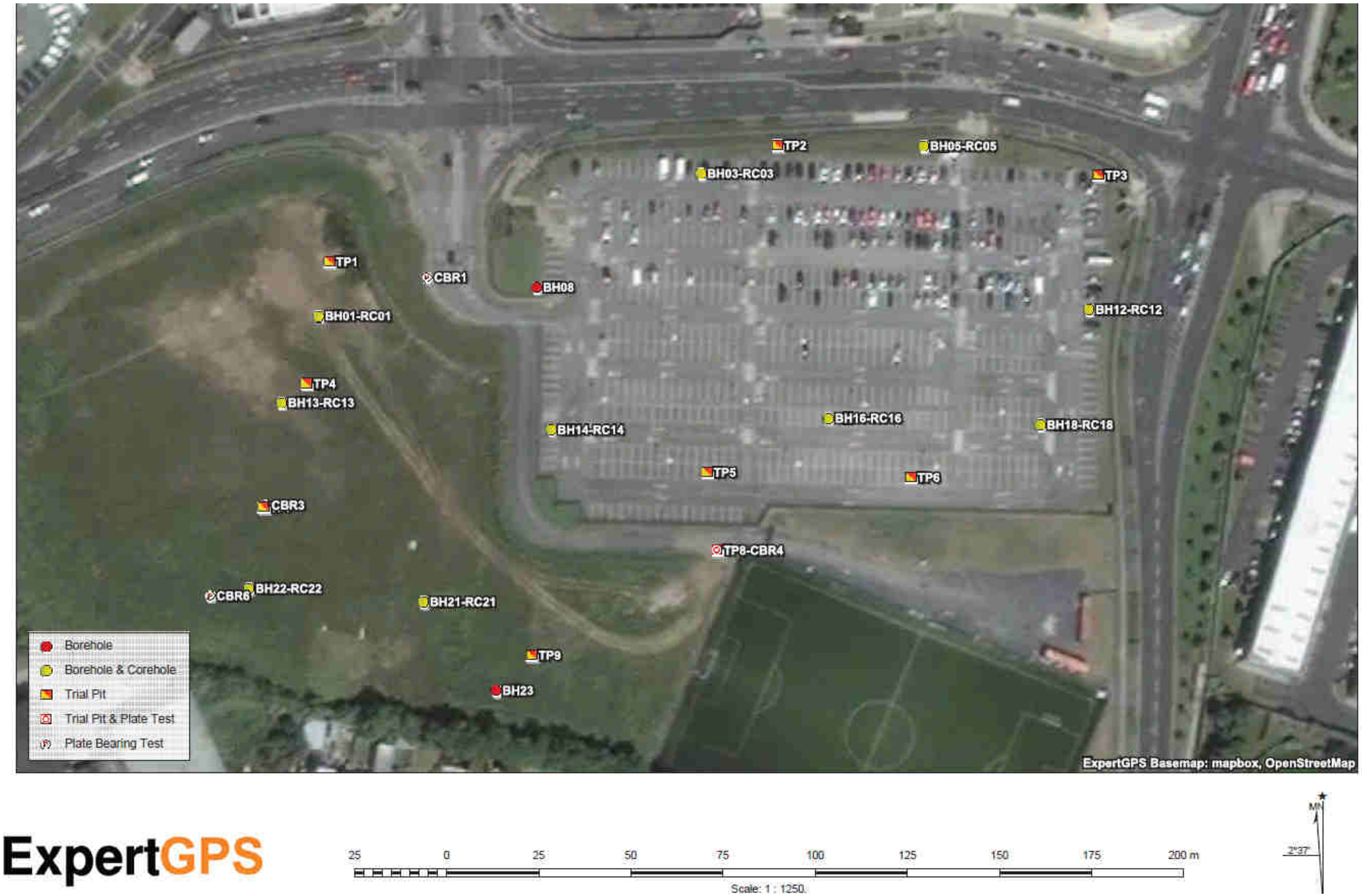
Table 2.1 Waste Classification

Sample No.	Depth (mbgl)	Classification	LoW Code
TP1	1.0	Non-Hazardous	17 05 04
TP3	0.5-0.8	Non-Hazardous	17 09 04
TP4	0.5-1.0	Non-Hazardous	17 05 04
TP4	1.75-2.25	Non-Hazardous	17 05 04
TP5	0.5-1.5	Non-Hazardous	17 05 04
TP6	0.2-1.0	Non-Hazardous	17 05 04
TP7	0.25-1.25	Non-Hazardous	17 05 04
TP7	1.5-2.5	Non-Hazardous	17 05 04
TP8	0.5-1.5	Non-Hazardous	17 05 04

Asbestos was not detected in any of the samples.

TP3 (0.5-0.8m) is classified as non-hazardous and the appropriate List of Waste Code is 17 09 04 (Construction and Demolition Waste other than those mentioned in 17 09 03*).

All other samples are classified as non-hazardous and the appropriate List of Waste Code is 17 05 04 (Soil and Stone other than those mentioned in 17 05 03*).



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Email: info@ocallaghanmoran.com

Title:

Figure 2.1 Sample Location Plan

Legend

This drawing is the property of O'Callaghan Moran & Associates and shall not be used, reproduced or disclosed to anyone without the prior written permission of O'Callaghan Moran & Associates and shall be returned upon request.

Client:

IGSL Limited

2.3 **Waste Acceptance Criteria**

The results of the WAC testing are presented in Table 2.2, which includes for comparative purposes the WAC for Inert, Non Hazardous and Hazardous Waste Landfills pursuant to Article 16 of the EU Landfill Directive 1999/31/EC Annex II which establishes criteria and procedures for the acceptance of waste at landfills.

The sample from TP5 (0.5-1.5m) exceeds the inert WAC for Total Dissolved Solids and the inert WAC increased limits for Sulphate. The sample from TP6 (0.2-1.0m) exceeds the inert WAC for Selenium and Sulphate.

Table 2.2 WAC Results

Parameter	Unit	TP1	TP3	TP4	TP4	TP5	TP6	TP7	TP7	TP8	Inert Landfill	Inert Landfill Increased Limits	Non-Hazardous Landfill	Hazardous Landfill
Depth	m	**1.0**	**0.5-0.8**	**0.5-1.0**	**1.75-2.25**	**0.5-1.5**	**0.2-1.0**	**0.25-1.25**	**1.5-2.5**	**0.5-1.5**				
Antimony	mg/kg	< 0.010	0.020	< 0.010	< 0.010	< 0.010	0.049	< 0.010	< 0.010	< 0.010	0.06	0.18	0.7	5
Arsenic	mg/kg	< 0.050	0.061	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.5	1.5	2	25
Barium	mg/kg	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	20	20	100	300
Cadmium	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.04	0.04	1	5
Chromium	mg/kg	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.5	0.5	10	70
Copper	mg/kg	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	2	2	50	100
Lead	mg/kg	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010	0.5	0.5	10	50
Molybdenum	mg/kg	< 0.050	0.074	0.13	0.25	0.37	0.45	0.058	0.10	0.17	0.5	1.5	10	30
Nickel	mg/kg	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050	0.4	0.4	10	40
Selenium	mg/kg	< 0.010	0.020	< 0.010	0.026	0.061	0.13	< 0.010	< 0.010	0.027	0.1	0.3	0.5	7
Zinc	mg/kg	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	4	4	50	200
Mercury	mg/kg	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	< 0.0050	0.01	0.01	0.2	2
Phenol	mg/kg	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	1	1	NE	NE
Fluoride	mg/kg	1.8	3.7	2.1	2.0	1.7	2.1	2.4	2.2	3.2	10	10	150	500
Chloride	mg/kg	67	71	61	64	64	66	64	61	65	800	2,400	15,000	25,000
Sulphate	mg/kg	37	150	< 10	28	6700	2400	18	11	400	1000*	3,000	20000*	50,000
DOC **	mg/kg	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	< 50	500	500	800	1,000
pH	pH units	8.1	8.4	8.1	8.1	7.8	7.9	8.0	8.1	7.9	NE	NE	NE	NE
TDS ***	mg/kg	490	560	570	490	7100	3700	3700	840	580	4,000	12,000	60,000	100,000
TOC	%	0.98	1	0.28	0.41	0.73	1.9	0.49	0.28	0.71	3	6	NE	6
Benzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Toluene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
Ethylbenzene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
m/p-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
o-Xylene	mg/kg	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001	6	6	NE	NE
PCB Total of 7	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	1	1	NE	NE
Total 17 PAH's	mg/kg	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	NE	100	NE	NE
Mineral Oil	mg/kg	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	500	500	NE	NE
Asbestos	% mass	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NAD	NE	NE	NE	NE

NAD denotes No Asbestos Detected

* denotes sulphate level exceeding inert waste limit may be considered as complying if the TDS value does not exceed 6,000mg/kg at L/S = 10l/kg.

** denotes a higher limit may be accepted provided the DOC values of 500mg/kg is achieved

*** denotes TDS. The values for TDS can be used alternative to sulphate and chloride.

PAH over 1mg/kg exceeds PAH limit at soil recovery site in Ireland

2.4 Waste Management Options

The EPA has released new guidance on waste acceptance criteria for a range of parameters for soil recovery facilities. This include;

- Metals in soil and stone (including As, Cd, Cr, Cu, Hg, Ni, Pb, Zn);
- Total organic carbon in soil and stone;
- Total BTEX (benzene, toluene, ethylbenzene, xylenes) in soil and stone;
- Mineral oil in soil and stone;
- Polycyclic aromatic hydrocarbons (PAHs) in soil and stone;
- Polychlorinated Biphenyls (PCBs) in soil and stone;
- Asbestos fibres in soil and stone.

This requires that soils from brownfield sites should not exceed the limits for the parameters specified in Table 2.3 and 2.4. For metals the limits have been specified for a range of soil types nationally separated into six domain areas.

Table 2.3 Soil Recovery Site Criteria

Parameter	Limit for Soil Recovery Sites
Total BTEX	0.05 mg/kg
Mineral oil	50 mg/kg
Total PAHs	1 mg/kg
Total PCBs	0.05 mg/kg

The soil and stone cannot be sent for recovery if the trigger levels for a particular domain are exceeded. There is however some flexibility in applying the limits. A derogation applies where up to three parameters can exceed the limit for a sample provided the concentration in the samples is no more than 1.5 times the trigger level. The site which is subject to this investigation is located in Domain 2 and the trigger levels are listed in Table 2.4.

Table 2.4

		Domain 2 Trigger Level	1.5 times Trigger Level
Arsenic	**mg/kg**	24.90	37.35
Cadmium	**mg/kg**	3.28	4.92
Chromium	**mg/kg**	50.30	75.45
Copper	**mg/kg**	63.50	95.25
Mercury	**mg/kg**	0.36	0.54
Nickel	**mg/kg**	61.90	92.85
Lead	**mg/kg**	86.10	129.15
Zinc	**mg/kg**	197.00	295.5

The sample from TP3 (0.5-0.8m) meets the inert WAC but do not meet the soil recovery criteria for metal concentrations. The sample exceeds the 1.5 times trigger level for Arsenic. The sample has been classified as B-1 suitable for recovery/disposal to inert waste landfill with increased limits.

Waste management options are summarised on Table 2.5. All are subject to approval of the waste management facility operators. Class A wastes are suitable for recovery at a licensed/permitted soils recovery facility. B-1 wastes are suitable for recovery/disposal to inert waste landfill with increased limits. Class C wastes are suitable for disposal to non-hazardous landfill.

Table 2.5 Waste Management Options

Sample No.	Depth (mbgl)	Classification	LoW Code	Category
TP1	1.0	Non-Hazardous	17 05 04	A
TP3	0.5-0.8	Non-Hazardous	17 09 04	B-1
TP4	0.5-1.0	Non-Hazardous	17 05 04	A
TP4	1.75-2.25	Non-Hazardous	17 05 04	A
TP5	0.5-1.5	Non-Hazardous	17 05 04	C
TP6	0.2-1.0	Non-Hazardous	17 05 04	B-1
TP7	0.25-1.25	Non-Hazardous	17 05 04	A
TP7	1.5-2.5	Non-Hazardous	17 05 04	A
TP8	0.5-1.5	Non-Hazardous	17 05 04	A

A	Classified as Non-Hazardous, 17 05 04 meets inert WAC
B-1	Classified as Non-Hazardous, 17 05 04 or 17 09 04 meets inert WAC increased limits
C	Classified as Non-Hazardous, 17 05 04 exceeds inert WAC and increased limits

3 CONCLUSIONS AND RECOMMENDATIONS

3.1 Conclusions

3.1.1 *Waste Classification*

Asbestos was not detected in any of the samples.

TP3 (0.5-0.8m) is classified as non-hazardous and the appropriate List of Waste Code is 17 09 04 (Construction and Demolition Waste other than those mentioned in 17 09 03*).

All other samples are classified as non-hazardous and the appropriate List of Waste Code is 17 05 04 (Soil and Stone other than those mentioned in 17 05 03*)

The recovery/disposal options are discussed in Section 2.4.

3.2 Recommendations

OCM recommend that a copy of this report be provided in full to the relevant waste management facilities to which the made ground and subsoils will be consigned to confirm its suitability for acceptance.

Appendix 1

Trial Pit Logs

TRIAL PIT RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**TRIAL PIT NO.**	**TP01**
		SHEET	Sheet 1 of 1
LOGGED BY	N. Scott	**DATE STARTED**	04/06/2020
CO-ORDINATES	712,630.75 E 740,491.43 N	**DATE COMPLETED**	04/06/2020
GROUND LEVEL (m)	69.82	**EXCAVATION METHOD**	7 tonne excavator
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Topsoil.		0.20	69.62						
1.0	Grey/ brown, gravelly silty clayey SAND with a high cobble content. Gravel is fine to coarse and angular to sub-rounded. Cobbles are angular to sub-rounded.		1.90	67.92		AA120845 AA120844	Env B	0.50-1.00 1.00		
2.0	Firm to stiff, grey/brown, slightly sandy gravelly silty CLAY. Gravel is fine to coarse and sub-angular to sub-rounded.		2.40	67.42		AA120846	B	2.00		
	Very stiff to hard, black, slightly sandy slightly gravelly silty CLAY. Gravel is fine to medium and sub-angular to sub-rounded.		3.00	66.82		AA120847	B	2.50		
3.0	Obstruction End of Trial Pit at 3.00m									
4.0										

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental sample 0.50-1.00m.

TRIAL PIT RECORD

REPORT NUMBER 22485

CONTRACT Charlestown , Finglas , Dublin 11

TRIAL PIT NO. TP02
SHEET Sheet 1 of 1

LOGGED BY N. Scott

CO-ORDINATES 712,751.54 E
740,525.93 N

GROUND LEVEL (m) 68.82

DATE STARTED 09/06/2020
DATE COMPLETED 09/06/2020

CLIENT Puddenhill Property Ltd.
ENGINEER POGA Consulting Engineers

EXCAVATION METHOD 3 tonne excavator

Depth scale	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Topsoil.		0.20	68.62						
	MADE GROUND consisting of very stiff to hard, very sandy very gravelly silty CLAY with a low cobble content containing concrete and red plastic.		0.60	68.22		AA127532 AA127531	Env B	0.20-0.60 0.50		
	Obstruction End of Trial Pit at 0.60m									
1.0										
2.0										
3.0										
4.0										

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental sample 0.20-0.60m

TRIAL PIT RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**TRIAL PIT NO.**	**TP03**
		SHEET	Sheet 1 of 1
LOGGED BY	N. Scott	**DATE STARTED**	09/06/2020
CO-ORDINATES	712,838.77 E 740,519.88 N	**DATE COMPLETED**	09/06/2020
GROUND LEVEL (m)	68.14	**EXCAVATION METHOD**	3 tonne excavator
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Topsoil.		0.20	67.94						
	MADE GROUND comprising grey, very sandy silty clayey GRAVEL with a medium cobble content containing tarmacadam. Gravel is fine to coarse and angular to sub-rounded. Cobbles are sub-rounded.		1.00	67.14		AA127530 AA127529	Env B	0.20-1.00 0.50		
1.0	Obstruction End of Trial Pit at 1.00m									
2.0										
3.0										
4.0										

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental sample 0.20-1.00m

TRIAL PIT RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**TRIAL PIT NO.**	**TP04**
		SHEET	Sheet 1 of 1
LOGGED BY	N. Scott	**DATE STARTED**	04/06/2020
CO-ORDINATES	712,625.44 E 740,458.24 N	**DATE COMPLETED**	04/06/2020
GROUND LEVEL (m)	69.85	**EXCAVATION METHOD**	7 tonne excavator
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Topsoil.		0.40	69.45						
	Firm to stiff, brown, sandy gravelly silty CLAY with a low cobble content. Gravel is fine to coarse and sub-angular to sub-rounded. Cobbles are sub-angular to sub-rounded.		1.60	68.25		AA120842	Env	0.50-1.50		
1.0						AA120841	B	1.00		
	Firm to stiff, brown/grey, slightly sandy gravelly silty CLAY with a low cobble content. Gravel is fine to coarse and sub-angular to sub-rounded. Cobbles are sub-angular to sub-rounded.		2.50	67.35		AA121709	Env	1.75-2.50		
2.0						AA120843	B	2.00		
	Obstruction End of Trial Pit at 2.50m									
3.0										
4.0										

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental samples 0.50-1.50m and 1.75-2.50m.

TRIAL PIT RECORD

REPORT NUMBER	22485		
CONTRACT	Charlestown , Finglas , Dublin 11	**TRIAL PIT NO.**	**TP05**
		SHEET	Sheet 1 of 1
LOGGED BY	N. Scott	**DATE STARTED**	09/06/2020
CO-ORDINATES	712,734.55 E 740,436.71 N	**DATE COMPLETED**	09/06/2020
GROUND LEVEL (m)	68.65	**EXCAVATION METHOD**	3 tonne excavator
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND consisting of tarmacadam.		0.20	68.45						
	Stiff to very stiff, black, slightly sandy very gravelly silty CLAY with a high cobble content. Gravel is fine to coarse and angular to sub-angular. Cobbles are sub-angular. (Possibly made ground)		0.90	67.75		AA127522 AA127523	B Env	0.50 0.50-1.50		
1.0	Firm, brown, sandy gravelly silty CLAY. Gravel is fine to coarse and sub-angular to sub-rounded.		1.50	67.15		AA127524	B	1.00		
	Firm, brown, gravelly silty very sandy CLAY. Gravel is fine to coarse and angular to sub-rounded.		2.00	66.65		AA127525	B	1.50		
2.0	Obstruction End of Trial Pit at 2.00m									
3.0										
4.0										

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental sample 0.50-1.50m.

TRIAL PIT RECORD

REPORT NUMBER 22485

CONTRACT	Charlestown , Finglas , Dublin 11	**TRIAL PIT NO.**	**TP06**
		SHEET	Sheet 1 of 1
LOGGED BY	N. Scott	**CO-ORDINATES**	712,789.88 E 740,436.64 N
CLIENT	Puddenhill Property Ltd.	**GROUND LEVEL (m)**	68.18
ENGINEER	POGA Consulting Engineers		
DATE STARTED	09/06/2020	**DATE COMPLETED**	09/06/2020
EXCAVATION METHOD	3 tonne excavator		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND consisting of tarmacadam.									
	Firm, black, slightly sandy very gravelly silty CLAY with a high cobble content. Gravel is fine to coarse and angular to sub-angular. Cobbles are sub-angular. (Possibly made ground)		0.20	67.98		AA127527 AA127526	Env B	0.20-1.00 0.50		
1.0 2.0	Stiff, grey/brown, slightly sandy gravelly silty CLAY. Gravel is fine to coarse and sub-angular to sub-rounded.		0.80	67.38		AA127528	B	1.50		
3.0 4.0	Obstruction End of Trial Pit at 2.50m		2.50	65.68						

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental sample 0.20-1.00m.

TRIAL PIT RECORD

REPORT NUMBER	22485		
CONTRACT	Charlestown , Finglas , Dublin 11	**TRIAL PIT NO.**	**TP07**
		SHEET	Sheet 1 of 1
LOGGED BY	N. Scott	**DATE STARTED**	04/06/2020
CO-ORDINATES	712,614.39 E 740,424.35 N	**DATE COMPLETED**	04/06/2020
GROUND LEVEL (m)	69.05	**EXCAVATION METHOD**	7 tonne excavator
CLIENT	Puddenhill Property Ltd.		
ENGINEER	POGA Consulting Engineers		

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	Topsoil.		0.40	68.65		AA120839	Env	0.25-1.25		
1.0	Firm , brown, sandy gravelly silty CLAY with a low cobble content. Gravel is fine to coarse and sub-angular to sub-rounded. Cobbles are sub-angular to sub-rounded.		1.50	67.55		AA120838	B	1.00		
2.0	Very stiff to hard,black/grey, very sandy gravelly silty CLAY. Gravel is fine to coarse and angular to sub-rounded.		2.50	66.55		AA121710 AA120840	Env B	1.50-2.50 2.00		
3.0 4.0	Obstruction End of Trial Pit at 2.50m									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental sample 0.25-1.25m

TRIAL PIT RECORD

REPORT NUMBER
22485

CONTRACT Charlestown , Finglas , Dublin 11

TRIAL PIT NO. TP08
SHEET Sheet 1 of 1

LOGGED BY N. Scott

CO-ORDINATES 712,737.79 E
740,415.67 N

GROUND LEVEL (m) 68.16

DATE STARTED 04/06/2020
DATE COMPLETED 04/06/2020

CLIENT Puddenhill Property Ltd.
ENGINEER POGA Consulting Engineers

EXCAVATION METHOD 7 tonne excavator

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples Sample Ref	Samples Type	Samples Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	MADE GROUND consisting of a sandy GRAVEL with a medium cobble content. Gravel is fine to coarse and angular to sub-angular.		0.40	67.76						
1.0	MADE GROUND comprising firm, grey/ brown, sandy gravelly silty CLAY with a low cobble content. Gravel is fine to coarse and sub-angular to sub-rounded. Cobbles are sub-angular to sub-rounded.		1.80	66.36		AA125802 AA125803	B Env	1.00 1.00		
2.0 3.0 4.0	400 mm diameter concrete pipe (crown at 1.8m) End of Trial Pit at 1.80m									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
Erected Covid 19 Safe Working Area.CAT Scanned Location . Composite Environmental sample 0.50-1.50m. Crown of concrete pipe (400 mm diameter) noted in corner of pit at 1.8m.

Appendix 2

Laboratory Reports

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING 2183

mCERTS THE ENVIRONMENT AGENCY'S MONITORING CERTIFICATION SCHEME

Final Report

Report No.:	20-15428-1		
Initial Date of Issue:	29-Jun-2020		
Client	IGSL		
Client Address:	M7 Business Park Naas County Kildare Ireland		
Contact(s):	Darren Keogh		
Project	22485 Charlestown Development Finglas Dublin		
Quotation No.:	Q19-18246	**Date Received:**	18-Jun-2020
Order No.:		**Date Instructed:**	19-Jun-2020
No. of Samples:	14		
Turnaround (Wkdays):	7	**Results Due:**	29-Jun-2020
Date Approved:	29-Jun-2020		
Approved By:			
Details:	Glynn Harvey, Technical Manager		

Results - Leachate

Project: 22485 Charlestown Development Finglas Dublin

Client: IGSL	**Chemtest Job No.:**					20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428
Quotation No.: Q19-18246	**Chemtest Sample ID.:**					1019097	1019098	1019099	1019100	1019101	1019102	1019103	1019104	1019105
Order No.:	Client Sample Ref.:					120845	127530	120842	120843	127523	127527	120836	120837	125802
	Sample Location:					TP1	TP3	TP4	TP4	TP5	TP6	TP7	TP7	TP8
	Sample Type:					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):					1.0	0.5	0.5	1.75	0.5	0.2	0.25	1.5	0.5
	Bottom Depth (m):					1.00	0.8	1.0	2.25	1.5	1.0	1.25	2.5	1.5
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**									
pH	U	1010	10:1		N/A	8.8	9.3	8.8	9.0	8.2	8.2	8.2	8.8	8.9
Ammonium	U	1220	10:1	mg/l	0.050	0.070	< 0.050	< 0.050	< 0.050	0.10	0.10	< 0.050	< 0.050	0.050
Ammonium	N	1220	10:1	mg/kg	0.10	0.94	0.90	0.58	0.62	1.1	1.1	0.44	0.44	0.71
Boron (Dissolved)	U	1450	10:1	µg/l	20	< 20	< 20	23	< 20	< 20	< 20	< 20	< 20	< 20
Boron (Dissolved)	U	1450	10:1	mg/kg	0.20	< 0.20	< 0.20	0.23	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20

Results - Soil

Project: 22485 Charlestown Development Finglas Dublin

Client: IGSL	**Chemtest Job No.:**				20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428
Quotation No.: Q19-18246	**Chemtest Sample ID.:**				1019097	1019098	1019099	1019100	1019101	1019102	1019103	1019104	1019105
Order No.:	Client Sample Ref.:				120845	127530	120842	120843	127523	127527	120836	120837	125802
	Sample Location:				TP1	TP3	TP4	TP4	TP5	TP6	TP7	TP7	TP8
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.0	0.5	0.5	1.75	0.5	0.2	0.25	1.5	0.5
	Bottom Depth (m):				1.00	0.8	1.0	2.25	1.5	1.0	1.25	2.5	1.5
	Asbestos Lab:				LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
ACM Type	U	2192		N/A	-	-	-	-	-	-	-	-	-
Asbestos Identification	U	2192	%	0.001	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected	No Asbestos Detected
ACM Detection Stage	U	2192		N/A	-	-	-	-	-	-	-	-	-
Moisture	N	2030	%	0.020	6.8	14	9.7	7.6	5.9	5.6	12	11	9.2
pH (2.5:1)	N	2010		4.0									
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.40	0.41	< 0.40	< 0.40	0.46	0.43	0.44	< 0.40	0.52
Magnesium (Water Soluble)	N	2120	g/l	0.010									
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010									
Total Sulphur	M	2175	%	0.010									
Sulphur (Elemental)	M	2180	mg/kg	1.0	[A] 4.2	[A] 8.7	[A] 1.5	[A] < 1.0	[A] 22	[A] 27	[A] 1.5	[A] < 1.0	[A] 2.0
Chloride (Water Soluble)	M	2220	g/l	0.010									
Nitrate (Water Soluble)	N	2220	g/l	0.010									
Cyanide (Total)	M	2300	mg/kg	0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50	[A] < 0.50
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 5.1	[A] 9.1	[A] 7.4	[A] 6.9	[A] 8.0	[A] 5.1	[A] 4.4	[A] 6.1	[A] 2.7
Ammonium (Water Soluble)	M	2120	g/l	0.01									
Sulphate (Acid Soluble)	M	2430	%	0.010	[A] 0.048	[A] 0.055	[A] 0.017	[A] 0.026	[A] 0.59	[A] 0.24	[A] 0.040	[A] 0.028	[A] 0.073
Arsenic	M	2450	mg/kg	1.0	28	53	26	24	47	23	25	26	25
Barium	M	2450	mg/kg	10	40	84	47	65	40	34	51	87	80
Cadmium	M	2450	mg/kg	0.10	1.7	0.46	1.9	1.8	1.0	0.63	1.9	2.2	1.6
Chromium	M	2450	mg/kg	1.0	13	12	15	17	8.6	6.2	15	22	16
Molybdenum	M	2450	mg/kg	2.0	2.9	< 2.0	4.1	4.4	8.2	6.2	3.6	4.3	4.0
Antimony	N	2450	mg/kg	2.0	< 2.0	3.0	< 2.0	< 2.0	4.3	2.9	< 2.0	< 2.0	< 2.0
Copper	M	2450	mg/kg	0.50	20	17	26	24	23	18	32	32	25
Mercury	M	2450	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	0.11	< 0.10	< 0.10
Nickel	M	2450	mg/kg	0.50	36	22	50	50	44	34	44	65	41
Lead	M	2450	mg/kg	0.50	16	26	19	18	21	19	42	27	29
Selenium	M	2450	mg/kg	0.20	< 0.20	< 0.20	3.8	3.3	5.2	2.9	0.38	0.70	0.73
Zinc	M	2450	mg/kg	0.50	63	52	67	64	37	29	76	87	65
Chromium (Trivalent)	N	2490	mg/kg	1.0	13	12	15	17	8.6	6.2	15	22	16
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50
Total Organic Carbon	M	2625	%	0.20	[A] 0.98	[A] 1.0	[A] 0.28	[A] 0.41	[A] 0.73	[A] 1.9	[A] 0.49	[A] 0.28	[A] 0.71
Mineral Oil	N	2670	mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10	< 10
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0

Results - Soil

Project: 22485 Charlestown Development Finglas Dublin

Client: IGSL	**Chemtest Job No.:**				20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428
Quotation No.: Q19-18246	**Chemtest Sample ID.:**				1019097	1019098	1019099	1019100	1019101	1019102	1019103	1019104	1019105
Order No.:	Client Sample Ref.:				120845	127530	120842	120843	127523	127527	120836	120837	125802
	Sample Location:				TP1	TP3	TP4	TP4	TP5	TP6	TP7	TP7	TP8
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.0	0.5	0.5	1.75	0.5	0.2	0.25	1.5	0.5
	Bottom Depth (m):				1.00	0.8	1.0	2.25	1.5	1.0	1.25	2.5	1.5
	Asbestos Lab:				LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0	[A] < 5.0
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10	[A] < 10
Benzene	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Toluene	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Ethylbenzene	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
m & p-Xylene	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
o-Xylene	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
Naphthalene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[j]fluoranthene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10

Results - Soil

Project: 22485 Charlestown Development Finglas Dublin

Client: IGSL	**Chemtest Job No.:**				20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428	20-15428
Quotation No.: Q19-18246	**Chemtest Sample ID.:**				1019097	1019098	1019099	1019100	1019101	1019102	1019103	1019104	1019105
Order No.:	Client Sample Ref.:				120845	127530	120842	120843	127523	127527	120836	120837	125802
	Sample Location:				TP1	TP3	TP4	TP4	TP5	TP6	TP7	TP7	TP8
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.0	0.5	0.5	1.75	0.5	0.2	0.25	1.5	0.5
	Bottom Depth (m):				1.00	0.8	1.0	2.25	1.5	1.0	1.25	2.5	1.5
	Asbestos Lab:				LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL	LIVERPOOL
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Coronene	N	2800	mg/kg	0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0
PCB 28	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 52	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 90+101	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 118	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 153	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 138	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
PCB 180	U	2815	mg/kg	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10	[A] < 0.10
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30

Results - Soil

Project: 22485 Charlestown Development Finglas Dublin

Client: IGSL	**Chemtest Job No.:**				20-15428	20-15428	20-15428	20-15428	20-15428
Quotation No.: Q19-18246	**Chemtest Sample ID.:**				1019106	1019107	1019108	1019109	1019110
Order No.:	Client Sample Ref.:				130012	130040	130025	135006	130049
	Sample Location:				BH9	BH4	BH11	BH19	BH22
	Sample Type:				SOIL	SOIL	SOIL	SOIL	SOIL
	Top Depth (m):				1.0	2.0	2.0	2.0	2.0
	Bottom Depth (m):				1.00	2.00	2.00	2.00	2.00
	Asbestos Lab:								
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
ACM Type	U	2192		N/A					
Asbestos Identification	U	2192	%	0.001					
ACM Detection Stage	U	2192		N/A					
Moisture	N	2030	%	0.020	13	11	11	12	9.7
pH (2.5:1)	N	2010		4.0	[A] 7.6	[A] 7.9	[A] 8.0	[A] 8.0	[A] 8.2
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40					
Magnesium (Water Soluble)	N	2120	g/l	0.010	0.030	0.010	< 0.010	< 0.010	< 0.010
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	0.81	0.30	0.19	0.13	0.062
Total Sulphur	M	2175	%	0.010	[A] 0.23	[A] 0.087	[A] 0.070	[A] 0.045	[A] 0.047
Sulphur (Elemental)	M	2180	mg/kg	1.0					
Chloride (Water Soluble)	M	2220	g/l	0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010	[A] < 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010	0.018	< 0.010	< 0.010	< 0.010	< 0.010
Cyanide (Total)	M	2300	mg/kg	0.50					
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50					
Ammonium (Water Soluble)	M	2120	g/l	0.01	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Sulphate (Acid Soluble)	M	2430	%	0.010	[A] 0.29	[A] 0.13	[A] 0.064	[A] 0.053	[A] 0.048
Arsenic	M	2450	mg/kg	1.0					
Barium	M	2450	mg/kg	10					
Cadmium	M	2450	mg/kg	0.10					
Chromium	M	2450	mg/kg	1.0					
Molybdenum	M	2450	mg/kg	2.0					
Antimony	N	2450	mg/kg	2.0					
Copper	M	2450	mg/kg	0.50					
Mercury	M	2450	mg/kg	0.10					
Nickel	M	2450	mg/kg	0.50					
Lead	M	2450	mg/kg	0.50					
Selenium	M	2450	mg/kg	0.20					
Zinc	M	2450	mg/kg	0.50					
Chromium (Trivalent)	N	2490	mg/kg	1.0					
Chromium (Hexavalent)	N	2490	mg/kg	0.50					
Total Organic Carbon	M	2625	%	0.20					
Mineral Oil	N	2670	mg/kg	10					
Aliphatic TPH >C5-C6	N	2680	mg/kg	1.0					
Aliphatic TPH >C6-C8	N	2680	mg/kg	1.0					
Aliphatic TPH >C8-C10	M	2680	mg/kg	1.0					
Aliphatic TPH >C10-C12	M	2680	mg/kg	1.0					

Results - Soil

Project: 22485 Charlestown Development Finglas Dublin

Client: IGSL				**Chemtest Job No.:**	20-15428	20-15428	20-15428	20-15428	20-15428
Quotation No.: Q19-18246				**Chemtest Sample ID.:**	1019106	1019107	1019108	1019109	1019110
Order No.:				Client Sample Ref.:	130012	130040	130025	135006	130049
				Sample Location:	BH9	BH4	BH11	BH19	BH22
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.0	2.0	2.0	2.0	2.0
				Bottom Depth (m):	1.00	2.00	2.00	2.00	2.00
				Asbestos Lab:					
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Aliphatic TPH >C12-C16	M	2680	mg/kg	1.0					
Aliphatic TPH >C16-C21	M	2680	mg/kg	1.0					
Aliphatic TPH >C21-C35	M	2680	mg/kg	1.0					
Aliphatic TPH >C35-C44	N	2680	mg/kg	1.0					
Total Aliphatic Hydrocarbons	N	2680	mg/kg	5.0					
Aromatic TPH >C5-C7	N	2680	mg/kg	1.0					
Aromatic TPH >C7-C8	N	2680	mg/kg	1.0					
Aromatic TPH >C8-C10	M	2680	mg/kg	1.0					
Aromatic TPH >C10-C12	M	2680	mg/kg	1.0					
Aromatic TPH >C12-C16	M	2680	mg/kg	1.0					
Aromatic TPH >C16-C21	U	2680	mg/kg	1.0					
Aromatic TPH >C21-C35	M	2680	mg/kg	1.0					
Aromatic TPH >C35-C44	N	2680	mg/kg	1.0					
Total Aromatic Hydrocarbons	N	2680	mg/kg	5.0					
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0					
Benzene	M	2760	µg/kg	1.0					
Toluene	M	2760	µg/kg	1.0					
Ethylbenzene	M	2760	µg/kg	1.0					
m & p-Xylene	M	2760	µg/kg	1.0					
o-Xylene	M	2760	µg/kg	1.0					
Methyl Tert-Butyl Ether	M	2760	µg/kg	1.0					
Naphthalene	M	2800	mg/kg	0.10					
Acenaphthylene	N	2800	mg/kg	0.10					
Acenaphthene	M	2800	mg/kg	0.10					
Fluorene	M	2800	mg/kg	0.10					
Phenanthrene	M	2800	mg/kg	0.10					
Benzo[j]fluoranthene	N	2800	mg/kg	0.10					
Anthracene	M	2800	mg/kg	0.10					
Fluoranthene	M	2800	mg/kg	0.10					
Pyrene	M	2800	mg/kg	0.10					
Benzo[a]anthracene	M	2800	mg/kg	0.10					
Chrysene	M	2800	mg/kg	0.10					
Benzo[b]fluoranthene	M	2800	mg/kg	0.10					
Benzo[k]fluoranthene	M	2800	mg/kg	0.10					
Benzo[a]pyrene	M	2800	mg/kg	0.10					
Indeno(1,2,3-c,d)Pyrene	M	2800	mg/kg	0.10					
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10					

Results - Soil

Project: 22485 Charlestown Development Finglas Dublin

Client: IGSL				**Chemtest Job No.:**	20-15428	20-15428	20-15428	20-15428	20-15428
Quotation No.: Q19-18246				**Chemtest Sample ID.:**	1019106	1019107	1019108	1019109	1019110
Order No.:				Client Sample Ref.:	130012	130040	130025	135006	130049
				Sample Location:	BH9	BH4	BH11	BH19	BH22
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.0	2.0	2.0	2.0	2.0
				Bottom Depth (m):	1.00	2.00	2.00	2.00	2.00
				Asbestos Lab:					
Determinand	**Accred.**	**SOP**	**Units**	**LOD**					
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10					
Coronene	N	2800	mg/kg	0.10					
Total Of 17 PAH's	N	2800	mg/kg	2.0					
PCB 28	U	2815	mg/kg	0.010					
PCB 52	U	2815	mg/kg	0.010					
PCB 90+101	U	2815	mg/kg	0.010					
PCB 118	U	2815	mg/kg	0.010					
PCB 153	U	2815	mg/kg	0.010					
PCB 138	U	2815	mg/kg	0.010					
PCB 180	U	2815	mg/kg	0.010					
Total PCBs (7 Congeners)	U	2815	mg/kg	0.10					
Total Phenols	M	2920	mg/kg	0.30					

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No:	20-15428
Chemtest Sample ID:	1019097
Sample Ref:	120845
Sample ID:	
Sample Location:	TP1
Top Depth(m):	1.0
Bottom Depth(m):	1.00
Sampling Date:	

					Landfill Waste Acceptance Criteria Limits		
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	[A] 0.98	3	5	6
Loss On Ignition	2610	M	%	1.7	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.068	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0052	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	0.0013	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0038	< 0.050	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0014	< 0.50	4	50	200
Chloride	1220	U	6.7	67	800	15000	25000
Fluoride	1220	U	0.18	1.8	10	150	500
Sulphate	1220	U	3.7	37	1000	20000	50000
Total Dissolved Solids	1020	N	49	490	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	2.7	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	6.8

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No:	20-15428
Chemtest Sample ID:	1019098
Sample Ref:	127530
Sample ID:	
Sample Location:	TP3
Top Depth(m):	0.5
Bottom Depth(m):	0.8
Sampling Date:	

					Landfill Waste Acceptance Criteria Limits		
Determinand	**SOP**	**Accred.**	**Units**		**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	[A] 1.0	3	5	6
Loss On Ignition	2610	M	%	1.4	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.4	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.15	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	0.0061	0.061	0.5	2	25
Barium	1450	U	0.017	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0016	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0074	0.074	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	0.0020	0.020	0.06	0.7	5
Selenium	1450	U	0.0020	0.020	0.1	0.5	7
Zinc	1450	U	0.0010	< 0.50	4	50	200
Chloride	1220	U	7.1	71	800	15000	25000
Fluoride	1220	U	0.37	3.7	10	150	500
Sulphate	1220	U	15	150	1000	20000	50000
Total Dissolved Solids	1020	N	57	560	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	2.7	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	14

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No:	20-15428				**Landflll Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1019099						
Sample Ref:	120842				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP4						
Top Depth(m):	0.5						
Bottom Depth(m):	1.0						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.28	3	5	6
Loss On Ignition	2610	M	%	2.2	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.080	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0039	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.013	0.13	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0011	< 0.50	4	50	200
Chloride	1220	U	6.1	61	800	15000	25000
Fluoride	1220	U	0.21	2.1	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	57	570	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.3	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.7

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No: 20-15428
Chemtest Sample ID: 1019100
Sample Ref: 120843
Sample ID:
Sample Location: TP4
Top Depth(m): 1.75
Bottom Depth(m): 2.25
Sampling Date:

Determinand	**SOP**	**Accred.**	**Units**		**Landfilll Waste Acceptance Criteria Limits** **Inert Waste Landfill**	**Landfilll Waste Acceptance Criteria Limits** **Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Landfilll Waste Acceptance Criteria Limits** **Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	[A] 0.41	3	5	6
Loss On Ignition	2610	M	%	2.5	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.097	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.021	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.025	0.25	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0026	0.026	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	6.4	64	800	15000	25000
Fluoride	1220	U	0.20	2.0	10	150	500
Sulphate	1220	U	2.8	28	1000	20000	50000
Total Dissolved Solids	1020	N	49	490	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	< 2.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	7.6

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Chemtest
The right chemistry to deliver results

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No:	20-15428				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1019101						
Sample Ref:	127523				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP5						
Top Depth(m):	0.5						
Bottom Depth(m):	1.5						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.73	3	5	6
Loss On Ignition	2610	M	%	1.8	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		7.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.066	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.033	< 0.50	20	100	300
Cadmium	1450	U	0.00011	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.037	0.37	0.5	10	30
Nickel	1450	U	0.0031	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0061	0.061	0.1	0.5	7
Zinc	1450	U	0.020	< 0.50	4	50	200
Chloride	1220	U	6.4	64	800	15000	25000
Fluoride	1220	U	0.17	1.7	10	150	500
Sulphate	1220	U	670	6700	1000	20000	50000
Total Dissolved Solids	1020	N	720	7100	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	< 2.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	5.9

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No:	20-15428
Chemtest Sample ID:	1019102
Sample Ref:	127527
Sample ID:	
Sample Location:	TP6
Top Depth(m):	0.2
Bottom Depth(m):	1.0
Sampling Date:	

Determinand	**SOP**	**Accred.**	**Units**		**Landfill Waste Acceptance Criteria Limits**		
					Inert Waste Landfill	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Total Organic Carbon	2625	M	%	[A] 1.9	3	5	6
Loss On Ignition	2610	M	%	2.2	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		7.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.11	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.033	< 0.50	20	100	300
Cadmium	1450	U	0.00013	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.045	0.45	0.5	10	30
Nickel	1450	U	0.0029	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	0.0049	0.049	0.06	0.7	5
Selenium	1450	U	0.013	0.13	0.1	0.5	7
Zinc	1450	U	0.013	< 0.50	4	50	200
Chloride	1220	U	6.6	66	800	15000	25000
Fluoride	1220	U	0.21	2.1	10	150	500
Sulphate	1220	U	240	2400	1000	20000	50000
Total Dissolved Solids	1020	N	370	3700	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	< 2.5	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	5.6

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No:	20-15428				**Landfilll Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1019103						
Sample Ref:	120836				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP7						
Top Depth(m):	0.25						
Bottom Depth(m):	1.25						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.49	3	5	6
Loss On Ignition	2610	M	%	1.7	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.0	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.080	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0026	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0058	0.058	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0012	< 0.50	4	50	200
Chloride	1220	U	6.4	64	800	15000	25000
Fluoride	1220	U	0.24	2.4	10	150	500
Sulphate	1220	U	1.8	18	1000	20000	50000
Total Dissolved Solids	1020	N	370	3700	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.4	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	12

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No:	20-15428				**Landfill Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1019104						
Sample Ref:	120837				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP7						
Top Depth(m):	1.5						
Bottom Depth(m):	2.5						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.28	3	5	6
Loss On Ignition	2610	M	%	1.9	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		8.1	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.072	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.0064	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.010	0.10	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	< 0.0010	< 0.010	0.1	0.5	7
Zinc	1450	U	0.0010	< 0.50	4	50	200
Chloride	1220	U	6.1	61	800	15000	25000
Fluoride	1220	U	0.22	2.2	10	150	500
Sulphate	1220	U	1.1	11	1000	20000	50000
Total Dissolved Solids	1020	N	85	840	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.1	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	11

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 22485 Charlestown Development Finglas Dublin

Chemtest Job No:	20-15428				**Landflll Waste Acceptance Criteria Limits**		
Chemtest Sample ID:	1019105						
Sample Ref:	125802				**Inert Waste Landfill**	**Stable, Non-reactive hazardous waste in non-hazardous Landfill**	**Hazardous Waste Landfill**
Sample ID:							
Sample Location:	TP8						
Top Depth(m):	0.5						
Bottom Depth(m):	1.5						
Sampling Date:							
Determinand	**SOP**	**Accred.**	**Units**				
Total Organic Carbon	2625	M	%	[A] 0.71	3	5	6
Loss On Ignition	2610	M	%	2.6	--	--	10
Total BTEX	2760	M	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 Congeners)	2815	M	mg/kg	< 0.10	1	--	--
TPH Total WAC (Mineral Oil)	2670	M	mg/kg	[A] < 10	500	--	--
Total (Of 17) PAH's	2800	N	mg/kg	< 2.0	100	--	--
pH	2010	M		7.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.077	--	To evaluate	To evaluate
Eluate Analysis			**10:1 Eluate mg/l**	**10:1 Eluate mg/kg**	**Limit values for compliance leaching test using BS EN 12457 at L/S 10 l/kg**		
Arsenic	1450	U	< 0.0010	< 0.050	0.5	2	25
Barium	1450	U	0.026	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	< 0.0010	< 0.050	0.5	10	70
Copper	1450	U	0.0012	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.017	0.17	0.5	10	30
Nickel	1450	U	< 0.0010	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	< 0.0010	< 0.010	0.06	0.7	5
Selenium	1450	U	0.0027	0.027	0.1	0.5	7
Zinc	1450	U	0.0026	< 0.50	4	50	200
Chloride	1220	U	6.5	65	800	15000	25000
Fluoride	1220	U	0.32	3.2	10	150	500
Sulphate	1220	U	40	400	1000	20000	50000
Total Dissolved Solids	1020	N	59	580	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.2	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.2

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1019097	120845		TP1		A	Amber Glass 250ml
1019097	120845		TP1		A	Plastic Tub 500g
1019098	127530		TP3		A	Amber Glass 250ml
1019098	127530		TP3		A	Plastic Tub 500g
1019099	120842		TP4		A	Amber Glass 250ml
1019099	120842		TP4		A	Plastic Tub 500g
1019100	120843		TP4		A	Amber Glass 250ml
1019100	120843		TP4		A	Plastic Tub 500g
1019101	127523		TP5		A	Amber Glass 250ml
1019101	127523		TP5		A	Plastic Tub 500g
1019102	127527		TP6		A	Amber Glass 250ml
1019102	127527		TP6		A	Plastic Tub 500g
1019103	120836		TP7		A	Amber Glass 250ml
1019103	120836		TP7		A	Plastic Tub 500g
1019104	120837		TP7		A	Amber Glass 250ml
1019104	120837		TP7		A	Plastic Tub 500g
1019105	125802		TP8		A	Amber Glass 250ml
1019105	125802		TP8		A	Plastic Tub 500g
1019106	130012		BH9		A	Amber Glass 250ml
1019106	130012		BH9		A	Plastic Tub 500g
1019107	130040		BH4		A	Amber Glass 250ml
1019107	130040		BH4		A	Plastic Tub 500g

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1019108	130025		BH11		A	Amber Glass 250ml
1019108	130025		BH11		A	Plastic Tub 500g
1019109	135006		BH19		A	Amber Glass 250ml
1019109	135006		BH19		A	Plastic Tub 500g
1019110	130049		BH22		A	Amber Glass 250ml
1019110	130049		BH22		A	Plastic Tub 500g

Test Methods

SOP	Title	Parameters included	Method summary
1010	pH Value of Waters	pH	pH Meter
1020	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Electrical Conductivity and Total Dissolved Solids (TDS) in Waters	Conductivity Meter
1220	Anions, Alkalinity & Ammonium in Waters	Fluoride; Chloride; Nitrite; Nitrate; Total; Oxidisable Nitrogen (TON); Sulfate; Phosphate; Alkalinity; Ammonium	Automated colorimetric analysis using 'Aquakem 600' Discrete Analyser.
1450	Metals in Waters by ICP-MS	Metals, including: Antimony; Arsenic; Barium; Beryllium; Boron; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Tin; Vanadium; Zinc	Filtration of samples followed by direct determination by inductively coupled plasma mass spectrometry (ICP-MS).
1610	Total/Dissolved Organic Carbon in Waters	Organic Carbon	TOC Analyser using Catalytic Oxidation
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measuremernt by 'Aquakem 600' Discrete Analyser using ferric nitrate / mercuric thiocyanate.
2300	Cyanides & Thiocyanate in Soils	Free (or easy liberatable) Cyanide; total Cyanide; complex Cyanide; Thiocyanate	Allkaline extraction followed by colorimetric determination using Automated Flow Injection Analyser.
2325	Sulphide in Soils	Sulphide	Steam distillation with sulphuric acid / analysis by 'Aquakem 600' Discrete Analyser, using N,N–dimethyl-p-phenylenediamine.
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.
2450	Acid Soluble Metals in Soils	Metals, including: Arsenic; Barium; Beryllium; Cadmium; Chromium; Cobalt; Copper; Lead; Manganese; Mercury; Molybdenum; Nickel; Selenium; Vanadium; Zinc	Acid digestion followed by determination of metals in extract by ICP-MS.
2490	Hexavalent Chromium in Soils	Chromium [VI]	Soil extracts are prepared by extracting dried and ground soil samples into boiling water. Chromium [VI] is determined by 'Aquakem 600' Discrete Analyser using 1,5-diphenylcarbazide.
2610	Loss on Ignition	loss on ignition (LOI)	Determination of the proportion by mass that is lost from a soil by ignition at 550°C.
2625	Total Organic Carbon in Soils	Total organic Carbon (TOC)	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2670	Total Petroleum Hydrocarbons (TPH) in Soils by GC-FID	TPH (C6–C40); optional carbon banding, e.g. 3-band – GRO, DRO & LRO*TPH C8–C40	Dichloromethane extraction / GC-FID

Test Methods

SOP	Title	Parameters included	Method summary
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Appendix 3

Waste Classification Report

Waste Classification Report

ENYL5-95HHK-YPK5M

Job name

20-001-05 Charlestown Place (17 05 04)

Description/Comments

Project

21-001-05

Site

Charlestown Place

Related Documents

#	Name	Description
None		

Waste Stream Template

O'Callaghan Moran Waste Stream

Classified by

Name:
Austin Hynes
Date:
05 Feb 2021 16:03 GMT
Telephone:
+353 (0)21 4345366

Company:
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park,
Model Farm Road
Cork

HazWasteOnline™ Training Record:

Course	**Date**
Hazardous Waste Classification	-
Advanced Hazardous Waste Classification	-

Report

Created by: Austin Hynes
Created date: 05 Feb 2021 16:03 GMT

Job summary

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
1	TP1	1.0	Non Hazardous		3
2	TP4	0.5-1.0	Non Hazardous		6
3	TP4[2]	1.75-2.25	Non Hazardous		9
4	TP5	0.5-1.5	Non Hazardous		12
5	TP6	0.2-1.0	Non Hazardous		15
6	TP7	0.25-1.25	Non Hazardous		18
7	TP7[2]	1.5-2.5	Non Hazardous		21
8	TP8	0.5-1.5	Non Hazardous		24

Classification of sample: TP1

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:		LoW Code:	
TP1		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.0 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
6.8% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 6.8% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide }				<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		<LOD
		051-005-00-X	215-175-0	1309-64-4									
2		arsenic { arsenic trioxide }				28	mg/kg	1.32	36.969	mg/kg	0.0037 %		
		033-003-00-0	215-481-4	1327-53-3									
3		boron { diboron trioxide; boric oxide }				0.4	mg/kg	3.22	1.288	mg/kg	0.000129 %		
		005-008-00-8	215-125-8	1303-86-2									
4		cadmium { cadmium oxide }				1.7	mg/kg	1.142	1.942	mg/kg	0.000194 %		
		048-002-00-0	215-146-2	1306-19-0									
5		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				13	mg/kg	1.462	19	mg/kg	0.0019 %		
			215-160-9	1308-38-9									
6		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
		024-001-00-0	215-607-8	1333-82-0									
7		copper { dicopper oxide; copper (I) oxide }				20	mg/kg	1.126	22.518	mg/kg	0.00225 %		
		029-002-00-X	215-270-7	1317-39-1									
8		lead { lead chromate }			1	16	mg/kg	1.56	24.957	mg/kg	0.0016 %		
		082-004-00-2	231-846-0	7758-97-6									
9		mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
		080-010-00-X	231-299-8	7487-94-7									
10		molybdenum { molybdenum(VI) oxide }				2.9	mg/kg	1.5	4.351	mg/kg	0.000435 %		
		042-001-00-9	215-204-7	1313-27-5									
11		nickel { nickel chromate }				36	mg/kg	2.976	107.146	mg/kg	0.0107 %		
		028-035-00-7	238-766-5	14721-18-7									
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				<0.2	mg/kg	1.405	<0.281	mg/kg	<0.0000281 %		<LOD
		034-002-00-8											
13		zinc { zinc chromate }				63	mg/kg	2.774	174.771	mg/kg	0.0175 %		
		024-007-00-3	236-878-9	13530-65-9									
14		TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
				TPH									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		<LOD
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
22	●	acenaphthylene		205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
23	●	acenaphthene		201-469-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
24	●	fluorene		201-695-5	86-73-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
25	●	phenanthrene		201-581-5	85-01-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
26	●	anthracene		204-371-1	120-12-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
27	●	fluoranthene		205-912-4	206-44-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
28	●	pyrene		204-927-3	129-00-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.3 mg/kg		<0.3 mg/kg	<0.00003 %		<LOD
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
									Total:	0.0401 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP4

✓ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:
TP4
Sample Depth:
0.5-1.0 m
Moisture content:
9.7%
(no correction)

LoW Code:
Chapter: 17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Entry: 17 05 04 (Soil and stones other than those mentioned in 17 05 03)

Hazard properties

None identified

Determinands

Moisture content: 9.7% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide }				<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		<LOD
		051-005-00-X	215-175-0	1309-64-4									
2		arsenic { arsenic trioxide }				26	mg/kg	1.32	34.328	mg/kg	0.00343 %		
		033-003-00-0	215-481-4	1327-53-3									
3		boron { diboron trioxide; boric oxide }				<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
		005-008-00-8	215-125-8	1303-86-2									
4		cadmium { cadmium oxide }				1.9	mg/kg	1.142	2.17	mg/kg	0.000217 %		
		048-002-00-0	215-146-2	1306-19-0									
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				15	mg/kg	1.462	21.923	mg/kg	0.00219 %		
			215-160-9	1308-38-9									
6		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
		024-001-00-0	215-607-8	1333-82-0									
7		copper { dicopper oxide; copper (I) oxide }				26	mg/kg	1.126	29.273	mg/kg	0.00293 %		
		029-002-00-X	215-270-7	1317-39-1									
8		lead { lead chromate }			1	19	mg/kg	1.56	29.636	mg/kg	0.0019 %		
		082-004-00-2	231-846-0	7758-97-6									
9		mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
		080-010-00-X	231-299-8	7487-94-7									
10		molybdenum { molybdenum(VI) oxide }				4.1	mg/kg	1.5	6.151	mg/kg	0.000615 %		
		042-001-00-9	215-204-7	1313-27-5									
11		nickel { nickel chromate }				50	mg/kg	2.976	148.813	mg/kg	0.0149 %		
		028-035-00-7	238-766-5	14721-18-7									
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				3.8	mg/kg	1.405	5.339	mg/kg	0.000534 %		
		034-002-00-8											
13		zinc { zinc chromate }				67	mg/kg	2.774	185.868	mg/kg	0.0186 %		
		024-007-00-3	236-878-9	13530-65-9									
14	●	TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
				TPH									

#		Determinand			CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number							
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
		603-181-00-X	216-653-1	1634-04-4							
16		benzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
		601-020-00-8	200-753-7	71-43-2							
17		toluene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
		601-021-00-3	203-625-9	108-88-3							
18	●	ethylbenzene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
		601-023-00-4	202-849-4	100-41-4							
19		xylene				<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]							
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		**<LOD**
		006-007-00-5									
21		naphthalene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
		601-052-00-2	202-049-5	91-20-3							
22	●	acenaphthylene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
			205-917-1	208-96-8							
23	●	acenaphthene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
			201-469-6	83-32-9							
24	●	fluorene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
			201-695-5	86-73-7							
25	●	phenanthrene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
			201-581-5	85-01-8							
26	●	anthracene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
			204-371-1	120-12-7							
27	●	fluoranthene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
			205-912-4	206-44-0							
28	●	pyrene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
			204-927-3	129-00-0							
29		benzo[a]anthracene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
		601-033-00-9	200-280-6	56-55-3							
30		chrysene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
		601-048-00-0	205-923-4	218-01-9							
31		benzo[b]fluoranthene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
		601-034-00-4	205-911-9	205-99-2							
32		benzo[k]fluoranthene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
		601-036-00-5	205-916-6	207-08-9							
33		benzo[a]pyrene; benzo[def]chrysene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
		601-032-00-3	200-028-5	50-32-8							
34	●	indeno[123-cd]pyrene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
			205-893-2	193-39-5							
35		dibenz[a,h]anthracene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
		601-041-00-2	200-181-8	53-70-3							
36	●	benzo[ghi]perylene				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
			205-883-8	191-24-2							
37		phenol				<0.3 mg/kg		<0.3 mg/kg	<0.00003 %		**<LOD**
		604-001-00-2	203-632-7	108-95-2							
38	●	polychlorobiphenyls; PCB				<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
		602-039-00-4	215-648-1	1336-36-3							
								Total:	0.0471 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP4[2]

✓ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:		LoW Code:	
TP4[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.75-2.25 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
7.6% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 7.6% No Moisture Correction applied (MC)

#		Determinand				CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		<LOD
2		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		24	mg/kg	1.32	31.688	mg/kg	0.00317 %		
3		boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		<LOD
4		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.8	mg/kg	1.142	2.056	mg/kg	0.000206 %		
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }		215-160-9	1308-38-9		17	mg/kg	1.462	24.846	mg/kg	0.00248 %		
6		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
7		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		24	mg/kg	1.126	27.021	mg/kg	0.0027 %		
8		lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	18	mg/kg	1.56	28.077	mg/kg	0.0018 %		
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
10		molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		4.4	mg/kg	1.5	6.601	mg/kg	0.00066 %		
11		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		50	mg/kg	2.976	148.813	mg/kg	0.0149 %		
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				3.3	mg/kg	1.405	4.637	mg/kg	0.000464 %		
13		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		64	mg/kg	2.774	177.545	mg/kg	0.0178 %		
14	●	TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD

#		Determinand				CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number							
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		**<LOD**
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
22	●	acenaphthylene		205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
23	●	acenaphthene		201-469-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
24	●	fluorene		201-695-5	86-73-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
25	●	phenanthrene		201-581-5	85-01-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
26	●	anthracene		204-371-1	120-12-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
27	●	fluoranthene		205-912-4	206-44-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
28	●	pyrene		204-927-3	129-00-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.3 mg/kg		<0.3 mg/kg	<0.00003 %		**<LOD**
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
									Total:	0.0459 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP5

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:		LoW Code:	
TP5		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.5-1.5 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
5.9% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 5.9% No Moisture Correction applied (MC)

#	Determinand	CLP index number	EC Number	CAS Number	CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
1	antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		4.3	mg/kg	1.197	5.148	mg/kg	0.000515 %		
2	arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		47	mg/kg	1.32	62.055	mg/kg	0.00621 %		
3	boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		0.46	mg/kg	3.22	1.481	mg/kg	0.000148 %		
4	cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1	mg/kg	1.142	1.142	mg/kg	0.000114 %		
5	chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		8.6	mg/kg	1.462	12.569	mg/kg	0.00126 %		
6	chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
7	copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		23	mg/kg	1.126	25.895	mg/kg	0.00259 %		
8	lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	21	mg/kg	1.56	32.756	mg/kg	0.0021 %		
9	mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
10	molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		8.2	mg/kg	1.5	12.302	mg/kg	0.00123 %		
11	nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		44	mg/kg	2.976	130.956	mg/kg	0.0131 %		
12	selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				5.2	mg/kg	1.405	7.306	mg/kg	0.000731 %		
13	zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		37	mg/kg	2.774	102.643	mg/kg	0.0103 %		
14	TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		**<LOD**
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
22	●	acenaphthylene		205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
23	●	acenaphthene		201-469-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
24	●	fluorene		201-695-5	86-73-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
25	●	phenanthrene		201-581-5	85-01-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
26	●	anthracene		204-371-1	120-12-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
27	●	fluoranthene		205-912-4	206-44-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
28	●	pyrene		204-927-3	129-00-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.3 mg/kg		<0.3 mg/kg	<0.00003 %		**<LOD**
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
									Total:	0.0397 %		

Key

🟨	User supplied data
⬜	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP6

✓ **Non Hazardous Waste**
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:		LoW Code:	
TP6		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.2-1.0 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
5.6% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 5.6% No Moisture Correction applied (MC)

#		Determinand			CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide }				2.9	mg/kg	1.197	3.472	mg/kg	0.000347 %		
		051-005-00-X	215-175-0	1309-64-4									
2		arsenic { arsenic trioxide }				23	mg/kg	1.32	30.367	mg/kg	0.00304 %		
		033-003-00-0	215-481-4	1327-53-3									
3		boron { diboron trioxide; boric oxide }				0.43	mg/kg	3.22	1.385	mg/kg	0.000138 %		
		005-008-00-8	215-125-8	1303-86-2									
4		cadmium { cadmium oxide }				0.63	mg/kg	1.142	0.72	mg/kg	0.000072 %		
		048-002-00-0	215-146-2	1306-19-0									
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				6.2	mg/kg	1.462	9.062	mg/kg	0.000906 %		
			215-160-9	1308-38-9									
6		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
		024-001-00-0	215-607-8	1333-82-0									
7		copper { dicopper oxide; copper (I) oxide }				18	mg/kg	1.126	20.266	mg/kg	0.00203 %		
		029-002-00-X	215-270-7	1317-39-1									
8		lead { lead chromate }			1	19	mg/kg	1.56	29.636	mg/kg	0.0019 %		
		082-004-00-2	231-846-0	7758-97-6									
9		mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
		080-010-00-X	231-299-8	7487-94-7									
10		molybdenum { molybdenum(VI) oxide }				6.2	mg/kg	1.5	9.301	mg/kg	0.00093 %		
		042-001-00-9	215-204-7	1313-27-5									
11		nickel { nickel chromate }				34	mg/kg	2.976	101.193	mg/kg	0.0101 %		
		028-035-00-7	238-766-5	14721-18-7									
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				2.9	mg/kg	1.405	4.074	mg/kg	0.000407 %		
		034-002-00-8											
13		zinc { zinc chromate }				29	mg/kg	2.774	80.45	mg/kg	0.00805 %		
		024-007-00-3	236-878-9	13530-65-9									
14	●	TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
				TPH									

#		Determinand				CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number							
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		<LOD
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
22	●	acenaphthylene		205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
23	●	acenaphthene		201-469-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
24	●	fluorene		201-695-5	86-73-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
25	●	phenanthrene		201-581-5	85-01-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
26	●	anthracene		204-371-1	120-12-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
27	●	fluoranthene		205-912-4	206-44-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
28	●	pyrene		204-927-3	129-00-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.3 mg/kg		<0.3 mg/kg	<0.00003 %		<LOD
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
									Total:	0.0293 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP7

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:		LoW Code:	
TP7		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.25-1.25 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
12% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 12% No Moisture Correction applied (MC)

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
1		antimony { antimony trioxide }	051-005-00-X	215-175-0	1309-64-4		<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		**<LOD**
2		arsenic { arsenic trioxide }	033-003-00-0	215-481-4	1327-53-3		25	mg/kg	1.32	33.008	mg/kg	0.0033 %		
3		boron { diboron trioxide; boric oxide }	005-008-00-8	215-125-8	1303-86-2		0.44	mg/kg	3.22	1.417	mg/kg	0.000142 %		
4		cadmium { cadmium oxide }	048-002-00-0	215-146-2	1306-19-0		1.9	mg/kg	1.142	2.17	mg/kg	0.000217 %		
5		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }		215-160-9	1308-38-9		15	mg/kg	1.462	21.923	mg/kg	0.00219 %		
6		chromium in chromium(VI) compounds { chromium(VI) oxide }	024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		**<LOD**
7		copper { dicopper oxide; copper (I) oxide }	029-002-00-X	215-270-7	1317-39-1		32	mg/kg	1.126	36.028	mg/kg	0.0036 %		
8		lead { lead chromate }	082-004-00-2	231-846-0	7758-97-6	1	42	mg/kg	1.56	65.512	mg/kg	0.0042 %		
9		mercury { mercury dichloride }	080-010-00-X	231-299-8	7487-94-7		0.11	mg/kg	1.353	0.149	mg/kg	0.0000149 %		
10		molybdenum { molybdenum(VI) oxide }	042-001-00-9	215-204-7	1313-27-5		3.6	mg/kg	1.5	5.401	mg/kg	0.00054 %		
11		nickel { nickel chromate }	028-035-00-7	238-766-5	14721-18-7		44	mg/kg	2.976	130.956	mg/kg	0.0131 %		
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }	034-002-00-8				0.38	mg/kg	1.405	0.534	mg/kg	0.0000534 %		
13		zinc { zinc chromate }	024-007-00-3	236-878-9	13530-65-9		76	mg/kg	2.774	210.835	mg/kg	0.0211 %		
14		TPH (C6 to C40) petroleum group			TPH		<10	mg/kg		<10	mg/kg	<0.001 %		**<LOD**

#		Determinand				CLP Note	User entered data		Conv. Factor	Compound conc.		Classification value	MC Applied	Conc. Not Used
			CLP index number	EC Number	CAS Number									
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		**<LOD**
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		**<LOD**
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
22	●	acenaphthylene		205-917-1	208-96-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
23	●	acenaphthene		201-469-6	83-32-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
24	●	fluorene		201-695-5	86-73-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
25	●	phenanthrene		201-581-5	85-01-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
26	●	anthracene		204-371-1	120-12-7		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
27	●	fluoranthene		205-912-4	206-44-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
28	●	pyrene		204-927-3	129-00-0		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		**<LOD**
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		**<LOD**
											Total:	0.0501 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP7[2]

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:		LoW Code:	
TP7[2]		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
1.5-2.5 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
11% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 11% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide }				<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		**<LOD**
		051-005-00-X	215-175-0	1309-64-4									
2		arsenic { arsenic trioxide }				26	mg/kg	1.32	34.328	mg/kg	0.00343 %		
		033-003-00-0	215-481-4	1327-53-3									
3		boron { diboron trioxide; boric oxide }				<0.4	mg/kg	3.22	<1.288	mg/kg	<0.000129 %		**<LOD**
		005-008-00-8	215-125-8	1303-86-2									
4		cadmium { cadmium oxide }				2.2	mg/kg	1.142	2.513	mg/kg	0.000251 %		
		048-002-00-0	215-146-2	1306-19-0									
5		chromium in chromium(III) compounds { chromium(III) oxide (worst case) }				22	mg/kg	1.462	32.154	mg/kg	0.00322 %		
			215-160-9	1308-38-9									
6		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		**<LOD**
		024-001-00-0	215-607-8	1333-82-0									
7		copper { dicopper oxide; copper (I) oxide }				32	mg/kg	1.126	36.028	mg/kg	0.0036 %		
		029-002-00-X	215-270-7	1317-39-1									
8		lead { lead chromate }			1	27	mg/kg	1.56	42.115	mg/kg	0.0027 %		
		082-004-00-2	231-846-0	7758-97-6									
9		mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		**<LOD**
		080-010-00-X	231-299-8	7487-94-7									
10		molybdenum { molybdenum(VI) oxide }				4.3	mg/kg	1.5	6.451	mg/kg	0.000645 %		
		042-001-00-9	215-204-7	1313-27-5									
11		nickel { nickel chromate }				65	mg/kg	2.976	193.457	mg/kg	0.0193 %		
		028-035-00-7	238-766-5	14721-18-7									
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.7	mg/kg	1.405	0.983	mg/kg	0.0000983 %		
		034-002-00-8											
13		zinc { zinc chromate }				87	mg/kg	2.774	241.351	mg/kg	0.0241 %		
		024-007-00-3	236-878-9	13530-65-9									
14	●	TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		**<LOD**
				TPH									

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		**<LOD**
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		**<LOD**
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
22	●	acenaphthylene		205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
23	●	acenaphthene		201-469-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
24	●	fluorene		201-695-5	86-73-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
25	●	phenanthrene		201-581-5	85-01-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
26	●	anthracene		204-371-1	120-12-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
27	●	fluoranthene		205-912-4	206-44-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
28	●	pyrene		204-927-3	129-00-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.3 mg/kg		<0.3 mg/kg	<0.00003 %		**<LOD**
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		**<LOD**
									Total:	0.0592 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Classification of sample: TP8

Non Hazardous Waste
Classified as **17 05 04**
in the List of Waste

Sample details

Sample Name:		LoW Code:	
TP8		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.5-1.5 m		Entry:	17 05 04 (Soil and stones other than those mentioned in 17 05 03)
Moisture content:			
9.2% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 9.2% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
1		antimony { antimony trioxide }				<2	mg/kg	1.197	<2.394	mg/kg	<0.000239 %		<LOD
		051-005-00-X	215-175-0	1309-64-4									
2		arsenic { arsenic trioxide }				25	mg/kg	1.32	33.008	mg/kg	0.0033 %		
		033-003-00-0	215-481-4	1327-53-3									
3		boron { diboron trioxide; boric oxide }				0.52	mg/kg	3.22	1.674	mg/kg	0.000167 %		
		005-008-00-8	215-125-8	1303-86-2									
4		cadmium { cadmium oxide }				1.6	mg/kg	1.142	1.828	mg/kg	0.000183 %		
		048-002-00-0	215-146-2	1306-19-0									
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }				16	mg/kg	1.462	23.385	mg/kg	0.00234 %		
			215-160-9	1308-38-9									
6		chromium in chromium(VI) compounds { chromium(VI) oxide }				<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
		024-001-00-0	215-607-8	1333-82-0									
7		copper { dicopper oxide; copper (I) oxide }				25	mg/kg	1.126	28.147	mg/kg	0.00281 %		
		029-002-00-X	215-270-7	1317-39-1									
8		lead { lead chromate }			1	29	mg/kg	1.56	45.235	mg/kg	0.0029 %		
		082-004-00-2	231-846-0	7758-97-6									
9		mercury { mercury dichloride }				<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
		080-010-00-X	231-299-8	7487-94-7									
10		molybdenum { molybdenum(VI) oxide }				4	mg/kg	1.5	6.001	mg/kg	0.0006 %		
		042-001-00-9	215-204-7	1313-27-5									
11		nickel { nickel chromate }				41	mg/kg	2.976	122.027	mg/kg	0.0122 %		
		028-035-00-7	238-766-5	14721-18-7									
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex }				0.73	mg/kg	1.405	1.026	mg/kg	0.000103 %		
		034-002-00-8											
13		zinc { zinc chromate }				65	mg/kg	2.774	180.32	mg/kg	0.018 %		
		024-007-00-3	236-878-9	13530-65-9									
14	●	TPH (C6 to C40) petroleum group				<10	mg/kg		<10	mg/kg	<0.001 %		<LOD
				TPH									

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
		CLP index number	EC Number	CAS Number									
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**
		603-181-00-X	216-653-1	1634-04-4									
16		benzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**
		601-020-00-8	200-753-7	71-43-2									
17		toluene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**
		601-021-00-3	203-625-9	108-88-3									
18	●	ethylbenzene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**
		601-023-00-4	202-849-4	100-41-4									
19		xylene				<0.001	mg/kg		<0.001	mg/kg	<0.0000001 %		<**LOD**
		601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]									
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }				<0.5	mg/kg	1.884	<0.942	mg/kg	<0.0000942 %		<**LOD**
		006-007-00-5											
21		naphthalene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-052-00-2	202-049-5	91-20-3									
22	●	acenaphthylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-917-1	208-96-8									
23	●	acenaphthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-469-6	83-32-9									
24	●	fluorene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-695-5	86-73-7									
25	●	phenanthrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			201-581-5	85-01-8									
26	●	anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-371-1	120-12-7									
27	●	fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-912-4	206-44-0									
28	●	pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			204-927-3	129-00-0									
29		benzo[a]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-033-00-9	200-280-6	56-55-3									
30		chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-048-00-0	205-923-4	218-01-9									
31		benzo[b]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-034-00-4	205-911-9	205-99-2									
32		benzo[k]fluoranthene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-036-00-5	205-916-6	207-08-9									
33		benzo[a]pyrene; benzo[def]chrysene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-032-00-3	200-028-5	50-32-8									
34	●	indeno[123-cd]pyrene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-893-2	193-39-5									
35		dibenz[a,h]anthracene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		601-041-00-2	200-181-8	53-70-3									
36	●	benzo[ghi]perylene				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
			205-883-8	191-24-2									
37		phenol				<0.3	mg/kg		<0.3	mg/kg	<0.00003 %		<**LOD**
		604-001-00-2	203-632-7	108-95-2									
38	●	polychlorobiphenyls; PCB				<0.1	mg/kg		<0.1	mg/kg	<0.00001 %		<**LOD**
		602-039-00-4	215-648-1	1336-36-3									
										Total:	0.0443 %		

Key

🟨	User supplied data
▒	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non CLP determinands

chromium(III) oxide (worst case) (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4 H332 , Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Resp. Sens. 1 H334 , Skin Sens. 1 H317 , Repr. 1B H360FD , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

TPH (C6 to C40) petroleum group (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3 H226 , Asp. Tox. 1 H304 , STOT RE 2 H373 , Muta. 1B H340 , Carc. 1B H350 , Repr. 2 H361d , Aquatic Chronic 2 H411

ethylbenzene (EC Number: 202-849-4, CAS Number: 100-41-4)

CLP index number: 601-023-00-4
Description/Comments:
Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)
Additional Hazard Statement(s): Carc. 2 H351
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2B (77) 2000

salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex

CLP index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Data source: Commission Regulation (EC) No 790/2009 - 1st Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP1)
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
14 Dec 2015 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

acenaphthylene (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4 H302 , Acute Tox. 1 H330 , Acute Tox. 1 H310 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315

acenaphthene (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Aquatic Chronic 2 H411

fluorene (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

phenanthrene (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Carc. 2 H351 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Skin Irrit. 2 H315

- **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2 H315 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2 H351

- **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **polychlorobiphenyls; PCB** (EC Number: 215-648-1, CAS Number: 1336-36-3)

CLP index number: 602-039-00-4
Description/Comments: Worst Case: IARC considers PCB Group 1; Carcinogenic to humans; POP specific threshold from ATP1 (Regulation 756/2010/EU) to POPs Regulation (Regulation 850/2004/EC). Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Hazard Statement(s): Carc. 1A H350
Reason for additional Hazards Statement(s):
29 Sep 2015 - Carc. 1A H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

Appendix B: Rationale for selection of metal species

antimony {antimony trioxide}

Worst case CLP species based on hazard statements/molecular weight and low solubility. Industrial sources include: flame retardants in electrical apparatus, textiles and coatings

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds

boron {diboron trioxide; boric oxide}

Reasonable case CLP species based on hazard statements/ molecular weight, physical form and low solubility. Industrial sources include: fluxing agent for glass/enamels; additive for fibre optics, borosilicate glass

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight. Industrial sources include: production stainless steel, electroplating, wood preservation, anti-corrosion agents or coatings, pigments

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected.

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight

molybdenum {molybdenum(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case. Pigment cadmium sulphoselenide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil.

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case as complex cyanides and those specified elsewhere in the annex are not likely to be present in this soil: [Note conversion factor based on a worst case compound: sodium cyanide] (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1, May 2018
HazWasteOnline Classification Engine Version: 2021.35.4640.8948 (04 Feb 2021)
HazWasteOnline Database: 2021.35.4640.8948 (04 Feb 2021)

This classification utilises the following guidance and legislation:
WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2019 - UK: 2019 No. 720 of 27th March 2019
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
POPs Regulation 2019 - Regulation (EU) 2019/1021 of 20 June 2019

Waste Classification Report

RF2UC-H92N9-3AJ3R

Job name

21-001-05 Charlestown Place (17 09 04)

Description/Comments

Project

21-001-05

Site

Charlestown Place

Related Documents

#	Name	Description
None		

Waste Stream Template

O'Callaghan Moran Waste Stream

Classified by

Name:
Austin Hynes
Date:
05 Feb 2021 16:05 GMT
Telephone:
+353 (0)21 4345366

Company:
O'Callaghan Moran & Associates
Unit 15 Melbourne Business Park,
Model Farm Road
Cork

HazWasteOnline™ Training Record:

Course	**Date**
Hazardous Waste Classification	-
Advanced Hazardous Waste Classification	-

Report

Created by: Austin Hynes
Created date: 05 Feb 2021 16:05 GMT

Job summary

#	Sample Name	Depth [m]	Classification Result	Hazard properties	Page
1	TP3	0.5-0.8	Non Hazardous		2

Classification of sample: TP3

Non Hazardous Waste
Classified as **17 09 04**
in the List of Waste

Sample details

Sample Name:		LoW Code:	
TP3		Chapter:	17: Construction and Demolition Wastes (including excavated soil from contaminated sites)
Sample Depth:			
0.5-0.8 m		Entry:	17 09 04 (mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03)
Moisture content:			
14% (no correction)			

Hazard properties

None identified

Determinands

Moisture content: 14% No Moisture Correction applied (MC)

#		Determinand			CLP Note	**User entered data**		Conv. Factor	Compound conc.		**Classification value**	MC Applied	Conc. Not Used
			EC Number	CAS Number									
		CLP index number											
1		antimony { antimony trioxide } 051-005-00-X	215-175-0	1309-64-4		3	mg/kg	1.197	3.591	mg/kg	0.000359 %		
2		arsenic { arsenic trioxide } 033-003-00-0	215-481-4	1327-53-3		53	mg/kg	1.32	69.977	mg/kg	0.007 %		
3		boron { diboron trioxide; boric oxide } 005-008-00-8	215-125-8	1303-86-2		0.41	mg/kg	3.22	1.32	mg/kg	0.000132 %		
4		cadmium { cadmium oxide } 048-002-00-0	215-146-2	1306-19-0		0.46	mg/kg	1.142	0.525	mg/kg	0.0000525 %		
5		chromium in chromium(III) compounds { ● chromium(III) oxide (worst case) }	215-160-9	1308-38-9		12	mg/kg	1.462	17.539	mg/kg	0.00175 %		
6		chromium in chromium(VI) compounds { chromium(VI) oxide } 024-001-00-0	215-607-8	1333-82-0		<0.5	mg/kg	1.923	<0.962	mg/kg	<0.0000962 %		<LOD
7		copper { dicopper oxide; copper (I) oxide } 029-002-00-X	215-270-7	1317-39-1		17	mg/kg	1.126	19.14	mg/kg	0.00191 %		
8		lead { lead chromate } 082-004-00-2	231-846-0	7758-97-6	1	26	mg/kg	1.56	40.555	mg/kg	0.0026 %		
9		mercury { mercury dichloride } 080-010-00-X	231-299-8	7487-94-7		<0.1	mg/kg	1.353	<0.135	mg/kg	<0.0000135 %		<LOD
10		molybdenum { molybdenum(VI) oxide } 042-001-00-9	215-204-7	1313-27-5		<2	mg/kg	1.5	<3	mg/kg	<0.0003 %		<LOD
11		nickel { nickel chromate } 028-035-00-7	238-766-5	14721-18-7		22	mg/kg	2.976	65.478	mg/kg	0.00655 %		
12		selenium { selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex } 034-002-00-8				<0.2	mg/kg	1.405	<0.281	mg/kg	<0.0000281 %		<LOD
13		zinc { zinc chromate } 024-007-00-3	236-878-9	13530-65-9		52	mg/kg	2.774	144.256	mg/kg	0.0144 %		
14	●	TPH (C6 to C40) petroleum group		TPH		<10	mg/kg		<10	mg/kg	<0.001 %		<LOD

#		Determinand	CLP index number	EC Number	CAS Number	CLP Note	User entered data	Conv. Factor	Compound conc.	Classification value	MC Applied	Conc. Not Used
15		tert-butyl methyl ether; MTBE; 2-methoxy-2-methylpropane	603-181-00-X	216-653-1	1634-04-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
16		benzene	601-020-00-8	200-753-7	71-43-2		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
17		toluene	601-021-00-3	203-625-9	108-88-3		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
18	●	ethylbenzene	601-023-00-4	202-849-4	100-41-4		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
19		xylene	601-022-00-9	202-422-2 [1] 203-396-5 [2] 203-576-3 [3] 215-535-7 [4]	95-47-6 [1] 106-42-3 [2] 108-38-3 [3] 1330-20-7 [4]		<0.001 mg/kg		<0.001 mg/kg	<0.0000001 %		<LOD
20		cyanides { ● salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex }	006-007-00-5				<0.5 mg/kg	1.884	<0.942 mg/kg	<0.0000942 %		<LOD
21		naphthalene	601-052-00-2	202-049-5	91-20-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
22	●	acenaphthylene		205-917-1	208-96-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
23	●	acenaphthene		201-469-6	83-32-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
24	●	fluorene		201-695-5	86-73-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
25	●	phenanthrene		201-581-5	85-01-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
26	●	anthracene		204-371-1	120-12-7		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
27	●	fluoranthene		205-912-4	206-44-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
28	●	pyrene		204-927-3	129-00-0		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
29		benzo[a]anthracene	601-033-00-9	200-280-6	56-55-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
30		chrysene	601-048-00-0	205-923-4	218-01-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
31		benzo[b]fluoranthene	601-034-00-4	205-911-9	205-99-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
32		benzo[k]fluoranthene	601-036-00-5	205-916-6	207-08-9		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
33		benzo[a]pyrene; benzo[def]chrysene	601-032-00-3	200-028-5	50-32-8		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
34	●	indeno[123-cd]pyrene		205-893-2	193-39-5		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
35		dibenz[a,h]anthracene	601-041-00-2	200-181-8	53-70-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
36	●	benzo[ghi]perylene		205-883-8	191-24-2		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
37		phenol	604-001-00-2	203-632-7	108-95-2		<0.3 mg/kg		<0.3 mg/kg	<0.00003 %		<LOD
38	●	polychlorobiphenyls; PCB	602-039-00-4	215-648-1	1336-36-3		<0.1 mg/kg		<0.1 mg/kg	<0.00001 %		<LOD
									Total:	0.0365 %		

Key

🟨	User supplied data
▨	Determinand values ignored for classification, see column 'Conc. Not Used' for reason
●	Determinand defined or amended by HazWasteOnline (see Appendix A)
⚛	Speciated Deteminand - Unless the Determinand is Note 1, the Conversion Factor is used to calculate the compound concentration
<LOD	Below limit of detection
ND	Not detected
CLP: Note 1	Only the metal concentration has been used for classification

Appendix A: Classifier defined and non CLP determinands

- **chromium(III) oxide (worst case)** (EC Number: 215-160-9, CAS Number: 1308-38-9)

Description/Comments: Data from C&L Inventory Database
Data source: https://echa.europa.eu/information-on-chemicals/cl-inventory-database/-/discli/details/33806
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4 H332 , Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Resp. Sens. 1 H334 , Skin Sens. 1 H317 , Repr. 1B H360FD , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **TPH (C6 to C40) petroleum group** (CAS Number: TPH)

Description/Comments: Hazard statements taken from WM3 1st Edition 2015; Risk phrases: WM2 3rd Edition 2013
Data source: WM3 1st Edition 2015
Data source date: 25 May 2015
Hazard Statements: Flam. Liq. 3 H226 , Asp. Tox. 1 H304 , STOT RE 2 H373 , Muta. 1B H340 , Carc. 1B H350 , Repr. 2 H361d , Aquatic Chronic 2 H411

- **ethylbenzene** (EC Number: 202-849-4, CAS Number: 100-41-4)

CLP index number: 601-023-00-4
Description/Comments:
Data source: Commission Regulation (EU) No 605/2014 – 6th Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP6)
Additional Hazard Statement(s): Carc. 2 H351
Reason for additional Hazards Statement(s):
03 Jun 2015 - Carc. 2 H351 hazard statement sourced from: IARC Group 2B (77) 2000

- **salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex**

CLP index number: 006-007-00-5
Description/Comments: Conversion factor based on a worst case compound: sodium cyanide
Data source: Commission Regulation (EC) No 790/2009 - 1st Adaptation to Technical Progress for Regulation (EC) No 1272/2008. (ATP1)
Additional Hazard Statement(s): EUH032 >= 0.2 %
Reason for additional Hazards Statement(s):
14 Dec 2015 - EUH032 >= 0.2 % hazard statement sourced from: WM3, Table C12.2

- **acenaphthylene** (EC Number: 205-917-1, CAS Number: 208-96-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Acute Tox. 4 H302 , Acute Tox. 1 H330 , Acute Tox. 1 H310 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315

- **acenaphthene** (EC Number: 201-469-6, CAS Number: 83-32-9)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Aquatic Chronic 2 H411

- **fluorene** (EC Number: 201-695-5, CAS Number: 86-73-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **phenanthrene** (EC Number: 201-581-5, CAS Number: 85-01-8)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Carc. 2 H351 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410 , Skin Irrit. 2 H315

- **anthracene** (EC Number: 204-371-1, CAS Number: 120-12-7)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 17 Jul 2015
Hazard Statements: Eye Irrit. 2 H319 , STOT SE 3 H335 , Skin Irrit. 2 H315 , Skin Sens. 1 H317 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **fluoranthene** (EC Number: 205-912-4, CAS Number: 206-44-0)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Acute Tox. 4 H302 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **pyrene** (EC Number: 204-927-3, CAS Number: 129-00-0)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 2014
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 21 Aug 2015
Hazard Statements: Skin Irrit. 2 H315 , Eye Irrit. 2 H319 , STOT SE 3 H335 , Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **indeno[123-cd]pyrene** (EC Number: 205-893-2, CAS Number: 193-39-5)

Description/Comments: Data from C&L Inventory Database
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 06 Aug 2015
Hazard Statements: Carc. 2 H351

- **benzo[ghi]perylene** (EC Number: 205-883-8, CAS Number: 191-24-2)

Description/Comments: Data from C&L Inventory Database; SDS Sigma Aldrich 28/02/2015
Data source: http://echa.europa.eu/web/guest/information-on-chemicals/cl-inventory-database
Data source date: 23 Jul 2015
Hazard Statements: Aquatic Acute 1 H400 , Aquatic Chronic 1 H410

- **polychlorobiphenyls; PCB** (EC Number: 215-648-1, CAS Number: 1336-36-3)

CLP index number: 602-039-00-4
Description/Comments: Worst Case: IARC considers PCB Group 1; Carcinogenic to humans; POP specific threshold from ATP1 (Regulation 756/2010/EU) to POPs Regulation (Regulation 850/2004/EC). Where applicable, the calculation method laid down in European standards EN 12766-1 and EN 12766-2 shall be applied.
Data source: Regulation 1272/2008/EC - Classification, labelling and packaging of substances and mixtures. (CLP)
Additional Hazard Statement(s): Carc. 1A H350
Reason for additional Hazards Statement(s):
29 Sep 2015 - Carc. 1A H350 hazard statement sourced from: IARC Group 1 (23, Sup 7, 100C) 2012

Appendix B: Rationale for selection of metal species

antimony {antimony trioxide}

Worst case CLP species based on hazard statements/molecular weight and low solubility. Industrial sources include: flame retardants in electrical apparatus, textiles and coatings

arsenic {arsenic trioxide}

Reasonable case CLP species based on hazard statements/molecular weight and most common (stable) oxide of arsenic. Industrial sources include: smelting; main precursor to other arsenic compounds

boron {diboron trioxide; boric oxide}

Reasonable case CLP species based on hazard statements/ molecular weight, physical form and low solubility. Industrial sources include: fluxing agent for glass/enamels; additive for fibre optics, borosilicate glass

cadmium {cadmium oxide}

Reasonable case CLP species based on hazard statements/molecular weight, very low solubility in water. Industrial sources include: electroplating baths, electrodes for storage batteries, catalysts, ceramic glazes, phosphors, pigments and nematocides. Worst case compounds in CLP: cadmium sulphate, chloride, fluoride & iodide not expected as either very soluble and/or compound's industrial usage not related to site history

chromium in chromium(III) compounds {chromium(III) oxide (worst case)}

Reasonable case species based on hazard statements/molecular weight. Industrial sources include: tanning, pigment in paint, inks and glass

chromium in chromium(VI) compounds {chromium(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight. Industrial sources include: production stainless steel, electroplating, wood preservation, anti-corrosion agents or coatings, pigments

copper {dicopper oxide; copper (I) oxide}

Reasonable case CLP species based on hazard statements/molecular weight and insolubility in water. Industrial sources include: oxidised copper metal, brake pads, pigments, antifouling paints, fungicide. Worse case copper sulphate is very soluble and likely to have been leached away if ever present and/or not enough soluble sulphate detected.

lead {lead chromate}

Worst case CLP species based on hazard statements/molecular weight

mercury {mercury dichloride}

Worst case CLP species based on hazard statements/molecular weight

molybdenum {molybdenum(VI) oxide}

Worst case CLP species based on hazard statements/molecular weight

nickel {nickel chromate}

Worst case CLP species based on hazard statements/molecular weight

selenium {selenium compounds with the exception of cadmium sulphoselenide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case. Pigment cadmium sulphoselenide not likely to be present in this soil. No evidence for the other CLP entries: sodium selenite, nickel II selenite and nickel selenide, to be present in this soil.

zinc {zinc chromate}

Worst case CLP species based on hazard statements/molecular weight

cyanides {salts of hydrogen cyanide with the exception of complex cyanides such as ferrocyanides, ferricyanides and mercuric oxycyanide and those specified elsewhere in this Annex}

Harmonised group entry used as most reasonable case as complex cyanides and those specified elsewhere in the annex are not likely to be present in this soil: [Note conversion factor based on a worst case compound: sodium cyanide] (edit as required)

Appendix C: Version

HazWasteOnline Classification Engine: WM3 1st Edition v1.1, May 2018
HazWasteOnline Classification Engine Version: 2021.35.4640.8948 (04 Feb 2021)
HazWasteOnline Database: 2021.35.4640.8948 (04 Feb 2021)

This classification utilises the following guidance and legislation:
WM3 v1.1 - Waste Classification - 1st Edition v1.1 - May 2018
CLP Regulation - Regulation 1272/2008/EC of 16 December 2008
1st ATP - Regulation 790/2009/EC of 10 August 2009
2nd ATP - Regulation 286/2011/EC of 10 March 2011
3rd ATP - Regulation 618/2012/EU of 10 July 2012
4th ATP - Regulation 487/2013/EU of 8 May 2013
Correction to 1st ATP - Regulation 758/2013/EU of 7 August 2013
5th ATP - Regulation 944/2013/EU of 2 October 2013
6th ATP - Regulation 605/2014/EU of 5 June 2014
WFD Annex III replacement - Regulation 1357/2014/EU of 18 December 2014
Revised List of Waste 2014 - Decision 2014/955/EU of 18 December 2014
7th ATP - Regulation 2015/1221/EU of 24 July 2015
8th ATP - Regulation (EU) 2016/918 of 19 May 2016
9th ATP - Regulation (EU) 2016/1179 of 19 July 2016
10th ATP - Regulation (EU) 2017/776 of 4 May 2017
HP14 amendment - Regulation (EU) 2017/997 of 8 June 2017
13th ATP - Regulation (EU) 2018/1480 of 4 October 2018
14th ATP - Regulation (EU) 2020/217 of 4 October 2019
15th ATP - Regulation (EU) 2020/1182 of 19 May 2020
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2019 - UK: 2019 No. 720 of 27th March 2019
The Chemicals (Health and Safety) and Genetically Modified Organisms (Contained Use)(Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1567 of 16th December 2020
The Waste and Environmental Permitting etc. (Legislative Functions and Amendment etc.) (EU Exit) Regulations 2020 - UK: 2020 No. 1540 of 16th December 2020
POPs Regulation 2019 - Regulation (EU) 2019/1021 of 20 June 2019

APPENDIX 13A – CULTURAL HERITAGE LEGISLATION, IMPACT AND MITIGATION

LEGISLATION PROTECTING THE ARCHAEOLOGICAL RESOURCE

Protection of Cultural Heritage

The cultural heritage in Ireland is safeguarded through national and international policy designed to secure the protection of the cultural heritage resource to the fullest possible extent (Department of Arts, Heritage, Gaeltacht, and the Islands 1999, 35). This is undertaken in accordance with the provisions of the *European Convention on the Protection of the Archaeological Heritage* (Valletta Convention), ratified by Ireland in 1997.

The Archaeological Resource

The *National Monuments Act 1930 to 2014* and relevant provisions of the *National Cultural Institutions Act 1997* are the primary means of ensuring the satisfactory protection of archaeological remains, which includes all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes. A National Monument is described as 'a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto' (National Monuments Act 1930 Section 2). A number of mechanisms under the National Monuments Act are applied to secure the protection of archaeological monuments. These include the Register of Historic Monuments, the Record of Monuments and Places, and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

Ownership and Guardianship of National Monuments

The Minister may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Register of Historic Monuments

Section 5 of the 1987 Act requires the Minister to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. Any interference with sites recorded on the register is illegal without the permission of the Minister. Two months' notice in writing is required prior to any work being undertaken on or in the vicinity of a registered monument. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

Preservation Orders and Temporary Preservation Orders

Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

Record of Monuments and Places

Section 12(1) of the 1994 Act requires the Minister for Arts, Heritage, Gaeltacht, and the Islands (now the Minister for the Department of Culture, Heritage, and the Gaeltacht) to establish and maintain a record of monuments and places where the Minister believes that such monuments exist. The record comprises a list of monuments and relevant places and a map/s showing each monument and relevant place in respect of each county in the state. All sites recorded on the Record of Monuments and Places receive statutory protection under the National Monuments Act 1994. All recorded monuments on the proposed development site are represented on the accompanying maps.

Section 12(3) of the 1994 Act provides that 'where the owner or occupier (other than the Minister for Arts, Heritage, Gaeltacht and the Islands) of a monument or place included in the Record, or any other person, proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice in writing to the Minister of Arts, Heritage, Gaeltacht and the Islands to carry out work and shall not, except in case of urgent necessity and with the consent of the Minister, commence the work until two months after giving of notice'.

Under the National Monuments (Amendment) Act 2004, anyone who demolishes or in any way interferes with a recorded site is liable to a fine not exceeding €3,000 or imprisonment for up to 6 months. On summary conviction and on conviction of indictment, a fine not exceeding €10,000 or imprisonment for up to 5 years is the penalty. In addition, they are liable for costs for the repair of the damage caused.

In addition to this, under the *European Communities (Environmental Impact Assessment) Regulations 1989,* Environmental Impact Statements (EIS) are required for various classes and sizes of development project to assess the impact the proposed development will have on the existing environment, which includes the cultural, archaeological, and built heritage resources. These document's recommendations are typically incorporated into the conditions under which the proposed development must proceed, and thus offer an additional layer of protection for monuments which have not been listed on the RMP.

The Planning and Development Act 2000

Under planning legislation, each local authority is obliged to draw up a Development Plan setting out their aims and policies with regard to the growth of the area over a five-year period. They cover a range of issues including archaeology and built heritage, setting out their policies and objectives with regard to the protection and enhancement of both. These policies can vary from county to county. The Planning and Development Act 2000 recognises that proper planning and sustainable development includes the protection of the archaeological heritage. Conditions relating to archaeology may be attached to individual planning permissions.

Fingal County Development Plan, 2017–2023

Archaeology is a non-renewable resource in that once an archaeological feature or site is excavated or removed it is gone forever from the landscape. Therefore, any proposed development should consider the potential impact on archaeology in the very earliest stages and seek to avoid affecting archaeological features or sites and their setting. This includes development along or in Fingal's rivers, coastline, and tidal estuaries. Currently 40% of the recorded archaeological sites within Fingal are sub surface. Therefore, any development has the potential to uncover previously unknown archaeological sites.

Statement of Policy:

The Council is committed to the protection and conservation of buildings, areas, structures, sites, and features of archaeological, architectural, historical, artistic, cultural, scientific, social, or technical interest:

- By safeguarding archaeological sites, monuments, objects, and their settings listed in the Record of Monuments and Places (RMP), and any additional newly discovered archaeological remains, and by identifying archaeologically sensitive historic landscapes.

- By protecting the architectural heritage of Fingal through the identification of Protected Structures, the designation of Architectural Conservation Areas (ACAs), the safeguarding of designed landscapes and historic gardens, and the recognition of structures and elements that contribute positively to the vernacular and industrial heritage of the County.
- By favouring the preservation in-situ (or at a minimum preservation by record) of all sites and features of historical and archaeological interest.
- By making our cultural heritage more accessible and maximise its potential as a learning resource.
- By promoting the understanding of Fingal's cultural heritage in terms of its inherent and unique character and to recognise what elements should be preserved, conserved, or enhanced.
- By implementing the objectives and actions of the Fingal Heritage Plan to raise the profile and awareness of Fingal's heritage.
- The Council is dedicated to protecting, conserving, and presenting the County's rich cultural heritage while promoting sustainable economic development and the enrichment of the environment.

Objective CH02:
Favour the preservation in situ or at a minimum preservation by record, of archaeological sites, monuments, features, or objects in their settings. In securing such preservation the Council will have regard to the advice and recommendations of the National Monuments Service of the Department of the Arts, Heritage, Regional, Rural and Gaeltacht Affairs. CH03

Objective CH03:
Protect all archaeological sites and monuments, underwater archaeology, and archaeological objects, which are listed in the Record of Monuments and Places and all sites and features of archaeological and historic interest discovered subsequent to the publication of the Record of Monuments and Places, and to seek their preservation in situ (or at a minimum, preservation by record) through the planning process.

Objective CH04:
Encourage and promote the appropriate management and maintenance of the County's archaeological heritage, including historical burial grounds, in accordance with conservation principles and best practice guidelines.

Objective CH05:
Ensure archaeological remains are identified and fully considered at the very earliest stages of the development process, that schemes are designed to avoid impacting on the archaeological heritage.

Objective CH06:
Require that proposals for linear development over one kilometre in length; proposals for development involving ground clearance of more than half a hectare; or developments in proximity to areas with a density of known archaeological monuments and history of discovery; to include an Archaeological Impact Assessment and refer such applications to the relevant Prescribed Bodies.

Objective CH07:

Ensure that development within the vicinity of a Recorded Monument or Zone of Archaeological Notification does not seriously detract from the setting of the feature and is sited and designed appropriately.

Objective CH09:
Recognise the importance of archaeology or historic landscapes and the connectivity between sites, where it exists, in order to safeguard them from developments that would unduly sever or disrupt the relationship and/or inter-visibility between sites.

Objective CH12:
Promote best practice for archaeological excavation by ensuring that they are undertaken according to best practice as outlined by the National Monuments Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs, The National Museum, and the Institute of Archaeologists of Ireland.

Objective CH13:
Actively support the dissemination of the findings of archaeological investigations and excavations through the publication of excavation reports thereby promoting public awareness and appreciation of the value of archaeological resources.

Objective CH14:
Identify Zones of Archaeological Notification that contain clusters of Recorded Monuments or have a significant history of the discovery of archaeological sites, features, and objects in order to allow for their designation, protection of their setting and environs.

Objective CH15:
Raise public awareness of the cultural heritage and improve legibility by providing appropriate signage or interpretation in areas, sites, villages, and buildings of archaeological and historic significance.

Objective CH16:
Develop and implement the findings of the Community Archaeology Strategy for Fingal.

Objective CH17:
Support the growth of cultural tourism in the County, including the potential for niche heritage-based tourism products by facilitating the development of heritage events, infrastructure such as heritage trails, walkways, and cycleways etc. and activities such as community excavation.

Objective CH18:
Manage the archaeological sites and monuments that Fingal County Council owns or is responsible for according to best practice and according to Conservation Plans where they exist.

IMPACT ASSESSMENT AND THE CULTURAL HERITAGE RESOURCE

Potential Impacts on Archaeological and Historical Remains

Impacts are defined as ‘the degree of change in an environment resulting from a development’ (Environmental Protection Agency 2003: 31). They are described as profound, significant, or slight impacts on archaeological remains. They may be negative, positive, or neutral, direct, indirect, or cumulative, temporary, or permanent.

Impacts can be identified from detailed information about a project, the nature of the area affected, and the range of archaeological and historical resources potentially affected. Development can affect the archaeological and historical resource of a given landscape in a number of ways.

Permanent and temporary land-take, associated structures, landscape mounding, and their construction may result in damage to or loss of archaeological remains and deposits, or physical loss to the setting of historic monuments and to the physical coherence of the landscape.

Archaeological sites can be affected adversely in a number of ways: disturbance by excavation, topsoil stripping and the passage of heavy machinery; disturbance by vehicles working in unsuitable conditions; or burial of sites, limiting accessibility for future archaeological investigation.

Hydrological changes in groundwater or surface water levels can result from construction activities such as de-watering and spoil disposal, or longer-term changes in drainage patterns. These may desiccate archaeological remains and associated deposits.

Visual impacts on the historic landscape sometimes arise from construction traffic and facilities, built earthworks and structures, landscape mounding and planting, noise, fences and associated works. These features can impinge directly on historic monuments and historic landscape elements as well as their visual amenity value.

Landscape measures such as tree planting can damage sub-surface archaeological features, due to topsoil stripping and through the root action of trees and shrubs as they grow.

Ground consolidation by construction activities or the weight of permanent embankments can cause damage to buried archaeological remains, especially in colluviums or peat deposits.

Disruption due to construction also offers in general the potential for adversely affecting archaeological remains. This can include machinery, site offices, and service trenches.

Although not widely appreciated, positive impacts can accrue from developments. These can include positive resource management policies, improved maintenance and access to archaeological monuments, and the increased level of knowledge of a site or historic landscape as a result of archaeological assessment and fieldwork.

Predicted Impacts

The severity of a given level of land-take or visual intrusion varies with the type of monument, site or landscape features and its existing environment. Severity of impact can be judged taking the following into account:

- The proportion of the feature affected and how far physical characteristics fundamental to the understanding of the feature would be lost;
- Consideration of the type, date, survival/condition, fragility/vulnerability, rarity, potential and amenity value of the feature affected;
- Assessment of the levels of noise, visual and hydrological impacts, either in general or site-specific terms, as may be provided by other specialists.

MITIGATION MEASURES AND THE CULTURAL HERITAGE RESOURCE

Potential Mitigation Strategies for Cultural Heritage Remains

Mitigation is defined as features of the design or other measures of the proposed development that can be adopted to avoid, prevent, reduce, or offset negative effects.

The best opportunities for avoiding damage to archaeological remains or intrusion on their setting and amenity arise when the site options for the development are being considered. Damage to the archaeological resource immediately adjacent to developments may be prevented by the selection of appropriate construction methods. Reducing adverse effects can be achieved by good design, for example by screening historic buildings or upstanding archaeological monuments or by burying archaeological sites undisturbed rather than destroying them. Offsetting adverse effects is probably best illustrated by the full investigation and recording of archaeological sites that cannot be preserved *in situ*.

Definition of Mitigation Strategies

Archaeological Resource

The ideal mitigation for all archaeological sites is preservation *in situ*. This is not always a practical solution, however. Therefore, a series of recommendations are offered to provide ameliorative measures where avoidance and preservation *in situ* are not possible.

Archaeological Test Trenching can be defined as 'a limited programme of intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site on land, inter-tidal zone or underwater. If such archaeological remains are present field evaluation defines their character, extent, quality, and preservation, and enables an assessment of their worth in a local, regional, national or international context as appropriate' (CIfA 2014a).

Full Archaeological Excavation can be defined as 'a programme of controlled, intrusive fieldwork with defined research objectives which examines, records and interprets archaeological deposits, features and structures and, as appropriate, retrieves artefacts, ecofacts and other remains within a specified area or site on land, inter-tidal zone or underwater. The records made and objects gathered during fieldwork are studied and the results of that study published in detail appropriate to the project design' (CIfA 2014b).

Archaeological Monitoring can be defined as 'a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive (CIfA 2014c).

Underwater Archaeological Assessment consists of a programme of works carried out by a specialist underwater archaeologist, which can involve wade surveys, metal detection surveys and the excavation of test pits within the sea or riverbed. These assessments are able to access and assess the potential of an underwater environment to a much higher degree than terrestrial based assessments.

APPENDIX 14A – LANDSCAPE AND VISUAL IMPACT VERIFIED VIEWS

See separately bound A3 document containing Appendix 14A Landscape and Visual Impact Assessment Verified Views.