Waterman Moylan
Engineering Consultants

Engineering Assessment Report

Tack Sandyford SHD

March 2022

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This document has been prepared and checked in accordance with
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Comments

Disclaimer

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1. Introduction

Waterman Moylan have been appointed on behalf of Sandyford Environmental Construction Ltd. to accompany a planning application to An Bord Pleanala (ABP) for a residential development on a brownfield site at the junction of Carmanhall Road and Ravens Rock Road, Sandyford, Dublin 18. It is also proposed to build 1 No. Creche along with resident support facilities/resident services and amenities.

This report describes the criteria used to design the storm water discharge, disposal of foul water, water supply and vehicular access to the developed site.

2. Site Description

2.1 Site Location

The subject site is located at Sandyford in south County Dublin.

The site has an area of 0.57ha (1.4 acre) but for the purpose of encompassing the proposed access junctions, services connections and landscaping, the area within the red line for the planning application has been extended to 0.7ha.

The site was formerly occupied by Tack Packaging but at the time of writing in February 2022, it was unoccupied save for a number of empty buildings.

The adjoining site to the east at the junction of Carmanhall Road and Blackthorn Road was formerly occupied by Avid Technology.

Figure 1 Site Location Map (Google Images)

2.2 Site Description

The site comprises the former Tack Packaging site the junction of Carmanhall Road and Ravens Rock Road. The site area is approximately 0.57ha and is currently largely hardstanding.

The site falls from southwest to northeast ranging in level from 88.0mOD in the southwest to 84.0 mOD in the northeast. The existing access to the site is from Ravens Rock Road.

The adjoining site to the east at the junction of Carmanhall Road and Blackthorn Road was formerly occupied by Avid Technology.

2.3 Proposed Development

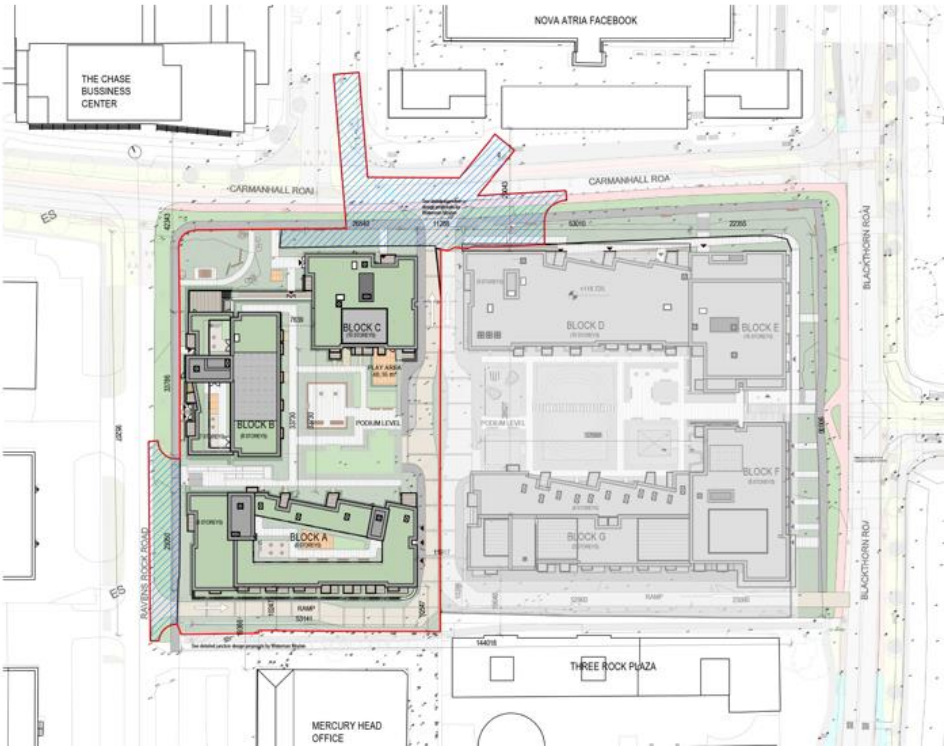
The proposed development will comprise some 207 Build-to-Rent residential units.

Car parking with a total of 79 car spaces will be provided at Lower Ground Level and Basement. Cycle parking with 288 spaces will be provided at Lower Ground Level. Access for vehicular traffic is proposed from Ravens Rock Road with egress onto Carmanhall Road.

The public realm around the site will incorporate an upgrade of the pedestrian and cycle environment.

The development includes all associated infrastructure to service the development including access junctions, footpaths and cycle paths together with a network of watermains, foul water drains and surface water drains.

Figure 2 Proposed Site Layout



The existing ground levels around the site range from 89 m – 84 m OD. The ground floors of the proposed buildings step across the site to mimic the existing levels as far as reasonably practicable to minimise cut and fill across the site.

2.4 Contiguous Development

A concurrent development with a separate Engineering Assessment on the former Avid Technology site to the east will comprise 336 Build-to-Rent residential units and 118 car parking spaces at Lower Ground Level and Basement. Access is proposed from Carmanhall Road and egress onto Blackthorn Road.

The foul and surface water disposal, as well as water supply arrangements from this adjoining development will be separate from those serving the subject site.

3. Foul Water Drainage

3.1 Receiving Environment

There is an existing 225 mm Ø foul sewer located adjacent to the site along Ravens Rock Road and Carmanhall Road. There is also a 225mm Ø foul sewer along Arkle Road to the northeast of the subject site. Details of the adjacent foul sewer are shown in Appendix A – Irish Water Record Maps.

The foul sewer receiving environment for the proposed development consists of the 225mm foul sewer within Arkle Road as required by Irish Water.

Waterman Moylan drawing No's 21-118-P122 and P124 show the proposed foul water sewer network for the subject site.

It is proposed to drain the subject site to the existing 225mmØ foul sewer network on Arkle Road the northeast of the subject lands. It is important to note that the Tack Site (subject site under this planning application) will discharge foul water independently from the adjacent site, Avid Site. However, the attached Irish Water Confirmation of Feasibility received assesses the cumulative impact of the development of the 2 No. sites as set out in the Irish Water Pre-Connection Enquiry.

3.2 Irish Water Pre-connection Enquiry Response

A pre-connection inquiry was submitted to Irish Water in November 2021 in respect of the foul connection from the proposed development. Subsequently, Irish Water has confirmed that based on the size of the proposed development and on the capacity currently available, that subject to a valid connection agreement being put in place, the proposed connection to the Irish Water network can be facilitated.

The Irish Water Pre-Connection Enquiry Form Response Letter (Ref. No. CDS21008079) dated 25 January 2022 is attached in Appendix B of this report. A set out above, it is important to note that the Tack Site (subject site under this planning application) will discharge foul water independently from the adjacent site, Avid Site. However, the attached Irish Water Confirmation of Feasibility received assesses the cumulative impact of the development of the 2 No. sites as set out in the Irish Water Pre-Connection Enquiry.

3.3 Irish Water Statement of Design Acceptance

The foul and water supply design for the proposed development was submitted to Irish Water. Subsequently, Irish Water issued a letter of design acceptance stating that there are no objections to the proposals. A copy of the letter has been included in Appendix F.

3.4 Proposed Foul Water Drainage

The proposed development will consist of 207 No. residential units and 1 No. Creche. Based on Irish Waters Code of Practice, the calculation of the peak foul flow from the proposed development can be seen in Tables 1 and 2 below.

Table 1 Calculation of Proposed Foul Water Flow

Description	No. of Units	Flow l/h/day	Population per Unit	Infiltration Factor	Total Discharge
Residential Units	207	150	2.7	1.1	92,218.5
Creche	1	50	78 67 pupils 11 staff	1.1	4,290
				Totals	**96,508.5 l/d**

Table 2 Calculation of Proposed Peak Foul Flow

Calculation of Proposed Peak Foul Flow		Units
Dry Weather Flow Residential (DWF)	1.07	l/s
Dry Weather Flow Commercial (DWF)	0.049	l/s
Peak Foul Flow Residential (=6 x DWF)	6.42	l/s
Peak Foul Flow Commercial (=4.5 x DWF)	0.22	l/s
Total Peak Foul Flow	6.64	***l/s***

Waterman Moylan Drawing's 21-118-P122 illustrate the proposed layout for the foul water sewer outfall for the subject site.

3.5 Network Design

Foul Water Drains will be uPVC to Irish Water specification or concrete socket and spigot pipes (to IS 6).

Drains will be laid to comply with the Building Regulations 2010, and in accordance with the recommendations contained in the Technical Guidance Documents, Section H.

Foul water sewers will consist of uPVC or concrete socket and spigot pipes (to IS 6) and will be laid strictly in accordance with Irish Waters code of practice for Wastewater Infrastructure and Irish Water requirements for taking in charge.

All manholes will be constructed in block work, precast or cast in-situ concrete. Construction details for the proposed drainage systems are included in the accompanying planning submission drawing.

4. Surface Water Drainage

4.1 Introduction

The following section deals with surface water drainage design including details of the SuDS measures proposed as part of the development.

The Surface Water Drainage design and SUDS Assessment carried out in the following sections has been undertaken in compliance with the requirements of the DLRCC County Development Plan 2022-2028, the guidelines set by the Greater Dublin Strategic Drainage Study (GDSDS) and CIRIA documents.

There is an existing 300mm diameter surface water sewer along Ravens Rocks Road. West of the site, that discharges into a 450mm diameter surface water sewer along Carmanhall Road, north of the site. Refer to Appendix A for the existing surface water record map.

The existing site currently drains surface water, unrestricted, to the above-mentioned sewers. It is proposed that the development will attenuate the surface water on-site before discharging at the existing greenfield rate.

The existing run-off rate for the existing hardstanding areas on site was estimated for the 1 in 1, 1 in 30 and 1 in 100 year return periods using the modified rational method:

Q = 2.78 x A x I (where A is the total pre-development area being drained in Hectares and I is the rainfall intensity in mm/h as estimated for the 60min storm from Flow using Met Eireann Data)

A = 0.398 ha (current hardstanding as measured from topographical survey)

I – 1 year return period = 11.235 mm/h

30 year return period = 27.335 mm/h

100 year return period = 43.042 mm/h

Table 3 Existing Run-off Rates for impermeable areas

Rainfall Event	Existing development run-off (l/sec) – Hardstanding Areas
Q1	2.78 x 0.398 x 11.235 = **12.43**
Q30	2.78 x 0.398 x 27.335 = **30.24**
Q100	2.78 x 0.398 x 43.042 = **47.62**

4.2 Site Characteristics

The following parameters have been used in greenfield run-off rate and attenuation calculations.

Table 4 Surface Water Catchment Details

	Catchment
Site Area (Catchment) - Ha	0.57
Hardstanding – Ha	0.46
SAAR – mm*1	930
SOIL Index*2	0.37
Climate Change	30%

*1 – From Met Éireann data.

*2 – The soil type of Ireland indicated Soil Type 1. Furthermore a Site investigation was carried out in February 2021 on the adjacent AVID site. The results of the site investigation revealed there is no infiltration present on the site. These soil conditions are expected for Soil type 3 and therefore 0.37 is used as Soil Index for this site as agreed with Johanne Codd of DLRCC. Refer to Appendix C for the above-mentioned Site Investigation.

The site investigation also revealed a highwater table is present at the site. The highest groundwater table was recorded as 1.63 - 2.5 m bgl (below ground level), in June 2020, four months after installation of the standpipes.

4.3 Greenfield run-off rates

The Local Authority requirements are that post-development run-off rates are limited to greenfield run-off rates for the site. The greenfield run-off rates for the site have been calculated in accordance with the Institute of Hydrology report No 124 “Flood Estimation for Small Catchments”, using the UK SUDS Website. Based on a total hardstanding of 0.46 Ha, the Greenfield run-off for the site is 1.8 l/s (Qbar). Please refer to Appendix D.

4.4 SuDS Assessment

As per Dun Laoghaire County Council guidelines surface water should be managed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) Regional Drainage Policies Volume 6, for New Developments and CIRIA documents. These documents specify that surface water run-off should be managed as close to its source as possible, with the re-use of rainwater within the buildings prioritised.

Sustainable Urban Drainage Systems (SUDS) have been developed and are in use to alleviate the detrimental effects of traditional urban storm water drainage practice that typically consisted of piping run-off of rainfall from developments to the nearest receiving watercourse. Surface water drainage methods that take account of quantity, quality and amenity issues are collectively referred to as SUDS. They are typically made up of one or more structures, built to manage surface water run-off. The use of SUDS to control run-off also provides the additional benefit of reducing pollutants in the surface water by settling out suspended solids, and in some cases providing biological treatment.

A stormwater management or treatment train approach ensures that run-off quantity and quality is improved. The following objectives of the treatment train provide an integrated and balanced approach to

help mitigate the changes in stormwater run-off flows that occur as land is urbanised and to help mitigate the impacts of stormwater quality on receiving systems:

1) **Source control:** conveyance and infiltration of run-off; and

2) **Site Control:** reduction in volume and rate of surface run-off, with some additional treatment provided.

The applicant has considered the use of all appropriate SUDS measures as part of the site SUDS strategy, details are outlined in Table 5 below.

Table 5 SuDs Measures

SUDS Stage	SUDS Measure	Measure Outline	Use on Site
Source Control	Permeable Asphalt	Permeable pavements are alternative paving surfaces to standard finishes that allow stormwater run-off to filter through voids in the pavement surface into an underlying stone reservoir, where it is temporarily stored and/or infiltrated. Permeable asphalt is very effective at removing a wide range of pollutants from surface water runoff as they are either retained on the pavement surface or flushed into the granular subbase where they become trapped and are degraded over time.	Permeable asphalt will be utilised for the surface of the main road to provide treatment and storage to rainwater falling on these areas. As described above, the ground conditions are not considered suitable for infiltration and the groundwater table was found at high level. Therefore, the permeable asphalt would be lined with an impermeable geotextile membrane due to the lack of infiltration available on the site and to prevent groundwater ingress. The design will include a perforated pipe to convey surface water to the site wide drainage system.
	Green Roofs/ Green Podium	As well as providing ecological benefits, green roofs contribute the following positive effects to surface water drainage design: • The retention of water, through storage in the growing medium and evapotranspiration from the roof's plants and substrate, reducing run-off volumes	The locations of the green roofs are illustrated on the accompanying Waterman Moylan Drawing *21-118-P125 - SUDS Measures and overland flood route.* Refer to section 4.5 of this report for further details on the Green Roof proposals for this development.

		and the burden on the drainage network. • Due to the time for water to infiltrate and permeate the substrate, there is also a reduction in peak rates of run-off, helping to reduce the risk of flooding. • They improve water quality through the filtration of pollutants during the process of water infiltration. This provides treatment in line with CIRIA SuDS Manual management train. Although green roof space can reduce peak flow rates in the small storm events and aid in reducing the volume of run-off from the site, they operate as conventional roofs in higher storm events. Therefore, green roofs cannot be considered in the surface water drainage run-off calculations for the development. As stated in CIRIA C697 *"although green roofs absorb most of the rainfall that they receive during ordinary events, there is still the need to discharge excess water to the building's drainage system. This is because their hydraulic performance during extreme events tends to be fairly similar to standard roofs*."	
SUDS Stage	SUDS Measure	Measure Outline	Use on Site
Site Control	Attenuation Tank and Hydro-brake	Attenuation tanks are used to create a below ground void space for the temporary storage of surface water before controlled release to the stream.	It is proposed to use a concrete attenuation tank to store surface water on site before discharging to the public surface water sewer via a hydro-brake.

		Hydro-brakes are used to restrict the outfall from the attenuation tank to the equivalent of the existing agricultural run-off. This ensures the development will not give rise to any impact downstream of the site.	
	Petrol Interceptor	A petrol interceptor is a trap used to filter out hydrocarbon pollutants from rainwater run-off. It is typically used in road construction to prevent fuel contamination of water courses carrying away the run-off. Petrol interceptors work on the premise that some hydrocarbons such as petroleum and diesel float on the top of water. The contaminated water enters the interceptor typically after flowing off roads and entering a drain before being deposited into the first tank inside the interceptor. The first tank builds up a layer of the hydrocarbon as well as other scum preventing it from entering the water course.	A petrol Interceptor will be installed, upstream of the proposed Attenuation tank as a final treatment level before discharging to the attenuation tank.

4.5 Green Roof Policy

Green Roofs have been considered and incorporated into the development proposals in accordance with Appendix 7.2 of DLRCC County Development Plan 2022-2028. There are 5 No. Green Roof Policy standards, all of which have been considered for this planning application as follows:

Standard GR1-Applicable development types

Planning applications which include roof areas of greater than 300 square metres for the following development types must make provision for a green and/ or blue roof (which includes a green component) as part of the development proposals.

- *Apartment Developments*
- *Employment Developments*
- *Retail and Ancillary Shopping*
- *Leisure Developments*
- *Education Facilities*

The proposed development has 3 No. apartment blocks and therefore green roof must be incorporated into the design. The locations of the green roofs are illustrated on the accompanying Waterman Moylan drawing *21-118-P125 - SUDS Measures and overland flood route.*

Standard GR2 – Aerial Coverage

To maximise the provision for biodiversity, green roofs must meet the following coverage requirements for all applicable buildings within the application boundary, subject to a reasonable allowance being made for the provision of services at roof level.

Table 6 Minimum Green Roof Coverage (Appendix 7.2 DLRCC Development Plan 2022-2028)

Type of Green Roof	***Minimum Coverage (% of Total Roof Area being developed)***
Extensive	*70%*
Intensive	*50%*

As described in the DLRCC Green Roof Policy document, the are two main types of green roof:

- ***Extensive*** *green roofs are more lightweight when compared with intensive green roofs with a shallow soil layer and are not normally designed to provide access for people.*
- ***Intensive*** *green roofs have a deep layer of soil, which can support a range of plants, trees and shrubs. Native species (plants which would grow naturally in the local area) can provide a ricj habitat for wildlife. Intensive Green Roofs can be designed to include access for people.*

Extensive roofs are defined having a minimum substrate depths of 80mm and Intensive roofs are defined as having a substrate minimum depth of 200mm (Source; the GRO Green Roof Guide).

The proposed development will comprise a mix of Extensive and Intensive green roofs. The exact location for each type of green roofs will be fully designed at detail design stage. For the purpose of this application, 60% Green Roof will be provided of which a minimum of 50% will be intensive and the location of Green Roof is indicated on Waterman Moylan Drawing *21-118-P125 - SUDS Measures and overland flood route.*

Standard GR3 – Hydraulic Requirements

Where the green/blue roof provides attenuation and management of storm runoff the applicant should demonstrate

- *Compliance with the Greater Dublin Strategic Drainage Study 2005 (GDSDS) Criterion 1-4.*
- *Provision for climate change allowance and urban creep as appropriate.*
- *Provision for overflow and exceedance as part of the drainage design.*

It is not proposed to provide attenuation within the proposed Green Roofs. Although green roof space can reduce peak flow rates in the small storm events and aid in reducing the volume of run-off from the site, they operate as conventional roofs during higher storm events. Therefore, green roofs cannot be considered in the surface water drainage run-off calculations for the development. As stated in CIRIA C697 *"although green roofs absorb most of the rainfall that they receive during ordinary events, there is still the*

need to discharge excess water to the building's drainage system. This is because their hydraulic performance during extreme events tends to be fairly similar to standard roofs."

Standard GR4 – Design in accordance with best practice Industry guidance

Designs for green and blue roofs should demonstrate that the designer has applied an abundance of caution as part of the design process and that designs are in adherence with current best practice design guidance.

The green roof will be designed at detail design stage by a green roof specialist designer with a good reputation within the industry. The developer will ensure that designs are in adherence with current best practice design guidance.

Standard GR5 – Design for access, operation and maintenance

Green and blue roof designs should be designed to ensure that any required maintenance or operation activities can be undertaken in a safe and cost-effective manner.

A Maintenance and Operation Manual will be provided by the green roof manufacturer to the Management company to ensure proper and safe operation of the Green Roofs. Refer to Table 11 below for the proposed green roof maintenance schedule.

Access to each of the green roofs is crucial not only for installation and ongoing maintenance but also for bringing up materials, soils and plants in a safe manner. Access to the green roof is provided from the stairwell in Blocks A and B and from specific access openings in Blocks B and C. Specific access for each of the Green Roofs is shown in the accompanying architect's drawings.

4.6 Stormwater Calculations

The total impermeable area of the catchment including roads, car-parking and roofs, is approximately 0.49 Ha, and the peak outflow will be limited to 1 l/s in the 1 in 100-year event. The 1 in 100 year critical design storm plus an additional 30% for climate change has been used for storm water attenuation calculations and a storage volume requirement of 353 m^3 is determined. A total volume of 420 m^3 will be provided in a concrete tank located beneath the podium at the car parking level. The calculation for the storage design is included in Appendix E. The proposed surface water drainage network is indicated on Waterman Moylan drawings 21-118-P120 - Proposed Surface Water Drainage Layout.

4.7 Network Design

As described above, the proposed surface water drainage system for this development has been designed as a SUDS system and uses permeable paving, green roofs green podium, below ground attenuation together with flow control devices and petrol interceptor to treat run-off and remove pollutants to improve quality, restrict outflow and control quantity.

Strict separation of surface water and wastewater will be implemented within the development. Surface water local drains will be a minimum of 225mm dia. and generally will consist of PVC (to IS123) or concrete socket and spigot pipes (to IS 6). These drains will be laid to comply with the requirement of the Building Regulations 2010, and in accordance with the recommendations contained in the Technical Guidance Documents, Section H and will be laid strictly in accordance with the requirements of Dun Laoghaire Rathdown County Council.

4.8 Interception Storage

Interception storage is defined in the SuDS Manual as *"the capture and retention on site of the first 5mm of the majority of rainfall events"*. In accordance with the table 24.6 of the SuDS Manual CIRIA C753 the following guidelines have been used in calculating the area of the site benefiting from interception storage;

Table 7 Interception Mechanisms (Table 24.6 The SuDs Manual)

Systems	Interception methods assumed compliant for zero runoff from the first 5mm of rainfall for 80% of events during the summer and 50% in winter.
Green Roofs/podium	All surfaces that have green roofs/podium.
Permeable Paving	All permeable pavements, whether lined or not, can be assumed to comply, provided there is no extra area drained to the permeable pavement. Where the pavement also drains an adjacent impermeable area, compliance can be assumed for all soil types where the pavement is unlined, as long as the extra paved area is no greater than the permeable pavement area

As described in section 4.4 and 4.5 the proposed development will provide, Green Roofs, green podium, and permeable paving. In order to calculate the percentage area of site benefiting from each form of interception storage the site areas are described in Table 8 below and demonstrated on Waterman Moylan drawing 21-118-P125.

At Podium level, all the hardstanding areas will be discharged into the landscape areas. The design will include a perforated pipe to convey surface water to the surface water network at ground level in order to discharge and attenuate water into the attenuation tank.

Table 8 Interception Storage Provided

Area	Total Hardstanding Area m2	Interception mechanism	Interception Area m2	green roof %	Percentage Benefiting %
Roof Blocks A-B-C	2079.9	Green Roof	1250.7	60.1	60.1
Podium Level	1592.2	Green podium	1592.2	N/A	100.0
Main Road and Footpaths	887.5	POROUS ASPHALT paving	663.0	N/A	91.8
		Permeable paving footpaths	152.0	N/A	
TOTAL	4559.6		3657.9	**N/A**	**80.2**

Within the basement carpark area, any rainwater entering the system as a result of snow melt or raindrops from cars will pass through a petrol interceptor providing treatment.

5. SuDS Maintenance

For the SuDS strategy to work as designed it is important that the entire drainage system is well maintained. It will be the responsibility of the site management team to ensure the drainage system is maintained. Maintenance and cleaning of gullies, drain manholes (including catch pits) and attenuation tanks will ensure adequate performance. The recommended program is outlined in the tables below.

Table 9 Concrete Attenuation Tank Maintenance Schedule

SUDS Element	Maintenance		
Attenuation Tanks	Maintenance Issues	Failure of components, blockage from debris	
	Maintenance Period	Maintenance Task	Frequency
	Regular	Inspect and identify any elements that are not operating correctly. If required, take remedial action.	Monthly for three months, then annually
		Remove sediment/debris from catchment surface that may lead to blockage of structures.	Monthly or as required
		Remove sediment/debris from catch pits/ gullies and control structures.	Annually, after severe storms or as required
	Remedial Work	Repair inlets, outlets, vents, overflows and control structures.	As required
	Monitoring	Inspect all inlets, outlets, vents, overflows and control structures to ensure they are in good condition and operating as designed.	Annually or after severe storms
		Survey inside of tank for sediment build-up and remove if necessary	Every five years or as required

Table 10 Permeable Paving Maintenance Schedule

SUDS Element	Maintenance		
Permeable Paving	**Maintenance period**	Maintenance Task	Frequency
	Regular	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or as required, based on site specific observations of clogging or manufacturer's recommendations.
	Occasional	Removal of weeds	As required
	Remedial work	Remediation work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users	As required
	Monitoring	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
		Monitor inspection chambers	Annually

Table 11 Green Roof Maintenance Schedule

SUDS Element	Maintenance		
Green Roof	**Maintenance Issues**	Vegetation becoming either overgrown or dying	
	Maintenance Period	Maintenance Task	Frequency
	Regular	Inspect all components including soil substrate, vegetation, drains, membranes and roof structure for proper operation, integrity of waterproofing and structural stability	Annually and after severe storms
		Inspect soil substrate for evidence of erosion channels and identify any sediment source	Annually and after severe storms
		Inspect drain inlets to ensure unrestricted run-off from the drainage layer to conveyance or roof drain system.	Annually and after severe storms
		Inspect underside of roof for evidence of leakage.	Annually and after severe storms
		Remove debris and litter to prevent clogging of inlet drains and interference with plant growth.	Six monthly and annually or as required
		During establishment (i.e. year one), replace dead plants as required.	Monthly
		Post-establishment, replace dead plants as required (where >5% of coverage)	Annually (in autumn)

		Remove fallen leaves and debris from deciduous plant foliage	Six monthly or as required
		Remove nuisance and invasive vegetation, including weeds	Six monthly or as required
		Mow grasses, prune shrubs and manage other planting (if appropriate) as required – clippings should be removed and not allowed to accumulate.	Six monthly or as required
	Remedial Work	If erosion channels are evident, these should be established with extra soil substrate similar to the original material, and sources of erosion damage should be identified and controlled	As required
		If drain inlet has settled, cracked or moved, investigate and repair as appropriate	As required

6. Benefits to the Surrounding Existing Drainage Network

It is important to note the very significant benefit the proposed development will have on the existing drainage network. The site currently discharges surface water, unrestricted to the public stormwater sewer. The proposed development will significantly reduce the surface water run-off to the existing public drainage network as demonstrated in Table 12 below. The introduction of the SUDS measures outlined earlier will also improve the quality of the discharge.

Table 12 Surface Water Run-off rates

Rainfall Event	Existing development run-off (l/sec)	Proposed run-off (l/sec)	Difference (%)
Q1	12.43 l/s	1.8 l/s	-85.52%
Q30	30.24 l/s	1.8 l/s	-94.05%
Q100	47.62 l/s	1.8 l/s	-96.22%

7. Water Supply

7.1 Water Supply – General

There is one existing 6 inch diameter watermain supplying the site to the southwest corner. There is one existing 6 inch diameter Asbestos watermain along Ravens Rock Road to the west of the subject site which connects into a larger 14 inch diameter asbestos watermain along Carmanhall Road to the north.

A Pre-Connection Enquiry form was submitted to Irish Water in November 2021 which outlined the proposals for the water supply to the development to the north of the subject lands. Irish Water advised that a water connection to the public main is feasible without infrastructure upgrade by Irish Water. This connection would be to the 14 inch diameter Asbestos main along Carmenhall Road.

It is important to note that the Tack Site (subject site under this planning application) will be connected to the existing public watermain independently from the adjacent site, Avid Site. However, the attached Irish Water Confirmation of Feasibility received assesses the cumulative impact of the development of the 2 No. sites, stating that Avid Site will need to be connected to the 6 inch diameter Asbestos main along Blackthorn Road and the subject (Tack) site to the 14 inch diameter Asbestos main along Carmenhall Road.

The water demand for the proposed development is calculated according to the Irish Water Code of Practice and is set out in Table 13 below.

Table 13 Total Water Demand

Description	No. of Units	Flow l/h/day	Population per Unit	Total Discharge (l/d)
Residential Units	207	150	2.7	83,835
Crèche	1	50	78 67 pupils 11 staff	3,900
Total				***87,735 l/d***

The total water requirement from the public supply, for the development, is estimated at 88 m^3/day.

Waterman Moylan Drawing 21-118-P150 shows the proposed indicative water supply layout for the subject site.

7.2 Irish Water Pre-Connection Enquiry

As set out above a pre-connection inquiry was submitted to Irish Water in November 2021 in respect of the foul connection from the proposed development. Subsequently, Irish Water has confirmed that based on the size of the proposed development and on the capacity currently available, that subject to a valid connection agreement being put in place, the proposed connection to the Irish Water network can be facilitated.

The Irish Water Pre-Connection Enquiry Form Response Letter (Ref. No. CDS21008079) dated 25 January 2022 is attached in Appendix B of this report. A set out above, it is important to note that the Tack Site (subject site under this planning application) will obtain a water supply independently from the adjacent site, Avid Site. However, the attached Irish Water Confirmation of Feasibility received assesses the cumulative impact of the development of the 2 No. sites as set out in the Irish Water Pre-Connection Enquiry.

7.3 Irish Water Statement of Design Acceptance

The foul and water supply design for the proposed development was submitted to Irish Water. Subsequently, Irish Water issued a letter of design acceptance stating that there are no objections to the proposals. A copy of the letter has been included in Appendix F.

8. Transport

8.1 Introduction

A site-specific Transport and Traffic Assessment (TTA) has been carried out by Waterman Moylan. This is included under separate cover as part of this application.

8.2 Site Access

Access to the proposed development is proposed Ravens Rock Road and egress onto Carmanhall Road.

An entrance only access is proposed on Ravens Rock Road for cars, service deliveries, refuse freighter and emergency vehicles. An exit only is proposed onto Carmanhall Road immediately to the west of the boundary between the subject site and the adjoining former Avid Technology site to the east.

These new entrance and exit points are also described in more detail in the accompanying TTA. They are in a 50 km/h zone. The junction into Carmanhall Road is designed to ensure a 2.4m x 45 metres in line with the Department of Transport 'Design Manual for Urban Roads and Streets' recommendation are provided as shown on the accompanying drawings. No development works will infringe upon this sightline provision.

8.3 Car Parking

Section 12.4.5 of the Dun Laoghaire Rathdown County Council Development Plan 2022 – 2028 consider the car parking requirements for various types of development. Specifically, Tables 12.6 set out the car parking standards for residential developments.

Based on these standards, Table 14 below details the maximum car parking spaces permitted for the proposed development.

Table 14 DLRCC Maximum Car Parking Required

Land Use	Units	Parking Standards	Car Parking Required
Apartments – 1 Bed	151	1 per unit	151
Apartments – 2 Bed	55	1 per unit	55
Apartments – 3 Bed+	1	2 per unit	2
Total	207	-	208

As per the Design Standards for New Apartments – Guidelines for Planning Authorities – December 2020, the subject proposed development meets criteria for reasonable grounds to minimise car parking provisions.

In suburban/urban locations served by public transport or close to town centres or employment areas and particularly for housing schemes with more than 45 dwellings per hectare net (18 per acre), as per guidelines mentioned above, planning authorities must consider a reduced overall car parking standard and apply an appropriate maximum car parking standard.

The development will provide 74 No. car parking spaces located between the basement and undercroft car parking. This equates to 0.35 No spaces/apartment across the development.

8.4 Cycle Parking

- Section 4.1 of the 'Standard for Cycle Parking and Associated Cycling Facilities for New Developments – Dun Laoghaire-Rathdown County Council 2018' sets out the cycle parking requirements as follows:

Table 15 Total Cycle Parking Spaces Required (DLRCC)

Land Use	No. of Units	Standards	Long Stay parking required	Short Stay Parking Required	Total Parking Required
Apartments	207	1 space per unit- Long Stay 1 space per every 5 units – Short Stay	207	43	250

- The Design Standards for New Apartments, who set out a requirement of 1 long stay space per bedroom and 1 visitor space for every two units, have also been reviewed with regards to cycle parking requirements and are set out in table 16 below.

Table 16 Total Cycle Parking Spaces Required (National Standards)

Land Use	No. of Units	Standards	Long Stay Parking Required	Short Stay Parking Required	Total Parking Required
Residential – 1 Bed	151	1 space per 1-bed unit – Long Stay 1 space per 2 units – Short Stay	151	75	227
Residential – 2 Bed	55	2 spaces per 2-bed unit - Long Stay 1 space per 2 units – Short Stay	55	27	82
Residential – 3 Bed	1	3 spaces per 3-bed unit - Long Stay 1 space per 2 units – Short Stay	1	1	2
Total	207 units		206	102	311

As can be seen on Table 15 above, the total number of cycle parking spaces required is 250. Table 16 shows a requirement for 311 spaces according to the National Standards. A total of 288 spaces will be provided of which 240 No. spaces will be provided for residents, and 48 No. spaces for visitors will be provided.

APPENDICES

A. Irish Water Records Map

carmanhall road - foul sewer

Water Distribution Network
- Water Treatment Plant
- Water Pump Station
- Storage Cell/Tower
- Dosing Point
- Meter Station
- Abstraction Point
- Telemetry Kiosk

Reservoir
- Potable
- Raw Water

Water Distribution Mains
- Irish Water
- Private

Trunk Water Mains
- Irish Water
- Private

Water Lateral Lines
- Irish Water
- Non IW
- Water Casings
- Water Abandoned Lines
- Boundary Meter
- Bulk/Check Meter
- Group Scheme
- Source Meter
- Waste Meter
- Unknown Meter ; Other Meter
- Non-Return
- PRV
- PSV
- Sluice Line Valve Open/Closed
- Butterfly Line Valve Open/Closed
- Sluice Boundary Valve Open/Closed
- Butterfly Boundary Valve Open/Closed
- Scour Valves
- Single Air Control Valve
- Double Air Control Valve
- Water Stop Valves
- Water Service Connections
- Water Distribution Chambers
- Water Network Junctions
- Pressure Monitoring Point
- Fire Hydrant
- Fire Hydrant/Washout

Water Fittings
- Cap
- Reducer
- Tap
- Other Fittings

Sewer Foul Combined Network
- Waste Water Treatment Plant
- Waste Water Pump station

Sewer Mains Irish Water
- Gravity - Combined
- Gravity - Foul
- Gravity - Unknown
- Pumping - Combined
- Pumping - Foul
- Pumping - Unknown
- Syphon - Combined
- Syphon - Foul
- Overflow

Sewer Mains Private
- Gravity - Combined
- Gravity - Foul
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- Pumping - Foul
- Pumping - Unknown
- Syphon - Combined
- Syphon - Foul
- Overflow
- Sewer Lateral Lines
- Sewer Casings

Sewer Manholes
- Standard
- Backdrop
- Cascade
- Catchpit
- Bifurcation
- Hatchbox
- Lamphole
- Hydrobrake
- Other; Unknown

Discharge Type
- Outfall
- Overflow
- Soakaway
- Standard Outlet
- Other; Unknown

Cleanout Type
- Rodding Eye
- Flushing Structure
- Other; Unknown

Sewer Inlets
- Catchpit
- Gully
- Standard
- Other; Unknown

Sewer Fittings
- Vent/Col
- Other; Unknown

Storm Water Network

Surface Water Mains
- Surface Gravity Mains
- Surface Gravity Mains Private
- Surface Water Pressurised Mains
- Surface Water Pressurised Mains Private

Inlet Type
- Gully
- Standard
- Other; Unknown

Storm Manholes
- Standard
- Backdrop
- Cascade
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- Bifurcation
- Hatchbox
- Lamphole
- Hydrobrake
- Other; Unknown
- Storm Culverts
- Storm Clean Outs
- Stormwater Chambers

Discharge Type
- Outfall
- Overflow
- Soakaway
- Other; Unknown

Gas Networks Ireland
- Transmission High Pressure Gasline
- Distribution Medium Pressure Gasline
- Distribution Low Pressure Gasline

ESB Networks

ESB HV Lines
- HV Underground
- HV Overhead
- HV Abandoned

ESB MVLV Lines
- MV Overhead Three Phase
- MV Overhead Single Phase
- LV Overhead Three Phase
- LV Overhead Single Phase
- MVLV Underground
- Abandoned

Non Service Categories
- Proposed
- Under Construction
- Out of Service
- Decommissioned

Water Non Service Assets
- Water Point Feature
- Water Pipe
- Water Structure

Waste Non Service Assets
- Waste Point Feature
- Sewer
- Waste Structure

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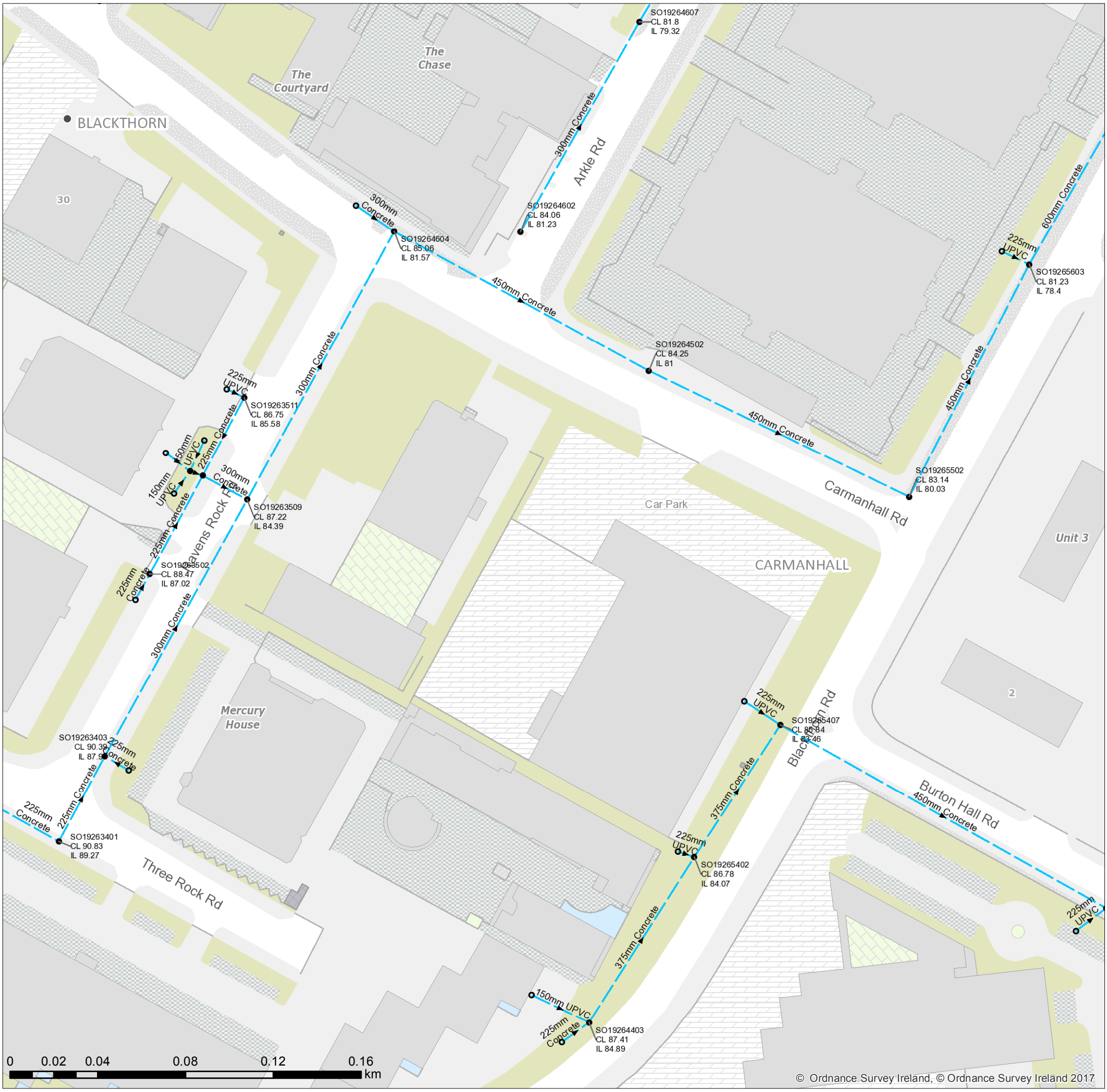
carmanhall road - stormwater



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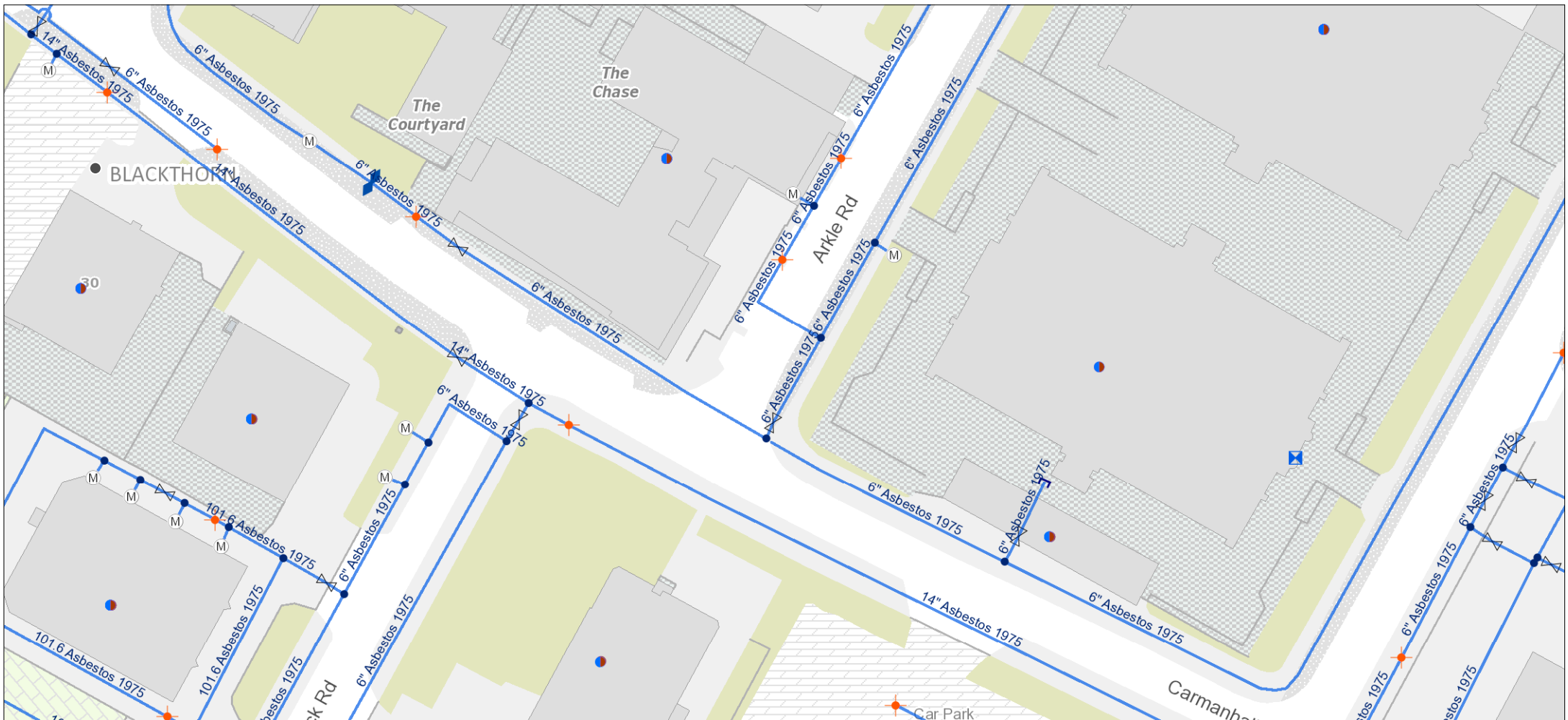
carmanhall road - watermains



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B. Irish Water Pre-Connection Enquiry Response

Jairo Rivero

Block S
Eastpoint Business Park
Alfie Byrne Road
Dublin
D03H3F4
Ireland

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

25 January 2022

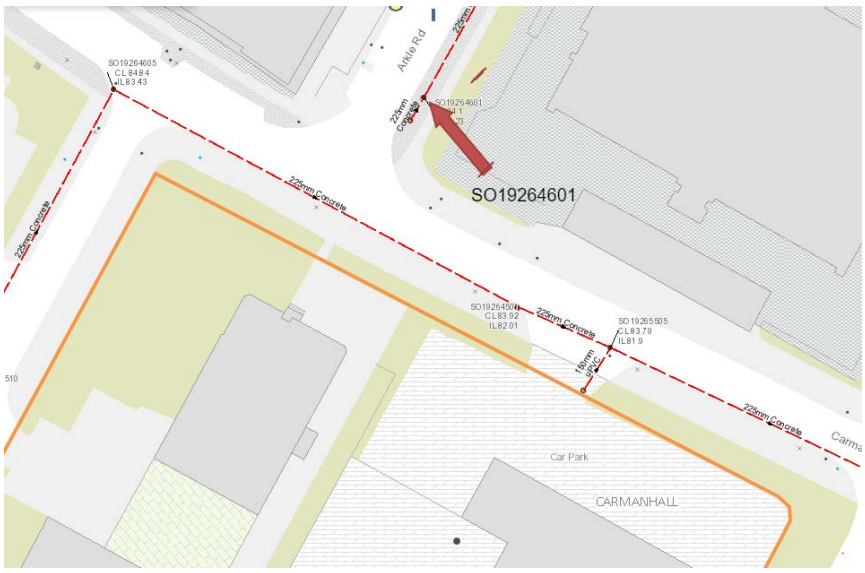
Re: CDS21008079 pre-connection enquiry - Subject to contract | Contract denied

Connection for Housing Development of 550 unit(s) at Ravens Rock Road, Sandyford, Dublin

Dear Sir/Madam,

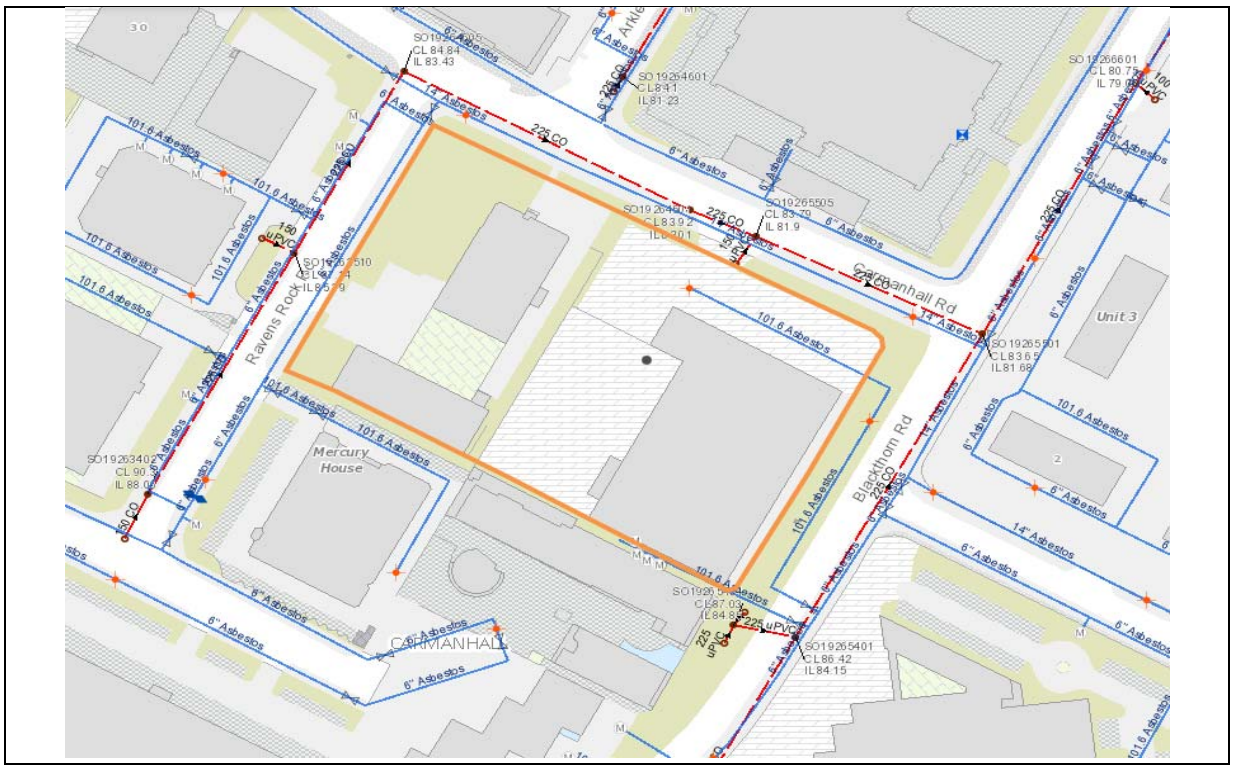
Irish Water has reviewed your pre-connection enquiry in relation to a Water & Wastewater connection at Ravens Rock Road, Sandyford, Dublin (the **Premises**). Based upon the details you have provided with your pre-connection enquiry and on our desk top analysis of the capacity currently available in the Irish Water network(s) as assessed by Irish Water, we wish to advise you that your proposed connection to the Irish Water network(s) can be facilitated at this moment in time.

SERVICE	**OUTCOME OF PRE-CONNECTION ENQUIRY** **THIS IS NOT A CONNECTION OFFER. YOU MUST APPLY FOR A CONNECTION(S) TO THE IRISH WATER NETWORK(S) IF YOU WISH TO PROCEED.**
Water Connection	Feasible without infrastructure upgrade by Irish Water
Wastewater Connection	Feasible without infrastructure upgrade by Irish Water
SITE SPECIFIC COMMENTS	
Water Connection	This Confirmation of Feasibility to connect to the Irish Water infrastructure does not extend to your fire flow requirements. Please note that Irish Water cannot guarantee a flow rate to meet fire flow requirements and in order to guarantee a flow to meet the Fire Authority requirements, you should provide adequate fire storage capacity within your development Connection is feasible to the 14” Asbestos main (Green in below screenshot) to the North of the site. A bulk meter is to be installed on this connection.

	A second connection is feasible to the 6” Asbestos main (Red in below screenshot) to the East of the site. A control valve is to be placed on this main allowing for this connection to be set to closed during normal operations. 
Wastewater Connection	Separate storm and foul water connection services have to be provided for the Development. The surface and storm water from the site must be discharged only into an existing storm water network that does not discharge to an IW combined/foul sewer. The connection arrangement should be agreed with the Local Authority Drainage Division. The connection has to be made to the Arkle Road (MH: SO19264601) network as shown below. A second connection to other sewers adjacent to the site are not feasible based on current constraints in the downstream network. 

The design and construction of the Water & Wastewater pipes and related infrastructure to be installed in this development shall comply with the Irish Water Connections and Developer Services Standard Details and Codes of Practice that are available on the Irish Water website. Irish Water reserves the right to supplement these requirements with Codes of Practice and these will be issued with the connection agreement.

The map included below outlines the current Irish Water infrastructure adjacent to your site:



Reproduced from the Ordnance Survey of Ireland by Permission of the Government. License No. 3-3-34

Whilst every care has been taken in its compilation Irish Water gives this information as to the position of its underground network as a general guide only on the strict understanding that it is based on the best available information provided by each Local Authority in Ireland to Irish Water. Irish Water can assume no responsibility for and give no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided and does not accept any liability whatsoever arising from any errors or omissions. This information should not be relied upon in the event of excavations or any other works being carried out in the vicinity of the Irish Water underground network. The onus is on the parties carrying out excavations or any other works to ensure the exact location of the Irish Water underground network is identified prior to excavations or any other works being carried out. Service connection pipes are not generally shown but their presence should be anticipated.

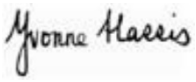
General Notes:

1) The initial assessment referred to above is carried out taking into account water demand and wastewater discharge volumes and infrastructure details on the date of the assessment. **The availability of capacity may change at any date after this assessment.**
2) This feedback does not constitute a contract in whole or in part to provide a connection to any Irish Water infrastructure. All feasibility assessments are subject to the constraints of the Irish Water Capital Investment Plan.

3) The feedback provided is subject to a Connection Agreement/contract being signed at a later date.
4) A Connection Agreement will be required to commencing the connection works associated with the enquiry this can be applied for at https://www.water.ie/connections/get-connected/
5) A Connection Agreement cannot be issued until all statutory approvals are successfully in place.
6) Irish Water Connection Policy/ Charges can be found at https://www.water.ie/connections/information/connection-charges/
7) Please note the Confirmation of Feasibility does not extend to your fire flow requirements.
8) Irish Water is not responsible for the management or disposal of storm water or ground waters. You are advised to contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges
9) To access Irish Water Maps email datarequests@water.ie
10) All works to the Irish Water infrastructure, including works in the Public Space, shall have to be carried out by Irish Water.

If you have any further questions, please contact Kevin McManmon from the design team at kmcmanmon@water.ie For further information, visit **www.water.ie/connections.**

Yours sincerely,



Yvonne Harris

Head of Customer Operations

C. Site Investigation Avid Site

PROPOSED DEVELOPMENT
SANDYFORD DUBLIN
MARLET PROPERTY

AECOM
CONSULTING ENGINEERS

CONTENTS

APPENDICES

FOREWORD

The following Conditions and Notes on Site Investigation Procedures should be read in conjunction with this report.

General.

Recommendations made, and opinions expressed in the 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 for conditions which have not been revealed by exploratory work, or which occur between exploratory hole locations. Whilst the report may suggest the likely configuration of strata, both between exploratory hole locations, or below the maximum depth of the investigation, this is only indicative, and liability cannot be accepted for its accuracy.

Unless specifically stated, no account has been taken of possible subsidence due to mineral extraction below or close to the site.

Boring Procedures.

Unless otherwise stated, the 'Shell and Auger' technique of soft ground boring has been employed. All boring operations sampling and/or logging of soils and in-situ testing complies with the recommendations of the British Standard Code of Practice BS 5930 (1981), 'Site Investigation' and BS 1377:1990, 'Methods of test for soils for civil engineering purposes'.

Whilst the technique allows the maximum data to be obtained in soft ground, some disturbance and variation of soft and layered soils is unavoidable. 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.

Where peat has been encountered during siteworks, samples have been logged in accordance with the Von Post Classification (ref. Von Post, L. 1992. Sveriges Gologiska Undersoknings torvinventering och nogra av dess hittils vunna resultat (SGU peat inventory and some preliminary results) Svenska Mosskulturforeningens Tidskrift, Jonkoping, Swedden, 36, 1-37 & Hobbs N. B. Mire morphology and the properties of some British and foreign peats. QJEG, Vol. 19, 1986).

Routine Sampling.

Undisturbed samples of soils, predominantly cohesive in nature are obtained unless otherwise stated by a 104mm diameter open-drive tube sampler. In granular soils, and where undisturbed sampling is inappropriate, disturbed samples are collected. Smaller disturbed samples are also recovered at intervals to allow a visual examination of the full strata section.

In-Situ Testing.

Standard penetration tests, utilising either the standard split spoon sampler or solid cone and automatic trip-hammer are conducted unless otherwise where required by instruction. Subsequent to a seating drive of 150mm, a summation for the number of blows for 300mm penetration is recorded on the boring records together with the blow count for each 75mm penetration. In cases where incomplete penetration is obtained, the number of blows for the recorded value of penetration are noted. In coarse granular soils, a cone end is fitted to the sampler and a similar procedure adopted.

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 condition, tidal variation or other causes.

Retention of Samples.

After satisfactory completion of all the scheduled laboratory tests on any sample, the remaining material is discarded unless a period of retention of samples is agreed, it is our normal practice to discard all soil samples one month after submission of our final report.

REPORT ON A SITE INVESTIGATION
AT
FORMER AVID SITE

SANDYFORD
FOR

MARLET PROPERTY GROUP
AECOM CONSULTING ENGINEERS

Report No. 22455 **JUNE 2020**

I Introduction

A new multi-storey residential development is proposed for this site located at the junction of Blackthorn Road and Carmanhall Road in Sandyford. The site was formerly occupied by AVID, the old buildings have all been demolished and the area prepared for this new development.

An investigation of sub soil conditions in the developments area has been carried out by IGSL under the direction of AECOM Consulting Engineers, acting for the developers, MARLET Property Group.

The scope of works scheduled and completed is detailed below:

*	Cable Percussion Boreholes	4 nr.
•	Rotary Core Drilling	2 nr.
•	Trial Pits	12 nr.
•	CBR by Plate Test	1 nr.
•	Infiltration Test	2 nr.
•	Water and Gas Monitoring	
•	Geotechnical Laboratory Tests	
•	Environmental Laboratory Tests	

The investigation has been carried out in accordance with the various standards outlined in the foreword to this document. Field operations were completed in March 2020.

This report includes all factual data from field operations and laboratory including detailed geotechnical logs and laboratory data.

Recommendations for foundation construction are also presented in this report.

II Fieldwork

The development area is Brownfield following demolition of buildings and site preparation works. The surfaces ranged from hard-core fill to tarmac and topsoil.

The various exploratory locations are noted on the drawing enclosed in Appendix VII. This drawing was provided by AECOM. Each location was set out to the specified co-ordinates by IGSL site personnel.

All exploratory positions were scanned electronically (CAT) to ensure that existing services were not damaged. Hand excavation was also carried out to a depth of 1.00 metres at borehole locations to ensure that underground services were not damaged.

The various exploratory methods are discussed in the following paragraphs.

Boreholes

Boreholes were 200mm diameter and were constructed using conventional cable percussion equipment. Holes were referenced BH01 to BH04 and were located at the four corners of the site

Detailed geotechnical records are contained in Appendix I to this report - the records give details of stratification, sampling, in-situ testing and groundwater. Note is also taken of any obstructions to normal boring requiring the use of the heavy chisel for advancement. It was not possible to recover undisturbed samples because of the high stone/cobble content of the strata encountered.

The findings at the four locations are quite consistent. Surface FILL extends to depths ranging from 1.00 to 1.90 metres.

In all four boreholes stiff to very stiff brown and grey sandy gravelly CLAY is present below the FILL Boreholes continued in this stratum to refusal on obstructions at depths ranging from 7.30 to 11.20 metres. An increasing strength with penetration depth has been noted. Cobbles and boulders were present in the gravelly clay stratum.

This gravelly clay is GLACIAL TILL or BOULDER CLAY, very typical of the greater Dublin area.

BH02 and BH04 were dry during boring while slow to moderate water seepages were noted at 3.30 metres in BH01 and 3.10 metres in BH03. Slotted standpipes were installed in BH01 and BH02 to facilitate long term observation of ground water and permit measurement of any gas present.

Rotary Core Drilling

Rotary core drilling was scheduled at two locations to advance hole depth and establish bedrock horizon. These holes were bored through the boulder clay deposits to the underlying granite bedrock. Rotary holes were designated RC02 and RC04.

A GEO405 rig was used to drill and recover 78mm diameter core of rock using triple tube diamond drilling technique. Open-hole Symmetrix Drilling was used in the overburden soils

All recovered core was returned to the laboratory for detailed logging and photography. The geotechnical core logs are contained in Appendix II. The logs note Total Core Recovery (TCR), Solid Core Recovery (SCR), Rock Quality Designation (RQD) as well as presenting a fracture spacing log and detailed geological description.

The drilling was advanced through overburden described as stiff brown and black very gravelly clay with cobbles and boulders throughout.

Weak to Medium Strong grey GRANITE was noted in RC02 at 8.70 metres BGL and 100% core was recovered from 8.70 to 11.70 metres. This core was quite fractured with low SCR and RQD values.

At RC04 very weathered GRANITE was noted at 11.10 metres BGL. Drilling continued to 14.80 metres with only limited recovery of solid core in this location.

Sub samples of the recovered core were taken and sent to the materials laboratory for Point Load Strength Tests.

A 50mm slotted PVC standpipe was installed in both locations with gravel surround and surface seal, details of the installations are provided on the drilling record. Water was noted at final standing levels of 2.20 and 1.32 metres BGL .

Trial Pits

Trial Pits were excavated at twelve locations to establish stratification and permit sample recovery for environmental analysis. Trial Pits are referenced TP01 to TP12 and fully detailed records are presented in Appendix III. Photographs were also taken at each trial pit and these are also attached for record purposes.

The pits reflect a very high degree of consistency with FILL in all locations (varying from 0.30 to 1.20 metres in thickness) overlying stiff to very stiff BOULDER CLAY. All trial pits were completed at 3.00 metres and no ground water was encountered during the course of the investigation, other than a minor seepage at 2.00 metres in TP01. Excavations remained stable throughout.

Trial Pits were backfilled with compacted excavated material and the areas levelled.

Plate Bearing Test

The CBR value of the soil at shallow depth was established at one locations using Plate Bearing Test Apparatus. A steel plate is loaded and off-loaded incrementally over two stages and the deflection under load and recovery under off-load is measured by a system of dial gauges. The data is processed and load settlement graphs are prepared. An equivalent CBR value is calculated in accordance with NRA HD25-26/10.

The test was carried out at 0.50 metres on MADE GROUND. An equivalent CBR value of 10% was obtained on the Load Cycle, increasing considerably on re-load.

Test data sheets are presented in Appendix IV.

Infiltration Tests

Two infiltration tests were carried out in accordance with BRE Digest 365 in the specified locations. Test data is presented in Appendix V.

In both locations no fall in water table was noted over the specified period and a ZERO Infiltration Rate was recorded. The results are typical of the very low permeability boulder clays present on the site and in the general area.

The use of the local authority drainage system for disposal of storm and surface water is therefore recommended.

Water and Gas Monitoring

Standpipes were installed in four locations to facilitate long term monitoring of ground water levels and determine gas concentrations. Measurements were carried out at intervals following site completion.

Details are presented in Appendix VIc. Final standing water level has stabilised at approximately 2.00 metres BGL.

Concentrations of CO2, O2, and CH4 are negligible and no safety issues arise in this regard.

III. Testing

a) In-Situ :

Standard penetration tests were carried out at approximate 1.00 metre intervals in the geotechnical boreholes to measure relative in-situ soil strength. Tests were also carried out in the rotary holes. N values are noted in the right hand column of the individual records, representing the blow count required to drive the standard sampler 300mm into the soil, following initial seating blows. Where full test penetration was not achieved the blow count for a specific penetration is recorded, or refusal is indicated where appropriate. Results are summarised as follows.

Stratum / Depth	**N Value Range**	**Comment**
FILL DEPOSITS	14 to 17	Medium Dense
BOULDER CLAY		
2.00 metres BGL	21 to 32	Stiff
3.00 metres BGL	18 to 32	Stiff
4.00 metres BGL	28 to 43	Stiff to Very Stiff
5.00 metres BGL	35 to 42	Very Stiff
6.00 metres BGL	36 to 43	Very Stiff
7.00 metres BGL	39 to +50	Very Stiff to Hard
8.00 to 10.00	40 to +50	Very Stiff to Hard

Refusal of SPT apparatus was recorded at the base of each borehole possibly indicative of the granite bedrock horizon.

(b) Laboratory :

A programme of laboratory testing was scheduled following completion of site operations. Geotechnical soil and rock testing was carried out by IGSL in its INAB-Accredited laboratory. Chemical testing was performed by CHEMTEST in a UKAS accredited laboratory.

The overall test programme included the following elements:

*	Moisture Content	IGSL
•	Liquid and Plastic Limits	IGSL
•	PSD Grading by wet sieve	IGSL
•	PSD Grading by Hydrometer	IGSL
•	Point Load Test on Rock Core	IGSL
•	Sulphate Chloride and pH	CHEMTEST
•	RILTA Suite Environmental	CHEMTEST

All test data is presented in Appendices VIa and VIb. and individual test results are discussed as follows:

Classification / Moisture Content

Six samples of the gravelly CLAY stratum from the boreholes had index properties established. Results consistently fall into Zone CL of the standard Classification, indicative of low plasticity sensitive clay matrix soils. Moisture content for the samples ranges from 11% to 17%. Results are typical of the local boulder clay.

Grading

Wet sieve analysis and hydrometer was used to establish PSD grading curves for four samples of the glacial till. The graphs reflect material graded smoothly from the clay to gravel fraction, the straight-line pattern of the graphs is typical of the local boulder clay deposition.

Point Load Test

The strength of the limestone bedrock has been established by Diametric Point Load Tests on four segments of core. Equivalent UCS values ranging from 4 to 40 MPa with an average UCS value of 23 MPa. The low results reflect the highly weathered and weak nature of the bedrock.

Chemical (BRE SOI Suite)

Five soil samples were selected for sulphate, Chloride and pH analysis. Sulphate concentrations (SO4 2:1 extract) of < 0.010 g/l were established with pH values of 8.4 to 8.7. Chloride contents were also consistently low <0.010 g/l. A sulphate design class of DS-1 (ACEC Classification for Concrete) is indicated for sulphate concentrations less than 0.5 g/l. No special precautions are therefore required to protect foundation concrete from sulphate or chloride aggression.

RILTA Suite Environmental

Sixteen samples of the MADE GROUND taken at 0.50 to 1.00 metre from each trial pit were submitted for detailed analysis to RILTA Suite (WAC) parameters.

Fifteen of the sixteen samples are classified as INERT with no elevated contaminant levels established.

In one sample however (TP05 @ 0.50m BGL) an elevated sulphate content was recorded, in excess of the permitted INERT limit. The remaining levels recorded in this sample were all below the INERT levels.

No traces of Asbestos were noted during routine screening.

IV Discussion:

A new multi-storey residential development is to be undertaken on this site in Sandyford. The nine-storey building will incorporate a single storey basement car park. A formation depth some 3.50 to 4.00 metres BGL is envisaged.

A detailed investigation of sub soil and bedrock conditions has been carried out under the direction of AECOM Consulting Engineers on behalf of MARLET Property Group.

Summary Stratification

The findings are very consistent and confirm the presence of shallow surface FILL over BOULDER CLAY deposits with GRANITE bedrock encountered at depth between approximately 9.00 and 11.00 metres.

The FILL extends to a maximum depth of about 1.50 metres and is firm or medium dense in situ, with N values in the range 14 to 17 and an in situ CBR value of 10%.

The BOULDER CLAY or glacial till comprises stiff to hard brown, grey and black sandy gravelly CLAY typically containing cobbles and boulders. SPT values increase with depth from about N=20 at 2.00 metres BGL to N > 50 below 7.00 metres.

The characteristics of the Dublin boulder clay are very well documented and the laboratory data for this site is consistent with the published data.

Ground water seepages were noted in several locations and long term water observations in standpipes indicates a final standing level of about 1.50 metres BGL for this site.

Variation in the general grading pattern of the till can occur, with an elevated granular content and increased moisture content often identified. Bands of water bearing clayey gravel can also typically occur within the generally cohesive soils.

Proposed Development

With regard to the proposed development (incorporating multi-storey construction over basement) the following geotechnical issues are discussed.

- Foundations / Bearing Capacity
- Piling
- Basement Construction
- Excavation / Ground Retention
- Groundwater Control / Uplift

Foundations / Bearing Capacity

At an assumed basement formation depth of 4.00 metres BGL, the sub soils consist of very stiff to hard dark brown or grey gravelly CLAY (Boulder Clay). SPT values at this depth range from N=28 to N=43 with an average value of N=36.

The boulder clay at 4.00 metres BGL should readily support an allowable bearing pressure of the order of 325 KPa for basement slab or column base construction.

N values at 5.00 metre BGL show an increase, with an allowable bearing pressure of the order of 375 KPa recommended at this depth.

The characteristics of the local boulder clay are well documented with numerous publications detailing behavioural and strength / settlement characteristics. The field and laboratory findings from this site are consistent with the extensive local data. The boulder clay will be sensitive to moisture content variation and should be protected from rainfall by blinding. Visual inspection of excavated formation by experienced personnel is also recommended to ensure uniformity and suitability of the founding medium. Any soft zones encountered should be removed and replaced with low-grade concrete.

Settlement in the very stiff to hard glacial till under the above loads should not exceed 5mm and differential movement should be negligible.

Piling

Should direct excavation to a suitable bearing stratum prove uneconomic from either an engineering or environmental viewpoint, the use of piling techniques can be considered.

Various piling techniques are available with specialist contractors, experienced in local ground conditions available to provide this service.

The stiff to hard black till encountered at about 2.00 metres extends to bedrock horizon at about 10.00 metres and can be used as founding medium for light to moderately loaded piles.

For multi-storey structures with high column loads it is likely that large diameter piles, rock socketed into the granite bedrock will be required.

Proof core drilling has indicated the presence of highly weathered non-intact granite at the soil rock interface, in excess of 3.00 metres in places.

Piling contractors should be consulted to determine the optimum solution for this site, having regard to the geotechnical data and to any possible environmental restraints.

Basement Construction

As a basement will be incorporated over the full footprint the very stiff to hard lodgement till at approximately 3.50 to 4.00 metres BGL is recommended as founding medium with an allowable bearing pressure of 300 to 350 KPa indicated by SPT values averaging N=36.

Settlement under this intensity of load will be low (< 5mm) and differential settlement will be negligible.

Excavation / Ground Retention

Assuming 4.00 metre deep basement construction a retaining wall structure will probably be required to support the soils, prevent undermining of sensitive adjoining buildings or roadways and preclude ground water ingress.

A number of ground retention techniques are available and each should be fully evaluated. These include the following:

- Steel Sheet Pile Wall
- Secant Pile Wall
- King Post Wall

Specialist contractors with will advise on the most suitable and economic option for this development.

Groundwater

Water ingress was noted in two of the boreholes at approximately 3.00 metres. The inflow was slight to moderate and control of ground water in basement excavation should be readily achieved by conventional pumping from local sumps.

Long-term water observation in standpipes has indicated a final standing level at approximately 2.00 metres BGL and this figure should be adopted in design against uplift.

Roads / Car Parking

A CBR value of 10% was obtained at 0.50 metres BG in the upper medium dense FILL. This should be suitable for pavement design. Visual inspection of pavement formation is recommended to ensure that all suspect or organic material is removed prior to construction.

Infiltration

Two percolation tests to BRE Digest 365 confirmed that the soils are unsuitable for dispersion of storm and surface water. The Local Authority drainage system should be utilised.

Environmental

The results of WAC analyses showed that one sample failed to satisfy the criteria for Inert waste as stipulated by the European Landfill Directive. The fact that only one element of one test out of sixteen analysed exceeded the INERT level, suggests that consultation with landfill operators may well result in acceptance of excavated material from this site.

The results of the RILTA Suite tests can be used to carry out a full Waste Characterisation Assessment (WCA). This assessment is carried out by an environmental specialist and determines whether the soils are Hazardous or Non-Hazardous in advance of being despatched to landfill. Given the test results a WCA may be relevant to this site and may be required by the landfill operators in the event of major excavation.

Concrete

Low sulphate and chloride contents were established with near neutral pH values. No special precautions are deemed necessary to protect foundation concrete.

IGSL/JC
June 2020

Appendix I Boring Records

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22455

CONTRACT	Avid Site, Sandyford	BOREHOLE NO.	BH1
		SHEET	Sheet 1 of 1
CO-ORDINATES		RIG TYPE	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)		BOREHOLE DEPTH (m)	7.30
		DATE COMMENCED	24/03/2020
		DATE COMPLETED	25/03/2020
CLIENT	Marlet	SPT HAMMER REF. NO.	
ENGINEER	AECOM	ENERGY RATIO (%)	
		BORED BY	W.Cahill
		PROCESSED BY	I.Reder

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL			0.20						
	MADE GROUND (comprised of angular broken rock fill)			0.60						
	MADE GROUND (Comprised of gravelly clay with some stone)			1.00						
1	Firm to stiff, dark brown, sandy silty CLAY with some gravel and occasional cobbles				AA135559	B	1.00		N = 17 (6, 7, 4, 4, 4, 5)	
2					AA135560	B	2.00		N = 21 (4, 4, 5, 5, 5, 6)	
				2.50						
	Stiff, dark grey, sandy silty gravelly CLAY with occasional cobbles									
3					AA135561	B	3.00		N = 26 (4, 5, 6, 6, 7, 7)	
4					AA135562	B	4.00		N = 33 (6, 7, 7, 8, 8, 10)	
				4.30						
	Very stiff, brown, sandy gravelly silty CLAY with many subangular to subrounded cobbles and boulders									
5					AA135563	B	5.00		N = 35 (4, 6, 7, 8, 8, 12)	
6					AA135564	B	6.00		N = 40 (7, 8, 8, 9, 11, 12)	
7					AA135565	B	7.00		N = 50/40 mm (25, 50)	
				7.30						
	Obstruction End of Borehole at 7.30 m									
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.8	5.1	0.75	
7.2	7.3	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.80	3.80	5.00	1.70	20	Moderate

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
25-03-20	7.30	1.00	7.00	50mm SP

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS Hand dug inspection pit for services

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

IGSL BH LOG 22455.GPJ IGSL.GDT 29/5/20

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22455

CONTRACT	Avid Site, Sandyford	BOREHOLE NO.	BH2
		SHEET	Sheet 1 of 1
CO-ORDINATES	RIG TYPE Dando 2000	DATE COMMENCED	26/03/2020
GROUND LEVEL (m AOD)	BOREHOLE DIAMETER (mm) 200	DATE COMPLETED	27/03/2020
	BOREHOLE DEPTH (m) 8.50		
CLIENT Marlet	SPT HAMMER REF. NO.	BORED BY	W.Cahill
ENGINEER AECOM	ENERGY RATIO (%)	PROCESSED BY	I.Reder

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TOPSOIL			0.05						
	Firm, dark brown, sandy silty CLAY with occasional gravel and cobbles (Possibly Made Ground)				SPL1	B	1.00		N = 16 (2, 2, 4, 3, 5, 4)	
				1.90						
2	Stiff to very stiff , dark grey, sandy gravelly silty CLAY with cobbles				SPL2	B	2.00		N = 23 (4, 5, 5, 5, 6, 7)	
3					SPL3	B	3.00		N = 32 (5, 7, 7, 8, 8, 9)	
				3.80						
4	Very stiff, light brown, very sandy CLAY with some gravel				SPL4	B	4.00		N = 43 (6, 8, 10, 10, 11, 12)	
5					SPL5	B	5.00		N = 42 (9, 10, 10, 10, 11, 11)	
				5.40						
	Very stiff to hard , grey and grey/brown, sandy gravelly silty CLAY with many subangular to subrounded cobbles and boulders									
6					SPL6	B	6.00		N = 44 (8, 9, 9, 10, 11, 14)	
7					SPL7	B	7.00		N = 39 (6, 8, 8, 9, 10, 12)	
8					SPL8	B	8.20		N = 50/75 mm (12, 16, 32, 18)	
				8.50						
	Obstruction End of Borehole at 8.50 m									
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.7	4.9	1.25	
8.3	8.5	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
27-03-20	8.50	1.00	8.50	50mm SP

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
27-03-20	5.40	5.40	0.30	

REMARKS Hand dug inspection pit for services

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

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GEOTECHNICAL BORING RECORD

REPORT NUMBER 22455

CONTRACT	Avid Site, Sandyford	BOREHOLE NO.	BH3
		SHEET	Sheet 1 of 1
CO-ORDINATES		RIG TYPE	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)		BOREHOLE DEPTH (m)	8.30
		DATE COMMENCED	23/03/2020
		DATE COMPLETED	24/03/2020
CLIENT	Marlet	SPT HAMMER REF. NO.	
ENGINEER	AECOM	ENERGY RATIO (%)	
		BORED BY	W.Cahill
		PROCESSED BY	I.Reder

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TARMAC			0.15						
	MADE GROUND (comprised of angular gravel - C.L.804)			0.30						
1	MADE GROUND (Comprised of brown sandy gravelly clay fill with some brick and concrete fragments)			1.20	AA135551	B	1.00		N = 14 (2, 2, 3, 3, 4, 4)	
2	Stiff grey/brown sandy silty CLAY with some gravel and occasional cobbles				AA135552	B	2.00		N = 20 (3, 4, 4, 5, 6, 5)	
3					AA135553	B	3.00		N = 18 (3, 4, 5, 5, 4, 4)	
				3.90						
4	Very stiff dark brown gravelly CLAY				AA135554	B	4.00		N = 50/210 mm (6, 14, 14, 20, 16)	
5					AA135555	B	5.00		N = 35 (5, 6, 8, 8, 9, 10)	
6					AA135556	B	6.00		N = 36 (6, 7, 7, 8, 10, 11)	
				6.40						
7	Very stiff, brown and grey/brown, sandy gravelly silty CLAY with many subangular to subrounded cobbles and boulders				AA135557	B	7.00		N = 40 (7, 8, 10, 10, 9, 11)	
8					AA135558	B	8.00		N = 50/75 mm (10, 14, 46, 4)	
				8.30						
9	Obstruction End of Borehole at 8.30 m									

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
4.2	4.5	1	
8	8.3	2	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
3.10	3.10	4.20	1.60	20	Moderate

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

REMARKS Hand dug inspection pit for services

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

IGSL BH LOG 22455.GPJ IGSL.GDT 29/5/20

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22455

CONTRACT	Avid Site, Sandyford	BOREHOLE NO.	BH4
		SHEET	Sheet 1 of 2
CO-ORDINATES		RIG TYPE	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)		BOREHOLE DEPTH (m)	11.20
		DATE COMMENCED	20/03/2020
		DATE COMPLETED	23/03/2020
CLIENT	Marlet	SPT HAMMER REF. NO.	
ENGINEER	AECOM	ENERGY RATIO (%)	
		BORED BY	W.Cahill
		PROCESSED BY	I.Reder

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
0	TARMAC			0.15						
	MADE GROUND (comprised of angular gravel - C.L.804)			0.30						
1	Firm to stiff, dark brown, sandy silty CLAY with some gravel (Possibly Made Ground)			1.80	AA130581	B	1.00		N = 17 (2, 3, 4, 4, 4, 5)	
2	Very stiff, dark brown/black, sandy silty gravelly CLAY			3.10	AA130582	B	2.00		N = 32 (5, 6, 8, 8, 7, 9)	
3	Stiff, dark brown, very sandy gravelly CLAY with some cobbles			4.20	AA130583	B	3.00		N = 24 (3, 4, 4, 6, 7, 7)	
4	Stiff to very stiff, brown and brown/grey, sandy gravelly silty CLAY with many cobbles and occasional boulders				AA130584	B	4.00		N = 28 (4, 5, 6, 7, 7, 8)	
5					AA130585	B	5.00		N = 35 (6, 8, 8, 9, 9, 9)	
6					AA130586	B	6.00		N = 43 (6, 8, 10, 10, 11, 12)	
7					AA130587	B	7.00		N = 42 (7, 9, 9, 10, 12, 11)	
8					AA130158	B	8.00		N = 41 (6, 7, 9, 11, 10, 11)	
9					AA130589	B	9.00		N = 43 (7, 9, 10, 11, 10, 12)	

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.3	2.5	1.25	
6.4	6.7	0.75	
10.9	11.2	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
20-03-20	4.50	4.50	DRY	
23-03-20	4.50	4.50	1.70	

REMARKS Hand dug inspection pit for services

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

IGSL BH LOG 22455.GPJ IGSL.GDT 29/5/20

GEOTECHNICAL BORING RECORD

REPORT NUMBER 22455

CONTRACT	Avid Site, Sandyford	BOREHOLE NO.	BH4
		SHEET	Sheet 2 of 2
CO-ORDINATES	RIG TYPE Dando 2000	DATE COMMENCED	20/03/2020
GROUND LEVEL (m AOD)	BOREHOLE DIAMETER (mm) 200 BOREHOLE DEPTH (m) 11.20	DATE COMPLETED	23/03/2020
CLIENT Marlet	SPT HAMMER REF. NO.	BORED BY	W.Cahill
ENGINEER AECOM	ENERGY RATIO (%)	PROCESSED BY	I.Reder

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Sample Type	Depth (m)	Recovery	Field Test Results	Standpipe Details
10	Stiff to very stiff, brown and brown/grey, sandy gravelly silty CLAY with many cobbles and occasional boulders *(continued)*				AA130590	B	10.00		N = 46 (8, 8, 10, 10, 12, 14)	
11				11.20	AA130591	B	11.00		N = 50/95 mm (13, 12, 27, 23)	
	Obstruction End of Borehole at 11.20 m									
12										
13										
14										
15										
16										
17										
18										
19										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.3	2.5	1.25	
6.4	6.7	0.75	
10.9	11.2	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 Hand dug inspection pit for services

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

IGSL BH LOG 22455.GPJ IGSL.GDT 29/5/20

Appendix II Rotary Core Records

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22455

CONTRACT	Avid Site, Sandyford	DRILLHOLE NO	RC02
		SHEET	Sheet 1 of 2
CO-ORDINATES		DATE COMMENCED	11/03/2020
GROUND LEVEL (mOD)		DATE COMPLETED	12/03/2020
CLIENT	Marlet	DRILLED BY	IGSL
ENGINEER	AECOM	LOGGED BY	D.O'Shea
RIG TYPE	Geo405		
FLUSH	Air/Mist		
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		

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								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND consisting of clayey gravel	0.70			
1								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown black silty sandy gravelly CLAY	1.80			
2								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown clayey sandy GRAVEL	2.30			
3								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown black gravelly CLAY				
4												
5												
6												
7												
8	8.70							SYMMETRIX DRILLING: No recovery, observed by driller as returns of probable weathered ROCK	8.10 / 8.70			
9	9.30	100	100	85								

REMARKS

Hole cased 0.00-8.70m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
12-03-20	11.70	8.10	11.70	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL RC FI 10M 22455.GPJ IGSL.GDT 16/4/20

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22455

CONTRACT	Avid Site, Sandyford
DRILLHOLE NO	**RC02**
SHEET	Sheet 2 of 2
CO-ORDINATES	
GROUND LEVEL (mOD)	
RIG TYPE	Geo405
FLUSH	Air/Mist
DATE COMMENCED	11/03/2020
DATE COMPLETED	12/03/2020
CLIENT	Marlet
INCLINATION (deg)	-90
DRILLED BY	IGSL
ENGINEER	AECOM
CORE DIAMETER (mm)	78
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		100	0	0				Medium strong (where competent) to predominantly weak, massive to structureless, crystalline, grey/black/white mottled, fine to medium-grained, GRANITE, slightly to predominantly highly weathered (contributing to coreloss at 9.30-10.70m, 11.32-11.38m & 11.46-11.70m).				
	10.70											
11		100	25	19				Discontinuities are rough, irregular. Apertures are open, commonly sandy clay-smeared. Dips are irregular. *(continued)*				
	11.70								11.70			
12								End of Borehole at 11.70 m				
13												
14												
15												
16												
17												
18												
19												

REMARKS

Hole cased 0.00-8.70m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
12-03-20	11.70	8.10	11.70	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
12-03-20	11.70	8.70	9.00	Water level recorded 10mins after end of drilling

IGSL RC FI 10M 22455.GPJ IGSL.GDT 16/4/20

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22455

CONTRACT	Avid Site, Sandyford	DRILLHOLE NO	RC04
		SHEET	Sheet 1 of 2
CO-ORDINATES		DATE COMMENCED	10/03/2020
GROUND LEVEL (mOD)		DATE COMPLETED	11/03/2020
CLIENT	Marlet	DRILLED BY	IGSL
ENGINEER	AECOM	LOGGED BY	D.O'Shea
RIG TYPE	Geo405		
FLUSH	Air/Mist		
INCLINATION (deg)	-90		
CORE DIAMETER (mm)	78		

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								SYMMETRIX DRILLING: No recovery, observed by driller as returns of MADE GROUND consisting of clayey gravel	0.90			
1								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown black sandy gravelly CLAY	2.20			
2								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown clayey sandy GRAVEL	3.20			
3								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown black silty sandy gravelly CLAY with occasional cobbles				
4												
5												
6												
7												
8												
9									9.40			
								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown black silty sandy gravelly CLAY				

REMARKS

Hole cased 0.00-11.30m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To ↓	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
11-03-20	14.80	11.10	0.00	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

IGSL RC FI 10M 22455.GPJ IGSL.GDT 16/4/20

GEOTECHNICAL CORE LOG RECORD

REPORT NUMBER 22455

CONTRACT	Avid Site, Sandyford
DRILLHOLE NO	RC04
SHEET	Sheet 2 of 2
CO-ORDINATES	
GROUND LEVEL (mOD)	
RIG TYPE	Geo405
FLUSH	Air/Mist
INCLINATION (deg)	-90
CORE DIAMETER (mm)	78
DATE COMMENCED	10/03/2020
DATE COMPLETED	11/03/2020
CLIENT	Marlet
ENGINEER	AECOM
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								SYMMETRIX DRILLING: No recovery, observed by driller as returns of grey brown sandy gravelly CLAY	10.10			
11								SYMMETRIX DRILLING: No recovery, observed by driller as returns of probable weathered ROCK	11.10			
12	12.60								12.60			
13		32	10	0				Probable Weathered ROCK - recovered as sandy gravelly cobbles of GRANITE - Non intact				
14	14.80								14.80			
15								End of Borehole at 14.80 m				
16												
17												
18												
19												

REMARKS

Hole cased 0.00-11.30m

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
					No water strike recorded

INSTALLATION DETAILS

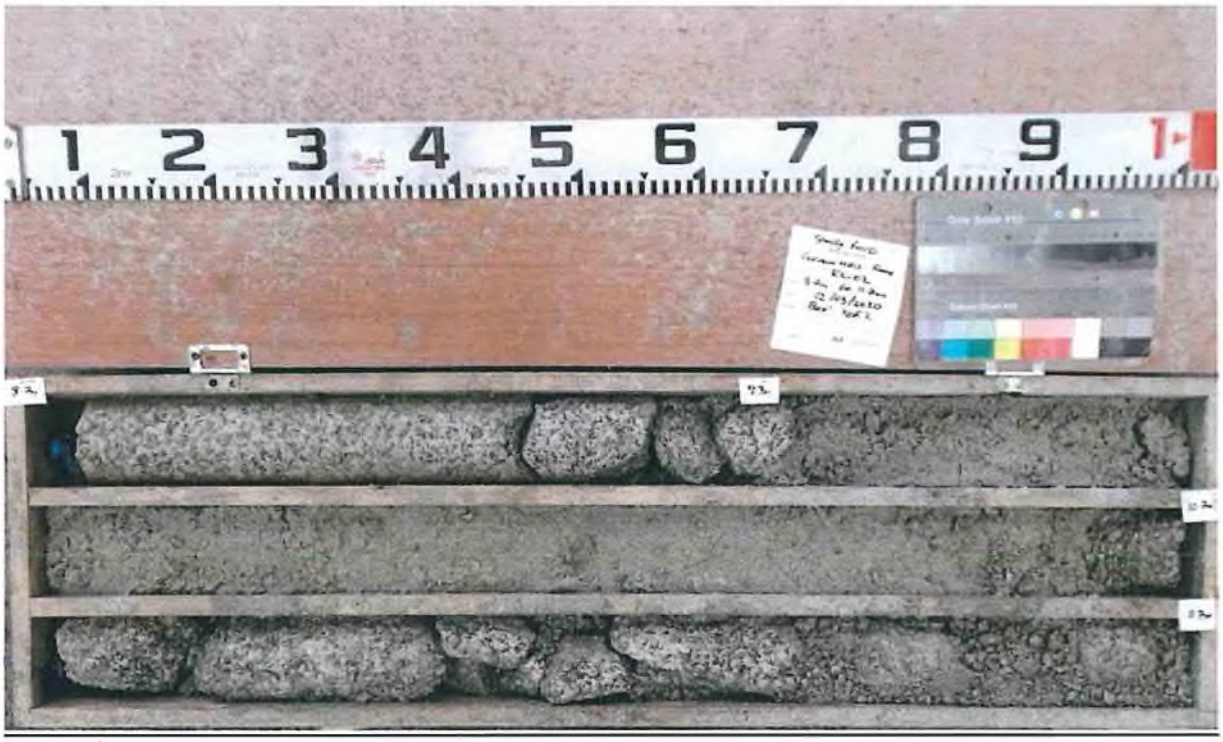
Date	Tip Depth	RZ Top	RZ Base	Type
11-03-20	14.80	11.10	0.00	50mm SP

GROUNDWATER DETAILS

Date	Hole Depth	Casing Depth	Depth to Water	Comments
11-03-20	14.80	11.30	1.80	Water level recorded 10mins after end of drilling

IGSL RC FI 10M 22455.GPJ IGSL.GDT 16/4/20

RC02 – Box 1 of 1 – 8.70-11.70m



RC04 – Box 1 of 1 – 12.60-14.80m

Appendix III Trial Pit Records

TRIAL PIT RECORD

REPORT NUMBER 22455

CONTRACT	Avid Residential Development - Avid Site , Sandyford , Dublin	TRIAL PIT NO.	Tp01
		SHEET	Sheet 1 of 1
LOGGED BY	S.Hannon	CO-ORDINATES	
		DATE STARTED	10/03/2020
		DATE COMPLETED	10/03/2020
CLIENT	Marlet Property Groupd	GROUND LEVEL (m)	
ENGINEER	Aecom	EXCAVATION METHOD	JCB

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 - Tar		0.10							
MADE GROUND - Dense sandy gravel. Gravels are fine to coarse and angular to sub rounded.		0.30							
MADE GROUND - Dense gravel with a high cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.		0.50			AA131830	B	0.50		
Stiff grey light brown slightly silty very gravelly CLAY with high cobble content and low boulder content. Gravels are fine to coarse and gravels cobbles and boulders are angular to sub rounded. Possible made ground.									
1.0 Stiff grey light brown slightly silty very gravelly CLAY with high cobble content and low boulder content. Gravels are fine to coarse and gravels cobbles and boulders are angular to sub rounded.		1.10			AA131831	B	1.00		
2.0					AA131832	B	2.00		
Stiff - very stiff dark grey slightly silty very gravelly CLAY with medium cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.		2.50			AA131833	B	2.80		
3.0 End of Trial Pit at 3.00m		3.00							
4.0									

Groundwater Conditions
Seepage at 2 m.

Stability
Stable

General Remarks
CAT scanned location for services

IGSL TP LOG 22455.GPJ IGSL.GDT 23/3/20

TRIAL PIT RECORD

REPORT NUMBER 22455

CONTRACT	Avid Residential Development - Avid Site , Sandyford , Dublin	TRIAL PIT NO.	Tp02
		SHEET	Sheet 1 of 1
LOGGED BY	S.Hannon	DATE STARTED	10/03/2020
	CO-ORDINATES	DATE COMPLETED	10/03/2020
CLIENT	Marlet Property Groupd	EXCAVATION METHOD	JCB
ENGINEER	Aecom	GROUND LEVEL (m)	

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 - very clayey gravel with occasional wood, plastic, concrete and metal pieces. Gravels are fine to coarse and angular to sub rounded.		0.40							
Firm - stiff dark brown slightly silty gravelly CLAY. Gravels are fine to coarse and angular to sub rounded. Possible made ground.					AA131834	B	0.50		
1.0		1.10							
Stiff dark brown very gravelly CLAY with high cobble content and low boulder content. Gravels are fine to coarse and gravels cobbles and boulders are angular to sub rounded.					AA131835	B	1.10		
2.0					AA131836	B	2.20		
Stiff - very stiff dark grey gravelly CLAY with medium cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.		2.80							
3.0 End of Trial Pit at 3.00m		3.00			AA1318337	B	3.00		
4.0									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
CAT scanned location for services

IGSL TP LOG 22455.GPJ IGSL.GDT 23/3/20

TRIAL PIT RECORD

REPORT NUMBER 22455

CONTRACT	Avid Residential Development - Avid Site , Sandyford , Dublin	TRIAL PIT NO.	Tp03
		SHEET	Sheet 1 of 1
LOGGED BY	S.Hannon	DATE STARTED	10/03/2020
	CO-ORDINATES	DATE COMPLETED	10/03/2020
CLIENT	Marlet Property Groupd	EXCAVATION METHOD	JCB
ENGINEER	Aecom	GROUND LEVEL (m)	

	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples			Vane Test (KPa)	Hand Penetrometer (KPa)
						Sample Ref	Type	Depth		
0.0	MADE GROUND - Stiff brown very gravelly clay with rare plastic and metal pieces and high cobble content and medium boulder content. Gravels are fine to coarse and gravels cobbles and boulders are angular to sub rounded.					AA131838	B	0.50		
			0.90							
1.0	Stiff dark brown gravelly CLAY with low cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.					AA131839	B	1.00		
			1.40							
	Stiff dark brown very gravelly CLAY with medium cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.									
2.0						AA131840	B	2.00		
			3.00							
3.0	End of Trial Pit at 3.00m					AA131841	B	3.00		
4.0										

Groundwater Conditions
Dry

Stability
Stable

General Remarks
CAT scanned location for services

IGSL TP LOG 22455.GPJ IGSL.GDT 23/3/20

TRIAL PIT RECORD

REPORT NUMBER 22455

CONTRACT	Avid Residential Development - Avid Site , Sandyford , Dublin	TRIAL PIT NO.	Tp04
		SHEET	Sheet 1 of 1
LOGGED BY	S.Hannon	CO-ORDINATES	
		DATE STARTED	10/03/2020
		DATE COMPLETED	10/03/2020
CLIENT	Marlet Property Groupd	GROUND LEVEL (m)	
ENGINEER	Aecom	EXCAVATION METHOD	JCB

	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 - very clayey gravel with occasional wood, plastic, concrete and metal pieces. Gravels are fine to coarse and angular to sub rounded.									
	Stiff dark brown very gravelly CLAY with medium cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded. Possible made ground.		0.50			AA131842	B	0.50		
1.0	Stiff dark brown very gravelly CLAY with medium cobble content and low boulder content. Gravels are fine to coarse and gravels cobbles and boulders are angular to sub rounded.		1.00			AA131843	B	1.00		
2.0	Stiff - very stiff dark grey very gravelly CLAY with medium cobble content and low boulder content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.		2.00			AA131844	B	2.00		
						AA131845	B	2.80		
3.0	End of Trial Pit at 3.00m		3.00							
4.0										

Groundwater Conditions
Dry

Stability
Stable

General Remarks
CAT scanned location for services

IGSL TP LOG 22455.GPJ IGSL.GDT 23/3/20

TRIAL PIT RECORD

REPORT NUMBER 22455

CONTRACT	Avid Residential Development - Avid Site , Sandyford , Dublin	TRIAL PIT NO.	Tp05
		SHEET	Sheet 1 of 1
LOGGED BY	S.Hannon	DATE STARTED	11/03/2020
		DATE COMPLETED	11/03/2020
CLIENT	Marlet Property Groupd	EXCAVATION METHOD	JCB
ENGINEER	Aecom		

CO-ORDINATES

GROUND LEVEL (m)

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 very dense very gravelly sand with occasional red brick metal plastic and concrete pieces and high cobble content and medium boulder content.					AA131846	B	0.50		
1.0 Stiff dark brown slightly silty very gravelly CLAY with high cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.		1.20			AA131847	B	1.20		
2.0					AA131848	B	2.00		
Stiff - very stiff dark grey gravelly CLAY with high cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.		2.70							
3.0 End of Trial Pit at 3.00m		3.00			AA131849	B	3.00		
4.0									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
CAT scanned location for services

IGSL TP LOG 22455.GPJ IGSL.GDT 23/3/20

TRIAL PIT RECORD

REPORT NUMBER 22455

CONTRACT	Avid Residential Development - Avid Site , Sandyford , Dublin	TRIAL PIT NO.	Tp06
		SHEET	Sheet 1 of 1
LOGGED BY	S.Hannon	DATE STARTED	11/03/2020
	CO-ORDINATES	DATE COMPLETED	11/03/2020
CLIENT	Marlet Property Groupd	EXCAVATION METHOD	JCB
ENGINEER	Aecom		
	GROUND LEVEL (m)		

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 very gravelly sand with high cobble content and medium boulder content. Gravels are fine to coarse and gravels cobbles and boulders are angular to sub rounded.					AA131850	B	0.50		
1.0 Stiff slightly sandy very gravelly CLAY with high cobble content and low boulder content. Gravels are fine to coarse and gravels cobbles and boulders are angular to sub rounded.		1.10			AA136803	B	1.10		
2.0					AA136804	B	2.00		
Stiff - very stiff dark grey very gravelly CLAY with high cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.		2.70							
3.0 End of Trial Pit at 3.00m		3.00			AA136805	B	3.00		
4.0									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
CAT scanned location for services

IGSL TP LOG 22455.GPJ IGSL.GDT 23/3/20

TRIAL PIT RECORD

REPORT NUMBER 22455

CONTRACT	Avid Residential Development - Avid Site , Sandyford , Dublin	TRIAL PIT NO.	Tp07
		SHEET	Sheet 1 of 1
LOGGED BY	S.Hannon	DATE STARTED	11/03/2020
		DATE COMPLETED	11/03/2020
CLIENT	Marlet Property Groupd	EXCAVATION METHOD	JCB
ENGINEER	Aecom		

CO-ORDINATES

GROUND LEVEL (m)

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 - Tar		0.10							
MADE GROUND - very sandy gravel with high cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.		0.40							
Stiff dark brown slightly silty very gravelly CLAY with medium cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded. Possible made ground.		0.60			AA136806	B	0.50		
1.0 Stiff dark brown very gravelly CLAY with medium cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.					AA136807	B	1.00		
2.0					AA136808	B	2.00		
Stiff - very stiff dark grey gravelly CLAY with medium cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.		2.50							
3.0 End of Trial Pit at 3.00m		3.00			AA136809	B	3.00		
4.0									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
CAT scanned location for services

IGSL TP LOG 22455.GPJ IGSL.GDT 23/3/20

TRIAL PIT RECORD

REPORT NUMBER 22455

CONTRACT	Avid Residential Development - Avid Site , Sandyford , Dublin	TRIAL PIT NO.	Tp08
		SHEET	Sheet 1 of 1
LOGGED BY	S.Hannon	CO-ORDINATES	
		DATE STARTED	11/03/2020
		DATE COMPLETED	11/03/2020
CLIENT	Marlet Property Groupd	GROUND LEVEL (m)	
ENGINEER	Aecom	EXCAVATION METHOD	JCB

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 - Tar		0.10							
MADE GROUND - Dense very sandy gravel with a high cobble content. Gravels are fine to coarse and gravels and cobbles and are angular to sub rounded.		0.30							
Stiff light brown slightly sandy very gravelly CLAY with high cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.		0.70			AA136810	B	0.50		
Stiff brown slightly sandy very gravelly clay with high cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.					AA136811	B	1.00		
2.0 Stiff - very stiff dark grey very gravelly CLAY with high cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.		2.00			AA136812	B	2.00		
3.0 End of Trial Pit at 3.00m		3.00			AA136813	B	3.00		
4.0									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
CAT scanned location for services

TRIAL PIT RECORD

REPORT NUMBER 22455

CONTRACT	Avid Residential Development - Avid Site , Sandyford , Dublin	TRIAL PIT NO.	Tp09
		SHEET	Sheet 1 of 1
LOGGED BY	S.Hannon	DATE STARTED	11/03/2020
	CO-ORDINATES	DATE COMPLETED	11/03/2020
CLIENT	Marlet Property Groupd	EXCAVATION METHOD	JCB
ENGINEER	Aecom		
	GROUND LEVEL (m)		

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 - Dense very sandy very gravelly clay with plastic concrete and metal pieces and a high cobble content. Gravels are fine to coarse and gravels and cobbles and are angular to sub rounded.									
Stiff light brown slightly silty very gravelly CLAY with high cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.		0.50			AA136814	B	0.50		
1.0					AA136815	B	1.00		
Stiff - very stiff dark grey very gravelly CLAY with medium cobble content and medium boulder content. Gravels are fine to coarse and gravels cobbles and boulders are angular to sub rounded.		1.50							
2.0					AA136816	B	2.00		
					AA136817	B	2.50		
3.0 End of Trial Pit at 3.00m		3.00							
4.0									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
CAT scanned location for services

IGSL TP LOG 22455.GPJ IGSL.GDT 23/3/20

TRIAL PIT RECORD

REPORT NUMBER 22455

CONTRACT	Avid Residential Development - Avid Site , Sandyford , Dublin	TRIAL PIT NO.	Tp10
		SHEET	Sheet 1 of 1
LOGGED BY	S.Hannon	DATE STARTED	11/03/2020
	CO-ORDINATES	DATE COMPLETED	11/03/2020
CLIENT	Marlet Property Groupd	EXCAVATION METHOD	JCB
ENGINEER	Aecom	GROUND LEVEL (m)	

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
MADE GROUND - very sandy gravel with medium cobble content. Gravels are fine to coarse and angular to sub rounded.		0.10							
Stiff brown very gravelly CLAY with high cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded. Probable made ground.					AA136818	B	0.50		
Stiff brown very gravelly CLAY with high cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.		0.70			AA136819	B	1.00		
Stiff - very stiff dark grey very gravelly CLAY with medium cobble content and low boulder content. Gravels are fine to coarse and gravels cobbles and boulders are angular to sub rounded.		1.80			AA136820	B	2.00		
					AA136821	B	2.50		
End of Trial Pit at 3.00m		3.00							

0.0 1.0 2.0 3.0 4.0

Groundwater Conditions
Dry

Stability
Stable

General Remarks
CAT scanned location for services

IGSL TP LOG 22455.GPJ IGSL.GDT 23/3/20

TRIAL PIT RECORD

REPORT NUMBER 22455

CONTRACT	Avid Residential Development - Avid Site , Sandyford , Dublin	TRIAL PIT NO.	Tp11
		SHEET	Sheet 1 of 1
LOGGED BY	S.Hannon	DATE STARTED	11/03/2020
		DATE COMPLETED	11/03/2020
CLIENT	Marlet Property Groupd	EXCAVATION METHOD	JCB
ENGINEER	Aecom		

CO-ORDINATES

GROUND LEVEL (m)

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 - Dense very sandy gravel with a medium cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.		0.10							
Stiff brown slightly sandy very gravelly clay with high cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded. Probable made ground.		0.50			AA136822	B	0.50		
Stiff brown very gravelly CLAY with medium cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.					AA136823	B	1.00		
1.0									
Stiff - very stiff dark grey very gravelly CLAY with high cobble content and low boulder content . Gravels are fine to coarse and gravels cobbles and boulders are angular to sub rounded.		1.80			AA136824	B	2.00		
2.0					AA136825	B	2.50		
3.0 End of Trial Pit at 3.00m		3.00							
4.0									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
CAT scanned location for services

IGSL TP LOG 22455.GPJ IGSL.GDT 23/3/20

TRIAL PIT RECORD

REPORT NUMBER 22455

CONTRACT	Avid Residential Development - Avid Site , Sandyford , Dublin	TRIAL PIT NO.	Tp12
		SHEET	Sheet 1 of 1
LOGGED BY	S.Hannon	DATE STARTED	11/03/2020
	CO-ORDINATES	DATE COMPLETED	11/03/2020
CLIENT	Marlet Property Groupd	EXCAVATION METHOD	JCB
ENGINEER	Aecom	GROUND LEVEL (m)	

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 dense very sandy gravel with medium cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.		0.10							
Stiff brown slightly sandy very gravelly clay with medium cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded. Probable Made ground.		0.50			AA136826	B	0.50		
Stiff brown very gravelly CLAY with medium cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.					AA136827	B	1.00		
1.0 Stiff - very stiff dark grey gravelly CLAY with medium cobble content and high cobble content. Gravels are fine to coarse and gravels cobbles and boulders are angular to sub rounded.		1.20							
2.0					AA136828	B	2.00		
Stiff yellowish orange silty gravelly CLAY with medium cobble content. Gravels are fine to coarse and gravels and cobbles are angular to sub rounded.		2.20			AA136829	B	2.50		
3.0 End of Trial Pit at 3.00m		3.00							
4.0									

Groundwater Conditions
Dry

Stability
Stable

General Remarks
CAT scanned location for services

IGSL TP LOG 22455.GPJ IGSL.GDT 23/3/20

Appendix IV CBR by Plate Test

PLATE TEST REPORT SHEET (F3.1)

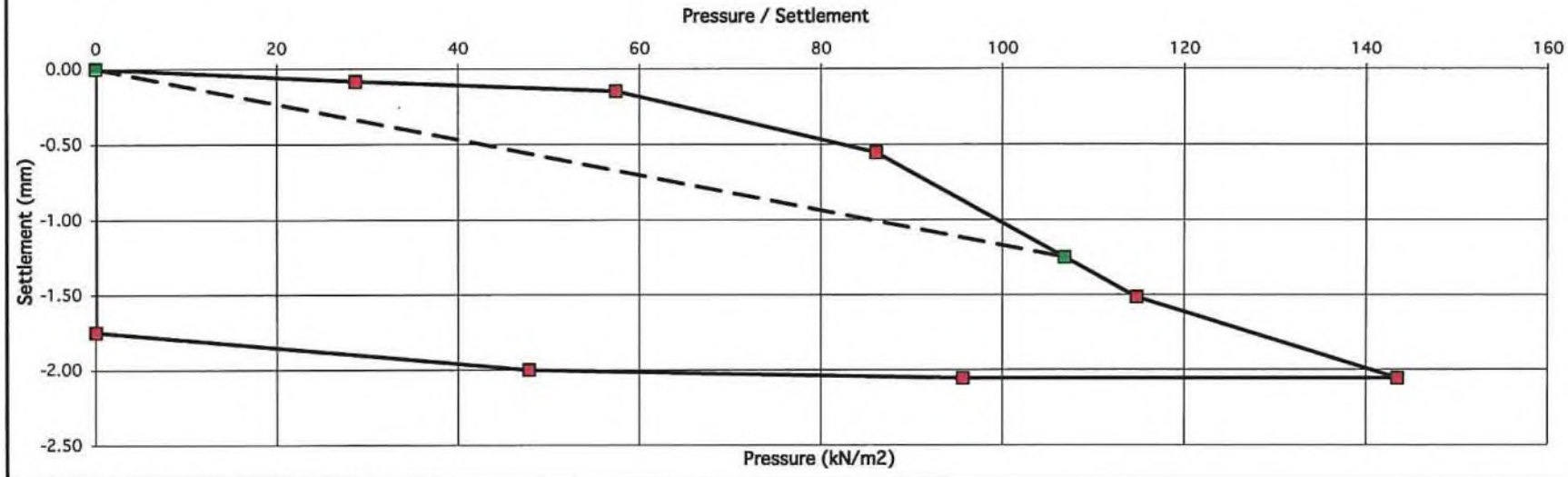
Applied Pressure/Settlement Curve

Reference No.	R110689
Contract	Avid site - Sandyford
Test No.	PT1 load
Location	39 carmanhall road
Depth	500 mm
Client	Marlet
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	S.Hannon
Authorised by	
Date	10/03/2020

Description of soil under test
(natural soil, placed fill, sub-base)

MADE GROUND very gravelly clay.

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 85
Modulus of subgrade reaction = 55 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 10.0 %

PLATE TEST REPORT SHEET (F3.1)

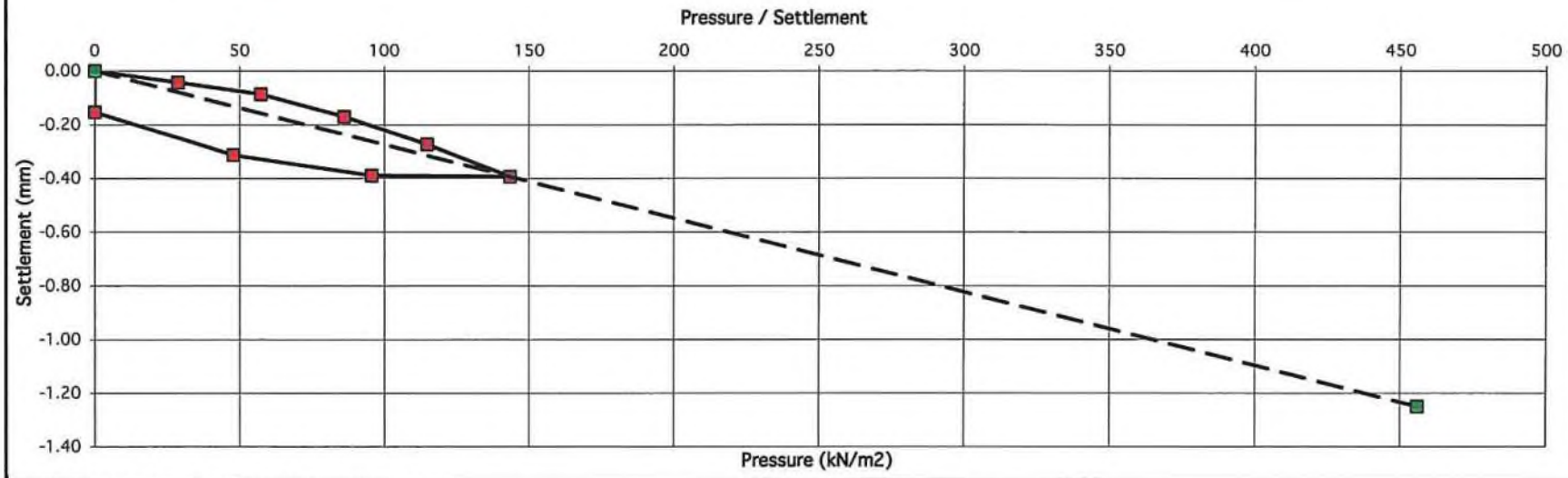
Applied Pressure/Settlement Curve

Reference No.	R110689
Contract	Avid site - Sandyford
Test No.	PT1 reload
Location	39 carmanhall road
Depth	500 mm
Client	Aecom
Plate Diameter:	450 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	S.Hannon
Authorised by	
Date	10/03/2020

Description of soil under test
(natural soil, placed fill, sub-base)

MADE GROUND very gravelly clay.

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 365
Modulus of subgrade reaction = 234 MPa/m
Correction factor applied = 0.64 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 123.5 %

Appendix V BRE Digest 365 Tests

Soakaway Design f -value from field tests (F2C) IGSI

Contract: Avid site 1-sandyford Contract No. 22455
Test No. SA01
Client Marlet
Date: 10/03/2020

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	MADE GROUND - firm sandy very gravelly clay with occasional metal and plastic.	
0.20	1.50	Firm -stiff very gravelly CLAY with medium cobble content.	None observec
		Gravels are fine to coarse and cobbles are angular to sub rounded.	

Notes:

Field Data

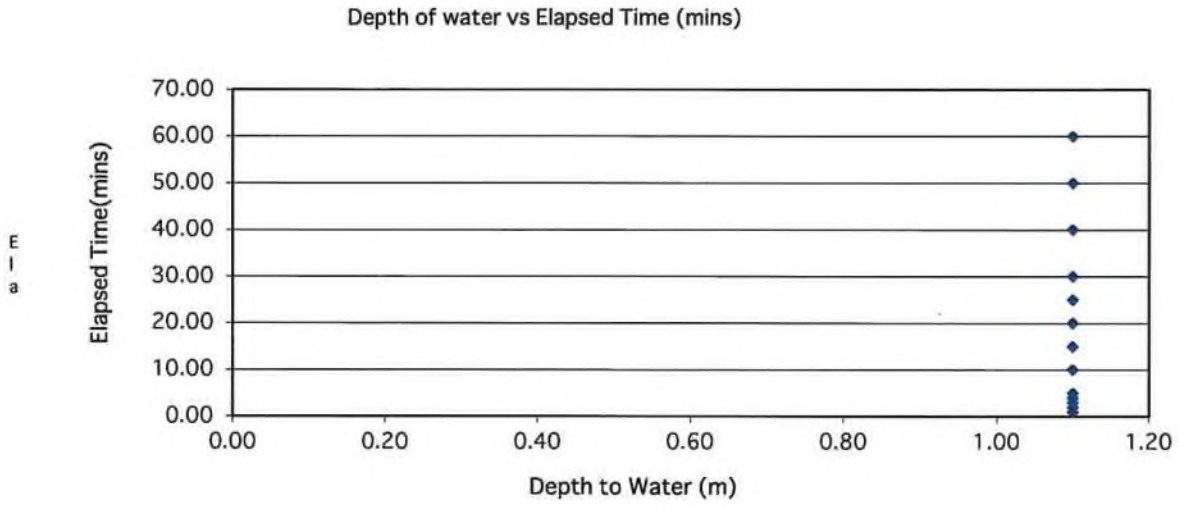
Depth to Water (m)	Elapsed Time (min)
1.10	1.00
1.10	2.00
1.10	3.00
1.10	4.00
1.10	5.00
1.10	10.00
1.10	15.00
1.10	20.00
1.10	25.00
1.10	30.00
1.10	40.00
1.10	50.00
1.10	60.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.80	m
Initial depth to Water =	1.10	m
Final depth to water =	1.10	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.9	m2
*Av. side area of permeable stratum over test period=	1.84	m2
Total Exposed area =	2.74	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec



Soakaway Design f -value from field tests (F2C) IGSI

Contract: Avid site 1-sandyford Contract No. 22455
Test No. SA02
Client Marlet
Date: 10/03/2020

Summary of ground conditions

from	to	Description	Ground water
0.00	0.20	MADE GROUND - firm sandy very gravelly clay with occasional metal and plastic.	
0.20	1.50	Firm -stiff very gravelly CLAY with medium cobble content.	None observec
		Gravels are fine to coarse and cobbles are angular to sub rounded.	

Notes:

Field Data

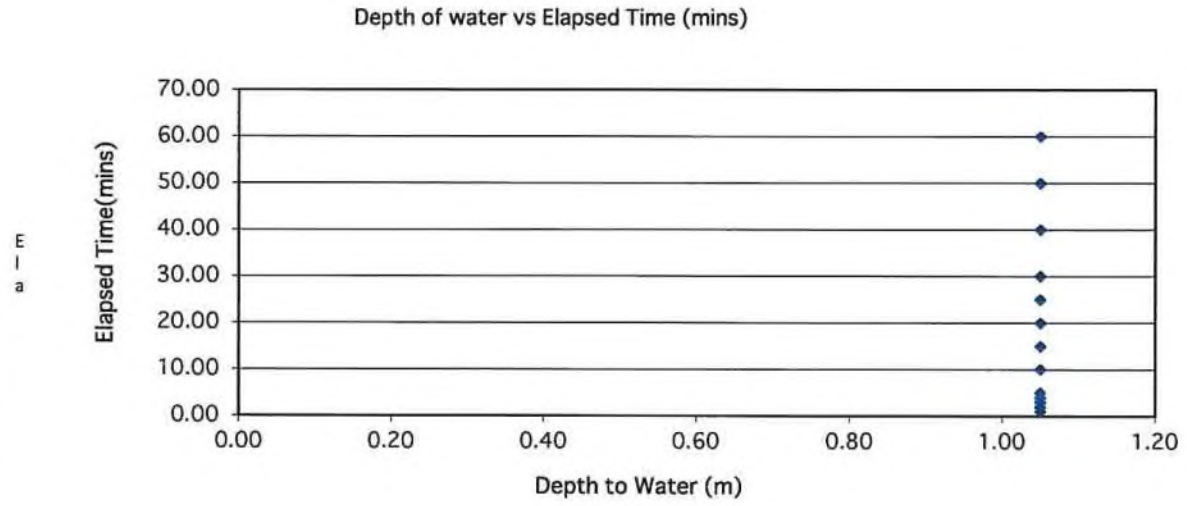
Depth to Water (m)	Elapsed Time (min)
1.05	1.00
1.05	2.00
1.05	3.00
1.05	4.00
1.05	5.00
1.05	10.00
1.05	15.00
1.05	20.00
1.05	25.00
1.05	30.00
1.05	40.00
1.05	50.00
1.05	60.00

Field Test

Depth of Pit (D)	1.50	m
Width of Pit (B)	0.50	m
Length of Pit (L)	1.80	m
Initial depth to Water =	1.05	m
Final depth to water =	1.05	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m
Base area=	0.9	m2
*Av. side area of permeable stratum over test period=	2.07	m2
Total Exposed area =	2.97	m2

Infiltration rate (f) = Volume of water used/unit exposed area / unit time

f= 0 m/min or 0 m/sec



Appendix VI Laboratory Data

a. Geotechnical Soil and Rock

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

Report No. **R111489** Contract No. 22455 Contract Name: Avid Development Sandyford

Customer Aecom/Marlet

Samples Received: 07/05/20 Date Tested: 22/05/20

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
Bh01	135561	3.0	A20/1674	B	11	30	14	16	59	WS	4.4	C L	Brown sandy gravelly CLAY
Bh02	3	3.0	A20/1676	B	12	29	13	16	47	WS	4.4	C L	Brown sandy gravelly CLAY
Bh03	13553	3.0	A20/1678	B	13	29	12	17	48	WS	4.4	C L	Brown sandy gravelly CLAY
Bh03	13558	8.0	A20/1679	B	16	31	14	17	71	WS	4.4	C L	Brown slightly sandy, slightly gravelly, CLAY
Bh04	135083	3.0	A20/1680	B	14	34	16	18	44	WS	4.4	C L	Brown sandy gravelly CLAY
Bh04	130586	6.0	A20/1681	B	17	35	15	20	65	WS	4.4	C L	Brown slightly sandy, gravelly, CLAY

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
H Byrne (Laboratory Manager)

Approved by	Date	Page
H Byrne	27/5/20	1 of 1

TEST REPORT
Determination of Particle Size Distribution

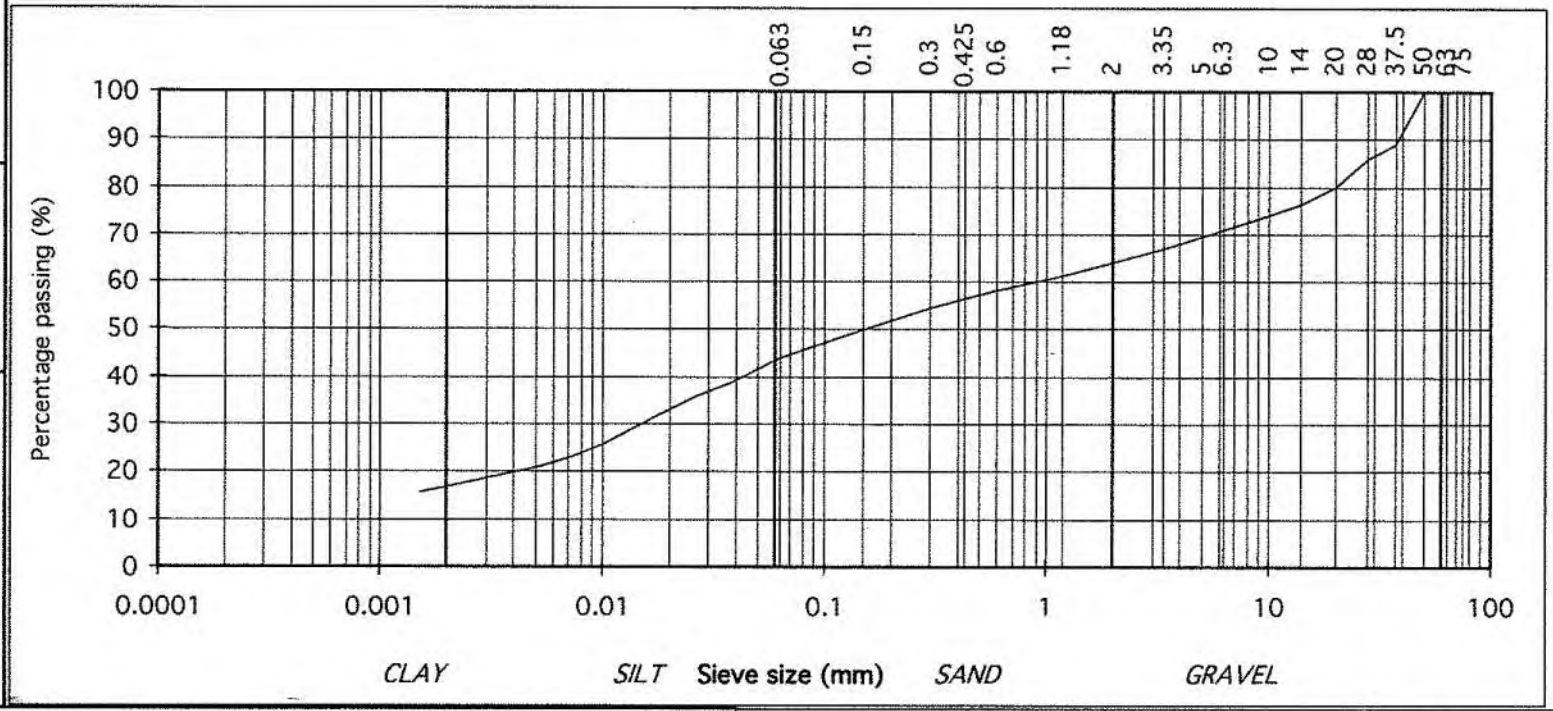
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

ISO 17025 IVNAB ACCREDITED TESTING DETAILED IN SCOPE AGS NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	89	
28	86	
20	80	
14	76	
10	74	
6.3	71	
5	69	
3.35	67	
2	64	
1.18	61	SAND
0.6	58	
0.425	56	
0.3	54	
0.15	50	
0.063	44	SILT/CLAY
0.037	39	
0.027	36	
0.017	31	
0.010	26	
0.007	23	
0.005	21	
0.002	16	

Contract No: 22455 Report No. R111487
Contract: Avid Development Sandyford
BH/TP : BH01
Sample No. 135564 Lab. Sample No. A20/1675
Sample Type: B
Depth (m) 6.00 Customer: Aecom/Marlet
Date Received 07/05/2020 Date Testing started 22/05/2020
Description: Brown slightly sandy, gravelly, SILT/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



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
	27/05/20	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

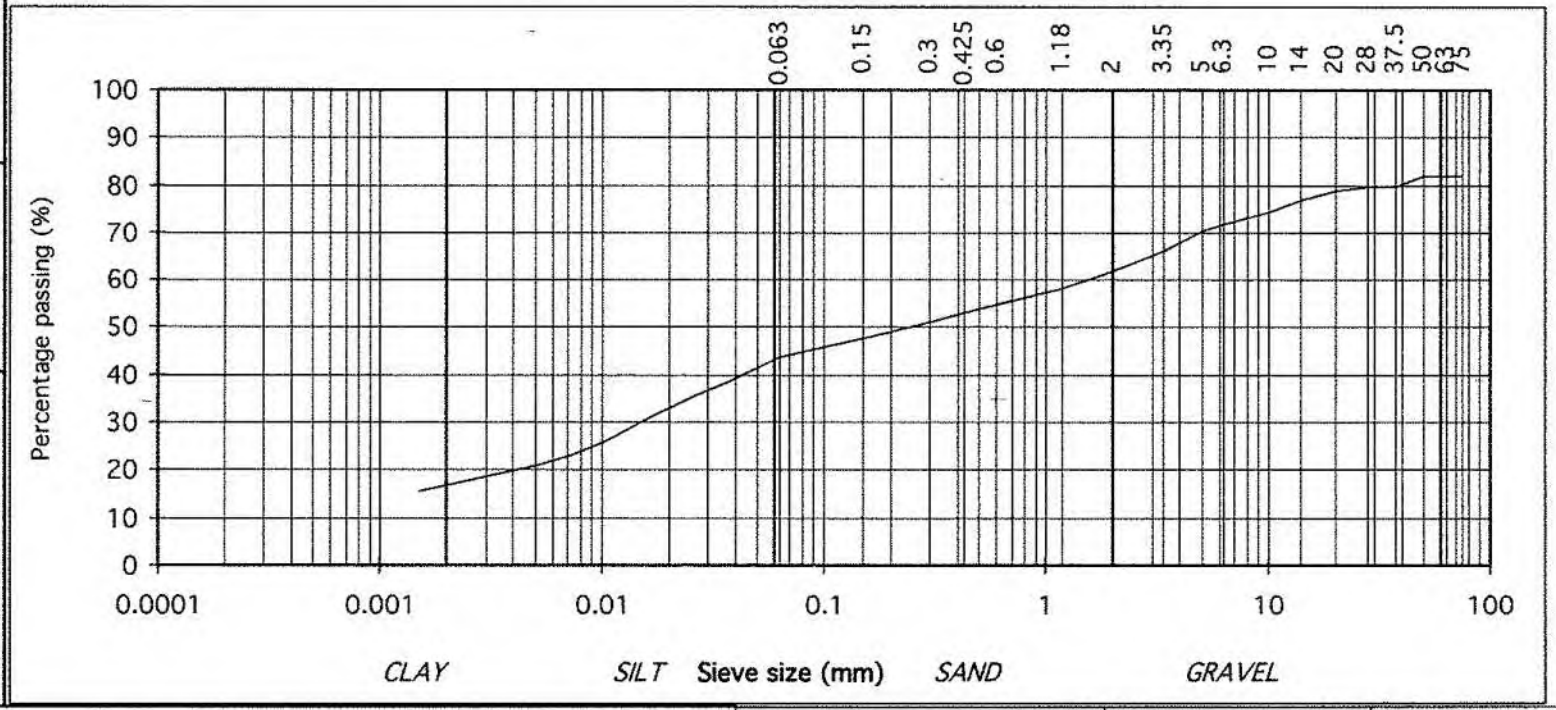
TEST REPORT
Determination of Particle Size Distribution

Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5
(note: Sedimentation stage not accredited)

particle size	% passing	
75	82	COBBLES
63	82	
50	82	GRAVEL
37.5	80	
28	80	
20	79	
14	77	
10	74	
6.3	72	
5	70	
3.35	66	
2	62	
1.18	58	SAND
0.6	55	
0.425	53	
0.3	51	
0.15	48	
0.063	44	SILT/CLAY
0.037	39	
0.027	36	
0.017	31	
0.010	26	
0.007	23	
0.005	21	
0.002	16	

Contract No: 22455 Report No. R111488
Contract: Avid Development Sandyford
BH/TP : BH02
Sample No. 7 Lab. Sample No. A20/1677
Sample Type: B
Depth (m) 7.00 Customer: Aecom/Marlet
Date Received 07/05/2020 Date Testing started 22/05/2020
Description: Brown slightly sandy, slightly gravelly, SILT/CLAY with some 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:
	27/05/20	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	100	COBBLES
63	100	
50	100	GRAVEL
37.5	100	
28	100	
20	94	
14	92	
10	91	
6.3	88	
5	86	
3.35	84	
2	78	
1.18	73	SAND
0.6	67	
0.425	65	
0.3	63	
0.15	60	
0.063	54	SILT/CLAY
0.038	47	
0.027	44	
0.017	39	
0.010	34	
0.007	31	
0.005	27	
0.002	19	

Contract No: 22455 Report No. R111486

Contract: Avid Development Sandyford

BH/TP : BH03

Sample No. 13558 Lab. Sample No. A20/1679

Sample Type: B

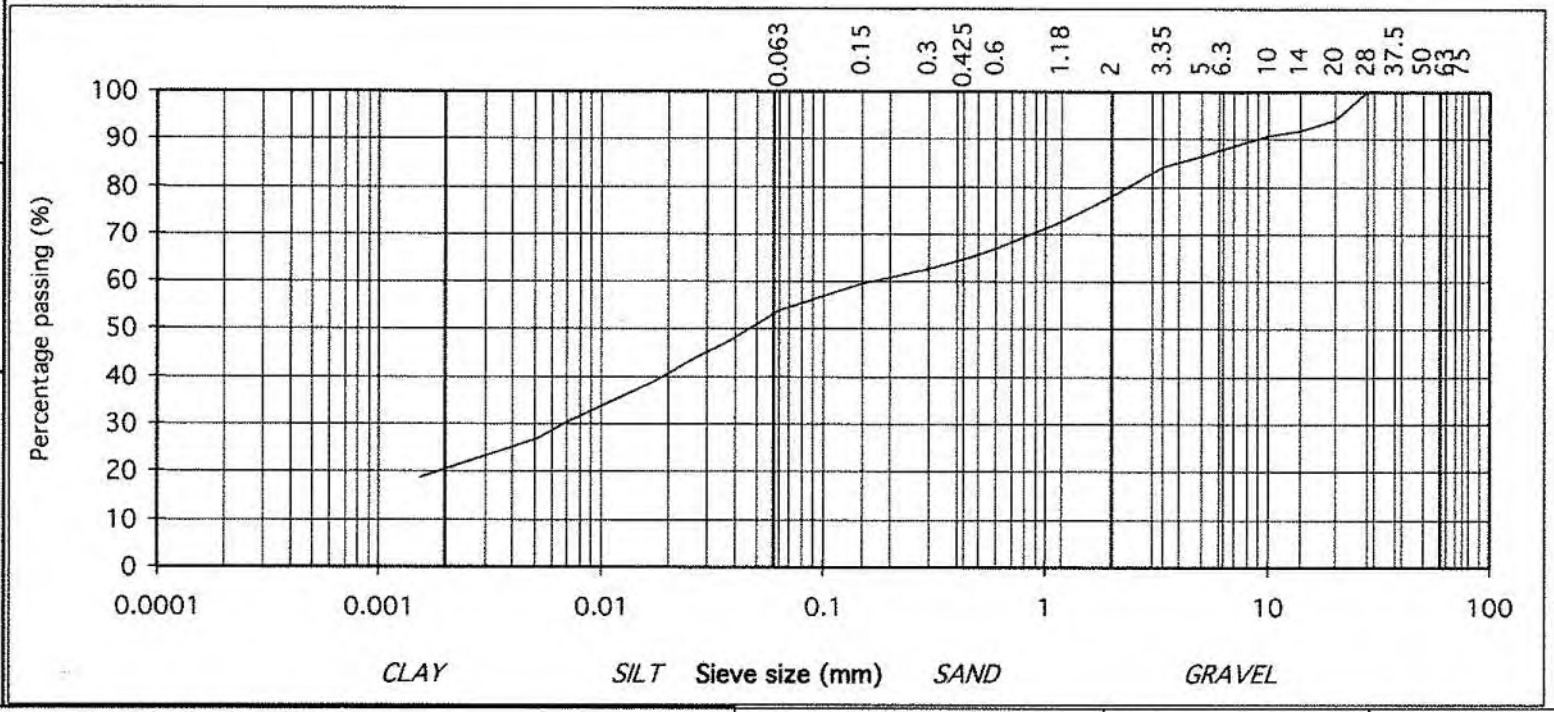
Depth (m) 8.00 Customer: Aecom/Marlet

Date Received 07/05/2020 Date Testing started 22/05/2020

Description: Brown slightly sandy, slightly 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:
	27/05/20	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	100	COBBLES
63	100	
50	91	GRAVEL
37.5	89	
28	87	
20	85	
14	81	
10	79	
6.3	75	
5	74	
3.35	67	
2	61	
1.18	58	SAND
0.6	55	
0.425	54	
0.3	53	
0.15	50	
0.063	46	SILT/CLAY
0.038	41	
0.027	38	
0.017	33	
0.010	28	
0.007	25	
0.005	22	
0.002	15	

Contract No: 22455 Report No. R111490

Contract: Avid Development Sandyford

BH/TP : BH04

Sample No. 130586 Lab. Sample No. A20/1681

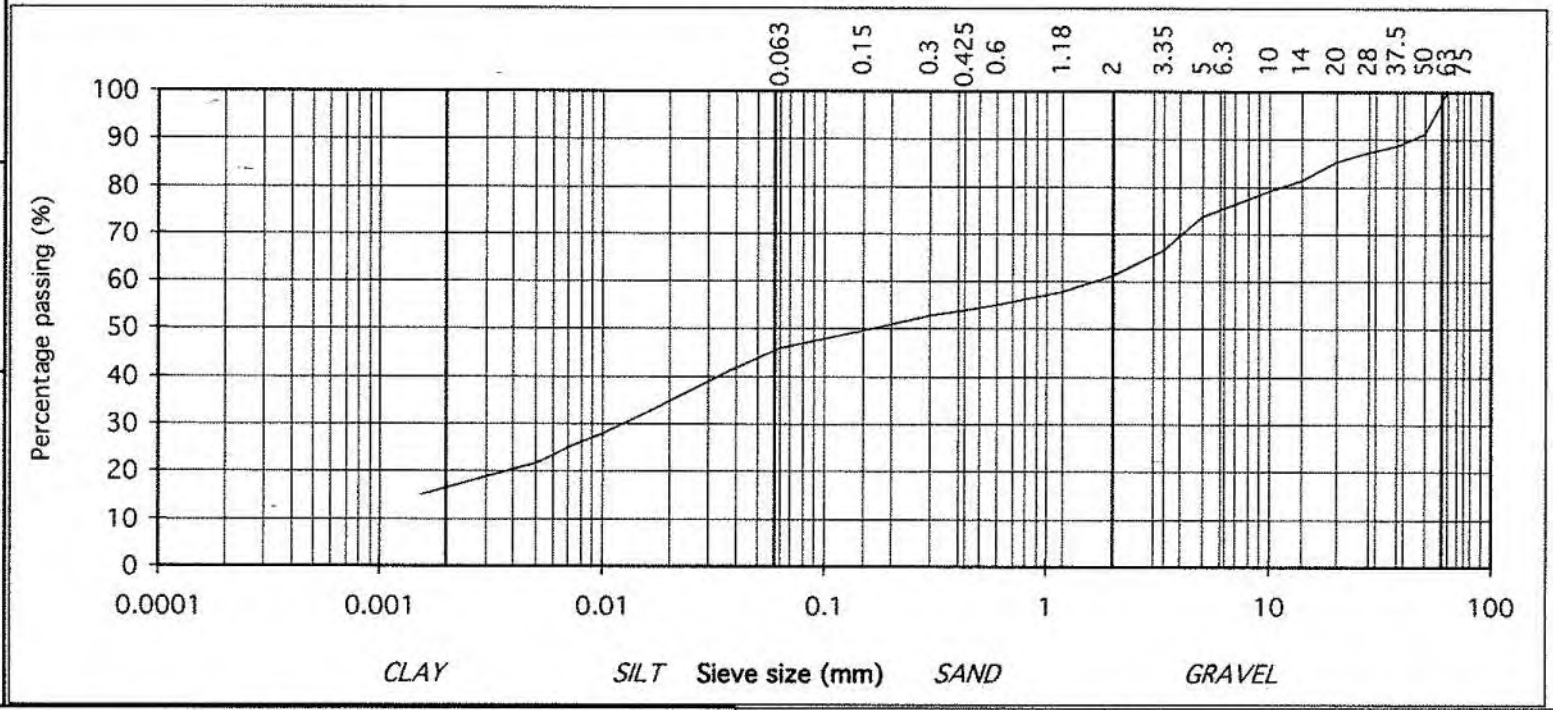
Sample Type: B

Depth (m) 6.00 Customer: Aecom/Marlet

Date Received 07/05/2020 Date Testing started 22/05/2020

Description: 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. Sample size did not meet the requirements of BS1377



IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
	28/05/20	1 of 1

Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

(Diametrial) POINT LOAD STRENGTH INDEX TEST DATA

Contract: Avid Site, Sandyford
Contract no. 22455
Date of test: 16/04/2020

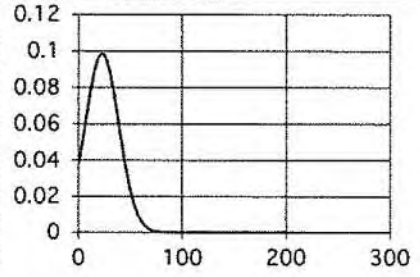
Sample Type: Core

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
RC02	8.8	78	8.0	1.222	1.31	1.61	32	d	//
	8.9	78	10.0	1.222	1.64	2.01	40	d	//
	10.9	78	4.0	1.222	0.66	0.80	16	d	//
RC04	12.8	78	1.0	1.222	0.16	0.20	4	d	//

Statistical Summary Data	Is(50)	UCS*
Number of Samples Tested	4	4
Minimum	0.20	4
Average	1.15	23
Maximum	2.01	40
Standard Dev.	0.81	16
Upper 95% Confidence Limit	2.74	54.82
Lower 95% Confidence Limit	-0.43	-8.64

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 VI Laboratory Data

b. Chemical and 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.:	20-10240-1		
Initial Date of Issue:	22-Apr-2020		
Client	IGSL		
Client Address:	M7 Business Park Naas County Kildare Ireland		
Contact(s):	Darren Keogh		
Project	22455 Avid Development Sandyford (Aecom / Marlet)		
Quotation No.:		**Date Received:**	08-Apr-2020
Order No.:		**Date Instructed:**	14-Apr-2020
No. of Samples:	21		
Turnaround (Wkdays):	7	**Results Due:**	22-Apr-2020
Date Approved:	22-Apr-2020		

Approved By:

Details: Glynn Harvey, Technical Manager

Chemtest
The right chemistry to deliver results

Results - Leachate

Project: 22455 Avid Development Sandyford (Aecom / Marlet)

Client: IGSL						Chemtest Job No.:	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240
Quotation No.:						Chemtest Sample ID.:	996074	996075	996076	996077	996078	996079	996080	996081	996082	996083	996084	996085	996086
Order No.:						Client Sample Ref.:	131830	131831	131834	131838	131839	131842	131846	131847	131850	136807	136811	136814	136819
						Sample Location:	TP1	TP1	TP2	TP3	TP3	TP4	TP5	TP5	TP6	TP7	TP8	TP9	TP10
						Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
						Top Depth (m):	0.50	1.00	0.50	0.50	1.00	0.50	0.50	1.20	0.50	1.00	1.00	0.50	1.00
						Bottom Depth (m):	0.50	1.00	0.50	0.50	1.00	0.50	0.50	1.20	0.50	1.00	1.00	0.50	1.00
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**														
pH	U	1010	10:1		N/A		8.5	8.3	8.7	8.4	8.8	8.9	10.2	8.5	10.6	9.3	9.3	10.4	9.4
Ammonium	U	1220	10:1	mg/l	0.050		0.058	0.14	0.21	1.7	< 0.050	0.18	< 0.050	0.16	< 0.050	< 0.050	< 0.050	< 0.050	< 0.050
Ammonium	N	1220	10:1	mg/kg	0.10		0.69	1.6	2.7	19	0.48	2.5	0.64	1.9	0.63	0.85	0.30	0.52	0.25
Boron (Dissolved)	U	1450	10:1	µg/l	20		27	26	29	32	< 20	29	< 20	< 20	23	< 20	< 20	20	< 20
Boron (Dissolved)	U	1450	10:1	mg/kg	0.20		0.27	0.26	0.29	0.32	< 0.20	0.29	< 0.20	< 0.20	0.23	< 0.20	< 0.20	0.20	< 0.20

Chemtest
The right chemistry to deliver results

Results - Leachate

Project: 22455 Avid Development Sandyford (Aecom / Marlet)

Client: IGSL						Chemtest Job No.:	20-10240	20-10240	20-10240
Quotation No.:						Chemtest Sample ID.:	996087	996088	996089
Order No.:						Client Sample Ref.:	138822	136827	13559
						Sample Location:	TP11	TP12	BH1
						Sample Type:	SOIL	SOIL	SOIL
						Top Depth (m):	0.50	1.00	1.00
						Bottom Depth (m):	0.50	1.00	1.00
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**				
pH	U	1010	10:1		N/A		9.4	9.2	9.1
Ammonium	U	1220	10:1	mg/l	0.050		< 0.050	< 0.050	< 0.050
Ammonium	N	1220	10:1	mg/kg	0.10		0.29	0.51	0.42
Boron (Dissolved)	U	1450	10:1	µg/l	20		< 20	< 20	< 20
Boron (Dissolved)	U	1450	10:1	mg/kg	0.20		< 0.20	< 0.20	< 0.20

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 22455 Avid Development Sandyford (Aecom / Marlet)

Client: IGSL			Chemtest Job No.:		20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240
Quotation No.:			Chemtest Sample ID.:		996074	996075	996076	996077	996078	996079	996080	996081	996082
Order No.:			Client Sample Ref.:		131830	131831	131834	131838	131839	131842	131846	131847	131850
			Sample Location:		TP1	TP1	TP2	TP3	TP3	TP4	TP5	TP5	TP6
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		0.50	1.00	0.50	0.50	1.00	0.50	0.50	1.20	0.50
			Bottom Depth (m):		0.50	1.00	0.50	0.50	1.00	0.50	0.50	1.20	0.50
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
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	15	16	12	13	8.6	8.2	5.9	17	7.3
pH (2.5:1)	N	2010		4.0									
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	0.68	0.49	< 0.40	0.48	< 0.40	< 0.40	< 0.40	0.42	0.53
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] 3.7	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0	[A] < 1.0
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] 3.2	[A] 2.2	[A] 8.1	[A] 9.2	[A] 5.2	[A] 6.5	[A] 7.1	[A] 2.1	[A] 7.2
Ammonium (Water Soluble)	M	2120	g/l	0.01									
Sulphate (Acid Soluble)	M	2430	%	0.010	[A] 0.074	[A] 0.015	[A] 0.029	[A] 0.054	[A] 0.031	[A] 0.038	[A] 0.45	[A] 0.045	[A] 0.11
Arsenic	M	2450	mg/kg	1.0	18	14	21	20	24	22	18	14	20
Barium	M	2450	mg/kg	10	120	98	71	91	46	47	49	68	61
Cadmium	M	2450	mg/kg	0.10	2.1	1.1	2.4	2.9	1.6	2.1	0.67	2.6	1.2
Chromium	M	2450	mg/kg	1.0	21	26	16	18	13	12	15	20	20
Molybdenum	M	2450	mg/kg	2.0	2.8	2.8	3.5	3.4	2.9	3.7	< 2.0	3.9	< 2.0
Antimony	N	2450	mg/kg	2.0	< 2.0	< 2.0	2.0	2.1	< 2.0	< 2.0	< 2.0	2.2	< 2.0
Copper	M	2450	mg/kg	0.50	27	21	26	32	20	22	15	29	19
Mercury	M	2450	mg/kg	0.10	0.17	0.15	< 0.10	0.16	< 0.10	< 0.10	< 0.10	0.11	< 0.10
Nickel	M	2450	mg/kg	0.50	41	39	48	53	37	41	22	56	32
Lead	M	2450	mg/kg	0.50	59	34	31	84	19	21	12	28	17
Selenium	M	2450	mg/kg	0.20	0.83	0.50	0.35	0.54	< 0.20	0.29	< 0.20	0.63	< 0.20
Zinc	M	2450	mg/kg	0.50	93	140	86	99	59	67	52	110	68
Chromium (Trivalent)	N	2490	mg/kg	1.0	21	26	16	18	13	12	15	20	20
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] 1.6	[A] 0.50	[A] 0.52	[A] 0.98	[A] 0.35	[A] 0.35	[A] 0.31	[A] 0.61	[A] < 0.20
Mineral Oil	N	2670	mg/kg	10	< 10	< 10	< 10	< 10	< 10	< 10	150	< 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

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Project: 22455 Avid Development Sandyford (Aecom / Marlet)

Client: IGSL					Chemtest Job No.:	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240
Quotation No.:					Chemtest Sample ID.:	996074	996075	996076	996077	996078	996079	996080	996081	996082
Order No.:					Client Sample Ref.:	131830	131831	131834	131838	131839	131842	131846	131847	131850
					Sample Location:	TP1	TP1	TP2	TP3	TP3	TP4	TP5	TP5	TP6
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.00	0.50	0.50	1.00	0.50	0.50	1.20	0.50
					Bottom Depth (m):	0.50	1.00	0.50	0.50	1.00	0.50	0.50	1.20	0.50
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
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		0.19	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	M	2800	mg/kg	0.10		0.17	< 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

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Project: 22455 Avid Development Sandyford (Aecom / Marlet)

Client: IGSL					Chemtest Job No.:	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240
Quotation No.:					Chemtest Sample ID.:	996074	996075	996076	996077	996078	996079	996080	996081	996082
Order No.:					Client Sample Ref.:	131830	131831	131834	131838	131839	131842	131846	131847	131850
					Sample Location:	TP1	TP1	TP2	TP3	TP3	TP4	TP5	TP5	TP6
					Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					Top Depth (m):	0.50	1.00	0.50	0.50	1.00	0.50	0.50	1.20	0.50
					Bottom Depth (m):	0.50	1.00	0.50	0.50	1.00	0.50	0.50	1.20	0.50
					Asbestos Lab:	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY
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

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Project: 22455 Avid Development Sandyford (Aecom / Marlet)

Client: IGSL			Chemtest Job No.:		20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240
Quotation No.:			Chemtest Sample ID.:		996083	996084	996085	996086	996087	996088	996089	996090	996091
Order No.:			Client Sample Ref.:		136807	136811	136814	136819	138822	136827	13559	135560	1
			Sample Location:		TP7	TP8	TP9	TP10	TP11	TP12	BH1	BH1	BH2
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.00	1.00	0.50	1.00	0.50	1.00	1.00	2.00	1.00
			Bottom Depth (m):		1.00	1.00	0.50	1.00	0.50	1.00	1.00	2.00	1.00
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY		
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		
ACM Detection Stage	U	2192		N/A	-	-	-	-	-	-	-		
Moisture	N	2030	%	0.020	11	9.1	8.5	10	9.1	10	10	12	12
pH (2.5:1)	N	2010		4.0								[A] 8.6	[A] 8.7
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40	< 0.40		
Magnesium (Water Soluble)	N	2120	g/l	0.010								< 0.010	< 0.010
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010								< 0.010	< 0.010
Total Sulphur	M	2175	%	0.010								[A] 0.033	[A] 0.036
Sulphur (Elemental)	M	2180	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		
Chloride (Water Soluble)	M	2220	g/l	0.010								[A] < 0.010	[A] < 0.010
Nitrate (Water Soluble)	N	2220	g/l	0.010								< 0.010	< 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		
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 6.6	[A] 7.8	[A] 9.3	[A] 8.3	[A] 8.3	[A] 7.6	[A] 6.6		
Ammonium (Water Soluble)	M	2120	g/l	0.01								0.02	0.04
Sulphate (Acid Soluble)	M	2430	%	0.010	[A] 0.011	[A] 0.013	[A] 0.083	[A] 0.012	[A] 0.033	[A] 0.010	[A] 0.017	[A] 0.018	[A] < 0.010
Arsenic	M	2450	mg/kg	1.0	23	22	23	23	24	21	23		
Barium	M	2450	mg/kg	10	71	63	65	100	50	62	71		
Cadmium	M	2450	mg/kg	0.10	2.3	1.9	1.2	2.0	1.8	2.0	2.0		
Chromium	M	2450	mg/kg	1.0	15	13	15	15	14	14	14		
Molybdenum	M	2450	mg/kg	2.0	3.4	3.4	2.5	3.7	3.4	3.6	3.5		
Antimony	N	2450	mg/kg	2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0	< 2.0		
Copper	M	2450	mg/kg	0.50	26	22	19	26	23	26	26		
Mercury	M	2450	mg/kg	0.10	< 0.10	< 0.10	0.11	< 0.10	< 0.10	< 0.10	< 0.10		
Nickel	M	2450	mg/kg	0.50	51	41	32	47	42	46	46		
Lead	M	2450	mg/kg	0.50	21	18	20	19	23	18	19		
Selenium	M	2450	mg/kg	0.20	< 0.20	0.41	0.30	1.4	0.24	1.6	0.37		
Zinc	M	2450	mg/kg	0.50	79	76	64	76	67	75	74		
Chromium (Trivalent)	N	2490	mg/kg	1.0	15	13	15	15	14	14	14		
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50		
Total Organic Carbon	M	2625	%	0.20	[A] 0.28	[A] 0.35	[A] 0.56	[A] 0.38	[A] 0.31	[A] 0.34	[A] 0.34		
Mineral Oil	N	2670	mg/kg	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		
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		
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		
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		

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Results - Soil

Project: 22455 Avid Development Sandyford (Aecom / Marlet)

Client: IGSL			Chemtest Job No.:		20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240
Quotation No.:			Chemtest Sample ID.:		996083	996084	996085	996086	996087	996088	996089	996090	996091
Order No.:			Client Sample Ref.:		136807	136811	136814	136819	138822	136827	13559	135560	1
			Sample Location:		TP7	TP8	TP9	TP10	TP11	TP12	BH1	BH1	BH2
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.00	1.00	0.50	1.00	0.50	1.00	1.00	2.00	1.00
			Bottom Depth (m):		1.00	1.00	0.50	1.00	0.50	1.00	1.00	2.00	1.00
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY		
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		
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		
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		
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		
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		
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		
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		
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		
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		
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		
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		
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		
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		
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		
Total Petroleum Hydrocarbons	N	2680	mg/kg	10.0	[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		
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		
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		
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		
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		
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		
Naphthalene	M	2800	mg/kg	0.10	< 0.10	< 0.10	0.14	< 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		
Acenaphthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	0.31	< 0.10	< 0.10	< 0.10	< 0.10		
Fluorene	M	2800	mg/kg	0.10	< 0.10	< 0.10	0.19	< 0.10	< 0.10	< 0.10	< 0.10		
Phenanthrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	1.7	< 0.10	< 0.10	< 0.10	< 0.10		
Benzo[j]fluoranthene	N	2800	mg/kg	0.10	< 0.10	< 0.10	0.27	< 0.10	< 0.10	< 0.10	< 0.10		
Anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	0.25	< 0.10	< 0.10	< 0.10	< 0.10		
Fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	1.5	< 0.10	< 0.10	< 0.10	< 0.10		
Pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	1.5	< 0.10	< 0.10	< 0.10	< 0.10		
Benzo[a]anthracene	M	2800	mg/kg	0.10	< 0.10	< 0.10	0.51	< 0.10	< 0.10	< 0.10	< 0.10		
Chrysene	M	2800	mg/kg	0.10	< 0.10	< 0.10	0.53	< 0.10	< 0.10	< 0.10	< 0.10		
Benzo[b]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	0.56	< 0.10	< 0.10	< 0.10	< 0.10		
Benzo[k]fluoranthene	M	2800	mg/kg	0.10	< 0.10	< 0.10	0.25	< 0.10	< 0.10	< 0.10	< 0.10		
Benzo[a]pyrene	M	2800	mg/kg	0.10	< 0.10	< 0.10	0.54	< 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	0.27	< 0.10	< 0.10	< 0.10	< 0.10		
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.10	< 0.10	< 0.10	0.11	< 0.10	< 0.10	< 0.10	< 0.10		

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Results - Soil

Project: 22455 Avid Development Sandyford (Aecom / Marlet)

Client: IGSL			Chemtest Job No.:		20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240	20-10240
Quotation No.:			Chemtest Sample ID.:		996083	996084	996085	996086	996087	996088	996089	996090	996091
Order No.:			Client Sample Ref.:		136807	136811	136814	136819	138822	136827	13559	135560	1
			Sample Location:		TP7	TP8	TP9	TP10	TP11	TP12	BH1	BH1	BH2
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.00	1.00	0.50	1.00	0.50	1.00	1.00	2.00	1.00
			Bottom Depth (m):		1.00	1.00	0.50	1.00	0.50	1.00	1.00	2.00	1.00
			Asbestos Lab:		COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY	COVENTRY		
Determinand	**Accred.**	**SOP**	**Units**	**LOD**									
Benzo[g,h,i]perylene	M	2800	mg/kg	0.10	< 0.10	< 0.10	0.37	< 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		
Total Of 17 PAH's	N	2800	mg/kg	2.0	< 2.0	< 2.0	8.7	< 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		
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		
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		
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		
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		
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		
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		
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		
Total Phenols	M	2920	mg/kg	0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30	< 0.30		

Results - Soil

Project: 22455 Avid Development Sandyford (Aecom / Marlet)

Client: IGSL			Chemtest Job No.:		20-10240	20-10240	20-10240
Quotation No.:			Chemtest Sample ID.:		996092	996093	996094
Order No.:			Client Sample Ref.:		13551	13553	130581
			Sample Location:		BH3	BH3	BH4
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		1.00	3.00	1.00
			Bottom Depth (m):		1.00	3.00	1.00
			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	18	12	10
pH (2.5:1)	N	2010		4.0	[A] 8.4	[A] 8.5	[A] 8.5
Boron (Hot Water Soluble)	M	2120	mg/kg	0.40			
Magnesium (Water Soluble)	N	2120	g/l	0.010	< 0.010	< 0.010	< 0.010
Sulphate (2:1 Water Soluble) as SO4	M	2120	g/l	0.010	< 0.010	< 0.010	< 0.010
Total Sulphur	M	2175	%	0.010	[A] 0.055	[A] 0.11	[A] 0.044
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
Nitrate (Water Soluble)	N	2220	g/l	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	2.8	0.07	0.03
Sulphate (Acid Soluble)	M	2430	%	0.010	[A] 0.027	[A] < 0.010	[A] 0.022
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: 22455 Avid Development Sandyford (Aecom / Marlet)

Client: IGSL			Chemtest Job No.:		20-10240	20-10240	20-10240
Quotation No.:			Chemtest Sample ID.:		996092	996093	996094
Order No.:			Client Sample Ref.:		13551	13553	130581
			Sample Location:		BH3	BH3	BH4
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		1.00	3.00	1.00
			Bottom Depth (m):		1.00	3.00	1.00
			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			

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Results - Soil

Project: 22455 Avid Development Sandyford (Aecom / Marlet)

Client: IGSL			Chemtest Job No.:		20-10240	20-10240	20-10240
Quotation No.:			Chemtest Sample ID.:		996092	996093	996094
Order No.:			Client Sample Ref.:		13551	13553	130581
			Sample Location:		BH3	BH3	BH4
			Sample Type:		SOIL	SOIL	SOIL
			Top Depth (m):		1.00	3.00	1.00
			Bottom Depth (m):		1.00	3.00	1.00
			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			

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Results - Single Stage WAC

Project: 22455 Avid Development Sandyford (Aecom / Marlet)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-10240						
Chemtest Sample ID:	996074						
Sample Ref:	131830						
Sample ID:							
Sample Location:	TP1						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
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] 1.6	3	5	6
Loss On Ignition	2610	M	%	5.5	--	--	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		8.2	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.031	--	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	0.0093	< 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	0.0011	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0033	< 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	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.47	4.7	10	150	500
Sulphate	1220	U	16	160	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	9.5	95	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	15

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: 22455 Avid Development Sandyford (Aecom / Marlet)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-10240						
Chemtest Sample ID:	996075						
Sample Ref:	131831						
Sample ID:							
Sample Location:	TP1						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
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] 0.50	3	5	6
Loss On Ignition	2610	M	%	3.7	--	--	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	0.028	--	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	0.0030	< 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	< 0.0010	< 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	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.19	1.9	10	150	500
Sulphate	1220	U	3.2	32	1000	20000	50000
Total Dissolved Solids	1020	N	62	620	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	5.9	59	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	16

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: 22455 Avid Development Sandyford (Aecom / Marlet)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-10240						
Chemtest Sample ID:	996076						
Sample Ref:	131834						
Sample ID:							
Sample Location:	TP2						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
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] 0.52	3	5	6
Loss On Ignition	2610	M	%	3.1	--	--	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		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.12	--	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	0.0065	< 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	0.0014	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0076	0.076	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	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.27	2.7	10	150	500
Sulphate	1220	U	2.3	23	1000	20000	50000
Total Dissolved Solids	1020	N	65	650	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	19	190	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: 22455 Avid Development Sandyford (Aecom / Marlet)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-10240						
Chemtest Sample ID:	996077						
Sample Ref:	131838						
Sample ID:							
Sample Location:	TP3						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
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	%	4.4	--	--	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		8.3	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.083	--	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	0.0015	< 0.050	0.5	2	25
Barium	1450	U	0.023	< 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	0.0031	< 0.050	2	50	100
Mercury	1450	U	< 0.00050	< 0.0050	0.01	0.2	2
Molybdenum	1450	U	0.0047	< 0.050	0.5	10	30
Nickel	1450	U	0.0018	< 0.050	0.4	10	40
Lead	1450	U	< 0.0010	< 0.010	0.5	10	50
Antimony	1450	U	0.0015	0.015	0.06	0.7	5
Selenium	1450	U	0.0011	0.011	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.27	2.7	10	150	500
Sulphate	1220	U	5.7	57	1000	20000	50000
Total Dissolved Solids	1020	N	100	1000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	14	140	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	13

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: 22455 Avid Development Sandyford (Aecom / Marlet)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-10240						
Chemtest Sample ID:	996078						
Sample Ref:	131839						
Sample ID:							
Sample Location:	TP3						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
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] 0.35	3	5	6
Loss On Ignition	2610	M	%	2.3	--	--	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		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.18	--	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	0.0015	< 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	0.0052	0.052	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	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.23	2.3	10	150	500
Sulphate	1220	U	2.2	22	1000	20000	50000
Total Dissolved Solids	1020	N	54	540	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	8.0	80	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	8.6

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: 22455 Avid Development Sandyford (Aecom / Marlet)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-10240						
Chemtest Sample ID:	996079						
Sample Ref:	131842						
Sample ID:							
Sample Location:	TP4						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
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] 0.35	3	5	6
Loss On Ignition	2610	M	%	2.3	--	--	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	0.18	--	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	0.0020	< 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	0.0074	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	< 0.0010	< 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	1.1	11	800	15000	25000
Fluoride	1220	U	0.24	2.4	10	150	500
Sulphate	1220	U	7.1	71	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	5.6	56	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	8.2

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.

Chemtest
The right chemistry to deliver results

Results - Single Stage WAC

Project: 22455 Avid Development Sandyford (Aecom / Marlet)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-10240						
Chemtest Sample ID:	996080						
Sample Ref:	131846						
Sample ID:							
Sample Location:	TP5						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
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] 0.31	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		10.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.18	--	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	0.0011	< 0.050	0.5	2	25
Barium	1450	U	0.023	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	0.0041	< 0.050	0.5	10	70
Copper	1450	U	< 0.0010	< 0.050	2	50	100
Mercury	1450	U	0.00069	0.0069	0.01	0.2	2
Molybdenum	1450	U	0.0034	< 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	0.011	< 0.50	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.14	1.4	10	150	500
Sulphate	1220	U	310	3100	1000	20000	50000
Total Dissolved Solids	1020	N	400	4000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.7	< 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: 22455 Avid Development Sandyford (Aecom / Marlet)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-10240						
Chemtest Sample ID:	996081						
Sample Ref:	131847						
Sample ID:							
Sample Location:	TP5						
Top Depth(m):	1.20						
Bottom Depth(m):	1.20						
Sampling Date:							
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] 0.61	3	5	6
Loss On Ignition	2610	M	%	3.3	--	--	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	0.037	--	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	0.0061	< 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	0.0041	< 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	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.26	2.6	10	150	500
Sulphate	1220	U	16	160	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	6.3	63	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	17

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: 22455 Avid Development Sandyford (Aecom / Marlet)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-10240						
Chemtest Sample ID:	996082						
Sample Ref:	131850						
Sample ID:							
Sample Location:	TP6						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
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] < 0.20	3	5	6
Loss On Ignition	2610	M	%	2.0	--	--	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		10.8	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.18	--	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	0.0029	< 0.050	0.5	2	25
Barium	1450	U	0.0040	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	0.0040	< 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	0.0031	< 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	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.19	1.9	10	150	500
Sulphate	1220	U	23	230	1000	20000	50000
Total Dissolved Solids	1020	N	100	1000	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.9	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	7.3

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: 22455 Avid Development Sandyford (Aecom / Marlet)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-10240						
Chemtest Sample ID:	996083						
Sample Ref:	136807						
Sample ID:							
Sample Location:	TP7						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
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] 0.28	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		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.19	--	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	0.0072	< 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	0.014	0.14	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	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.29	2.9	10	150	500
Sulphate	1220	U	2.0	20	1000	20000	50000
Total Dissolved Solids	1020	N	65	650	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	4.8	< 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.

Chemtest
The right chemistry to deliver results

Results - Single Stage WAC

Project: 22455 Avid Development Sandyford (Aecom / Marlet)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-10240						
Chemtest Sample ID:	996084						
Sample Ref:	136811						
Sample ID:							
Sample Location:	TP8						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
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] 0.35	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		8.6	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.17	--	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	0.0014	< 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	0.0089	0.089	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	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.19	1.9	10	150	500
Sulphate	1220	U	1.4	14	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	5.7	57	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.1

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
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Results - Single Stage WAC

Project: 22455 Avid Development Sandyford (Aecom / Marlet)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-10240						
Chemtest Sample ID:	996085						
Sample Ref:	136814						
Sample ID:							
Sample Location:	TP9						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
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] 0.56	3	5	6
Loss On Ignition	2610	M	%	2.3	--	--	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	8.7	100	--	--
pH	2010	M		9.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.18	--	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	0.0017	< 0.050	0.5	2	25
Barium	1450	U	0.0043	< 0.50	20	100	300
Cadmium	1450	U	< 0.00010	< 0.010	0.04	1	5
Chromium	1450	U	0.0018	< 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	0.015	0.15	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	0.0011	0.011	0.1	0.5	7
Zinc	1450	U	< 0.0010	< 0.50	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.23	2.3	10	150	500
Sulphate	1220	U	42	420	1000	20000	50000
Total Dissolved Solids	1020	N	120	1200	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	3.9	< 50	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	8.5

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: 22455 Avid Development Sandyford (Aecom / Marlet)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-10240						
Chemtest Sample ID:	996086						
Sample Ref:	136819						
Sample ID:							
Sample Location:	TP10						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
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] 0.38	3	5	6
Loss On Ignition	2610	M	%	2.4	--	--	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		8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.13	--	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	0.0019	< 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	0.0071	0.071	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	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.19	1.9	10	150	500
Sulphate	1220	U	2.1	21	1000	20000	50000
Total Dissolved Solids	1020	N	53	-530	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	5.2	52	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	10

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
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Results - Single Stage WAC

Project: 22455 Avid Development Sandyford (Aecom / Marlet)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-10240						
Chemtest Sample ID:	996087						
Sample Ref:	138822						
Sample ID:							
Sample Location:	TP11						
Top Depth(m):	0.50						
Bottom Depth(m):	0.50						
Sampling Date:							
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] 0.31	3	5	6
Loss On Ignition	2610	M	%	2.3	--	--	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		8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.14	--	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	0.0013	< 0.050	0.5	2	25
Barium	1450	U	0.0020	< 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	0.00052	0.0052	0.01	0.2	2
Molybdenum	1450	U	0.0072	0.072	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	0.0021	0.021	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	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.19	1.9	10	150	500
Sulphate	1220	U	8.3	83	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	7.7	77	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	9.1

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: 22455 Avid Development Sandyford (Aecom / Marlet)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-10240						
Chemtest Sample ID:	996088						
Sample Ref:	136827						
Sample ID:							
Sample Location:	TP12						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
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] 0.34	3	5	6
Loss On Ignition	2610	M	%	2.4	--	--	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		8.6	--	>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	< 0.0010	< 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	0.014	0.14	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	< 1.0	< 10	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	54	540	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	7.3	73	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	10

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: 22455 Avid Development Sandyford (Aecom / Marlet)

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	20-10240						
Chemtest Sample ID:	996089						
Sample Ref:	13559						
Sample ID:							
Sample Location:	BH1						
Top Depth(m):	1.00						
Bottom Depth(m):	1.00						
Sampling Date:							
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] 0.34	3	5	6
Loss On Ignition	2610	M	%	2.3	--	--	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		8.5	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.17	--	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	0.0031	< 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	0.00062	0.0062	0.01	0.2	2
Molybdenum	1450	U	0.012	0.12	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	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.26	2.6	10	150	500
Sulphate	1220	U	2.1	21	1000	20000	50000
Total Dissolved Solids	1020	N	52	520	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	5.3	53	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	10

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
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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:
996074	131830		TP1		A	Amber Glass 250ml
996074	131830		TP1		A	Plastic Tub 500g
996075	131831		TP1		A	Amber Glass 250ml
996075	131831		TP1		A	Plastic Tub 500g
996076	131834		TP2		A	Amber Glass 250ml
996076	131834		TP2		A	Plastic Tub 500g
996077	131838		TP3		A	Amber Glass 250ml
996077	131838		TP3		A	Plastic Tub 500g
996078	131839		TP3		A	Amber Glass 250ml
996078	131839		TP3		A	Plastic Tub 500g
996079	131842		TP4		A	Amber Glass 250ml
996079	131842		TP4		A	Plastic Tub 500g
996080	131846		TP5		A	Amber Glass 250ml
996080	131846		TP5		A	Plastic Tub 500g
996081	131847		TP5		A	Amber Glass 250ml
996081	131847		TP5		A	Plastic Tub 500g
996082	131850		TP6		A	Amber Glass 250ml
996082	131850		TP6		A	Plastic Tub 500g
996083	136807		TP7		A	Amber Glass 250ml
996083	136807		TP7		A	Plastic Tub 500g
996084	136811		TP8		A	Amber Glass 250ml
996084	136811		TP8		A	Plastic Tub 500g

Chemtest
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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:
996085	136814		TP9		A	Amber Glass 250ml
996085	136814		TP9		A	Plastic Tub 500g
996086	136819		TP10		A	Amber Glass 250ml
996086	136819		TP10		A	Plastic Tub 500g
996087	138822		TP11		A	Amber Glass 250ml
996087	138822		TP11		A	Plastic Tub 500g
996088	136827		TP12		A	Amber Glass 250ml
996088	136827		TP12		A	Plastic Tub 500g
996089	13559		BH1		A	Amber Glass 250ml
996089	13559		BH1		A	Plastic Tub 500g
996090	135560		BH1		A	Amber Glass 250ml
996090	135560		BH1		A	Plastic Tub 500g
996091	1		BH2		A	Amber Glass 250ml
996091	1		BH2		A	Plastic Tub 500g
996092	13551		BH3		A	Amber Glass 250ml
996092	13551		BH3		A	Plastic Tub 500g
996093	13553		BH3		A	Amber Glass 250ml
996093	13553		BH3		A	Plastic Tub 500g
996094	130581		BH4		A	Amber Glass 250ml
996094	130581		BH4		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.
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 measurememt 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

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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 VI Test Data

c. Water Levels and Gas Concentrations

Gas & Groundwater Monitoring

Site Location	Carmanhall road, Sandyford.
Project No.	22455
Client	Marlet
Date	20th March 2020

	BH3	RC2	BH1	RC4				
WATER LEVEL (m bgl)	2.5	2.9	2.2	2.4				
GAS FLOW	n/a	n/a	n/a	n/a				
CH4(%)	0.0	0.0	0.0	0.0				
LEL(%)	0.0	0.0	0.0	0.0				
CO2(%)	0.1	0.0	0.2	0.0				
O2(%)	20.7	19.9	19.6	20.6				
BAROMETRIC PRESURE (mb)	1014	1014	1014	1014				
WEATHER	Sunny	Sunny	Sunny	Sunny				
COMMENTS								

Gas & Groundwater Monitoring

Site Location	**Carmanhall road, Sandyford.**							
Project No.	**22455**							
Client	**Marlet**							
Date	**15th May 2020**							
	BH3	RC2	BH1	RC4				
WATER LEVEL (m bgl)	2.2	2.6	1.9	2.05				
GAS FLOW	n/a	n/a	n/a	n/a				
CH4(%)	0.0	0.0	0.0	0.0				
LEL(%)	0.0	0.0	0.0	0.0				
CO2(%)	0.1	0.0	0.1	0.0				
O2(%)	20.5	19.7	19.9	20.1				
BAROMETRIC PRESURE (mb)	1006	1006	1006	1006				
WEATHER	Sunny	Sunny	Sunny	Sunny				
COMMENTS								

Gas & Groundwater Monitoring

Site Location	**Carmanhall road, Sandyford.**							
Project No.	**22455**							
Client	**Marlet**							
Date	**16-Jun-20**							
	BH3	RC2	BH1	RC4				
WATER LEVEL (m bgl)	2.1	2.5	1.63	1.83				
GAS FLOW	0.0l/hr	0l/hr	0l/hr	0l/hr				
CH4(%)	0.0	0.0	0.0	0.0				
LEL(%)	0.0	0.0	0.0	0.0				
CO2(%)	0.0	0.0	0.1	0.0				
O2(%)	20.7	19.9	20.4	20.6				
BAROMETRIC PRESURE (mb)	1001	1001	1001	1001				
WEATHER	Raining	Raining	Raining	Raining				
COMMENTS								

Appendix VII Site Plan

LEGEND
- TP (12No.)
- BH (4No.)
- IT (2No.)
- CBR (1No.)

NOTE:
DRAWING TO BE READ IN CONJUNCTION WITH GROUND INVESTIGATION SCOPE OF WORKS

Borehole Schedule

Ref.	Position X	Position Y
BH-01	719412664	726603419
BH-02	719477406	726573600
BH-03	719442183	726498510
BH-04	719370351	726535805

Trial Pit Schedule

Ref	Position X	Position Y
TP-01	719402076	726599798
TP-02	719434445	726584189
TP-03	719482361	726560529
TP-04	719453098	726534700
TP-05	719435031	726543263
TP-06	719409829	726554848
TP-07	719385458	726566683
TP-08	719377388	726550082
TP-09	719402076	726539009
TP-10	719427078	726528279
TP-11	719446041	726520288
TP-12	719399928	726517623

Infiltration Schedule

Ref	Position X	Position Y
IT-01	719410787	726597320
IT-02	719437351	726505470

CBR Schedule

Ref	Position X	Position Y
CBR-01	719389252	726572599

AECOM

PROJECT
Residental Development at Sandyford Avid Site

CLIENT
Marlet Property Group

CONSULTANT

AECOM
4th Floor, Adelphi Plaza, George's Street
Upper, Dun Laoghaire, Co Dublin
+353 (0)1 2383100 tel
+353 (0)1 238 3199 fax
www.aecom.com

NOTES

ISSUE/REVISION

I/R	DATE	DESCRIPTION
P01	18.02.2020	Issued for Tender

SUITABILITY STATUS
D2 - Suitable for Tender

PROJECT NUMBER
PR-461030

SHEET TITLE
Site Investigation Scope of Works

SHEET NUMBER
AVID-ACM-00-XX-DR-S-060001

SCALE: 1:500 **REV:** P01

D. Greenfield Run-off Rate Calculations for Proposed Site

Greenfield runoff rate estimation for sites

www.uksuds.com | Greenfield runoff tool

Calculated by:	Laura Ruiz
Site name:	TACK SHD
Site location:	Sandyford

This is an estimation of the greenfield runoff rates that are used to meet normal best practice criteria in line with Environment Agency guidance "Rainfall runoff management for developments", SC030219 (2013) , the SuDS Manual C753 (Ciria, 2015) and the non-statutory standards for SuDS (Defra, 2015). This information on greenfield runoff rates may be the basis for setting consents for the drainage of surface water runoff from sites.

Site Details

Latitude:	
Longitude:	
Reference:	916828047
Date:	Mar 31 2022 16:58

Runoff estimation approach IH124

Site characteristics

Total site area (ha): 0.46

Methodology

Q_{BAR} estimation method:	Calculate from SPR and SAAR
SPR estimation method:	Calculate from SOIL type

Soil characteristics	Default	Edited
SOIL type:	0	3
HOST class:	N/A	N/A
SPR/SPRHOST:	0.00	0.37

Hydrological characteristics	Default	Edited
SAAR (mm):	0	930
Hydrological region:	1	1
Growth curve factor 1 year:	-	0.85
Growth curve factor 30 years:	-	1.95
Growth curve factor 100 years:	-	2.48
Growth curve factor 200 years:	-	2.84

Notes

(1) Is Q_{BAR} < 2.0 l/s/ha?

When Q_{BAR} is < 2.0 l/s/ha then limiting discharge rates are set at 2.0 l/s/ha.

(2) Are flow rates < 5.0 l/s?

Where flow rates are less than 5.0 l/s consent for discharge is usually set at 5.0 l/s if blockage from vegetation and other materials is possible. Lower consent flow rates may be set where the blockage risk is addressed by using appropriate drainage elements.

(3) Is SPR/SPRHOST ≤ 0.3?

Where groundwater levels are low enough the use of soakaways to avoid discharge offsite would normally be preferred for disposal of surface water runoff.

Greenfield runoff rates	Default	Edited
Q_{BAR} (l/s):	0	1.84
1 in 1 year (l/s):		1.57
1 in 30 years (l/s):		3.59
1 in 100 year (l/s):		4.57
1 in 200 years (l/s):		5.23

E. Attenuation Calculations

Design Settings

Rainfall Methodology	FSR	Maximum Time of Concentration (mins)	30.00
Return Period (years)	5	Maximum Rainfall (mm/hr)	50.0
Additional Flow (%)	0	Minimum Velocity (m/s)	1.00
FSR Region	England and Wales	Connection Type	Level Soffits
M5-60 (mm)	17.800	Minimum Backdrop Height (m)	0.200
Ratio-R	0.274	Preferred Cover Depth (m)	1.200
CV	0.750	Include Intermediate Ground	✓
Time of Entry (mins)	4.00	Enforce best practice design rules	✓

Nodes

Name	Area (ha)	T of E (mins)	Cover Level (m)	Diameter (mm)	Easting (m)	Northing (m)	Depth (m)
3	0.025	4.00	85.470	1200	719353.583	726533.352	1.425
20			84.350	1200	719376.314	726575.258	1.600
19	0.025	4.00	84.430	1200	719370.802	726565.006	1.425
17	0.140	4.00	84.150	1200	719347.616	726586.027	1.630
16	0.056	4.00	84.150	1200	719354.578	726598.631	1.780
15			84.150	1200	719372.569	726584.828	2.370
14			84.250	1200	719379.482	726581.589	2.509
13			83.950	1200	719398.596	726617.105	2.478
5	0.072	4.00	84.870	1200	719376.194	726602.582	1.425
6			84.200	1200	719382.001	726577.750	1.419
7	0.059	4.00	83.990	1200	719398.173	726610.716	1.025
8	0.082	4.00	84.150	1200	719370.962	726590.817	2.130
9			84.150	1200	719369.445	726586.155	2.350
2			83.950	1200	719405.157	726615.358	2.523
1			84.250	1200	719420.522	726621.550	2.934

Links (Input)

Name	US Node	DS Node	Length (m)	ks (mm) / n	US IL (m)	DS IL (m)	Fall (m)	Slope (1:X)	Dia (mm)	T of C (mins)	Rain (mm/hr)
2	2	1	16.673	0.600	81.427	81.316	0.111	150.0	225	6.19	1.0
13	13	2	6.791	0.600	81.472	81.427	0.045	150.0	225	5.93	1.0
14	14	13	40.334	0.600	81.741	81.472	0.269	150.0	225	5.82	1.0
15	15	14	7.704	0.600	81.780	81.741	0.039	200.0	225	5.19	1.0
16	16	8	18.260	0.600	82.370	82.020	0.350	52.2	225	4.35	50.0
17	17	16	14.469	0.600	82.520	82.370	0.150	96.5	225	4.18	50.0
5	5	8	12.876	0.600	83.445	83.228	0.217	59.3	225	4.13	50.0
3	3	19	36.034	0.600	84.045	83.005	1.040	34.6	225	4.27	50.0
8	8	9	4.903	0.600	82.020	81.800	0.220	22.3	225	4.38	50.0
9	9	15	3.394	0.600	81.800	81.780	0.020	169.7	225	5.05	1.0
19	19	20	11.640	0.600	83.005	82.750	0.255	45.6	225	4.37	50.0
7	7	6	36.719	0.600	82.965	82.781	0.184	200.0	225	4.66	50.0
6	6	20	6.209	0.600	82.781	82.750	0.031	200.0	225	4.78	50.0
20	20	9	12.881	0.600	82.750	82.674	0.076	169.5	225	4.99	50.0

Simulation Settings

Rainfall Methodology	FSR	Analysis Speed	Normal
FSR Region	England and Wales	Skip Steady State	x
M5-60 (mm)	17.800	Drain Down Time (mins)	240
Ratio-R	0.274	Additional Storage (m³/ha)	20.0
Summer CV	0.750	Check Discharge Rate(s)	x
Winter CV	0.840	Check Discharge Volume	x

Storm Durations

15	60	180	360	600	960	2160	4320	7200	10080
30	120	240	480	720	1440	2880	5760	8640	

Return Period (years)	Climate Change (CC %)	Additional Area (A %)	Additional Flow (Q %)
30	0	0	0
100	30	0	0

Node 14 Online Hydro-Brake® Control

Flap Valve	x	Objective	(HE) Minimise upstream storage
Replaces Downstream Link	✓	Sump Available	✓
Invert Level (m)	81.741	Product Number	CTL-SHE-0054-1800-2000-1800
Design Depth (m)	2.000	Min Outlet Diameter (m)	0.075
Design Flow (l/s)	1.8	Min Node Diameter (mm)	1200

Node 9 Depth/Area Storage Structure

Base Inf Coefficient (m/hr)	0.00000	Safety Factor	2.0	Invert Level (m)	81.800
Side Inf Coefficient (m/hr)	0.00000	Porosity	1.00	Time to half empty (mins)	

Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)	Depth (m)	Area (m²)	Inf Area (m²)
0.000	210.0	0.0	2.000	210.0	0.0	2.001	0.0	0.0

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 15 minute summer	208.939	59.123
30 year 15 minute winter	146.624	59.123
30 year 30 minute summer	144.850	40.988
30 year 30 minute winter	101.649	40.988
30 year 60 minute summer	103.437	27.335
30 year 60 minute winter	68.721	27.335
30 year 120 minute summer	67.025	17.713
30 year 120 minute winter	44.530	17.713
30 year 180 minute summer	52.724	13.568
30 year 180 minute winter	34.272	13.568
30 year 240 minute summer	42.216	11.156
30 year 240 minute winter	28.047	11.156
30 year 360 minute summer	32.862	8.456
30 year 360 minute winter	21.361	8.456
30 year 480 minute summer	26.256	6.939
30 year 480 minute winter	17.444	6.939
30 year 600 minute summer	21.742	5.947

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
30 year 600 minute winter	14.855	5.947
30 year 720 minute summer	19.551	5.240
30 year 720 minute winter	13.140	5.240
30 year 960 minute summer	16.282	4.287
30 year 960 minute winter	10.786	4.287
30 year 1440 minute summer	12.035	3.226
30 year 1440 minute winter	8.088	3.226
30 year 2160 minute summer	8.762	2.422
30 year 2160 minute winter	6.037	2.422
30 year 2880 minute summer	7.363	1.973
30 year 2880 minute winter	4.948	1.973
30 year 4320 minute summer	5.653	1.478
30 year 4320 minute winter	3.723	1.478
30 year 5760 minute summer	4.707	1.205
30 year 5760 minute winter	3.047	1.205
30 year 7200 minute summer	4.032	1.029
30 year 7200 minute winter	2.603	1.029
30 year 8640 minute summer	3.544	0.904
30 year 8640 minute winter	2.288	0.904
30 year 10080 minute summer	3.179	0.811
30 year 10080 minute winter	2.052	0.811
100 year +30% CC 15 minute summer	349.324	98.847
100 year +30% CC 15 minute winter	245.140	98.847
100 year +30% CC 30 minute summer	245.025	69.334
100 year +30% CC 30 minute winter	171.948	69.334
100 year +30% CC 60 minute summer	176.443	46.629
100 year +30% CC 60 minute winter	117.224	46.629
100 year +30% CC 120 minute summer	114.583	30.281
100 year +30% CC 120 minute winter	76.126	30.281
100 year +30% CC 180 minute summer	89.817	23.113
100 year +30% CC 180 minute winter	58.383	23.113
100 year +30% CC 240 minute summer	71.506	18.897
100 year +30% CC 240 minute winter	47.507	18.897
100 year +30% CC 360 minute summer	55.219	14.210
100 year +30% CC 360 minute winter	35.894	14.210
100 year +30% CC 480 minute summer	43.859	11.591
100 year +30% CC 480 minute winter	29.139	11.591
100 year +30% CC 600 minute summer	36.139	9.885
100 year +30% CC 600 minute winter	24.692	9.885
100 year +30% CC 720 minute summer	32.360	8.673
100 year +30% CC 720 minute winter	21.748	8.673
100 year +30% CC 960 minute summer	26.757	7.046
100 year +30% CC 960 minute winter	17.724	7.046
100 year +30% CC 1440 minute summer	19.562	5.243
100 year +30% CC 1440 minute winter	13.147	5.243
100 year +30% CC 2160 minute summer	14.070	3.888
100 year +30% CC 2160 minute winter	9.695	3.888
100 year +30% CC 2880 minute summer	11.714	3.139
100 year +30% CC 2880 minute winter	7.872	3.139
100 year +30% CC 4320 minute summer	8.874	2.320
100 year +30% CC 4320 minute winter	5.844	2.320
100 year +30% CC 5760 minute summer	7.323	1.875

Rainfall

Event	Peak Intensity (mm/hr)	Average Intensity (mm/hr)
100 year +30% CC 5760 minute winter	4.740	1.875
100 year +30% CC 7200 minute summer	6.230	1.589
100 year +30% CC 7200 minute winter	4.021	1.589
100 year +30% CC 8640 minute summer	5.447	1.390
100 year +30% CC 8640 minute winter	3.515	1.390
100 year +30% CC 10080 minute summer	4.864	1.241
100 year +30% CC 10080 minute winter	3.139	1.241

Results for 30 year Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	3	10	84.088	0.043	7.1	0.0636	0.0000	OK
15 minute winter	20	10	82.908	0.158	30.2	0.1781	0.0000	OK
15 minute winter	19	10	83.070	0.065	14.2	0.0963	0.0000	OK
1440 minute winter	17	1380	82.747	0.227	2.6	0.6467	0.0000	SURCHARGED
1440 minute winter	16	1380	82.747	0.377	3.7	0.6635	0.0000	SURCHARGED
1440 minute winter	15	1380	82.747	0.967	1.4	1.0938	0.0000	SURCHARGED
1440 minute winter	14	1380	82.747	1.006	1.4	1.1374	0.0000	SURCHARGED
1440 minute winter	13	1380	81.500	0.028	1.3	0.0318	0.0000	OK
15 minute summer	5	10	83.536	0.091	20.5	0.1947	0.0000	OK
15 minute winter	6	10	82.921	0.140	16.8	0.1585	0.0000	OK
15 minute summer	7	10	83.071	0.106	16.8	0.2420	0.0000	OK
1440 minute winter	8	1380	82.747	0.727	6.6	1.3819	0.0000	SURCHARGED
1440 minute winter	9	1380	82.747	0.947	13.7	199.9246	0.0000	SURCHARGED
1440 minute winter	2	1380	81.455	0.028	1.3	0.0312	0.0000	OK
1440 minute winter	1	1380	81.343	0.027	1.3	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	3	3	19	7.1	0.973	0.080	0.2657	
15 minute winter	20	20	9	29.7	1.056	0.747	0.3625	
15 minute winter	19	19	20	14.2	0.802	0.184	0.2280	
1440 minute winter	17	17	16	2.6	0.678	0.049	0.5754	
1440 minute winter	16	16	8	3.7	0.836	0.051	0.7262	
1440 minute winter	15	15	14	1.4	0.168	0.039	0.3064	
1440 minute winter	14	Hydro-Brake®	13	1.3				
1440 minute winter	13	13	2	1.3	0.471	0.031	0.0191	
15 minute summer	5	5	8	20.5	1.433	0.303	0.1842	
15 minute winter	6	6	20	16.0	0.576	0.437	0.1728	
15 minute summer	7	7	6	16.9	0.800	0.461	0.8108	
1440 minute winter	8	8	9	12.0	1.200	0.109	0.1950	
1440 minute winter	9	9	15	1.4	0.348	0.036	0.1350	
1440 minute winter	2	2	1	1.3	0.483	0.031	0.0457	112.3

Results for 100 year +30% CC Critical Storm Duration. Lowest mass balance: 99.79%

Node Event	US Node	Peak (mins)	Level (m)	Depth (m)	Inflow (l/s)	Node Vol (m³)	Flood (m³)	Status
15 minute winter	3	10	84.100	0.055	11.9	0.0822	0.0000	OK
2160 minute winter	20	2040	83.479	0.729	2.5	0.8250	0.0000	SURCHARGED
2160 minute winter	19	2040	83.479	0.474	1.2	0.7031	0.0000	SURCHARGED
15 minute winter	17	11	83.643	1.123	66.6	3.2005	0.0000	SURCHARGED
2160 minute winter	16	2040	83.480	1.110	4.4	1.9527	0.0000	SURCHARGED
2160 minute winter	15	2040	83.480	1.700	1.6	1.9225	0.0000	SURCHARGED
2160 minute winter	14	2040	83.479	1.738	1.8	1.9657	0.0000	SURCHARGED
2160 minute winter	13	2040	81.504	0.032	1.7	0.0359	0.0000	OK
15 minute winter	5	10	83.569	0.124	34.3	0.2664	0.0000	OK
2160 minute winter	6	2040	83.479	0.698	1.3	0.7899	0.0000	SURCHARGED
2160 minute winter	7	2040	83.479	0.514	1.3	1.1739	0.0000	SURCHARGED
2160 minute winter	8	2040	83.479	1.459	7.8	2.7745	0.0000	SURCHARGED
2160 minute winter	9	2040	83.479	1.679	10.1	354.5759	0.0000	SURCHARGED
2160 minute winter	2	2040	81.458	0.031	1.7	0.0352	0.0000	OK
2160 minute winter	1	2040	81.347	0.031	1.7	0.0000	0.0000	OK

Link Event (Upstream Depth)	US Node	Link	DS Node	Outflow (l/s)	Velocity (m/s)	Flow/Cap	Link Vol (m³)	Discharge Vol (m³)
15 minute winter	3	3	19	11.9	1.124	0.134	0.3848	
2160 minute winter	20	20	9	2.5	0.555	0.063	0.5123	
2160 minute winter	19	19	20	1.2	0.396	0.016	0.4629	
15 minute winter	17	17	16	59.0	1.483	1.114	0.5754	
2160 minute winter	16	16	8	4.3	0.744	0.060	0.7262	
2160 minute winter	15	15	14	1.8	0.155	0.049	0.3064	
2160 minute winter	14	Hydro-Brake®	13	1.7				
2160 minute winter	13	13	2	1.7	0.505	0.040	0.0228	
15 minute winter	5	5	8	34.3	1.619	0.507	0.2728	
2160 minute winter	6	6	20	1.3	0.358	0.036	0.2469	
2160 minute winter	7	7	6	1.3	0.437	0.036	1.4604	
2160 minute winter	8	8	9	7.7	0.908	0.070	0.1950	
2160 minute winter	9	9	15	1.6	0.277	0.040	0.1350	
2160 minute winter	2	2	1	1.7	0.520	0.040	0.0543	191.2

F. Irish Water Statement of Design Acceptance

Jairo Rivero
Block S
Eastpoint Business Park
Alfie Byrne Road
D03H3F4
Dublin
Ireland

Uisce Éireann
Bosca OP 448
Oifig Sheachadta na
Cathrach Theas
Cathair Chorcaí

Irish Water
PO Box 448,
South City
Delivery Office,
Cork City.

www.water.ie

28 March 2022

Re: Design Submission for Ravens Rock Road, Sandyford, Dublin (the "Development") (the "Design Submission") / Connection Reference No: CDS21008079

Dear Jairo Rivero,

Many thanks for your recent Design Submission.

We have reviewed your proposal for the connection(s) at the Development. Based on the information provided, which included the documents outlined in Appendix A to this letter, Irish Water has no objection to your proposals.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before you can connect to our network you must sign a connection agreement with Irish Water. This can be applied for by completing the connection application form at www.water.ie/connections. Irish Water's current charges for water and wastewater connections are set out in the Water Charges Plan as approved by the Commission for Regulation of Utilities (CRU)(https://www.cru.ie/document_group/irish-waters-water-charges-plan-2018/).

You the Customer (including any designers/contractors or other related parties appointed by you) is entirely responsible for the design and construction of all water and/or wastewater infrastructure within the Development which is necessary to facilitate connection(s) from the boundary of the Development to Irish Water's network(s) (the "**Self-Lay Works**"), as reflected in your Design Submission. Acceptance of the Design Submission by Irish Water does not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.

If you have any further questions, please contact your Irish Water representative:
Name: Dario Alvarez
Email: dalvarez@water.ie

Yours sincerely,

Yvonne Harris

Yvonne Harris
Head of Customer Operations

Appendix A

Document Title & Revision

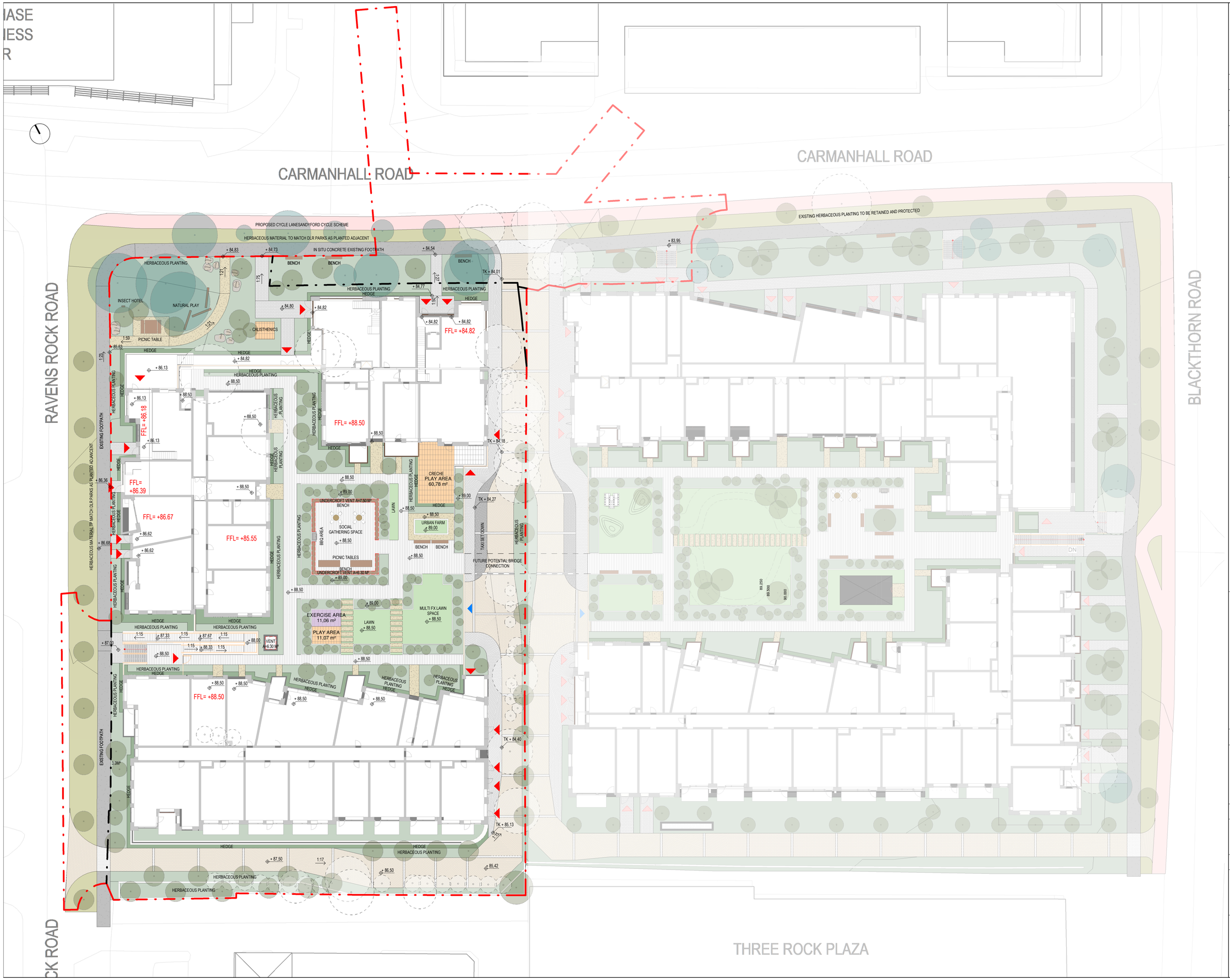
- [21-118-P150 - Proposed Water Supply Layout]
- [21-118-P122 - Proposed Foul Water Drainage Layout]
- [21-118 Foul long sections]

This Statement of Design Acceptance is valid for Phase 1 of the development, 207 units plus creche located on the western side of the site.

Irish Water notes that the water and wastewater infrastructure will remain private and not be vested.

For further information, visit ***www.water.ie/connections***

Notwithstanding any matters listed above, the Customer (including any appointed designers/contractors, etc.) is entirely responsible for the design and construction of the Self-Lay Works. Acceptance of the Design Submission by Irish Water will not, in any way, render Irish Water liable for any elements of the design and/or construction of the Self-Lay Works.



NOTE

ALL DIMENSIONS TO BE CHECKED ON SITE
NO DIMENSIONS TO BE SCALED FROM THIS DRAWING
THIS DRAWING IS TO BE READ IN CONJUNCTION WITH RELEVANT CONSULTANTS DRAWINGS

FOR DRAWING INDEX, GENERAL NOTES, REFER TO DWG L1-001

CLIENT:

Sandyford Environmental Construction Limited

ARCHITECTS:

MDO ARCHITECTS

LEGEND

- HEDGE PLANTING
- HERBACEOUS PLANTING
- HERBACEOUS MATERIAL TP MATCH DLR PARKS AS PLANTED
- LAWN
- GATE TO COMMUNAL AND PRIVATE AMENITY SPACES
- SITE BOUNDARY
- LEGAL INTEREST BOUNDARY
- BUILDING ENTRACE
- CAR PARK ENTRACE
- 0.00 LEVEL
- P CAR PARKING
- TAXI SET DOWN
- PUBLIC REALM PAVING
- NATURAL STONE PAVING BAND
- SHARED SURFACE
- IN SITU CONCRETE EXISTING FOOTPATH
- RESIN BOUND GRAVEL
- COURTYARD PAVING
- SOFT POUR PLAYGROUND FINISH
- PROPOSED TREES
- EXISTING TREES TO BE RETAINED
- EXISTING TREES TO BE REMOVED

DRAFT

01	BOUNDARY LINE	15/03/2022

REVISIONS

Job No.	18A5A	Drawn By	NN
Dwg No.	T-L1-500	Checked By	JM
Scale	1 : 250 @A1	Date	MARCH 2022

JOB DESCRIPTION

Site	RAVENS ROCK ROAD
Project	TACK SANDYFORD SHD
Title	LANDSCAPE PLAN

NMP Niall Montgomery + Partners
Architects 33 Rock Road, Willamstown, Blackrock, Co. Dublin
Telephones : 2121 800 Fax : 2121 007 E mail : info@nmp.ie

NOTES:

1. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.

NOTE:
PUBLIC FOUL PIPE MATERIAL TO BE U-PVC (STIFFNESS CLASS 8) AND IN COMPLIANCE WITH SECTION 3.13 OF IRISH WATER CODE OF PRACTICE.

NOTE:
FOUL SEWERS TO BE CONSTRUCTED WITH CONCRETE SURROUND IN ACCORDANCE WITH IRISH WATER STD-WW-08 WHERE VERTICAL CLEARANCE FROM SURFACE WATER IS LESS THAN 300mm AND WHERE DEPTH OF COVER TO ROAD IS LESS THAN 1.2m

NOTE:
RISING MAINS TO BE DEMARCATED IN ACCORDANCE WITH SECTION 3.5.22 OF WASTEWATER CODE OF PRACTICE.

LEGEND FOUL WATER

FW MH2
CL 84.000
IL 80.049
225mmØ @ 1:200.0 ←
INDICATES PROPOSED PUBLIC FOUL WATER SEWER, PIPE SIZE AND GRADIENT WITH MANHOLE REFERENCE, COVER AND INVERT LEVELS

F MH 1
CL 84.100
IL 83.100
ø225 →@ 1:43.2
INDICATES PROPOSED PRIVATE FOUL WATER SEWER, PIPE SIZE AND GRADIENT WITH MANHOLE REFERENCE, COVER AND INVERT LEVELS

FWDP
PROPOSED 150mmø FOUL WASTE WATER DOWN PIPE (BY OTHERS)

Ex. FW
CL: 83.79
IL: 81.90
EX 225ø
FOUL → FOUL
INDICATES EXISTING SURFACE WATER PUBLIC SEWER PIPE SIZE WITH MANHOLE REFERENCE, COVER AND INVERT LEVELS

INDICATES FUTURE FOOTPATH

INDICATES FUTURE CYCLETRACK

INDICATES FUTURE ROAD

INDICATES FUTURE GRASS VERGE

REV.	DATE	AMENDMENT	DRN	APPD

STATUS **FOR PLANNING ONLY NOT FOR CONSTRUCTION**

Waterman Moylan
Engineering Consultants
BLOCK S, EASTPOINT BUSINESS PARK, ALFIE BYRNE ROAD,
DUBLIN D03 H3F4 IRELAND.
Tel: (01) 664 8900 Fax: (01) 661 3618
Email: info@waterman-moylan.ie www.waterman-moylan.ie

CLIENT SANDYFORD ENVIRONMENTAL CONSTRUCTON LTD AND ATLAS GP LTD.

ARCHITECT MC CAULEY DAYE O'CONNELL

PROJECT
TACK SANDYFORD LRD

TITLE
PROPOSED FOUL WATER DRAINAGE LAYOUT

DRAWN	DESIGNED	APPROVED	DATE
G.Byrne	BMC	JG	MAR. '22
SCALE	JOB NO.	DRG. NO.	REVISION
1:250 @A1	21-118	P122	

1:250 0 5.0 10.0 15.0 20.0 25.0m
1:1 0 10 20 30 40 50 60 70 80 90 100

8 March 2022 15:06 - - DRAFT - - Laura Ruiz Garrido

Ex. FW
CL: 81.80
IL: 79.32

Ex. FW
CL: 84.10
IL: 81.23

F MH 12
CL 84.300
IL 81.535

ø225 ←@ 1:55.5

F MH 11
CL 84.000
IL 81.848

ø225 →@ 1:80.4

EX 225ø

Ex. FW
CL: 83.92
IL: 82.01

Ex. FW
CL: 83.79
IL: 81.90

F MH 10
CL 83.980
IL 81.900

ø225 →@ 1:142.5

CARMANHALL ROAD

RAVENS ROCK ROAD

existing footpath

existing footpath

proposed footpath

existing footpath

FWDP

F MH 8
CL 84.100
IL 82.370

ø225 →@ 1:109.7

ø225 →@ 1:108.6

F MH 6
CL 84.100
IL 82.520

F MH 9
CL 84.175
IL 82.050

ø225 →@ 1:230.5

PEDESTRIAN LINK BRIDGE

TAXI SET DOWN

TAXI SET DOWN

STOP

STOP

F MH 3 S/O
CL 84.100
IL 82.750

F MH 4
CL 84.420
IL 82.166

RISING MAIN FROM BASEMENT

ø225 →@ 1:200.0

F MH 2
CL 85.200
IL 82.350

ø225 →@ 1:43.2

F MH 1
CL 84.100
IL 83.100

FFL 86.615

FFL 85.00

FFL 85.00

1:10 SLOPE

WASTE COMPACTOR

NOTES:

1. DO NOT SCALE. USE FIGURED DIMENSIONS ONLY.
2. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT ARCHITECTURAL AND ENGINEERING DRAWINGS.

NOTE:
PUBLIC FOUL PIPE MATERIAL TO BE U-PVC (STIFFNESS CLASS 8) AND IN COMPLIANCE WITH SECTION 3.13 OF IRISH WATER CODE OF PRACTICE.

NOTE:
FOUL SEWERS TO BE CONSTRUCTED WITH CONCRETE SURROUND IN ACCORDANCE WITH IRISH WATER STD-WW-08 WHERE VERTICAL CLEARANCE FROM SURFACE WATER IS LESS THAN 300mm AND WHERE DEPTH OF COVER TO ROAD IS LESS THAN 1.2m

NOTE:
RISING MAINS TO BE DEMARCATED IN ACCORDANCE WITH SECTION 3.5.22 OF WASTEWATER CODE OF PRACTICE.

LEGEND FOUL AND SURFACE WATER

- INDICATES PROPOSED PUBLIC FOUL WATER SEWER AND MANHOLE.
- INDICATES PROPOSED PRIVATE FOUL WATER SEWER AND MANHOLE
- Ex. FW CL: 83.79 IL: 81.90 — INDICATES EXISTING SURFACE WATER PUBLIC SEWER PIPE SIZE WITH MANHOLE REFERENCE, COVER AND INVERT LEVELS
- INDICATES PROPOSED SURFACE WATER SEWER AND MANHOLE
- Ex. SW CL: 84.25 IL: 81.00 — INDICATES EXISTING SURFACE WATER PUBLIC SEWER,PIPE SIZE WITH MANHOLE REFERENCE, COVER AND INVERT LEVELS
- INDICATES FUTURE FOOTPATH
- INDICATES FUTURE CYCLETRACK
- INDICATES FUTURE ROAD
- INDICATES FUTURE GRASS VERGE

REV.	DATE	AMENDMENT	DRN	APPD

STATUS **FOR PLANNING ONLY NOT FOR CONSTRUCTION**

Waterman Moylan
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BLOCK S, EASTPOINT BUSINESS PARK, ALFIE BYRNE ROAD, DUBLIN D03 H3F4 IRELAND.
Tel: (01) 664 8900 Fax: (01) 661 3618
Email: info@waterman-moylan.ie www.waterman-moylan.ie

CLIENT SANDYFORD ENVIRONMENTAL CONSTRUCTON LTD

ARCHITECT MC CAULEY DAYE O'CONNELL

PROJECT
TACK SANDYFORD SHD

TITLE
PROPOSED FOUL & SURFACE WATER DRAINAGE LAYOUT

DRAWN	DESIGNED	APPROVED	DATE
G.Byrne	BMC	JG	MAR. '22
SCALE	JOB NO.	DRG. NO.	REVISION
1:250 @A1	21-118	P124	

1:250 0 5.0 10.0 15.0 20.0 25.0m
1:1 0 10 20 30 40 50 60 70 80 90 100

28 March 2022 10:23
- - DRAFT - -
Laura Ruiz Garrido

Ex. FW CL: 81.80 IL: 79.32

EX 225ø

Ex. FW CL: 84.10 IL: 81.23

ø225 @ 1:80.4

EX 300ø

Ex. SW CL: 85.06 IL: 81.57

EX 450ø

F MH 12 CL 84.300 IL 81.535

ø225 @ 1:55.5

F MH 11 CL 84.000 IL 81.848

Ex. SW CL: 84.25 IL: 81.00

EX 225ø

Ex. FW CL: 83.92 IL: 82.01

Ex. FW CL: 83.79 IL: 81.90

CARMANHALL ROAD

F MH 10 CL 83.980 IL 81.889

ø225 @ 1:180

EX 450ø

EX 300ø

RAVENS ROCK ROAD

FFL 84.82

FFL 84.82

FFL 86.125

FFL 86.615

FFL 84.15

FFL 84.15

FFL 85.00

F MH 8 CL 84.100 IL 82.370

ø225 @ 1:109.7

ø225 @ 1:108.6

SURFACE WATER ATTENUATION
12m x 16.6m x 2m Deep
Top of tank 83.8
IL 81.8

F MH 6 CL 84.100 IL 82.520

Down Pipe from Podium Drainage

F MH 9 CL 84.175 IL 82.050

TAXI SET DOWN

PEDESTRIAN LINK BRIDGE

F MH 3 S/O CL 84.100 IL 82.750

RISING MAIN FROM BASEMENT

F MH 4 CL 84.420 IL 82.183

GULLY TO BASEMENT DRAINAGE

GULLY TO BASEMENT DRAINAGE

Ex. SW CL: 87.22 IL: 84.39

ø225 @ 1:250.0

7.82

13.21

F MH 2 CL 85.200 IL 82.367

ø225 @ 1:44.2

F MH 1 CL 84.100 IL 83.100

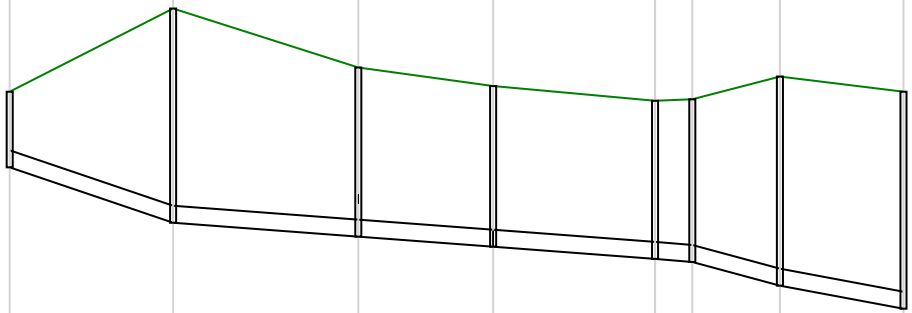
existing footpath

existing footpath

existing footpath

existing footpath

Mar 28, 2022 - 10:23am Drawing Location: M:\Projects\21\21-118 - Ravens Rock\Drawings\Waterman Moylan\Civil\Planning\Autocad Drawings\TACK PLANNING\21-118-P124 - Proposed Foul & Surface Water Drainage Layout.dwg

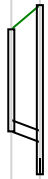


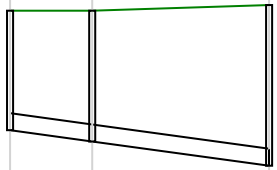
A4 drawing

Hor Scale 1500
Ver Scale 100

Datum (m) 77.000

Node Name	1	2	4	9	10	11	12	13
Link Name	1	2	4	9	10	11	12	
Section Type	225mm	225mm	225mm	225mm	225	225mm	225mm	
Slope (1:X)	44.2	200.0	201.1	200.0	180	55.5	80.4	
Cover Level (m)	84.100	85.200	84.420	84.175	83.980	84.000	84.300	84.100
Invert Level (m)	83.100	82.367 / 82.367	82.183 / 82.183	82.050 / 82.050	81.889 / 81.889	81.848	81.535 / 81.535	81.230
Length (m)	32.414	36.735	26.743	32.118	7.3	17.378	24.508	

Node Name		3 S4O
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 78.000		
Link Name		3
Section Type		15
Slope (1:X)		39
Cover Level (m)		84.100 84.420
Invert Level (m)		[illegible]
Length (m)		5.6

Node Name		6	8	9
A4 drawing Hor Scale 1500 Ver Scale 100 Datum (m) 77.000				
Link Name		6	8	
Section Type		225mm	225mm	
Slope (1:X)		108.6	109.7	
Cover Level (m)		84.100	84.100	84.175
Invert Level (m)		82.520 / 82.370	82.370	82.050
Length (m)		16.294	35.088	

UK and Ireland Office Locations