Kildare County Council

St. Evins Park, Monasterevin, Co. Kildare

Infrastructure Design Report (Part 8 Planning Submission)

2305-DOB-XX-SI-RP-C-0001

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DONNACHADH O'BRIEN
& ASSOCIATES CONSULTING ENGINEERS
A | Unit 5C Elm House, Millennium Park, Naas, Co. Kildare, W91P9P8
P | +353(0)45 984 042 W | www.doba.ie E | info@ww.doba.ie

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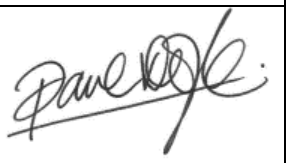
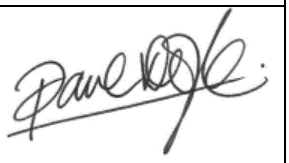
S2.P01	06/10/2023	Draft	Client, Design Team	1E	
S2.P02	06/04/2024	Issued for Part 8 Planning	Kildare Co. Co.	1E	

Contents

1 Introduction

Donnachadh O'Brien & Associates Consulting Engineers Ltd. (DOBA) have been instructed by the Client, Kildare County Council, to prepare an Infrastructure Design Report to accompany a Planning Application to Kildare County Council (KCC) for the proposed 15 additional residential units to be constructed on the existing green area in St Evins Park, Monasterevin. This report is structured as follows;

- **Section 2** summarises the attributes of the **Existing Site**,
- **Section 3** provides a description of the **Proposed Development**,
- **Section 4** addresses the proposed **Surface Water** & SuDS design demonstrating compliance with the requirements of the Greater Dublin Strategic Drainage Study (GDSDS) and Kildare County Council. This section demonstrates how the proposed development has adopted a Nature Based SuDS (NBS) focused approach to surface water disposal on site through the provision of Constructed Wetlands (as Reginal Control measures), Bioretention areas, bioswales, bioretention tree pits, filter drains and permeable paving (as Source Control SuDS) and finally petrol/ oil separator is proposed as proprietary system SuDS.
- **Section 5** addresses existing and proposed **Wastewater Drainage** arrangements,
- **Section 6** addresses the existing and proposed **Water Supply** proposals to the development,
- **Section 7** addresses the **Flood Assessment** for the development
- **Section 8** outlines the **Roads & Traffic** arrangements for the proposed development and describes the existing infrastructure, proposed development access and proposed roads infrastructure throughout the site. This section also summarises the Road Safety Audit which has been prepared and submitted with the Planning Application.

2 Existing Site

The existing green area is 1.33Ha (3.3Acre) which is park of the existing St Evins Park development as illustrated in **Figure 1** below. St Evins Park is located on lands to the north of Monasterevin and an Irish Rail line runs on the northern boundary of the development with the R414, Monasterevin to Rathangan Road is to the east of St Evins Park. St Evins Park is an existing housing development with two storey semi-detached houses. The proposed entrance is through the existing St Evins Park entrance on the R414, the proposed houses will be positioned on the north boundary of the green area and an existing road to the north east will be extended to give access to these units. The existing site is illustrated on **Engineering drawings C-0001 and C-0005**. The site topography is relatively flat with existing levels c. +63.700mOD.

Figure 1 Site of proposed development outlined in red (source: Google Maps)

3 Proposed Development Description

The development will comprise of 15 new residential units, consisting of 4no. 1-bedroom apartments, 7 no. 2 bedroom 2 storey houses and 3 no. 3 bedroom 2 storey houses, and all associated site-works including the construction of site boundaries, landscaping, paving, car parking spaces, ducting for utilities, sustainable drainage features, formation of new connections to existing public foul and surface water drainage, and existing utilities.

Figure 2 Proposed development (source: Kildare Co. Co.)

4 Surface Water & SuDS Design

The structure of this section of the report is as follows;

- **Section 4.1** summarises the **existing surface water** located on and adjacent to the proposed development,
- **Section 4.2** summarises the **planning stage ground investigations** carried out to date,
- **Section 4.3** provides the proposed **SuDS Strategy** including SuDS Hierarchy, proposed SuDS elements, SuDS treatment train and the maintenance regime for the proposed SuDS features. This section also outlines the rationale for providing or not providing various SuDS measures across the site with a focus on Nature Based SuDS (NBS) measures,
- **Section 4.4** summarises the proposed maintenance requirements for each of the SuDS systems,
- **Section 4.6** calculates the proposed Qbar runoff rate for the proposed development
- **Section 4.7** demonstrates how the proposed scheme complies with the requirements of the **Greater Dublin Regional Drainage Study** Criterion 1 through 4 namely River Water Quality Protection, River Protection Regime, Level of Service (Flooding) for the site and River flood protection, and finally,
- **Section 4.8** describes the **proposed surface water piped network design parameters**

4.1 Existing Surface Water

The Applicant commissioned a GPR Survey which determined the location of an existing 300mm dia. surface water sewer to the north-east of the site as illustrated on the Engineer's drawing 2305-DOB-XX-SI-DR-C-0005 Existing Underground Services.

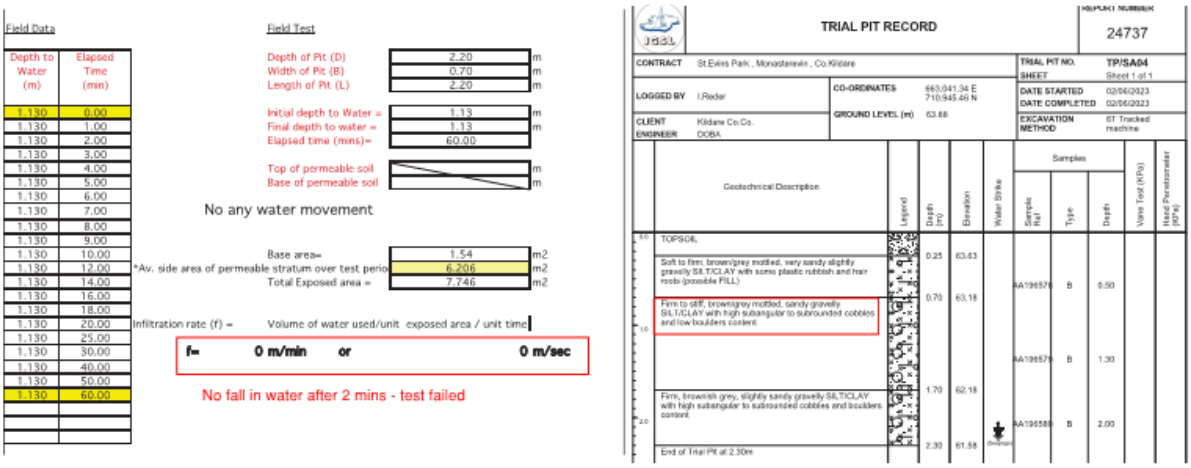
4.2 Planning Stage Ground Investigations

A suite of ground investigations, refer to **Appendix A**, has been carried out on site which includes the following;

- Boreholes
- Trial Pits & BRE365 soakaway tests
- Plate Bearing Tests
- Dynamic Probes
- Ground Water Monitoring
- Geotechnical Laboratory Testing
- Geo-environmental Testing

In summary,

- The underlying strata consists of predominately sandy gravelly CLAYS.
- Ground Water was observed in the trail pits at depths ranging 2.1 to 2.2m while a borehole recorded water seepage at 1.5m below existing ground level (BEGL).
- BRE365 soakaway testing yielded very poor infiltration rates ($8.377x10^{7}$ m/s) or zero infiltration as indicated in **Figure 3** below,
- Disposal of surface water run-off to ground via infiltration will not be possible and therefore **filtration SuDS** will be required.



Field Data

Depth to Water (m)	Elapsed Time (min)
1.130	0.00
1.130	1.00
1.130	2.00
1.130	3.00
1.130	4.00
1.130	5.00
1.130	6.00
1.130	7.00
1.130	8.00
1.130	9.00
1.130	10.00
1.130	12.00
1.130	14.00
1.130	16.00
1.130	18.00
1.130	20.00
1.130	25.00
1.130	30.00
1.130	40.00
1.130	50.00
1.130	60.00

Field Test

Depth of Pit (D) 2.20 m
Width of Pit (B) 0.70 m
Length of Pit (L) 2.20 m

Initial depth to Water = 1.13 m
Final depth to water = 1.13 m
Elapsed time (mins)= 60.00

Top of permeable soil m
Base of permeable soil m

No any water movement

Base area= 1.54 m2
*Av. side area of permeable stratum over test perio 6.206 m2
Total Exposed area = 7.746 m2

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

f= 0 m/min or 0 m/sec

No fall in water after 2 mins - test failed

TRIAL PIT RECORD

24737

CONTRACT St.Evins Park , Monasterevin , Co.Kildare
TRIAL PIT NO. TP/SA04
SHEET Sheet 1 of 1
LOGGED BY I.Reder
CO-ORDINATES 663,041.34 E 710,945.46 N
DATE STARTED 02/06/2023
DATE COMPLETED 02/06/2023
CLIENT Kildare Co.Co.
ENGINEER DOBA
GROUND LEVEL (m) 63.68
EXCAVATION METHOD 6T Tracked machine

Geotechnical Description | Legend | Depth (m) | Elevation | Water Strike | Samples: Sample Ref | Type | Depth | Vane Test (KPa) | Hand Penetrometer (KPa)

TOPSOIL
Soft to firm, brown/grey mottled, very sandy slightly gravelly SILT/CLAY with some plastic rubbish and hair roots (possible FILL) — 0.25 — 63.63
Firm to stiff, brown/grey mottled, sandy gravelly SILT/CLAY with high subangular to subrounded cobbles and low boulders content — 0.70 — 63.18 — AA196570 B 0.50
Firm, brownish grey, slightly sandy gravelly SILT/CLAY with high subangular to subrounded cobbles and boulders content — 1.70 — 62.18 — AA196579 B 1.30
End of Trial Pit at 2.30m — 2.30 — 61.58 — AA196580 B 2.00

Figure 3 Extract from Geotechnical Interpretative Report

4.3 Proposed SuDS Strategy

(a) Proposed SuDS Hierarchy

The SuDS hierarchy outlined in **Table 2** below has been considered for this site in accordance with the requirements of KCC Water Services Department;

Table 1 SuDS Hierarchy

Sustainable Urban Drainage System		Regional Control	Source Control	Site Control	Other	Proposed for the Scheme (Y/N)	Rationale for the provision or otherwise of proposed SuDS measures
#	**Nature Based SuDS (NBS)**						
1	Constructed Wetlands	●				Y	Constructed wetlands are proposed as regional control NBS SuDS measures for this project.
2	Retention Pond	●				N	Retention ponds are not proposed as regional control NBS SuDS measures for this project as the Constructed Wetlands are being proposed.
3	Bioretention Areas		●			Y	Bioretention areas are proposed as source control NBS SuDS measures for this project.
4	Bioswales		●			Y	Bioswales areas are proposed as source control NBS SuDS measures for this project.
5	Rain Gardens		●			N	Raingardens are not proposed as source control NBS SuDS measures for this project.
6	Blue-Green Roofs		●			N	Blue-Green Roofs are not proposed for this project as these elements are most suited to extensive areas of flat roofs on building under Management control. This project is a residential scheme with pitched roofs which are to suited to blue-green roofs.
7	Green Walls		●			N	Green walls are most suited to Management Controlled multi-unit apartments as opposed to the type of dwelling being proposed for this development. There are however, other Source Control NBS SuDS features proposed such as Bioretention Areas and Tree Pits.
8	Tree Pits		●			Y	Tree Pits are proposed as source control NBS SuDS measures for this project.
	Infiltration System SuDS						
9	Unlined tree pits-trenches		●			N	Further to Ground Investigation works carried out on site, Infiltration of the sub-soils is very poor and therefore infiltration system SuDS cannot be implemented. Filtration System SuDS have instead been proposed.
10	Unlined permeable paving		●			N	Further to Ground Investigation works carried out on site, Infiltration of the sub-soils is very poor and therefore infiltration system SuDS cannot be implemented. Filtration System SuDS have instead been proposed. However, unlined permeable paving is proposed for interception purposes only and to avail of the limited infiltration available. For the purpose of calculation, permeable paving is assumed to be lined.

11	Infiltration trenches		●			N	Further to Ground Investigation works carried out on site, Infiltration of the sub-soils is very poor and therefore infiltration system SuDS cannot be implemented. Filtration System SuDS have instead been proposed.
	Filtration System SuDS						
12	Filter Drains		●			Y	Filter Drains are proposed as source control SuDS measures for this project.
13	Filter Strips		●			N	It is not proposed to provide filter strips on this development. Filter drains and lined permeable paving has instead been proposed.
14	Lined Permeable Paving		●			Y	It is proposed to provide unlined permeable paving on this development to allow for the minimal infiltration available and for interception purposes. For the purpose of calculations, the permeable paving will be assumed to be lined.
	Detention Systems SuDS						
15	Detention Basin			●		N	It is not proposed to provide a detention basin on this development.
16	Lined Underground Attenuation Tank			●		N	It is not proposed to provide an attenuation tank on this development.
17	Over-sized pipes			●		N	It is not proposed to provide oversized pipes on this development.
	Proprietary Treatment Systems						
18	Petrol/ oil separators				●	Y	Petrol/ oil interceptors are proposed to be placed prior to the discharge of surface water to the public surface water drainage network.
19	Rainwater Harvesting		●			N	Rainwater Harvesting is not proposed for this development.

(b) Proposed Treatment Strategy

The minimum 2 stage treatment strategy proposed for the development and associated SuDS hierarchy is illustrated in **Figure 4** below.

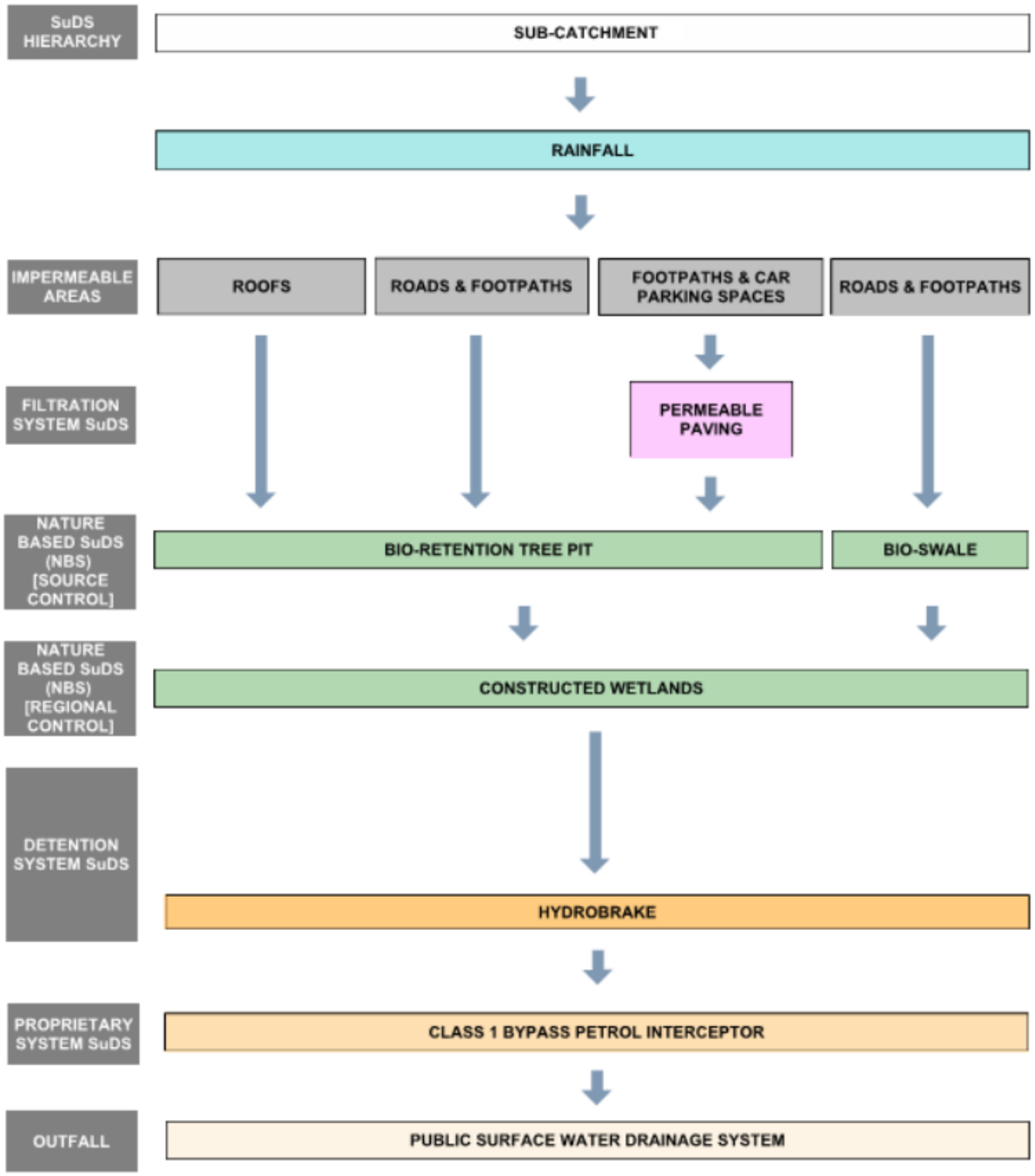


Figure 4 Proposed Sub-Catchment Treatment Train

4.4 Proposed SuDS Features & Associated Management/ Maintenance

The following section of the report addresses the maintenance requirements for the proposed SuDS features in accordance with the CIRIA SuDS Manual.

(c) Nature Based SuDS

4.1.1.1 Constructed Wetlands (Regional Control)

TABLE 23.1 Operation and maintenance requirements for ponds and wetlands

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Cut the grass – public areas	Monthly (during growing season)
	Cut the meadow grass	Half yearly (spring, before nesting season, and autumn)
	Inspect marginal and bankside vegetation and remove nuisance plants (for first 3 years)	Monthly (at start, then as required)
	Inspect inlets, outlets, banksides, structures, pipework etc for evidence of blockage and/or physical damage	Monthly
	Inspect water body for signs of poor water quality	Monthly (May – October)
	Inspect silt accumulation rates in any forebay and in main body of the pond and establish appropriate removal frequencies; undertake contamination testing once some build-up has occurred, to inform management and disposal options	Half yearly
	Check any mechanical devices, eg penstocks	Half yearly
	Hand cut submerged and emergent aquatic plants (at minimum of 0.1 m above pond base; include max 25% of pond surface)	Annually
	Remove 25% of bank vegetation from water's edge to a minimum of 1 m above water level	Annually
	Tidy all dead growth (scrub clearance) before start of growing season (Note: tree maintenance is usually part of overall landscape management contract)	Annually
	Remove sediment from any forebay.	Every 1–5 years, or as required
	Remove sediment and planting from one quadrant of the main body of ponds without sediment forebays.	Every 5 years, or as required
Occasional maintenance	Remove sediment from the main body of big ponds when pool volume is reduced by 20%	With effective pre-treatment, this will only be required rarely, eg every 25–50 years
Remedial actions	Repair erosion or other damage	As required
	Replant, where necessary	As required
	Aerate pond when signs of eutrophication are detected	As required
	Realign rip-rap or repair other damage	As required
	Repair / rehabilitate inlets, outlets and overflows.	As required

4.1.1.2 Bioretention Areas & Bioswales (Source Control)

TABLE 17.1 Operation and maintenance requirements for swales

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly, or as required
	Cut grass – to retain grass height within specified design range	Monthly (during growing season), or as required
	Manage other vegetation and remove nuisance plants	Monthly at start, then as required
	Inspect inlets, outlets and overflows for blockages, and clear if required	Monthly
	Inspect infiltration surfaces for ponding, compaction, silt accumulation, record areas where water is ponding for > 48 hours	Monthly, or when required
	Inspect vegetation coverage	Monthly for 6 months, quarterly for 2 years, then half yearly
	Inspect inlets and facility surface for silt accumulation, establish appropriate silt removal frequencies	Half yearly
Occasional maintenance	Reseed areas of poor vegetation growth, alter plant types to better suit conditions, if required	As required or if bare soil is exposed over 10% or more of the swale treatment area
Remedial actions	Repair erosion or other damage by re-turfing or reseeding	As required
	Relevel uneven surfaces and reinstate design levels	As required
	Scarify and spike topsoil layer to improve infiltration performance, break up silt deposits and prevent compaction of the soil surface	As required
	Remove build-up of sediment on upstream gravel trench, flow spreader or at top of filter strip	As required
	Remove and dispose of oils or petrol residues using safe standard practices	As required

TABLE 18.3 Operation and maintenance requirements for bioretention systems

Maintenance schedule	Required action	Typical frequency
Regular inspections	Inspect infiltration surfaces for silting and ponding, record de-watering time of the facility and assess standing water levels in underdrain (if appropriate) to determine if maintenance is necessary	Quarterly
	Check operation of underdrains by inspection of flows after rain	Annually
	Assess plants for disease infection, poor growth, invasive species etc and replace as necessary	Quarterly
	Inspect inlets and outlets for blockage	Quarterly
Regular maintenance	Remove litter and surface debris and weeds	Quarterly (or more frequently for tidiness or aesthetic reasons)
	Replace any plants, to maintain planting density	As required
	Remove sediment, litter and debris build-up from around inlets or from forebays	Quarterly to biannually
Occasional maintenance	Infill any holes or scour in the filter medium, improve erosion protection if required	As required
	Repair minor accumulations of silt by raking away surface mulch, scarifying surface of medium and replacing mulch	As required
Remedial actions	Remove and replace filter medium and vegetation above	As required but likely to be > 20 years

4.1.1.3 Tree Pits (Source Control)

TABLE 19.3 Operation and maintenance requirements for trees (after CRWA, 2009)

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter and debris	Monthly (or as required)
	Manage other vegetation and remove nuisance plants	Monthly (at start, then as required)
	Inspect inlets and outlets	Inspect monthly
Occasional maintenance	Check tree health and manage tree appropriately	Annually
	Remove silt build-up from inlets and surface and replace mulch as necessary	Annually, or as required
	Water	As required (in periods of drought)
Monitoring	Inspect silt accumulation rates and establish appropriate removal frequencies	Half yearly

(d) Filtration System SuDS

4.1.1.4 Filter Drains (Source Control)

TABLE 16.1 Operation and maintenance requirements for filter drains

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Remove litter (including leaf litter) and debris from filter drain surface, access chambers and pre-treatment devices	Monthly (or as required)
	Inspect filter drain surface, inlet/outlet pipework and control systems for blockages, clogging, standing water and structural damage	Monthly
	Inspect pre-treatment systems, inlets and perforated pipework for silt accumulation, and establish appropriate silt removal frequencies	Six monthly
	Remove sediment from pre-treatment devices	Six monthly, or as required
Occasional maintenance	Remove or control tree roots where they are encroaching the sides of the filter drain, using recommended methods (eg NJUG, 2007 or BS 3998:2010)	As required
	At locations with high pollution loads, remove surface geotextile and replace, and wash or replace overlying filter medium	Five yearly, or as required
	Clear perforated pipework of blockages	As required

4.1.1.5 Permeable Paving (Source Control)

TABLE 20.15 Operation and maintenance requirements for pervious pavements

Maintenance schedule	Required action	Typical frequency
Regular maintenance	Brushing and vacuuming (standard cosmetic sweep over whole surface)	Once a year, after autumn leaf fall, or reduced frequency as required, based on site-specific observations of clogging or manufacturer's recommendations – pay particular attention to areas where water runs onto pervious surface from adjacent impermeable areas as this area is most likely to collect the most sediment
Occasional maintenance	Stabilise and mow contributing and adjacent areas	As required
	Removal of weeds or management using glyphospate applied directly into the weeds by an applicator rather than spraying	As required – once per year on less frequently used pavements
Remedial Actions	Remediate any landscaping which, through vegetation maintenance or soil slip, has been raised to within 50 mm of the level of the paving	As required
	Remedial work to any depressions, rutting and cracked or broken blocks considered detrimental to the structural performance or a hazard to users, and replace lost jointing material	As required
	Rehabilitation of surface and upper substructure by remedial sweeping	Every 10 to 15 years or as required (if infiltration performance is reduced due to significant clogging)
Monitoring	Initial inspection	Monthly for three months after installation
	Inspect for evidence of poor operation and/or weed growth – if required, take remedial action	Three-monthly, 48 h after large storms in first six months
	Inspect silt accumulation rates and establish appropriate brushing frequencies	Annually
	Monitor inspection chambers	Annually

(e) Proprietary Treatment Systems

4.1.1.6 Petrol/ oil separators

TABLE 14.2 An example of operation and maintenance requirements for a proprietary treatment system

Maintenance schedule	Required action	Typical frequency
Routine maintenance	Remove litter and debris and inspect for sediment, oil and grease accumulation	Six monthly
	Change the filter media	As recommended by manufacturer
	Remove sediment, oil, grease and floatables	As necessary – indicated by system inspections or immediately following significant spill
Remedial actions	Replace malfunctioning parts or structures	As required
Monitoring	Inspect for evidence of poor operation	Six monthly
	Inspect filter media and establish appropriate replacement frequencies	Six monthly
	Inspect sediment accumulation rates and establish appropriate removal frequencies	Monthly during first half year of operation, then every six months

4.5 Estimation of Greenfield Runoff Rate

In accordance with the IH24 method, the greenfield runoff for existing undeveloped sites measuring less than 50Ha can be estimated adopting the following formula and the total permissible outflow has been calculated in **Table 2** below.

$Qbar_{rural}(m^3/s) = 0.00108x(Area)^{0.89}(SAAR)^{1.17}(SOIL)^{2.17}$

Table 2 Qbar calculation

Standard Average Annual Rainfal (SAAR) =						826	mm
Soil Index =						0.3	
Total Site Area =						1.3092	Hectares (ha)
Storm Return Period =						100	Years
Permissible Outflow per hectare, QBAR =						2.2	l/s/ha
* Total Permissible Outflow=						2.90	l/s
Outflow limited to greater of QBAR and 2l/s						2.00	l/s

From the above calculation the max permissible outflow is 2.9l/s, while the Qbar used for the site is 2.2 l/s and therefore a 25% reduction on the permissible outflow.

4.6 Proposed Design of Sustainable Drainage System

The design of sustainable drainage systems, as per Chapter 6 of the Greater Dublin Strategic Drainage Study (GDSDS), is set out below and describes the performance of the proposed surface water drainage system when measured against the relevant GDSDS drainage criterion, namely

- Criterion 1 – River Quality Protection
- Criterion 2 – River Regime Protection
- Criterion 3 – Level of Service (flooding) for the Site
- Criterion 4 – River Flood Protection

The requirements of SuDS are typically addressed through the provision of

- Interception Storage
- Treatment Storage *(not required if interception storage is provided)*
- Attenuation Storage
- Long Term Storage *(not required if growth factors are not applied to Q_{bar} when designing attenuation storage)*

In accordance with KCC WSD requirements, a Climate Change factor of 30% plus an Urban Creep Factor (applied to roof areas only) of 10% will be applied to the design of the surface water system.

(f) River Quality Protection

4.1.1.7 Objective

Interception storage of at least 5mm, and preferably 10mm, of rainfall where run-off to the receiving water can be prevented.

4.1.1.8 Proposal

The 10mm rainfall event on site will be intercepted without discharging to the public system. The below is a summary of the interception storage provided per sub-catchment. The calculations for these volumes are located in **Appendix B**.

Sub-Catchment	**Site**		
Interception Storage required			
Interception Storage required	=	Sub-Catchment area x min. rainfall	
Sub-Catchment Area	=	5092	m^2
Minimum Rainfall	=	5	mm
Total required	=	25	m^3
Interception Storage Provided			
Area Type		SuDS Feature Interception Volume	
Landscaping (Soft/ Grassed)	=	0.0	m^3
Permeable Paving	=	39.4	m^3
Tree Pits	=	4.6	m^3
Bio Retention Areas	=	0.0	m^3
Filter Drains	=	4.2	m^3
Impermebale Hardstanding	=	0.0	m^3
Impermeable Roof	=	0.0	m^3
Total provided	=	**48**	m^3
Interecption Storage Provided	>	**Interception Storage Required**	

(g) River Regime Protection

4.1.1.9 Objectives

2.1 Discharge rate equal to 1-year Greenfield site peak runoff rate or 2 l/s/Ha, whichever, is the greater. Site critical duration storm to be used to assess attenuation volume.
2. 2 Discharge rate equal to 1 in 100-year Greenfield site peak run off rate. Site critical duration storm to be used to assess attenuation storage volume.

4.1.1.10 Proposals

The surface water network has been designed to comply with these sub-criteria and prior to discharging to the public surface water network, the surface water runoff will be reduced to the existing Greenfield runoff rate, $\mathbf{Q_{bar}}$, of **2.2 l/s**. In order to achieve this, it is proposed to limit the surface water runoff from the site via a proposed hydro brake flow control device fitted to the discharge manhole.

(h) Level of Service (flooding) for the Site

4.1.1.11 Objectives

- *No flooding on site except where specifically planned flooding is approved. Summer design storm of 15 or 30 minutes are normally critical.*
- *No internal property flooding. Planned flood routing and temporary flood storage accommodation on site for short high intensity storms. Site critical duration events.*
- *No internal property flooding. Floor levels at least 500mm above Maximum River level and adjacent on-site storage retention.*
- *No flooding of adjacent urban areas. Overland flooding managed within the development.*

4.1.1.12 Proposal

Engineering calculations included in **Appendix B** demonstrate that no pluvial out-of-manhole flooding of the proposed surface network occurs for storms up to and including a 1 in 100 Year plus 30% Climate Change plus 10% Urban Creep (applied to roof areas). Therefore, no flooding of the site, internal properties or adjacent urban areas occurs. Pipe sizes and gradients have been designed so as to achieve self-cleansing velocities as per the requirements of the Building Regulations Part 'H'. The lowest proposed floor level is set at **+64.45mOD** which is over 1m above the top of water level in the retention pond. In the event of a storm exceeding a 1:100 Year plus 30% Climate Change plus 10% Urban Creep event and the outfall becoming block, a high-level overflow manhole is to be installed. **Engineering Calculations** included in **Appendix B** demonstrate that no pluvial out-of-manhole flooding occurs when the outfall is set to the high level over flow level.

(i) River Flood Protection

4.1.1.13 Objectives

- *Long-term floodwater accommodated on site for development runoff volume is in excess of the Greenfield volume. Temporary flood storage drained by infiltration on a designated flooding area brought into operation by extreme flood events only. 100-year, 6-hour duration storm to be used for assessment of the additional volume of runoff.*
- *Infiltration storage provided equal in volume to long term storage and usually designed to operate fort all events.*
- *Maximum discharge rate of Q_{bar} or 2 l/s/Ha, whichever is the greater, for all attenuation storage where separate long-term storage cannot be provided.*

4.1.1.14 Proposals

As noted above, the proposed Q_{bar} for the site is **2.2 l/s** and as the surface water run-off generated on site does not exceed Q_{bar} there is no requirement for long-term storage to limit the impact on the receiving watercourse.

4.7 Proposed Piped Surface Water Network Design Parameters

The surface water piped network and associated attenuation design calculations have been prepared using Infodrainage Network Design Computer software by Innovyze. The proposed surface water drainage system has been designed in accordance with I.S. EN 12056: 2000 'Gravity Drainage Systems inside Buildings', I.S. EN 752: 2017 'Drain & Sewer Systems outside Buildings', 'The Greater Dublin Region Code of Practice for Drainage Works', the recommendations of the 'Greater Dublin Strategic Drainage Study', (GDSDS) and the Building Regulations Technical Guidance Document Part H applying the following parameters.

Surface water drainage design method	Modified Rational Method
Storm Return period (years)	1 in 5 year
Allowable outflow (l/s)	2.2 l/s
Flooding Period	Up to and including a 1 in 100 Year + 30% CC + 10% Urban Creep
Standard Annual Average Rainfall (SAAR) (mm)	826
M5-60 rainfall depth (mm)	16.5
Ratio, r	0.331
Allowance for Climate Change (%)	30% + 10% Urban Creep
Minimum self-cleansing velocity (m/s)	0.75
Pipe roughness (mm)	0.6
Run-off coefficients	
Soft landscaped areas	30%
External hardstanding	80%

The proposed surface water network is illustrated on **Engineering drawing C-0020**.

5 Wastewater Drainage

5.1 Existing Wastewater Drainage

Irish Water (IW) GIS mapping indicates the presence of an existing 225mm dia. uPVC wastewater sewer on the R414 to the east of the proposed development. The Applicant commissioned a Ground Penetrating Radar (GPR) and Topographical Survey of the site which have confirmed the invert level of the existing 225mm dia. foul sewer as +62.19mOD.The

5.2 Irish Water Pre-Connection Enquiry and Confirmation of Feasibility

The Applicant submitted a pre-connection enquiry (PCE) to which IW responded. The Connection & Developer Services (CDS) Response noted that a new wastewater connection is feasible once the connection is made at the R414 with the Developer funding the extension of the works. The IW PCE and CoF are included in **Appendices D** and **E** respectively.

5.3 Proposed Wastewater Drainage

The proposed wastewater network will collect effluent from the new development via a 225 dia foul drainage network which will be located in the green area and then discharge via foul pumping station to the road in St Evins Park where it will flow approx. 200m before finally discharging by gravity to the existing 225mm dia. foul sewer to the east of the subject site on the R414. The wastewater sewer network is illustrated on **Engineering drawings C-0300** and have been designed in accordance with the principles and methods set out in Irish Water's Code of Practice for Wastewater Infrastructure IW-CDS-5030-03, IS EN 752 Drain & Sewer Systems outside Buildings, IS EN 12056 Gravity Drainage Systems inside Buildings and the Building Regulations Technical Guidance Document Part H Drainage & Wastewater. The estimated peak Wastewater loading generated by the proposed development's Dry Weather Flow is estimated at 0.07 l/s while the Design Foul Flow of 6DWF is 0.42 l/s as illustrated in **Table 3** below. Engineering calculations have been included in **Appendix F**.

Table 3 Proposed Post-Development Wastewater Flows

RESIDENTIAL **Proposed Development Foul Flows**						
Use Type	**No. of Units**	**Occupancy Rate (persons/ dwelling)**	**Popualtion (P)**	**Loading (L/ person/ day)**	**Daily Loading (L/ day)**	**Daily Loading (L/s)**
Residential	15	2.7	41	150	6075	0.07
Dry Weather Flow (1 DWF)						**0.07**
Total Proposed Peak Foul Flow (6 DWF)						**0.42**

6 Water Supply

6.1 Existing Water Supply

Irish Water (IW) GIS mapping indicates the presence of existing 100mm dia. uPVC watermains to the south and east of the proposed development. The Applicant commissioned a Ground Penetrating Radar (GPR) and Topographical Survey of the site which have confirmed the presence of the same. The existing watermain network is illustrated on the Engineer's drawing 2305-DOB-XX-SI-DR-C-0005 Existing Underground Services.

6.2 Irish Water Pre-Connection Enquiry

The Applicant submitted a pre-connection enquiry (PCE) to which IW responded. The Connection & Developer Services (CDS) Response noted that a new water connection is feasible without upgrades. The IW PCE and CoF are included in **Appendices D** and **E** respectively.

6.3 Proposed Water Supply

A new 100mm dia. will create a loop between two existing watermains. The watermain layout and connections, valves, hydrants, meters etc. shall be designed in accordance with Irish Water's Code of Practice for Water Infrastructure IW-CDS-5020-03/ Standard Details and the Department of the Environment's Building Regulations "Technical Guidance Document Part B Fire Safety". The new site watermain network will adequately serve the firefighting requirements with Fire Hydrants provided on the loop main in accordance with Part B of the Building Regulations. The estimated peak hour water demand generated by the proposed development is 0.41 l/s as illustrated in Table 4 below. The proposed watermains are illustrated on **Engineering drawings C-0040**.

Table 4 Post-Development Peak Water Demand

RESIDENTIAL Proposed Water Demand								
Use Type	**No. of Units**	**Occupancy Rate (persons/ dwelling)**	**Popualtion (P)**	**Per Capita Cosumption (l/ person/day)**	**Average daily domestic demand (l/ day)**	**Average daily domestic demand (l/ sec)**	**Average day/ peak week demand (l/sec)**	**Peak hour water demand (l/sec)**
Residental	**15.0**	2.7	40.5	140	5670	0.07	0.08	0.41
						Peak hour water demand (l/s)		**0.41**

7 Flood Risk Assessment

The following section of the report deals with the assessment of the potential risk of flooding to the proposed development.

7.1 CFRAMS

The OPW have established a national flood information portal, providing location specific access to flood risk and flood management information, www.floodinfo.ie which highlights areas at flood risk through the collection of recorded data and observed flood events. **Figure 5** below is an extract from the website and indicates no flooding in the vicinity of the site and the nearest flood events are located approximately 250m to the south-east. The nearest upstream node, 14CASS00087, is noted as having a 0.1% AEP Flood Level of +62.86mOD while the lowest proposed house level is +64.45m. Therefore, the proposed houses are 1.59m above the 1:1000 Year/ 1:100 Year + 20% Climate Change Flood level.

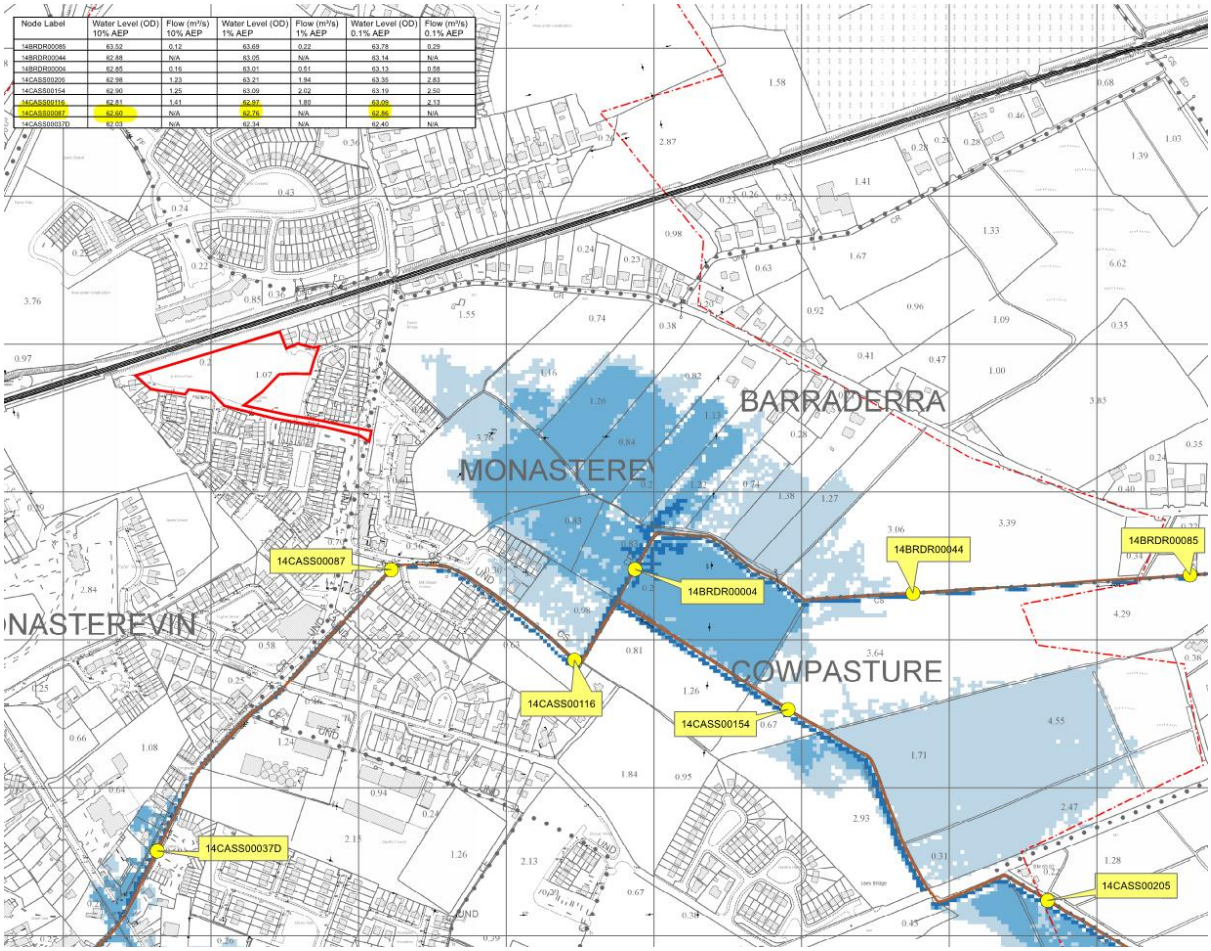


Figure 5 Extract from CFRAMS map

7.2 Sources of Flooding

Following the guidance of the Planning Guidelines, Stage 1 of a Flood Risk Assessment requires the identification and consideration of potential sources of flooding. The potential sources of flooding at the proposed development site are as follows:

- Fluvial
- Pluvial / Surface Water

7.3 Fluvial

The nearest watercourse is a local watercourse which is approximately 250m south east of the site. No records were found of any flood reports on recent planning applications for any nearby sites. It is therefore clear that there is minimal risk of local fluvial flooding to the site or the proposed building, and no further detailed assessment of fluvial flood risk is required.

7.4 Pluvial Flooding

Pluvial flooding is the result of rainfall-generated overland flows which arise before run-off can enter any watercourse or sewer. It is usually associated with high intensity rainfall. Flood risk from pluvial sources exists in all areas. Provision of adequate storm water drainage systems will minimise the risk from pluvial flooding sources. On this site, there are no reports of pluvial flooding to the hard-standing areas. The increase in total area of roofs and hard-standing (paved areas) on the proposed site will result in increased runoff. The proposed drainage system has been designed in accordance with GDSDS and best practise SUDS to accommodate flows in peak rainfall events and the drainage system has sufficient capacity to accommodate a 1 in 100 Year plus 30% Climate Change plus 10% urban creep event below ground without flooding any of the paved surfaces. **Engineering calculations** included in **Appendix B** demonstrate that no pluvial "out-of-manhole" flooding occurs for all storms up to and including a 1:100 Year plus 30% Climate Change plus 10% Urban Creep event. The above measures incorporated into the design will serve to significantly reduce any risk of pluvial flooding arising from the development of the site.

7.5 Sequential Approach and Justification Tests

The sequential approach and Justification tests procedures are outlined in 'The Planning System and Flood Risk Management Guidelines for Planning Authorities' 2009 and is summarised and adopted below. A sequential approach is a key tool in ensuring that development, particularly new development, is first and foremost directed towards land that is at low risk of flooding. The philosophy used in this approach is

1. Avoid – preferably choose lower risk flood zones for new development

2. Substitute – Ensure the type of development proposed is not especially vulnerable to the adverse impact of flooding
3. Justify – Ensure that the development is being considered for strategic reasons
4. Mitigate – Ensure flood risk is reduced to minimal levels
5. Proceed – Only where Justification Test passed and emergency planning measures are in place

Figure 6 below sets out the mechanism for the use of the sequential approach to development in flood areas from the planning perspective.

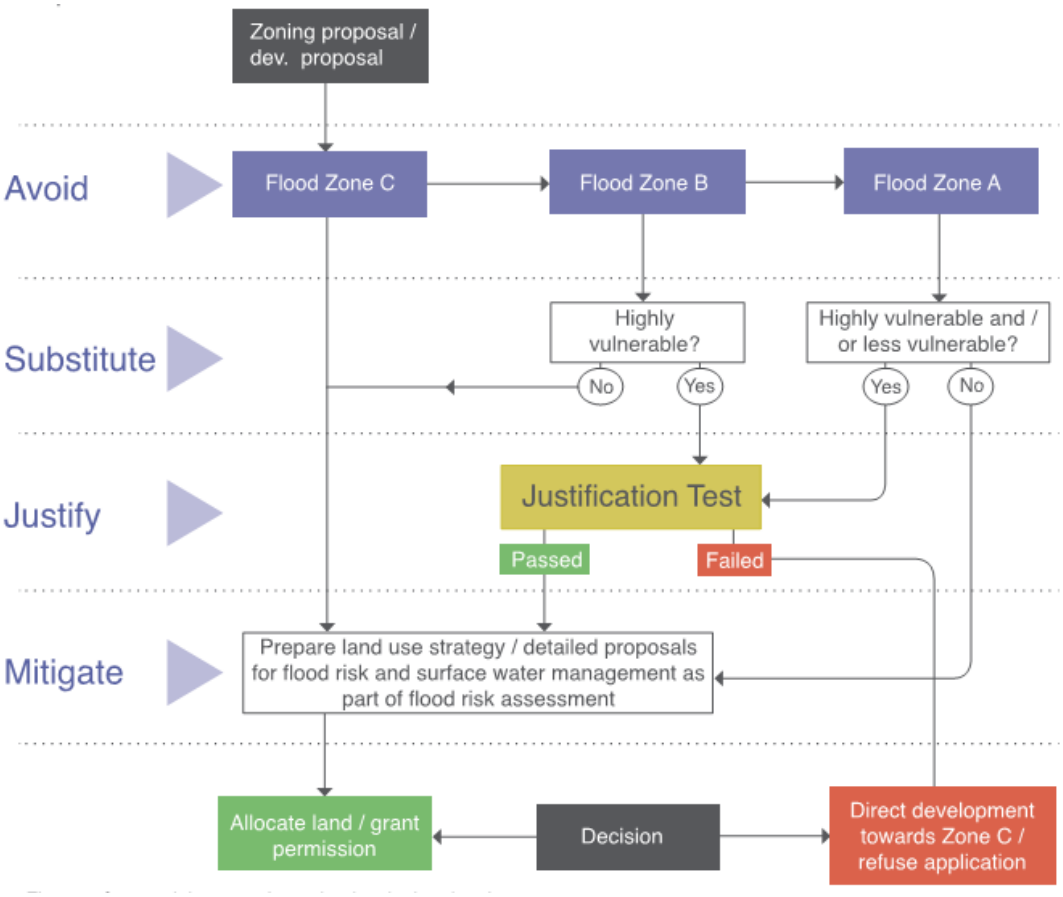


Figure 6 Sequential approach mechanism in the planning process

The sequential approach makes use of flood risk assessment and of prior identification of flood zones for river and coastal flooding and classification of the vulnerability to flooding of different types of development as outlined in the figures below.

Vulnerability class	Land uses and types of development which include*:
Highly vulnerable development (including essential infrastructure)	Garda, ambulance and fire stations and command centres required to be operational during flooding; Hospitals; Emergency access and egress points; Schools; Dwelling houses, student halls of residence and hostels; Residential institutions such as residential care homes, children's homes and social services homes; Caravans and mobile home parks; Dwelling houses designed, constructed or adapted for the elderly or, other people with impaired mobility; and Essential infrastructure, such as primary transport and utilities distribution, including electricity generating power stations and sub-stations, water and sewage treatment, and potential significant sources of pollution (SEVESO sites, IPPC sites, etc.) in the event of flooding.
Less vulnerable development	Buildings used for: retail, leisure, warehousing, commercial, industrial and non-residential institutions; Land and buildings used for holiday or short-let caravans and camping, subject to specific warning and evacuation plans; Land and buildings used for agriculture and forestry; Waste treatment (except landfill and hazardous waste); Mineral working and processing; and Local transport infrastructure.
Water-compatible development	Flood control infrastructure; Docks, marinas and wharves; Navigation facilities; Ship building, repairing and dismantling, dockside fish processing and refrigeration and compatible activities requiring a waterside location; Water-based recreation and tourism (excluding sleeping accommodation); Lifeguard and coastguard stations; Amenity open space, outdoor sports and recreation and essential facilities such as changing rooms; and Essential ancillary sleeping or residential accommodation for staff required by uses in this category (subject to a specific warning and evacuation plan).
*Uses not listed here should be considered on their own merits	

Figure 7 Classification of Vulnerability of different types of development

Figure 8 below illustrates those types of development which would be appropriate to each flood zone and those which would be required to meet the Justification test.

	Flood Zone A	Flood Zone B	Flood Zone C
Highly vulnerable development (including essential infrastructure)	Justification Test	Justification Test	Appropriate
Less vulnerable development	Justification Test	Appropriate	Appropriate
Water-compatible development	Appropriate	Appropriate	Appropriate

Figure 8 Vulnerability of Development vs. Flood Zone

As the site is located within Flood Zone C, the development is appropriate and there is no requirement for a justification test.

7.6 Summary

As described above, there is no risk from Fluvial Flooding based on the available CFRAMS data nor is there any risk from Pluvial Flooding.

8 Roads Infrastructure

8.1 Proposed Development Access

The proposed development shall be accessed off the existing St. Evins Road network as illustrated in **Figure 9** below.

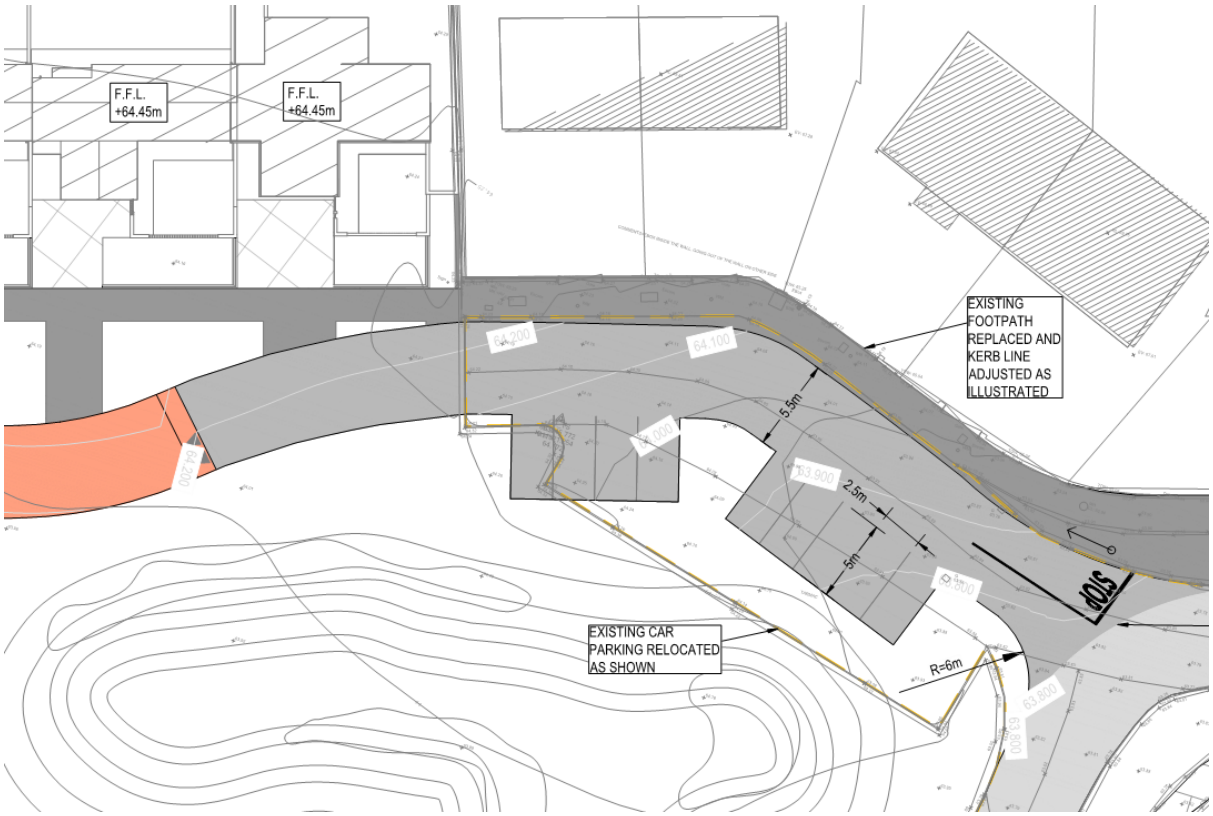


Figure 9 Proposed extension of existing road in St Evins Park and relocation of car parking (extract from Engineering drawing 2305-DOB-XX-SI-DR-C-0050)

8.2 DMURS Statement of Consistency

The internal roads infrastructure to serve the proposed development will follow a roads hierarchy in accordance with the Design Manual for Urban Roads and Streets (DMURS) as follows and is illustrated on **Engineering drawings 2305-DOB-XX-SI-DR-C-0050 and 0060**;

- 5.5m wide local internal roadway to tie into the existing road with a 2.0m footpaths and off-street perpendicular car parking and on street parallel visitor parking,

Psychological and physical traffic calming measures have been adopted within the proposed site layout to balance the functional needs of various carriageway users in particular Vulnerable Roads Users (VRUs) as follows;

- The creation of a self-regulating street environment through the introduction of shared surfaces, on-street parking, tight corner radii and reduced visibility splays,
- Limiting straight sections of roads to 70m through the introduction of horizontal deflections coupled with vertical deflections in the form of raised table tops where required,
- The promotion of on street activity internally along streets through the provision of on-street parking,
- The use of minimal signage and line markings along internal streets with such treatments used sensitively throughout and predominately at key nodes and transition areas with adjoining streets,
- The provision of footpath widths no less than 2.0m are proposed throughout the scheme with tie-ins provided to existing external pedestrian routes, in particular along the northern boundary of the subject site,
- Appropriate clear unobstructed visibility splays are provided at all internal nodes,
- Well-designed pedestrian crossing facilities are provided along key travel desire lines throughout the scheme. All uncontrolled crossings are provided with either dropped kerbs and tactile paving or flat raised table top treatments thereby allowing pedestrians to informally assert a degree of priority,
- All uncontrolled informal pedestrian crossing facilities will be a minimum of 2.0m wide coupled with tactile paving and dropped kerbs,
- The materials used in shared surface areas will be varied to indicate that the carriageway is an extension of the pedestrian domain,
- Vertical deflections in the form of raised tables are strategically placed across the internal road network to promote lower speeds and enable pedestrians to cross at grade. The maximum height of these raised flat top treatments is deigned to be 75mm,
- At any flat top pedestrian crossing/ traffic calming traffic table treatments, different surface material treatments are proposed to alert and subsequently influence driver behaviour and associated vehicle speeds,
- Kerb heights will be maintained at 75mm internally within the development,
- In accordance with DMURS, the parallel car parking bays are dimensioned as 6.0m long by 2.5m wide while perpendicular parking spaces are a minimum of 5.0m long by 2.5m wide,
- Car Parking shall be in compliance with the requirements of KCC CDP with visitor, accessible and e-charging spaces to be provided throughout the scheme.

8.3 Vehicle Autotracks

The Applicant has prepared vehicle autotracks for Passenger 4x4s, Fire Tender and Refuse vehicles accessing the proposed development which have been illustrated on **Engineering drawing series 2305-DOB-XX-SI-DR-C-0070, 0071 and 0072** submitted with the Planning Application.

8.4 Stage 1-2 Road Safety Audit

A Stage 1-2 Road Safety Audit has been completed by Bruton Consulting Engineers on behalf of the Applicant and a copy of the audit in addition to the signed Feedback Form has been submitted with the Planning Application. Furthermore, the Designer has prepared a Response to Stage 1-2 Road Safety Audit report, 2305-DOB-XX-SI-RP-C-0005, which has been also been submitted with the Planning Application, located in **Appendix G**. The response document outlines the alternations applied to the site layout following the auditors' recommendations.

Appendix A IGSL Ground Investigation

IGSL Limited

Donnachadh O' Brien
And Associates

St. Evins Park
Monasterevin

Geotechnical Report

Report No. 24737

August 2023

Report

M7 Business Park
Naas
Co. Kildare
Ireland

T: +353 (45) 846176
E: info @igsl.ie
W: www.igsl.ie

Project: St. Evins Park, Monasterevin

Project No. 24737

Revision	**Date**	**Title**		
Rev 0	31/08/2023	Ground Investigation Report		
	Copies	Document Format	Prepared By	Reviewed By
		PDF	Brian Green Chartered Engineer	David Green Chartered Engineer
	To	DOBA Consulting Engineers		
Revision	**Date**	**Title**		
Rev 1				
	Copies	Document Format	Prepared By	Reviewed By
	To			
Revision	**Date**	**Title**		
	Copies	Document Format	Prepared By	Reviewed By
	To			
Revision	**Date**	**Title**		
	Copies	Document Format	Prepared By	Reviewed By
	To			

TABLE OF CONTENTS

FOREWORD

The following conditions and notes on the geotechnical site investigation procedures should be read in conjunction with this report.

Standards

The ground investigation works for this project have been carried out by IGSL in accordance with Eurocode 7 - Part 2: Ground Investigation & Testing (EN 1997-2:2007). This has been used together with complementary documents such as BS 5930 (1999), BS 1377 (Parts 1 to 9) and Engineers Ireland Specification & Related Documents for Ground Investigation in Ireland (2006). A new National Annex for use in the Republic of Ireland is currently in circulation for comment and will be adopted in the near future. In the meantime, the following Irish (IS) and European Standards or Norms are referenced:

- IS EN 1997-2 Eurocode 7: 2007 – Geotechnical Design – Part 2: Ground Investigation & Testing
- IS EN ISO 22475-1:2006 Geotechnical Investigation and Sampling – Sampling Methods & Groundwater Measurements
- IS EN ISO 14688-1:2002 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 1: Identification and Description
- IS EN ISO 14688-2:2004 Geotechnical Investigation and Testing – Identification and Classification of Soil, Part 2: Classification Principles
- IS EN ISO 14689-1:2004 Geotechnical Investigation and Testing - Identification & Classification of Rock, Part 1: Identification & Description

Reporting

Recommendations made and opinions expressed in this report are based on the strata observed in the exploratory holes, together with the results of in-situ and laboratory tests. No responsibility can be held by IGSL Ltd for ground conditions between exploratory hole locations.

The engineering logs provide ground profiles and configuration of strata relevant to the investigation depths achieved and caution should be taken when extrapolating between exploratory points. No liability is accepted for ground conditions extraneous to the investigation points.

This report has been prepared for DOBA Consulting Engineers and the information should not be used without prior written permission. The recommendations developed in this report specifically relate to the proposed development. IGSL Ltd accepts no responsibility or liability for this document being used other than for the purposes for which it was intended.

In-Situ Testing

Standard penetration tests were conducted strictly in accordance with Section 4.6 of IS EN 1997-2:2007. The SPT equipment (hammer energy test) has been calibrated in accordance with EN ISO 22476-3:2005 and the Energy Ratio (E_r). A calibration certificate is available upon request. The E_r is defined as the ratio of the actual energy E_{meas} (measured energy during calibration) delivered to the drive weight assembly into the drive rod below the anvil, to the theoretical energy (E_{theor}) as calculated from the drive weight assembly. The measured number of blows (N) reported on the engineering logs are uncorrected. In sands, the energy losses due to rod length and the effect of the overburden pressure should be taken into account (see IS EN ISO 22476-3:2005).

Groundwater

The depth of entry of any influx of groundwater is recorded during the course of boring operations. However, the normal rate of boring does not usually permit the recording of an equilibrium level for any one water strike. Where possible drilling is suspended for a period of twenty minutes to monitor the subsequent rise in water level. Groundwater conditions observed in the borings or pits are those

appertaining to the period of investigation. It should be noted however, that groundwater levels are subject to diurnal, seasonal and climatic variations and can also be affected by drainage conditions, tidal variations etc.

Engineering Logging

Soil and rock identification has been based on the examination of the samples recovered and conforms with IS EN ISO 14688-1:2002 and IS EN ISO 14689-1:2004. Rock weathering classification conforms to IS EN ISO 14689-1:2003 while discontinuities (bedding planes, joints, cleavages, faults etc) are classified in accordance with 4.3.3 of IS EN ISO 14689-1:2003. Rock mechanical indices (TCR, SCR, RQD) are defined in accordance with IS EN ISO 22475-1:2006.

Retention of Samples

Samples shall be retained for a period of 60 days following approval of the final factual report, as detailed in the Scope of Works.

1.0 Introduction

An investigation of ground conditions in St. Evins Park Monasterevin was carried out ascertain foundation requirements for the proposed 15 social houses. Also required was an indication of the suitability of the sub-soils for soakaway purposes. In addition, environmental testing was scheduled on selected soil samples in order to screen for inherent contamination and to assess their suitability for disposal to an inert landfill.

Fieldwork for this investigation entailed the following:

- Boreholes were constructed in 3 locations to ascertain the sub-soil stratification.
- Trial pits were excavated in 4 locations in association with infiltration tests.
- Dynamic probing was performed in 9 locations to obtain soil resistance profiles.
- Infiltration testing was performed in 4 locations to assess the suitability of the sub-soils for soakaway purposes
- Plate Bearing Tests were performed in 3 locations to provide information for pavement design purposes.
- Slit trenches were excavated between stipulated coordinates to locate buried utilities.

This report presents an assessment of the ground conditions with respect to the proposed development.

2.0 Ground Conditions

2.1 Boreholes

Boreholes were constructed in the locations indicated on the site plan enclosed in Appendix 10, while the descriptions and depths of the various soils encountered are shown on the boring records enclosed in Appendix 1. Also shown on these records are the depths at which samples were recovered, the results of in-situ Standard Penetration Tests, and the groundwater conditions observed during the course of boring operations.

The boreholes revealed Made Ground, present to depths of 0.9 to 1.0 metres. The Made Ground consisted of brown sandy gravelly clay with occasional brick and concrete fragments. Underlying this material was stiff brown sandy gravelly clay which extended to depths ranging from 1.4 to 2.1 metres. Further boring revealed medium dense to dense sandy gravel with cobbles in which the boreholes were terminated on obstructions at depths of between 2.9 and 3.8 metres.

Groundwater ingress was observed at depths ranging from 2.1 to 2.6 metres, rising as shallow as 1.5 metres below existing ground level (m BGL) in BH01. Since the relatively short duration of boring operations does not permit an accurate measurement of the standing water level, standpipes were installed in BH01 and BH03 to facilitate long-term monitoring. The borehole information is summarised in Table 1.

Location	Depth of Made Ground (m)	Firm/stiff sandy gravelly silt/clay	Medium dense to dense sandy gravel	Water Strike (m/bgl)	Water rose to (m/bgl)
BH01	1.00	1.00 to 1.40	1.40 to 2.90	2.10	1.50
BH02	1.00	1.00 to 2.10	2.10 to 3.10	2.60	No rise
BH03	0.90	0.90 to 1.70	1.70 to 3.80	2.60	2.50

Table 1

2.2 Trial Pits

Trial pits were excavated to facilitate the performance of infiltration tests. These pits revealed soft to firm sandy silty clay, grading to stiff sandy gravelly silty clay at depths of 0.8 to 0.9 m BGL. While TP01 and TP04 were terminated in this material, TP02 and TP03 encountered underlying deposits of sandy gravel. Ground water strikes were noted at depths of 2.1 to 2.2 metres. The trial pit findings are summarised in Table 2.

Location	Topsoil	soft/firm sandy silt/clay	Firm/stiff sandy gravelly silt/clay	sandy gravel	Water strike (m bgl)
TP01	0.30	0.30 to 0.90	0.90 to 2.5		2.00
TP02	0.25	0.25 to 0.80	0.80 to 1.5	1.50 to 2.10	2.10
TP03	0.25	0.25 to 0.80	0.80 to 2.00	2.00 to 2.20	2.20
TP04	0.25	0.25 to 0.70	0.70 to 2.30		2.20

Table2

2.3 Window Samples

Window samples WS01 and WS02 were recovered in order to obtain undisturbed samples of the subsoils.

Window samples are advanced by driving a steel sampling tube under constant percussive effort. The soils enter the tube within a protective plastic liner, which is withdrawn after every metre of progress. The liners are then placed in wooden channel boxes and transported to the IGSL offices where they are logged and sub-sampled as required.

The window sample record is presented in Appendix 3 of this report.

2.4 Dynamic Probing

Dynamic probing techniques were employed in 9 locations as shown on the site plan.

The dynamic probe utilised by IGSL Ltd complies with the requirements of ISO 22476-2: 2005+A1: 2011 – Geotechnical Investigation and testing – Field testing - Part 2: Dynamic probing. DPH probing comprises a 50 kg drop weight, 500mm drop height and a 43.7mm diameter (90°) cone.

In accordance with the standards, the number of blows required to drive the probe through each 100mm increment of penetration is recorded. Probing is generally terminated when blow counts, N_{100} values, exceed 25, in order to avoid damage to equipment. Detailed probe records are provided on which the blow counts are recorded both numerically and graphically.

Probe results are used primarily in conjunction with known information on soil composition and stratification, to define more accurately the soil profile, and to detect any soft or loose zones.

While the probes generally showed increasing resistance with depth some of them recorded high resistance from surface level, reducing with depth to zones of very low resistance, before rising again to the probed depths. For reporting purposes, the depths below which sustained N_{100} values exceeded 3 have been presented in Table 3. Also shown are the depths below which N_{100} values exceeded 10.

Location	$N_{100} > 3$	$N_{100} > 10$	Refusal	Remarks
DP01	0.80	0.80	1.30	initially high resistance
DP02	0.80	1.00	1.70	
DP03	0.50	0.50	1.60	
DP04	2.00	2.00	2.20	initially high resistance
DP05	0.10	2.50	2.70	
DP06	0.10	1.60	1.80	initially high resistance
DP07	0.30	1.50	1.80	
DP08	0.30	0.80	1.40	
DP09	0.20	0.80	2.60	initially high resistance

Table 3

2.5 Infiltration Test

The infiltration tests were performed at TP01 to TP04, and are numbered SA01 to SA04. Tests were performed in accordance with BRE Digest 365 ‘Soakaway Design’.

To obtain a measure of the infiltration rate of the sub-soils, water is poured into the test pit, and records taken of the fall in water level against time. This procedure is repeated twice more to ensure saturation of the sub-soils. Normally the results for the final stage of testing, following the saturation periods, are used for soakaway design purposes. The infiltration rate is the volume of water dispersed per unit exposed area per unit of time, and is generally expressed as metres/minute or metres/second.

The records for the monitored stages, following the initial saturation stages, are enclosed in Appendix 5.

The tests recorded no discernible fall in water level in all but SA01, where a very low infiltration rate was recorded.

2.6 Plate Bearing Tests

Plate bearing tests were performed in three locations to obtain a measure of the CBR values. A 300 mm diameter plate was used, and tests were performed at a depth of 0.5 metres below existing ground level. Tests were performed in accordance with BS 1377 Part 9: 1990. “In-situ Tests”. The incremental loading test (4.1.6.4.2) was used.

The maximum applied load was estimated on the basis of obtaining an accumulative displacement of at least 1.25 mm. The load was then applied in five approximately equal increments to the design load. To measure recovery the load was removed in three increments. A second phase of loading and unloading was performed to assess the benefits of further compaction.

The settlement under each increment was measured against time until movement had effectively ceased and the results are presented as graphs of applied pressure against settlement. Calculation of Modulus of Sub-grade Reaction (k) and CBR values are in accordance with NRA HD25-26/10 Volume7: Pavement Design and Maintenance.

The test records from the initial and reload stages are enclosed in Appendix 6, while the calculated CBR values are shown in Table 3.

Location	Depth (m bgl)	CBR%	
		First Cycle	Reload Cycle
PBT1	0.5	3.0	18.2
PBT2	0.5	1.2	7.3
PBT3	0.5	1.1	1.6

Table 3

2.7 Slit Trenches

Slit trenches were excavated in two areas to locate any services over the stipulated four metre lengths. For health and safety reasons, trench depths were limited to 1.2 metres.

The slit trench records show the coordinates of the beginning and end of each trench, and details of any services encountered. No services were encountered in the trenches. However, some flat stones in ST01 had the appearance of a disused land drain.

The slit trench records are presented in Appendix 7.

3.0 Laboratory Testing (Geotechnical)

3.1 Particle Size Distributions

Grading curves for selected samples show variations in soil composition, with fines content values varying from 3 to 50%.

3.2 Index Properties

The results of plastic and liquid limit tests generally classify the sub-soils as non-plastic.

3.3 Chemical analysis

The results of chemical testing showed very low concentrations of water-soluble sulphates (< 0.01 g/l). In addition, the pH values of 8.9 to 9.0 indicated near neutral conditions.

4.0 Laboratory Testing (Environmental)

Environmental testing was scheduled on selected soil samples in order to screen for inherent contamination and to assess their suitability for disposal to an inert landfill.

Samples were tested in accordance with the RILTA Suite, which is used to determine the suitability of soils for disposal to a landfill. The RILTA suite includes Heavy Metals, Polycyclic Aromatic Hydrocarbons (PAH), TPH-CWG, BTEX, PCB and Total Organic Carbon (TOC) carried out on dry soil samples. Also included are leachate analyses, whereby leachate is generated in accordance with CEN 10:1 specification and this is tested for the presence of recognised contaminants including Heavy Metals, Dissolved Organic Carbon (DOC) and Total Dissolved Solids (TDS). An Asbestos Screen is also included in the RILTA Suite.

5.0 Discussion

An investigation of ground conditions in St. Evins Park Monasterevin was carried out ascertain foundation requirements for the proposed 15 social houses. Also required was an indication of the suitability of the sub-soils for soakaway purposes. In addition, environmental testing was scheduled on selected soil samples in order to screen for inherent contamination and to assess their suitability for disposal to an inert landfill

Boreholes revealed Made Ground, present to depths of 0.9 to 1.0 metres. Underlying this material was firm to stiff brown sandy gravelly clay, which extended to depths ranging from 1.4 metres to 2.1 metres. Further boring revealed medium dense to dense sandy gravel with cobbles.

Groundwater ingress was observed at depths ranging from 2.1 metres to 2.6 metres, rising to 1.5 metres in BH01.

The trial pits revealed a soil stratification similar to that encountered in the boreholes, while the dynamic probe records show the resistance profiles with depth.

5.1 Structural Foundations

From the aspect of structural foundations, the firm to stiff sandy silty clay directly underlying the Made Ground in the boreholes will provide a stable founding medium with a presumed bearing resistance of approximately 150 kN/m^2. This implies a founding depth of approximately 1.0 metres. Interpreting sustained N_{100} dynamic probe values in excess of 3 as indicating a similar bearing resistance, the probes also confirm that foundations can be placed within a metre of current ground level.

Careful visual inspection of excavations will be of importance to ensure that foundations are placed below Made Ground and any organic material. Particular care will be required in the vicinity of probe DP04, where a zone of low soil resistance between 1.6 and 2.0 m BGL could indicate deeper deposits of Made Ground. Foundations in this area should be deepened as necessary.

The underlying gravel soils were shown by SPT's to be in a medium dense to dense condition, and the presumed bearing resistance can be increased to circa 200 to 250 kN/m^2. However, this implies founding depths in excess of 2 metres in places, which would likely entail excavation below the water table. While consideration can be given to trench-fill techniques, provision should be made for control of groundwater ingress, which can result in instability of side walls.

5.2 Groundwater and Trench Stability

Standpipes were installed in BH01 and BH03 to facilitate long-term groundwater monitoring. Monitoring of these standpipes should continue until the construction period so that a better understanding of the true groundwater table can be gained. As observed in the boreholes, the groundwater levels in open excavations could rise to at least 1.5 metres of current ground level, given sufficient time.

Some instability was noted in the trial pits during the excavation period (typically 45 minutes). Therefore, allowance should be made for trench support measures in open excavations as required. It is noted that where groundwater ingress occurs, this is likely to accelerate the collapse of open trenches, particularly where excavations extend into the gravel soils.

5.3 Infiltration

The field tests recorded very low infiltration rates. In addition, reference is made to the groundwater table, which appears to be present within the upper 1.5 to 2 metres.

In view of the test results and the possible presence of shallow groundwater, the design of a conventional soakaway system could be deemed impractical. It may, therefore, be necessary to discharge storm water to an existing surface water system, using attenuation techniques to regulate the flow.

5.4 Chemical Attack on Buried Concrete

The results of Sulphate and pH testing showed very low Water-Soluble Sulphate and near-neutral pH levels.

With reference to Table C1 of BRE Special Digest 1: 2005, the level of Sulphate suggests a design Sulphate Class of DS-1. Assuming a static groundwater table, an ACEC (Aggressive Chemical Environment for Concrete) Classification of AC-1s is applicable, since the pH levels are greater than 5.5.

In terms of concrete to I.S. EN 206-1:2013, the chemical testing demonstrates that concrete could be manufactured to Class XA1.

5.5 Landfill Disposal of Excavated Soils

The results of WAC analyses showed that all samples satisfied the criteria for inert waste as set out in the European Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.

It is therefore anticipated that any excavated soils would be accepted by an inert landfill if removed from site.

If required, the environmental test results can be used to produce a Waste Characterisation Assessment (WCA), which is generally undertaken by an environmental specialist.

It should be noted that the chosen landfill should be furnished with the WAC results in advance of any soils being removed from site. Depending on the extent and depth of excavation, the landfill may require additional testing to achieve the frequency of analysis (i.e. number of samples per unit volume of excavation) that meets their license requirements.

Appendix 1 Borehole Records

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24737

CONTRACT St.Evins Park , Monasterevin , Co.Kildare

BOREHOLE NO. **BH01**
SHEET Sheet 1 of 1

CO-ORDINATES 662,880.91 E
710,994.30 N
GROUND LEVEL (m AOD) 63.87

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 2.90

DATE COMMENCED 31/05/2023
DATE COMPLETED 31/05/2023

CLIENT Kildare Co.Co.
ENGINEER DOBA

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY P.Thomas
PROCESSED BY F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		63.77	0.10						
	MADE GROUND (Comprised of brown sandy gravelly CLAY with brick and concrete pieces)		62.87	1.00						
1	Firm to stiff brown sandy slightly gravelly SILT/CLAY		62.47	1.40	AA199363	B	1.00		N = 18 (2, 2, 3, 3, 5, 7)	
	Medium dense to dense grey fine to coarse slightly silty sandy GRAVEL with some cobble									
2					AA199364	B	2.00		N = 50 (4, 5, 6, 8, 15, 21)	
					AA199365	B	2.50			
			60.97	2.90					N = 50/150 mm (18, 21, 29)	
3	Obstruction End of Borehole at 2.90 m									
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.3	2.5	0.75	
2.7	2.9	1	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.10	2.10	No	1.50	20	Moderate

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
31-05-23	3.10	1.00	3.10	50mm SP

REMARKS CAT scanned location and hand dug inspection pit was carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 24737.GPJ IGSL.GDT 31/8/23

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24737

CONTRACT	St.Evins Park , Monasterevin , Co.Kildare	**BOREHOLE NO.**	**BH02**
		SHEET	Sheet 1 of 1
CO-ORDINATES	662,956.12 E 711,016.66 N	**RIG TYPE**	Dando 2000
		BOREHOLE DIAMETER (mm)	200
GROUND LEVEL (m AOD)	63.74	**BOREHOLE DEPTH (m)**	3.10
		DATE COMMENCED	31/05/2023
		DATE COMPLETED	31/05/2023
CLIENT	Kildare Co.Co.	**SPT HAMMER REF. NO.**	
		BORED BY	P.Thomas
ENGINEER	DOBA	**ENERGY RATIO (%)**	
		PROCESSED BY	F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		63.64	0.10						
	MADE GROUND comprising soft to firm brown sandy slightly gravelly SILT/CLAY		62.74	1.00						
1	Stiff grey/brown sandy gravelly SILT/CLAY				AA199366	B	1.00		N = 20 (3, 3, 5, 4, 5, 6)	
2			61.64	2.10	AA199367	B	2.00		N = 35 (4, 6, 6, 8, 9, 12)	
	Dense grey fine to coarse slightly clayey GRAVEL with some cobbles and occasional boulders									
3			60.64	3.10	AA199368	B	3.00		N = 50/150 mm (15, 10, 23, 27)	
	Obstruction End of Borehole at 3.10 m									
4										
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
2.6	2.8	1	
3	3.1	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.60	2.60	2.70	No	20	Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS CAT scanned location and hand dug inspection pit was carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 24737.GPJ IGSL.GDT 31/8/23

GEOTECHNICAL BORING RECORD

REPORT NUMBER 24737

CONTRACT St.Evins Park , Monasterevin , Co.Kildare

BOREHOLE NO. **BH03**
SHEET Sheet 1 of 1

CO-ORDINATES 663,013.58 E 711,034.31 N
GROUND LEVEL (m AOD) 64.19

RIG TYPE Dando 2000
BOREHOLE DIAMETER (mm) 200
BOREHOLE DEPTH (m) 3.80

DATE COMMENCED 01/06/2023
DATE COMPLETED 01/06/2023

CLIENT Kildare Co.Co.
ENGINEER DOBA

SPT HAMMER REF. NO.
ENERGY RATIO (%)

BORED BY P.Thomas
PROCESSED BY F.C

Depth (m)	Description	Legend	Elevation	Depth (m)	Samples: Ref. Number	Samples: Sample Type	Samples: Depth (m)	Samples: Recovery	Field Test Results	Standpipe Details
0	TOPSOIL		64.09	0.10						
	MADE GROUND (Comprised of brown sandy gravelly CLAY with plastic fragments)		63.29	0.90						
1	Stiff grey brown sandy gravelly SILT/CLAY		62.49	1.70	AA199369	B	1.00		N = 24 (2, 3, 5, 5, 7, 7)	
2	Medium dense to dense grey fine to coarse silty sandy GRAVEL with frequent cobbles and boulders				AA199370	B	2.00		N = 27 (4, 5, 6, 6, 7, 8)	
3					AA199371	B	3.00		N = 50 (6, 7, 9, 9, 14, 18)	
			60.39	3.80	AA199372	B	3.70		N = 50/75 mm (25, 31, 50)	
4	Obstruction End of Borehole at 3.80 m									
5										
6										
7										
8										
9										

HARD STRATA BORING/CHISELLING

From (m)	To (m)	Time (h)	Comments
3.3	3.5	1	
3.7	3.8	1.5	

WATER STRIKE DETAILS

Water Strike	Casing Depth	Sealed At	Rise To	Time (min)	Comments
2.60	2.60	2.80	2.50	20	Slow

INSTALLATION DETAILS

Date	Tip Depth	RZ Top	RZ Base	Type
01-06-23	3.80	1.00	2.80	50mm SP

GROUNDWATER PROGRESS

Date	Hole Depth	Casing Depth	Depth to Water	Comments

REMARKS CAT scanned location and hand dug inspection pit was carried out .

Sample Legend
D - Small Disturbed (tub)
B - Bulk Disturbed
LB - Large Bulk Disturbed
Env - Environmental Sample (Jar + Vial + Tub)
UT - Undisturbed 100mm Diameter Sample
P - Undisturbed Piston Sample
W - Water Sample

IGSL BH LOG 24737.GPJ IGSL.GDT 31/8/23

Appendix 2 Trial Pit Records

TRIAL PIT RECORD

REPORT NUMBER 24737

CONTRACT	St.Evins Park , Monasterevin , Co.Kildare	**TRIAL PIT NO.**	**TP/SA01**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	662,947.91 E 710,988.82 N
		DATE STARTED	02/06/2023
		DATE COMPLETED	02/06/2023
CLIENT	Kildare Co.Co.	**GROUND LEVEL (m)**	63.79
		EXCAVATION METHOD	6T Tracked machine
ENGINEER	DOBA		

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.30	63.49						
Soft to firm, brown/grey mottled, very sandy slightly gravelly SILT					AA196569	B	0.70		
Stiff, brown/grey mottled, sandy gravelly SILT with high subangular to subrounded cobbles content		0.90	62.89						
					AA196570	B	1.60		
Firm, grey, very sandy very gravelly SILT/CLAY with low subangular cobbles content (possible very clayey/silty gravelly sand)		1.80	61.99	1 (Moderate)					
					AA196571	B	2.40		
End of Trial Pit at 2.50m		2.50	61.29						

Groundwater Conditions
Moderate water flow at 2.0m

Stability
TP slightly unstable form 1.8m

General Remarks
SA01 done in location - for all details see SA01 log

TRIAL PIT RECORD

REPORT NUMBER 24737

CONTRACT	St.Evins Park , Monasterevin , Co.Kildare	**TRIAL PIT NO.**	**TP/SA02**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	662,996.28 E 711,008.95 N
		DATE STARTED	02/06/2023
		DATE COMPLETED	02/06/2023
CLIENT	Kildare Co.Co.	**GROUND LEVEL (m)**	63.81
		EXCAVATION METHOD	6T Tracked machine
ENGINEER	DOBA		

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.25	63.56						
Soft to firm, brown/grey mottled, very sandy slightly gravelly SILT					AA196572	B	0.50		
Stiff, brown/grey mottled, sandy gravelly SILT with high subangular to subrounded cobbles and low boulders content		0.80	63.01						
1.0									
Dense, grey, very silty sandy fine to coarse GRAVEL with high subangular to subrounded cobbles and low boulders content		1.50	62.31		AA196573	B	1.40		
2.0									
End of Trial Pit at 2.10m		2.10	61.71	1 (Slow)	AA196574	B	2.00		
3.0									
4.0									

Groundwater Conditions
Slow water flow at 2.1m

Stability
TP unstable form 1.5m

General Remarks
SA02 done in location - for all details see SA02 log

IGSL TP LOG 24737.GPJ IGSL.GDT 31/8/23

TRIAL PIT RECORD

REPORT NUMBER 24737

CONTRACT	St.Evins Park , Monasterevin , Co.Kildare	**TRIAL PIT NO.**	**TP/SA03**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	663,031.87 E 710,995.67 N
		DATE STARTED	02/06/2023
		DATE COMPLETED	02/06/2023
CLIENT	Kildare Co.Co.	**GROUND LEVEL (m)**	63.97
		EXCAVATION METHOD	6T Tracked machine
ENGINEER	DOBA		

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
TOPSOIL		0.25	63.72						
Soft to irm, brown/grey mottled, very sandy slightly gravelly SILT/CLAY					AA196575	B	0.60		
Stiff, brown/grey mottled, sandy gravelly SILT/CLAY with high subangular to subrounded cobbles and low boulders content		0.80	63.17		AA196576	B	1.40		
Firm, grey, sandy very gravelly SILT/CLAY with low subangular cobbles content (possible very clayey/silty gravel)		2.00	61.97						
End of Trial Pit at 2.20m		2.20	61.77	1 (Slow)	AA196577	B	2.20		

Groundwater Conditions
Slow water flow at 2.2m

Stability
TP unstable form 2.0m

General Remarks
SA03 done in location - for all details see SA03 log

TRIAL PIT RECORD

REPORT NUMBER 24737

CONTRACT	St.Evins Park , Monasterevin , Co.Kildare	**TRIAL PIT NO.**	**TP/SA04**
		SHEET	Sheet 1 of 1
LOGGED BY	I.Reder	**CO-ORDINATES**	663,041.34 E 710,945.46 N
		DATE STARTED	02/06/2023
		DATE COMPLETED	02/06/2023
CLIENT	Kildare Co.Co.	**GROUND LEVEL (m)**	63.88
		EXCAVATION METHOD	6T Tracked machine
ENGINEER	DOBA		

Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Samples: Sample Ref	Samples: Type	Samples: Depth	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0 TOPSOIL		0.25	63.63						
Soft to firm, brown/grey mottled, very sandy slightly gravelly SILT/CLAY with some plastic rubbish and hair roots (possible FILL)		0.70	63.18		AA196578	B	0.50		
Firm to stiff, brown/grey mottled, sandy gravelly SILT/CLAY with high subangular to subrounded cobbles and low boulders content		1.70	62.18		AA196579	B	1.30		
Firm, brownish grey, slightly sandy gravelly SILT/CLAY with high subangular to subrounded cobbles and boulders content				1 (Seepage)	AA196580	B	2.00		
End of Trial Pit at 2.30m		2.30	61.58						

Groundwater Conditions
Seepage flow at 2.2m

Stability
TP stable

General Remarks
SA04 done in location - for all details see SA04 log

Project Number: 24737
Site: St.Evin's Park, Monasterevin
Project Engineer: DOBA

TRIAL PIT PHOTOGRAPHY RECORD
TP-SA 01

TP-SA 01 – spoil

Project Number: 24737
Site: St.Evin's Park, Monasterevin
Project Engineer: DOBA

IGSL Ltd.

TRIAL PIT PHOTOGRAPHY RECORD
TP-SA 02

TP-SA 02 – spoil

Project Number: 24737
Site: St.Evin's Park, Monasterevin
Project Engineer: DOBA

TRIAL PIT PHOTOGRAPHY RECORD
TP-SA 03

TP-SA 03 – spoil

Project Number: 24737
Site: St.Evin's Park, Monasterevin
Project Engineer: DOBA

IGSL Ltd.

TRIAL PIT PHOTOGRAPHY RECORD
TP-SA 04

TP-SA 04 – spoil

Appendix 3 Window Sample Records

WINDOW SAMPLE RECORD

REPORT NUMBER 24737

CONTRACT	St. Evin's Park Monasterevin
PROBE NO.	**WS01**
SHEET	Sheet 1 of 1
CO-ORDINATES	662,997.47 E 711,025.74 N
GROUND LEVEL (mOD)	64.02
DATE DRILLED	09/06/2023
DATE LOGGED	09/06/2023
CLIENT	
ENGINEER	DOBA
SAMPLED BY	CK
LOGGED BY	

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	Topsoil		0.10	63.92						
	Firm brown sandy gravelly silty CLAY					0.00-1.00	100			
1.0										
	Grey-brown very sandy GRAVEL. Gravel is fine to medium.		1.50	62.52						
	Grey-brown sandy GRAVEL. Gravel is medium to coarse		1.90	62.12		1.00-2.00	80			
2.0						2.00-2.50	90			
	Final Depth 2.50m		2.50	61.52						
3.0										
4.0										
5.0										

General Remarks

Installations

IGSL WS LOG 24737.GPJ IGSL.GDT 31/8/23

WINDOW SAMPLE RECORD

REPORT NUMBER 24737

CONTRACT	St. Evin's Park Monasterevin
PROBE NO.	**WS02**
SHEET	Sheet 1 of 1
CO-ORDINATES	662,925.10 E 711,006.64 N
GROUND LEVEL (mOD)	63.64
DATE DRILLED	09/06/2023
DATE LOGGED	09/06/2023
CLIENT	
ENGINEER	DOBA
SAMPLED BY	CK
LOGGED BY	

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation	Water Strike	Depth of Sample Run (m)	Recovery (%)	Blowcount	Vane Test (KPa)	Hand Penetrometer (KPa)
0.0	Topsoil		0.10	63.54						
	Firm brown sandy gravelly silty CLAY					0.00-1.00	100			
1.0			1.20	62.44						
	Grey-brown very sandy silty GRAVEL. Gravel is fine to medium.					1.00-2.00	80			
2.0										
						2.00-3.00	70			
3.0										
						3.00-3.60	50			
	Final Depth 3.60m		3.60	60.04						
4.0										
5.0										

General Remarks

Installations

IGSL WS LOG 24737.GPJ IGSL.GDT 31/8/23

Appendix 4 Dynamic Probe Records

DYNAMIC PROBE RECORD

REPORT NUMBER 24737

CONTRACT St.Evins Park , Monasterevin , Co.Kildare

PROBE NO. **DP01**
SHEET Sheet 1 of 1

CO-ORDINATES 662,899.19 E
710,984.67 N
GROUND LEVEL (mOD) 63.83

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

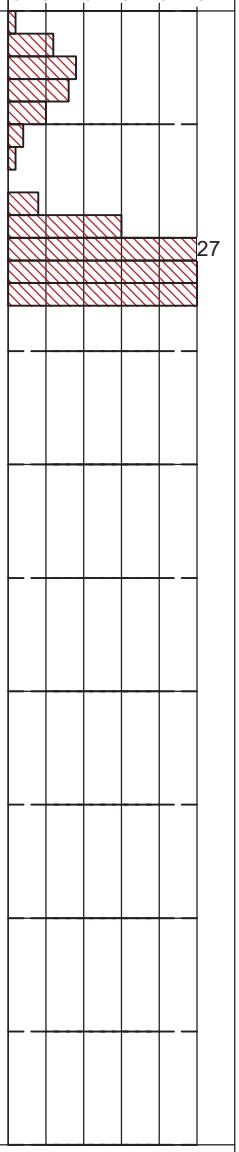
DATE DRILLED 09/06/2023
DATE LOGGED 09/06/2023

CLIENT Kildare Co.Co.
ENGINEER DOBA

PROBE TYPE DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.		0.00			0.00	1
						0.10	6
						0.20	9
						0.30	8
						0.40	5
						0.50	2
						0.60	1
						0.70	0
						0.80	4
						0.90	15
1.0						1.00	27
						1.10	25
						1.20	25
	End of Probe at 1.30 m			62.53			
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24737

CONTRACT St.Evins Park , Monasterevin , Co.Kildare

PROBE NO. **DP02**
SHEET Sheet 1 of 1

CO-ORDINATES 662,907.58 E
710,998.59 N
GROUND LEVEL (mOD) 63.80

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE DRILLED 09/06/2023
DATE LOGGED 09/06/2023

CLIENT Kildare Co.Co.
ENGINEER DOBA

PROBE TYPE DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.		0.00			0.00	1
						0.10	3
						0.20	3
						0.30	2
						0.40	5
						0.50	4
						0.60	4
						0.70	2
						0.80	5
						0.90	5
1.0						1.00	16
						1.10	15
						1.20	15
						1.30	13
						1.40	13
						1.50	19
						1.60	25
	End of Probe at 1.70 m			62.10			
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24737.GPJ IGSL.GDT 31/8/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24737

CONTRACT St.Evins Park , Monasterevin , Co.Kildare

PROBE NO. **DP03**
SHEET Sheet 1 of 1

CO-ORDINATES 662,943.36 E
711,012.64 N
GROUND LEVEL (mOD) 63.70

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

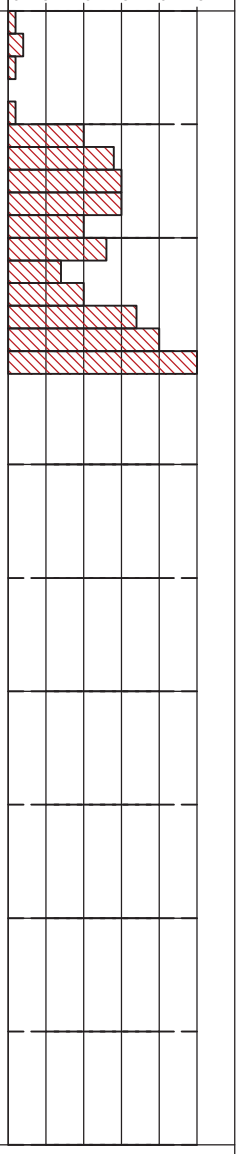
DATE DRILLED 09/06/2023
DATE LOGGED 09/06/2023

CLIENT Kildare Co.Co.
ENGINEER DOBA

PROBE TYPE DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.		0.00			0.00	1
						0.10	2
						0.20	1
						0.30	0
						0.40	1
						0.50	10
						0.60	14
						0.70	15
						0.80	15
						0.90	10
1.0						1.00	13
						1.10	7
						1.20	10
						1.30	17
						1.40	20
						1.50	25
	End of Probe at 1.60 m			62.10			
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24737.GPJ IGSL.GDT 31/8/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24737

CONTRACT St.Evins Park , Monasterevin , Co.Kildare

PROBE NO. **DP04**
SHEET Sheet 1 of 1

CO-ORDINATES 662,972.89 E
711,014.91 N
GROUND LEVEL (mOD) 63.72

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE DRILLED 09/06/2023
DATE LOGGED 09/06/2023

CLIENT Kildare Co.Co.
ENGINEER DOBA

PROBE TYPE DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.		0.00			0.00	1
						0.10	2
						0.20	3
						0.30	4
						0.40	6
						0.50	8
						0.60	9
						0.70	8
						0.80	8
						0.90	7
1.0						1.00	6
						1.10	4
						1.20	2
						1.30	1
						1.40	8
						1.50	3
						1.60	3
						1.70	0
						1.80	1
						1.90	0
2.0						2.00	25
						2.10	25
	End of Probe at 2.20 m			61.52			
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24737.GPJ IGSL.GDT 31/8/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24737

CONTRACT St.Evins Park , Monasterevin , Co.Kildare

PROBE NO. **DP05**
SHEET Sheet 1 of 1

CO-ORDINATES 662,983.54 E
711,027.59 N
GROUND LEVEL (mOD) 63.89

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE DRILLED 09/06/2023
DATE LOGGED 09/06/2023

CLIENT Kildare Co.Co.
ENGINEER DOBA

PROBE TYPE DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.		0.00			0.00	1
						0.10	3
						0.20	3
						0.30	3
						0.40	3
						0.50	6
						0.60	8
						0.70	11
						0.80	10
						0.90	9
1.0						1.00	6
						1.10	5
						1.20	7
						1.30	2
						1.40	4
						1.50	10
						1.60	14
						1.70	13
						1.80	8
						1.90	4
2.0						2.00	6
						2.10	6
						2.20	7
						2.30	7
						2.40	10
						2.50	21
						2.60	25
	End of Probe at 2.70 m			61.19			
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24737.GPJ IGSL.GDT 31/8/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24737

CONTRACT St.Evins Park , Monasterevin , Co.Kildare

PROBE NO. **DP06**
SHEET Sheet 1 of 1

CO-ORDINATES 663,022.42 E
711,023.50 N
GROUND LEVEL (mOD) 64.19

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE DRILLED 09/06/2023
DATE LOGGED 09/06/2023

CLIENT Kildare Co.Co.
ENGINEER DOBA

PROBE TYPE DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.		0.00			0.00	2
						0.10	8
						0.20	9
						0.30	7
						0.40	5
						0.50	6
						0.60	6
						0.70	7
						0.80	9
						0.90	8
1.0						1.00	8
						1.10	6
						1.20	7
						1.30	7
						1.40	7
						1.50	6
						1.60	20
						1.70	25
	End of Probe at 1.80 m			62.39			
2.0							
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24737.GPJ IGSL.GDT 31/8/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24737

CONTRACT St.Evins Park , Monasterevin , Co.Kildare

PROBE NO. **DP07**
SHEET Sheet 1 of 1

CO-ORDINATES 663,005.72 E
711,007.03 N
GROUND LEVEL (mOD) 63.89

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE DRILLED 09/06/2023
DATE LOGGED 09/06/2023

CLIENT Kildare Co.Co.
ENGINEER DOBA

PROBE TYPE DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.		0.00			0.00	0
						0.10	2
						0.20	3
						0.30	4
						0.40	6
						0.50	7
						0.60	9
						0.70	7
						0.80	8
						0.90	8
1.0						1.00	10
						1.10	12
						1.20	9
						1.30	6
						1.40	7
						1.50	16
						1.60	21
						1.70	25
	End of Probe at 1.80 m			62.09			
2.0							
3.0							
4.0							

Graphic Probe Record
0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24737.GPJ IGSL.GDT 31/8/23

DYNAMIC PROBE RECORD

REPORT NUMBER 24737

CONTRACT St.Evins Park , Monasterevin , Co.Kildare

PROBE NO. **DP08**
SHEET Sheet 1 of 1

CO-ORDINATES 662,958.93 E
710,998.93 N
GROUND LEVEL (mOD) 63.76

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

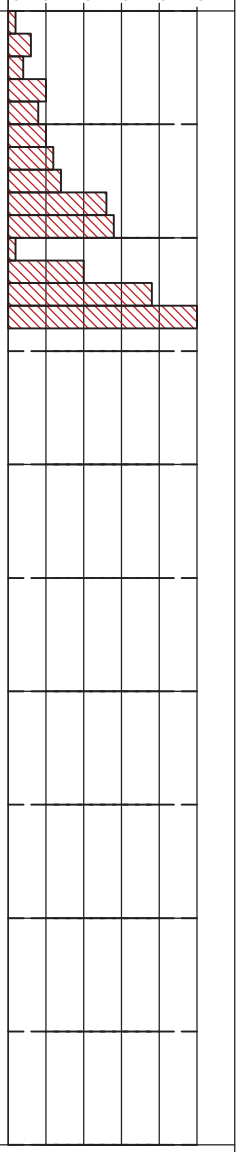
DATE DRILLED 09/06/2023
DATE LOGGED 09/06/2023

CLIENT Kildare Co.Co.
ENGINEER DOBA

PROBE TYPE DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.		0.00			0.00	1
						0.10	3
						0.20	2
						0.30	5
						0.40	4
						0.50	5
						0.60	6
						0.70	7
						0.80	13
						0.90	14
1.0						1.00	1
						1.10	10
						1.20	19
						1.30	25
	End of Probe at 1.40 m			62.36			
2.0							
3.0							
4.0							

Graphic Probe Record



GROUNDWATER OBSERVATIONS

REMARKS

DYNAMIC PROBE RECORD

REPORT NUMBER 24737

CONTRACT St.Evins Park , Monasterevin , Co.Kildare

PROBE NO. **DP09**
SHEET Sheet 1 of 1

CO-ORDINATES 662,933.50 E
710,976.73 N
GROUND LEVEL (mOD) 63.63

HAMMER MASS (kg) 50
INCREMENT SIZE (mm) 100
FALL HEIGHT (mm) 500

DATE DRILLED 09/06/2023
DATE LOGGED 09/06/2023

CLIENT Kildare Co.Co.
ENGINEER DOBA

PROBE TYPE DPH

Depth (m)	Geotechnical Description	Legend	Depth (m)	Elevation (mOD)	Water	Depth (m)	Probe Readings (Blows/Increment)
0.0	.		0.00			0.00	1
						0.10	3
						0.20	4
						0.30	5
						0.40	5
						0.50	4
						0.60	6
						0.70	7
						0.80	10
						0.90	6
1.0						1.00	9
						1.10	18
						1.20	22
						1.30	17
						1.40	12
						1.50	9
						1.60	8
						1.70	8
						1.80	9
						1.90	9
2.0						2.00	11
						2.10	12
						2.20	11
						2.30	10
						2.40	15
						2.50	25
	End of Probe at 2.60 m			61.03			
3.0							
4.0							

Graphic Probe Record: 0 5 10 15 20 25

GROUNDWATER OBSERVATIONS

REMARKS

IGSL DP LOG 100MM INCREMENTS 24737.GPJ IGSL.GDT 31/8/23

Appendix 5 Infiltration Test Results

Soakaway Design f -value from field tests

IGSL

Contract: St.Evins Park, Monasterevin — Contract No. **24737**

Test No. SA01

Engineer DOBA

Date: 02/06/2023

Summary of ground conditions

from	to	Description	Ground water
0.00	0.30	TOPSOIL	Moderate water at 2.0m
0.30	0.90	Firm, brown/grey mottled, very sandy slightly gravelly SILT	
0.90	1.80	Stiff to very stiff, brown/grey mottled, sandy gravelly SILT with many cobbles	
1.80	2.50	Firm, grey, very sandy very gravelly SILT/CLAY with occasional cobbles (possible	
		very clayey/silty gravelly sand)	

Notes: For all excavation details see TP/SA01 log

Field Data

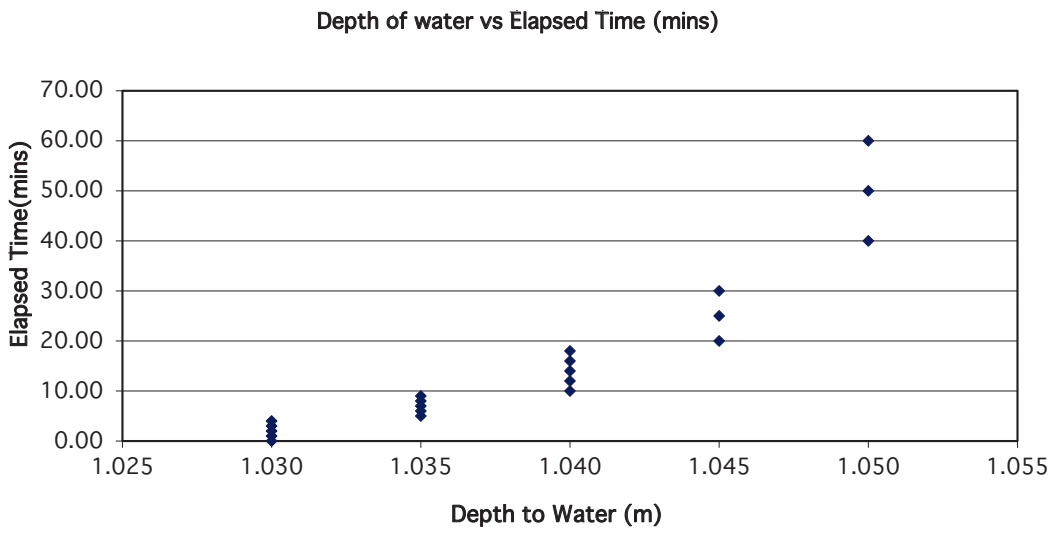
Depth to Water (m)	Elapsed Time (min)
1.030	0.00
1.030	1.00
1.030	2.00
1.030	3.00
1.030	4.00
1.035	5.00
1.035	6.00
1.035	7.00
1.035	8.00
1.035	9.00
1.040	10.00
1.040	12.00
1.040	14.00
1.040	16.00
1.040	18.00
1.045	20.00
1.045	25.00
1.045	30.00
1.050	40.00
1.050	50.00
1.050	60.00

Field Test

Depth of Pit (D)	2.50	m
Width of Pit (B)	0.70	m
Length of Pit (L)	2.00	m
Initial depth to Water =	1.03	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=	1.4	m2
*Av. side area of permeable stratum over test perio	7.884	m2
Total Exposed area =	9.284	m2

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

f= 5E-05 m/min or 8.37762E-07 m/sec



Soakaway Design f -value from field tests IGSL

Contract: St.Evins Park, Monasterevin Contract No. **24737**
Test No. SA02
Engineer DOBA
Date: 02/06/2023

Summary of ground conditions

from	to	Description	Ground water
0.00	0.25	TOPSOIL	Slow water at 2.1m
0.25	0.80	Firm, brown/grey mottled, very sandy slightly gravelly SILT	
0.80	1.50	Stiff, brown/grey mottled, sandy gravelly SILT with many cobbles and occ. bould	
1.50	2.10	Dense, grey, very silty sandy fine to coarse GRAVEL with many subangular to	
		subrounded cobbles and occasional boulders	

Notes: For all excavation details see TP/SA02 log

Field Data

Depth to Water (m)	Elapsed Time (min)
1.330	0.00
1.330	1.00
1.330	2.00
1.330	3.00
1.330	4.00
1.330	5.00
1.330	6.00
1.330	7.00
1.330	8.00
1.330	9.00
1.330	10.00
1.330	12.00
1.330	14.00
1.330	16.00
1.330	18.00
1.330	20.00
1.330	25.00
1.330	30.00
1.330	40.00
1.330	50.00
1.330	60.00

Field Test

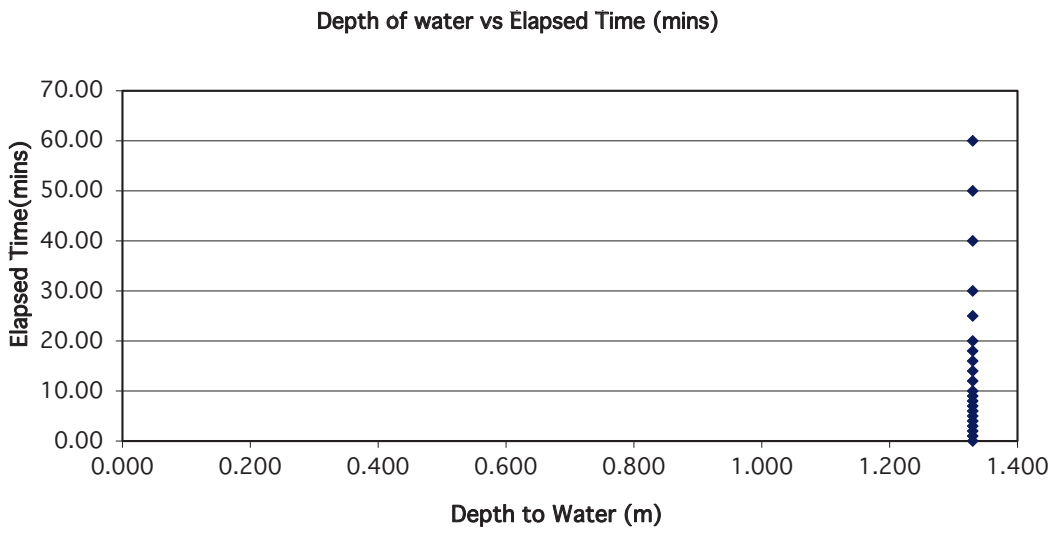
Depth of Pit (D)	2.10	m
Width of Pit (B)	0.70	m
Length of Pit (L)	2.00	m
Initial depth to Water =	1.33	m
Final depth to water =	1.33	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m

No any water movement

Base area=	1.4	m2
*Av. side area of permeable stratum over test perio	4.158	m2
Total Exposed area =	5.558	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 IGSL

Contract: St.Evins Park, Monasterevin Contract No. **24737**
Test No. SA03
Engineer DOBA
Date: 02/06/2023

Summary of ground conditions

from	to	Description	Ground water
0.00	0.25	TOPSOIL	Slow water at 2.2m
0.25	0.80	Firm, brown/grey mottled, very sandy slightly gravelly SILT	
0.80	2.00	Stiff, brown/grey mottled, sandy gravelly SILT with many cobbles and occ. bould	
2.00	2.20	Firm, grey, sandy very gravelly SILT/CLAY with high cobbles and low boulders	
		content (possible very silty/clayey gravel)	

Notes: For all excavation details see TP/SA03 log

Field Data

Depth to Water (m)	Elapsed Time (min)
1.130	0.00
1.130	1.00
1.130	2.00
1.130	3.00
1.130	4.00
1.130	5.00
1.130	6.00
1.130	7.00
1.130	8.00
1.130	9.00
1.130	10.00
1.130	12.00
1.130	14.00
1.130	16.00
1.130	18.00
1.130	20.00
1.130	25.00
1.130	30.00
1.130	40.00
1.130	50.00
1.130	60.00

Field Test

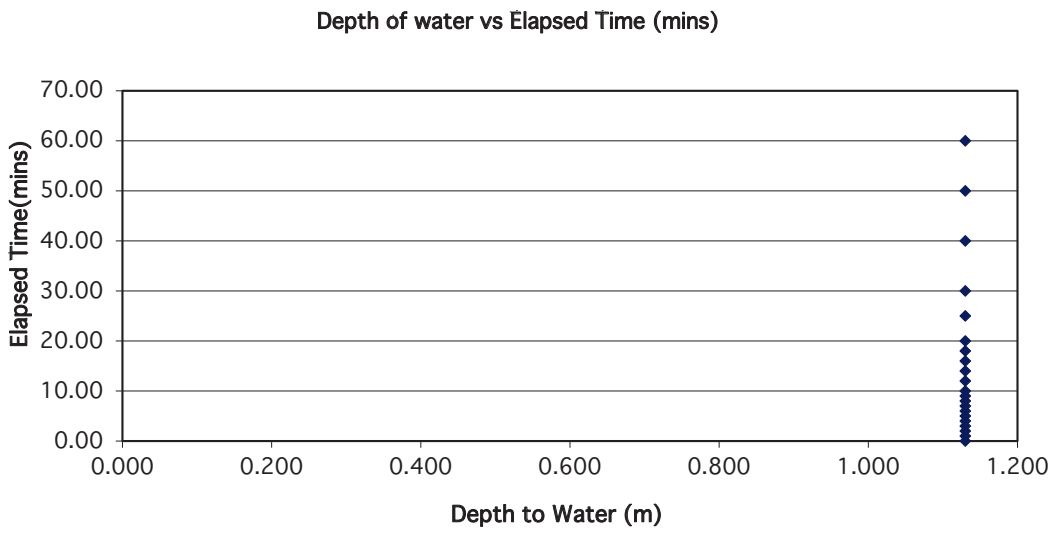
Depth of Pit (D)	2.20	m
Width of Pit (B)	0.70	m
Length of Pit (L)	2.20	m
Initial depth to Water =	1.13	m
Final depth to water =	1.13	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m

No any water movement

Base area=	1.54	m2
*Av. side area of permeable stratum over test perio	6.206	m2
Total Exposed area =	7.746	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 IGSL

Contract: St.Evins Park, Monasterevin Contract No. **24737**
Test No. SA04
Engineer DOBA
Date: 02/06/2023

Summary of ground conditions

from	to	Description	Ground water
0.00	0.25	TOPSOIL	
0.25	0.70	Firm, brown/grey, very sandy slightly gravelly SILT/CLAY with occ. rubbish (FILL)	
0.70	1.70	Firm to stiff, brown/grey mottled, sandy gravelly SILT/CLAY with many cobbles	Seepage at 2.2m
1.70	2.30	Soft to firm, brownish grey, slightly sandy gravelly SILT/CLAY with many cobbles	
		and occasional boulders	

Notes: For all excavation details see TP/SA04 log

Field Data

Depth to Water (m)	Elapsed Time (min)
1.510	0.00
1.510	1.00
1.510	2.00
1.510	3.00
1.510	4.00
1.510	5.00
1.510	6.00
1.510	7.00
1.510	8.00
1.510	9.00
1.510	10.00
1.510	12.00
1.510	14.00
1.510	16.00
1.510	18.00
1.510	20.00
1.510	25.00
1.510	30.00
1.510	40.00
1.510	50.00
1.510	60.00

Field Test

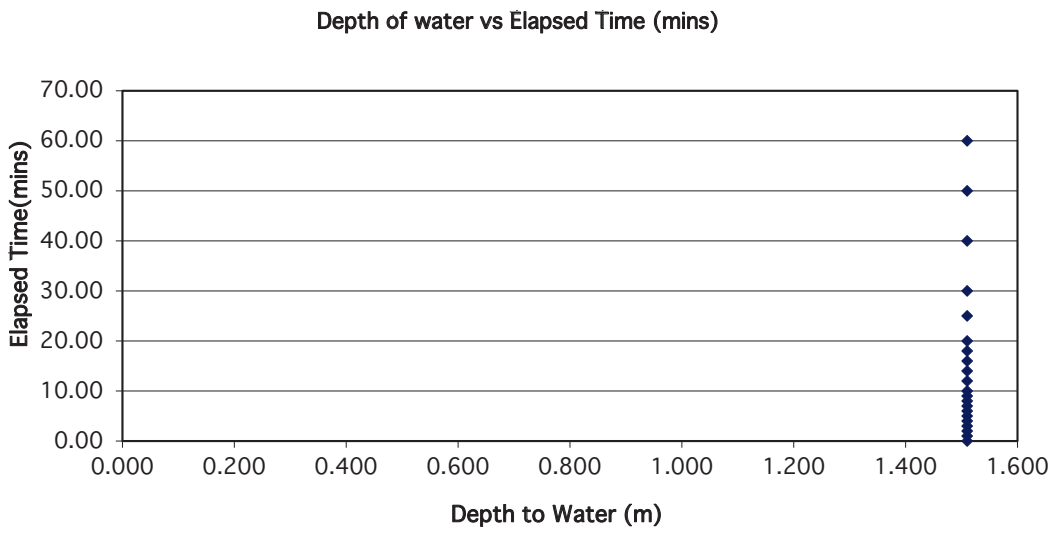
Depth of Pit (D)	2.30	m
Width of Pit (B)	0.70	m
Length of Pit (L)	1.80	m
Initial depth to Water =	1.51	m
Final depth to water =	1.51	m
Elapsed time (mins)=	60.00	
Top of permeable soil		m
Base of permeable soil		m

No any water movement

Base area=	1.26	m2
*Av. side area of permeable stratum over test perio	3.95	m2
Total Exposed area =	5.21	m2

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

f= 0 m/min or 0 m/sec



Appendix 6 Plate Bearing Test Records

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

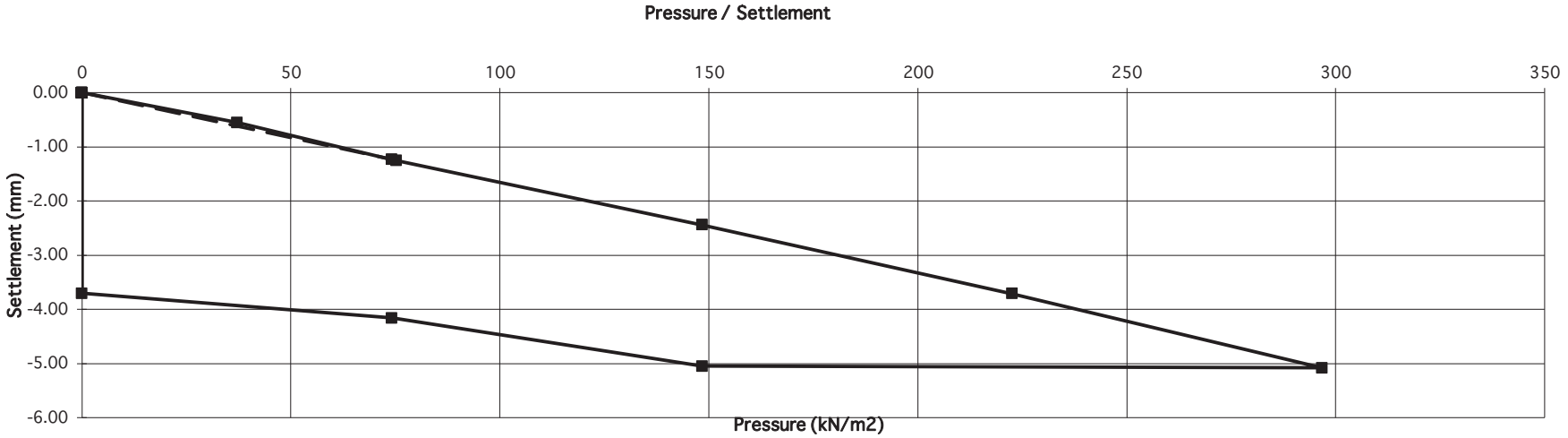
Reference No.	R146443
Contract	St. Evin's Park, Monasterevin
Test No.	CBR01 (Load)
Location	CBR01
Depth	0.5m bgl
Client	DOBA
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	06/06/2023

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

brown, sandy slightly gravelly CLAY

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 60
Modulus of subgrade reaction = 27 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 3.0 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

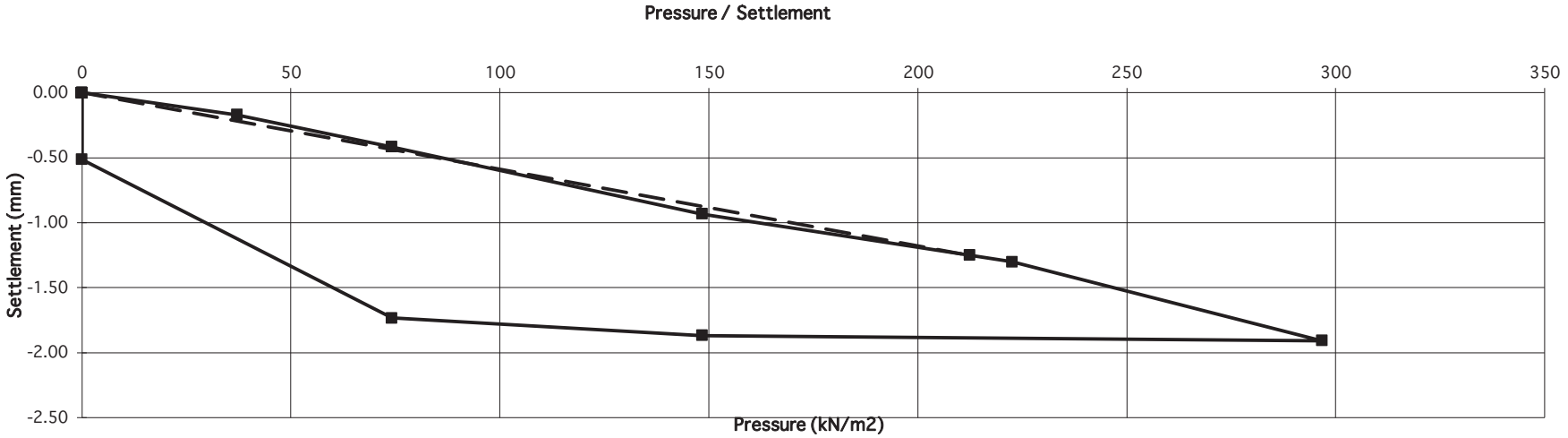
Reference No.	R146443
Contract	St. Evin's Park, Monasterevin
Test No.	CBR01 (ReLoad)
Location	CBR01
Depth	0.5m bgl
Client	DOBA
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	06/06/2023

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

brown, sandy slightly gravelly CLAY

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 170
Modulus of subgrade reaction = 78 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 18.2 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

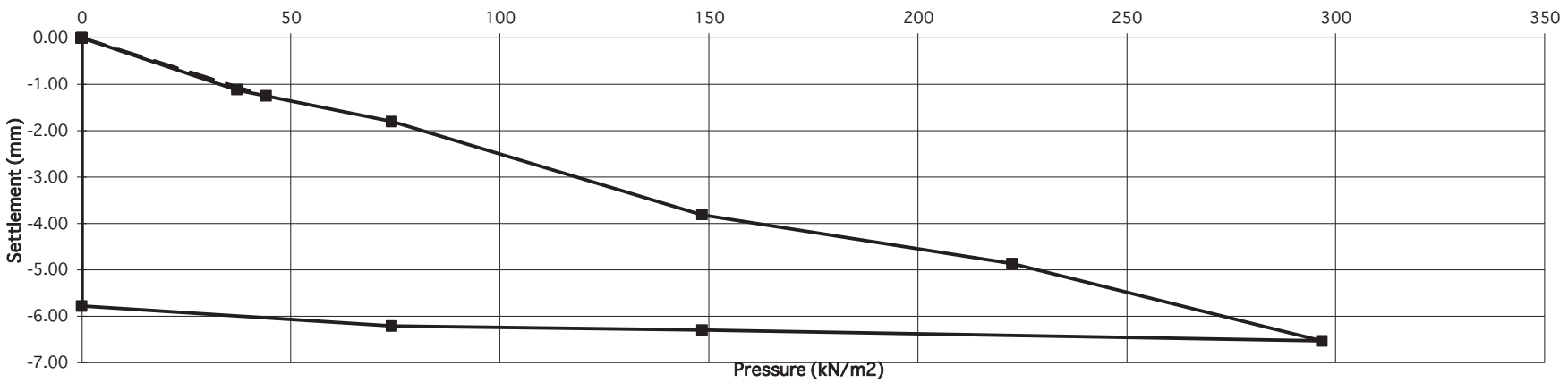
Reference No.	R146444
Contract	St. Evin's Park, Monasterevin
Test No.	CBR02 (Load)
Location	CBR02
Depth	0.5m bgl
Client	DOBA
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	06/06/2023

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

brown, sandy slightly gravelly SIL/CLAY

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 35
Modulus of subgrade reaction = 16 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.2 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

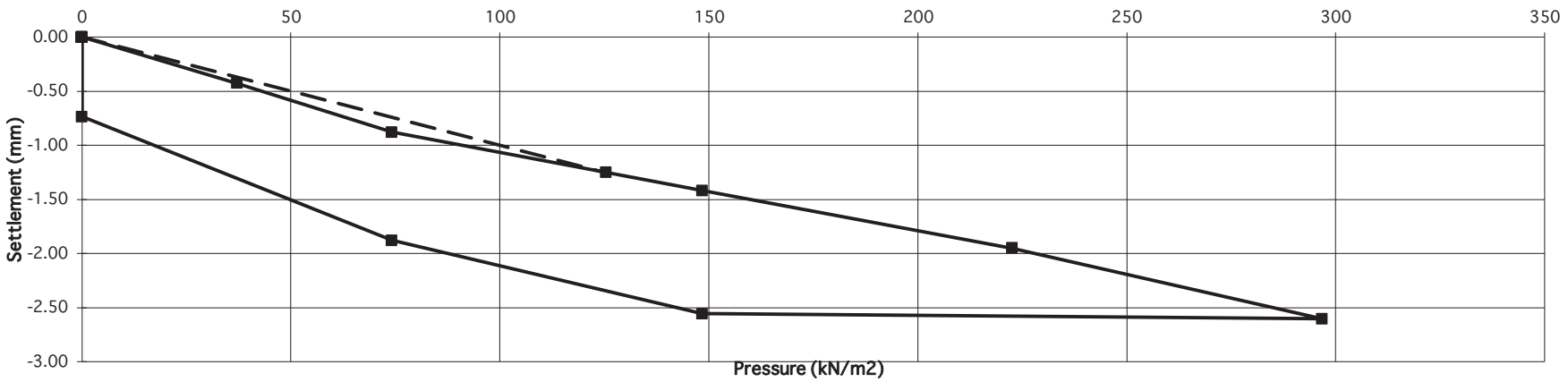
Reference No.	R146444
Contract	St. Evin's Park, Monasterevin
Test No.	CBR02 (ReLoad)
Location	CBR02
Depth	0.5m bgl
Client	DOBA
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	06/06/2023

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

brown, sandy slightly gravelly SIL/CLAY

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 100
Modulus of subgrade reaction = 46 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 7.3 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

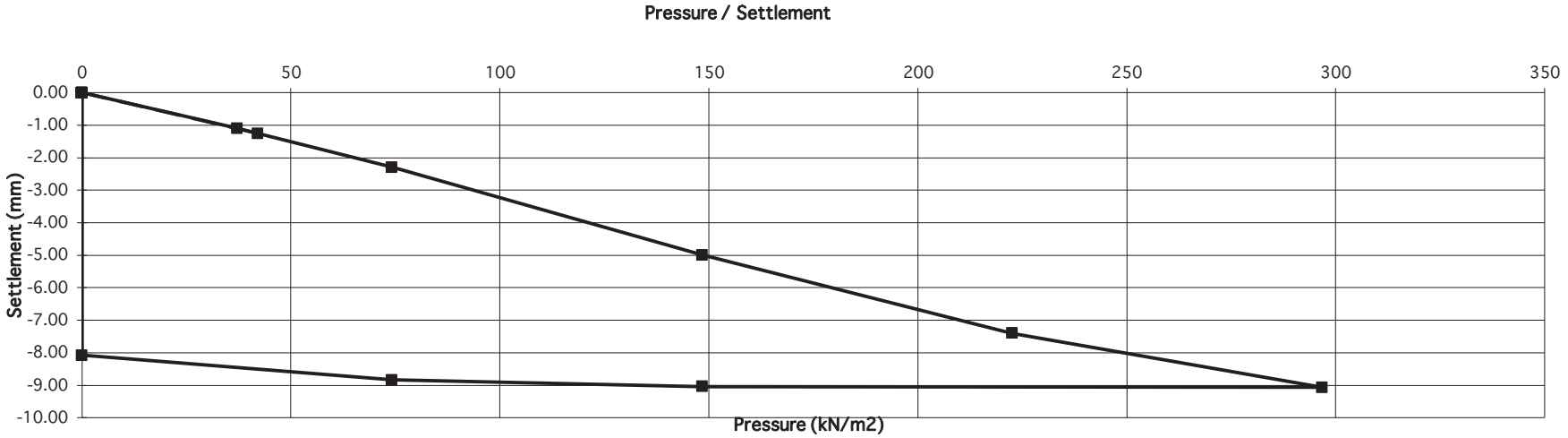
Reference No.	R146445
Contract	St. Evin's Park, Monasterevin
Test No.	CBR03 (Load)
Location	CBR03
Depth	0.5m bgl
Client	DOBA
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	06/06/2023

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

brown, sandy gravelly CLAY

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 34
Modulus of subgrade reaction = 15 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.1 %

PLATE TEST REPORT SHEET (F3.1)

Applied Pressure/Settlement Curve

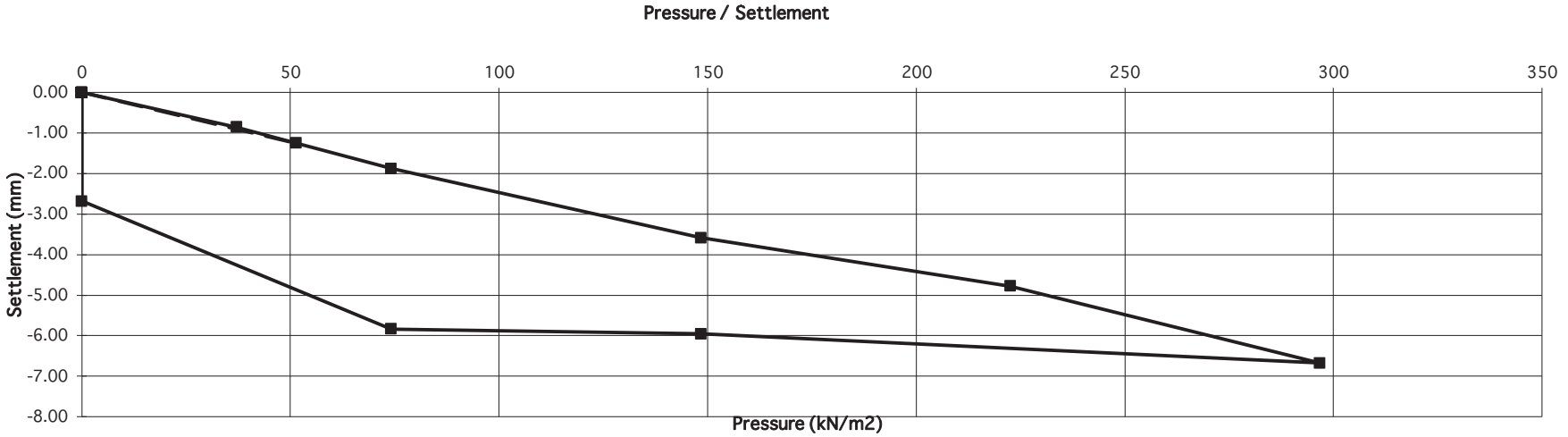
Reference No.	R146445
Contract	St. Evin's Park, Monasterevin
Test No.	CBR03 (ReLoad)
Location	CBR03
Depth	0.5m bgl
Client	DOBA
Plate Diameter:	300 mm
Test Method	BS 1377: Part 9: 1990 Test4 - Incremental Loading Test
Technician	I.Reder
Authorised by	
Date	06/06/2023

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

brown, sandy gravelly CLAY

Easting (m)
Northing (m)
Ground Level (mOD)

Sample Ref No. N/A
Depth 0.00 m bgl



Gradient at 1.25 mm settlement intersection = 41
Modulus of subgrade reaction = 19 MPa/m
Correction factor applied = 0.46 as per HD 25-26/10

Equivalent CBR value in accordance with NRA HD25-26/10 1.6 %

Appendix 7 Slit Trench Records

Report No. 24737	SLIT TRENCH RECORD	FACING DIRECTION: N / W / E / S	IGSL

		Survey				
Project: St.Evins Park, Monasterevin		Easting (m)	Northing (m)	Elevation (mOD)	Slit Trench No.	ST01
Engineer: DOBA					Sheet	1 of 1
Crew: I.R. / Hinch Plant Hire	Start of Trench	663000.052	711012.585	63.84	Date Commenced	06/06/2023
	End of Trench	663004.028	711013.142	63.926	Date Completed	06/06/2023

Ground Conditions

From (m)	To (m)	Soil Description
0.00	0.25	TOPSOIL
0.25	0.6	Firm, brown, sandy slightly gravelly CLAY with flat stones (possible fill)
0.6	1.2	Firm to stiff, brown/grey mottled, sandy gravelly SILT/CLAY with many cobbles

Photograph

Trench Dimensions	
LHS of Trench (m)	0.0
RHS of Trench (m)	4.0
Trench Depth (m)	1.2
Trench Width (m)	0.7

Location

Excavation Quantities

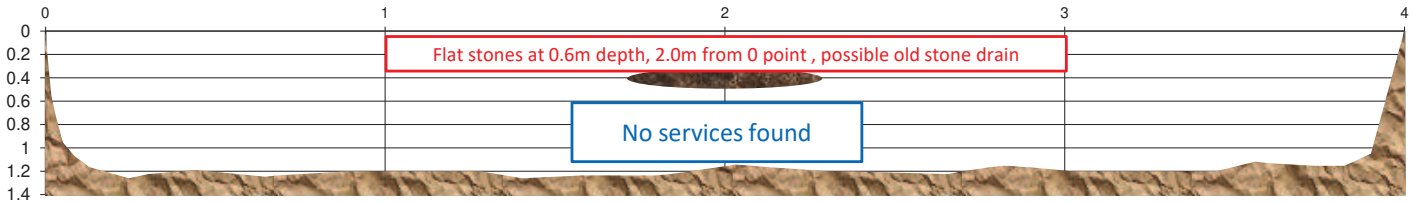
Surface	Length (m)	Material
Road		
Path (LHS)		
Path (RHS)		
Grass Verge (LHS)		
Grass Verge (RHS)		
Other	4	
Total Length	4.0	

Facing Direction	84° East
Facing Features	Main Road
Groundwater	Dry

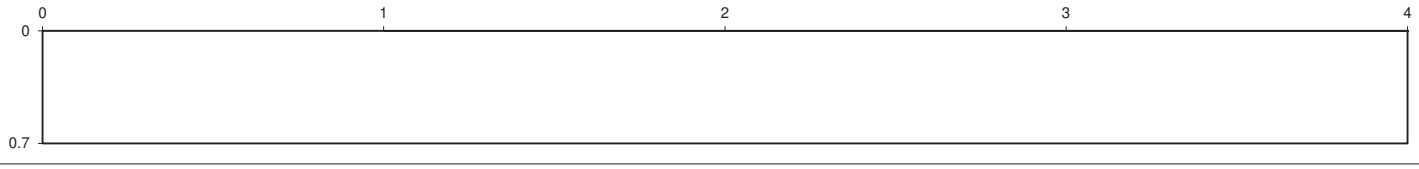
SAMPLES

Zero Metres Taken As: Pitch Goal side

X-Section



Plan



	Diameter (mm)	Material	Description	Distance (m)	Depth to crown (m)	Angle (deg.)
Service A						
Service B						
Service C						
Service D						
Service E						
Service F						
Service G						
Service H						
Service I						
Service J						
Service K						
Service L						
Service M						

Report No. 24737	SLIT TRENCH RECORD	FACING DIRECTION: N / W / E / S

		Survey				
Project: St.Evins Park, Monasterevin		Easting (m)	Northing (m)	Elevation (mOD)	Slit Trench No.	ST02
Engineer: DOBA					Sheet	1 of 1
Crew: I.R. / Hinch Plant Hire	Start of Trench	662999.998	711029.751	64.116	Date Commenced	06/06/2023
	End of Trench	663003.638	711030.555	64.15	Date Completed	06/06/2023

Ground Conditions

From (m)	To (m)	Soil Description
0.00	0.25	TOPSOIL
0.25	0.8	Firm, brown/grey, sandy slightly gravelly CLAY with occasional cobbles
0.8	1.2	Firm to stiff, brown/grey mottled, sandy gravelly SILT/CLAY with some cobbles

Photograph

Trench Dimensions	
LHS of Trench (m)	0.0
RHS of Trench (m)	3.3
Trench Depth (m)	1.2
Trench Width (m)	0.7
Facing Direction	71° East - North East
Facing Features	Last house in row
Groundwater	Dry

Location

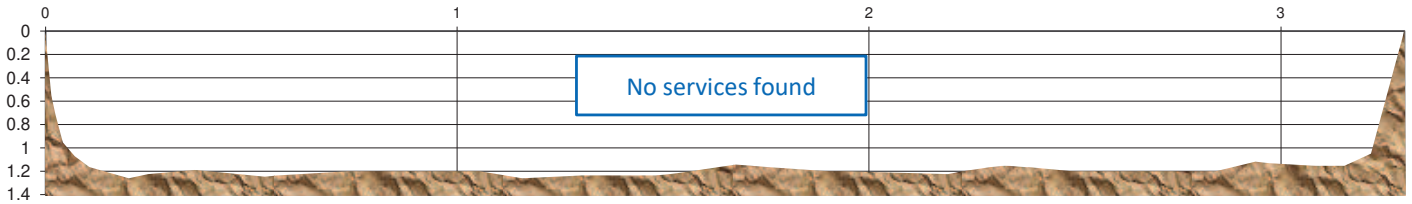
SAMPLES

Excavation Quantities

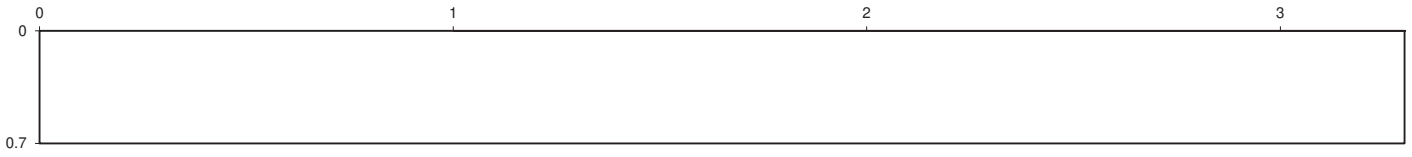
Surface	Length (m)	Material
Road		
Path (LHS)		
Path (RHS)		
Grass Verge (LHS)		
Grass Verge (RHS)		
Other	4	
Total Length	4.0	

Zero Metres Taken As: Pitch Goal side

X-Section



Plan



	Diameter (mm)	Material	Description	Distance (m)	Depth to crown (m)	Angle (deg.)
Service A						
Service B						
Service C						
Service D						
Service E						
Service F						
Service G						
Service H						
Service I						
Service J						
Service K						
Service L						
Service M						

Appendix 8 Laboratory Test Results (Geotechnical)

IGSL Ltd
Materials Laboratory
Unit J5, M7 Business Park
Newhall, Naas
Co. Kildare
045 846176

Test Report

Determination of Moisture Content, Liquid & Plastic Limits

Tested in accordance with BS1377:Part 2:1990, clauses 3.2, 4.3, 4.4 & 5.3**

Report No. **R148127** Contract No. 24737 Contract Name: St Evins Park Monastervin Kildare

Customer DOBA

Samples Received: 07/07/23 Date Tested: 07/07/23

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
BH02	AA199366	1.0	A23/2497	B	15	24	15	9	84	WS	4.4	C L	Brown sandy gravelly CLAY
BH03	AA199369	1.0	A23/2350	B	25	39	20	19	89	WS	4.4	C I	Brown sandy gravelly CLAY
TPSA01	AA196570	1.6	A23/2351	B	47	47	NP	NP	76	WS	4.4		Brown sandy gravelly SILT
TP/SA02	AA196573	1.4	A23/2352	B	7.9	20	NP	NP	80	WS	4.4		Grey/Brown slightly sandy, slightly gravelly, SILT with many cobbles
TP/SA03	AA196576	1.4	A23/2353	B	12	18	NP	NP	80	WS	4.4		Brown sandy gravelly SILT
TP/SA04	AA196579	1.3	A23/2354	B	9.0	18	NP	NP	77	WS	4.4		Brown sandy gravelly SILT

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 relate only to the specimen tested,in as received condition unless otherwise noted.
NOTE: **These clauses have been superceded by EN 17892-1 and EN17892-12.
Opinions and interpretations are outside the scope of accreditation. * denotes Customer supplied information.

IGSL Ltd Materials Laboratory

Persons authorized to approve reports
H Byrne (Laboratory Manager)

Approved by	Date	Page
H Byrne	27/07/23	1 of 1

TEST REPORT
Determination of Particle Size Distribution

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

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	96	
28	89	
20	84	
14	76	
10	74	
6.3	69	
5	67	
3.35	60	
2	55	
1.18	50	SAND
0.6	45	
0.425	42	
0.3	38	
0.15	29	
0.063	18	SILT/CLAY

Contract No. 24737 Report No. R148128
Contract Name : St Evins Park Monastervin Kildare
BH/TP No. BH1
Sample No.* AA199364 Lab. Sample No. A23/2496
Sample Type: B
Depth* (m) 2.00 Customer: DOBA
Date Received 07/07/2023 Date Testing started 07/07/2023
Description: Brown clayey/silty, very sandy, GRAVEL

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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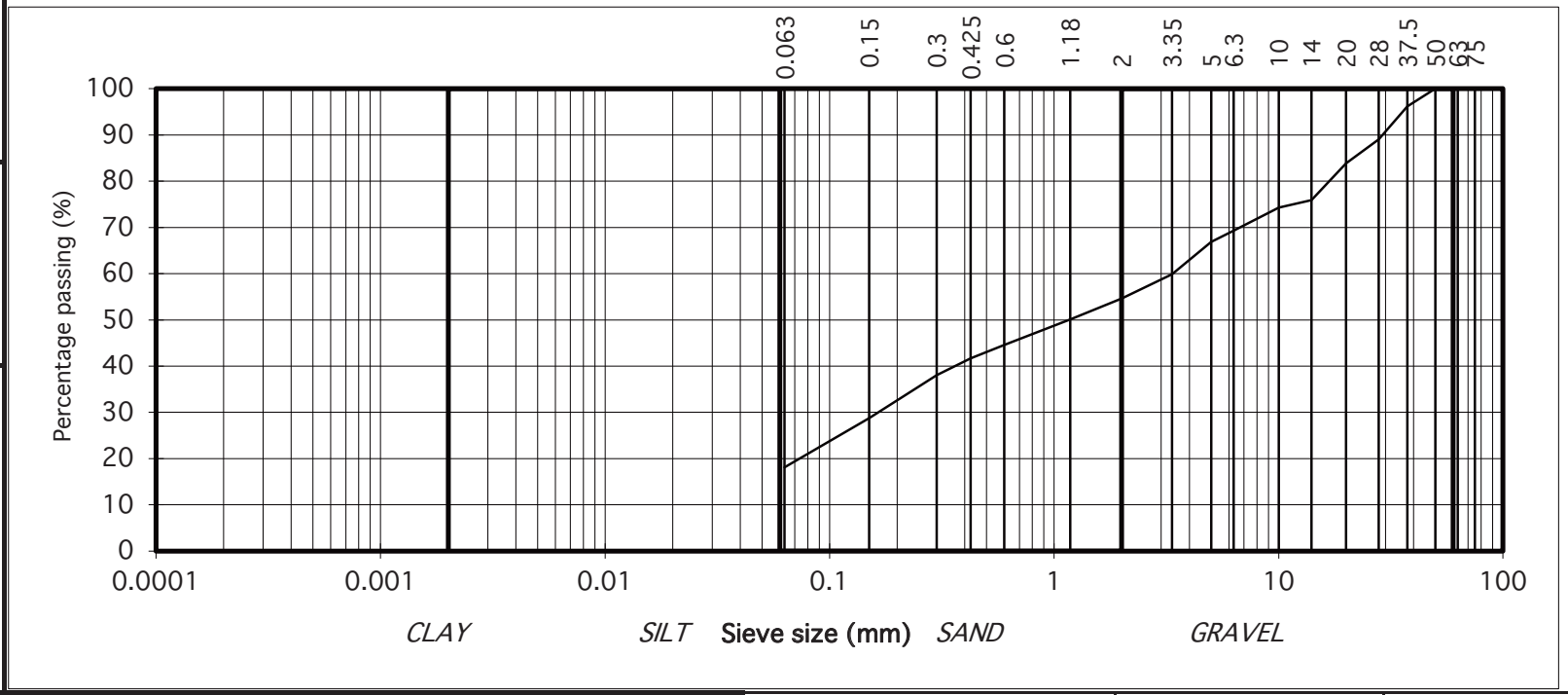

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Approved by:	Date:	Page no:
H Byrne	27/07/23	1 of 1

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

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	88	
50	88	GRAVEL
37.5	78	
28	77	
20	70	
14	67	
10	63	
6.3	57	
5	55	
3.35	53	
2	49	
1.18	45	SAND
0.6	41	
0.425	39	
0.3	37	
0.15	33	
0.063	27	SILT/CLAY

Contract No. 24737 Report No. R148129
Contract Name : St Evins Park Monastervin Kildare
BH/TP No. BH02
Sample No.* AA199368 Lab. Sample No. A23/2498
Sample Type: B
Depth* (m) 3.00 Customer: DOBA
Date Received 07/07/2023 Date Testing started 07/07/2023
Description: Brown slightly sandy, gravelly, SILT/CLAY with some cobbles

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2 Sample size did not meet the requirements of BS1377

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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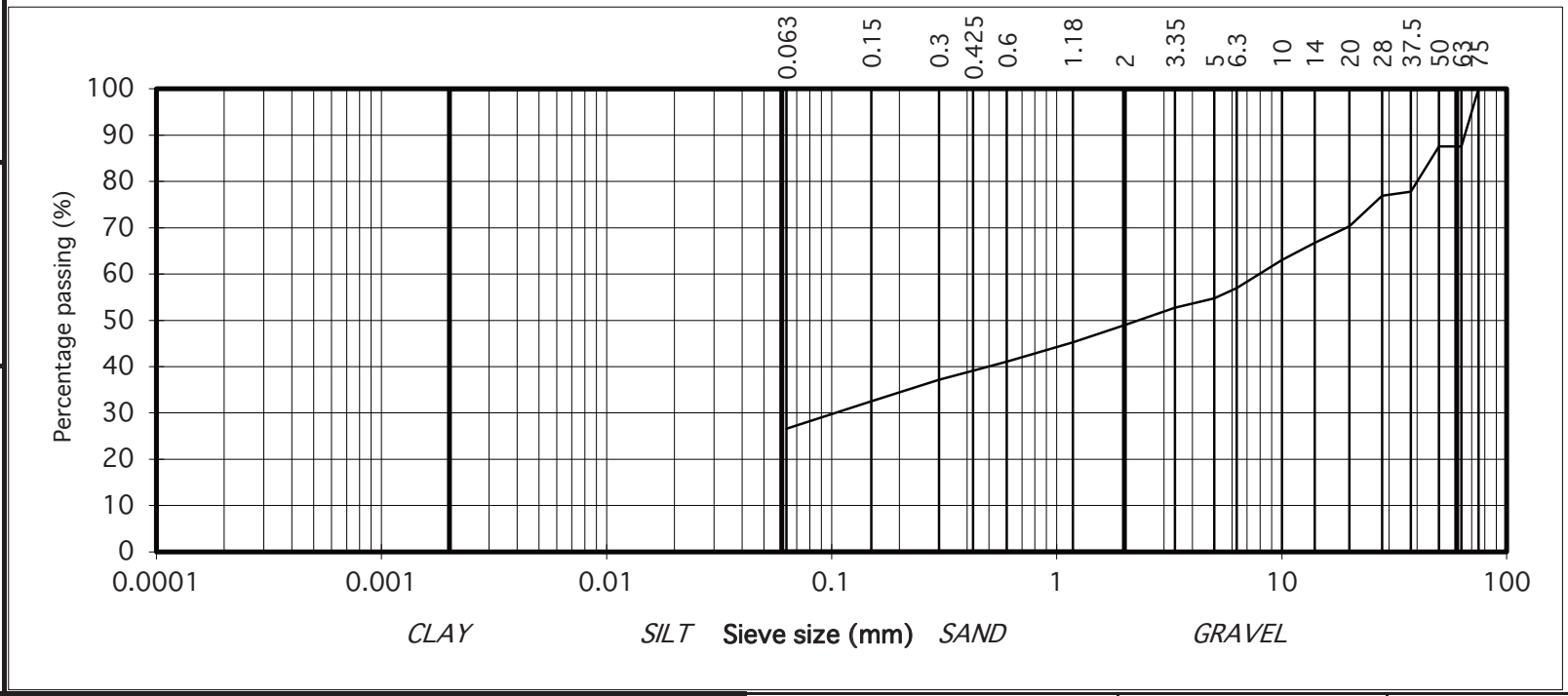

IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	27/07/23	1 of 1

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

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	80	
50	75	GRAVEL
37.5	73	
28	66	
20	54	
14	46	
10	39	
6.3	32	
5	29	
3.35	26	
2	21	
1.18	16	SAND
0.6	9	
0.425	7	
0.3	5	
0.15	4	
0.063	3	SILT/CLAY

Contract No. 24737 Report No. R148130
Contract Name : St Evins Park Monastervin Kildare
BH/TP No. BH03
Sample No.* AA199371 Lab. Sample No. A23/2500
Sample Type: B
Depth* (m) 3.00 Customer: DOBA
Date Received 07/07/2023 Date Testing started 07/07/2023
Description: Grey slightly clayey/silty, sandy, GRAVEL with some cobbles

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2 Sample size did not meet the requirements of BS1377

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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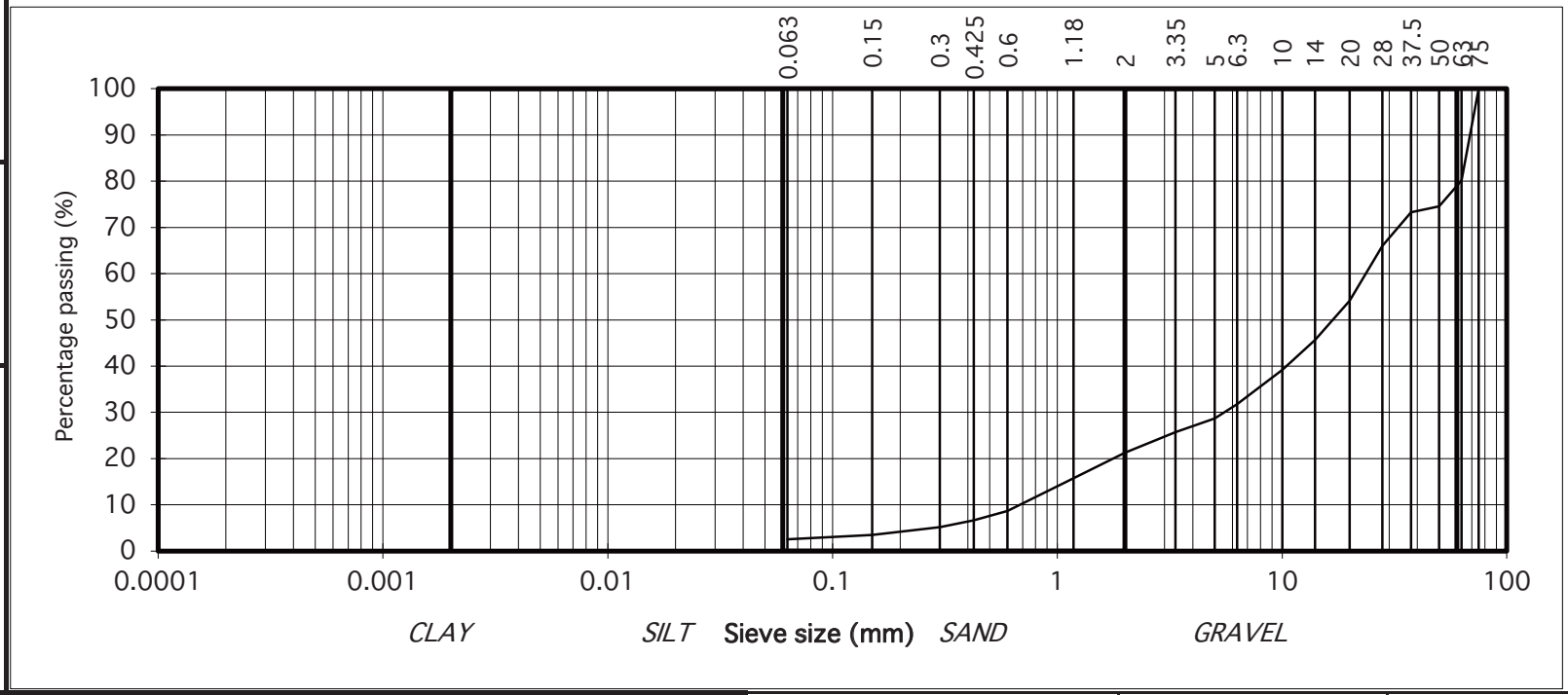

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Approved by:	Date:	Page no:
H Byrne	27/07/23	1 of 1

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

TEST REPORT
Determination of Particle Size Distribution

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

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	83	COBBLES
63	83	
50	83	GRAVEL
37.5	80	
28	70	
20	67	
14	61	
10	58	
6.3	53	
5	51	
3.35	48	
2	46	
1.18	44	SAND
0.6	41	
0.425	40	
0.3	38	
0.15	33	
0.063	21	SILT/CLAY
0.040	16	
0.028	15	
0.018	14	
0.011	11	
0.008	10	
0.005	8	
0.002	5	

Contract No. 24737 Report No. R148131
Contract Name : St Evins Park Monastervin Kildare
BH/TP No. TP/SA01
Sample No.* AA196571 Lab. Sample No. A23/2500
Sample Type: B
Depth* (m) 1.60 Customer: DOBA
Date Received 07/07/2023 Date Testing started 07/07/2023
Description: Brown slightly sandy, gravelly, SILT/CLAY with some cobbles

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2 Sample size did not meet the requirements of BS1377

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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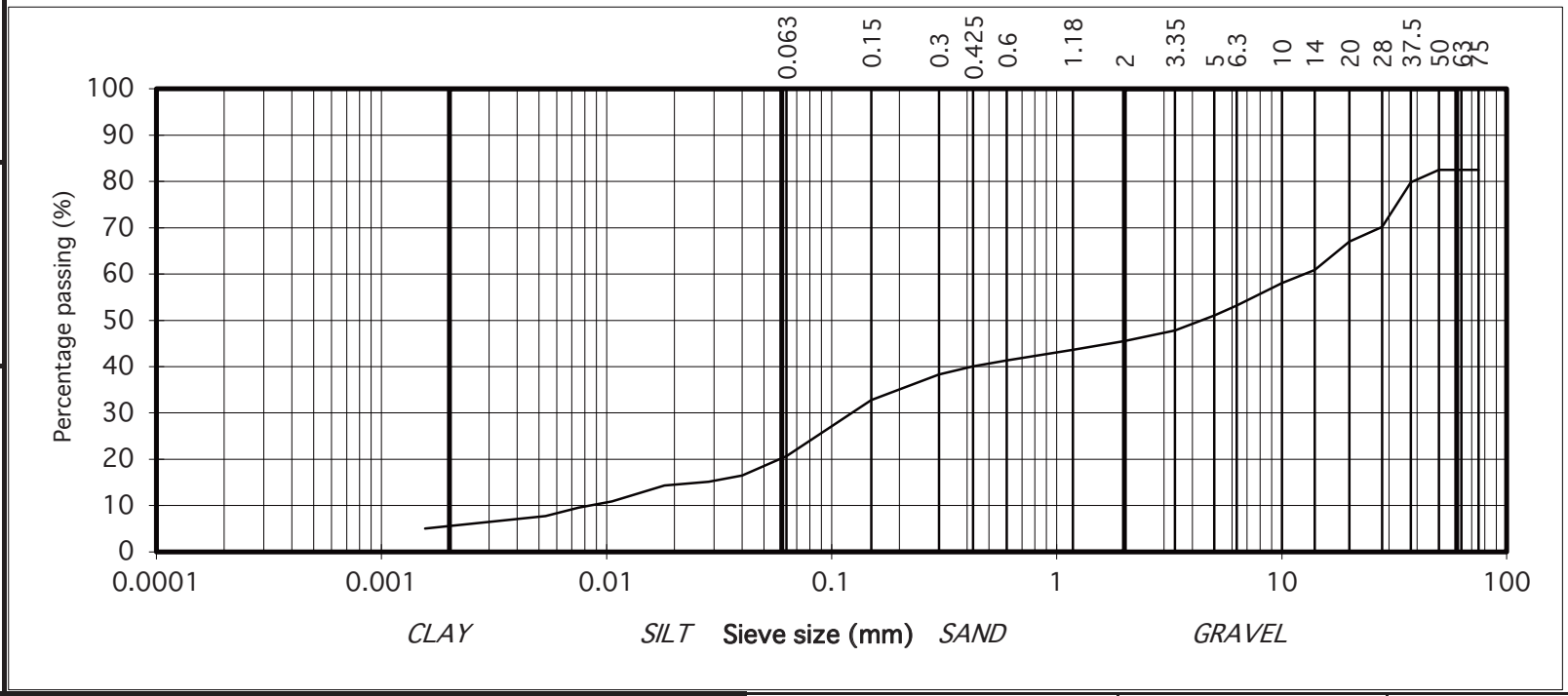

IGSL Ltd Materials Laboratory	Approved by:	Date:	Page no:
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	71	COBBLES
63	71	
50	71	GRAVEL
37.5	67	
28	67	
20	66	
14	66	
10	65	
6.3	64	
5	63	
3.35	61	
2	60	
1.18	57	SAND
0.6	54	
0.425	53	
0.3	50	
0.15	44	
0.063	35	SILT/CLAY
0.038	28	
0.027	25	
0.017	22	
0.010	19	
0.007	16	
0.005	13	
0.002	8	

Contract No. 24737 Report No. R148132
Contract Name : St Evins Park Monastervin Kildare
BH/TP No. TP/SA02
Sample No.* AA196573 Lab. Sample No. A23/2503
Sample Type: B
Depth* (m) 1.40 Customer: DOBA
Date Received 07/07/2023 Date Testing started 07/07/2023
Description: Grey/Brown slightly sandy, slightly gravelly, SILT with many cobbles

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2 Sample size did not meet the requirements of BS1377

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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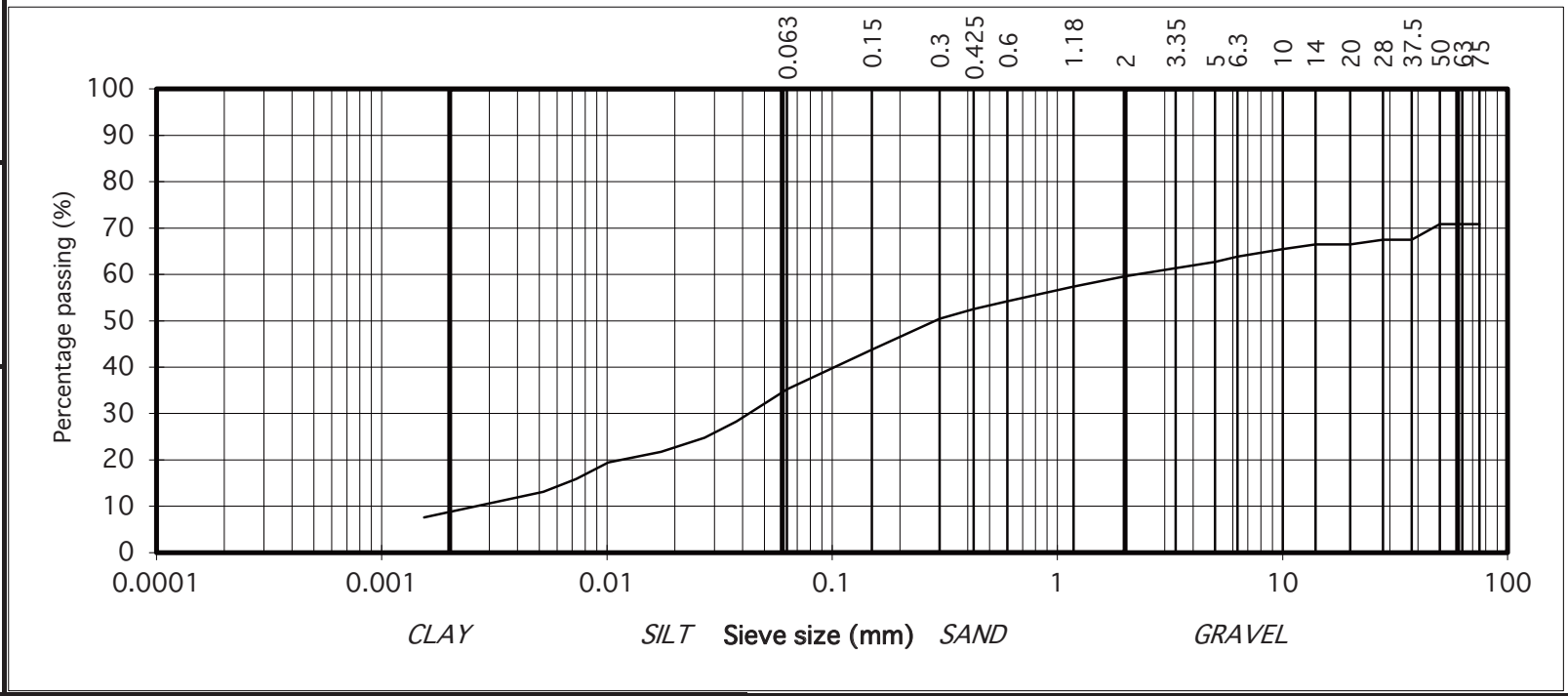

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Approved by:	Date:	Page no:
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Persons authorised to approve report: J Barrett (Quality Manager) H Byrne (Laboratory Manager)

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	96	
28	88	
20	81	
14	72	
10	68	
6.3	60	
5	57	
3.35	52	
2	46	
1.18	41	SAND
0.6	35	
0.425	33	
0.3	30	
0.15	23	
0.063	16	SILT/CLAY

Contract No. 24737 Report No. R148133
Contract Name : St Evins Park Monastervin Kildare
BH/TP No. TP/SA02
Sample No.* AA196574 Lab. Sample No. A23/2504
Sample Type: B
Depth* (m) 2.00 Customer: DOBA
Date Received 07/07/2023 Date Testing started 07/07/2023
Description: Brown clayey/silty, very sandy, GRAVEL

Remarks Note: **Clause 9.2 and Clause 9.5 of BS1377:Part 2:1990 have been superseded by ISO17892-4:2016 .

Results relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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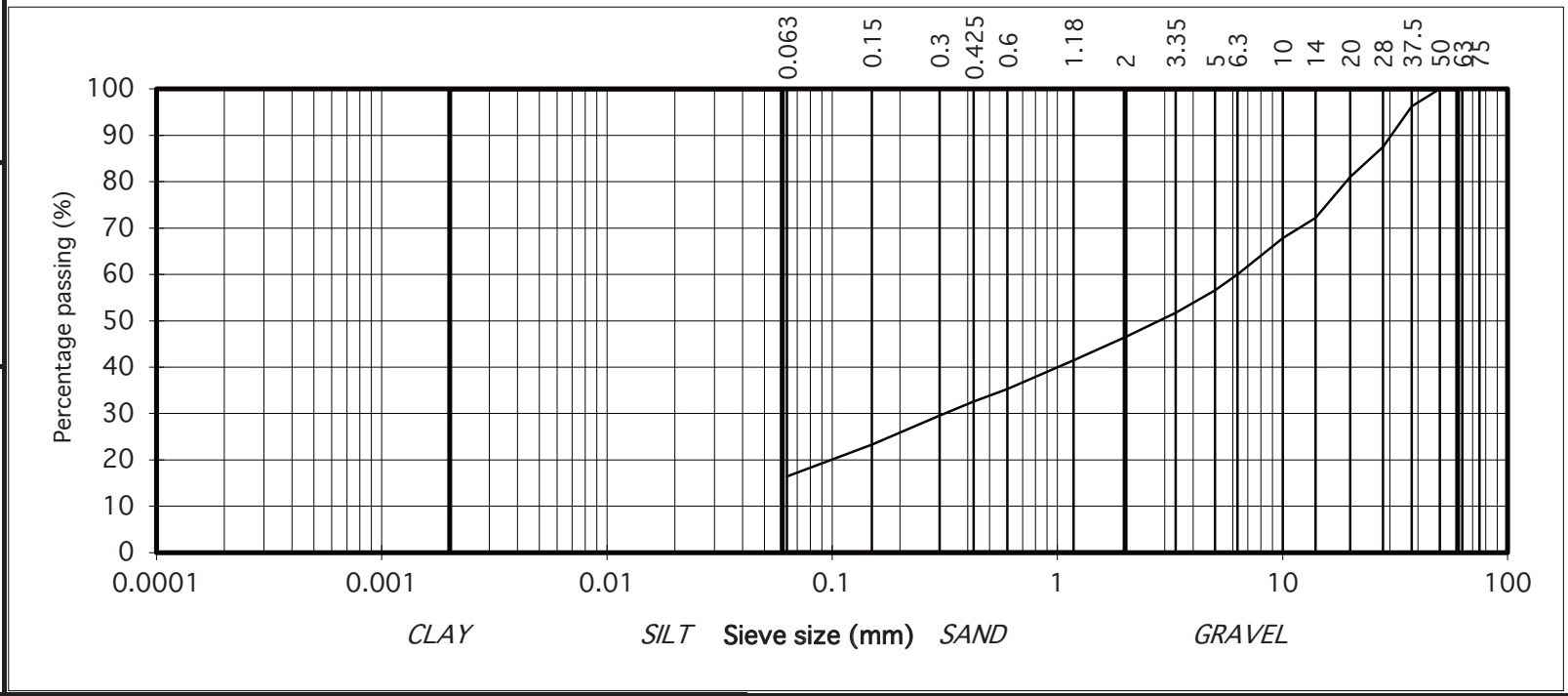

IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	27/07/23	1 of 1

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

TEST REPORT
Determination of Particle Size Distribution
Tested in accordance with: BS1377:Part2:1990 , clause 9.2 & 9.5**
(note: Sedimentation stage not accredited)

ISO 17025 INAB ACCREDITED TESTING DETAILED IN SCOPE REG NO. 133T

particle size	% passing	
75	100	COBBLES
63	100	
50	100	GRAVEL
37.5	97	
28	95	
20	92	
14	89	
10	87	
6.3	84	
5	83	
3.35	81	
2	78	
1.18	75	SAND
0.6	71	
0.425	69	
0.3	67	
0.15	60	
0.063	50	SILT/CLAY
0.037	41	
0.026	38	
0.017	34	
0.010	29	
0.007	23	
0.005	19	
0.002	11	

Contract No. 24737 Report No. R148134
Contract Name : St Evins Park Monastervin Kildare
BH/TP No. TP/SA04
Sample No.* AA196580 Lab. Sample No. A23/2507
Sample Type: B
Depth* (m) 2.00 Customer: DOBA
Date Received 07/07/2023 Date Testing started 07/07/2023
Description: Brown slightly sandy, slightly 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 relate only to the specimen tested in as received condition unless otherwise noted. * denotes Customer supplied information. Opinions and interpretations are outside the scope of accreditation.
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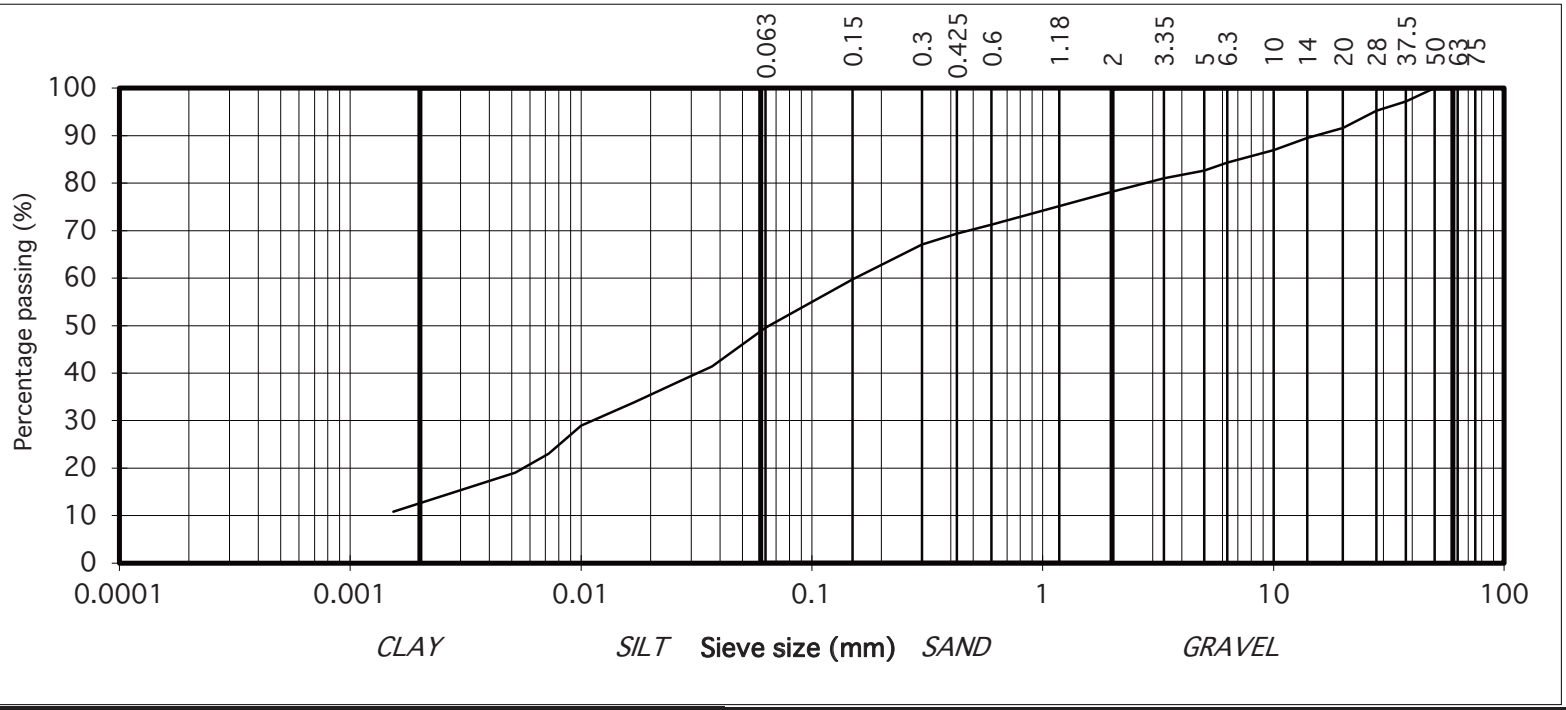

IGSL Ltd Materials Laboratory

Approved by:	Date:	Page no:
H Byrne	27/07/23	1 of 1

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

Appendix 9 Laboratory Test Results (Environmental)

Eurofins Chemtest Ltd
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

Final Report

Report No.:	23-21180-1
Initial Date of Issue:	05-Jul-2023
Re-Issue Details:	
Client	IGSL
Client Address:	M7 Business Park Naas County Kildare Ireland
Contact(s):	Darren Keogh
Project	24737 St Evins Park Monaservin Kildare
Quotation No.:	Q20-21693
Order No.:	
No. of Samples:	8
Turnaround (Wkdays):	7
Date Approved:	05-Jul-2023
Approved By:	
Details:	Stuart Henderson, Technical Manager

Date Received:	22-Jun-2023
Date Instructed:	22-Jun-2023
Results Due:	30-Jun-2023

Results - Leachate

Project: 24737 St Evins Park Monaservin Kildare

Client: IGSL				**Chemtest Job No.:**		23-21180	23-21180	23-21180	23-21180	23-21180
Quotation No.: Q20-21693				**Chemtest Sample ID.:**		1662178	1662180	1662182	1662183	1662185
Order No.:				Client Sample Ref.:		AA199363	AA196569	AA196572	AA196575	AA196578
				Sample Location:		BH01	TP/SA01	TP/SA02	TP/SA03	TP/SA04
				Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):		1.00	0.70	0.50	0.60	0.50
Determinand	**Accred.**	**SOP**	**Type**	**Units**	**LOD**					
pH	U	1010	10:1		N/A	8.3	8.6	8.4	8.7	8.5
Ammonium	U	1220	10:1	mg/l	0.050	0.11	0.15	0.079	0.064	0.085
Ammonium	N	1220	10:1	mg/kg	0.10	1.2	1.8	0.90	0.81	1.0
Boron (Dissolved)	U	1455	10:1	mg/kg	0.01	< 0.01	< 0.01	0.12	0.10	0.10
Benzo[j]fluoranthene	N	1800	10:1	µg/l	0.010	< 0.010	< 0.010	< 0.010	< 0.010	< 0.010

Results - Soil

Project: 24737 St Evins Park Monaservin Kildare

Client: IGSL				Chemtest Job No.:	23-21180	23-21180	23-21180	23-21180	23-21180	23-21180	23-21180	23-21180
Quotation No.: Q20-21693				Chemtest Sample ID.:	1662178	1662179	1662180	1662181	1662182	1662183	1662184	1662185
Order No.:				Client Sample Ref.:	AA199363	AA199366	AA196569	AA196570	AA196572	AA196575	AA196576	AA196578
				Sample Location:	BH01	BH02	TP/SA01	TP/SA01	TP/SA02	TP/SA03	TP/SA03	TP/SA04
				Sample Type:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.00	1.00	0.70	1.60	0.50	0.60	1.40	0.50
				Asbestos Lab:	COVENTRY		COVENTRY		COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
ACM Type	U	2192		N/A	-		-		-	-		-
Asbestos Identification	U	2192		N/A	No Asbestos Detected		No Asbestos Detected		No Asbestos Detected	No Asbestos Detected		No Asbestos Detected
Moisture	N	2030	%	0.020	14	13	11	11	14	15	10	18
pH (2.5:1)	N	2010		4.0		[A] 8.9		[A] 9.0			[A] 8.9	
Boron (Hot Water Soluble)	U	2120	mg/kg	0.40	[A] 0.48		[A] < 0.40		[A] < 0.40	[A] < 0.40		[A] 0.65
Magnesium (Water Soluble)	N	2120	g/l	0.010		[A] < 0.010		[A] < 0.010			[A] < 0.010	
Magnesium (Water Soluble)	U	2120	mg/kg	20		[A] < 20		[A] < 20			[A] < 20	
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010		[A] < 0.010		[A] < 0.010			[A] < 0.010	
Total Sulphur	U	2175	%	0.010		[A] 0.030		[A] 0.020			[A] 0.026	
Sulphur (Elemental)	U	2180	mg/kg	1.0	[A] < 1.0		[A] 1.0		[A] 3.6	[A] 1.2		[A] < 1.0
Chloride (Water Soluble)	U	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)	U	2300	mg/kg	0.50	[A] < 0.50		[A] < 0.50		[A] < 0.50	[A] < 0.50		[A] 0.70
Sulphide (Easily Liberatable)	N	2325	mg/kg	0.50	[A] 4.3		[A] 5.0		[A] 3.5	[A] 6.4		[A] 4.0
Ammonium (Water Soluble)	U	2220	g/l	0.01		< 0.01		< 0.01			< 0.01	
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.034	[A] 0.10	[A] < 0.010	[A] 0.069	[A] < 0.010	[A] 0.017	[A] 0.067	[A] 0.010
Arsenic	U	2455	mg/kg	0.5	2.3		3.4		2.9	3.6		3.3
Barium	U	2455	mg/kg	0	23		38		37	36		53
Cadmium	U	2455	mg/kg	0.10	0.28		0.62		0.17	0.39		0.25
Chromium	U	2455	mg/kg	0.5	6.5		8.1		9.4	9.0		9.6
Molybdenum	U	2455	mg/kg	0.5	< 0.5		< 0.5		< 0.5	< 0.5		< 0.5
Antimony	N	2455	mg/kg	2.0	< 2.0		< 2.0		< 2.0	< 2.0		< 2.0
Copper	U	2455	mg/kg	0.50	4.9		7.4		3.5	4.9		4.8
Mercury	U	2455	mg/kg	0.05	< 0.05		< 0.05		0.06	< 0.05		0.07
Nickel	U	2455	mg/kg	0.50	11		18		12	16		14
Lead	U	2455	mg/kg	0.50	8.4		9.4		9.0	8.6		13
Selenium	U	2455	mg/kg	0.25	< 0.25		< 0.25		< 0.25	< 0.25		0.27
Zinc	U	2455	mg/kg	0.50	32		33		36	28		30
Chromium (Trivalent)	N	2490	mg/kg	1.0	6.5		8.1		9.4	9.0		9.6
Chromium (Hexavalent)	N	2490	mg/kg	0.50	< 0.50		< 0.50		< 0.50	< 0.50		< 0.50
Mineral Oil (TPH Calculation)	N	2670	mg/kg	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
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
Aliphatic TPH >C8-C10	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
Aliphatic TPH >C10-C12	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
Aliphatic TPH >C12-C16	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
Aliphatic TPH >C16-C21	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
Aliphatic TPH >C21-C35	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0

Results - Soil

Project: 24737 St Evins Park Monaservin Kildare

Client: IGSL			Chemtest Job No.:		23-21180	23-21180	23-21180	23-21180	23-21180	23-21180	23-21180	23-21180
Quotation No.: Q20-21693			Chemtest Sample ID.:		1662178	1662179	1662180	1662181	1662182	1662183	1662184	1662185
Order No.:			Client Sample Ref.:		AA199363	AA199366	AA196569	AA196570	AA196572	AA196575	AA196576	AA196578
			Sample Location:		BH01	BH02	TP/SA01	TP/SA01	TP/SA02	TP/SA03	TP/SA03	TP/SA04
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.00	1.00	0.70	1.60	0.50	0.60	1.40	0.50
			Asbestos Lab:		COVENTRY		COVENTRY		COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
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
Total Aliphatic Hydrocarbons	N	2680	mg/kg	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
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
Aromatic TPH >C8-C10	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
Aromatic TPH >C10-C12	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
Aromatic TPH >C12-C16	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
Aromatic TPH >C16-C21	N	2680	mg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
Aromatic TPH >C21-C35	N	2680	mg/kg	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
Total Aromatic Hydrocarbons	N	2680	mg/kg	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
Benzene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
Toluene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
Ethylbenzene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
m & p-Xylene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
o-Xylene	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
Methyl Tert-Butyl Ether	U	2760	µg/kg	1.0	[A] < 1.0		[A] < 1.0		[A] < 1.0	[A] < 1.0		[A] < 1.0
Naphthalene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Acenaphthylene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Acenaphthene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Fluorene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Phenanthrene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Anthracene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Pyrene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Benzo[a]anthracene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Chrysene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Benzo[b]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Benzo[k]fluoranthene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Benzo[a]pyrene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Indeno(1,2,3-c,d)Pyrene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Dibenz(a,h)Anthracene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Benzo[g,h,i]perylene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Coronene	N	2800	mg/kg	0.010	[A] < 0.010		[A] < 0.010		[A] < 0.010	[A] < 0.010		[A] < 0.010
Total Of 17 PAH's	N	2800	mg/kg	0.20	[A] < 0.20		[A] < 0.20		[A] < 0.20	[A] < 0.20		[A] < 0.20
PCB 28	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010
PCB 52	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010
PCB 90+101	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010

Results - Soil

Project: 24737 St Evins Park Monaservin Kildare

Client: IGSL			**Chemtest Job No.:**		23-21180	23-21180	23-21180	23-21180	23-21180	23-21180	23-21180	23-21180
Quotation No.: Q20-21693			**Chemtest Sample ID.:**		1662178	1662179	1662180	1662181	1662182	1662183	1662184	1662185
Order No.:			Client Sample Ref.:		AA199363	AA199366	AA196569	AA196570	AA196572	AA196575	AA196576	AA196578
			Sample Location:		BH01	BH02	TP/SA01	TP/SA01	TP/SA02	TP/SA03	TP/SA03	TP/SA04
			Sample Type:		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			Top Depth (m):		1.00	1.00	0.70	1.60	0.50	0.60	1.40	0.50
			Asbestos Lab:		COVENTRY		COVENTRY		COVENTRY	COVENTRY		COVENTRY
Determinand	**Accred.**	**SOP**	**Units**	**LOD**								
PCB 118	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010
PCB 153	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010
PCB 138	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010
PCB 180	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010
Total PCBs (7 congeners)	N	2815	mg/kg	0.0010	[A] < 0.0010		[A] < 0.0010		[A] < 0.0010	[A] < 0.0010		[A] < 0.0010
Total Phenols	U	2920	mg/kg	0.10	< 0.10		< 0.10		< 0.10	< 0.10		< 0.10

Results - Single Stage WAC

Project: 24737 St Evins Park Monaservin Kildare

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-21180						
Chemtest Sample ID:	1662178						
Sample Ref:	AA199363						
Sample ID:							
Sample Location:	BH01						
Top Depth(m):	1.00						
Bottom Depth(m):							
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	U	%	[A] 1.6	3	5	6
Loss On Ignition	2610	U	%	4.1	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.015	--	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	1455	U	0.0012	0.012	0.5	2	25
Barium	1455	U	0.014	0.14	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	0.0022	0.022	0.5	10	70
Copper	1455	U	0.0036	0.036	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0031	0.031	0.5	10	30
Nickel	1455	U	0.0018	0.018	0.4	10	40
Lead	1455	U	0.0013	0.013	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.0005	0.0054	0.1	0.5	7
Zinc	1455	U	0.027	0.27	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.34	3.4	10	150	500
Sulphate	1220	U	1.1	11	1000	20000	50000
Total Dissolved Solids	1020	N	84	840	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	8.7	87	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	14

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24737 St Evins Park Monaservin Kildare

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-21180						
Chemtest Sample ID:	1662180						
Sample Ref:	AA196569						
Sample ID:							
Sample Location:	TP/SA01						
Top Depth(m):	0.70						
Bottom Depth(m):							
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	U	%	[A] < 0.20	3	5	6
Loss On Ignition	2610	U	%	1.6	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.9	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.014	--	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	1455	U	0.0015	0.015	0.5	2	25
Barium	1455	U	0.005	0.053	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	0.0023	0.023	0.5	10	70
Copper	1455	U	0.0035	0.035	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0014	0.014	0.5	10	30
Nickel	1455	U	0.0051	0.051	0.4	10	40
Lead	1455	U	0.0019	0.019	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	< 0.0005	< 0.0050	0.1	0.5	7
Zinc	1455	U	0.028	0.28	4	50	200
Chloride	1220	U	1.7	17	800	15000	25000
Fluoride	1220	U	0.51	5.1	10	150	500
Sulphate	1220	U	3.9	39	1000	20000	50000
Total Dissolved Solids	1020	N	55	550	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	7.1	71	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	11

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24737 St Evins Park Monaservin Kildare

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-21180						
Chemtest Sample ID:	1662182						
Sample Ref:	AA196572						
Sample ID:							
Sample Location:	TP/SA02						
Top Depth(m):	0.50						
Bottom Depth(m):							
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	U	%	[A] 0.25	3	5	6
Loss On Ignition	2610	U	%	1.7	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.012	--	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	1455	U	0.0017	0.018	0.5	2	25
Barium	1455	U	0.005	0.054	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	0.0025	0.025	0.5	10	70
Copper	1455	U	0.0028	0.028	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0008	0.0077	0.5	10	30
Nickel	1455	U	0.0020	0.020	0.4	10	40
Lead	1455	U	0.0039	0.039	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.0012	0.012	0.1	0.5	7
Zinc	1455	U	0.046	0.46	4	50	200
Chloride	1220	U	2.3	23	800	15000	25000
Fluoride	1220	U	0.27	2.7	10	150	500
Sulphate	1220	U	< 1.0	< 10	1000	20000	50000
Total Dissolved Solids	1020	N	50	490	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	7.9	79	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	14

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Results - Single Stage WAC

Project: 24737 St Evins Park Monaservin Kildare

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-21180						
Chemtest Sample ID:	1662183						
Sample Ref:	AA196575						
Sample ID:							
Sample Location:	TP/SA03						
Top Depth(m):	0.60						
Bottom Depth(m):							
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	U	%	[A] < 0.20	3	5	6
Loss On Ignition	2610	U	%	1.6	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.0090	--	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	1455	U	0.0021	0.021	0.5	2	25
Barium	1455	U	0.006	0.058	20	100	300
Cadmium	1455	U	< 0.00011	< 0.0011	0.04	1	5
Chromium	1455	U	0.0024	0.024	0.5	10	70
Copper	1455	U	0.0030	0.030	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0013	0.013	0.5	10	30
Nickel	1455	U	0.0048	0.048	0.4	10	40
Lead	1455	U	0.0028	0.028	0.5	10	50
Antimony	1455	U	< 0.0005	< 0.0050	0.06	0.7	5
Selenium	1455	U	0.0013	0.013	0.1	0.5	7
Zinc	1455	U	0.045	0.45	4	50	200
Chloride	1220	U	< 1.0	< 10	800	15000	25000
Fluoride	1220	U	0.36	3.6	10	150	500
Sulphate	1220	U	< 1.0	< 10	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	6.2	62	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.

Results - Single Stage WAC

Project: 24737 St Evins Park Monaservin Kildare

					Landfill Waste Acceptance Criteria Limits		
Chemtest Job No:	23-21180						
Chemtest Sample ID:	1662185						
Sample Ref:	AA196578						
Sample ID:							
Sample Location:	TP/SA04						
Top Depth(m):	0.50						
Bottom Depth(m):							
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	U	%	[A] 0.90	3	5	6
Loss On Ignition	2610	U	%	6.1	--	--	10
Total BTEX	2760	U	mg/kg	[A] < 0.010	6	--	--
Total PCBs (7 congeners)	2815	N	mg/kg	[A] < 0.0010	1	--	--
TPH Total WAC	2670	U	mg/kg	[A] < 10	500	--	--
Total Of 17 PAH's	2800	N	mg/kg	[A] < 0.20	100	--	--
pH	2010	U		8.7	--	>6	--
Acid Neutralisation Capacity	2015	N	mol/kg	0.013	--	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	1455	U	0.0049	0.049	0.5	2	25
Barium	1455	U	0.013	0.13	20	100	300
Cadmium	1455	U	0.00015	0.0015	0.04	1	5
Chromium	1455	U	0.0068	0.068	0.5	10	70
Copper	1455	U	0.0054	0.054	2	50	100
Mercury	1455	U	< 0.00005	< 0.00050	0.01	0.2	2
Molybdenum	1455	U	0.0015	0.015	0.5	10	30
Nickel	1455	U	0.011	0.11	0.4	10	40
Lead	1455	U	0.0061	0.061	0.5	10	50
Antimony	1455	U	0.0008	0.0080	0.06	0.7	5
Selenium	1455	U	0.0025	0.025	0.1	0.5	7
Zinc	1455	U	0.052	0.52	4	50	200
Chloride	1220	U	1.8	18	800	15000	25000
Fluoride	1220	U	0.40	4.0	10	150	500
Sulphate	1220	U	4.0	40	1000	20000	50000
Total Dissolved Solids	1020	N	59	590	4000	60000	100000
Phenol Index	1920	U	< 0.030	< 0.30	1	-	-
Dissolved Organic Carbon	1610	U	8.1	81	500	800	1000

Solid Information	
Dry mass of test portion/kg	0.090
Moisture (%)	18

Waste Acceptance Criteria

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes. This analysis is only applicable for hazardous waste landfill acceptance and does not give any indication as to whether a waste may be hazardous or non-hazardous.

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
1662178	AA199363		BH01		A	Amber Glass 250ml
1662178	AA199363		BH01		A	Plastic Tub 500g
1662179	AA199366		BH02		A	Amber Glass 250ml
1662179	AA199366		BH02		A	Plastic Tub 500g
1662180	AA196569		TP/SA01		A	Amber Glass 250ml
1662180	AA196569		TP/SA01		A	Plastic Tub 500g
1662181	AA196570		TP/SA01		A	Amber Glass 250ml
1662181	AA196570		TP/SA01		A	Plastic Tub 500g
1662182	AA196572		TP/SA02		A	Amber Glass 250ml
1662182	AA196572		TP/SA02		A	Plastic Tub 500g
1662183	AA196575		TP/SA03		A	Amber Glass 250ml
1662183	AA196575		TP/SA03		A	Plastic Tub 500g
1662184	AA196576		TP/SA03		A	Amber Glass 250ml
1662184	AA196576		TP/SA03		A	Plastic Tub 500g
1662185	AA196578		TP/SA04		A	Amber Glass 250ml
1662185	AA196578		TP/SA04		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.
1455	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
1800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Waters 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	Pentane extraction / GCMS detection
1920	Phenols in Waters by HPLC	Phenolic compounds including: Phenol, Cresols, Xylenols, Trimethylphenols Note: Chlorophenols are excluded.	Determination by High Performance Liquid Chromatography (HPLC) using electrochemical detection.
2010	pH Value of Soils	pH	pH Meter
2015	Acid Neutralisation Capacity	Acid Reserve	Titration
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2040	Soil Description(Requirement of MCERTS)	Soil description	As received soil is described based upon BS5930
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2175	Total Sulphur in Soils	Total Sulphur	Determined by high temperature combustion under oxygen, using an Eltra elemental analyser.
2180	Sulphur (Elemental) in Soils by HPLC	Sulphur	Dichloromethane extraction / HPLC with UV detection
2192	Asbestos	Asbestos	Polarised light microscopy / Gravimetry
2220	Water soluble Chloride in Soils	Chloride	Aqueous extraction and measurememrnt 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.
2455	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.

Test Methods

SOP	Title	Parameters included	Method summary
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
2680	TPH A/A Split	Aliphatics: >C5–C6, >C6–C8,>C8–C10, >C10–C12, >C12–C16, >C16–C21, >C21–C35, >C35– C44Aromatics: >C5–C7, >C7–C8, >C8– C10, >C10–C12, >C12–C16, >C16– C21, >C21– C35, >C35– C44	Dichloromethane extraction / GCxGC FID detection
2760	Volatile Organic Compounds (VOCs) in Soils by Headspace GC-MS	Volatile organic compounds, including BTEX and halogenated Aliphatic/Aromatics.(cf. USEPA Method 8260)*please refer to UKAS schedule	Automated headspace gas chromatographic (GC) analysis of a soil sample, as received, with mass spectrometric (MS) detection of volatile organic compounds.
2800	Speciated Polynuclear Aromatic Hydrocarbons (PAH) in Soil by GC-MS	Acenaphthene*; Acenaphthylene; Anthracene*; Benzo[a]Anthracene*; Benzo[a]Pyrene*; Benzo[b]Fluoranthene*; Benzo[ghi]Perylene*; Benzo[k]Fluoranthene; Chrysene*; Dibenz[ah]Anthracene; Fluoranthene*; Fluorene*; Indeno[123cd]Pyrene*; Naphthalene*; Phenanthrene*; Pyrene*	Dichloromethane extraction / GC-MS
2815	Polychlorinated Biphenyls (PCB) ICES7Congeners in Soils by GC-MS	ICES7 PCB congeners	Acetone/Hexane extraction / GC-MS
2920	Phenols in Soils by HPLC	Phenolic compounds including Resorcinol, Phenol, Methylphenols, Dimethylphenols, 1-Naphthol and TrimethylphenolsNote: chlorophenols are excluded.	60:40 methanol/water mixture extraction, followed by HPLC determination using electrochemical detection.
640	Characterisation of Waste (Leaching C10)	Waste material including soil, sludges and granular waste	ComplianceTest for Leaching of Granular Waste Material and Sludge

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"
SOP	Standard operating procedure
LOD	Limit of detection

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 30 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 10 Site Plan

ExpertGPS

24737 St. Evins Park Monasterevin

10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170 180 m

Scale: 1 : 1000.

MN

2°00'

Appendix B Surface Water Network & Interception Calculations

This Appendix contains the following;

- Appendix B.1 Surface Water Network Calculations
- Appendix B.2 Surface Water Interception Calculations

Appendix B.1 Surface Water Network Calculations

2305: St Evin's Park Monasterevin Surface Water Calculations	Date: 12/09/2023		
	Designed by: EC	Checked by: PD	Approved By: PD
Report Details: Type: Junctions Storm Phase: Surface Network 1	Unit 5c Elm House : Millenium Park Naas		

Name	Junction Type	Easting (m)	Northing (m)	Cover Elevation (m)	Depth (m)	Invert Elevation (m)	Chamber Shape	Diameter (m)
EX. SMH	Manhole	663103.193	711031.714	63.777	1.347	62.430	Circular	1.350
SMH 1.10	Manhole	663077.197	711025.740	64.007	1.510	62.497	Circular	1.350
SMH 1.9	Manhole	663069.792	711010.491	64.084	1.545	62.539	Circular	1.350
SMH 2.0	Manhole	663069.851	711022.459	63.899	1.100	62.799	Circular	1.350
SMH 2.1	Manhole	663055.097	711025.299	64.033	1.284	62.749	Circular	1.350
SMH 2.2	Manhole	663038.491	711021.020	64.155	1.463	62.692	Circular	1.350
SMH 1.2	Manhole	662950.579	710991.851	64.005	1.223	62.782	Circular	1.350
SMH 1.1	Manhole	662906.904	710978.459	64.176	1.264	62.912	Circular	1.350
SMH 1.0	Manhole	662896.514	710976.884	64.160	1.217	62.942	Circular	1.350
SMH 3.0	Manhole	662913.072	710973.152	63.950	1.079	62.871	Circular	1.350
SMH 3.1	Manhole	662955.442	710986.247	64.070	1.325	62.745	Circular	1.350
SMH 3.2	Manhole	662973.736	710986.761	64.040	1.348	62.692	Circular	1.350
SMH 3.3	Manhole	663008.575	710997.045	63.900	1.311	62.589	Circular	1.350
SMH 1.5	Manhole	663016.256	710996.512	64.000	1.433	62.567	Circular	1.350
SMH 1.4	Manhole	663013.544	711006.364	64.219	1.624	62.595	Circular	1.350
SMH 1.3	Manhole	662989.748	711004.815	64.196	1.532	62.664	Circular	1.350
SMH 1.7	Manhole	663065.239	711005.601	64.098	1.537	62.561	Circular	1.350
SMH 1.8	Manhole	663066.689	711006.098	64.091	1.538	62.553	Circular	1.350
SMH 1.6	Manhole	663018.146	710996.017	64.000	1.439	62.561	Circular	1.350

Name	Lock
EX. SMH	None
SMH 1.10	None
SMH 1.9	None
SMH 2.0	None
SMH 2.1	None
SMH 2.2	None
SMH 1.2	None
SMH 1.1	None
SMH 1.0	None
SMH 3.0	None
SMH 3.1	None
SMH 3.2	None
SMH 3.3	None
SMH 1.5	None
SMH 1.4	None
SMH 1.3	None
SMH 1.7	None
SMH 1.8	None
SMH 1.6	None

2305: St Evin's Park Monasterevin Surface Water Calculations	Date: 12/09/2023		
	Designed by: EC	Checked by: PD	Approved By: PD
Report Details: Type: Stormwater Controls Storm Phase: Surface Network 1	Unit 5c Elm House : Millenium Park Naas		

Bioretention

Type : Bioretention

Ponding Area

Exceedance Elevation (m)	63.690
Depth (m)	0.250
Base Elevation (m)	63.440
Top Area (m²)	77.91
Side Slope (1:x)	6.00
Base Area (m²)	21.42
Freeboard (mm)	0
Porosity (%)	40
Length (m)	18.831
Long. Slope (1:x)	350.00
Filtration Rate (m/hr)	0.1
Friction Scheme	Manning's n
n	0.015
Total Volume (m³)	12.620

Filter Area

Base Elevation (m)	62.640

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	300
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☐	Soil	0	0	0.0	Soil Type
	Storage	800	40	500.0	

Advanced

Ponding Area

Base Perimeter (m)	39.937
Top Perimeter (m)	45.937

2305: St Evin's Park Monasterevin Surface Water Calculations	Date: 12/09/2023		
	Designed by: EC	Checked by: PD	Approved By: PD
Report Details: Type: Stormwater Controls Storm Phase: Surface Network 1	Unit 5c Elm House : Millenium Park Naas		

Bioretention (1)

Type : Bioretention

Ponding Area

Exceedance Elevation (m)	63.650
Depth (m)	0.250
Base Elevation (m)	63.400
Top Area (m²)	283.50
Side Slope (1:x)	4.50
Base Area (m²)	201.72
Freeboard (mm)	0
Porosity (%)	100
Length (m)	36.345
Long. Slope (1:x)	350.00
Filtration Rate (m/hr)	0.1
Friction Scheme	Manning's n
n	0.015
Total Volume (m³)	110.609

Filter Area

Base Elevation (m)	62.800

Under Drain

Height Above Base (m)	0.100
Diameter (mm)	300
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☐	Soil	0	0	0.0	Soil Type
	Storage	600	40	500.0	

Advanced

Ponding Area

Base Perimeter (m)	83.790
Top Perimeter (m)	88.290

2305: St Evin's Park Monasterevin Surface Water Calculations	Date: 12/09/2023		
	Designed by: EC	Checked by: PD	Approved By: PD
Report Details: Type: Stormwater Controls Storm Phase: Surface Network 1	Unit 5c Elm House : Millenium Park Naas		

Bioretention (2)

Type : Bioretention

Ponding Area

Exceedance Elevation (m)	63.730
Depth (m)	0.250
Base Elevation (m)	63.480
Top Area (m²)	451.03
Side Slope (1:x)	10.00
Base Area (m²)	197.85
Freeboard (mm)	0
Porosity (%)	100
Length (m)	50.637
Long. Slope (1:x)	350.00
Filtration Rate (m/hr)	0.1
Friction Scheme	Manning's n
n	0.015
Total Volume (m³)	146.569

Filter Area

Base Elevation (m)	62.680

Under Drain

Height Above Base (m)	0.100
Diameter (mm)	300
No. of Barrels	1
Friction Scheme	Manning's n
n	0.015
Release Height (m)	0.000

Filtration Layers

Use	Name	Filtration Layer Depth (mm)	Porosity (%)	Conductivity (m/hr)	Soil Type
☐	Soil	0	0	0.0	Soil Type
	Storage	800	40	500.0	

Advanced

Ponding Area

Base Perimeter (m)	109.089
Top Perimeter (m)	119.089

Pond

Type : Pond

Dimensions

Exceedance Elevation (m)	63.801
Depth (m)	1.240
Base Elevation (m)	62.561
Freeboard (mm)	520
Initial Depth (m)	0.000
Porosity (%)	100
Average Slope (1:x)	6.66
Total Volume (m³)	382.350

Depth (m)	Area (m²)	Volume (m³)
0.000	345.20	0.000
0.520	617.60	246.919
1.240	1103.45	858.097

Advanced

Perimeter	Circular
Length (m)	53.976
Friction Scheme	Manning's n
n	0.015

Porous Paving

Type : Porous Paving

Dimensions

Exceedance Elevation (m)	63.800
Depth (m)	0.610
Base Elevation (m)	63.190
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	1000.0
Porosity (%)	40
Length (m)	7.344
Long. Slope (1:x)	200.00
Width (m)	3.411
Total Volume (m³)	5.051

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

Porous Paving (1)

Type : Porous Paving

Dimensions

Exceedance Elevation (m)	63.820
Depth (m)	0.610
Base Elevation (m)	63.210
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	1000.0
Porosity (%)	40
Length (m)	7.898
Long. Slope (1:x)	200.00
Width (m)	3.286
Total Volume (m³)	5.236

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

Porous Paving (2)

Type : Porous Paving

Dimensions

Exceedance Elevation (m)	63.800
Depth (m)	0.610
Base Elevation (m)	63.190
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	1000.0
Porosity (%)	40
Length (m)	8.672
Long. Slope (1:x)	200.00
Width (m)	3.498
Total Volume (m³)	6.116

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

Porous Paving (3)

Type : Porous Paving

Dimensions

Exceedance Elevation (m)	63.700
Depth (m)	0.610
Base Elevation (m)	63.090
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	1000.0
Porosity (%)	40
Length (m)	7.938
Long. Slope (1:x)	200.00
Width (m)	3.311
Total Volume (m³)	5.302

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

Porous Paving (4)

Type : Porous Paving

Dimensions

Exceedance Elevation (m)	63.670
Depth (m)	0.610
Base Elevation (m)	63.060
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	1000.0
Porosity (%)	40
Length (m)	7.552
Long. Slope (1:x)	200.00
Width (m)	3.128
Total Volume (m³)	4.767

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

Porous Paving (5)

Type : Porous Paving

Dimensions

Exceedance Elevation (m)	63.720
Depth (m)	0.610
Base Elevation (m)	63.110
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	1000.0
Porosity (%)	40
Length (m)	8.811
Long. Slope (1:x)	200.00
Width (m)	3.542
Total Volume (m³)	6.292

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

Porous Paving (6)

Type : Porous Paving

Dimensions

Exceedance Elevation (m)	63.750
Depth (m)	0.610
Base Elevation (m)	63.140
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	1000.0
Porosity (%)	40
Length (m)	8.041
Long. Slope (1:x)	200.00
Width (m)	3.266
Total Volume (m³)	5.299

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

Porous Paving (7)

Type : Porous Paving

Dimensions

Exceedance Elevation (m)	63.780
Depth (m)	0.610
Base Elevation (m)	63.170
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	1000.0
Porosity (%)	40
Length (m)	7.940
Long. Slope (1:x)	200.00
Width (m)	3.304
Total Volume (m³)	5.293

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

Porous Paving (8)

Type : Porous Paving

Dimensions

Exceedance Elevation (m)	63.900
Depth (m)	0.610
Base Elevation (m)	63.290
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	1000.0
Porosity (%)	40
Length (m)	8.780
Long. Slope (1:x)	200.00
Width (m)	3.539
Total Volume (m³)	6.264

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

Porous Paving (9)

Type : Porous Paving

Dimensions

Exceedance Elevation (m)	64.100
Depth (m)	0.610
Base Elevation (m)	63.490
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	1000.0
Porosity (%)	40
Length (m)	7.977
Long. Slope (1:x)	200.00
Width (m)	3.313
Total Volume (m³)	5.331

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

Porous Paving (10)

Type : Porous Paving

Dimensions

Exceedance Elevation (m)	64.100
Depth (m)	0.610
Base Elevation (m)	63.490
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	1000.0
Porosity (%)	40
Length (m)	7.929
Long. Slope (1:x)	200.00
Width (m)	3.280
Total Volume (m³)	5.247

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

Porous Paving (11)

Type : Porous Paving

Dimensions

Exceedance Elevation (m)	64.200
Depth (m)	0.610
Base Elevation (m)	63.590
Paving Layer Depth (mm)	110
Membrane Percolation (m/hr)	1000.0
Porosity (%)	40
Length (m)	7.829
Long. Slope (1:x)	200.00
Width (m)	3.898
Total Volume (m³)	6.149

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

TP

Type : Infiltration Trench

Dimensions

Exceedance Elevation (m)	63.800
Depth (m)	0.800
Base Elevation (m)	63.000
Freeboard (mm)	300
Porosity (%)	40
Length (m)	2.090
Long. Slope (1:x)	200.00
Width (m)	1.624
Total Volume (m³)	0.691

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

TP (1)

Type : Infiltration Trench

Dimensions

Exceedance Elevation (m)	63.780
Depth (m)	0.800
Base Elevation (m)	62.980
Freeboard (mm)	300
Porosity (%)	40
Length (m)	2.090
Long. Slope (1:x)	200.00
Width (m)	1.624
Total Volume (m³)	0.691

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

2305: St Evin's Park Monasterevin Surface Water Calculations	Date: 12/09/2023		
	Designed by: EC	Checked by: PD	Approved By: PD
Report Details: Type: Stormwater Controls Storm Phase: Surface Network 1	Unit 5c Elm House : Millenium Park Naas		

TP (2)

Type : Infiltration Trench

Dimensions

Exceedance Elevation (m)	63.700
Depth (m)	0.800
Base Elevation (m)	62.900
Freeboard (mm)	300
Porosity (%)	40
Length (m)	2.090
Long. Slope (1:x)	200.00
Width (m)	1.624
Total Volume (m³)	0.691

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

TP (3)

Type : Infiltration Trench

Dimensions

Exceedance Elevation (m)	63.620
Depth (m)	0.800
Base Elevation (m)	62.820
Freeboard (mm)	300
Porosity (%)	40
Length (m)	2.090
Long. Slope (1:x)	200.00
Width (m)	1.624
Total Volume (m³)	0.691

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

TP (4)

Type : Infiltration Trench

Dimensions

Exceedance Elevation (m)	63.700
Depth (m)	0.800
Base Elevation (m)	62.900
Freeboard (mm)	300
Porosity (%)	40
Length (m)	2.090
Long. Slope (1:x)	200.00
Width (m)	1.624
Total Volume (m³)	0.691

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

TP (5)

Type : Infiltration Trench

Dimensions

Exceedance Elevation (m)	63.750
Depth (m)	0.800
Base Elevation (m)	62.950
Freeboard (mm)	300
Porosity (%)	40
Length (m)	2.090
Long. Slope (1:x)	200.00
Width (m)	1.624
Total Volume (m³)	0.691

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

TP (6)

Type : Infiltration Trench

Dimensions

Exceedance Elevation (m)	63.800
Depth (m)	0.800
Base Elevation (m)	63.000
Freeboard (mm)	300
Porosity (%)	40
Length (m)	2.090
Long. Slope (1:x)	200.00
Width (m)	1.624
Total Volume (m³)	0.691

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

TP (7)

Type : Infiltration Trench

Dimensions

Exceedance Elevation (m)	63.800
Depth (m)	0.800
Base Elevation (m)	63.000
Freeboard (mm)	300
Porosity (%)	40
Length (m)	2.090
Long. Slope (1:x)	200.00
Width (m)	1.624
Total Volume (m³)	0.691

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

TP (8)

Type : Infiltration Trench

Dimensions

Exceedance Elevation (m)	63.900
Depth (m)	0.800
Base Elevation (m)	63.100
Freeboard (mm)	300
Porosity (%)	40
Length (m)	2.090
Long. Slope (1:x)	200.00
Width (m)	1.624
Total Volume (m³)	0.691

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

TP (9)

Type : Infiltration Trench

Dimensions

Exceedance Elevation (m)	64.100
Depth (m)	0.800
Base Elevation (m)	63.300
Freeboard (mm)	300
Porosity (%)	40
Length (m)	2.090
Long. Slope (1:x)	200.00
Width (m)	1.624
Total Volume (m³)	0.691

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

TP (10)

Type : Infiltration Trench

Dimensions

Exceedance Elevation (m)	64.100
Depth (m)	0.800
Base Elevation (m)	63.300
Freeboard (mm)	300
Porosity (%)	40
Length (m)	2.090
Long. Slope (1:x)	200.00
Width (m)	1.624
Total Volume (m³)	0.691

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

TP (11)

Type : Infiltration Trench

Dimensions

Exceedance Elevation (m)	64.200
Depth (m)	0.800
Base Elevation (m)	63.400
Freeboard (mm)	300
Porosity (%)	40
Length (m)	2.090
Long. Slope (1:x)	200.00
Width (m)	1.624
Total Volume (m³)	0.691

Under Drain

Height Above Base (m)	0.300
Diameter (mm)	110
No. of Barrels	1
Release Height (m)	0.000
Friction Scheme	Manning's n
n	0.015

Advanced

Conductivity (m/hr)	500.0

2305: St Evin's Park Monasterevin Surface Water Calculations	Date: 12/09/2023		
	Designed by: EC	Checked by: PD	Approved By: PD
Report Details: Type: Inflow Summary Storm Phase: Surface Network 1	Unit 5c Elm House : Millenium Park Naas		

Inflow Label	Connected To	Flow (L/s)	Runoff Method	Area (ha)	Percentage Impervious (%)	Urban Creep (%)	Adjusted Percentage Impervious (%)	Area Analyzed (ha)
1.000 - 24.69m	Porous Paving		Time of Concentration	0.002	80	0	80	0.002
1.000 - 62.36m	TP		Time of Concentration	0.006	30	0	30	0.002
1.000 - 68.89m	TP		Time of Concentration	0.007	30	0	30	0.002
1.000 - 69.77m	Porous Paving		Time of Concentration	0.007	95	0	95	0.007
1.000 - 85.22m	Bioretention		Time of Concentration	0.009	80	0	80	0.007
1.000 - 87.56m	Porous Paving		Time of Concentration	0.009	95	0	95	0.008
1.000 - 262.09m	TP		Time of Concentration	0.026	30	0	30	0.008
1.001 - 24.88m	Porous Paving (4)		Time of Concentration	0.002	80	0	80	0.002
1.001 - 26.18m	Porous Paving (1)		Time of Concentration	0.003	80	0	80	0.002
1.001 - 26.63m	Porous Paving (3)		Time of Concentration	0.003	80	0	80	0.002
1.001 - 27.75m	Porous Paving (2)		Time of Concentration	0.003	80	0	80	0.002
1.001 - 62.38m	TP (2)		Time of Concentration	0.006	30	0	30	0.002
1.001 - 64.35m	TP (1)		Time of Concentration	0.006	30	0	30	0.002
1.001 - 65.60m	TP (3)		Time of Concentration	0.007	30	0	30	0.002
1.001 - 68.76m	Porous Paving (3)		Time of Concentration	0.007	95	0	95	0.007
1.001 - 69.56m	Porous Paving (1)		Time of Concentration	0.007	95	0	95	0.007
1.001 - 74.20m	Porous Paving (2)		Time of Concentration	0.007	95	0	95	0.007
1.001 - 103.52m	Porous Paving (4)		Time of Concentration	0.010	95	0	95	0.010
1.001 - 504.44m	TP (2)		Time of Concentration	0.050	30	0	30	0.015
1.002 - 6.63m	SMH 1.2		Time of Concentration	0.001	100	0	100	0.001
1.002 - 27.17m	Porous Paving (7)		Time of Concentration	0.003	80	0	80	0.002
1.002 - 28.05m	Porous Paving (6)		Time of Concentration	0.003	80	0	80	0.002
1.002 - 31.06m	Porous Paving (5)		Time of Concentration	0.003	80	0	80	0.002
1.002 - 52.93m	TP (5)		Time of Concentration	0.005	30	0	30	0.002
1.002 - 54.12m	TP (6)		Time of Concentration	0.005	30	0	30	0.002
1.002 - 61.15m	TP (7)		Time of Concentration	0.006	30	0	30	0.002
1.002 - 61.47m	TP (4)		Time of Concentration	0.006	30	0	30	0.002
1.002 - 68.88m	Porous Paving (7)		Time of Concentration	0.007	95	0	95	0.007
1.002 - 76.15m	Porous Paving (6)		Time of Concentration	0.008	95	0	95	0.007
1.002 - 77.97m	Porous Paving (5)		Time of Concentration	0.008	95	0	95	0.007
1.002 - 525.27m	TP (6)		Time of Concentration	0.053	30	0	30	0.016
1.003 - 6.25m	SMH 1.3		Time of Concentration	0.001	30	0	30	0.000
1.003 - 27.41m	Porous Paving (9)		Time of Concentration	0.003	80	0	80	0.002

1.003 - 30.75m	Bioretention (2)		Time of Concentration	0.003	30	0	30	0.001
1.003 - 31.31m	Porous Paving (8)		Time of Concentration	0.003	80	0	80	0.003
1.003 - 53.46m	Pond		Time of Concentration	0.005	30	0	30	0.002
1.003 - 62.32m	TP (8)		Time of Concentration	0.006	30	0	30	0.002
1.003 - 68.77m	Porous Paving (9)		Time of Concentration	0.007	95	0	95	0.007
1.003 - 75.58m	Porous Paving (8)		Time of Concentration	0.008	95	0	95	0.007
1.003 - 77.29m	Bioretention (2)		Time of Concentration	0.008	80	0	80	0.006
1.004 - 433.74m	Pond		Time of Concentration	0.044	100	0	100	0.044
1.007 - 2795.75m	Pond		Time of Concentration	0.280	30	0	30	0.084
1.008 - 132.40m	Pond		Time of Concentration	0.013	80	0	80	0.011
1.008 - 166.19m	Pond		Time of Concentration	0.017	80	0	80	0.013
1.009 - 171.72m	SMH 2.0		Time of Concentration	0.017	80	0	80	0.014
2.001 - 150.48m	Pond		Time of Concentration	0.015	80	0	80	0.012
2.002 - 26.74m	Porous Paving (10)		Time of Concentration	0.003	80	0	80	0.002
2.002 - 31.50m	Porous Paving (11)		Time of Concentration	0.003	80	0	80	0.003
2.002 - 35.35m	Pond		Time of Concentration	0.004	30	0	30	0.001
2.002 - 48.11m	TP (11)		Time of Concentration	0.005	30	0	30	0.001
2.002 - 61.58m	TP (10)		Time of Concentration	0.006	30	0	30	0.002
2.002 - 63.68m	TP (9)		Time of Concentration	0.006	30	0	30	0.002
2.002 - 66.99m	Porous Paving (10)		Time of Concentration	0.007	95	0	95	0.006
2.002 - 77.64m	Pond		Time of Concentration	0.008	80	0	80	0.006
2.002 - 87.74m	Porous Paving (11)		Time of Concentration	0.009	95	0	95	0.008
2.002 - 155.94m	Pond		Time of Concentration	0.016	80	0	80	0.012
2.002 - 388.47m	TP (10)		Time of Concentration	0.039	30	0	30	0.012
3.000 - 86.08m	SMH 1.1		Time of Concentration	0.009	80	0	80	0.007
3.000 - 383.73m	Bioretention (1)		Time of Concentration	0.038	80	0	80	0.031
3.000 - 1195.25m	Bioretention (1)		Time of Concentration	0.120	30	0	30	0.036
3.001 - 351.46m	Bioretention (2)		Time of Concentration	0.035	80	0	80	0.028
3.001 - 1386.56m	Bioretention (2)		Time of Concentration	0.139	30	0	30	0.042
3.002 - 132.28m	SMH 3.2		Time of Concentration	0.013	80	0	80	0.011
3.002 - 2144.89m	Bioretention (2)		Time of Concentration	0.214	30	0	30	0.064
TOTAL		**0.0**		**1.387**				**0.627**

2305: St Evin's Park Monasterevin Surface Water Calculations	Date: 12/09/2023		
	Designed by: EC	Checked by: PD	Approved By: PD
Report Details: Type: Network Design Criteria Storm Phase: Surface Network 1	Unit 5c Elm House : Millenium Park Naas		

Flow Options

Peak Flow Calculation	(UK) Modified Rational Method
Min. Time of Entry (mins)	5
Max. Travel Time (mins)	30

FSR

Type: FSR

Return Period (years)	100.0
Region	Scotland and Ireland
M5-60 (mm)	16.5
Ratio R	0.331

Pipe Options

Lock Slope Options	None
Design Level	Level Crowns
Min. Cover Depth (m)	1.200
Min. Slope (1:x)	500.00
Max. Slope (1:x)	40.00
Min. Backdrop (m)	0.200
Max. Backdrop (m)	1.500
Min. Velocity (m/s)	0.75
Max. Velocity (m/s)	2.5
Use Flow Restriction	☑
Reduce Channel Depths	☑

2305: St Evin's Park Monasterevin Surface Water Calculations	Date: 12/09/2023		
	Designed by: EC	Checked by: PD	Approved By: PD
Report Details: Type: Rainfall Analysis Criteria	Unit 5c Elm House : Millenium Park Naas		

Runoff Type	Dynamic
Output Interval (mins)	5
Time Step	Default
Urban Creep	Apply Global Value
Urban Creep Global Value (%)	0
Junction Flood Risk Margin (mm)	300
Perform No Discharge Analysis	☐

Rainfall

FSR

Type: FSR

Region	Scotland and Ireland
M5-60 (mm)	16.5
Ratio R	0.331
Summer	☑
Winter	☑

Return Period

Return Period (years)	Increase Rainfall (%)
30.0	30.000
100.0	30.000

Storm Durations

Duration (mins)	Run Time (mins)
15	30
30	60
60	120
120	240
180	360
240	480
360	720
480	960
600	1200
720	1440
960	1920
1440	2880
2160	4320
2880	5760
4320	8640
5760	11520
7200	14400
8640	17280
10080	20160

Critical Storm Per Item: Rank By: Max. Inflow

Inflow	Storm Event	Inflow Area (ha)	Max. Inflow (L/s)	Total Inflow Volume (m³)
1.000 - 87.56m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	3.8	1.741
1.000 - 85.22m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	3.1	1.424
1.000 - 69.77m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	3.0	1.385
1.001 - 69.56m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	3.0	1.382
1.001 - 74.20m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	3.2	1.472
1.001 - 68.76m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	3.0	1.367
1.001 - 103.52m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	4.5	2.055
1.002 - 77.97m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	3.4	1.549
1.002 - 76.15m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	3.3	1.510
1.002 - 68.88m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	3.0	1.367
1.003 - 75.58m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	3.3	1.501
1.003 - 68.77m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	3.0	1.367
2.002 - 66.99m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	2.9	1.331
2.002 - 87.74m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	3.8	1.744
3.000 - 383.73m	FSR: 100 years: +30 %: 15 mins: Winter	0.04	13.9	6.412

3.000 - 86.08m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	3.1	1.439
3.001 - 351.46m	FSR: 100 years: +30 %: 15 mins: Winter	0.04	12.7	5.877
3.002 - 132.28m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	4.8	2.210
2.002 - 155.94m	FSR: 100 years: +30 %: 15 mins: Winter	0.02	5.7	2.611
2.001 - 150.48m	FSR: 100 years: +30 %: 15 mins: Winter	0.02	5.5	2.515
1.008 - 132.40m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	4.8	2.216
1.008 - 166.19m	FSR: 100 years: +30 %: 15 mins: Winter	0.02	6.0	2.781
1.009 - 171.72m	FSR: 100 years: +30 %: 15 mins: Winter	0.02	6.2	2.871
1.000 - 262.09m	FSR: 100 years: +30 %: 15 mins: Winter	0.03	3.6	1.642
1.001 - 504.44m	FSR: 100 years: +30 %: 15 mins: Winter	0.05	6.9	3.161
1.002 - 525.27m	FSR: 100 years: +30 %: 15 mins: Winter	0.05	7.1	3.296
2.002 - 388.47m	FSR: 100 years: +30 %: 15 mins: Winter	0.04	5.3	2.432
1.003 - 77.29m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	2.8	1.295
2.002 - 77.64m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	2.8	1.298
1.000 - 24.69m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	0.9	0.413
1.001 - 26.18m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	0.9	0.440
1.001 - 27.75m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	1.0	0.464

1.001 - 26.63m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	1.0	0.446
1.001 - 24.88m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	0.9	0.413
1.002 - 31.06m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	1.1	0.517
1.002 - 28.05m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	1.0	0.467
1.002 - 27.17m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	1.0	0.458
1.003 - 31.31m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	1.1	0.526
1.003 - 27.41m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	1.0	0.461
2.002 - 26.74m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	1.0	0.446
2.002 - 31.50m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	1.1	0.526
1.000 - 68.89m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	0.9	0.431
1.000 - 62.36m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	0.8	0.392
1.001 - 64.35m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	0.9	0.407
1.001 - 62.38m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	0.8	0.392
1.001 - 65.60m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	0.9	0.410
1.002 - 61.47m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	0.8	0.389
1.002 - 52.93m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	0.7	0.329
1.002 - 54.12m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	0.7	0.341

1.002 - 61.15m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	0.8	0.380
1.002 - 6.63m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	0.5	0.227
1.003 - 62.32m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	0.8	0.392
2.002 - 63.68m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	0.9	0.398
2.002 - 61.58m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	0.8	0.389
2.002 - 48.11m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	0.7	0.305
3.000 - 1195.25m	FSR: 100 years: +30 %: 15 mins: Winter	0.12	16.3	7.492
3.001 - 1386.56m	FSR: 100 years: +30 %: 15 mins: Winter	0.14	18.9	8.694
3.002 - 2144.89m	FSR: 100 years: +30 %: 15 mins: Winter	0.21	29.2	13.447
1.004 - 433.74m	FSR: 100 years: +30 %: 15 mins: Winter	0.04	19.7	9.104
1.007 - 2795.75m	FSR: 100 years: +30 %: 15 mins: Winter	0.28	38.0	17.529
1.003 - 6.25m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	0.1	0.066
1.003 - 30.75m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	0.4	0.191
1.003 - 53.46m	FSR: 100 years: +30 %: 15 mins: Winter	0.01	0.7	0.338
2.002 - 35.35m	FSR: 100 years: +30 %: 15 mins: Winter	0.00	0.5	0.221

2305: St Evin's Park Monasterevin Surface Water Calculations	Date: 12/09/2023		
	Designed by: EC	Checked by: PD	Approved By: PD
Report Details: Type: Junctions Summary Storm Phase: Surface Network 1	Unit 5c Elm House : Millenium Park Naas		

Critical Storm Per Item: Rank By: Max. Depth

Junction	Storm Event	Cover Elevation (m)	Invert Elevation (m)	Max. Elevation (m)	Max. Depth (m)	Max. Inflow (L/s)	Max. Flooded Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Max. Resident Volume (m³)	Status
EX. SMH	FSR: 100 years: +30 %: 60 mins: Winter	63.777	62.430	62.471	0.041	2.2	0.000	2.2	11.606	0.000	OK
SMH 1.10	FSR: 100 years: +30 %: 60 mins: Winter	64.007	62.497	62.538	0.042	2.2	0.000	2.2	11.606	0.060	OK
SMH 1.9	FSR: 100 years: +30 %: 120 mins: Winter	64.084	62.539	62.581	0.042	2.2	0.000	2.2	24.213	0.060	OK
SMH 2.0	FSR: 100 years: +30 %: 1440 mins: Winter	63.899	62.799	63.079	0.281	0.3	0.000	0.3	11.756	0.401	OK
SMH 2.1	FSR: 100 years: +30 %: 1440 mins: Winter	64.033	62.749	63.079	0.331	0.3	0.000	0.3	12.485	0.473	Surcharged
SMH 2.2	FSR: 100 years: +30 %: 1440 mins: Winter	64.155	62.692	63.079	0.388	0.5	0.000	0.4	19.116	0.555	Surcharged
SMH 1.2	FSR: 100 years: +30 %: 1440 mins: Winter	64.005	62.782	63.079	0.298	2.4	0.000	2.2	66.322	0.426	OK
SMH 1.1	FSR: 100 years: +30 %: 1440 mins: Winter	64.176	62.912	63.080	0.168	1.1	0.000	1.1	31.381	0.240	OK
SMH 1.0	FSR: 100 years: +30 %: 1440 mins: Winter	64.160	62.942	63.080	0.138	0.4	0.000	0.4	11.464	0.197	OK
SMH 3.0	FSR: 100 years: +30 %: 10080 mins: Winter	63.950	62.871	63.647	0.776	0.5	0.000	0.2	3.734	1.110	Surcharged
SMH 3.1	FSR: 100 years: +30 %: 120 mins: Winter	64.070	62.745	63.705	0.961	3.4	0.000	0.2	0.447	1.375	Surcharged
SMH 3.2	FSR: 100 years: +30 %: 120 mins: Winter	64.040	62.692	63.706	1.014	6.9	0.000	1.2	4.509	1.451	Surcharged
SMH 3.3	FSR: 100 years: +30 %: 1440 mins: Winter	63.900	62.589	63.080	0.491	6.9	0.000	3.4	118.269	0.703	Surcharged
SMH 1.5	FSR: 100 years: +30 %: 1440 mins: Winter	64.000	62.567	63.079	0.513	6.7	0.000	6.6	257.135	0.734	Surcharged
SMH 1.4	FSR: 100 years: +30 %: 1440 mins: Winter	64.219	62.595	63.080	0.485	4.5	0.000	4.4	140.144	0.693	Surcharged
SMH 1.3	FSR: 100 years: +30 %: 1440 mins: Winter	64.196	62.664	63.079	0.416	3.3	0.000	3.2	96.763	0.595	Surcharged
SMH 1.7	FSR: 100 years: +30 %: 1440 mins: Winter	64.098	62.561	63.082	0.521	8.8	0.000	2.2	306.600	0.745	Surcharged
SMH 1.8	FSR: 100 years: +30 %: 120 mins: Winter	64.091	62.553	62.596	0.043	2.2	0.000	2.2	24.335	0.062	OK
SMH 1.6	FSR: 100 years: +30 %: 1440 mins: Winter	64.000	62.561	63.079	0.518	6.6	0.000	6.6	230.709	0.742	OK

2305: St Evin's Park Monasterevin Surface Water Calculations	Date: 12/09/2023		
	Designed by: EC	Checked by: PD	Approved By: PD
Report Details: Type: Stormwater Controls Summary Storm Phase: Surface Network 1	Unit 5c Elm House : Millenium Park Naas		

Critical Storm Per Item: Rank By: Max. US Depth

Stormwater Control	Storm Event	Max. US Elevation (m)	Max. DS Elevation (m)	Max. US Depth (m)	Max. DS Depth (m)	Max. Inflow (L/s)	Max. Resident Volume (m³)	Max. Flooded Volume (m³)	Total Lost Volume (m³)	Max. Outflow (L/s)	Total Discharge Volume (m³)	Percentage Available (%)	Status
Pond	FSR: 100 years: +30 %: 1440 mins: Winter	63.079	63.079	0.518	0.518	11.1	245.947	0.000	0.000	8.5	311.815	35.675	OK
Bioretention	FSR: 100 years: +30 %: 10080 mins: Winter	63.662	63.662	0.968	1.022	0.0	9.791	0.000	0.000	0.4	1.373	22.417	OK
Bioretention (1)	FSR: 100 years: +30 %: 10080 mins: Winter	63.647	63.647	0.743	0.847	0.4	89.690	0.000	0.000	0.0	4.733	18.912	OK
Bioretention (2)	FSR: 100 years: +30 %: 120 mins: Winter	63.705	63.706	0.881	1.026	21.0	53.403	0.000	0.000	2.7	28.971	63.564	OK
Porous Paving	FSR: 100 years: +30 %: 60 mins: Winter	63.570	63.559	0.343	0.369	3.8	3.568	0.000	0.000	2.9	3.138	29.359	OK
TP	FSR: 100 years: +30 %: 15 mins: Winter	63.403	63.400	0.393	0.400	5.3	0.538	0.000	0.000	5.1	2.056	22.140	OK
TP (1)	FSR: 100 years: +30 %: 60 mins: Winter	63.302	63.296	0.311	0.316	0.4	0.426	0.000	0.000	0.3	0.282	38.378	OK
TP (2)	FSR: 100 years: +30 %: 15 mins: Winter	63.343	63.335	0.432	0.435	7.7	0.589	0.000	0.000	7.2	3.143	14.770	OK
TP (3)	FSR: 100 years: +30 %: 60 mins: Winter	63.142	63.136	0.311	0.316	0.4	0.426	0.000	0.000	0.3	0.300	38.315	OK
TP (4)	FSR: 100 years: +30 %: 60 mins: Winter	63.221	63.215	0.311	0.315	0.4	0.425	0.000	0.000	0.3	0.252	38.456	OK
TP (5)	FSR: 100 years: +30 %: 120 mins: Winter	63.267	63.262	0.307	0.312	0.2	0.420	0.000	0.000	0.2	0.289	39.218	OK
TP (6)	FSR: 100 years: +30 %: 15 mins: Winter	63.447	63.439	0.436	0.439	7.9	0.594	0.000	0.000	7.3	3.227	14.058	OK
TP (7)	FSR: 100 years: +30 %: 60 mins: Winter	63.321	63.315	0.311	0.315	0.4	0.425	0.000	0.000	0.3	0.252	38.456	OK
TP (8)	FSR: 100 years: +30 %: 60 mins: Winter	63.421	63.415	0.311	0.315	0.4	0.425	0.000	0.000	0.3	0.258	38.444	OK

TP (9)	FSR: 100 years: +30 %: 60 mins: Winter	63.622	63.616	0.311	0.316	0.4	0.426	0.000	0.000	0.3	0.276	38.378	OK
TP (10)	FSR: 100 years: +30 %: 15 mins: Winter	63.714	63.709	0.403	0.409	6.1	0.551	0.000	0.000	5.8	2.412	20.189	OK
TP (11)	FSR: 100 years: +30 %: 120 mins: Winter	63.715	63.710	0.305	0.310	0.2	0.418	0.000	0.000	0.2	0.223	39.547	OK
Porous Paving (1)	FSR: 100 years: +30 %: 240 mins: Winter	63.555	63.529	0.306	0.319	0.8	3.241	0.000	0.000	0.4	1.644	38.100	OK
Porous Paving (2)	FSR: 100 years: +30 %: 360 mins: Winter	63.532	63.507	0.299	0.317	0.6	3.735	0.000	0.000	0.4	2.024	38.926	OK
Porous Paving (3)	FSR: 100 years: +30 %: 360 mins: Winter	63.433	63.408	0.304	0.318	0.6	3.268	0.000	0.000	0.4	2.136	38.372	OK
Porous Paving (4)	FSR: 100 years: +30 %: 120 mins: Winter	63.423	63.400	0.326	0.340	1.8	3.147	0.000	0.000	1.3	2.483	33.997	OK
Porous Paving (5)	FSR: 100 years: +30 %: 360 mins: Winter	63.456	63.428	0.302	0.318	0.7	3.872	0.000	0.000	0.4	2.299	38.463	OK
Porous Paving (6)	FSR: 100 years: +30 %: 240 mins: Winter	63.490	63.462	0.310	0.322	0.9	3.322	0.000	0.000	0.5	2.064	37.308	OK
Porous Paving (7)	FSR: 100 years: +30 %: 240 mins: Winter	63.514	63.489	0.304	0.319	0.8	3.269	0.000	0.000	0.4	1.642	38.237	OK
Porous Paving (8)	FSR: 100 years: +30 %: 360 mins: Winter	63.634	63.608	0.300	0.318	0.7	3.839	0.000	0.000	0.4	2.194	38.713	OK
Porous Paving (9)	FSR: 100 years: +30 %: 360 mins: Winter	63.834	63.808	0.304	0.318	0.6	3.290	0.000	0.000	0.4	2.155	38.296	OK
Porous Paving (10)	FSR: 100 years: +30 %: 360 mins: Winter	63.833	63.808	0.303	0.318	0.6	3.228	0.000	0.000	0.4	2.071	38.479	OK
Porous Paving (11)	FSR: 100 years: +30 %: 240 mins: Winter	63.939	63.914	0.310	0.324	1.0	3.869	0.000	0.000	0.6	2.266	37.074	OK

2305: St Evin's Park Monasterevin Surface Water Calculations	Date: 12/09/2023		
	Designed by: EC	Checked by: PD	Approved By: PD
Report Details: Type: Connections Summary Storm Phase: Surface Network 1	Unit 5c Elm House : Millenium Park Naas		

Critical Storm Per Item: Rank By: Max. Flow

Connection	Storm Event	Connection Type	From	To	Upstream Cover Elevation (m)	Max. US Water Elevation (m)	Max. Flow Depth (m)	Discharge Volume (m³)	Max. Velocity (m/s)	Flow / Capacity	Max. Flow (L/s)	Status
SMH 1.0-SMH 1.1	FSR: 100 years: +30 %: 60 mins: Winter	Pipe	SMH 1.0	SMH 1.1	64.160	62.990	0.056	3.128	0.3	0.05	3.0	OK
SMH 2.2-SMH 1.4	FSR: 100 years: +30 %: 15 mins: Winter	Pipe	SMH 2.2	SMH 1.4	64.155	62.760	0.115	2.865	0.4	0.07	4.7	OK
SMH 1.3-SMH 1.4	FSR: 100 years: +30 %: 30 mins: Winter	Pipe	SMH 1.3	SMH 1.4	64.196	62.781	0.140	16.411	0.5	0.27	16.0	OK
SMH 1.7-SMH 1.8	FSR: 100 years: +30 %: 180 mins: Summer	Pipe	SMH 1.7	SMH 1.8	64.098	62.872	0.042	36.426	0.4	0.03	2.2	Surcharged
SMH 1.9-SMH 1.10	FSR: 100 years: +30 %: 180 mins: Summer	Pipe	SMH 1.9	SMH 1.10	64.084	62.581	0.042	36.223	0.4	0.04	2.2	OK
SMH 1.8-SMH 1.9	FSR: 100 years: +30 %: 180 mins: Summer	Pipe	SMH 1.8	SMH 1.9	64.091	62.596	0.042	36.345	0.4	0.04	2.2	OK
SMH 2.0-SMH 2.1	FSR: 100 years: +30 %: 15 mins: Winter	Pipe	SMH 2.0	SMH 2.1	63.899	62.863	0.063	2.871	0.5	0.09	5.9	OK
SMH 1.10-EX. SMH	FSR: 100 years: +30 %: 60 mins: Winter	Pipe	SMH 1.10	EX. SMH	64.007	62.538	0.041	11.606	0.4	0.04	2.2	OK
SMH 3.1-SMH 3.2	FSR: 100 years: +30 %: 30 mins: Winter	Pipe	SMH 3.1	SMH 3.2	64.070	63.679	0.300	0.000	0.0	0.04	2.7	Surcharged
SMH 1.5-SMH 1.6	FSR: 100 years: +30 %: 30 mins: Winter	Pipe	SMH 1.5	SMH 1.6	64.000	62.746	0.180	21.854	0.6	0.38	22.5	OK
SMH 3.3-SMH 1.5	FSR: 100 years: +30 %: 720 mins: Winter	Pipe	SMH 3.3	SMH 1.5	63.900	63.052	0.300	89.689	0.2	0.06	3.6	Surcharged
SMH 2.1-SMH 2.2	FSR: 100 years: +30 %: 15 mins: Winter	Pipe	SMH 2.1	SMH 2.2	64.033	62.810	0.058	2.863	0.6	0.09	5.5	OK
SMH 1.4-SMH 1.5	FSR: 100 years: +30 %: 30 mins: Winter	Pipe	SMH 1.4	SMH 1.5	64.219	62.757	0.171	22.481	0.6	0.4	23.1	OK
SMH 1.2-SMH 1.3	FSR: 100 years: +30 %: 15 mins: Winter	Pipe	SMH 1.2	SMH 1.3	64.005	62.871	0.100	7.220	0.6	0.2	11.5	OK

SMH 1.1-SMH 1.2	FSR: 100 years: +30 %: 15 mins: Winter	Pipe	SMH 1.1	SMH 1.2	64.176	62.980	0.078	3.938	0.4	0.11	6.6	OK
No Delay	FSR: 100 years: +30 %: 15 mins: Winter	No Delay	SMH 1.6	Pond		62.731	0.101	13.916	0.0		22.7	
No Delay (1)	FSR: 30 years: +30 %: 600 mins: Winter	No Delay	Pond	SMH 1.7		62.938	0.239	124.790	0.0		10.0	
No Delay (2)	FSR: 100 years: +30 %: 60 mins: Winter	No Delay	Porous Paving	SMH 1.0		63.546	0.018	3.138	0.0		2.9	
No Delay (3)	FSR: 100 years: +30 %: 15 mins: Winter	No Delay	TP	SMH 1.1		63.396	0.036	2.055	0.0		5.1	
No Delay (4)	FSR: 100 years: +30 %: 240 mins: Winter	No Delay	Porous Paving (1)	SMH 1.1		63.522	0.006	1.645	0.0		0.4	
No Delay (5)	FSR: 100 years: +30 %: 360 mins: Winter	No Delay	Porous Paving (2)	SMH 1.2		63.498	0.003	2.024	0.0		0.4	
No Delay (6)	FSR: 100 years: +30 %: 60 mins: Winter	No Delay	TP (1)	SMH 1.2		63.293	0.003	0.282	0.0		0.3	
No Delay (7)	FSR: 100 years: +30 %: 15 mins: Winter	No Delay	TP (2)	SMH 1.2		63.334	0.020	3.138	0.0		7.1	
No Delay (8)	FSR: 100 years: +30 %: 240 mins: Winter	No Delay	Porous Paving (3)	SMH 1.2		63.401	0.005	1.601	0.0		0.4	
No Delay (9)	FSR: 100 years: +30 %: 60 mins: Winter	No Delay	TP (3)	SMH 1.2		63.134	0.005	0.300	0.0		0.3	
No Delay (10)	FSR: 100 years: +30 %: 120 mins: Winter	No Delay	Porous Paving (4)	SMH 1.2		63.393	0.011	2.483	0.0		1.3	
No Delay (11)	FSR: 100 years: +30 %: 60 mins: Winter	No Delay	TP (4)	SMH 1.2		63.213	0.007	0.252	0.0		0.3	
No Delay (12)	FSR: 100 years: +30 %: 360 mins: Winter	No Delay	Porous Paving (5)	SMH 1.3		63.420	0.004	2.299	0.0		0.4	
No Delay (13)	FSR: 100 years: +30 %: 120 mins: Winter	No Delay	TP (5)	SMH 1.3		63.259	0.003	0.289	0.0		0.2	
No Delay (14)	FSR: 100 years: +30 %: 240 mins: Winter	No Delay	Porous Paving (6)	SMH 1.3		63.456	0.005	2.065	0.0		0.5	
No Delay (15)	FSR: 100 years: +30 %: 15 mins: Winter	No Delay	TP (6)	SMH 1.3		63.438	0.024	3.221	0.0		7.3	

No Delay (16)	FSR: 100 years: +30 %: 240 mins: Winter	No Delay	Porous Paving (7)	SMH 1.3		63.481	0.005	1.642	0.0		0.4	
No Delay (17)	FSR: 100 years: +30 %: 60 mins: Winter	No Delay	TP (7)	SMH 1.3		63.313	0.009	0.252	0.0		0.3	
No Delay (18)	FSR: 100 years: +30 %: 360 mins: Winter	No Delay	Porous Paving (8)	SMH 1.4		63.599	0.004	2.194	0.0		0.4	
No Delay (19)	FSR: 100 years: +30 %: 60 mins: Winter	No Delay	TP (8)	SMH 1.4		63.413	0.005	0.258	0.0		0.3	
No Delay (20)	FSR: 100 years: +30 %: 60 mins: Winter	No Delay	TP (9)	SMH 1.4		63.613	0.007	0.276	0.0		0.3	
No Delay (21)	FSR: 100 years: +30 %: 240 mins: Winter	No Delay	Porous Paving (9)	SMH 1.4		63.801	0.005	1.620	0.0		0.4	
No Delay (22)	FSR: 100 years: +30 %: 240 mins: Winter	No Delay	Porous Paving (10)	SMH 1.4		63.800	0.005	1.542	0.0		0.4	
No Delay (23)	FSR: 100 years: +30 %: 15 mins: Winter	No Delay	TP (10)	SMH 1.4		63.706	0.021	2.409	0.0		5.8	
No Delay (24)	FSR: 100 years: +30 %: 240 mins: Winter	No Delay	Porous Paving (11)	SMH 2.2		63.907	0.006	2.266	0.0		0.6	
No Delay (25)	FSR: 100 years: +30 %: 120 mins: Winter	No Delay	TP (11)	SMH 2.2		63.707	0.005	0.223	0.0		0.2	
No Delay (26)	FSR: 100 years: +30 %: 2160 mins: Winter	No Delay	Bioretention	SMH 3.0		63.399	0.050	1.205	0.0		1.2	
No Delay (27)	FSR: 30 years: +30 %: 360 mins: Summer	No Delay	Bioretention (1)	SMH 3.1		63.415	0.021	0.253	0.0		0.6	
No Delay (28)	FSR: 100 years: +30 %: 600 mins: Winter	No Delay	Bioretention (2)	SMH 3.3		63.597	0.380	84.269	0.0		7.8	
SMH 3.0-SMH 3.1	FSR: 100 years: +30 %: 10080 mins: Summer	Pipe	SMH 3.0	Bioretention (1)	63.950	63.608	0.300	0.692	0.0	0	0.2	Surcharged
SMH 3.2-SMH 3.3	FSR: 100 years: +30 %: 30 mins: Winter	Pipe	SMH 3.2	Bioretention (2)	64.040	63.678	0.300	1.681	0.1	0.05	4.1	Surcharged

Appendix B.2 Surface Water Interception Calculations

Project St Evin's Park
Project No. DOBA 2305
Calculation Interception Calculations

DONNACHADH O'BRIEN & ASSOCIATES CONSULTING ENGINEERS

Sub-Catchment	Site		
Interception Storage required			
Interception Storage required	=	Sub-Catchment area x min. rainfall	
Sub-Catchment Area	=	5092	m^2
Minimum Rainfall	=	5	mm
Total required	=	25	m^3
Interception Storage Provided			
Area Type		SuDS Feature Interception Volume	
Landscaping (Soft/ Grassed)	=	0.0	m^3
Permeable Paving	=	39.4	m^3
Tree Pits	=	4.6	m^3
Bio Retention Areas	=	0.0	m^3
Filter Drains	=	4.2	m^3
Impermebale Hardstanding	=	0.0	m^3
Impermeable Roof	=	0.0	m^3
Total provided	**=**	**48**	m^3
Interecption Storage Provided	**>**	**Interception Storage Required**	

Areas			
Roofs (m^2)	**Roads/Paths (m^2)**	**Perm. Car Parking (m^2)**	**Bioretention Area (m^2)**
885	1912	328	1967

Interception Calculation		
Tree Pit		
Length	2.0	m
Width	1.6	m
Depth of stone below invert	0.30	m
Void ratio	0.4	
Volume	0.4	m^3
No. Tree Pits	12	nr
Interception Volume	4.6	m^3

Filter Drain		
Length	88.0	m
Width	0.6	
Depth of stone below invert	0.20	
Voids Ratio	0.4	
Interception Volume	4.2	m^3

Permeable Paving		
Area	328	m^2
Depth of stone below invert	0.3	m
Voids Ratio	0.4	
Interception Volume	39.4	m^3

Bioretention Areas		
Area	0.0	m^2
Depth of stone below invert	0.0	m
Voids Ratio	0.0	
Interception Volume	0.0	m^3

Soft Landscaped Open Space		
Length	0.0	m
Width	0.0	
Depth of stone below invert	0.0	
Void Ratio	0.0	
Interception Volume	0.0	m^3

Total Interception Storage Provided	48.2	m^3

Appendix C Irish Water Record Drawings

Irish Water Web Map

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
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- Gravity - Foul
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- Pumping - Combined
- 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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- Hatchbox
- Lamphole
- Hydrobrake
- Other; Unknown
- Storm Culverts
- Storm Clean Outs
- Stormwater Chambers

Discharge Type
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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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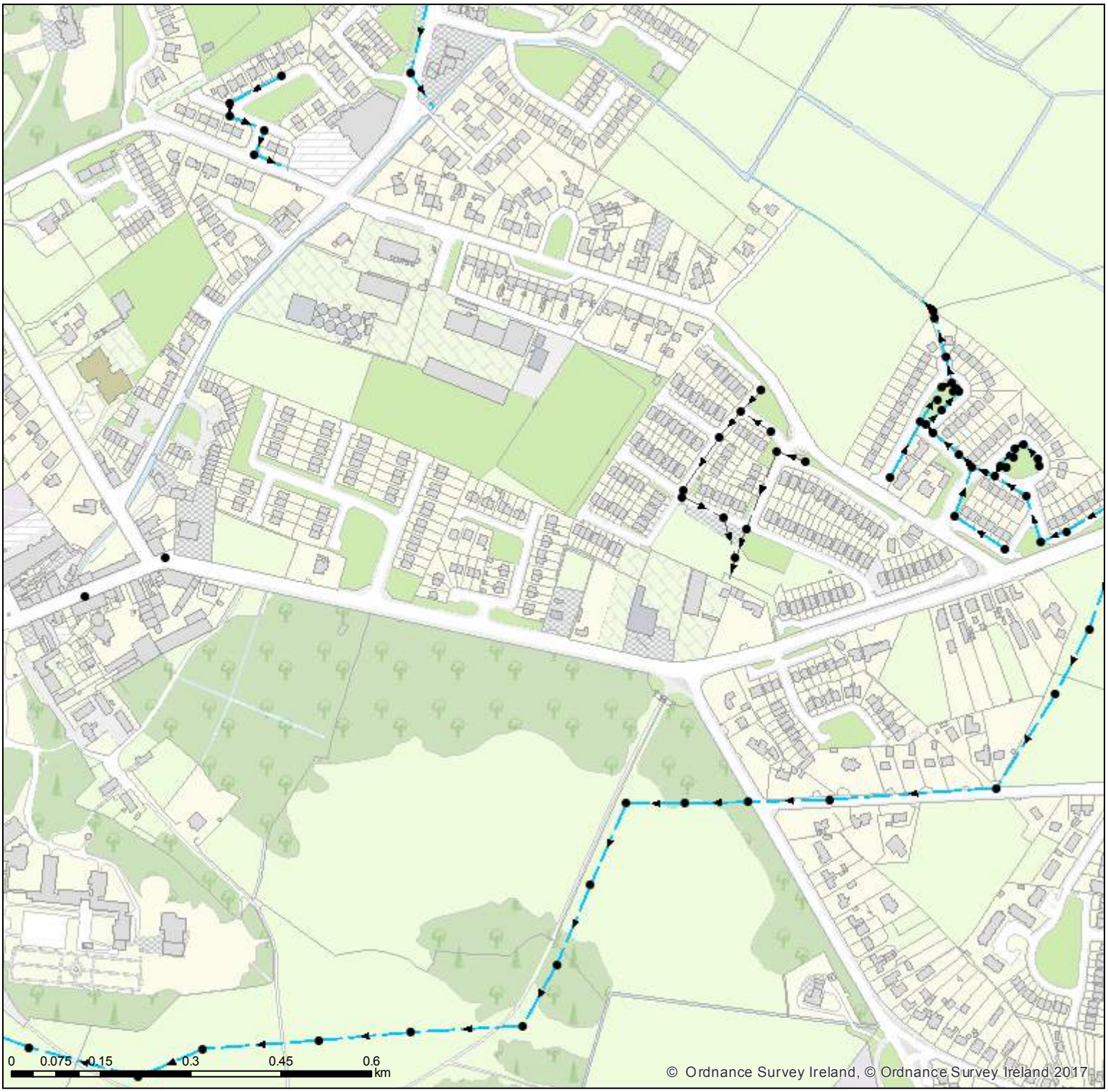
Irish Water Web Map



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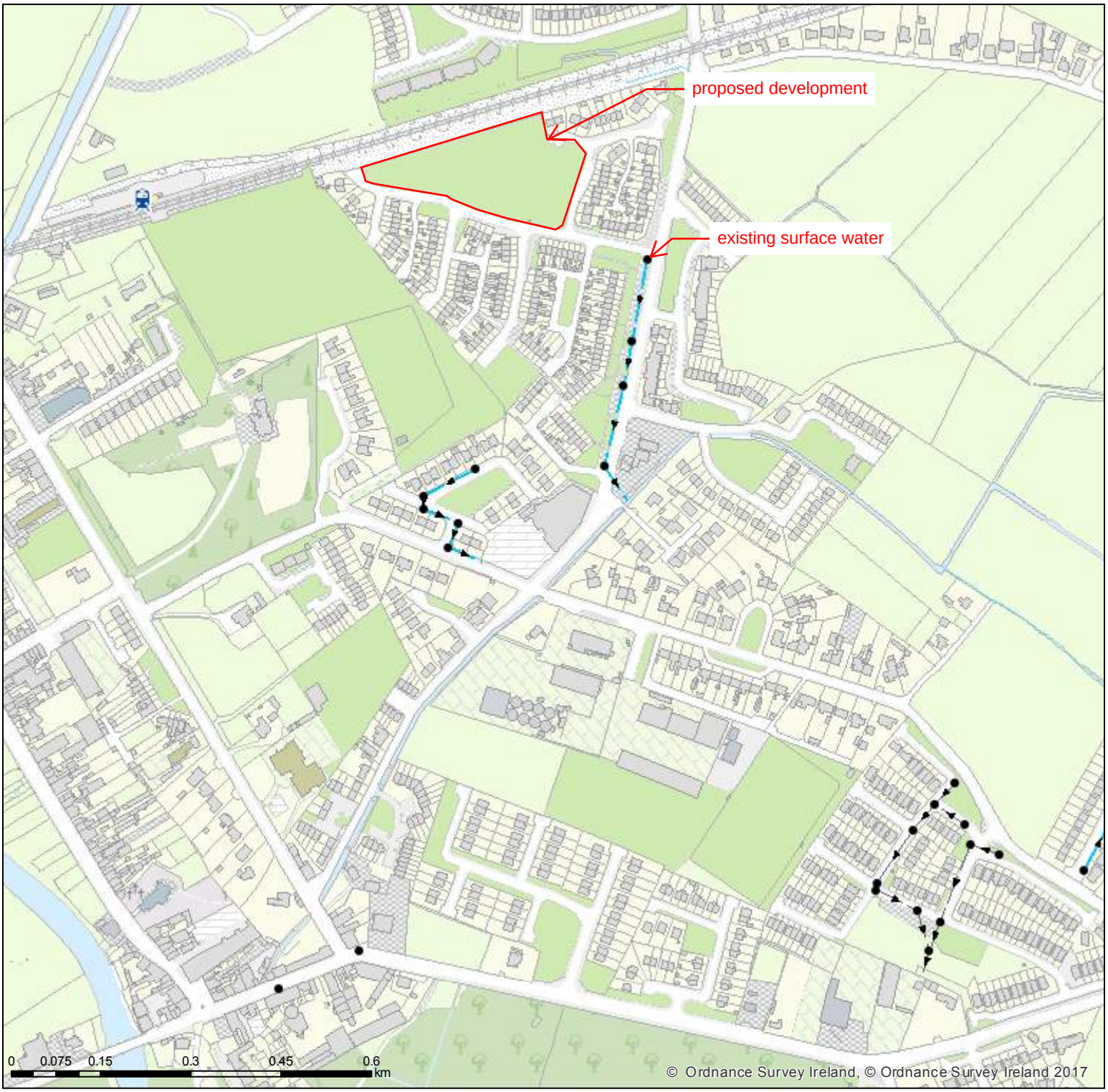

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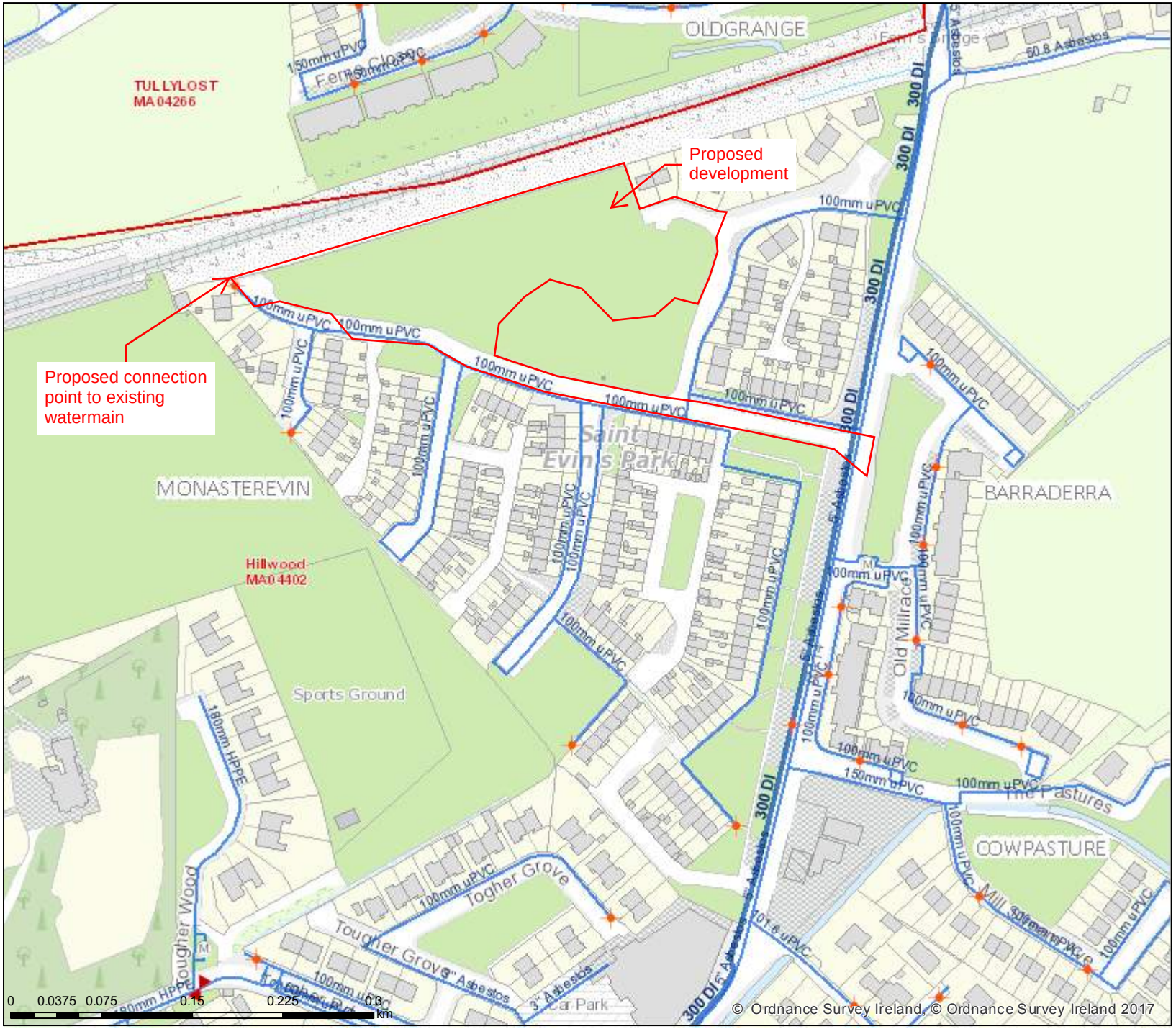

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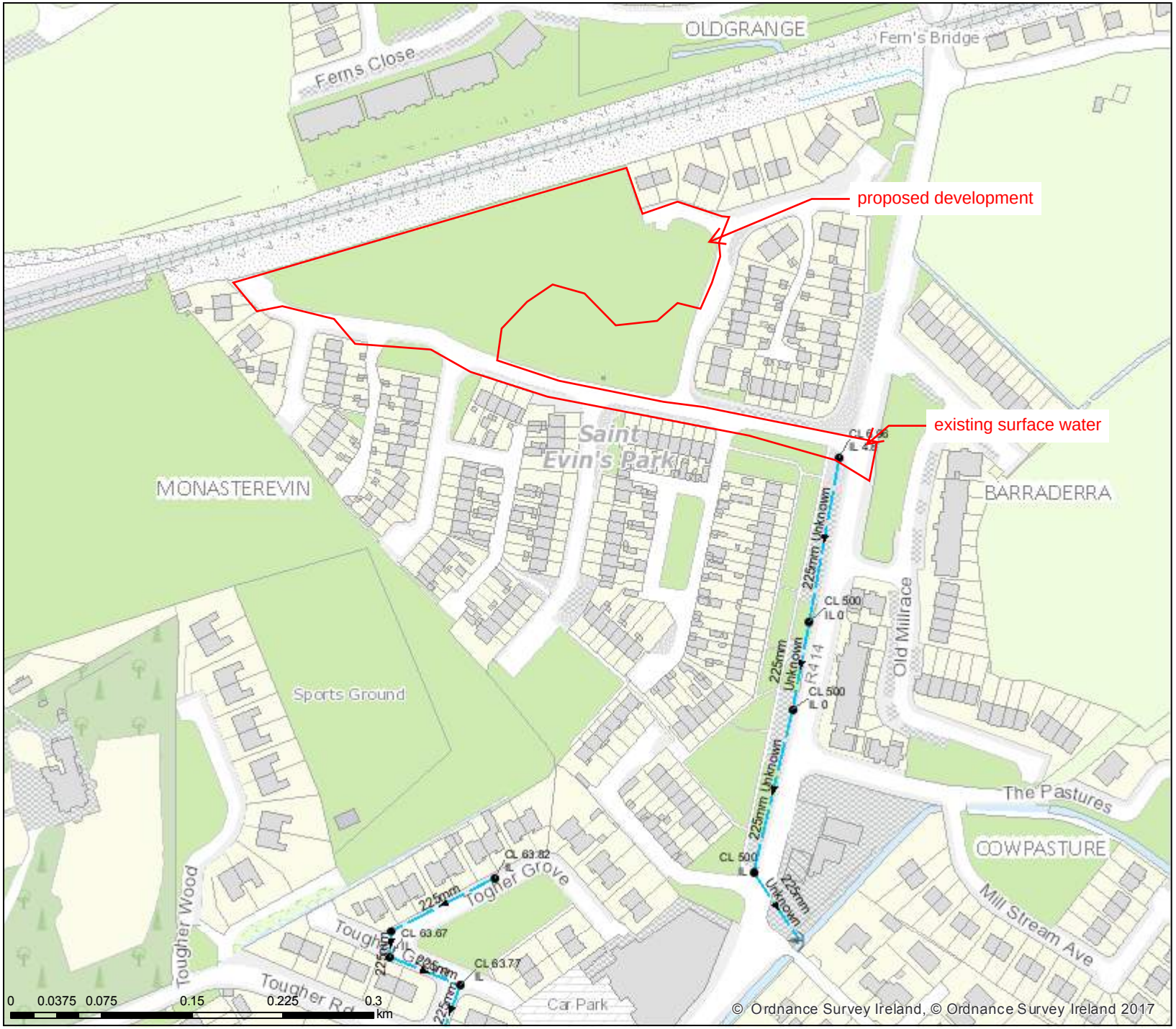

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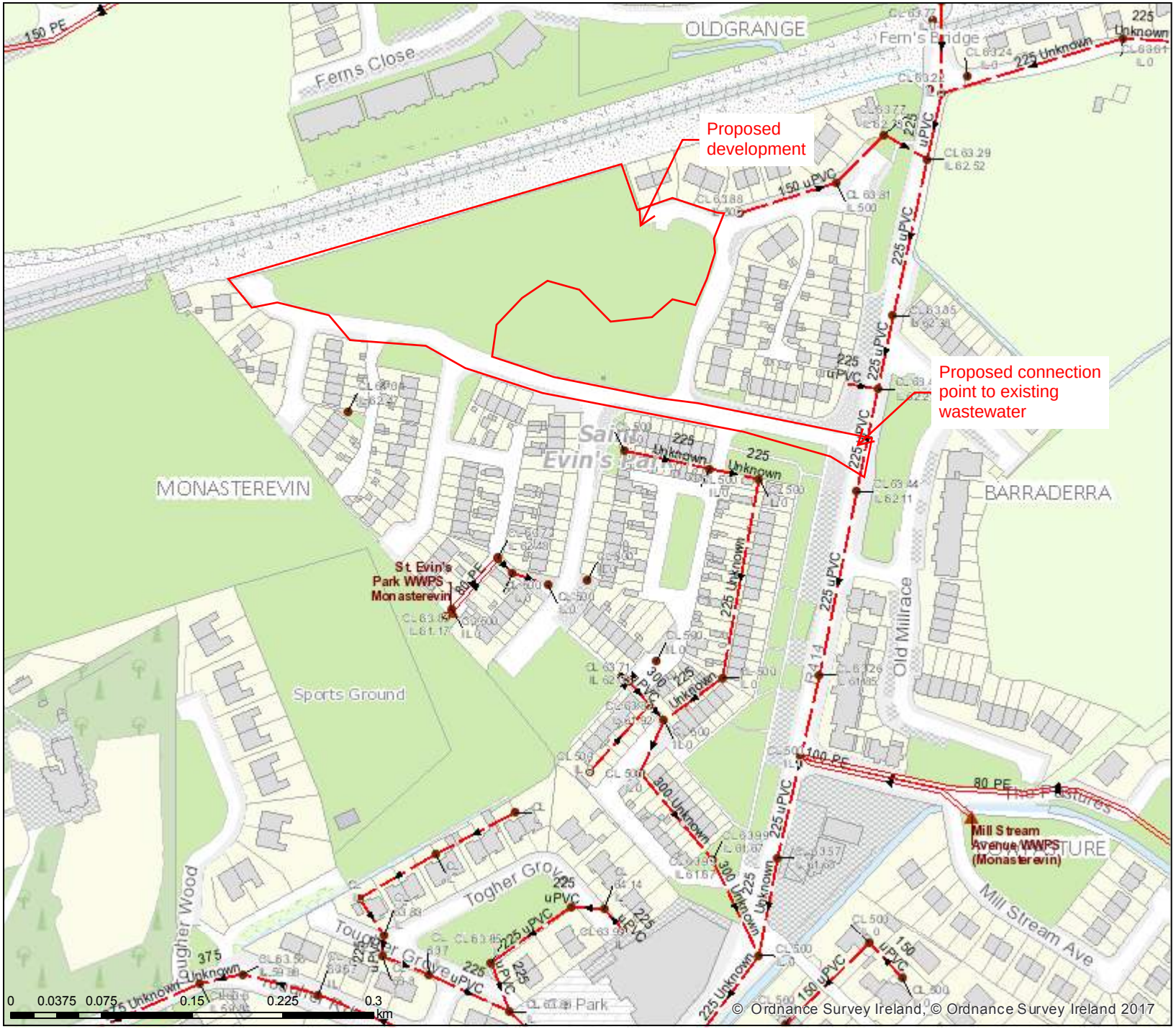

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Appendix D Irish Water Pre-Connection Enquiry

Pre-connection enquiry form

Business developments, mixed use developments, housing developments

This form is to be filled out by applicants enquiring about the feasibility of a water and/or wastewater connection to Irish Water infrastructure. If completing this form by hand, please use BLOCK CAPITALS and black ink.
Please note that this is a digital PDF form and can be filled in electronically

Please refer to the **Guide to completing the pre-connection enquiry form** on page 14 of this document when completing the form.

*** Denotes mandatory/ required field. Please note, if mandatory fields are not completed the application will be returned.**

Section A | Applicant details

1 *Applicant details:

Registered company name (if applicable): KILDARE COUNTY COUNCIL

Trading name (if applicable):

Company registration number (if applicable):

Parent company registered company name (if applicable):

Parent company registration number (if applicable):

If you are not a registered company/business, please provide the applicant's name:

*Contact name: MARY MORRISSEY

*Postal address: ARAS CHILL DARA, DEVOY PARK, NAAS, KILDARE

*Eircode: W91X77F

Please provide either a landline or a mobile number

Landline:

*Mobile: 0459805133

*Email: MMORRISSEY@KILDARECOCO.IE

2 Agent details (if applicable):

The fields marked with * in this section are mandatory if using an agent

*Contact name: LISA HANRAHAN

Company name (if applicable): DONNACHADH OBRIEN & ASSOCIATED CONSULTING ENGINEERS

*Postal address: UNIT 5C, ELM HOUSE,

MILLENNIUM PARK, NAAS

KILDARE

*Eircode: W91P9P8

Please provide either a landline or a mobile number

Landline:

*Mobile 0459840422

*Email: LISA.HANRAHAN@DOBA.IE

3 *Please indicate whether it is the applicant or agent who should receive future correspondence in relation to the enquiry:

Applicant ○ Agent ◉

Section B | Site details

4 *Site address 1 (include Site name/Building name/Building number):

STEVINS PARK

***Address 2**

***Address 3**

***City/Town** MONASTEREVIN

***County** kILDARE **Eircode**

5 *Irish Grid co-ordinates (proposed connection point):

Eastings (X) 263021 Northings (Y) 210983

Note: Values for Eastings must be between 015,900 and 340,000. Northings, between 029,000 and 362,000
Eg. co-ordinates of GPO, O'Connell St., Dublin: E(X) 315,878 N(Y) 234,619

6 *Local Authority where proposed development is located:

KILDARE COUNTY COUNCIL

7 *Has full planning permission been granted? Yes ☐ No ☑

If 'Yes', please provide the current or previous planning reference number:

8 ***Is this development affiliated with a government body/agency?** Yes ☑ No ☐

If 'Yes', please specify the body/agency:

K	I	L	D	A	R	E		C	O	U	N	T	Y		C	O	U	N	C	I	L									

Eg. IDA, HSE, LDA, etc.

Section C | Development details

9 ***Please outline the domestic and/or industry/business use proposed:**

Domestic:

Property type	Number of units	Property type	Number of units
House	11	Apartments	2
Duplex		Number of Apartment Blocks	

Industry/business:

Property type	Number of units	Property type	Number of units
Agricultural		Brewery / Distillery	
Restaurant / Café / Pub		Car Wash / Valeting	
Creche		Data Centre	
Fire Hydrant		Fire Station	
Food Processing		Hotel Accommodation	
Industrial / Manufacturing		Laundry / Laundrette	
Office		Primary Care Centre	
Residential / Nursing Care Home		Retail	
School		Sports Facility	
Student Accommodation		Warehouse	

Other (please specify type)		No. of Units	

9.1 Please provide additional details if your proposed business use are in the Food Processing, Industrial unit/ Manufacturing, Sports Facility or Other Categories.

9.2 Please provide the maximum expected occupancy in number of people, according to the proposed development you selected, e.g. Number of office workers, number of nursing home residents, maximum pub occupancy, number of hotel beds, number of retail workers:

4	0				

10 ***Approximate start date of proposed development:**

0	2	/	1	0	/	2	0	2	3

11 ***Is the development multi-phased?** Yes ☐ No ☑

If 'Yes', application must include a master-plan identifying the development phases and the current phase number.

If 'Yes', please provide details of variations in water demand volumes and wastewater discharge loads due to phasing requirements.

12 ***Please indicate the type of connection required by ticking the appropriate box below:**

Both Water and Wastewater ◉ Please complete both Sections D and E

Water only ○ Please go to Section D

Wastewater only ○ Please go to Section E

Reason for only applying for one service (if applicable):

Section D | Water connection and demand details

13 ***Is there an existing connection to public water mains at the site?** Yes ☑ No ☐

13.1 If yes, is this enquiry for an additional connection to one already installed? Yes ☑ No ☐

13.2 If yes, is this enquiry to increase the size of an existing connection? Yes ☐ No ☑

14 **Approximate date water connection is required:** 0 1 / 0 1 / 2 0 2 4

15 ***What diameter of water connection is required to service the development?** 1 0 0 mm

16 ***Is more than one connection required to the public infrastructure to service this development?** Yes ☐ No ☑

If 'Yes', how many? ☐☐

17 **Please indicate the business water demand (shops, offices, schools, hotels, restaurants, etc.):**

Post-development peak hour water demand	N/A	**l/s**
Post-development average hour water demand		**l/s**

Please include calculations on the attached sheet provided. Where there will be a daily/weekly/seasonal variation in the water demand profile, please provide all such details.

18 **Please indicate the industrial water demand (industry-specific water requirements):**

Post-development peak hour water demand	N/A	**l/s**
Post-development average hour water demand		**l/s**

Please include calculations on the attached sheet provided. Where there will be a daily/weekly/seasonal variation in the water demand profile, please provide all such details.

19 **What is the existing ground level at the property boundary at connection point (if known) above Malin Head Ordnance Datum?**

0 6 5 ☐☐ m

20 **What is the highest finished floor level of the proposed development above Malin Head Ordnance Datum?**

0 6 5 ☐☐ m

21 **Is on-site water storage being provided?** Yes ☐ No ☑

Please include calculations on the attached sheet provided.

22 **Are there fire flow requirements?** Yes ☐ No ☑

Additional fire flow requirements over and above those identified in Q17-18		**l/s**

Please include calculations on the attached sheet provided, and include confirmation of requirements from the Fire Authority.

23 **Do you propose to supplement your potable water supply from other sources?** Yes ☐ No ☑

If 'Yes', please indicate how you propose to supplement your potable water supply from other sources (see **Guide to completing the application form** on page 15 of this document for further details):

Section E | Wastewater connection and discharge details

24 ***Is there an existing connection to a public sewer at the site?** Yes ☑ No ☐

24.1 If yes, is this enquiry for an additional connection to the one already installed? Yes ☑ No ☐

24.2 If yes, is this enquiry to increase the size of an existing connection? Yes ☐ No ☑

25 ***Approximate date that wastewater connection is required:** 0 1 / 0 1 / 2 0 2 4

26 ***What diameter of wastewater connection is required to service the development?** 2 2 5 mm

27 ***Is more than one connection required to the public infrastructure to service this development?** Yes ☐ No ☑

If 'Yes', how many?

28 **Please indicate the commercial wastewater hydraulic load (shops, offices, schools, hotels, restaurants, etc.):**

Post-development peak discharge	N/A	**l/s**
Post-development average discharge		**l/s**

Please include calculations on the attached sheet provided.

29 **Please indicate the industrial wastewater hydraulic load (industry-specific discharge requirements):**

Post-development peak discharge	N/A	**l/s**
Post-development average discharge		**l/s**

Please include calculations on the attached sheet provided.

30 Wastewater organic load:

Characteristic	Max concentration (mg/l)	Average concentration (mg/l)	Maximum daily load (kg/day)
Biochemical oxygen demand (BOD)	Domestic		
Chemical oxygen demand (COD)			
Suspended solids (SS)			
Total nitrogen (N)			
Total phosphorus (P)			
Other			

Temperature range	Domestic
pH range	Domestic

31 *Storm water run-off will only be accepted from brownfield sites that already have a storm/surface water connection to a combined sewer. In the case of such brownfield sites, please indicate if the development intends discharging surface water to the combined wastewater collection system:

Yes ☐ No ☑

If 'Yes', please give reason for discharge and comment on adequacy of SUDS/attenuation measures proposed.

Please submit detailed calculations on discharge volumes, peak flows and attenuation volumes with this application

32 *Do you propose to pump the wastewater? Yes ☐ No ☑

If 'Yes', please include justification for your pumped solution with this application.

33 What is the existing ground level at the property boundary at connection point (if known) above Malin Head Ordnance Datum?

6 5 . 0 m

34 What is the lowest finished floor level on site above Malin Head Ordnance Datum? m

35 What is the proposed invert level of the pipe exiting the property to the public road?

6 2 . 1 1 m

Section F | Supporting documentation

Please provide the following additional information (all mandatory):

> Site location map: A site location map to a scale of 1:1000, which clearly identifies the land or structure to which the enquiry relates. The map shall include the following details: ☑

i. The scale shall be clearly indicated on the map.

ii. The boundaries shall be delineated in red.

iii. The site co-ordinates shall be marked on the site location map.

> Details of planning and development exemptions (if applicable). ☐

> Calculations (calculation sheets provided below). ☐

> Site layout map to a scale of 1:500 showing layout of proposed development, water network and wastewater network layouts, additional water/wastewater infrastructure if proposed, connection points to Irish Water infrastructure. ☑

> Conceptual design of the connection asset from the proposed development to the existing Irish Water infrastructure, including service conflicts, gradients, pipe sizes and invert levels. ☐

> Any other information that might help Irish Water assess this pre-connection enquiry. ☐

Section G | Declaration

I/We hereby make this application to Irish Water for a water and/or wastewater connection as detailed on this form.

I/We understand that any alterations made to this application must be declared to Irish Water.

The details that I/we have given with this application are accurate.

I/We have enclosed all the necessary supporting documentation.

Any personal data you provide will be stored and processed by Irish Water and may be transferred to third parties for the purposes of the water and/or wastewater connection process. I hereby give consent to Irish Water to store and process my personal data and to transfer my personal data to third parties, if required, for the purposes of the connection process.

If you wish to revoke consent at any time or wish to see Irish Water's full Data Protection Notice, please see **https://www.water.ie/privacy-notice/**

Signature: 

Date: 27 / 04 / 2023

Your full name (in BLOCK CAPITALS):

L	I	S	A		H	A	N	R	A	H	A	N																		

Irish Water will carry out a formal assessment based on the information provided on this form.
Any future connection offer made by Irish Water will be based on the information that has been provided here.

Please submit the completed form to **newconnections@water.ie** or alternatively, post to:

Irish Water
PO Box 860
South City Delivery Office
Cork City

Calculations

Water demand

Average Daily Demand:
Domestic -

150 liters/person/day x 2.7 persons per dwelling x 15 dwellings x 1.25
= 759.4 litres / day
= 0.009 l/s

Peak Daily Demand:
= 0.009 x 5 = 0.044 l/s

Section 3.6 IW WW CoP

150 l/person/day x 2.7 persons / dwelling x 15 dwellings x 10%
= 0.09 l/s

Peak = 6DWF (Appendix C Section 1.2.5)
= 0.09 x 6 = 0.56 l/s

Appendix E Irish Water Confirmation of Feasibility

CONFIRMATION OF FEASIBILITY

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

Lisa Hanrahan

Donnachadh O' Brien & Associates Consulting Engineers
Unit 5C Elm House
Millennium Park
Naas
Kildare
W91P9P8

15 May 2023

Our Ref: CDS23003230 Pre-Connection Enquiry
St Evins Park, Monasterevin, Kildare

Dear Applicant/Agent,

We have completed the review of the Pre-Connection Enquiry.

Irish Water has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Multi/Mixed Use Development of 13 unit(s) at St Evins Park, Monasterevin, Kildare, (the **Development)**.

Based upon the details provided we can advise the following regarding connecting to the networks;

• **Water Connection**	-	Feasible without infrastructure upgrade by Irish Water
• **Wastewater Connection**	-	Feasible Subject to upgrades
	-	In order to complete the proposed connection, the wastewater network will have to be extended for approximately 200 metres, from the existing 225uPVC on Drogheda Road, to the Development site. The Developer will be required to fund the extension works. The fee will be calculated at a connection application stage.

This letter does not constitute an offer, in whole or in part, to provide a connection to any Irish Water infrastructure. Before the Development can be connected to

our network(s) you must submit a connection application and be granted and sign a connection agreement with Irish Water.

As the network capacity changes constantly, this review is only valid at the time of its completion. As soon as planning permission has been granted for the Development, a completed connection application should be submitted. The connection application is available at www.water.ie/connections/get-connected/

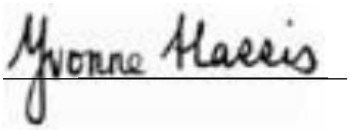
Where can you find more information?

- **Section A -** What is important to know?
- **Section B -** Details of Irish Water's Network(s)

This letter is issued to provide information about the current feasibility of the proposed connection(s) to Irish Water's network(s). This is not a connection offer and capacity in Irish Water's network(s) may only be secured by entering into a connection agreement with Irish Water.

For any further information, visit **www.water.ie/connections, email newconnections@water.ie** or contact 1800 278 278**.**

Yours sincerely,



Yvonne Harris
Head of Customer Operations

Section A - What is important to know?

What is important to know?	Why is this important?
Do you need a contract to connect?	• Yes, a contract is required to connect. This letter does not constitute a contract or an offer in whole or in part to provide a connection to Irish Water's network(s). • Before the Development can connect to Irish Water's network(s), you must submit a connection application and be granted and sign a connection agreement with Irish Water.
When should I submit a Connection Application?	• A connection application should only be submitted after planning permission has been granted.
Where can I find information on connection charges?	• Irish Water connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	• All works to Irish Water's network(s), including works in the public space, must be carried out by Irish Water*. *Where a Developer has been granted specific permission and has been issued a connection offer for Self-Lay in the Public Road/Area, they may complete the relevant connection works
Fire flow Requirements	• The Confirmation of Feasibility does not extend to fire flow requirements for the Development. Fire flow requirements are a matter for the Developer to determine. • **What to do?** - Contact the relevant Local Fire Authority
Plan for disposal of storm water	• The Confirmation of Feasibility does not extend to the management or disposal of storm water or ground waters. • **What to do?** - Contact the relevant Local Authority to discuss the management or disposal of proposed storm water or ground water discharges.
Where do I find details of Irish Water's network(s)?	• Requests for maps showing Irish Water's network(s) can be submitted to: datarequests@water.ie

What are the design requirements for the connection(s)?	• 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,*** available at www.water.ie/connections
Trade Effluent Licensing	• Any person discharging trade effluent** to a sewer, must have a Trade Effluent Licence issued pursuant to section 16 of the Local Government (Water Pollution) Act, 1977 (as amended). • More information and an application form for a Trade Effluent License can be found at the following link: https://www.water.ie/business/trade-effluent/about/ **trade effluent is defined in the Local Government (Water Pollution) Act, 1977 (as amended)

Section B – Details of Irish Water's Network(s)

The map included below outlines the current Irish Water infrastructure adjacent the Development: To access Irish Water Maps email datarequests@water.ie

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

Note: The information provided on the included maps as to the position of Irish Water's underground network(s) is provided as a general guide only. The information is based on the best available information provided by each Local Authority in Ireland to Irish Water.

Whilst every care has been taken in respect of the information on Irish Water's network(s), Irish Water assumes no responsibility for and gives no guarantees, undertakings or warranties concerning the accuracy, completeness or up to date nature of the information provided, nor does it accept any liability whatsoever arising from or out of any errors or omissions. This information should not be solely relied upon in the event of excavations or any other works being carried out in the vicinity of Irish Water's underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Irish Water's underground network(s) 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.

Appendix F Foul Network Calculations

FOUL SEWERAGE DESIGN

Design Criteria for Foul Network 2

Pipe Sizes STANDARD Manhole Sizes STANDARD

Industrial Flow (l/s/ha)	0.00	Add Flow / Climate Change (%)	0
Industrial Peak Flow Factor	0.00	Minimum Backdrop Height (m)	0.200
Flow Per Person (l/per/day)	150.00	Maximum Backdrop Height (m)	1.500
Persons per House	3.00	Min Design Depth for Optimisation (m)	1.200
Domestic (l/s/ha)	0.00	Min Vel for Auto Design only (m/s)	0.75
Domestic Peak Flow Factor	6.00	Min Slope for Optimisation (1:X)	500

Designed with Level Soffits

Network Design Table for Foul Network 2

PN	Length (m)	Fall (m)	Slope (1:X)	Area (ha)	Houses	Base Flow (l/s)	k (mm)	HYD SECT	DIA (mm)	Section Type	Auto Design
1.000	21.049	0.351	60.0	0.000	2	0.0	1.500	o	150	Pipe/Conduit	
1.001	24.837	0.414	60.0	0.000	2	0.0	1.500	o	150	Pipe/Conduit	
1.002	35.201	0.587	60.0	0.000	3	0.0	1.500	o	150	Pipe/Conduit	
2.000	9.597	0.160	60.0	0.000	2	0.0	1.500	o	150	Pipe/Conduit	
2.001	52.169	0.869	60.0	0.000	4	0.0	1.500	o	150	Pipe/Conduit	
1.003	29.047	0.194	150.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	
1.004	6.630	0.044	150.0	0.000	0	0.0	1.500	o	225	Pipe/Conduit	

Network Results Table

PN	US/IL (m)	Σ Area (ha)	Σ Base Flow (l/s)	Σ Hse	Add Flow (l/s)	Vel (m/s)	Cap (l/s)	Flow (l/s)
1.000	62.807	0.000	0.0	2	0.0	1.13	20.0	0.1
1.001	62.456	0.000	0.0	4	0.0	1.13	20.0	0.1
1.002	62.042	0.000	0.0	7	0.0	1.13	20.0	0.2
2.000	62.836	0.000	0.0	2	0.0	1.13	20.0	0.1
2.001	62.676	0.000	0.0	6	0.0	1.13	20.0	0.2
1.003	61.456	0.000	0.0	13	0.0	0.94	37.2	0.4
1.004	61.262	0.000	0.0	13	0.0	0.94	37.2	0.4

Appendix G RSA Audit and Response

Kildare County Council

St Evins Park, Monasterevin, Co. Kildare

Designer's Response to Stage 1-2 Road Safety Audit

(Planning Submission)

2305-DOB-XX-SI-RP-C-0005

September 2023

Document Control

Document:		Designer's Response to Stage 1-2 Road Safety Audit (Planning Submission)			
Project:		St Evins Park, Monasterevin, Co Kildare			
Client:		Kildare County Council			
Job Number:		DOBA2305			
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Author:		Lisa Hanrahan			
Issue	Date	Status	Issued to	Copies	Checked for Issue
S2.P01	25.09.2023	Issue 1	Road Safety Auditor	1E	

Contents

1 Introduction

Donnachadh O'Brien & Associates Consulting Engineers Ltd. (DOBA) have been instructed by the Client, Kildare County Council, to prepare a Response to the Stage 1-2 Road Safety Audit (RSA) completed by Bruton Consulting Engineers on the proposed Residential Development at the green area in the existing St Evins Park development, Monasterevin, Co. Kildare

- **Section 2** describes the attributes of the **Existing Site**,
- **Section 3** summarises the **Proposed Development**,
- **Section 4** provides the **Designer's Responses** to each of the **issues raised** by the Audit Team.

2 Existing Site

The existing green area as illustrated in Figure 1 **Site location (highlighted in red)**below is within the existing St Evins Park Development and bound to the north by the Irish Rail train line. The proposed development includes 12 new houses which will be accessed through the existing St Evins Park entrance on the R414.

Figure 1 Site location (highlighted in red)

3 Proposed Development Description

The development will consist of the:

- Construction of 15 No. residential units ranging from one bed Duplex units to three bed two-storey houses.
- Provision of vehicular and pedestrian access by extending the existing road in St Evins Park.

The development will also consist of:

- The redevelopment of nine existing car park spaces with 1 additional visitor space, one electric charge space and 1 accessible space.
- Provision of public lighting;
- All hard and soft landscaping;
- Provision of Sustainable Urban Drainage systems (SUDS);
- All other associated site excavation, infrastructural and site development works above and below ground, including associated site servicing (foul and surface water drainage and water supply); including the public road.

Figure 2 Proposed development (source: DOBA Site Layout)

4 Issues Raised in the Road Safety Audit and associated Designer's Responses

The following sections describe the issues raised in the Road Safety Audit (RSA) and the associated Designer's Response. These responses should be read in conjunction with the Feedback Form contained within the Bruton Consulting Engineers Stage 1-2 Road Safety Audit.

4.1 Problem 3.1

There may not be enough room for those using the perpendicular parking spaces to exit if the adjacent spaces are occupied given the relatively narrow (5.5m) carriageway access road. This could lead to material damage of parked vehicles.

4.1.1 Designer's Response

The designer agrees with the issues raised and an autotrack analysis was carried out on these parking spaces using a Passenger 4X4 to determine if there was enough space to reverse out of the spaces. This autotrack analysis showed that a 4x4 could reverse in or out of the space without impinging on the spaces either side. Please see below **Figure 3** Autotrack Analysis of Car park Spaces and attached autotrack analysis, drawing no. **2305-DOB-XX-SI-DR-C-0070**.

Figure 3 Autotrack Analysis of Car park Spaces

4.2 Problem 3.2

There is no on-curtilage parking for the most westerly unit. This could lead to parking in the turning head which in turn could lead to refuse vehicles and the like reversing along the road which would increase the likelihood collisions with pedestrians. It is assumed that the disable parking bay will be for general use and not exclusive for one dwelling.

4.2.1 Designer's Response

Firstly, yes the disabled space is for general use.

Secondly, highlighted in Figure 4 **Car park space for most western unit** below, parking for the most westerly unit is the car park next to the disable parking bay so access for this house is from the existing road.

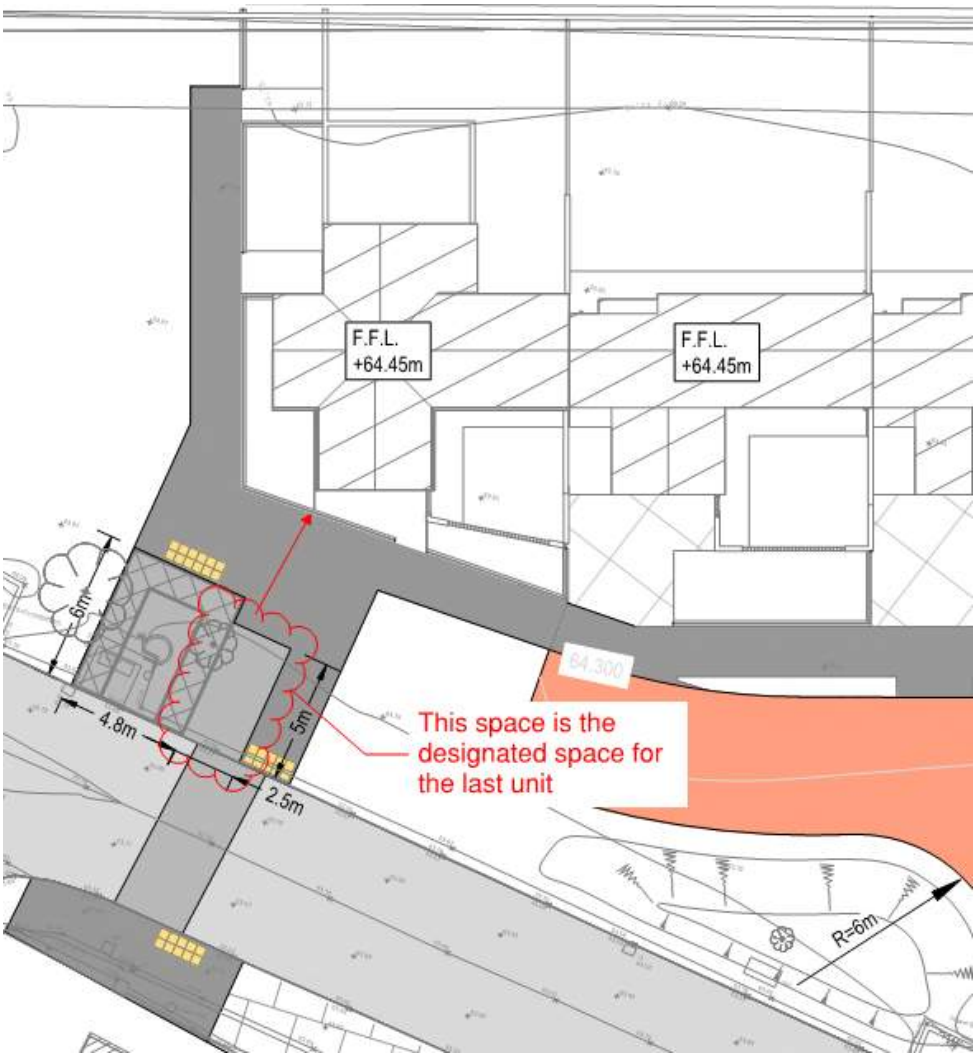

Figure 4 Car park space for most western unit

Problem 3.3

The existing carriageway is to be repaired at that the new uncontrolled pedestrian crossing at the western-end of the development after the water supply connection is complete. New joints in the pavement may deteriorate over time and lead to a trip hazards.

4.2.2 Designer's Response

The designer agrees with this comment and the recommendation to extend the new surfacing over the entire crossing area. Please see updated Proposed Site Layout Sheet DR-C-0050.

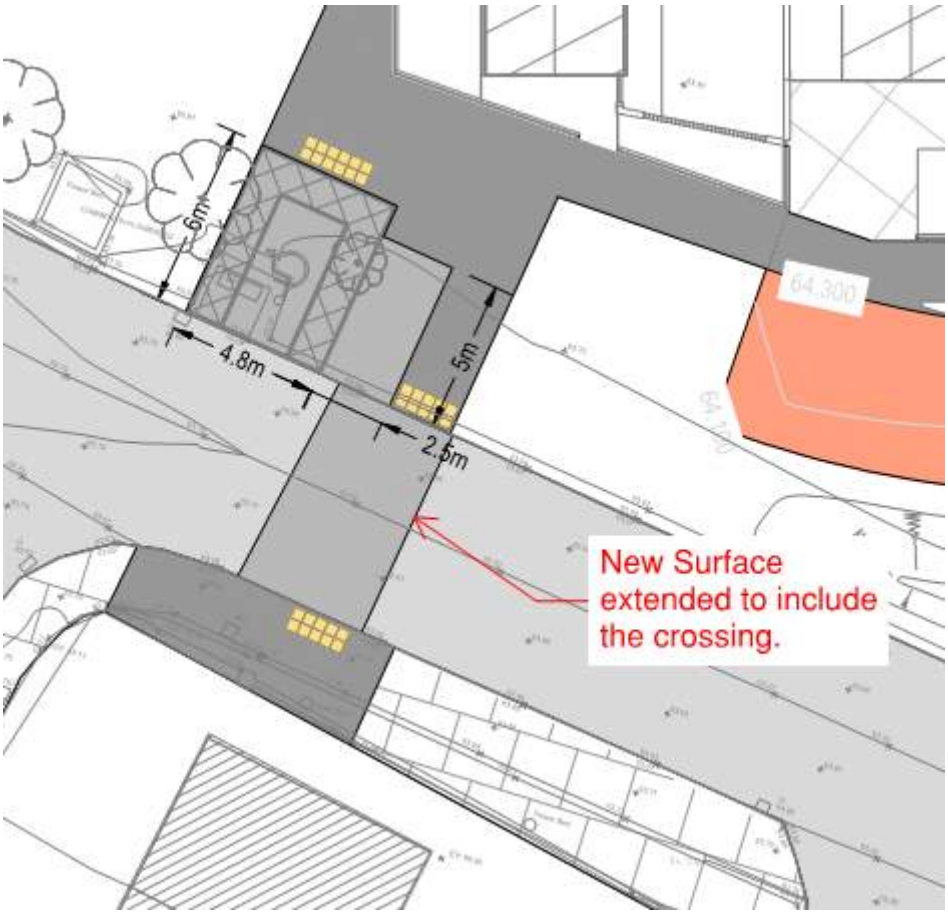

Figure 5 Extract from the updated Proposed Site Layout DR-C-0050 illustrating the new surface to be extended to include the new crossing

4.3 Problem 3.4

The access road kerb at the green area side is to be flush to allow surface water runoff. The absence of a kerb could lead to drivers parking partially on the carriageway and partially on the verge which could lead to loss of traction and control when exiting. The absence of a kerb could also lead to higher speeds as drivers perceive a wider road ahead.

4.3.1 Designer's Response

The designer agrees with the issue and the purposed recommendation. The kerb will be 75mm high for the length of the road similar to the opposite side of the road and there will be a 1m long dropped kerb every 5m along the length of the road.

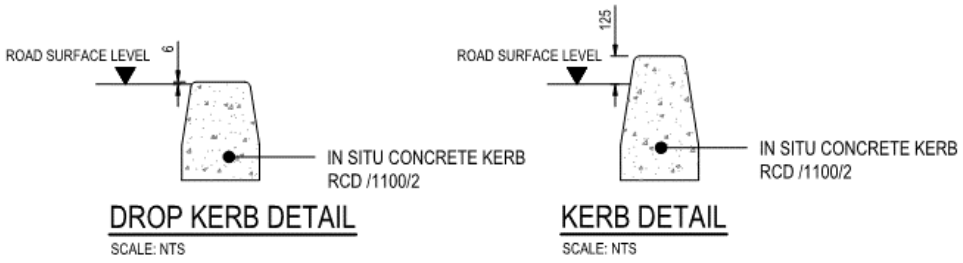

Figure 6- Kerb details