HAYES HIGGINS PARTNERSHIP
CHARTERED ENGINEERS • PROJECT MANAGERS

Civil Engineering Services Report

For

Development at St. Johns Convent, Rathangan

2nd Floor, The Glass House, 11 Coke Lane, Smithfield, Dublin 7.
Tel: +353 (0)1 661 2321 **Email:** admin@hayeshiggins.ie
Web: www.hhp.ie

Contents

DOCUMENT CONTROL SHEET

	Client	Sophia Housing Association							
	Project Title	St. Johns Convent, Rathangan							
	Project Ref.	20D004							
	Document Title	Planning Report							
	Document No.	20D004-PR 01							
	This Document Comprises	DCS	PD	TOC	Text	-	-	-	Appendices
		1	-	1	4				7
	Check								

Revision	Status	Author	Reviewed By	Approved By	Issue Dates
P	Planning	LM	DH	DH	January 2024

1. Introduction

Hayes Higgins Partnership has been commissioned to prepare a Civil Engineering Services Report for the proposed development St. Johns Convent, Rathangan.

This report was compiled after reviewing the available information on drainage and water supply, reviewing the OPW flood maps and other available information from public bodies. It contains information on the design of the surface water and foul drainage systems to be constructed for the proposed development.

The design of both the surface water and foul drainage systems has been carried out in accordance with the following:

- The Greater Dublin Regional Code of Practice for Drainage Works
- Technical Guidance Document H of the Building Regulations
- The Greater Dublin Strategic Drainage Study (GDSDS)
- DOE Recommendations for Site Development Works for Housing Areas
- BS 8301:1985, Code of practice for Building Drainage
- BS EN 752 External building drainage
- Irish Water Code of Practice and Standard Details (Water & Wastewater)
- South Dublin County Council Sustainable Drainage Explanatory Design & Evaluation Guide 2022
- Kildare CPD 2023-2029
- Nature-based Solutions to the Management of Rainwater and Surface Water Runoff in Urban Areas
- The SuDS Manual (C753)

The proposed surface water drainage system is a combination of SuDs mechanisms including permeable surfaces, rain gardens / landscaped areas and gravity feed drainage systems discharging to soakaways. All surface water run-off will be dealt with on the site and no connection to the public system is required. The surface water system is designed to take the runoff generated by a 1 in 100 year storm event (+30%).

The foul drainage system for the proposed development is a gravity feed system within the site falling to the existing foul drainage system on the site at the site entrance. There is an existing foul connection on the site to the public main in the road to the south of the site which will be maintained.

There will be a full separation of the foul and surface systems within the site.

2. Proposed Site

The site in question is located at St. Johns Convent, Rathangan. There is an existing building on the site which will be demolished. There is a combined sewer traversing the site from the east to south from the neighbour site. 2HP will liaise with Irish Water regarding this line as required. An Irish Water Diversion Application will be submitted in the normal way as required. A Confirmation of Feasibility was received from Irish Water which noted this approach. The proposed site measures approximately 0.69ha. The site is bound by New Street to the South and greenfields to the north. There are housing units to the west of the site and a Church to the east. The topography of the site shows a decrease in level falling from the north to south. However, due to its previous development, the site itself remains fairly level and the interfaces between the site and the surrounds are relatively level. Proposed on the site are 35 apartments and associated facilities. On site parking for residents will be provided. The site will be accessed from a new entrance in similar location to existing entrance on New Street, refer to appendix A for sightlines and Autotrack drawings.

3. Surface Water Drainage

Local Authorities require that all developments include a sustainable urban drainage system, SuDS. A combination of SuDS mechanisms will be utilised on this site. Having undertaken a detailed review of the current site (including site investigations), the surrounding areas and the proposed development a detailed surface drainage strategy has been developed in accordance with all current SuDS guidelines. All possible SuDs mechanisms have been explored, refer to the justification matrix for SuDs in Appendix G. The site investigation confirms an infiltration rate of 7.32×10^{-6} m/s is available. There is no surface water line within the vicinity of the site however, given the infiltration rate we can utilise natural infiltration of the surface water generated on site within the site and no connection to the public system is required.

SuDS measures to be utilised on this site include;

- Permeable surfacing – will be used within the parking areas and pathways, this will allow natural infiltration.
- Rain gardens / planting – will be used to deal with overflow from pathways.
- Soakaways – will be used to deal with the roofs and entrance road. The soakways have been suitably sized for each hard standing area.

To alleviate any possible risk of flood the on-site surface water system is designed for a 1 in 100-year storm (+30%). A 30% increase in runoff due to global warming is included. Site specific MET Eireann Rainfall data has been used in the surface water drainage and soakaway design. There will be a complete separation of the foul and surface water drainage systems within the site, both in respect of installation and use. The surface water drains are designed in accordance with BS EN 752, Code of Practice for Drainage Outside Buildings.

Refer to Appendix A for storm water layouts and Appendix C for surface water calculations.

4. Foul Water Drainage

The foul drainage system has been designed in accordance with Irish Water Code of Practice and Standard Details for Wastewater, BS 8301:1985, Code of Practice for Building Drainage and the current Building Regulations and Irish Water Code of Practice.

There is an existing combined sewer traversing the site from the eastern side as noted above. There is an existing connection from the foul lines on the site to this combined line and the combined line connects to foul line on this site which connects to the public foul sewer on New Street (225mm dia. foul water pipe) to the south of the site. This existing foul connection will be maintained. The foul drainage system for the development is a gravity feed system falling to this foul connection. The main foul sewers in the proposed development are to consist of 225mm diameter uPVC pipes with fall 1/170 chosen throughout to minimise the risk of blockages and to aid maintenance. Based on the 225mm diameter pipes with a 1:170 fall, the design flow is calculated as 34.94 l/s. A roughness coefficient (ks) of 1.5mm is applied to the design of all pipes.

Considering the loading from the proposed development and the existing site on the public wastewater system 2HP note as follows;

- The existing hardstanding on the site made up of roof and car parking is approx. 1200m^2 (plus some additional pathways not included), this current hardstanding drains to the foul network. Based on 1 hour storm for a 1 in 1 year storm (using site rainfall data) event this equates to 12.4m^3. The existing convent will be demolished (8 person) which equates to a DWF of 0.014ls or 1.2m^3. On this basis the outfall daily into the public wastewater system from the existing site is 13.6 m^3
- The proposed development of 1 and 2 bed apartments will have a maximum capacity DWF of 0.1l/s or 8.6m^3 daily and as detailed above there will be no surface water discharge from the site into the foul network

As can be seen from the above there will be a reduction in load on the public wastewater system with the proposed development as the surface water run-off will no longer enter the system. We do not anticipate any capacity problems. A Confirmation of Feasibility reflecting same for the development has been received from Irish Water, refer to letter contained in Appendix F. Irish Water have confirmed the development is feasible without upgrade by Irish Water. Details of the proposed foul sewer system for this site are shown in Hayes Higgins Partnership drawing within Appendix A. Calculations are provided within Appendix D.

5. Water Supply System

There is an existing 100mm diameter UPVC water main on New Street south of the site. A service connection from the line is currently contained within the site. This connection will be maintained. The

existing watermain will be removed as part of the demolition works and a looped 100mm diameter HDPE watermain to suit the new layout will be installed.

In accordance with requirements air valves and scour valves will be provided around the site as necessary. Hydrants will be provided as directed by the Fire Safety Certificate and Technical Guidance Document B of the Building Regulations 2006. Water saving devices including aerated taps and low water usage appliances will be used in the proposed development in accordance with best practice. The water supply system has been designed and will be installed in accordance with Irish Water Code of Practice and Standard Details for Water. Confirmation of Feasibility for the development has been received from Irish Water, refer to letter contained in Appendix F. Irish Water have confirmed the development is feasible without upgrade by Irish Water.

The proposed watermain layout and details are shown on Hayes Higgins Partnership drawing within Appendix A.

6. Flood Risk Assessment

A Site Specific Flood Risk Assessment was undertaken by IE Consulting to identify possible sources of flooding and the risk posed to the development, and separately the risk posed to the surrounding areas because of the development. Per the report the risk of flooding to the development and surrounding areas is not an issue. Refer to Appendix E.

7. Services Design Summary

The proposed Surface water drainage system has been set up to ensure that adequate self-cleansing velocities are obtained, in accordance with the Building Regulations, and to comply fully with the Greater Dublin Regional Code of Practice for Drainage Works. The SuDS design for the site is in compliance with current guidelines. Similarly, the proposed Foul drainage system has been set up to ensure that adequate self-cleansing velocities are obtained for partial flows under design loading, in accordance with the Building Regulations and Irish Water Code of Practice and Standard Details for Water & Wastewater.

Appendix A – Proposed Layout Drawings

Appendix B – Site Invetigation

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

Ground Investigations Ireland

St. John's Convent, Rathangan

Sophia Housing Association Ltd.

Ground Investigation Report

April 2021

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

DOCUMENT CONTROL SHEET

Project Title	St. John's Convent, Rathangan
Engineer	Hayes Higgins Partnership
Client	Sophia Housing Association Ltd.
Project No	10363-02-21
Document Title	Ground Investigation Report

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
0	Draft	S Graydon	J Cashen	B Sexton	Dublin	23 April 2021

Ground Investigations Ireland Ltd. present the results of the fieldworks and laboratory testing in accordance with the specification and related documents provided by or on behalf of the client. The possibility of variation in the ground and/or groundwater conditions between or below exploratory locations or due to the investigation techniques employed must be taken into account when this report and the appendices inform designs or decisions where such variation may be considered relevant. Ground and/or groundwater conditions may vary due to seasonal, man-made or other activities not apparent during the fieldworks and no responsibility can be taken for such variation. The data presented and the recommendations included in this report and associated appendices are intended for the use of the client and the client's geotechnical representative only and any duty of care to others is excluded unless approved in writing.

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

CONTENTS

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

APPENDICES

1.0 Preamble

On the instructions of Hayes Higgins Partnership, a site investigation was carried out by Ground Investigations Ireland Ltd., between March and April 2021 at the site of the proposed housing development in Rathangan, Co. Kildare.

2.0 Overview

2.1. Background

It is proposed to construct a new housing development with associated services, access roads and car parking at the proposed site. The site is currently occupied by St. Johns Convent and gardens with a greenfield to the North of the site and is situated near the centre of Rathangan Village. The proposed construction is envisaged to consist of conventional foundations and pavement make up with some local excavations for services and plant.

2.2. Purpose and Scope

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out 2 No. Trial Pits to a maximum depth of 3.00m BGL
- Carry out 7 No. Foundation Inspection Pits to determine existing foundation details
- Carry out 1 No. Soakaways to determine a soil infiltration value to BRE digest 365
- Carry out 5 No. Dynamic Probes to determine soil strength/density characteristics
- Carry out 2 No. Plate bearing tests to determine the modulus of subgrade reaction and equivalent CBR values
- Geotechnical & Environmental Laboratory testing
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.
The procedures used in this site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

3.2. Trial Pits

The trial pits were excavated using a 7.5T JCB 3CX excavator at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged and photographed by a Geotechnical Engineer/Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 of this Report.

3.3. Foundation Pits

The foundation inspection pits were excavated at the locations shown in the exploratory hole location plan in Appendix 1. The exposed foundations were logged and sketched prior to backfilling and reinstatement. The logs and sketches are provided in Appendix 3 of this Report.

3.4. Soakaway Testing

The soakaway testing was carried out in a selected trial pit at the location shown in the exploratory hole location plan in Appendix 1. This pit was carefully excavated and filled with water to assess the infiltration characteristics of the proposed site. The pit was allowed to drain and the drop in water level was recorded over time as required by BRE Digest 365. The pit was logged prior to completing the soakaway test and were backfilled with arising's upon completion. The soakaway test result is provided in Appendix 4 of this Report.

3.5. Dynamic Probing

The dynamic probe tests (DPH) were carried out at the locations shown in the location plan in Appendix 1 in accordance with B.S. 1377: Part 9 1990. The test consists of mechanically driving a cone with a 50kg weight in 100mm intervals and monitoring the number of blows required. An equivalent Standard Penetration Test (SPT) 'N' value may be calculated by dividing the total number of blows over a 300mm drive length by 1.5. The dynamic probe logs are provided in Appendix 5 of this Report.

3.6. Surveying

The exploratory hole locations have been recorded using a Trimble R10 GNSS System which records the coordinates and elevation of the locations to ITM as required by the project specification. The coordinates and elevations are provided on the exploratory hole logs in the appendices of this Report.

3.7. Insitu Plate Bearing Test

The plate bearing tests were carried out using a 457mm diameter plate at the locations shown on the site plan in Appendix 1. The plate was loaded in increments using a hydraulic jack and an excavator to provide a reaction and the displacement was monitored in accordance with BS1377 Part 9 using independently

mounted digital strain gauges. The constrained modulus and equivalent CBR are calculated in accordance with HD29/75 and are provided on the test reports in Appendix 6 of this Report.

3.8. Laboratory Testing

Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design.
Environmental & Chemical testing as required by the specification, including the Rilta Suite, pH and sulphate testing was carried out by Element Materials Technology Laboratory in the UK. The Rilta suite testing includes both Solid Waste and Leachate Waste Acceptance Criteria.
Geotechnical testing consisting of moisture content, Atterberg limits, and Particle Size Distribution (PSD) tests were carried out in NMTL's Geotechnical Laboratory in Carlow.
The results of the laboratory testing are included in Appendix 7 of this Report.

4.0 Ground Conditions

4.1. General

The ground conditions encountered during the investigation are summarised below with reference to insitu and laboratory test results. The full details of the strata encountered during the ground investigation are provided in the exploratory hole logs included in the appendices of this report.

The sequence of strata encountered were variable across the site but generally comprised;

- Topsoil
- Made Ground
- Cohesive Deposits
- Granular Deposits

TOPSOIL: Topsoil was encountered in all the exploratory holes and was present to a maximum depth of 0.4m BGL.

MADE GROUND: Made Ground deposits were encountered beneath the Topsoil at the majority of locations and were present to a relatively consistent depth of between 0.65m and 1.00m BGL. These deposits were described generally as *brown slightly sandy slightly gravelly Clay with many cobbles* and contained *occasional fragments of concrete, red brick, tarmac, glass and plastic.* At the locations of TP03, TP11 and TP12, made ground was described as *brown slightly organic clayey very gravelly Sand with some cobbles* and contained *occasional large fragments of brick, concrete, clay pipe, ceramic and plastic.*

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Topsoil and/or Made Ground and were described typically as *brown/grey slightly sandy slightly gravelly CLAY with occasional cobbles*

and boulders. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. These deposits had occasional, some or many cobble and boulder content where noted on the exploratory hole logs.

GRANULAR DEPOSITS: The granular deposits were encountered below the cohesive deposits and/or made ground deposits at the majority of locations and were typically described as *light grey silty gravelly very clayey fine to coarse SAND.* At the location of SA01*, a grey very sandy subangular to subrounded fine to coarse GRAVEL* was encountered below the cohesive deposits. The secondary gravel and silt/clay constituents varied across the site and with depth while occasional, some or many cobble and boulder content also present where noted on the exploratory hole logs.

4.2. Insitu Strength Testing

The correlated DPH blow counts indicate that the overburden deposits are soft or soft to firm to depth of 0.70m to 0.80m BGL and become firm or firm to stiff with depth.

4.3. Groundwater

No groundwater was noted during the investigation however we would point out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the time of year, rainfall, nearby construction and other factors.

4.4. Laboratory Testing

4.4.1. Geotechnical Laboratory Testing

To be included in final report.

4.4.2. Chemical Laboratory Testing

To be included in final report.

4.4.3. Environmental Laboratory Testing

A number of samples were analysed for a suite of parameters which allows for the assessment of the sampled material in terms of total pollutant content for classification of materials as *hazardous* or *non-hazardous*. The suite also allows for the assessment of the sampled material in terms of suitability for placement at licenced landfills (inert, stable non-reactive, hazardous etc.). The parameter list for the suite includes analysis of the solid samples for arsenic, barium, cadmium, chromium, copper, cyanide, lead, nickel, mercury, zinc, speciated aliphatic and aromatic petroleum hydrocarbons, pH, sulphate, sulphide, moisture content, soil organic matter and an asbestos screen.

The suite also includes those parameters specified in the EU Council Decision establishing criteria for the acceptance of waste at Landfills (Council Decision 2003/33/EC), which for the solid samples are total organic carbon (TOC), speciated aliphatic and aromatic petroleum hydrocarbons, BTEX, phenol, polychlorinated biphenyls (PCB) and PAH.
As part of the suite a leachate is generated from the solid sample which is analysed for antimony, arsenic, barium, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, chloride, fluoride, soluble sulphate, sulphide, phenols, dissolved organic carbon (DOC) and total dissolved solids (TDS).
While the laboratory report provides a comparison with the waste acceptance criteria limits it does not provide a waste classification of the material sampled nor does it comment on any potentially hazardous properties of the materials tested. The possibility for contamination, not revealed by the testing undertaken should be borne in mind particularly where Made Ground deposits are present or the previous site use or location indicate a risk of environmental variation. The waste classification report is included under the cover of a sperate report by Ground Investigations Ireland.

The results from the completed laboratory testing are included in Appendix 7 of this report.

5.0 Recommendations & Conclusions.

5.1. General

The recommendations given and opinions expressed in this report are based on the findings as detailed in the exploratory hole records. Where an opinion is expressed on the material between exploratory hole locations, this is for guidance only and no liability can be accepted for its accuracy. No responsibility can be accepted for conditions which have not been revealed by the exploratory holes. Limited information has been provided at the ground investigation stage and any designs based on the recommendations or conclusions should be completed in accordance with the current design codes, taking into account the variation and the specific details contained within the exploratory hole logs.

5.2. Foundations

An indicative allowable bearing capacity of 100 kN/m^2 is recommended for conventional strip or pad foundations on the firm to stiff cohesive deposits or medium dense granular deposits at a depth of 1.00m BGL. These recommendations need to be verified by the completion of cable percussion boreholes due on site. The possibility for variation in the depth of the made ground in the vicinity of these foundations should be considered and foundation inspections should be carried out. Any soft spots encountered at the proposed foundation depths should be excavated and replaced with lean mix concrete.

A ground bearing floor slab is recommended to be based on the firm to stiff cohesive deposits with an appropriate depth of compacted hardcore specified by the consulting engineer and in accordance with the limits and guidelines in SR21:2014 +A1:2016 and/or NRA SRW CL808 Type E granular stone fill. Where the depth of Made Ground/Soft deposits exceeds 0.9m then suspended floor slabs should be considered.

5.3. External Pavements

The proposed pavements are recommended to be designed in accordance with the CBR test results included in the Appendixes of this Report. The low CBR test results indicate that a capping layer or a sufficient depth of crushed stone fill may be required. Plate bearing tests are recommended at the time of construction to verify the design assumptions for the proposed pavement make up and to verify adequate compaction has been achieved.

The use of a geogrid and separation membrane may improve the performance of the proposed pavement and enable a more economical pavement design to be achieved, a specialist supplier is recommended to advise of the required strength, depth and type of geotextile for the proposed design.

5.4. Excavations

Short term temporary excavations in the cohesive deposits will remain stable for a limited time only and will require to be appropriately battered or the sides supported if the excavation is below 1.25m BGL or is required to permit man entry.

Excavations in the Made Ground, or soft Cohesive Deposits will require to be appropriately battered or the sides supported due to the low strength of these deposits.

Any excavations which penetrate the granular deposits will require to be appropriately battered or the sides supported and are likely to require dewatering.

The groundwater and stability noted on the trial pit logs should be consulted when determining the most appropriate construction methods for excavations.

Any waste material to be removed off site should be disposed of to a suitably licenced landfill.

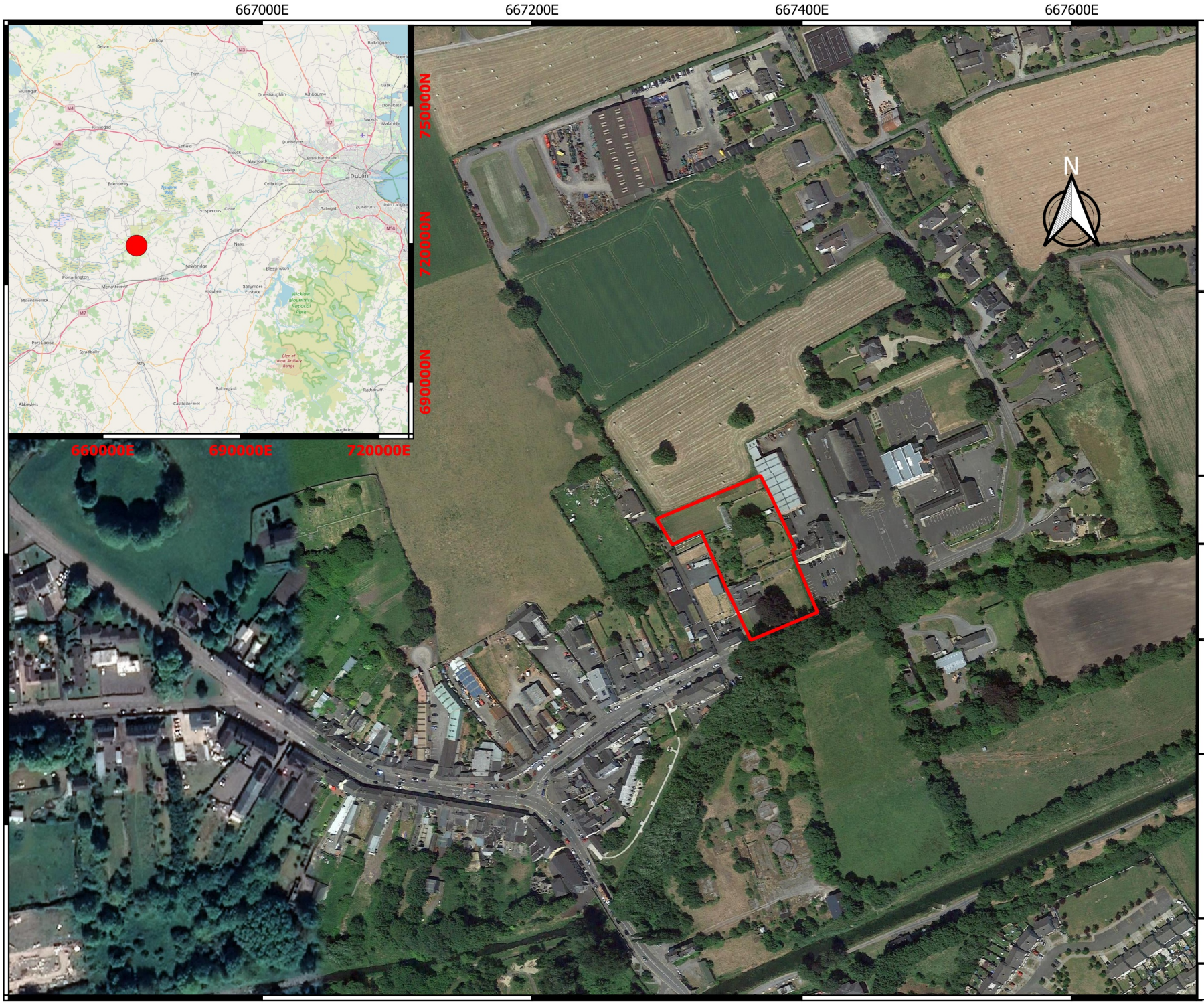
The environmental testing completed during the ground investigation is reported under the cover of a separate GII Waste Classification Report.

5.5. Soakaway Design

An infiltration rate of f = 7.32 x 10^{-6} m/s was calculated for the soakaway location SA01.

The recommendations provided in this report should be verified in the design of the proposed buildings, using the full details of the loading conditions and taking into consideration the allowable tolerable settlements/movements that the building can accommodate. The founding strata should be inspected and verified by a suitably qualified engineer prior to construction of the building foundations.

APPENDIX 1 - Site Location Plan



Engineer:

HAYES HIGGINS PARTNERSHIP

Project Code:

10363-02-21

Project Title:

St. John's Convent, Rathangan

Drawing Title:

Figure 1 - Site Location

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

0 25 50 75 100 125 150 m

Drawn By:	Date:
SG	12/04/2021

Trial Pit
Foundation Pit
Soakaway Pit
Plate Bearing Test
Dynamic Probe
Indicative Site Boundary

Engineer:

HAYES HIGGINS PARTNERSHIP

Project Code:
10363-02-21

Project Title:
St. John's Convent,
Rathangan

Drawing Title:
Figure 2 - SI Locations

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental
Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,
Newcastle, Co. Dublin
www.gii.ie 01-6015175/5176

0 5 10 15 20 25 30 m

Drawn By:	Date:
SG	12/04/2021

APPENDIX 2 – Trial Pit Records

Ground Investigations Ireland Ltd
www.gii.ie

Site St. John's Convent, Rathangan			**Trial Pit Number** TP01
Machine : 7.5T JCB **Method :** Trial Pit	**Dimensions** 3.20m x 0.60m x 2.80m	**Ground Level (mOD)** 72.59	**Client** Sophia Housing Association Ltd.	**Job Number** 10363-02-21
	Location (dGPS) 667356.8 E 719612.1 N	**Dates** 30/03/2021	**Engineer** Hayes Higgins	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	TOPSOIL		
				72.19	0.40			
					(0.30)	Soft to firm brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to medium		
				71.89	0.70			
1.00	B01					Firm to stiff light greyish brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse		
1.00	ES01				(1.00)			
				70.89	1.70			
2.00	ES02					Firm to stiff brownish grey slightly sandy slightly gravelly CLAY with occasional subrounded cobbles. Gravel is subangular to subrounded fine to coarse		
					(1.10)			
2.50	B02							
				69.79	2.80			
						Complete at 2.80m		

Plan

Remarks

No groundwater encountered
Pit wall stability: Good
Pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	SG	10363-02-21.TP01

Ground Investigations Ireland Ltd
www.gii.ie

Site St. John's Convent, Rathangan			**Trial Pit Number** TP03
Machine : 7.5T JCB **Method :** Trial Pit	**Dimensions** 3.20m x 0.60m x 3.00m	**Ground Level (mOD)** 71.24	**Client** Sophia Housing Association Ltd.	**Job Number** 10363-02-21
	Location (dGPS) 667394 E 719568.4 N	**Dates** 30/03/2021	**Engineer** Hayes Higgins	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
				71.04	0.20	MADE GROUND: Greyish brown slightly organic clayey very gravelly Sand with some subrounded cobbles and occasional large fragments of red brick, concrete and plastic pipe		
0.50 0.50	B01 ES01				(0.70)			
				70.34	0.90	Firm to stiff light grey mottled brown slightly sandy slightly gravelly CLAY with occasional subrounded cobbles. Gravel is subangular to subrounded fine to coarse		
1.50 1.50	B02 ES02				(1.10)			
				69.24	2.00	Medium dense light grey silty gravelly very clayey fine to coarse SAND. Gravel is subrounded fine to coarse		
2.50	B03				(1.00)			
				68.24	3.00	Complete at 3.00m		

Plan

Remarks

No groundwater encountered
Pit wall stability: Good
Pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	SG	10363-02-21.TP03

St. John’s Convent, Rathangan – Trial Pit Photographs

TP01

TP01

St. John’s Convent, Rathangan – Trial Pit Photographs

TP01

TP01

St. John's Convent, Rathangan – Trial Pit Photographs

TP03

TP03

St. John’s Convent, Rathangan – Trial Pit Photographs

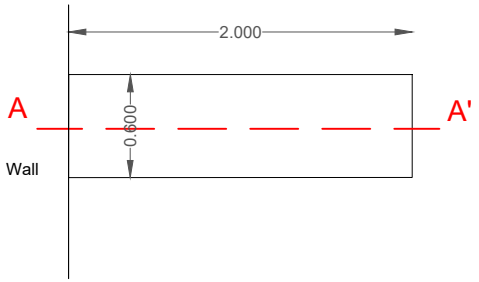
TP03

TP03

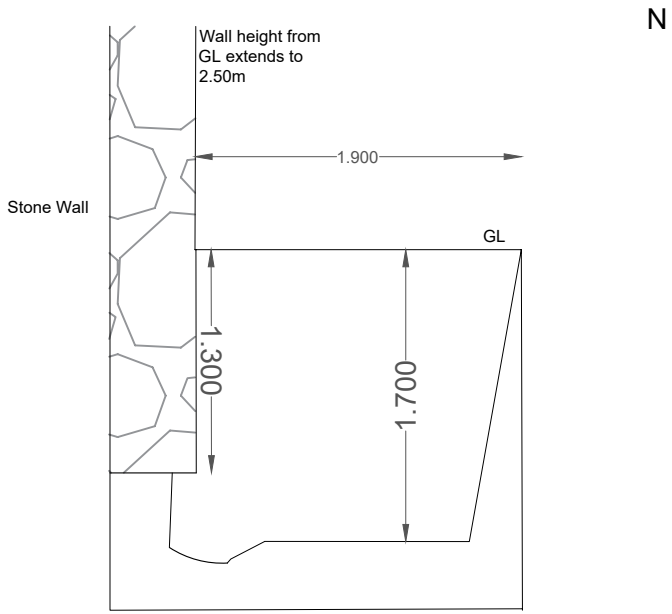
APPENDIX 3 – Foundation Pit Records

TP04

Plan View



X-Section A-A'



From (m)	To (m)	Description
0.00	0.20	TOPSOIL
0.20	0.45	Soft brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse
0.45	1.20	Soft to firm dark brown and red slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse
1.20	1.70	Brownish grey slightly clayey very gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse

Groundwater	Y/N	Depth
	N	-

Sample Type	Sample Depth
B	0.50 - 1.00
ES	0.50

Surface from/to		Surface Type
0.00	1.90	Grass

DATE OF EXCAVATION : 30/03/2021

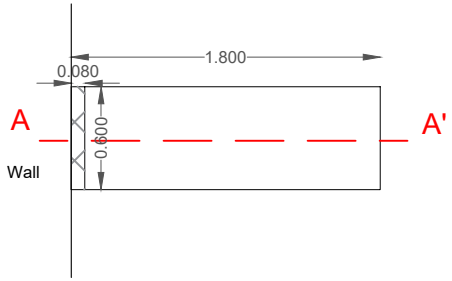
GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

PROJECT:	St. John's Convent, Rathangan
DRAWING No.:	10363-03-21.TP04
DATE:	April 2021
CLIENT:	Hayes Higgins
SCALE:	NTS @ A4

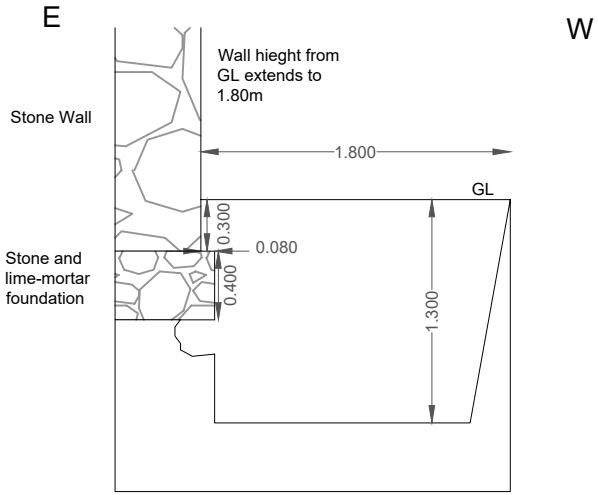
Version:	Date:	Drawn By:	Checked:
	20/04/21	SG	JC

TP07

Plan View



X-Section A-A'



From (m)	To (m)	Description
0.00	0.30	TOPSOIL
0.30	0.80	Soft to firm dark brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse
0.80	1.30	Soft to firm light greyish brown slightly sandy slightly gravelly CLAY with occasional subrounded cobbles. Gravel is subangular to subrounded fine to coarse

Groundwater	Y/N	Depth
	N	-

Sample Type	Sample Depth
ES	0.50

Surface from/to		Surface Type
0.00	1.80	Grass

DATE OF EXCAVATION : 30/03/2021

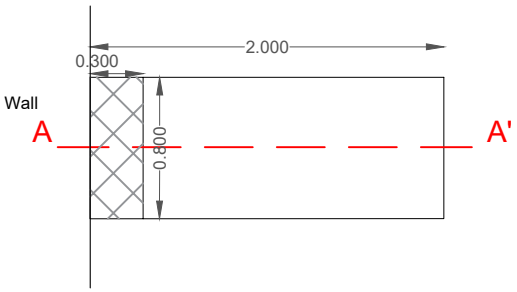
GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

PROJECT:	St. John's Convent, Rathangan
DRAWING No.:	10363-03-21.TP07
DATE:	April 2021
CLIENT:	Hayes Higgins
SCALE:	NTS @ A4

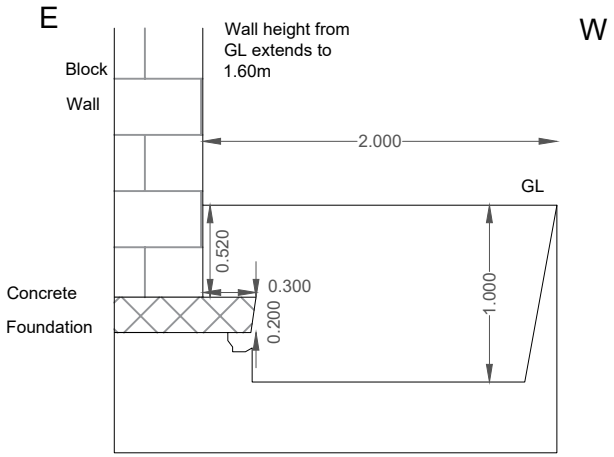
Version:	Date:	Drawn By:	Checked:
	20/04/21	SG	JC

TP08

Plan View



X-Section A-A'



From (m)	To (m)	Description
0.00	0.20	MADE GROUND - TOPSOIL
0.20	0.70	MADE GROUND: Brown slightly gravelly sandy Clay with occasional pieces of red brick, tarmac and concrete and lenses of light brown slightly clayey very gravelly Sand
0.70	1.00	Greyish brown slightly clayey very gravelly SAND with some subrounded cobbles. Gravel is subangular to subrounded fine to coarse

Groundwater	Y/N	Depth
	N	-

Sample Type	Sample Depth
B	0.20 - 0.70
ES	0.5

Surface from/to		Surface Type
0.00	2.00	Grass

DATE OF EXCAVATION : 31/03/2021

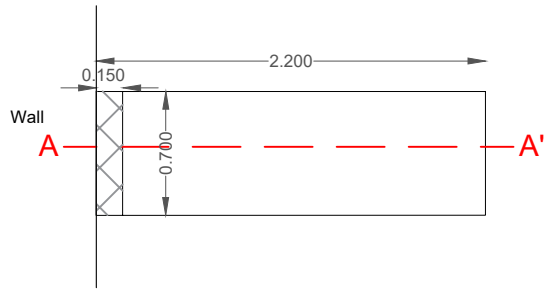
GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

PROJECT:	St. John's Convent, Rathangan
DRAWING No.:	10363-03-21.TP08
DATE:	April 2021
CLIENT:	Hayes Higgins
SCALE:	NTS @ A4

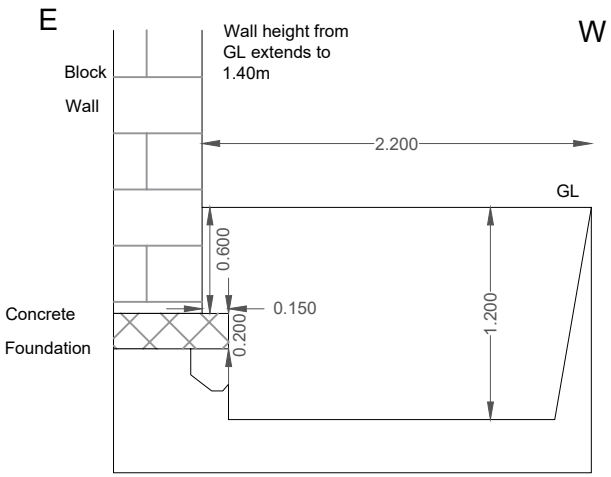
Version:	Date:	Drawn By:	Checked:
	20/04/21	SG	JC

TP09

Plan View



X-Section A-A'



From (m)	To (m)	Description
0.00	0.10	TOPSOIL
0.10	0.80	MADE GROUND: Dark brown slightly gravelly sandy CLAY with rootlets and rare fragments of red brick
0.80	1.20	Light grey clayey very gravelly fine to coarse SAND. Gravel is subangular to subrounded fine to coarse

Groundwater	Y/N	Depth
	N	-

Sample Type	Sample Depth
ES	0.5

Surface from/to		Surface Type
0.00	2.20	Grass

DATE OF EXCAVATION : 31/03/2021

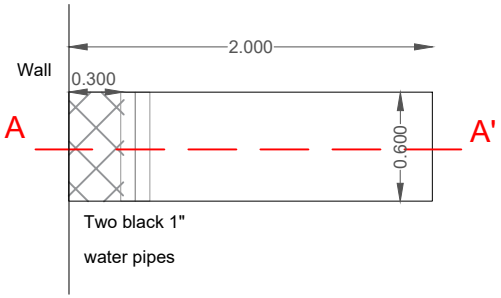
GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

PROJECT:	St. John's Convent, Rathangan
DRAWING No.:	10363-03-21.TP09
DATE:	April 2021
CLIENT:	Hayes Higgins
SCALE:	NTS @ A4

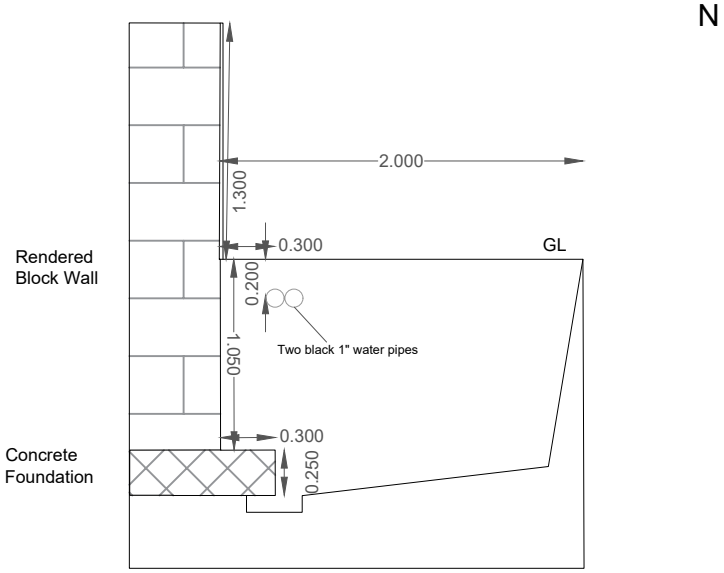
Version:	Date:	Drawn By:	Checked:
	20/04/21	SG	JC

TP10

Plan View



X-Section A-A'



From (m)	To (m)	Description
0.00	0.10	TOPSOIL
0.10	0.30	MADE GROUND: Brown slightly sandy slightly gravelly organic Clay with rootlets
0.30	1.00	MADE GROUND: Grey slightly sandy gravelly Clay with many subrounded cobbles and occasional fragments of plastic and red brick
1.00	1.30	Firm grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse

Groundwater	Y/N	Depth
	N	-

Sample Type	Sample Depth
B	0.30 - 1.00
ES	0.5

Surface from/to		Surface Type
0.00	2.00	Grass

DATE OF EXCAVATION : 30/03/2021

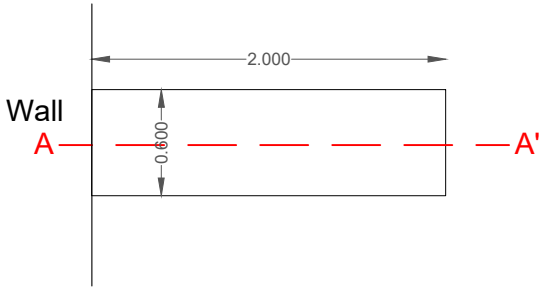
GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

PROJECT:	St. John's Convent, Rathangan
DRAWING No.:	10363-03-21.TP10
DATE:	April 2021
CLIENT:	Hayes Higgins
SCALE:	NTS @ A4

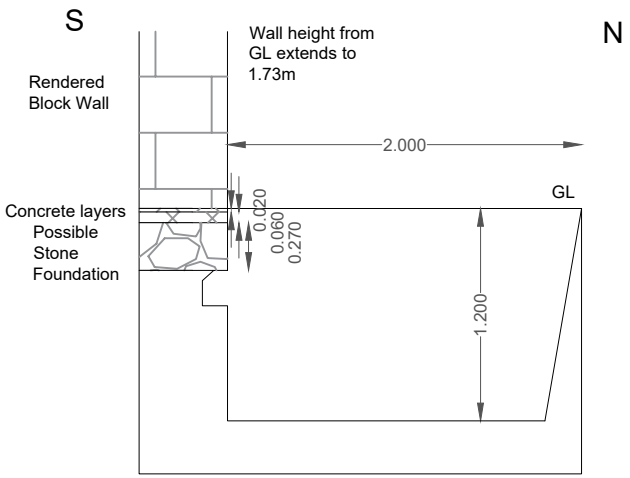
Version:	Date:	Drawn By:	Checked:
	20/04/21	SG	JC

TP11

Plan View



X-Section A-A'



From (m)	To (m)	Description
0.00	0.10	TOPSOIL
0.10	0.25	MADE GROUND: Greyish brown slightly sandy slightly gravelly Clay with rootlets and rare fragments of plastic
0.25	0.80	MADE GROUND: Light grey slightly clayey very gravelly SAND with some subangular to subrounded cobbles and occasional fragments of clay pipe ceramics and red brick
0.80	1.20	Light brownish grey slightly clayey gravelly fine to coarse SAND with some subrounded cobbles. Gravel is subangular to subrounded fine to coarse

Groundwater	Y/N	Depth
	N	-

Sample Type	Sample Depth
B	0.80 - 1.20
ES	0.5

Surface from/to		Surface Type
0.00	2.00	Grass

DATE OF EXCAVATION : 31/03/2021

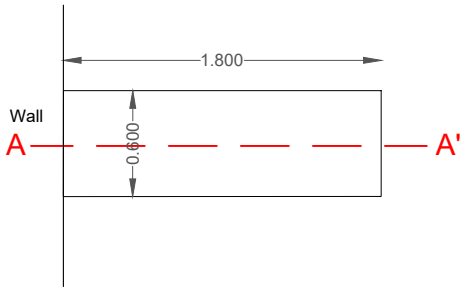
GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

PROJECT:	St. John's Convent, Rathangan
DRAWING No.:	10363-03-21.TP11
DATE:	April 2021
CLIENT:	Hayes Higgins
SCALE:	NTS @ A4

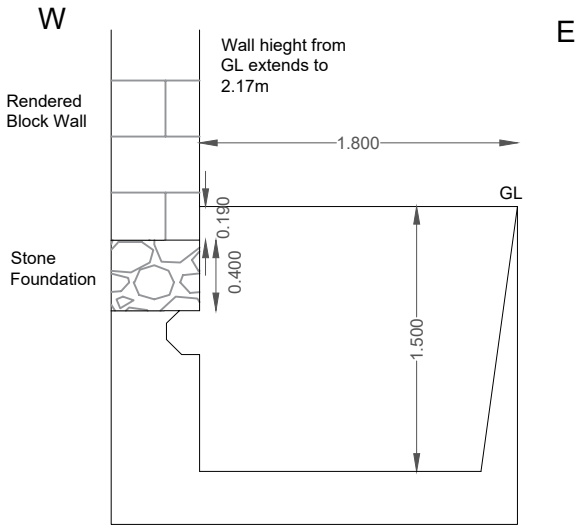
Version:	Date:	Drawn By:	Checked:
	20/04/21	SG	JC

TP12

Plan View



X-Section A-A'



From (m)	To (m)	Description
0.00	0.10	TOPSOIL
0.10	0.30	MADE GROUND: Dark brown slightly gravelly sandy organic Clay with rootlets
0.30	0.65	MADE GROUND Greyish brown clayey gravelly fine to coarse Sand with some subrounded cobbles, pockets of clay and occasional pieces of concrete, red and yellow brick
0.65	1.10	Firm dark grey mottled brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse
1.10	1.50	Firm brownish grey slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse

Groundwater	Y/N	Depth
	N	-

Sample Type	Sample Depth
B	0.70 - 1.10
ES	0.5

Surface from/to		Surface Type
0.00	1.80	Grass

DATE OF EXCAVATION : 31/03/2021

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

PROJECT:	St. John's Convent, Rathangan
DRAWING No.:	10363-03-21.TP12
DATE:	April 2021
CLIENT:	Hayes Higgins
SCALE:	NTS @ A4

Version:	Date:	Drawn By:	Checked:
	20/04/21	SG	JC

St. John’s Convent, Rathangan – Foundation Pit Photographs

TP04

TP04

St. John’s Convent, Rathangan – Foundation Pit Photographs

TP04

TP04

St. John’s Convent, Rathangan – Foundation Pit Photographs

TP07

TP07

St. John’s Convent, Rathangan – Foundation Pit Photographs

TP07

TP07

St. John’s Convent, Rathangan – Foundation Pit Photographs

TP08

TP08

St. John’s Convent, Rathangan – Foundation Pit Photographs

TP08

TP08

St. John’s Convent, Rathangan – Foundation Pit Photographs

TP09

TP09

St. John’s Convent, Rathangan – Foundation Pit Photographs

TP09

TP09

St. John’s Convent, Rathangan – Foundation Pit Photographs

TP10

TP10

St. John’s Convent, Rathangan – Foundation Pit Photographs

TP10

TP10

St. John’s Convent, Rathangan – Foundation Pit Photographs

TP10

TP11

St. John’s Convent, Rathangan – Foundation Pit Photographs

TP11

TP11

St. John’s Convent, Rathangan – Foundation Pit Photographs

TP11

TP12

St. John’s Convent, Rathangan – Foundation Pit Photographs

TP12

TP12

St. John’s Convent, Rathangan – Foundation Pit Photographs

TP12

TP12

APPENDIX 4 – Soakaway Testing Records

Ground Investigations Ireland Ltd
www.gii.ie

Site St. John's Convent, Rathangan			**Trial Pit Number** SA01
Machine : 7.5T JCB **Method :** Trial Pit	**Dimensions** 2.00m x 0.50m x 1.50m	**Ground Level (mOD)** 71.96	**Client** Sophia Housing Association Ltd.	**Job Number** 10363-02-21
	Location (dGPS) 667369.3 E 719598.8 N	**Dates** 30/03/2021	**Engineer** Hayes Higgins	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20)	TOPSOIL		
				71.76	0.20	Soft to firm light brown slightly sandy slightly gravelly CLAY. Gravel is subangular to subrounded fine to coarse		
0.50	B01				(0.50)			
				71.26	0.70	Medium dense grey very sandy subangular to subrounded fine to coarse GRAVEL		
1.00	B02				(0.80)			
				70.46	1.50	Complete at 3.00m		

Plan

Remarks

No groundwater encountered
Pit wall stability: Good
Pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	SG	10363-02-21.TP03

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
Co. Dublin.
D22 YD52

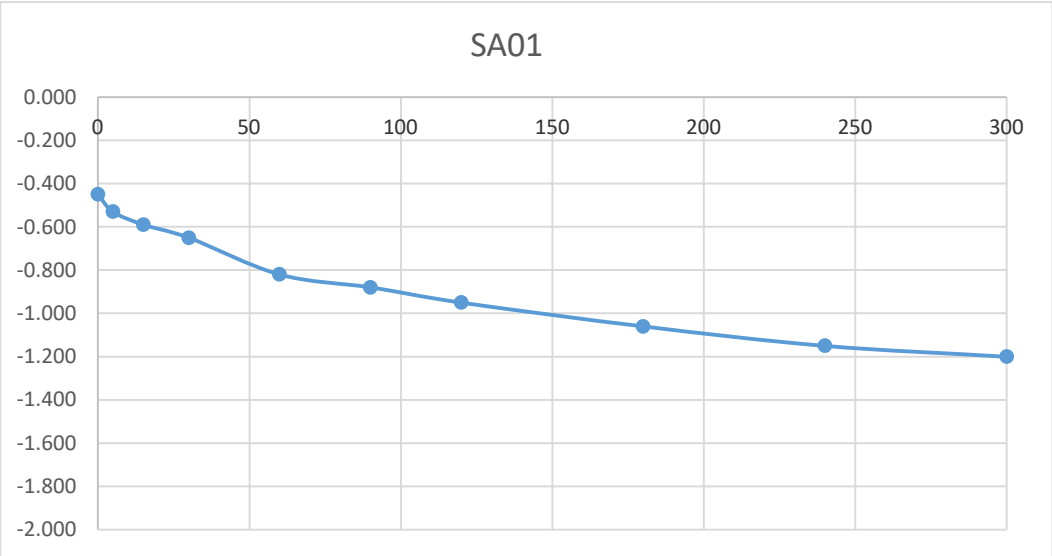
Tel: 01 601 5175 / 5176
Email: info@gii.ie
Web: www.gii.ie

SA01

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.00m x 0.50m 1.50m (L x W x D)

Date	Time	Water level (m bgl)
30/03/2021	0	-0.450
30/03/2021	5	-0.530
30/03/2021	15	-0.590
30/03/2021	30	-0.650
30/03/2021	60	-0.820
30/03/2021	90	-0.880
30/03/2021	120	-0.950
30/03/2021	180	-1.060
30/03/2021	240	-1.150
30/03/2021	300	-1.200
30/03/2021	360	-1.250

Start depth	Depth of Pit		Diff	75% full	25%full
0.45	**1.500**		**1.050**	**0.7125**	**1.2375**
Length of pit (m)	Width of pit (m)			75-25Ht (m)	Vp75-25 (m3)
2.000	0.500			0.525	0.53
Tp75-25 (from graph) (s)		**19800**		50% Eff Depth	ap50 (m2)
				0.525	3.625
f =	**7.315E-06**	**m/s**			



St. John's Convent, Rathangan – Soakaway Test Photographs

SA01

SA01

St. John’s Convent, Rathangan – Soakaway Test Photographs

SA01

SA01

St. John’s Convent, Rathangan – Soakaway Test Photographs

SA01

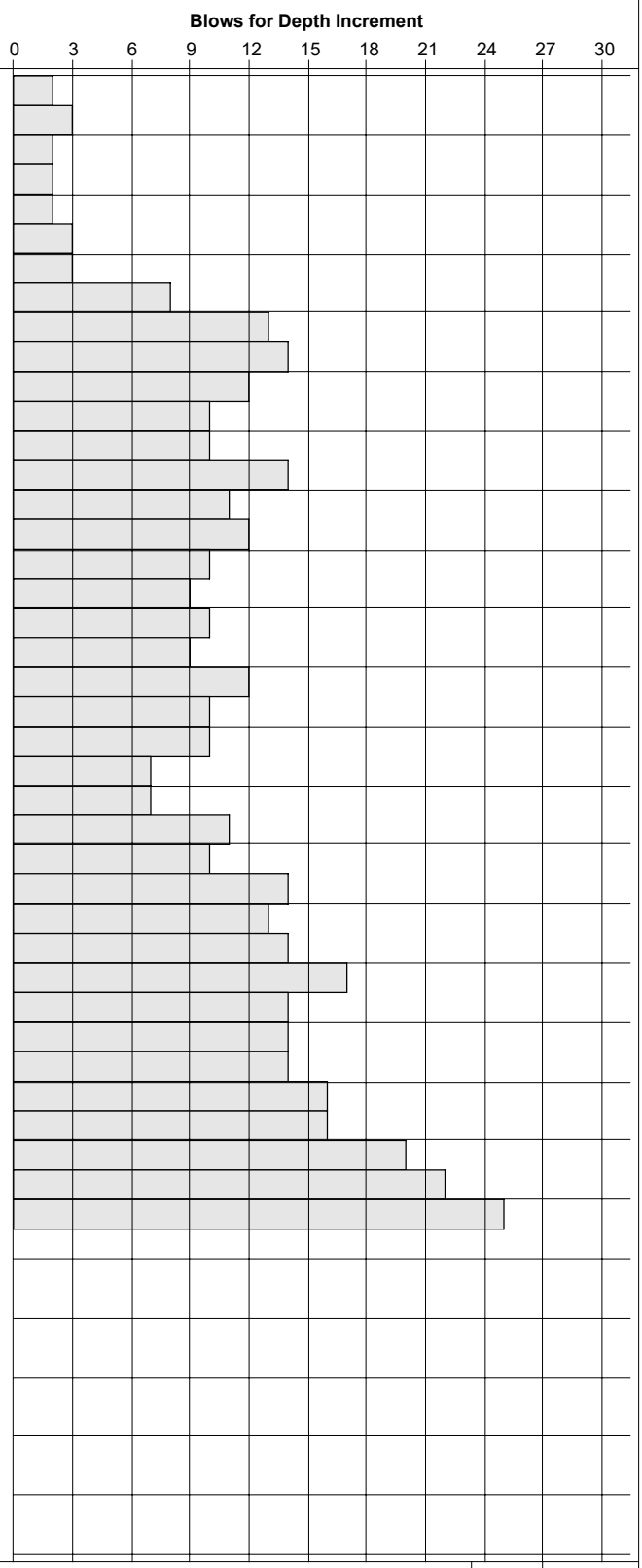
APPENDIX 5 – Dynamic Probe Records

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
St. John's Convent, Rathangan	DPH01

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), fall height 500mm, hammer weight 50kg	Diameter 43.7mm	72.58	Sophia Housing Association Ltd.	10363-02-21
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	667354.3 E 719613 N	22/04/2021	Hayes Higgins	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		72.58	0.00
0.10-0.20	3			
0.20-0.30	2			
0.30-0.40	2			
0.40-0.50	2			
0.50-0.60	3		72.08	0.50
0.60-0.70	3			
0.70-0.80	8			
0.80-0.90	13			
0.90-1.00	14			
1.00-1.10	12		71.58	1.00
1.10-1.20	10			
1.20-1.30	10			
1.30-1.40	14			
1.40-1.50	11			
1.50-1.60	12		71.08	1.50
1.60-1.70	10			
1.70-1.80	9			
1.80-1.90	10			
1.90-2.00	9			
2.00-2.10	12		70.58	2.00
2.10-2.20	10			
2.20-2.30	10			
2.30-2.40	7			
2.40-2.50	7			
2.50-2.60	11		70.08	2.50
2.60-2.70	10			
2.70-2.80	14			
2.80-2.90	13			
2.90-3.00	14			
3.00-3.10	17		69.58	3.00
3.10-3.20	14			
3.20-3.30	14			
3.30-3.40	14			
3.40-3.50	16			
3.50-3.60	16		69.08	3.50
3.60-3.70	20			
3.70-3.80	22			
3.80-3.90	25			
			68.58	4.00
			68.08	4.50
			67.58	5.00



Remarks
Refuasl at 3.90m BGL

Scale (approx)	Logged By
1:25	PC

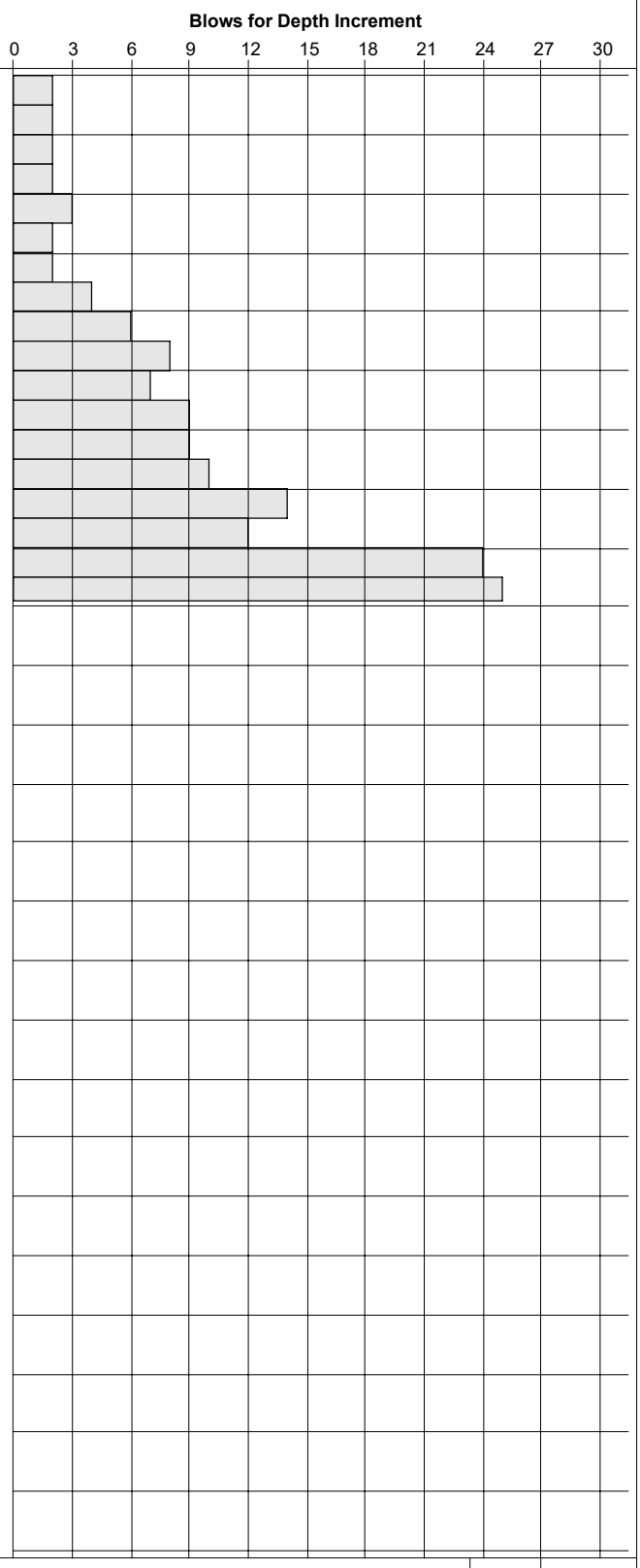
Figure No.
10363-02-21.DPH01

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
St. John's Convent, Rathangan	DPH02

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), fall height 500mm, hammer weight 50kg	Diameter 43.7mm	73.43	Sophia Housing Association Ltd.	10363-02-21
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	667331.4 E 719624.3 N	22/04/2021	Hayes Higgins	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		73.43	0.00
0.10-0.20	2			
0.20-0.30	2			
0.30-0.40	2			
0.40-0.50	3			
0.50-0.60	2		72.93	0.50
0.60-0.70	2			
0.70-0.80	4			
0.80-0.90	6			
0.90-1.00	8			
1.00-1.10	7		72.43	1.00
1.10-1.20	9			
1.20-1.30	9			
1.30-1.40	10			
1.40-1.50	14			
1.50-1.60	12		71.93	1.50
1.60-1.70	24			
1.70-1.78	25			
			71.43	2.00
			70.93	2.50
			70.43	3.00
			69.93	3.50
			69.43	4.00
			68.93	4.50
			68.43	5.00



Remarks
Refusal at 1.78m BGL

Scale (approx)	Logged By
1:25	PC

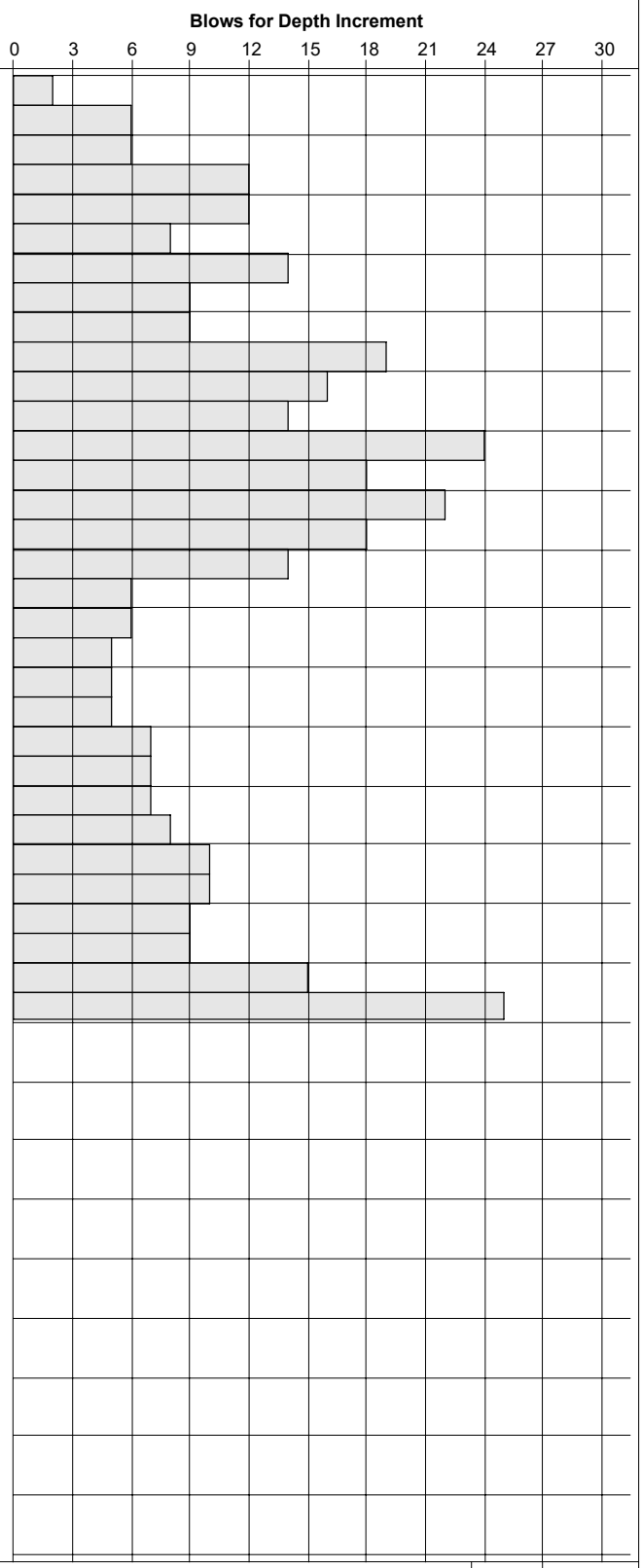
Figure No.
10363-02-21.DPH02

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
St. John's Convent, Rathangan	DPH03

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), fall height 500mm, hammer weight 50kg	Diameter 43.7mm	71.19	Sophia Housing Association Ltd.	10363-02-21
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	667393.3 E 719569.8 N	22/04/2021	Hayes Higgins	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		71.19	0.00
0.10-0.20	6			
0.20-0.30	6			
0.30-0.40	12			
0.40-0.50	12			
0.50-0.60	8		70.69	0.50
0.60-0.70	14			
0.70-0.80	9			
0.80-0.90	9			
0.90-1.00	19			
1.00-1.10	16		70.19	1.00
1.10-1.20	14			
1.20-1.30	24			
1.30-1.40	18			
1.40-1.50	22			
1.50-1.60	18		69.69	1.50
1.60-1.70	14			
1.70-1.80	6			
1.80-1.90	6			
1.90-2.00	5			
2.00-2.10	5		69.19	2.00
2.10-2.20	5			
2.20-2.30	7			
2.30-2.40	7			
2.40-2.50	7			
2.50-2.60	8		68.69	2.50
2.60-2.70	10			
2.70-2.80	10			
2.80-2.90	9			
2.90-3.00	9			
3.00-3.10	15		68.19	3.00
3.10-3.19	25			
			67.69	3.50
			67.19	4.00
			66.69	4.50
			66.19	5.00



Remarks
Refusal at 3.19m BGL

Scale (approx)	Logged By
1:25	PC

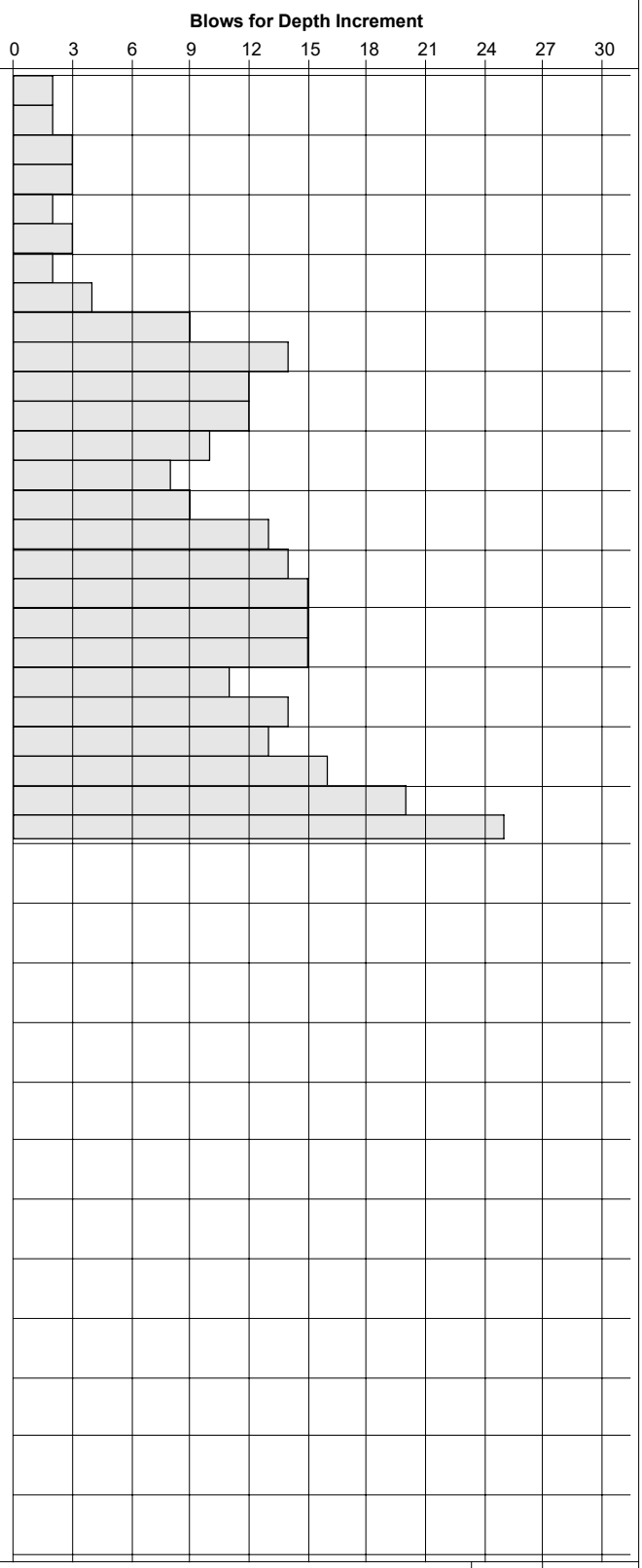
Figure No.
10363-02-21.DPH03

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
St. John's Convent, Rathangan	DPH04

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), fall height 500mm, hammer weight 50kg	Diameter 43.7mm	72.12	Sophia Housing Association Ltd.	10363-02-21
	Location (dGPS)	**Dates**	**Engineer**	**Sheet**
	667374.3 E 719599.8 N	22/04/2021	Hayes Higgins	1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)	Depth (m)
0.00-0.10	2		72.12	0.00
0.10-0.20	2			
0.20-0.30	3			
0.30-0.40	3			
0.40-0.50	2			
0.50-0.60	3		71.62	0.50
0.60-0.70	2			
0.70-0.80	4			
0.80-0.90	9			
0.90-1.00	14			
1.00-1.10	12		71.12	1.00
1.10-1.20	12			
1.20-1.30	10			
1.30-1.40	8			
1.40-1.50	9			
1.50-1.60	13		70.62	1.50
1.60-1.70	14			
1.70-1.80	15			
1.80-1.90	15			
1.90-2.00	15			
2.00-2.10	11		70.12	2.00
2.10-2.20	14			
2.20-2.30	13			
2.30-2.40	16			
2.40-2.50	20			
2.50-2.58	25		69.62	2.50
			69.12	3.00
			68.62	3.50
			68.12	4.00
			67.62	4.50
			67.12	5.00



Remarks
Refusal at 2.58m BGL

Scale (approx)	Logged By
1:25	PC

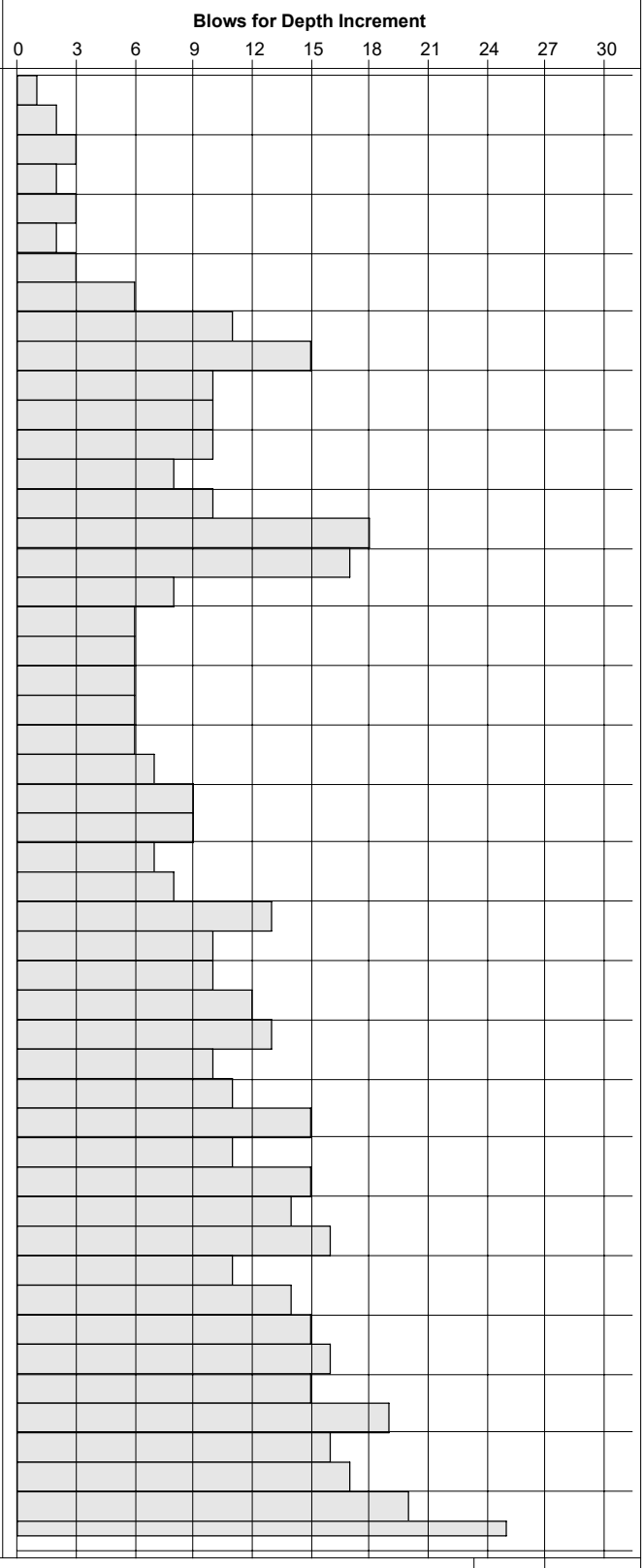
Figure No.
10363-02-21.DPH04

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
St. John's Convent, Rathangan	DPH05

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Probe Heavy (DPH), fall height 500mm, hammer weight 50kg			Sophia Housing Association Ltd.	10363-02-21
	Location (dGPS)	**Dates** 22/04/2021	**Engineer** Hayes Higgins	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	1		
0.10-0.20	2		
0.20-0.30	3		
0.30-0.40	2		
0.40-0.50	3		
0.50-0.60	2		
0.60-0.70	3		
0.70-0.80	6		
0.80-0.90	11		
0.90-1.00	15		
1.00-1.10	10		
1.10-1.20	10		
1.20-1.30	10		
1.30-1.40	8		
1.40-1.50	10		
1.50-1.60	18		
1.60-1.70	17		
1.70-1.80	8		
1.80-1.90	6		
1.90-2.00	6		
2.00-2.10	6		
2.10-2.20	6		
2.20-2.30	6		
2.30-2.40	7		
2.40-2.50	9		
2.50-2.60	9		
2.60-2.70	7		
2.70-2.80	8		
2.80-2.90	13		
2.90-3.00	10		
3.00-3.10	10		
3.10-3.20	12		
3.20-3.30	13		
3.30-3.40	10		
3.40-3.50	11		
3.50-3.60	15		
3.60-3.70	11		
3.70-3.80	15		
3.80-3.90	14		
3.90-4.00	16		
4.00-4.10	11		
4.10-4.20	14		
4.20-4.30	15		
4.30-4.40	16		
4.40-4.50	15		
4.50-4.60	19		
4.60-4.70	16		
4.70-4.80	17		
4.80-4.90	20		
4.90-4.95	25		



Remarks
Refusal at 4.95m BGL

Scale (approx)	Logged By
1:25	PC

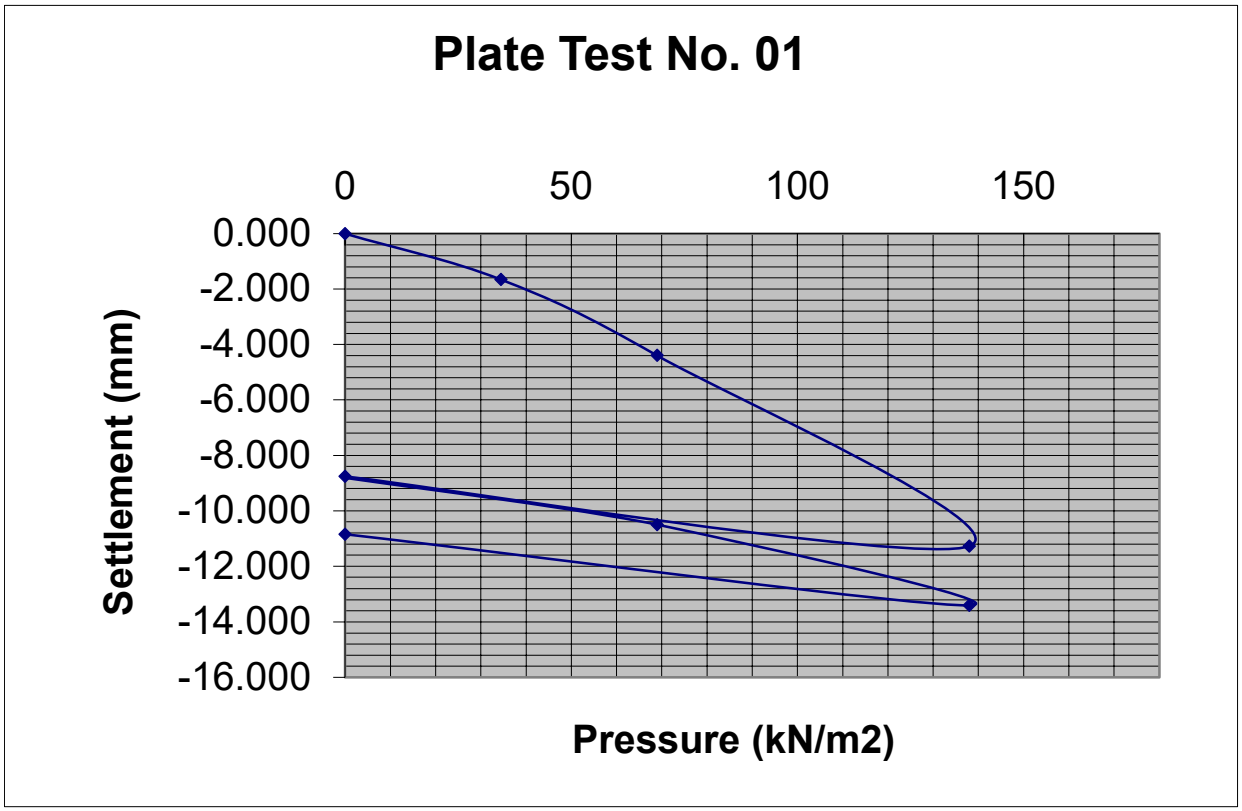
Figure No.
10363-02-21.DPH05

APPENDIX 6 – Plate Bearing Test Records

Applied Load	Gauge settlement
0	**0.000**
34.5	-1.66
69	-4.395
138	-11.27
0	-8.76
69	-10.5
138	-13.41
0	-10.845

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	St. Johns Convent	**MATERIAL**	Dark brown slightly sandy slightly gravelly CLAY with rare fragments of red brick.
CONTRACT NO.	10363-02-21		
DATE	31/03/2021		
CLIENT	Glenveagh Properties Plc	**DEPTH**	0.35m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-02	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **10.61 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **26.80 MN/m2/m**

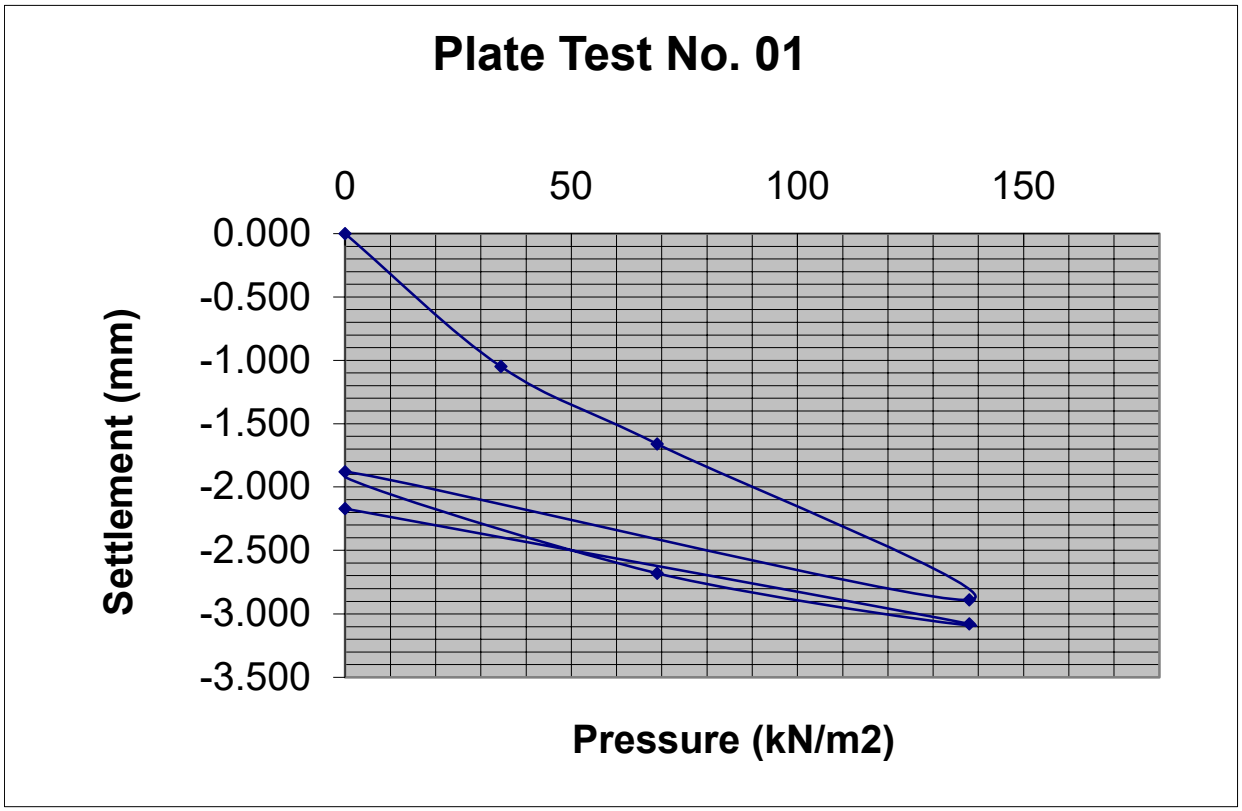
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **0.58 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **2.88 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-1.05
69	-1.66
138	-2.89
0	-1.88
69	-2.68
138	-3.08
0	-2.17

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	St. Johns Convent	**MATERIAL**	Dark brown slightly sandy slightly gravelly CLAY with rare fragments of red brick.
CONTRACT NO.	10363-02-21		
DATE	31/03/2021		
CLIENT	Glenveagh Properties Plc	**DEPTH**	0.35m
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-03	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **28.09 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **58.28 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **3.12 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **11.07 %**

APPENDIX 7 – Laboratory Testing

Element Materials Technology
Unit 3 Deeside Point
Zone 3
Deeside Industrial Park
Deeside
CH5 2UA

P: +44 (0) 1244 833780
F: +44 (0) 1244 833781
W: www.element.com

Ground Investigations Ireland
Catherinestown House
Hazelhatch Road
Newcastle
Co. Dublin
Ireland

Attention :	Barry Sexton
Date :	19th April, 2021
Your reference :	10363-02-21
Our reference :	Test Report 21/4994 Batch 1
Location :	St. Johns Convent
Date samples received :	6th April, 2021
Status :	Final report
Issue :	1

Eleven samples were received for analysis on 6th April, 2021 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Phil Sommerton BSc
Senior Project Manager

Client Name: Ground Investigations Ireland
Reference: 10363-02-21
Location: St. Johns Convent
Contact: Barry Sexton
EMT Job No: 21/4994

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	19-21	25-27	28-30			LOD/LOR	Units	Method No.
Sample ID	TP01	TP01	TP03	TP03	TP04	TP08	TP10	TP11					
Depth	1.00	2.00	0.50	1.50	0.50	0.50	0.50	0.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021					
Antimony	<1	<1	<1	<1	1	1	<1	<1			<1	mg/kg	TM30/PM15
Arsenic #	4.1	7.1	4.4	2.6	6.1	4.6	3.8	4.8			<0.5	mg/kg	TM30/PM15
Barium #	29	30	43	23	69	74	41	62			<1	mg/kg	TM30/PM15
Cadmium #	1.2	1.0	1.0	1.0	1.4	1.0	0.7	1.0			<0.1	mg/kg	TM30/PM15
Chromium #	31.6	29.8	41.0	38.8	57.9	37.8	43.5	39.6			<0.5	mg/kg	TM30/PM15
Copper #	14	13	12	11	17	16	12	14			<1	mg/kg	TM30/PM15
Lead #	11	14	24	10	25	59	28	49			<5	mg/kg	TM30/PM15
Mercury #	0.4	0.5	0.3	0.3	0.2	0.4	0.4	0.6			<0.1	mg/kg	TM30/PM15
Molybdenum #	1.8	1.6	2.2	2.2	3.5	2.1	2.5	2.3			<0.1	mg/kg	TM30/PM15
Nickel #	29.5	25.6	19.2	23.1	30.3	19.4	16.0	16.7			<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	<1	<1	<1	<1	<1			<1	mg/kg	TM30/PM15
Zinc #	64	65	65	54	114	121	63	81			<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.09	<0.03			<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	0.07	<0.03			<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	0.09	<0.06			<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.06	<0.02			<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	0.11	<0.07			<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	0.06	<0.04			<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
PAH 6 Total #	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	0.26	<0.22			<0.22	mg/kg	TM4/PM8
PAH 17 Total	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64			<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	<0.05			<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	<0.02			<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	<1	<1	<1	<1	<1	<1	<1			<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	92	90	93	93	92	94	93	94			<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	<30	<30	<30	<30	<30	<30	<30	<30			<30	mg/kg	TM5/PM8/PM16

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 10363-02-21
Location: St. Johns Convent
Contact: Barry Sexton
EMT Job No: 21/4994

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	19-21	25-27	28-30			LOD/LOR	Units	Method No.
Sample ID	TP01	TP01	TP03	TP03	TP04	TP08	TP10	TP11					
Depth	1.00	2.00	0.50	1.50	0.50	0.50	0.50	0.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021					
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL) #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL) #	<4	<4	<4	<4	<4	<4	<4	<4			<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL) #	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL) #	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_1D_AL)	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH+HS_1D_AL)	<26	<26	<26	<26	<26	<26	<26	<26			<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_1D_AL)	<10	<10	<10	<10	<10	<10	<10	<10			<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_1D_AL)	<10	<10	<10	<10	<10	<10	<10	<10			<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR) #	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR) #	<4	<4	<4	<4	<4	<4	<4	<4			<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR) #	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR) #	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_1D_AR)	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH+HS_1D_AR)	<26	<26	<26	<26	<26	<26	<26	<26			<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH+HS_CU_1D_Total)	<52	<52	<52	<52	<52	<52	<52	<52			<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 (HS_1D_AR) #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_1D_AR)	<10	<10	<10	<10	<10	<10	<10	<10			<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_1D_AR)	<10	<10	<10	<10	<10	<10	<10	<10			<10	mg/kg	TM5/PM8/PM16
MTBE #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
Benzene #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
Toluene #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
Ethylbenzene #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
m/p-Xylene #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
o-Xylene #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
PCB 28 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 52 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 101 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 118 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 138 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 153 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 180 #	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
Total 7 PCBs #	<35	<35	<35	<35	<35	<35	<35	<35			<35	ug/kg	TM17/PM8

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 10363-02-21
Location: St. Johns Convent
Contact: Barry Sexton
EMT Job No: 21/4994

Report : Solid

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	19-21	25-27	28-30			LOD/LOR	Units	Method No.
Sample ID	TP01	TP01	TP03	TP03	TP04	TP08	TP10	TP11					
Depth	1.00	2.00	0.50	1.50	0.50	0.50	0.50	0.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021					
Natural Moisture Content	9.1	12.8	11.5	10.5	22.4	20.2	13.2	23.7			<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	8.4	11.3	10.3	9.5	18.3	16.8	11.7	19.2			<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3			<0.3	mg/kg	TM38/PM20
Chromium III	31.6	29.8	41.0	38.8	57.9	37.8	43.5	39.6			<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.16	0.10	0.63	0.16	0.88	1.12	0.75	0.94			<0.02	%	TM21/PM24
pH #	8.70	8.81	8.58	8.89	8.32	8.39	8.43	8.37			<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1004	0.1008	0.099	0.1011	0.1092	0.1114	0.1001	0.1097				kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09				kg	NONE/PM17

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 10363-02-21
Location: St. Johns Convent
Contact: Barry Sexton
EMT Job No: 21/4994

Report : CEN 10:1 1 Batch

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	19-21	25-27	28-30			LOD/LOR	Units	Method No.
Sample ID	TP01	TP01	TP03	TP03	TP04	TP08	TP10	TP11					
Depth	1.00	2.00	0.50	1.50	0.50	0.50	0.50	0.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021					
Dissolved Antimony #	<0.002	<0.002	<0.002	<0.002	<0.002	0.002	<0.002	<0.002			<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02			<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	0.0032	0.0033			<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.032	0.033			<0.025	mg/kg	TM30/PM17
Dissolved Barium #	<0.003	<0.003	<0.003	<0.003	<0.003	0.009	<0.003	0.004			<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	0.09	<0.03	0.04			<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005			<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005			<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015			<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015			<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007			<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07			<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005			<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	0.002	0.011	<0.002	0.009	<0.002	<0.002	<0.002	<0.002			<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	<0.02	0.11	<0.02	0.09	<0.02	<0.02	<0.02	<0.02			<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002			<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003			<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	0.003	<0.003			<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	0.00002	<0.00001	<0.00001			<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001			<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3			<0.3	mg/l	TM173/PM0
Fluoride	<3	<3	<3	<3	<3	<3	<3	<3			<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<0.5	<0.5	<0.5	<0.5	0.7	<0.5	<0.5	<0.5			<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	<5	<5	<5	<5	7	<5	<5	<5			<5	mg/kg	TM38/PM0
Chloride #	<0.3	0.8	0.5	0.3	0.5	1.4	0.9	0.9			<0.3	mg/l	TM38/PM0
Chloride #	<3	8	5	<3	5	14	9	9			<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	2	2	5	<2	5	8	8	5			<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	<20	50	<20	50	80	80	50			<20	mg/kg	TM60/PM0
pH	8.89	8.99	9.10	8.60	8.28	8.70	8.96	9.10			<0.01	pH units	TM73/PM0
Total Dissolved Solids #	47	45	41	38	64	93	60	71			<35	mg/l	TM20/PM0
Total Dissolved Solids #	470	450	410	380	640	930	600	710			<350	mg/kg	TM20/PM0

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 10363-02-21
Location: St. Johns Convent
Contact: Barry Sexton
EMT Job No: 21/4994

Report : EN12457_2

Solids: V=60g VOC jar, J=250g glass jar, T=plastic tub

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-3	4-6	7-9	10-12	13-15	19-21	25-27	28-30								
Sample ID	TP01	TP01	TP03	TP03	TP04	TP08	TP10	TP11								
Depth	1.00	2.00	0.50	1.50	0.50	0.50	0.50	0.50								
COC No / misc																
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T								
Sample Date	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021	30/03/2021								
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil								
Batch Number	1	1	1	1	1	1	1	1								
Date of Receipt	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021	06/04/2021			Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Solid Waste Analysis																
Total Organic Carbon #	0.16	0.10	0.63	0.16	0.88	1.12	0.75	0.94			3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025			6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035			1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	<30	<30	<30	<30	<30			500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	0.26	<0.22			-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64			100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	0.032	0.033			0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	<0.03	<0.03	<0.03	<0.03	<0.03	0.09	<0.03	0.04			20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005			0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015			0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07			2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	0.0002	<0.0001	<0.0001			0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	<0.02	0.11	<0.02	0.09	<0.02	<0.02	<0.02	<0.02			0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	<0.02	<0.02			0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	470	450	410	380	640	930	600	710			4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	<20	<20	50	<20	50	80	80	50			500	800	1000	<20	mg/kg	TM60/PM0
Dry Matter Content Ratio	89.3	89.5	91.3	89.2	82.5	80.8	90.1	82.1			-	-	-	<0.1	%	NONE/PM4
pH #	8.70	8.81	8.58	8.89	8.32	8.39	8.43	8.37			-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	<3	<3	<3	<3	<3	<3	<3			-	-	-	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<5	<5	<5	<5	7	<5	<5	<5			1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	<3	8	5	<3	5	14	9	9			800	15000	25000	<3	mg/kg	TM38/PM0

All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland

Reference: 10363-02-21

Location: St. Johns Convent

Contact: Barry Sexton

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
21/4994	1	TP01	1.00	1-3	No interpretation possible
21/4994	1	TP01	2.00	4-6	No interpretation possible
21/4994	1	TP03	0.50	7-9	No interpretation possible
21/4994	1	TP03	1.50	10-12	No interpretation possible
21/4994	1	TP04	0.50	13-15	No interpretation possible
21/4994	1	TP08	0.50	19-21	No interpretation possible
21/4994	1	TP10	0.50	25-27	No interpretation possible
21/4994	1	TP11	0.50	28-30	No interpretation possible

Client Name: Ground Investigations Ireland
Reference: 10363-02-21
Location: St. Johns Convent
Contact: Barry Sexton

Note:

Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
21/4994	1	TP01	1.00	2	13/04/2021	**General Description (Bulk Analysis)**	soil.stones
					13/04/2021	**Asbestos Fibres**	NAD
					13/04/2021	**Asbestos ACM**	NAD
					13/04/2021	**Asbestos Type**	NAD
					13/04/2021	**Asbestos Level Screen**	NAD
21/4994	1	TP01	2.00	5	13/04/2021	**General Description (Bulk Analysis)**	Soil/Stones
					13/04/2021	**Asbestos Fibres**	NAD
					13/04/2021	**Asbestos ACM**	NAD
					13/04/2021	**Asbestos Type**	NAD
					13/04/2021	**Asbestos Level Screen**	NAD
21/4994	1	TP03	0.50	8	13/04/2021	**General Description (Bulk Analysis)**	Soil/Stones
					13/04/2021	**Asbestos Fibres**	NAD
					13/04/2021	**Asbestos ACM**	NAD
					13/04/2021	**Asbestos Type**	NAD
					13/04/2021	**Asbestos Level Screen**	NAD
21/4994	1	TP03	1.50	11	13/04/2021	**General Description (Bulk Analysis)**	Soil/Stone
					13/04/2021	**Asbestos Fibres**	NAD
					13/04/2021	**Asbestos ACM**	NAD
					13/04/2021	**Asbestos Type**	NAD
					13/04/2021	**Asbestos Level Screen**	NAD
21/4994	1	TP04	0.50	14	13/04/2021	**General Description (Bulk Analysis)**	Soil/Stonen
					13/04/2021	**Asbestos Fibres**	NAD
					13/04/2021	**Asbestos ACM**	NAD
					13/04/2021	**Asbestos Type**	NAD
					13/04/2021	**Asbestos Level Screen**	NAD
21/4994	1	TP08	0.50	20	13/04/2021	**General Description (Bulk Analysis)**	Soil/Stone
					13/04/2021	**Asbestos Fibres**	NAD
					13/04/2021	**Asbestos ACM**	NAD
					13/04/2021	**Asbestos Type**	NAD
					13/04/2021	**Asbestos Level Screen**	NAD
21/4994	1	TP10	0.50	26	13/04/2021	**General Description (Bulk Analysis)**	Soil/Stone
					13/04/2021	**Asbestos Fibres**	NAD
					13/04/2021	**Asbestos ACM**	NAD

Client Name: Ground Investigations Ireland
Reference: 10363-02-21
Location: St. Johns Convent
Contact: Barry Sexton

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
21/4994	1	TP10	0.50	26	13/04/2021	**Asbestos Type**	NAD
					13/04/2021	**Asbestos Level Screen**	NAD
21/4994	1	TP11	0.50	29	13/04/2021	**General Description (Bulk Analysis)**	Soil/Stones
					13/04/2021	**Asbestos Fibres**	NAD
					13/04/2021	**Asbestos ACM**	NAD
					13/04/2021	**Asbestos Type**	NAD
					13/04/2021	**Asbestos Level Screen**	NAD

Client Name: Ground Investigations Ireland
Reference: 10363-02-21
Location: St. Johns Convent
Contact: Barry Sexton

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 21/4994						

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating.
Only analyses which are accredited are recorded as deviating if set criteria are not met.

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 21/4994

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overesitimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.
Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range

HWOL ACRONYMS AND OPERATORS USED

HS	Headspace Analysis.
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent.
CU	Clean-up - e.g. by florisil, silica gel.
1D	GC - Single coil gas chromatography.
Total	Aliphatics & Aromatics.
AL	Aliphatics only.
AR	Aromatics only.
2D	GC-GC - Double coil gas chromatography.
#1	EH_Total but with humics mathematically subtracted
#2	EU_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +).
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry.

EMT Job No: 21/4994

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270D v5:2014 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	Yes
TM5	Modified 8015B v2:1996 method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM17	Modified US EPA method 8270D v5:2014. Determination of specific Polychlorinated Biphenyl congeners by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM20	Modified BS 1377-3:1990/USEPA 160.1/3 (TDS/TS: 1971) Gravimetric determination of Total Dissolved Solids/Total Solids	PM0	No preparation is required.	Yes		AR	Yes
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.	Yes		AD	Yes

EMT Job No: 21/4994

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013l	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes
TM61	Determination of Mercury by Cold Vapour Atomic Fluorescence - WATERS: Modified USEPA Method 245.7, Rev 2, Feb 2005. SOILS: Modified USEPA Method 7471B, Rev.2, Feb 2007	PM0	No preparation is required.	Yes		AR	Yes

EMT Job No: 21/4994

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM65	Asbestos Bulk Identification method based on HSG 248 First edition (2006)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 9214 - 340.2 (EPA 1998)	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	

Appendix C – Surface Water Calculations (Soakaway, MET Eireann rainfall)

Job Title: Rathangan **Job Number:** 20D044
Calculation by: LM **Date:** Aug-23
Checked by:

Soakway Design: BRE Digest 365 1-100+30%

	Storm Frequency & Duration	Rainfall (mm)	I Inflow imper. area (m3)	O Outflow from soakaway during rainfall (m3)	Sreq Allowing for infiltration (m3)	Sufficient storage required	ts50 Time to empty half storage vol. (hours)	ts50 < 24 hours
5	M100-5	16.38	12.65	0.10	12.5	pass	5.4	pass
10	M100-10	22.88	17.66	0.19	17.5	pass	7.5	pass
15	M100-15	26.91	20.77	0.29	20.5	pass	8.8	pass
30	M100-30	33.28	25.69	0.58	25.1	pass	10.8	pass
60	M100-60	41.08	31.71	1.17	30.5	pass	13.1	pass
120	M100-120	50.83	39.24	2.33	36.9	pass	15.8	pass
240	M100 - 4hr	71.11	54.90	4.66	50.2	pass	21.5	pass
360	**M100-6 hr**	80.47	**62.12**	**7.00**	**55.1**	**pass**	**23.6**	**pass**
720	M100-12 hr	108.68	83.90	13.99	69.9	fail	30.0	fail

Run-off 0 l/s
Imp. Area 772 m^2 Road

Soakaway Details

width	4.5		
depth	1.5		
length	25		
as50	44.25	volume	168.75
		actual vol	67.5
filtration	0.00000732 m/s	(GRANULAR 40% voids)	

Job Title: Rathangan **Job Number:** 20D044
Calculation by: LM **Date:** Aug-23
Checked by:

Soakway Design: BRE Digest 365 1-100+30%

	Storm Frequency & Duration	Rainfall (mm)	I Inflow imper. area (m3)	O Outflow from soakaway during rainfall (m3)	Sreq Allowing for infiltration (m3)	Sufficient storage required	ts50 Time to empty half storage vol. (hours)	ts50 < 24 hours
5	M100-5	16.38	8.60	0.07	8.5	pass	5.4	pass
10	M100-10	22.88	12.01	0.13	11.9	pass	7.5	pass
15	M100-15	26.91	14.13	0.20	13.9	pass	8.8	pass
30	M100-30	33.28	17.47	0.40	17.1	pass	10.8	pass
60	M100-60	41.08	21.57	0.79	20.8	pass	13.1	pass
120	M100-120	50.83	26.69	1.58	25.1	pass	15.9	pass
240	M100 - 4hr	71.11	37.33	3.16	34.2	pass	21.6	pass
360	**M100-6 hr**	80.47	**42.25**	**4.74**	**37.5**	**pass**	**23.7**	**pass**
720	M100-12 hr	108.68	57.06	9.49	47.6	pass	30.1	fail

Run-off 0 l/s
Imp. Area 525 m^2 Roof

Soakaway Details

width	10		
depth	1.5		
length	10		
as50	30	volume	150
		actual vol	60
filtration	0.00000732 m/s	(GRANULAR 40% voids)	

Easting: 267446, Northing: 219545,

			Years											
DURATION	6months,	1year,	2,	3,	4,	5,	10,	20,	30,	50,	75,	100,	150,	200,	250,	500,
5 mins	2.7,	3.7,	4.2,	5.0,	5.5,	5.9,	7.1,	8.5,	9.4,	10.7,	11.8,	12.6,	13.9,	14.9,	15.7,	N/A ,
10 mins	3.8,	5.1,	5.9,	6.9,	7.6,	8.2,	9.9,	11.8,	13.1,	14.9,	16.4,	17.6,	19.4,	20.8,	21.9,	N/A ,
15 mins	4.4,	6.1,	6.9,	8.1,	9.0,	9.6,	11.7,	13.9,	15.4,	17.5,	19.3,	20.7,	22.8,	24.4,	25.8,	N/A ,
30 mins	5.9,	7.9,	8.9,	10.5,	11.5,	12.3,	14.8,	17.5,	19.3,	21.8,	23.9,	25.6,	28.1,	30.0,	31.6,	N/A ,
1 hours	7.8,	10.3,	11.6,	13.5,	14.7,	15.7,	18.7,	22.0,	24.2,	27.1,	29.7,	31.6,	34.5,	36.8,	38.6,	N/A ,
2 hours	10.3,	13.4,	15.0,	17.4,	18.9,	20.1,	23.7,	27.7,	30.3,	33.8,	36.8,	39.1,	42.5,	45.2,	47.3,	N/A ,
3 hours	12.1,	15.7,	17.5,	20.1,	21.8,	23.1,	27.3,	31.7,	34.5,	38.4,	41.7,	44.2,	48.0,	50.9,	53.3,	N/A ,
4 hours	13.6,	17.5,	19.5,	22.4,	24.2,	25.6,	30.1,	34.9,	37.9,	42.0,	45.6,	48.3,	52.4,	55.4,	57.9,	N/A ,
6 hours	16.0,	20.4,	22.7,	25.9,	28.0,	29.6,	34.6,	39.9,	43.2,	47.8,	51.7,	54.7,	59.1,	62.5,	65.2,	N/A ,
9 hours	18.8,	23.9,	26.4,	30.0,	32.4,	34.2,	39.7,	45.6,	49.3,	54.3,	58.7,	61.9,	66.8,	70.5,	73.4,	N/A ,
12 hours	21.1,	26.7,	29.4,	33.4,	35.9,	37.8,	43.8,	50.1,	54.1,	59.5,	64.1,	67.6,	72.8,	76.7,	79.9,	N/A ,
18 hours	24.9,	31.2,	34.3,	38.7,	41.5,	43.7,	50.3,	57.3,	61.7,	67.7,	72.7,	76.5,	82.2,	86.5,	89.9,	N/A ,
24 hours	27.9,	34.8,	38.2,	43.0,	46.0,	48.4,	55.5,	63.1,	67.8,	74.1,	79.5,	83.6,	89.6,	94.2,	97.8,	110.1,
2 days	33.5,	41.0,	44.7,	49.9,	53.2,	55.7,	63.3,	71.2,	76.1,	82.7,	88.3,	92.4,	98.6,	103.2,	107.0,	119.4,
3 days	38.3,	46.5,	50.5,	56.1,	59.6,	62.2,	70.3,	78.7,	83.9,	90.8,	96.6,	101.0,	107.4,	112.2,	116.0,	128.9,
4 days	42.7,	51.5,	55.8,	61.7,	65.5,	68.3,	76.8,	85.6,	91.1,	98.3,	104.4,	108.9,	115.6,	120.6,	124.6,	137.8,
6 days	50.7,	60.6,	65.4,	72.0,	76.1,	79.2,	88.6,	98.2,	104.2,	112.0,	118.6,	123.4,	130.6,	136.0,	140.2,	154.4,
8 days	58.1,	69.0,	74.1,	81.3,	85.8,	89.2,	99.3,	109.7,	116.1,	124.5,	131.5,	136.7,	144.3,	150.0,	154.6,	169.5,
10 days	65.0,	76.8,	82.4,	90.1,	94.9,	98.5,	109.4,	120.4,	127.2,	136.1,	143.6,	149.1,	157.1,	163.1,	167.9,	183.7,
12 days	71.6,	84.2,	90.2,	98.4,	103.5,	107.4,	118.9,	130.6,	137.8,	147.2,	155.0,	160.8,	169.3,	175.5,	180.6,	197.1,
16 days	84.1,	98.3,	105.0,	114.1,	119.9,	124.1,	136.8,	149.8,	157.6,	167.9,	176.5,	182.8,	192.0,	198.8,	204.3,	222.2,
20 days	96.1,	111.7,	119.0,	129.0,	135.3,	139.9,	153.8,	167.8,	176.3,	187.4,	196.6,	203.4,	213.3,	220.7,	226.5,	245.6,
25 days	110.5,	127.7,	135.8,	146.8,	153.7,	158.7,	173.9,	189.2,	198.4,	210.5,	220.5,	227.9,	238.6,	246.5,	252.8,	273.4,

NOTES:
N/A Data not available
These values are derived from a Depth Duration Frequency (DDF) Model
For details refer to:
'Fitzgerald D. L. (2007), Estimates of Point Rainfall Frequencies, Technical Note No. 61, Met Eireann, Dublin',
Available for download at www.met.ie/climate/dataproducts/Estimation-of-Point-Rainfall-Frequencies_TN61.pdf

Appendix D – Foul Water Calculations

Job Title:	Rathangan	**Job Number:**	20D004
Calculation by:	LM	**Date:**	Aug-23
Checked by:	DH		

Proposed Foul Drainage: BS 8301 1985

RESIDENTIAL

SITE COMPRISES

No. of Apartments/houses = 35

DETERMINE AVERAGE DAILY FLOW

Assume foul discharge for each dwelling = 650 litres/day

Average Residential Daily Flow = 0.263 l/s

DESIGN FOR PEAK FOUL FLOW

Assume 26 Discharge Units/Apartment/house - Table 4 BS 8301

Therefore, No. of Discharge Units = 910

PEAK FLOW = 7.5668 l/s - Fig.2 BS 8301

COLEBROOK - WHITE FORMULA

Q = 7.57 **l/s**

ks = 1.5 **mm**

Kinematic viscosity @ 15 degrees Celsius = 1.141×10^{-6} m^2/s

Self Cleansing Velocity= 0.75 m/s

Use	225	**mm Pipe**	
@ 1 in	170	**Gradient**	
Q =	34.94	**l/s**	-
v =	0.879	**m/s**	-

24 units on site
10 2-bed
14 1-bed
Max 58 people
DWF -- 58x150 = 0.1l/s (8.6m3)

All surface water for the proposed site will be dealt with on site via SUDs measures. All current surface water as detailed below will now no longer enter the foul water system. There will be an overall net reduction in water from the site as detailed below.

Considering the foul network we note;
• The existing hardstanding on the site is approx. 1200m2 (plus some additional pathways not included), this current hardstanding drains to the foul network. Based on 1 hour storm for a 1 in 1 year storm (using site rainfall data) event this equates to 12.4m3. The existing convent will be demolished (8 person) which equates to a DWF of 0.014ls or 1.2m3. On this basis the outfall daily from the existing site is 13.6 m3
• The proposed development of 1 and 2 bed apartments will have a maximum capacity DWF of 0.1l/s or 8.6m3 daily (refer to above calculation) and as detailed above there will be no surface water discharge from the site into the foul network
• As can be seen from the above there will be a reduction in load on the Irish Water wastewater system with the proposed development as the surface water will no longer enter the system

Appendix E – Flood Risk Assessment

Hayes Higgins Partnership

Site Specific Flood Risk Assessment

St. John's Convent, New Street, Rathangan, Co. Kildare

June 2023

IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

Site Specific Flood Risk Assessment

Client: Hayes Higgins Partnership

Location: St. John's Convent, New Street, Rathangan, Co. Kildare

Date: 09th June 2023

Document Control

PROJECT NUMBER: IE2728		DOCUMENT REF: IE2728_Report_5748			
3.0	ISSUE-01	RM	PMS	JK	24-07-2023
2.0	DRAFT-02	RM	PMS	JK	26-06-2023
1.0	DRAFT-01	RM	MOF	PMS	09-06-2023
Revision	Purpose Description	Originated	Checked	Reviewed	Date

Contents

Appendices

1. Introduction

IE Consulting was requested by Hayes Higgins Partnership to undertake a Site-Specific Flood Risk Assessment (SSFRA) in support of a planning application for a proposed development at St. John's Convent, New Street, Rathangan, Co, Kildare. The development as proposed comprises the construction of two residential blocks, each containing 12 No. dwelling units, 1 No. community room and all associated site infrastructure works.

The purpose of this SSFRA is to assess the potential flood risk to the site of the proposed development and to assess the impact that the development as proposed may or may not have on the hydrological regime of the area.

Quoted ground levels or estimated flood levels relate to Ordnance Datum (Malin) unless stated otherwise.

This flood risk assessment study has been undertaken in consideration of the following guidance document:

'The Planning System and Flood Risk Management – Guidelines for Planning Authorities' DOEHLG 2009.

2. Proposed Site Description

2.1. General

The proposed development site is located at St. John's Convent, New Street, Rathangan, Co. Kildare. The site is bounded to the east and west by existing properties, to the south by the R414 (New Street) and to the north by agricultural lands. The total area of the proposed development site is approximately 0.67 hectares.

The location of the proposed development site is illustrated on *Figure 1* below and is shown on *Drawing Number IE2728-001-A, Appendix A*.

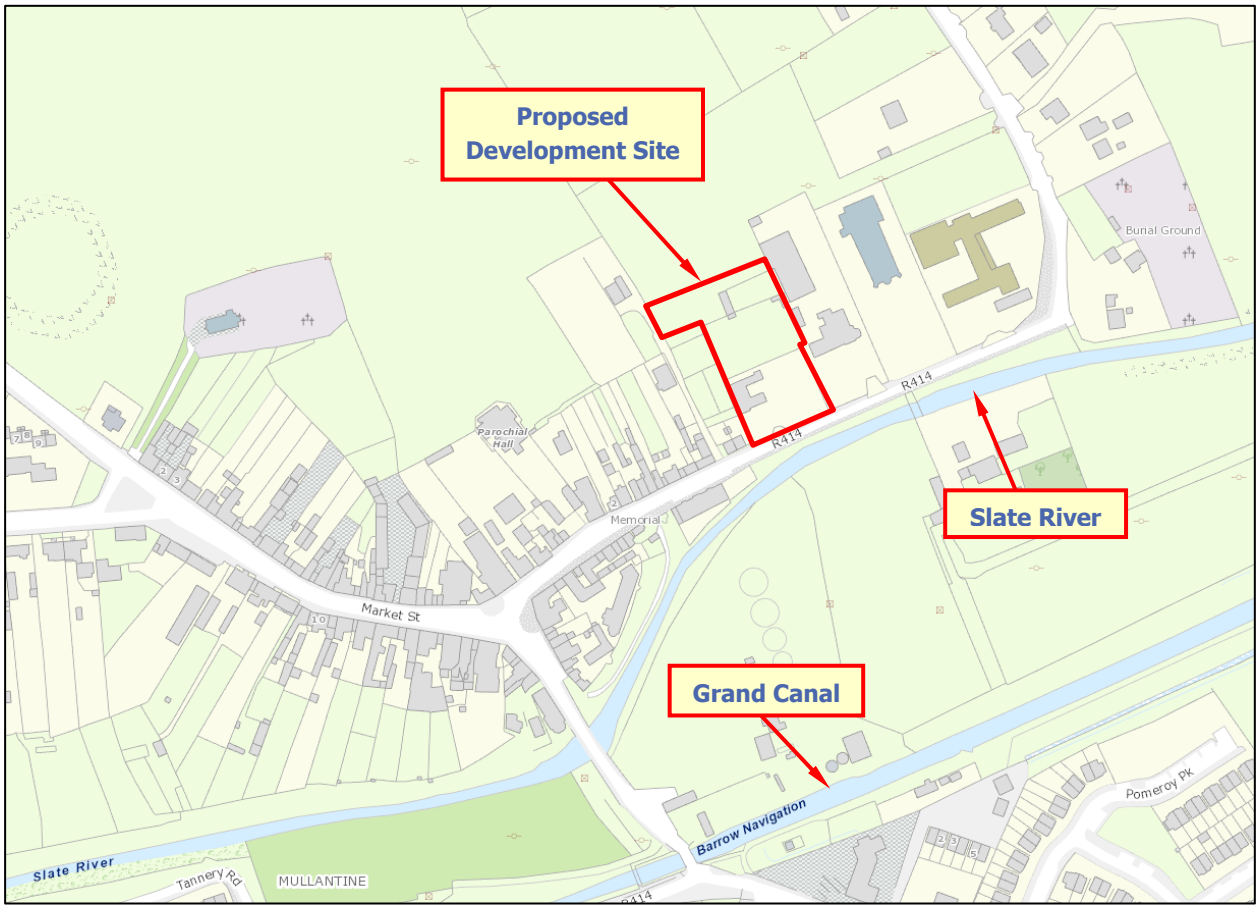


Figure 1 – Site Location

2.2. Existing Topography Levels at Site

The proposed development site slopes moderately from the northern boundary of the site to the southern boundary at an approximate gradient of 2.32%.

Existing ground elevations range from approximately 70.05m OD (Malin) at the southern boundary of the site to 73.36 OD (Malin) adjacent to the northern boundary of the site.

2.3. Local Hydrology, Landuse & Existing Drainage

The most immediate and significant hydrological feature in the vicinity of the proposed development site is the Slate River which flows in an east to west direction approximately 23m beyond the southern boundary of the site. The Grand Canal is also located approximately 232m beyond the southern south east of the southern boundary of the site.

The catchment area of the River Slate was delineated and found to be approximately 172.088km^2 to a point downstream of the site. An assessment of the Slate River upstream catchment area indicates that the catchment is predominantly rural in nature with the urban fraction accounting for approximately 0.0325 % of the total catchment area.

3. Initial Flood Risk Assessment

The flood risk assessment for the proposed development site is undertaken in three principal stages, these being 'Step 1 – Screening', 'Step 2 – Scoping' and 'Step 3 – Assessing'.

3.1. Possible Flooding Mechanisms

Table 1 below summarises the possible flooding mechanisms in consideration of the site:

Source/Pathway	Significant?	Comment/Reason
Tidal/Coastal	No	The site is not located within a coastal or tidally influenced region.
Fluvial	Yes	The Slate River is located approximately 23m beyond the southern boundary of the site. The Grand Canal is located approximately 232m beyond the southern boundary of the site.
Pluvial (urban drainage)	No	There is no major or significant drainage or water supply infrastructure located in the vicinity of the site.
Pluvial (overland flow)	No	The site is not surrounded by significantly elevated lands and does not provide an important surface water discharge point to adjacent lands.
Blockage	No	There are no significant or restrictive hydraulic structures in the vicinity of the site.
Groundwater	No	There are no significant springs or groundwater discharges mapped or recorded in the immediate vicinity of the site

Table 1: Flooding Mechanisms

The primary potential flood risk to the proposed development site can be attributed to an extreme fluvial flood event in the Slate River and/or the Grand Canal located beyond the southern boundary of the site.

In accordance with 'The Planning System and Flood Risk Management – Guidelines for Planning Authorities - DOEHLG 2009' the potential flood risk to the site of the proposed development is analysed in the subsequent 'Screening Assessment' and ''Scoping Assessment'' section of this study report.

4. Screening Assessment

The purpose of the screening assessment is to establish the level of flooding risk that may or may not exist for a particular site and to collate and assess existing current or historical information and data which may indicate the level or extent of any flood risk.

If there is a potential flood risk issue then the flood risk assessment procedure should move to 'Step 2 – Scoping Assessment' or if no potential flood risk is identified from the screening stage then the overall flood risk assessment can end at 'Step 1'.

The following information and data were collated as part of the flood risk screening assessment for the proposed development site.

4.1. OPW/EPA/Local Authority Hydrometric Data

Existing sources of OPW, EPA and local authority hydrometric data were investigated. As illustrated in *Figure 3* below, this assessment has determined there is one hydrometric gauging station located in the general vicinity of the proposed development site.

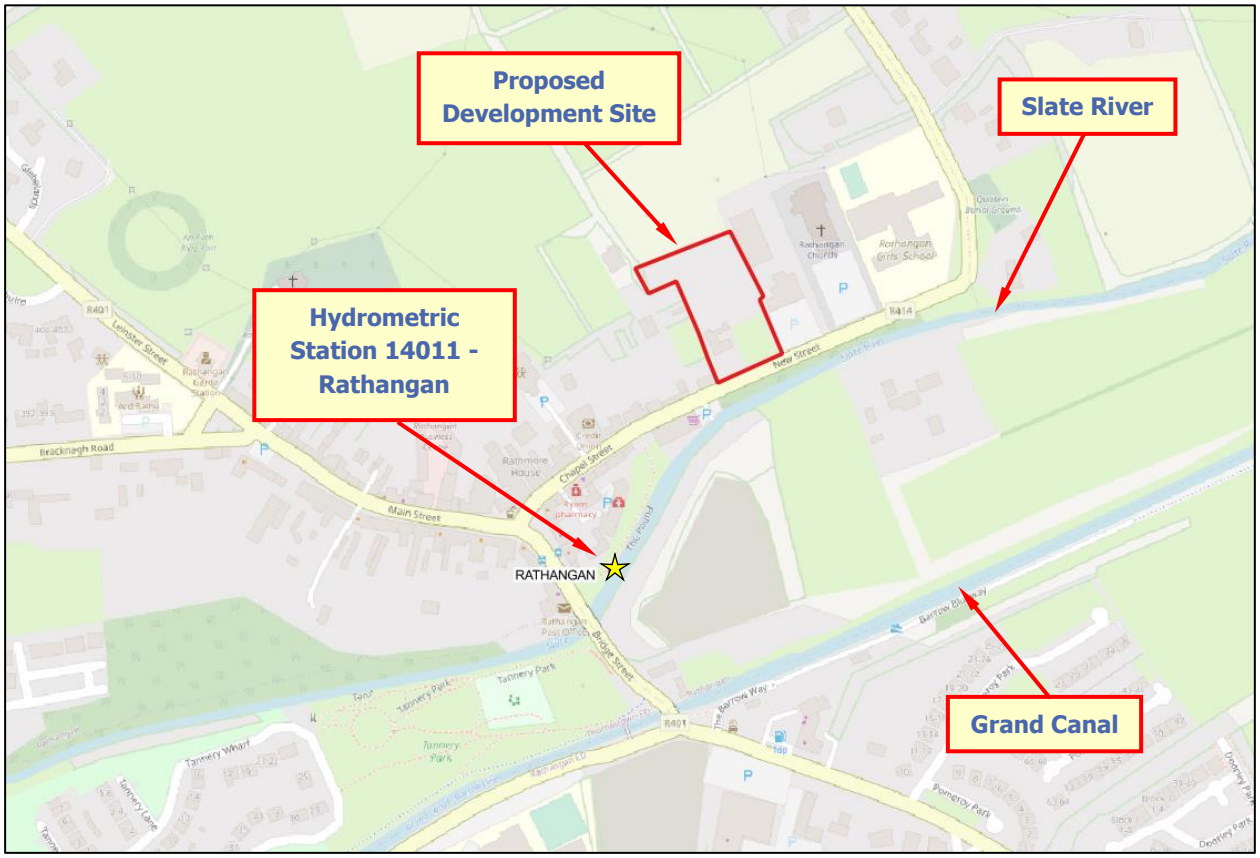


Figure 2 - Hydrometric Gauging Station

Hydrometric station 14011 is located on the Slate River approximately 185m downstream of the proposed development site.

The hydrometric data from gauging station 14011 was examined to assess the suitability of the data to assist in the prediction of extreme flood flows and levels in the vicinity of the proposed development site. Hydrometric data for this station is available from 10-01-1999 to the present day. If required, the data from this gauging station may be suitable for the determination of flood levels in the general vicinity of the proposed development site.

4.2. OPW PFRA Indicative Flood Mapping

Preliminary Flood Risk Assessment (PFRA) Mapping for Ireland was produced by the OPW in 2011. OPW PFRA flood map number 2019/MAP/218/A illustrates indicative flood zones within this area of County Kildare.

Figure 3 below illustrates an extract from the above indicative flood map in the vicinity of the proposed development site.

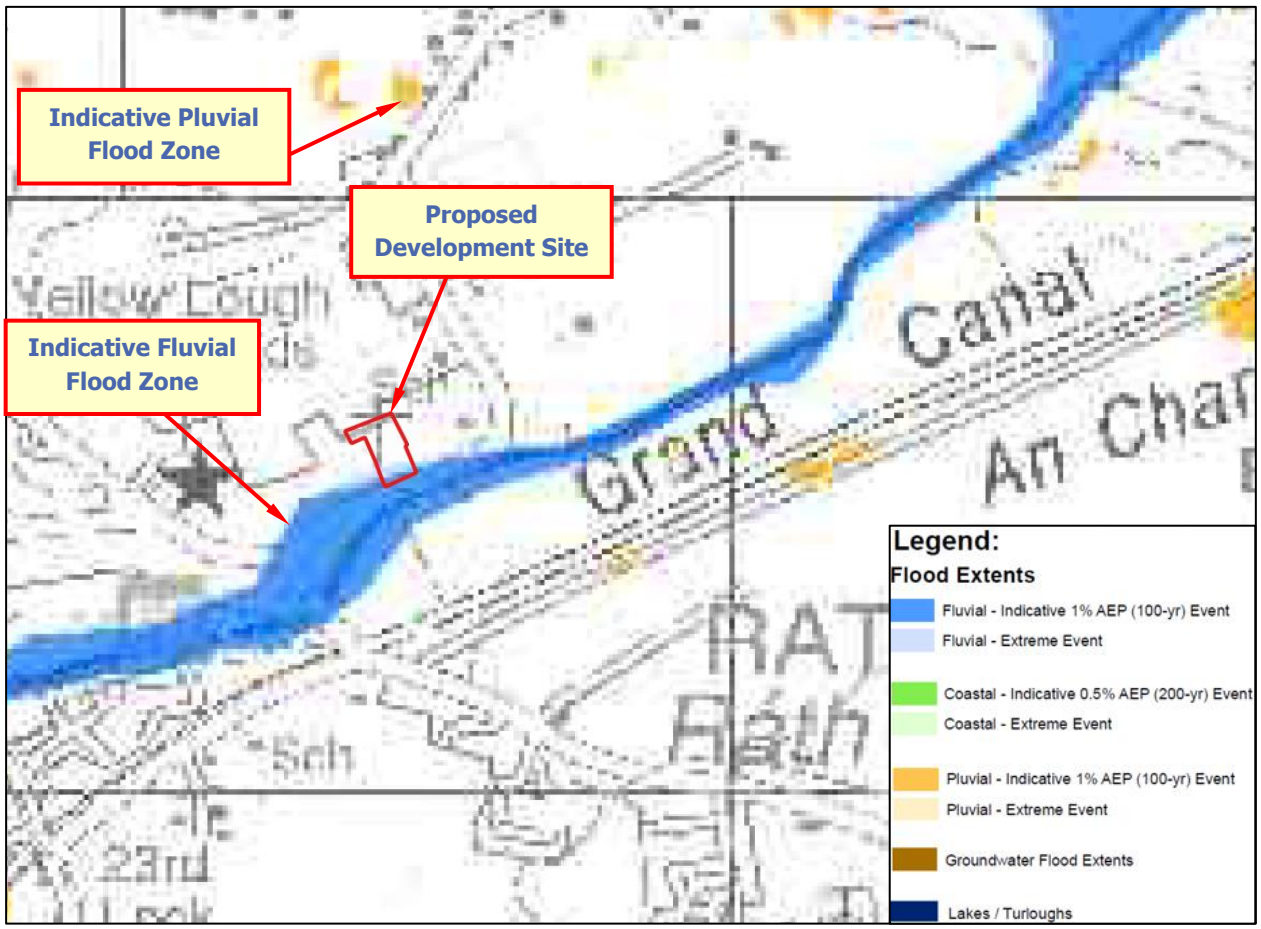


Figure 3 - OPW PFRA Mapping

The OPW PFRA flood mapping indicates that a limited area adjacent to the southern boundary of the proposed development site falls within an indicative fluvial flood zone. The site does not fall within an indicative pluvial or groundwater flood zone.

It should be noted that the extent of flooding illustrated on these maps was developed using a low-resolution digital terrain model (DTM) and illustrated flood extents are intended to be indicative only. The flood extents mapped on the PFRA maps are not intended to be used on a site specific basis.

4.3. OPW Flood Info Past Flood Events

The OPW Flood Info Website (www.floodinfo.ie) was consulted in relation to available historical or anecdotal information on any flooding incidences or occurrences recorded in the vicinity of the proposed development site. *Figure 4* below illustrates mapping from the Flood Info website in the vicinity of the site.

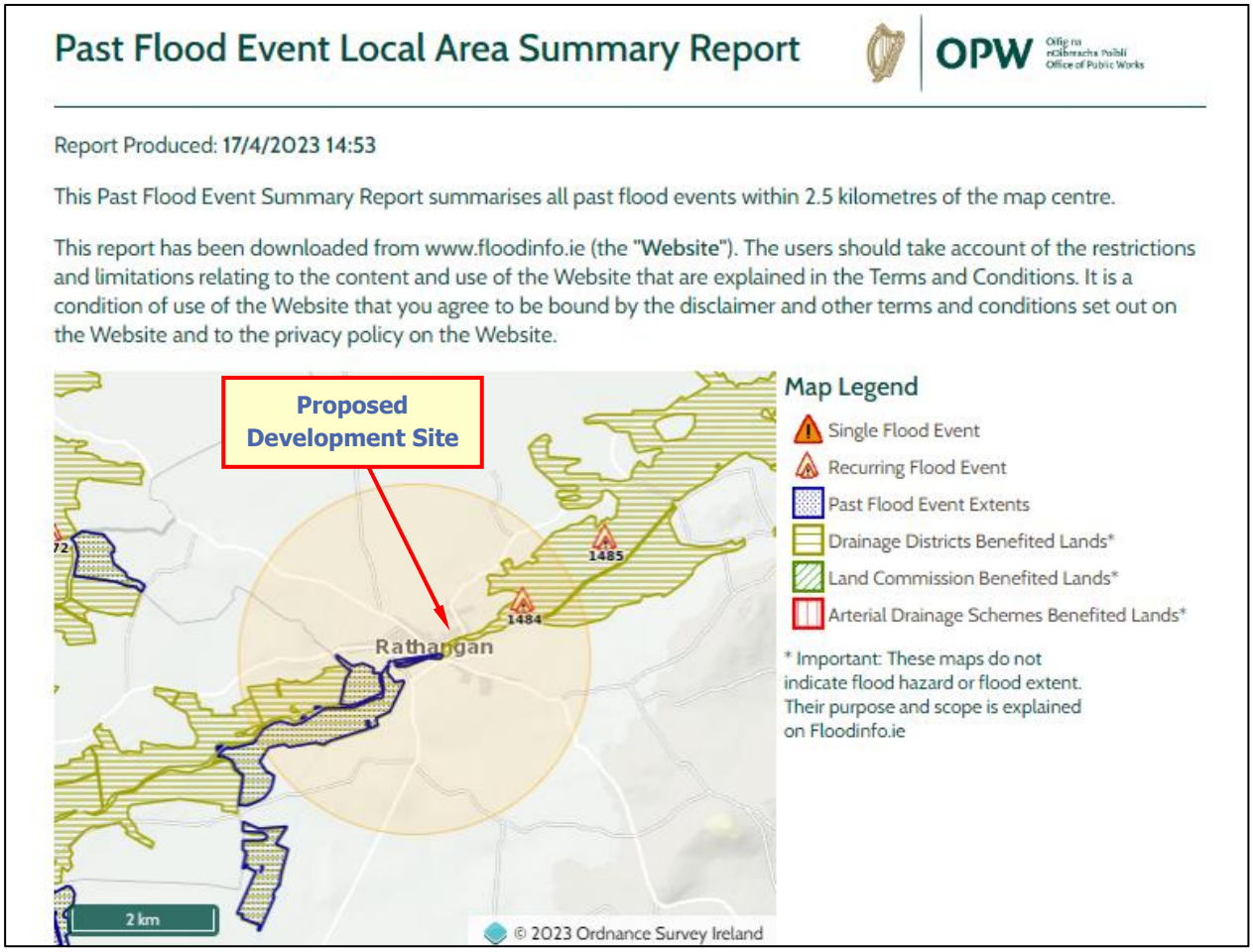


Figure 4 - OPW Flood Info Records

Figure 4 above indicates that there is one recorded recurring flood event located approximately 1.1km upstream of the proposed development site (Flood ID = 1484). The OPW meeting minutes indicate that

this area of Rathangan floods every year. No specific data or photographic record of this specific recurring flood event is available on the OPW Floodinfo.ie portal.

There is no recorded or anecdotal information or data to suggest that the above recurring flood event has impacted the area of the proposed development site.

4.4. Ordnance Survey Historic Mapping

Available historic mapping for the area was consulted, as this can provide evidence of historical flooding incidences or occurrences. The maps that were consulted were the historical 6-inch maps (pre-1900), and the historic 25-inch map series.

Figure 5 and *Figure 6* below show the historic mapping for the area of the proposed development site.

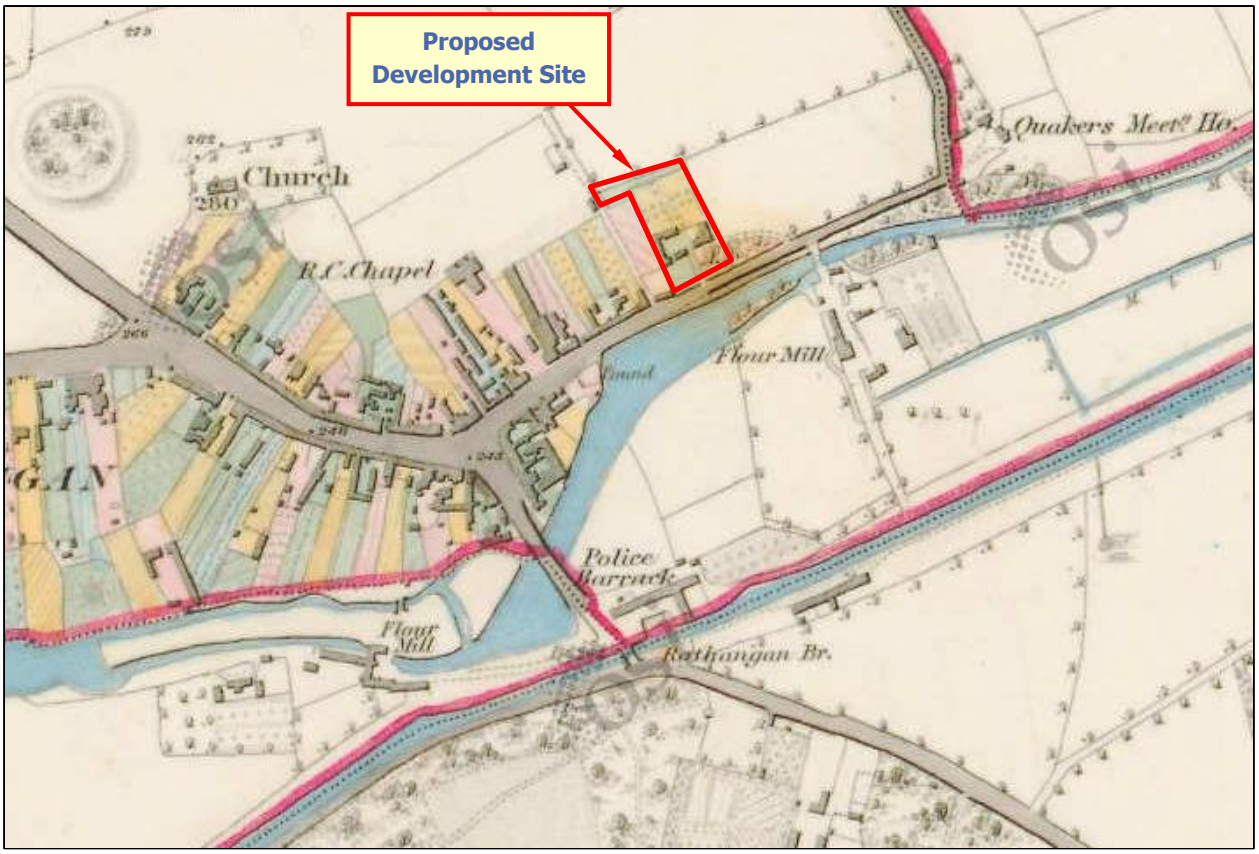


Figure 5 - Historic 6 Inch Mapping

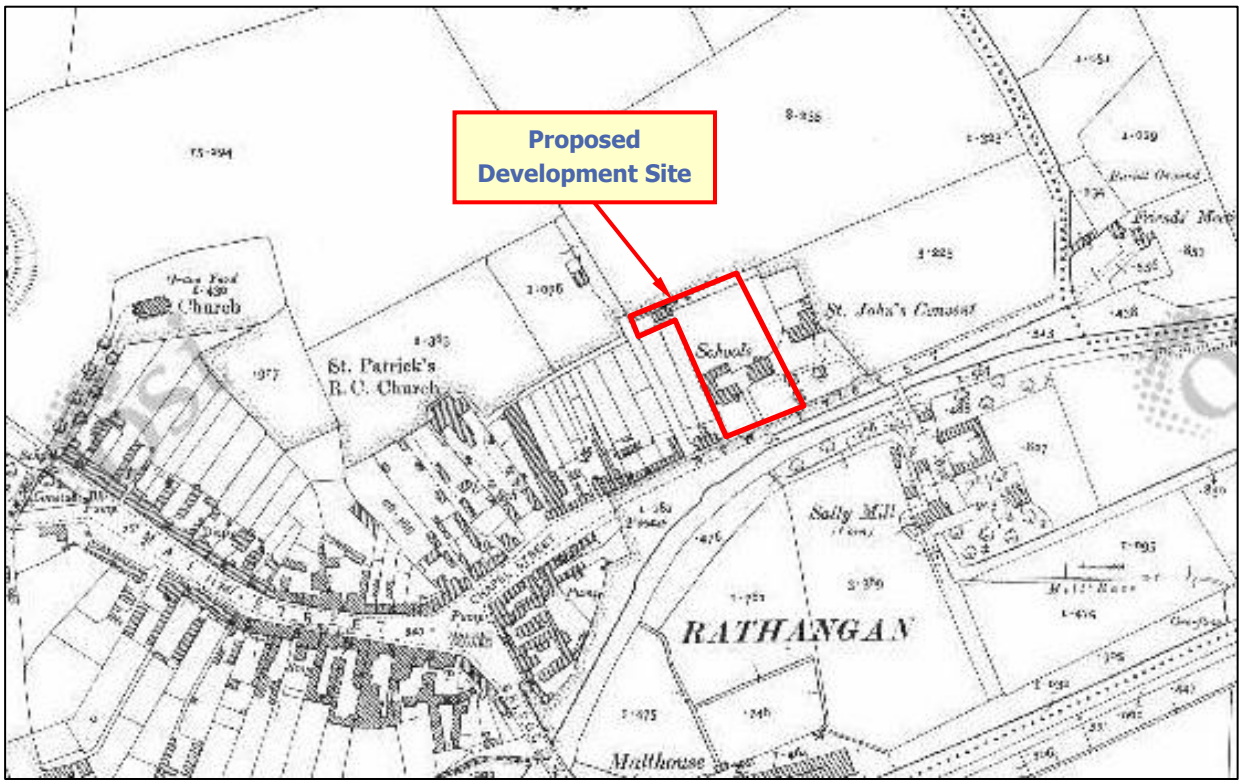


Figure 6 - Historic 25 Inch Mapping

The historic 6 inch and 25 inch mapping does not indicate any historical or anecdotal instances of flooding within or adjacent to the boundary of the proposed development site.

4.5. Geological Survey of Ireland Mapping

The alluvial deposit maps of the Geological Survey of Ireland (GSI) were consulted to assess the extent of any alluvial deposits in the vicinity of the proposed development site. Alluvial deposits can be an indicator of areas that have been subject to flooding in the recent geological past.

Figure 7 below illustrates the sub-soils mapping for the general area of the site.

Figure 7 - GSI Subsoil Mapping

Figure 7 above indicates that the site is primarily underlain by Made Ground with the remainder underlain by Carboniferous Limestone sands and gravels in the north of the site. Alluvium deposits are mapped close to the southern boundary of the site, however these do not encroach the site boundary.

4.6. Geological Survey of Ireland Groundwater Flood Mapping

Historic and Predictive Groundwater Mapping for Ireland was prepared by the GSi Department of Communication, Climate Action, and Environment in collaboration with Trinity College Dublin and the Institute of Technology Carlow.

Figure 8 below illustrates an extract from the above groundwater flood mapping in the vicinity of the site.

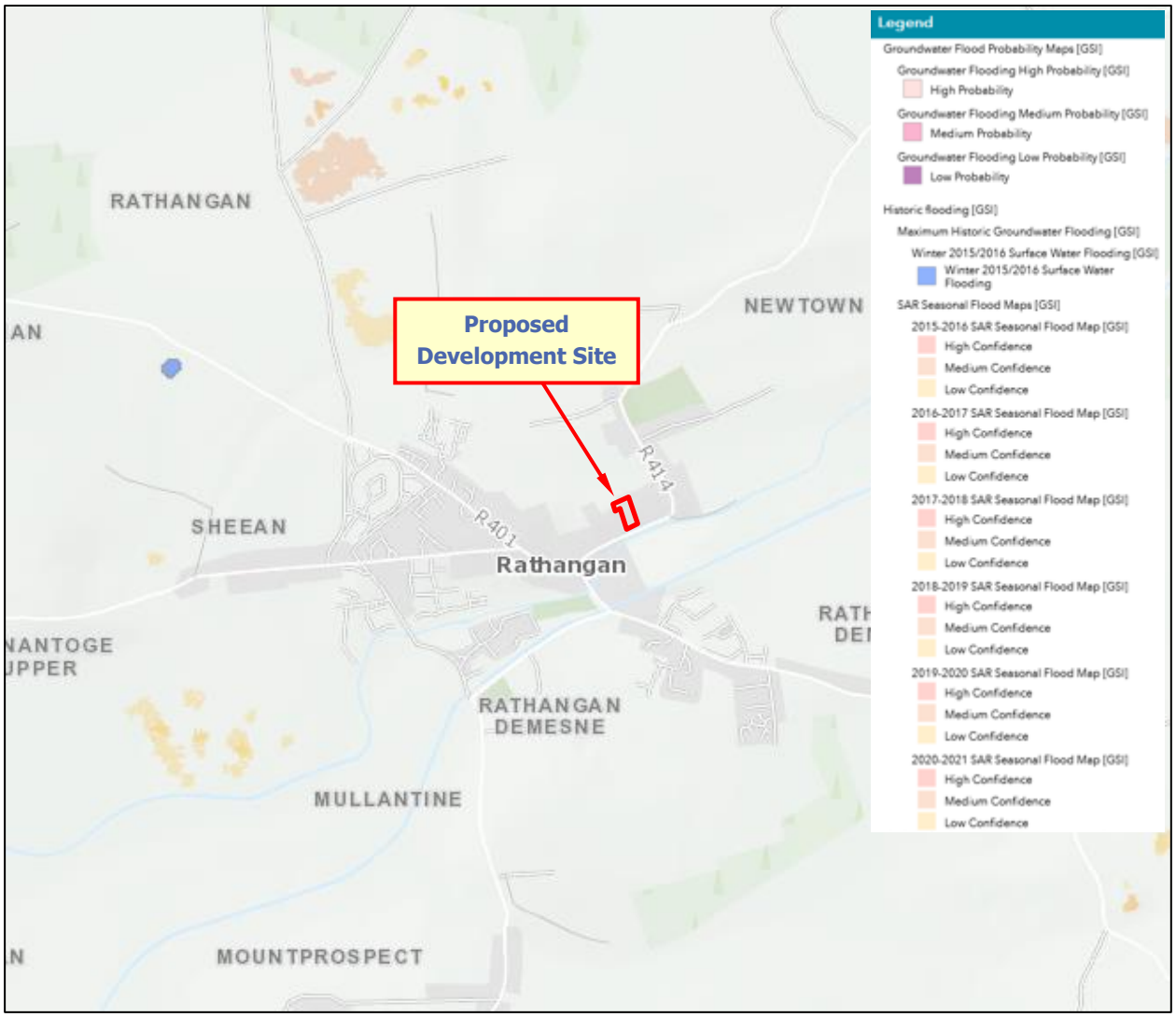


Figure 8 - GSI Groundwater Flood Mapping

The above GSi Groundwater Mapping indicates no areas of predictive or historical groundwater or surface water flooding located at or in the vicinity of the site.

4.7. South Eastern CFRAM Study

The South Eastern Catchment Flood Risk & Management Study (CFRAMS) has been undertaken by the OPW and the final version of the flood maps were issued in January 2017. Flood risk extent and depth maps for further assessment areas within Rathangan have also been produced.

OPW CFRAMS predictive fluvial flood map number O14RTN_EXFCD_F0_03 illustrates predictive extreme present day scenario fluvial flood extent zones associated with the Slate River in the vicinity of the proposed development site.

Figure 9 below (extracted from CFRAMS flood maps O14RTN_EXFCD_F0_03) illustrates the predictive extreme present day scenario 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) or 0.1% AEP (1 in 1000 year) flood extents in the vicinity of the site.

A full copy of OPW CFRAMS flood extent map O14RTN_EXFCD_F0_03 is presented in *Appendix B*.

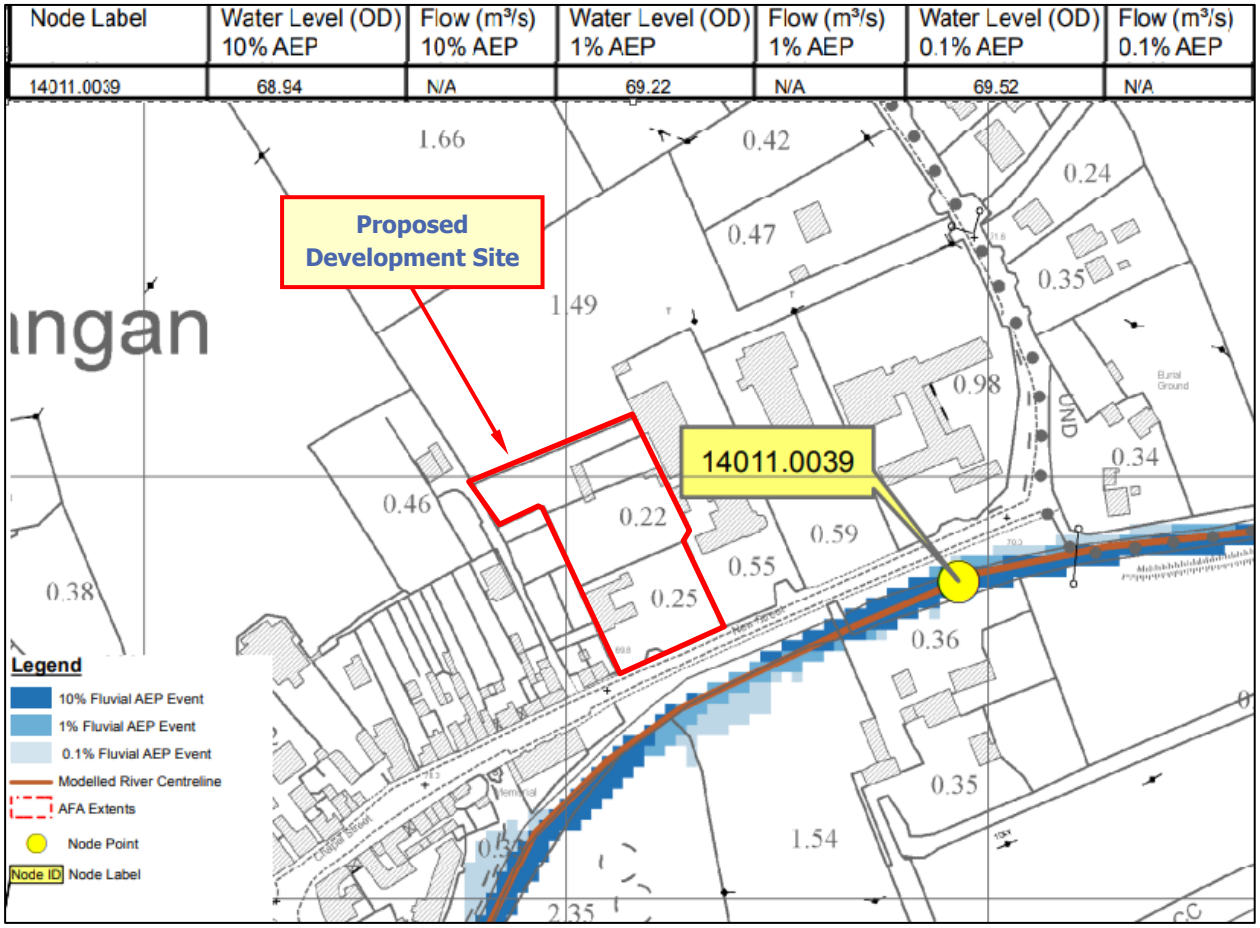


Figure 9 – CFRAMS Fluvial Flood Maps

As illustrated in *Figure 9* above, the site of the proposed development does not fall within a predictive present day scenario 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) or 0.1% AEP (1 in 1000 year) fluvial flood zone.

The South Eastern CFRAMS flood map reference O14RTN_EXFCD_F0_03 also provides information on predictive flood water levels for the present day scenario 10% AEP (1 in 10 year), 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) fluvial flood events at various node points (hydrological estimation points) along the Slate River.

As illustrated in *Figure 9* above, the node point closest to the proposed development site is referenced as node point 14011.0039 located approximately 120m upstream from the site. Predictive flood levels at this node point are applicable for the purposes of assessing potential flood risk to the proposed development site.

Details of the predictive fluvial flood levels for CFRAMS node point 14011.009 are listed in *Table 2* below.

Node Label	Flood Level (m OD) 10% AEP	Flood Level (m OD) 1% AEP	Flood Level (m OD) 0.1% AEP
14011.0039	68.94	69.22	69.52

Table 2: CFRAMS Predicted Fluvial Flood Volumes & Levels

Existing site ground levels adjacent to the southern boundary of the site range from 70.05m OD – 70.72m OD. These levels are elevated above the predictive 0.1% AEP (1 in 1000 year) flood level listed above.

4.8. Climate Change Scenario

The OPW Floodinfo.ie and OPW WMS resource was utilised to acquire information and data in relation to the climate change scenario predictive fluvial flood extent and flood levels associated with the Slate River in the vicinity of the proposed development site.

Figure 10 below illustrates the predictive mid-range future climate change scenario 1% AEP + CC (1 in 100 year + climate change) and 0.1% AEP + CC (1 in 1000 year + climate change) OPW CFRAMS fluvial flood extents at the location of the proposed development site.

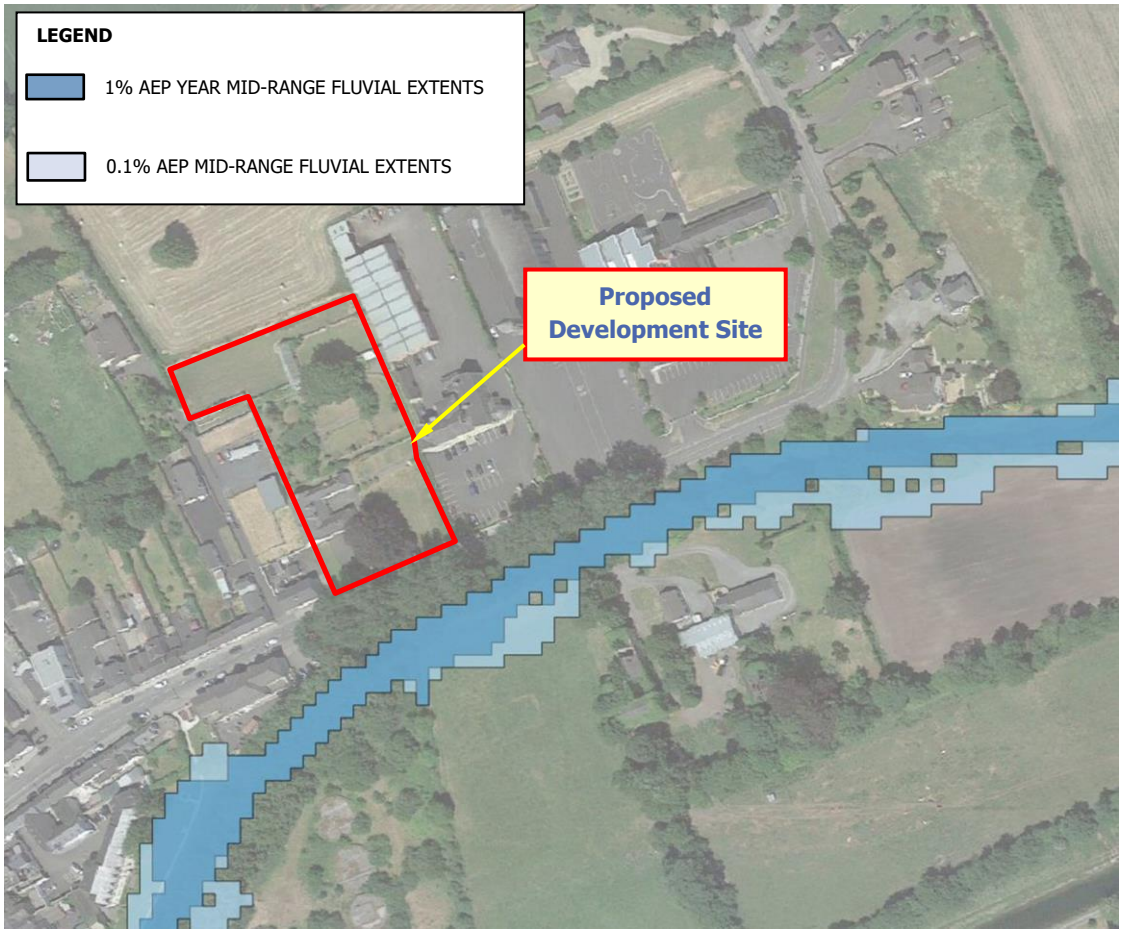


Figure 10 – OPW CFRAMS Flood Extents – Mid-Range Future Climate Change Scenario

As illustrated in *Figure 10* above the proposed development site does not fall within a predictive mid-range future climate change scenario 1% AEP + CC (1 in 100 year + climate change) or a 0.1% AEP + CC (1 in 1000 year + climate change) fluvial flood zone.

Figure 11 below illustrates the predictive high-end future climate change scenario 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) OPW CFRAMS fluvial flood extents at the location of the proposed development site.

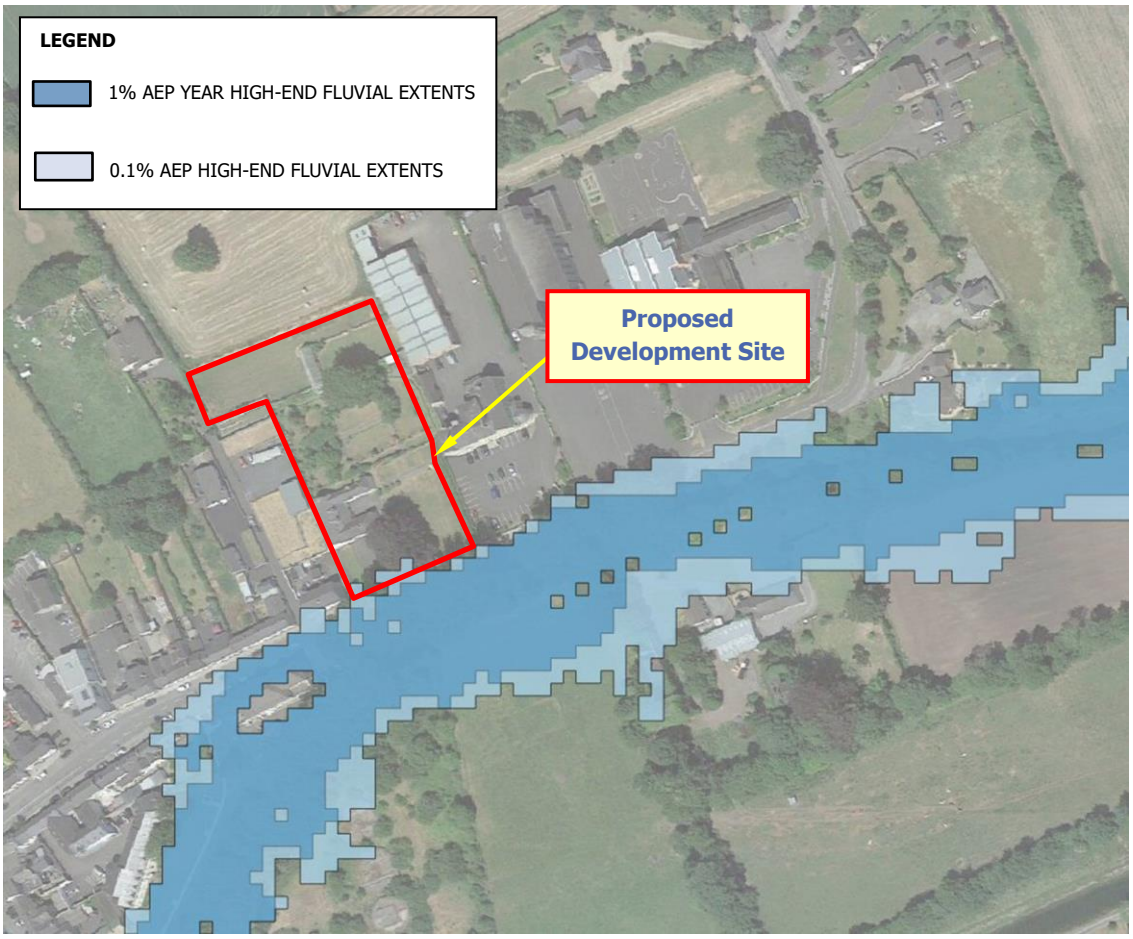


Figure 11 – OPW CFRAMS Flood Extents – High-End Future Climate Change Scenario

As illustrated in *Figure 11* above the proposed development site does not fall within a predictive high-end future climate change scenario 1% AEP + CC (1 in 100 year + climate change). The predictive high-end future climate change scenario 0.1% AEP + CC (1 in 1000 year + climate change) flood extent slightly encroaches the southern boundary of the site, however no residential development is proposed as this particular location, this area of the site shall be public open space only.

4.1. Grand Canal – Preliminary Flood Risk Analysis

In July 2011 a Preliminary Flood Risk Analysis Report was undertaken by Waterways Ireland to assess the possible flood risk to adjacent lands and properties associated with the Royal Canal, the Grand Canal, Lough Allen Canal, the Jamestown Canal and the River Blackwater / Errina-Plassey Canal.

In relation to the assessment of the Grand Canal Barrow Navigation reach, the analysis determined that no historic instances of flooding have been recorded at Rathangan, and that due to the on-going management, inspection and assessment of this watercourse, the risk of flooding from the Grand Canal to adjacent lands and properties in Rathangan is deemed to be extremely LOW.

5. Scoping Assessment

The purpose of the scoping stage is to identify possible flood risks and to implement the necessary level of detail and assessment to assess these possible risks, and to ensure these can be adequately addressed in the flood risk assessment. The scoping exercise should also identify that sufficient quantitative information is already available to complete a flood risk assessment appropriate to the scale and nature of the development proposed.

The above screening assessment indicates that the primary flood risk to the proposed development site can be attributed to an extreme fluvial flood event in the Slate River located beyond the southern boundary of the proposed development site.

In consideration of the information collated as part of the screening exercise, and the availability of other information and data specific to the area of the proposed development site, it is considered that sufficient quantitative information to complete an appropriate flood risk assessment for the proposed development site can be derived from the information collated as part of the screening exercise.

In particular, the present day and climate change scenario flood extent maps and predictive flood levels for the area produced as part of the OPW South Eastern CFRAM study are based on the results of detailed hydraulic modelling undertaken along the Slate River and provide a reasonably accurate delineation of flood zones and prediction of extreme flood levels at and in the general vicinity of the proposed development site.

The specific flood risk to and from the proposed development site is assessed in the subsequent 'Assessing Flood Risk' stage of this study report.

6. Assessing Flood Risk

Flood risk from a particular watercourse is normally assessed for a 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) flood event, in accordance with most county development plans and in accordance with the DOEHLG guidelines *'The Planning System and Flood Risk Management Guidelines'*.

The following section present an analysis and assessment of the estimated 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) flood event in the Slate River.

6.1. Assessment of Extreme Flood Extents & Flood Levels

As illustrated in *Figure 9* above the proposed development site does not fall within a predictive present day scenario 1% AEP (1 in 100 year) or a 0.1% AEP (1 in 1000 year) fluvial flood zone associated with the Slate River.

The predictive present day scenario 1% AEP (1 in 100 year) and 0.1% AEP (1 in 1000 year) flood levels in the Slate River at the general location of the proposed development site are 69.22m OD and 69.52m OD respectively. Reference to the architects proposed site layout drawing indicates that the proposed development 'Block A' and 'Block B' shall be constructed to finished ground floor levels of 71.748 m OD and 73.491m OD respectively. These proposed finished floor levels are significantly elevated above the predictive 0.1% AEP flood level in the Slate River.

As illustrated in *Figure 10* above the proposed development site does not fall within a predictive mid-range future climate change scenario 1% AEP + CC (1 in 100 year + climate change) or a 0.1% AEP + CC (1 in 1000 year + climate change) fluvial flood zone associated with the Slate River.

As illustrated in *Figure 11* above the proposed development site does not fall within a predictive high-end range future climate change scenario 1% AEP + CC (1 in 100 year + climate change) fluvial flood zone associated with the Slate River. The predictive high-end future climate change scenario 0.1% AEP + CC (1 in 1000 year + climate change) flood zone slightly encroaches the southern boundary of the site, however no residential development is proposed as this particular location, this area of the site shall be public open space only.

In summary, the proposed development site, and areas of the site where development is proposed, is not predicted to be impacted due to the occurrence of an extreme present day scenario, mid-range future climate change scenario or high-end climate change scenario fluvial flood event.

6.2. Potential Hydrological Impact of Development as Proposed

As presented above, the proposed development site, and areas of the site where development is proposed, do not fall within a predictive present day scenario, mid-range future climate change scenario or high-end future climate change scenario fluvial flood zone. The development as proposed shall therefore not result in an adverse impact to the existing hydrological regime of the area or increase fluvial flood risk elsewhere.

In consideration of potential pluvial flood risk from the development as proposed, the screening assessment undertaken as part of this Site Specific Flood Risk Assessment indicates that the proposed development site does not fall within an indicative, predictive or anecdotal pluvial flood zone. The development as proposed shall incorporate an appropriate stormwater management system designed in accordance with the requirements and standards of the relevant Kildare County Council Drainage Policy (see details from Hayes Higgins Partnership).

In summary, and in consideration of the incorporation of an appropriate stormwater management system, the development as proposed is therefore not expected to result in an adverse impact to the existing pluvial regime of the area or increase pluvial flood risk elsewhere.

7. Development in the Context of the Guidelines

In the context of the 'Planning System and Flood Risk Management Guidelines, DOEHLG, 2009' three flood zones are designated in consideration of flood risk to a particular development site.

Flood Zone 'A' – where the probability of flooding from rivers and watercourses is the highest (greater than 1% or 1 in 100 year for river and watercourse flooding and 0.5% or 1 on 200 for coastal or tidal flooding).

Flood Zone 'B' – where the probability of flooding from rivers and watercourses is moderate (between 0.1% or 1 in 1000 year for river and watercourse flooding and 0.5% or 1 on 200 for coastal or tidal flooding).

Flood Zone 'C' – where the probability of flooding from rivers and watercourses is low or negligible (less than 0.1% of 1 in 1000 year for both river and watercourse and coastal flooding). Flood Zone 'C' covers all areas that are not in Zones 'A' or 'B'.

The 'Planning System and Flood Risk Management Guidelines' list the planning implications for each flood zone, as summarised below:

Zone A – High Probability of Flooding. Most types of development would not be considered in this zone. Development in this zone should only be considered in exceptional circumstances, such as in city and town centres, or in the case of essential infrastructure that cannot be located elsewhere, and where the 'Planning System and Flood Risk Management Guidelines' justification test has been applied. Only water-compatible development, such as docks and marinas, dockside activities that require a waterside location, amenity open space and outdoor sports and reaction would be considered appropriate in this zone.

Zone B – Moderate Probability of Flooding. Highly vulnerable development such as hospitals, residential care homes, Garda, fire and ambulance stations, dwelling houses, strategic transport and essential utilities infrastructure would generally be considered inappropriate in this zone, unless the requirements of the justification test can be met. Less vulnerable development such as retail, commercial and industrial uses and recreational facilities might be considered appropriate in this zone. In general however, less vulnerable development should only be considered in this zone if adequate lands or sites are not available in Zone 'C' and subject to a flood risk assessment to the appropriate level of detail to demonstrate that flood risk to the development can be adequately managed and that development in this zone will not adversely affect adjacent lands and properties.

Zone C – Low to Negligible Probability of Flooding. Development in this zone is appropriate from a flood risk perspective. Developments in this zone are generally not considered at risk of fluvial flooding and would not adversely affect adjacent lands and properties from a flood risk perspective.

In the context of the 'Planning System and Flood Risk Management Guidelines, DOEHLG, 2009' the assessment and analysis undertaken a part of this Site Specific Flood Risk Assessment indicates that the proposed development site, and areas of the site where development is proposed, does not fall within a predictive present day scenario, mid-range future climate change scenario or high-end climate change scenario Flood Zone 'A' or Flood Zone 'B'.

The area of the site where development is proposed therefore falls within Flood Zone 'C'.

The development as proposed is therefore not subject to the requirements of 'The Justification Test'.

8. Summary Conclusions

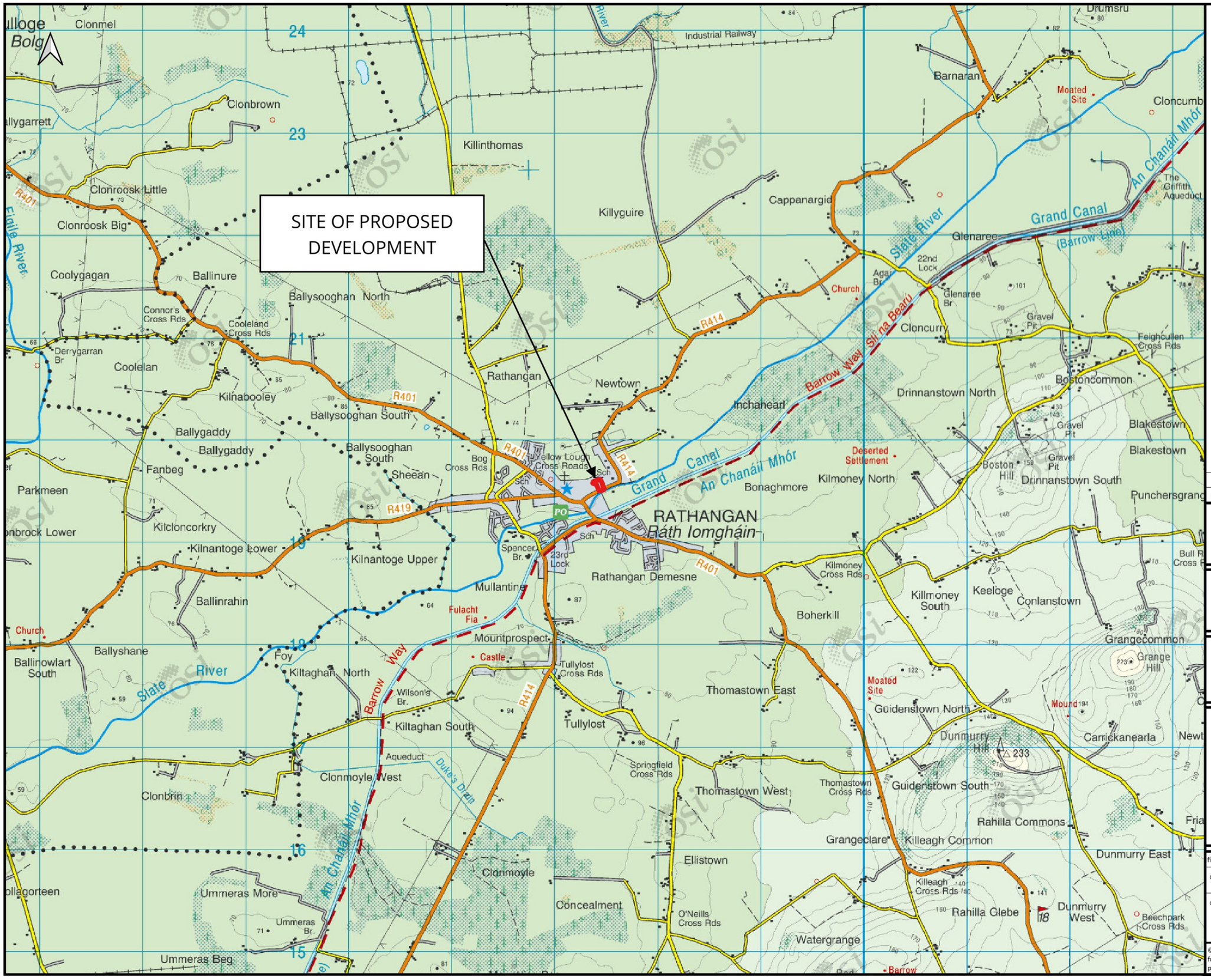
In consideration of the findings of this Site Specific Flood Risk Assessment and analysis the following conclusions are made in respect of the proposed development site:

- *A Site Specific Flood Risk (SSFRA) assessment, appropriate to the type and scale of development proposed, and in accordance with 'The Planning System and Flood Risk Management Guidelines – DoEHLG-2009' has been undertaken.*
- *The proposed development site has been screened, scoped and assessed for flood risk in accordance with the above guidelines.*
- *The primary flood risk to the proposed development site can be attributed to an extreme fluvial flood event in the Slate River located beyond the southern boundary of the site.*
- *The site is not at risk of pluvial or groundwater flooding.*
- *In the context of the 'Planning System and Flood Risk Management Guidelines, DOEHLG, 2009' the assessment and analysis undertaken a part of this Site Specific Flood Risk Assessment indicates that the proposed development site, and areas of the site where development is proposed, does not fall within a predictive present day scenario, mid-range future climate change scenario or high-end climate change scenario Flood Zone 'A' or Flood Zone 'B'.*
- *The area of the site where development is proposed falls within Flood Zone 'C'.*
- *The development as proposed shall incorporate an appropriate stormwater management system designed in accordance with the requirements and standards of the relevant Kildare County Council Drainage Policy.*
- *In consideration of the findings of this Site Specific Flood Risk Assessment and the incorporation of an appropriate stormwater management system, the development as proposed is not expected to result in an adverse impact to the existing hydrological regime of the area or increase fluvial or pluvial flood risk elsewhere. The development as proposed is therefore considered to be appropriate from a flood risk perspective.*

Appendices

Appendix A. Drawings

IE2728-001-A - Site Location



LEGEND

rev.	date	amendment	drn	ckd
A	19.04.23	ISSUE	RM	MOF

PROPOSED DEVELOPMENT AT RATHANGAN, CO. KILDARE

SITE SPECIFIC FLOOD RISK ASSESSMENT

SITE LOCATION

IE CONSULTING
WATER-ENVIRONMENTAL-CIVIL

CARLOW OFFICE:
INNOVATION CENTRE
GREEN ROAD
CARLOW R95 W248

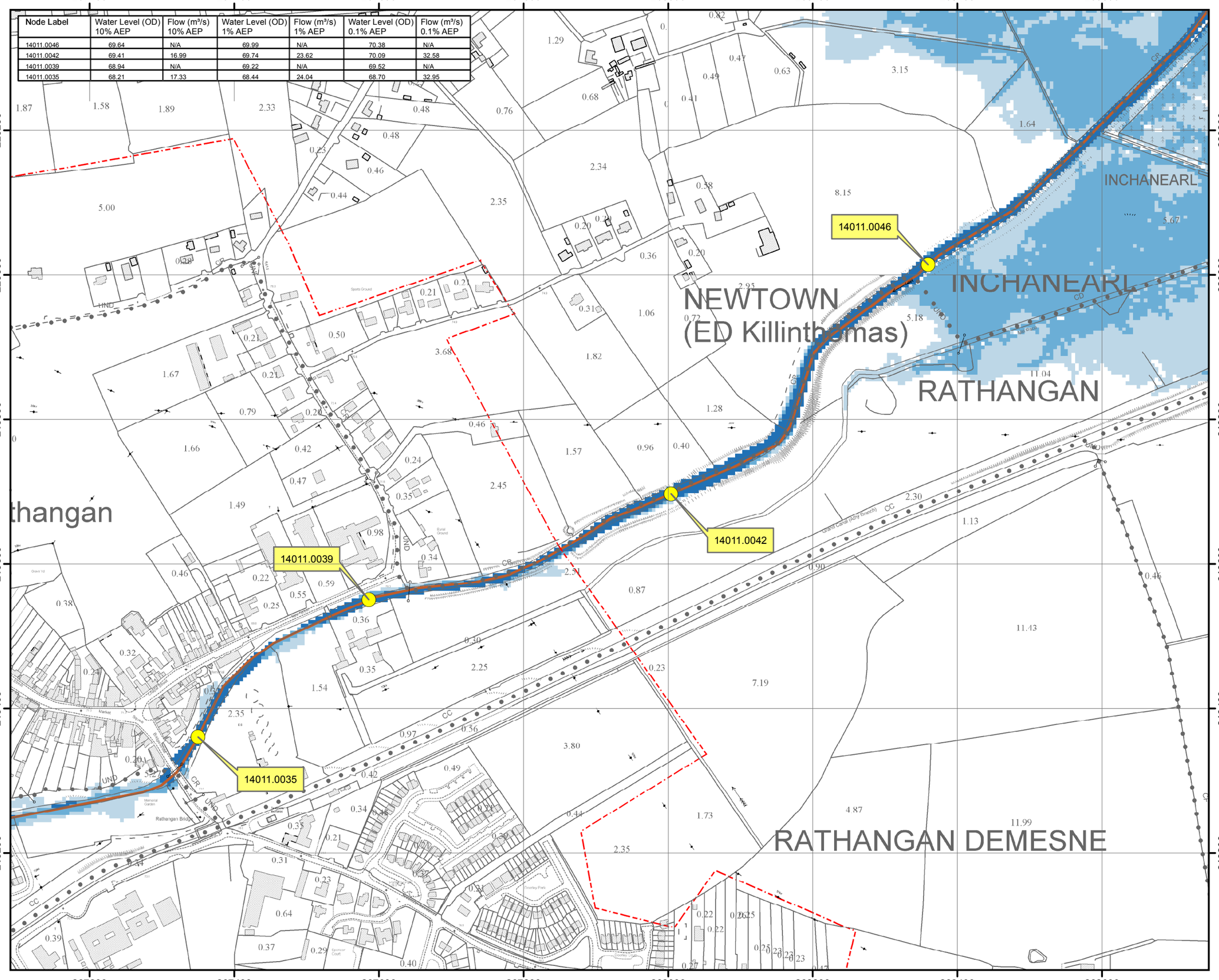
NEWRY OFFICE:
1 RDC HOUSE
WIN BUSINESS PARK
NEWRY BT35 6PH

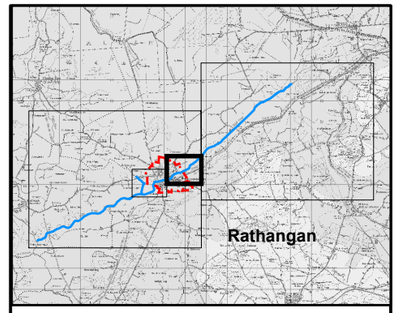
file location: N:\IE2728\DRAWINGS	scale: 1:50,000	A3
drawing status: PLANNING	datum: MALIN	
	drawn: RM	
drawing no. IE2728-001	rev. A	checked: MOF
		approved: PMS
		date: 19/04/2023

Appendix B. – CFRAMS Map

O14RTN_EXFCD_F0_03

Node Label	Water Level (OD) 10% AEP	Flow (m³/s) 10% AEP	Water Level (OD) 1% AEP	Flow (m³/s) 1% AEP	Water Level (OD) 0.1% AEP	Flow (m³/s) 0.1% AEP
14011.0046	69.64	N/A	69.99	N/A	70.38	N/A
14011.0042	69.41	16.99	69.74	23.62	70.09	32.58
14011.0039	68.94	N/A	69.22	N/A	69.52	N/A
14011.0035	68.21	17.33	68.44	24.04	68.70	32.95





IMPORTANT USER NOTE:
THE VIEWER OF THIS MAP SHOULD REFER TO THE DISCLAIMER, GUIDANCE NOTES AND CONDITIONS OF USE THAT ACCOMPANY THIS MAP.

Legend

- 10% Fluvial AEP Event
- 1% Fluvial AEP Event
- 0.1% Fluvial AEP Event
- Modelled River Centreline
- AFA Extents
- Node Point
- Node ID Node Label

FINAL

REV:	NOTE:	DATE:
01	Amendments to Flood Extent	28/11/2016

SOUTH EASTERN CFRAM STUDY
CATCHMENT FLOOD RISK ASSESSMENT AND MANAGEMENT

OPW
Oifig na nOibreacha Poiblí
The Office of Public Works

RPS

The Office of Public Works
Jonathan Swift Street
Trim
Co Meath

Elmwood House
74 Boucher Road
Belfast
BT12 6RZ

T +44(0) 28 90 667914
F +44(0) 28 90 668286
W www.rpsgroup.com
E ireland@rpsgroup.com

Map:
Rathangan Fluvial Flood Extents

Map Type:	EXTENT
Source:	FLUVIAL
Map Area:	HPW
Scenario:	CURRENT
Drawn By :	F.M.C. Date : 6 January 2017
Checked By :	J.M. Date : 6 January 2017
Approved By :	G.G. Date : 6 January 2017
Drawing No. :	O14RTN_EXFCD_F0_03
Map Series :	Page 3 of 4
Drawing Scale :	1:5,000 @ A3

Appendix F – Irish Water Confirmation of Feasibility

CONFIRMATION OF FEASIBILITY

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

Uisce Éireann
PO Box 448
South City
Delivery Office
Cork City

www.water.ie

Louise Mahony

Hayes Higgins
The Glasshouse
11 Coke Lane, Smithfield
Smithfield
Dublin 7
Dublin
D07 WNP2

4 January 2024

Our Ref: CDS23009438 Pre-Connection Enquiry
Saint John's, Rathangan, Co. Kildare

Dear Applicant/Agent,

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

Uisce Éireann has reviewed the pre-connection enquiry in relation to a Water & Wastewater connection for a Multi/Mixed Use Development of 24 unit(s) at Saint John's, Saint John's, Rathangan, 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 without infrastructure upgrade by Irish Water

- This connection has been deemed feasible based on the submitted SUDS measures which will offset the hydraulic discharge demands from this development.
- The proposed Development indicates that Uisce Éireann assets are present on the site. The Developer has to demonstrate that proposed structures and works will not inhibit access for maintenance or endanger structural or functional integrity of the assets during and after the works. Drawings (showing clearance distances, changing to ground levels) and

Method Statements should be included in the Detailed Design of the Development. A wayleave in favour of Uisce Éireann will be required over the assets that are not located within the Public Space. For design submissions and queries related to diversion/build near or over, please contact IW Diversion Team via email address diversions@water.ie

This letter does not constitute an offer, in whole or in part, to provide a connection to any Uisce Éireann 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 Uisce Éireann.

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/

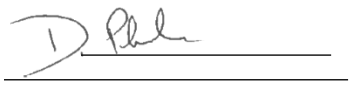
Where can you find more information?

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

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

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

Yours sincerely,



Dermot Phelan
Connections Delivery Manager

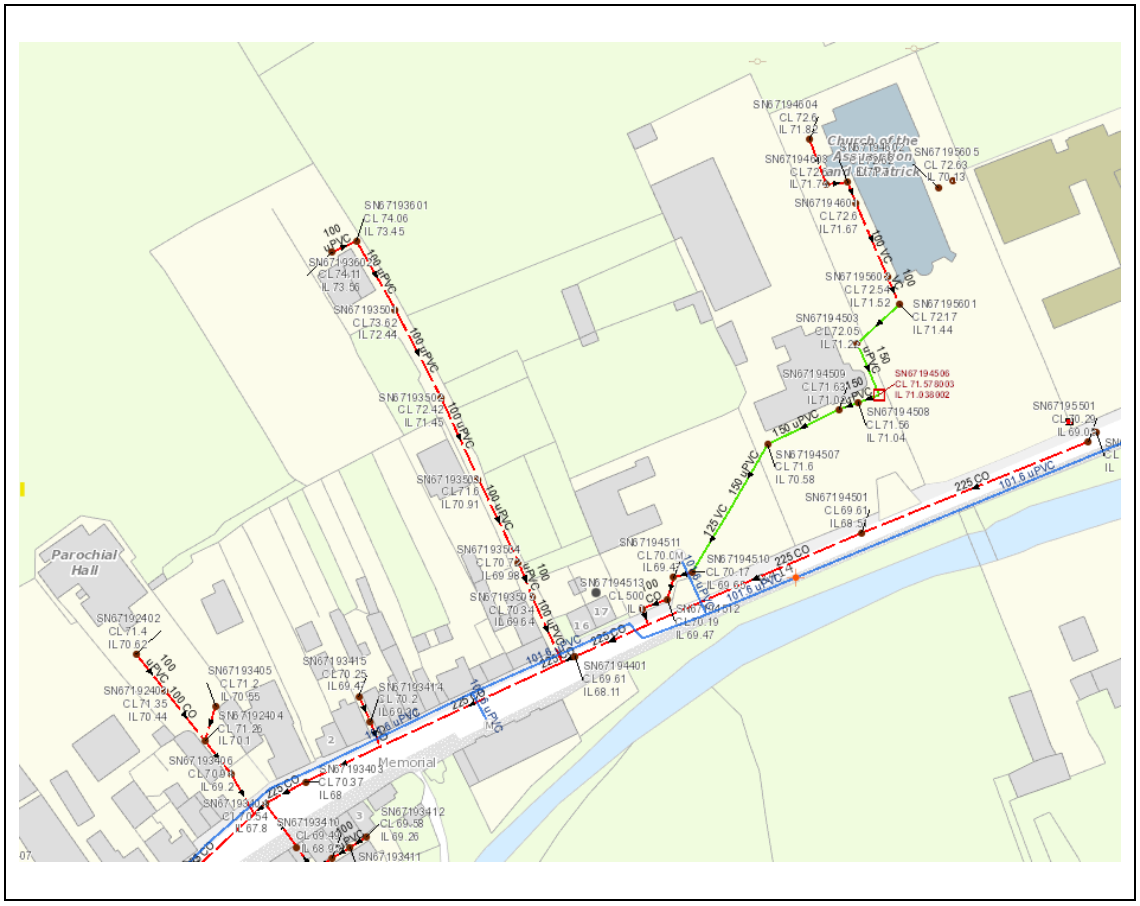
Section A - What is important to know?

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 Uisce Éireann's network(s). • Before the Development can connect to Uisce Éireann's network(s), you must submit a connection application and be granted and sign a connection agreement with Uisce Éireann.
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?	• Uisce Éireann connection charges can be found at: https://www.water.ie/connections/information/charges/
Who will carry out the connection work?	• All works to Uisce Éireann's network(s), including works in the public space, must be carried out by Uisce Éireann*. *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 Uisce Éireann's network(s)?	• Requests for maps showing Uisce Éireann'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 Uisce Éireann 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 Uisce Éireann's Network(s)

The map included below outlines the current Uisce Éireann infrastructure adjacent the Development: To access Uisce Éireann 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 Uisce Éireann'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 Uisce Éireann.

Whilst every care has been taken in respect of the information on Uisce Éireann's network(s), Uisce Éireann 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 Uisce Éireann's underground network(s). The onus is on the parties carrying out excavations or any other works to ensure the exact location of Uisce Éireann'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 G – SuDs Matrix Document

SUDS/Green Infrastructure feasibility checklist – 20D024 – August 2023

SuDS Measures	Measures to be used on this site	Rationale for selecting/not selecting measure
Source Control		
Swales	N	There is limited space within the site for same.
Tree Pits	N	Tree pits maybe included in landscape design – to be reviewed. Not included in the SuDs calculations, but they will contribute.
Rainwater Butts	TBC	Usage will be reviewed with architect and client.
Rainwater harvesting	TBC	Will be reviewed with the architect and client to see if it is a viable option.
Soakaways	Y	Included for hardstanding roof and entrance road.
Infiltration trenches	N	Not required.
Permeable pavement	Y	Permeable surfacing will be provided to allow infiltration directly to the ground.
Green Roofs	N	Not viable due to nature of development
Filter strips	N	Filter strips maybe included in landscape design – to be reviewed. Not included in the SuDs calculations, but they will contribute.
Bio-retention systems/Raingardens	Y	Raingardens included in landscape design. Not included in the SuDs calculations, but they will contribute.
Blue Roofs	N	Not cost effective over the lifespan due to maintenance.
Filter Drain	N	Not currently proposed.
Site Control		
Detention Basins	N	No available room on site for large bodies of water and poses a potential drowning hazard.
Retentions basins	N	No available room on site for large bodies of water and poses a potential drowning hazard.
Regional Control		
Ponds	N	No available room on site for large bodies of water and poses a potential drowning hazard
Wetlands	N	No available room on site for large bodies of water and poses a potential drowning hazard.
Other		
Petrol/Oil interceptor	N	Not required.
Attenuation tank – only as a last resort where other measures are not feasible	N	Not required.