INFRASTRUCTURE

Project

Rosemount House

Report Title

Site Specific Flood Risk Assessment Report

Client

Walls Construction Ltd

DBFL CONSULTING ENGINEERS

August 2022

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Report Title: **Site Specific Flood Risk Assessment Report**

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Author: **Seán Byrne**

Approved by: **Brendan Keogh**

Date: **August 2022**

DBFL Consulting Engineers

Dublin Office
Ormond House
Ormond Quay
Dublin 7

Tel 01 4004000
Email info@dbfl.ie
Web www.dbfl.ie

Waterford Office
Suite 8b, The Atrium,
Maritana Gate, Canada Street,
Waterford. X91W028

Tel 051 309500
Email info@dbfl.ie
Web www.dbfl.ie

Cork Office
14 South Mall
Cork, T12CT91

Tel 021 202 4538
Email info@dbfl.ie
Web www.dbfl.ie

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APPENDIX A – FLOOD HAZARD INFORMATION

1.0 INTRODUCTION

1.1 Background

DBFL were commissioned to undertake a Site Specific Flood Risk Assessment (SSFRA), to accompany an SHD planning application for a proposed mixed-use development of 176 apartments with associated residential amenities, office space and café at Rosemount House, Northern Cross, Malahide Road, Dublin 17 (site area approx. 0.6462 ha).

The subject site located within the Clongriffin – Belmayne Local Area Plan and is approx. 9km northeast of Dublin City Centre.

Figure 1-1: Site Location (Site Boundary Indicative Only)

1.2 Objectives

The objective of this report is to inform the planning authority regarding flood risk for the proposed residential development. This report assesses the proposed development in accordance with the requirements of "*The Planning System and Flood Risk Management Guidelines for Planning Authorities"* and its technical Appendices (Office of Public Works, November 2009). This report clarifies the subject sites' flood zone category and presents information which would facilitate an informed decision of the planning application in the context of flood risk.

This flood risk assessment will outline the following;

- Information to allow an informed decision by the planning authority in relation to flood risk
- The site's flood zone category
- Appropriate flood risk mitigation and management measures for any residual flood risk

1.3 Flood Risk Assessment Scope

This SSFRA relates only to the proposed development at Rosemount House, Northern Cross, Malahide Road, Dublin 17 and its immediate surroundings.

This SSFRA uses information obtained from various sources in order to carry out an assessment of flood risk for the existing land and proposed development.

1.4 Approach

Section 2.0 of this SSFRA considers "The Planning System and Flood Risk Management, Guidelines for Planning Authorities" and its Technical Appendices as they relate to the site.

Flood risk identification is presented in Section 3.0, an initial flood risk assessment is carried out in Section 4.0, while a more detailed flood risk assessment is presented in Section 5.0. Conclusions and recommendations are outlined in Section 6.0.

1.5 Site Characteristics

The proposed development site is situated in Northern Cross, Dublin 17 (approx. 9km northeast of Dublin City Centre and approx. 4.5km southeast of Dublin Airport) and is currently occupied by a three-storey office building and associated ancillary facilities.

The site is bound by Mayne River Avenue to the west and south, a site to the north ("Mylan Carpark") in use as a building compound for the construction of the permitted development to the east (ABP Ref.: 307887-20).

Generally, the site falls from west to the east. The existing topography levels range from 27.9m AOD in the south-west corner of the site to circa 26.2m AOD in the north-east corner of the site.

The topographical survey has been included as a background in the DBFL Roads and Site Services drawings.

1.6 Ground Conditions

Ground Investigations Ireland carried out site investigations dated July 2022 (Report No. 11468-02-22 are included in Appendix B). Although the majority of the sites is paved, the topsoil layer in the verge around the periphery of the site went to a maximum depth of 0.4m BLG. Made ground which was described as described generally as brown sandy slightly gravelly CLAY with frequent cobbles and boulders extended 1.8m BGL. Below the made ground Cohesive deposits of brown sandy gravelly CLAY with occasional cobbles and boulders overlying a stiff or very stiff grey sandy gravelly CLAY with occasional cobbles and boulders where encountered.

The strength of the cohesive deposits typically increased with depth and was firm to stiff or stiff below 1.0m BGL in the majority of the exploratory holes. These deposits had some, occasional or frequent cobble and boulder content where noted on the exploratory hole logs.

1.7 Development Proposals

The proposed development consists of the demolition of the existing 3-storey office block on site and the construction of a mixed-use block of up to 9 storeys over basement in a 4-sided building around a central courtyard area, consisting of 176 no. apartments with associated residential amenities, office (1,050.8m^2), and café use (143.7 m^2).

2.0 PLANNING GUIDELINES & FLOOD RISK ASSESSMENT

2.1 The Planning System and Flood Risk Management, Guidelines for Planning Authorities

The FRM Guidelines provide "mechanisms for the incorporation of flood risk identification, assessment and management into the planning process". They ensure a consistent approach throughout the country requiring identification of flood risk and flood risk assessment to be key considerations when preparing development plans, local area plans and planned development.

"The core objectives of The FRM Guidelines are to:

- Avoid inappropriate development in areas at risk of flooding;
- Avoid new developments increasing flood risk elsewhere, including that which may arise from surface water run-off;
- Ensure effective management of residual risks for development permitted in floodplains;
- Avoid unnecessary restriction of national, regional or local economic and social growth;
- Improve the understanding of flood risk among relevant stakeholders; and
- Ensure the requirements of EU and national law in relation to the natural environment and nature conservation are complied with for flood risk management."

The FRM Guidelines outlines the key principles that should be adopted by regional and local authorities, developers and their as agents as follows

- Avoid the risk, where possible;
- Substitute less vulnerable uses, where avoidance is not possible, and
- Mitigate and manage the risk, where avoidance and substitution are not possible."

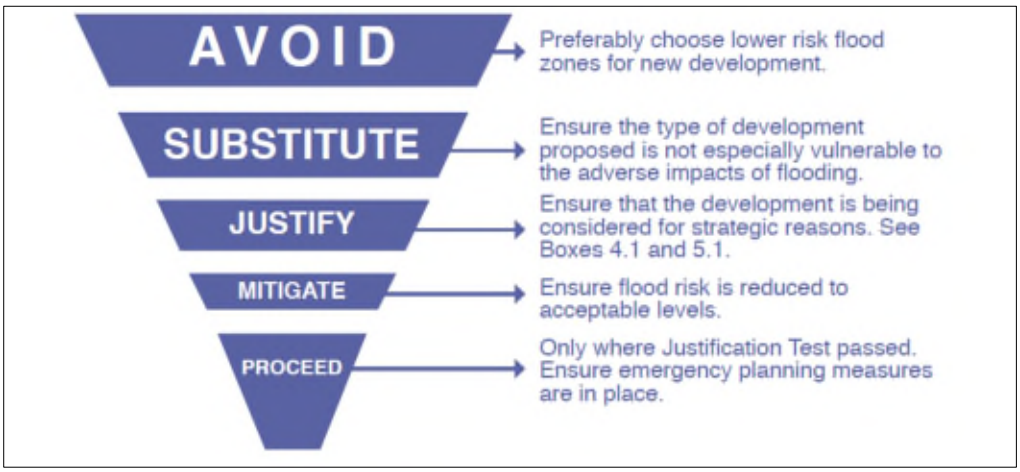

Figure 2-1: Sequential Approach Principles in Flood Risk Management (Extracted from FRM Guidelines)

The Sequential Approach in the Management of Flood Risk is included in Figure 2-1. Where the avoid and substitute principles of the sequential approach are not appropriate, then the Guidelines allow application of a Justification Test to assess the appropriateness or otherwise, of developments under consideration in areas of moderate or high flood risk.

2.2 Flood Risk Appraisal & Assessment

2.2.1 General

The assessment of flood risk requires an understanding of where water comes from (the source), how and where it flows (the pathways) and the people and assets affected by it (the receptors). Refer to Figure 2-2 below.

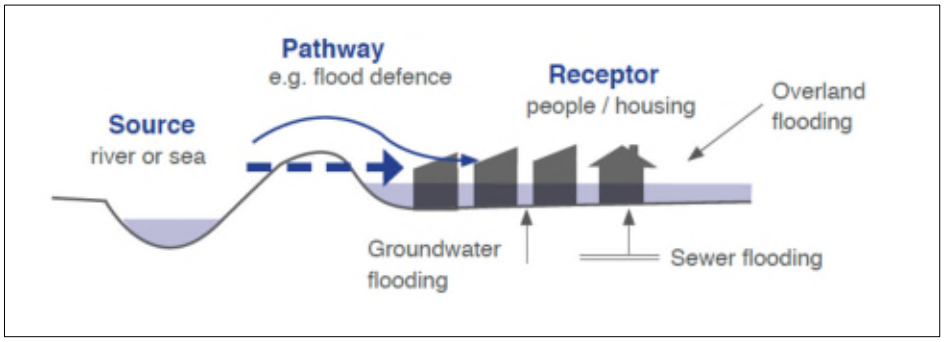

Figure 2-2: Source-Pathway-Receptor Model (Extracted from FRM Guidelines)

The principal sources are rainfall or higher than normal sea levels. The principal pathways are rivers, drains, sewers, overland flow and river and coastal floodplains and their defence assets. The receptors can include people, their property and the environment.

The Guidelines further state that "*A staged approach should be adopted, carrying out only such appraisal and or assessment as is needed for the purposes of decision-making at the regional, development and local area plan levels, and also at the site-specific level. The stages of appraisal and assessment are".*

Stage 1 Flood Risk Identification – to identify whether there may be any flooding or surface water management issues related to either the area of regional planning guidelines, development plans and LAP's or a proposed development site that may warrant further investigation at the appropriate lower level plan or planning application levels;

Stage 2 Initial Flood Risk Assessment – to confirm sources of flooding that may affect a plan area or proposed development site, to appraise the adequacy of existing information and to scope the extent of the risk of flooding which may involve preparing indicative flood zone maps. Where hydraulic models exist the potential impact of a development on flooding elsewhere and of the scope of possible mitigation measures can be assessed. In addition, the requirements of the detailed assessment should be scoped; and

Stage 3 Detailed Flood Risk Assessment – to assess flood risk issues in sufficient detail and to provide a quantitative appraisal of potential flood risk to a proposed or existing development or land to be zoned, of its potential impact on flood risk elsewhere and of the effectiveness of any proposed mitigation measures.

This SSFRA includes Stages 1, 2 and 3 Flood Risk Assessments related to the planned development.

2.2.2 Flood Zones

The FRM Guidelines use flood zones to determine the likelihood of flooding and for flood risk management within the planning process. The three flood zones levels are:

- Flood Zone A – where the probability of flooding from rivers and the sea is highest 1% AEP (Annual Exceedance Probability) for rivers and 0.5% AEP for coastal;
- Flood Zone B – where the probability of flooding from rivers and the sea is moderate (between 0.1% AEP or 1 in 1000 and 1% AEP or 1 in 100 for river flooding); and
- Flood Zone C – where the probability of flooding from rivers and the sea is low (less than 0.1% AEP or 1 in 1000 for both river and coastal flooding). Flood Zone C covers all areas outside zones A and B.

The FRM Guidelines categorises all types of development as either;

- Highly Vulnerable e.g. dwellings, hospitals, fire stations, essential infrastructure,
- Vulnerable e.g. retail, commercial or industrial buildings, local transport infrastructure,
- Water Compatible e.g. flood infrastructure, docks, amenity open space.

2.3 Vulnerability v Flood Zone

The FRM Guidelines states that "*a sequential approach to planning is a key tool in ensuring that development, particularly new development, is first and foremost directed towards land that is at low risk of flooding*".

The Sequential Approach restricts development types to occur within the flood zone appropriate to their vulnerability class, as outlined below in Table 2-1. Alternatively, a Justification Test can be completed to justify development in higher risk areas, (refer to Figure 2-3).

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

Table 2-1: Matrix of Vulnerability versus Flood Zone to illustrate where development appropriate for flood zone or where justification test required (Extract from FRM Guidelines)

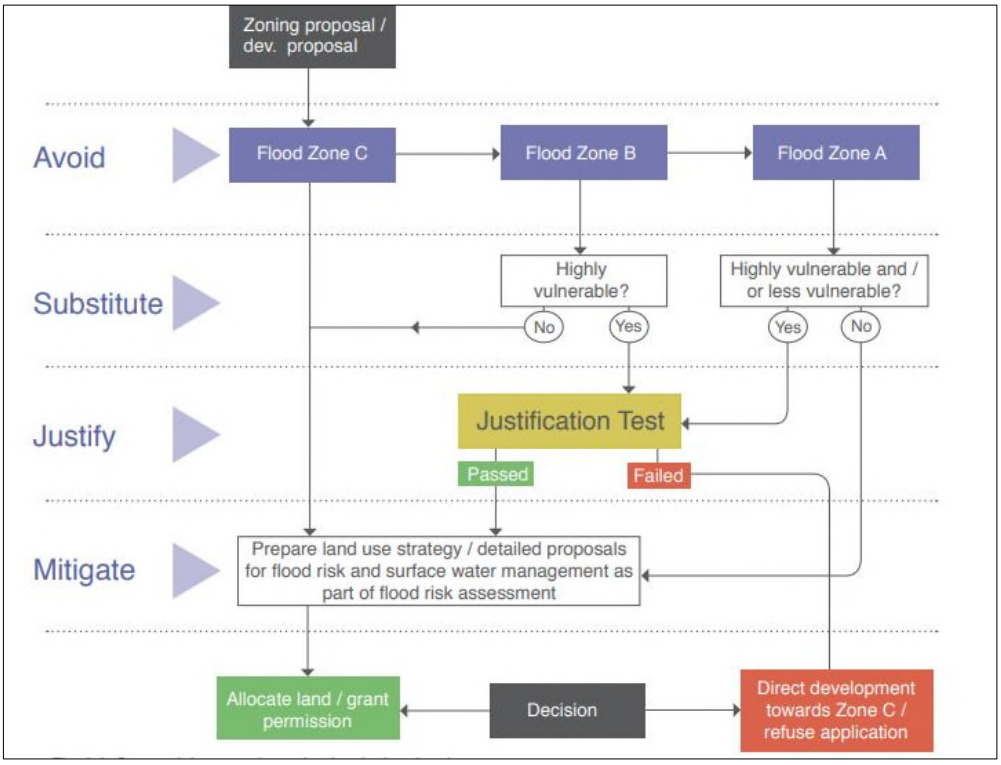

Figure 2-3: Sequential Approach & Justification Test Mechanism in the Planning Process (FRM Guidelines)

The proposed development is classified as a highly vulnerable development (residential and essential infrastructure) in the Guidelines. This class is appropriate to flood zone 'C'.

3.0 STAGE 1 – FLOOD RISK IDENTIFICATION

The initial flood risk identification stage uses predictive and historical information to identify and confirm whether there may be flooding or surface water management issues for the site in question which may warrant further investigation. Findings from the flood risk identification stage are outlined below.

3.1 Predictive Flood Data

3.1.1 OPW FEMFRAMS Flood Extent Mapping 2017

Extracts from the Fingal East Meath FRAM Study (Fluvial Flood Extent Map) are included in Appendix A of this report which indicate the extent of fluvial flooding associated with the Mayne River.

No fluvial flooding is indicated in the vicinity of the proposed development. Also refer to Figure 3-1.

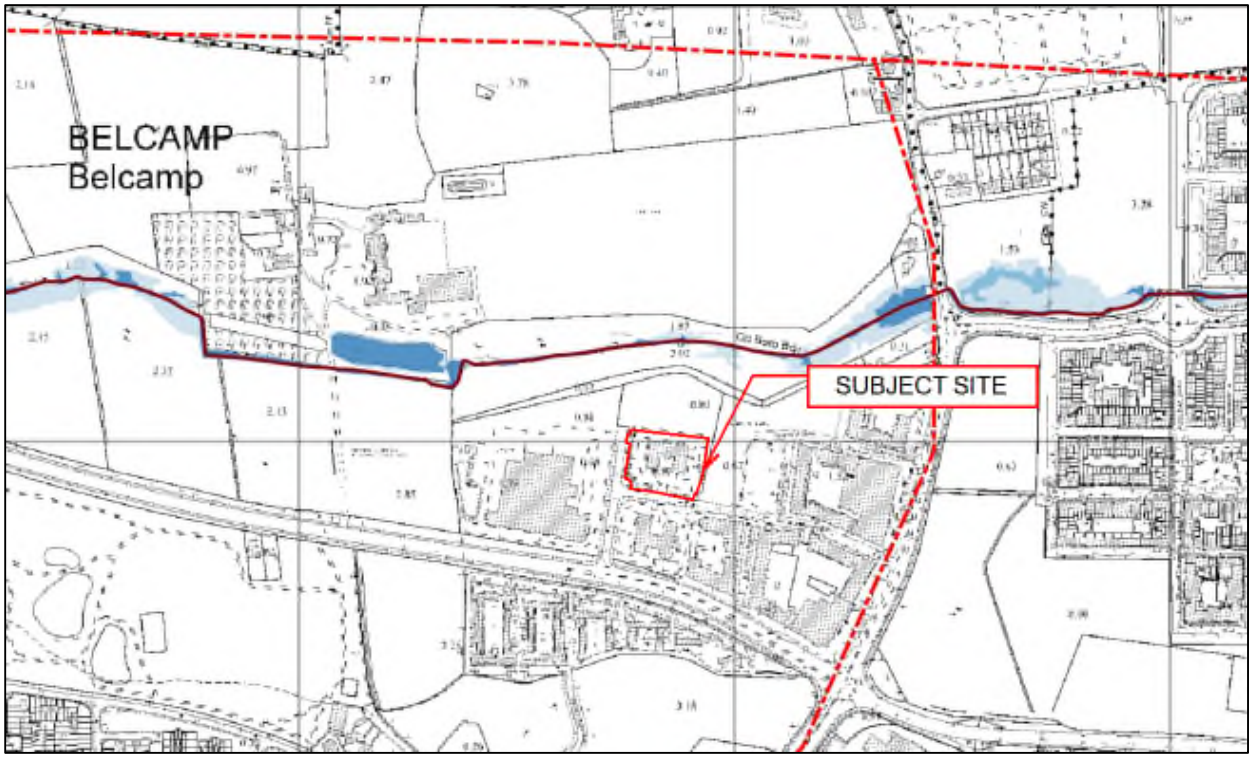

Figure 3-1: Extract of FEM FRAMS Fluvial Flood Extents

3.1.2 Clongriffin – Belmayne Local Area Plan 2012-2018

Extracts from the Clongriffin – Belmayne Local Area Plan (Fingal East Meath FRAMS Flood Extent Map) are included in Appendix A of this report which indicate the extent of fluvial flooding associated with the Mayne River.

No fluvial flooding is indicated in the vicinity of the proposed development. Also refer to Figure 3-2.

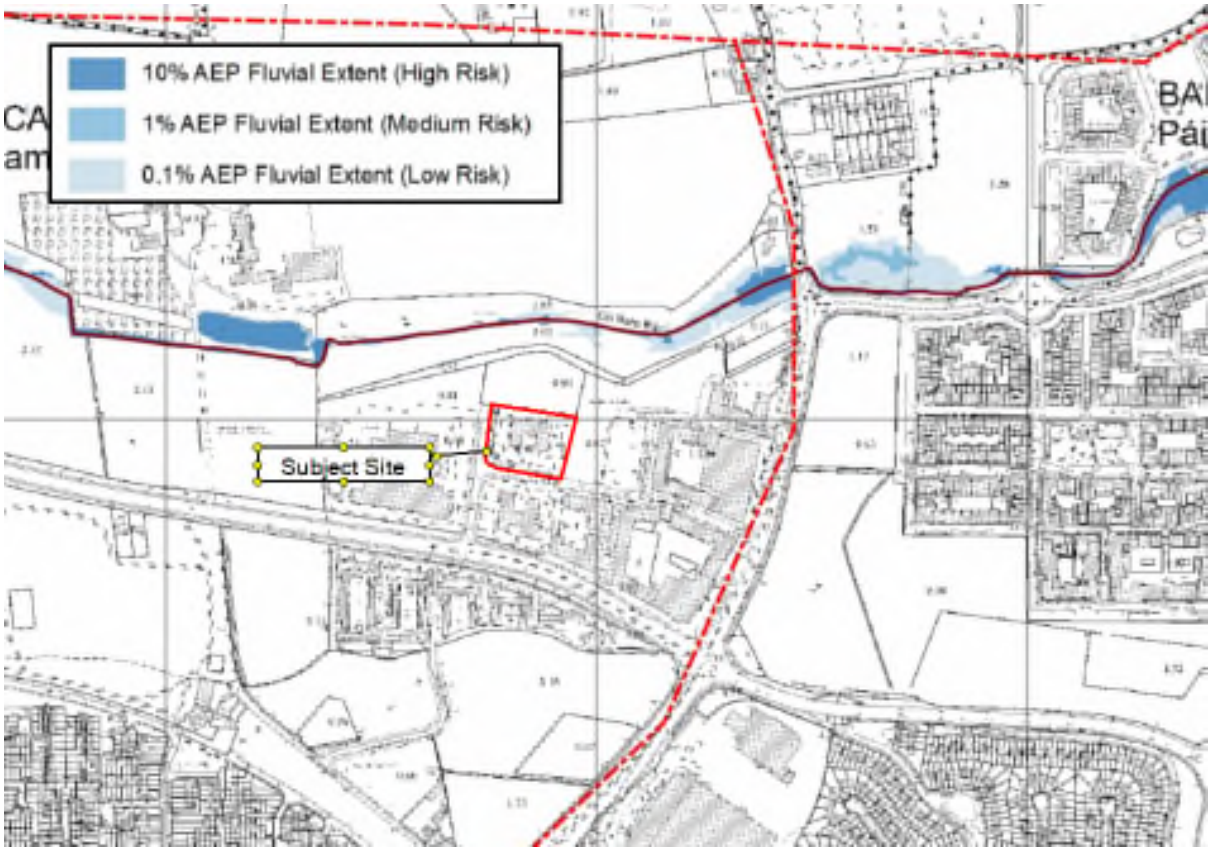

Figure 3-2: Extract of Clongriffin – Belmayne Local Area Plan 2012-2018

3.1.3 DCC County Development Plan 2016-2022 Strategic Flood Risk Assessment

Extracts from the DCC County Development Plan 2022-2028 Strategic Flood Risk Assessment are included in Appendix A of this report. No fluvial flooding is indicated in the vicinity of the proposed development. Also refer to Figure 3-3.

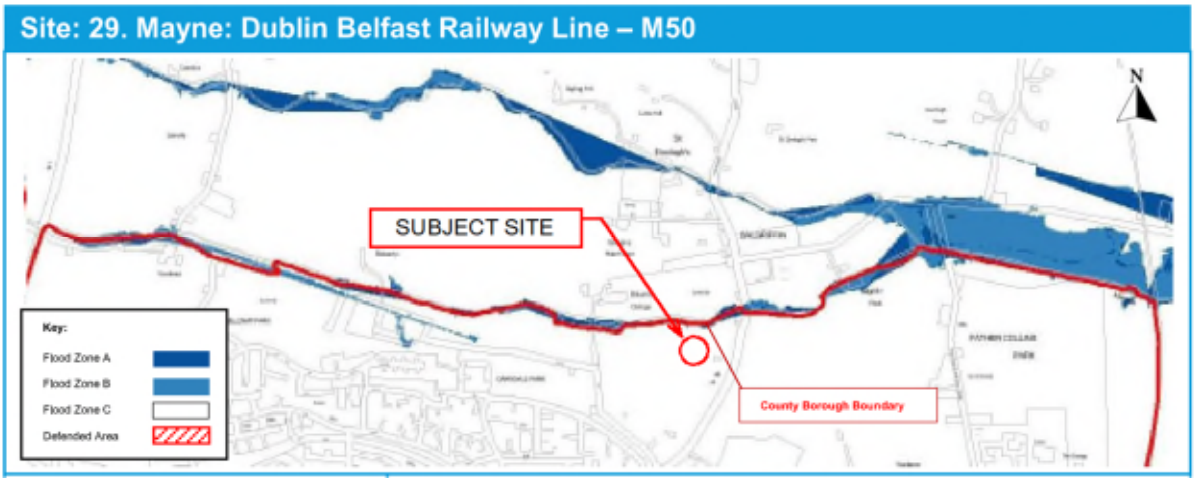

Figure 3-3: Extract of Dublin City Council SFRA 2022-2028

3.2 Flood History

3.2.1 OPW National Flood Hazard Mapping

OPW's Summary Local Area Report is included in Appendix A (Flood Hazard Information). This report is sourced from the OPW website (www.floodmaps.ie) and summarises all flood events within 2.5 km of the site. No flood events are noted in the immediate vicinity of the site.

3.3 Site Investigations

Ground Investigations Ireland (Report No. 11468-02-22) determined that Ground water levels were 4.00m below ground level.

3.4 Source-Pathway-Receptor Model

A Source-Pathway-Receptor model was produced to summarize the possible sources of floodwater, the pathways by which flood water could reach receptors and the receptors that could be affected by potential flooding, see Table 3-1 below.

It outlines effects of various potential sources, the performance and response of pathways and the consequences to the receptors in the context of the proposed development.

These sources, pathways and receptors will be assessed further by the initial flood risk assessment stage.

Source	Pathway	Receptor	Likelihood	Consequence	Risk
Fluvial	Overbank from Mayne River 100m North of the site (refer to Figure 3-1 & Figure 3-2)	People and Property (the proposed development).	Remote	Medium	Low
Surface Water (Pluvial)	Blockage and / or surcharging of the surface water drainage network	People and Property (the proposed development).	Possible	Medium	Medium
Human / Mechanical Error (Pluvial)	Failure of SuDS measures (e.g. Hydrobrake failure)	People and Property (the proposed development).	Possible	Medium	Medium
Groundwater	Rising groundwater levels within the site	People and Property (the proposed development).	Remote	Low	Low

Table 3-1 Source-Pathway-Receptor Analysis

4.0 STAGE 2 – INITIAL FLOOD RISK ASSESSMENT

Flood risks identified during Stage 1 – Flood Risk Identification, are outlined in Table 3.2 (Source Pathway Receptor Analysis) and noted below. These risks are assessed further in this section of the SSFRA.

- Low risk of fluvial flooding
- Medium risk of pluvial flooding (surface water and human / mechanical error)
- Low risk of groundwater flooding

The information sources identified in Section 3.0 are considered adequate for the purpose of an Initial Flood Risk Assessment for the site and no further technical studies are proposed.

4.1 Initial Fluvial Flood Risk Assessment

The Source-Pathway-Receptor model identified a low risk of fluvial flooding.

Fingal East Meath FRAMS Flood Extent Map

The Fingal East Meath FRAMS Fluvial Flood Extent maps identify the extents of the predicated 1% AEP fluvial flood event associated with the Mayne River which is located approx. 100m to the north of the site (refer to Figures 3-2 and 4-1). No fluvial flooding is indicated in the vicinity of the site.

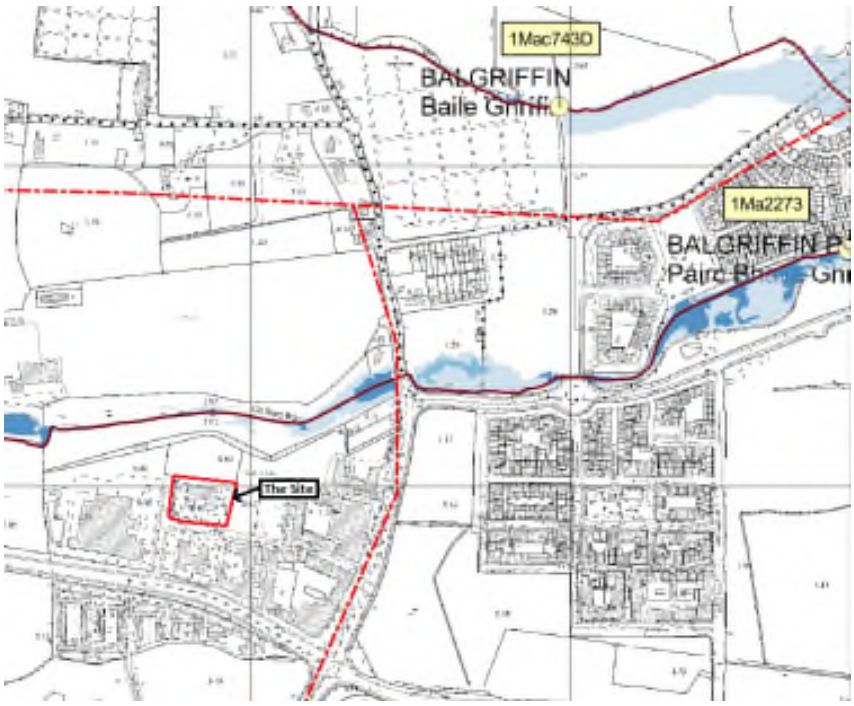

Figure 4-1 Extract of FEM FRAMS Fluvial Flood Extents map

The closest modelled nodes on the Mayne River, 1Ma2273 and 1Ma5284, are located approx. 1.0km downstream and 2.0km upstream from the proposed development, respectively. Associated 1% AEP

flood levels are show in Figure 4-1 below. Fingal East Meath FRAMS Fluvial Flood Extent maps are included in Appendix A of this report.

Node Label	Water Level (mOD) 10% AEP	Flow (m3/s) 10% AEP	Water Level (mOD) 1% AEP	Flow (m3/s) 1% AEP	Water Level (mOD) 0.1% AEP	Flow (m3/s) 0.1% AEP
1Ma5284	38.26	3.68	38.36	4.44	38.38	7.06
1Ma2273	11.79	8.56	11.97	13.89	12.17	21.34

Figure 4-2: Extract of FEM FRAMS Fluvial Flood Extents

- Interpolated 1% AEP Fluvial Flood Level on Mayne River from Node 1Ma2273 to Node 1Ma5284 (approx. 100m to the north of the site) 20.80m
- FFL / Podium Level 27.30m

The proposed ground floor level (+27.30m) is 6.50m above the interpolated 1% AEP Fluvial Flood Level as described above. As previously noted, no fluvial flooding is identified in the vicinity of the site within the Fingal East Meath FRAMS

4.2 Initial Pluvial Flood Risk Assessment

The Source-Pathway-Receptor model identified a medium risk of pluvial flooding relating to the proposed surface water drainage network and human / mechanical error. This risk can be mitigated by designing the surface water network in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) including attenuation of the 1% AEP storm event and implementation of SuDS methodologies.

Proper operation and maintenance of the drainage system should also be implemented to reduce the risk of human or mechanical error causing pluvial flood risk from blockages, fuel / oil interceptor operation problems etc.

4.3 Initial Groundwater Flood Risk Assessment

As noted in section 3.3 Ground water levels were 4.00m BLG and there is no history of flooding from ground water on site, Therefore, the risk of groundwater flooding occurring at the site is considered negligible.

4.4 Flood Zone Category

On completion of Stage 2 – Initial Flood Risk Assessment, the site is considered to be located in Flood Zone C as defined by the requirements of “The Planning System and Flood Risk Management, Guidelines for Planning Authorities” and its Technical Appendices.

The proposed development is therefore considered appropriate as it is located in a Flood Zone C area.

5.0 STAGE 3 – DETAILED FLOOD RISK ASSESSMENT

5.1 General

As the Initial Flood Risk Assessment considers the site to be located in Flood Zone C and the proposed development is considered appropriate, the Detailed Flood Risk Assessment Stage will only consider pluvial flood risk in relation to the following;

- Proposed Surface Water Management Measures and SuDS.
- Flood Exceedance.
- Impact on Adjacent Areas.
- Climate Change.
- Access and Egress During Flood Events.
- Residual Risks.
- Effectiveness of Flood Mitigation Measures.

5.2 Surface Water Management Measures and SuDS

Surface water drainage flows from the existing 3-storey office block on the site discharge to an existing 300mm diameter surface water drain located along Mayne River Avenue (to the west of the site).

This 300mm diameter surface water drain will provide a suitable surface water discharge point for the proposed development.

The proposed surface water drainage network for the site is shown on Drawing 210100-DBFL-CS-SP-DR-C-1011 (Site Services Layout) included with the planning pack.

Proposed surface water drains have been designed in accordance with the Greater Dublin Strategic Drainage Study (GDSDS). Surface water discharge rates from the proposed surface water drainage network will be controlled by a Hydrobrake type flow control device and associated underground attenuation tanks (Stormtech Chambers). Surface water discharge will also pass via a full retention fuel / oil separator (sized in accordance with permitted discharge from the site).

Refer to DBFL's Infrastructure Design Report (Section 3.0) for a full description of the surface water drainage strategy and proposed SUDS methodologies.

5.3 Flood Exceedance

For storms greater than the 1%AEP pluvial event, the development's drainage network design will be exceeded.

The proposed FFL / podium level (+27.30m) is elevated above existing road levels to the south of the site (along Mayne River Avenue). As such, overland flow resulting from surcharging of the proposed surface water network for storms greater than the 1%AEP pluvial event will be directed towards the existing roads network adjacent to the site.

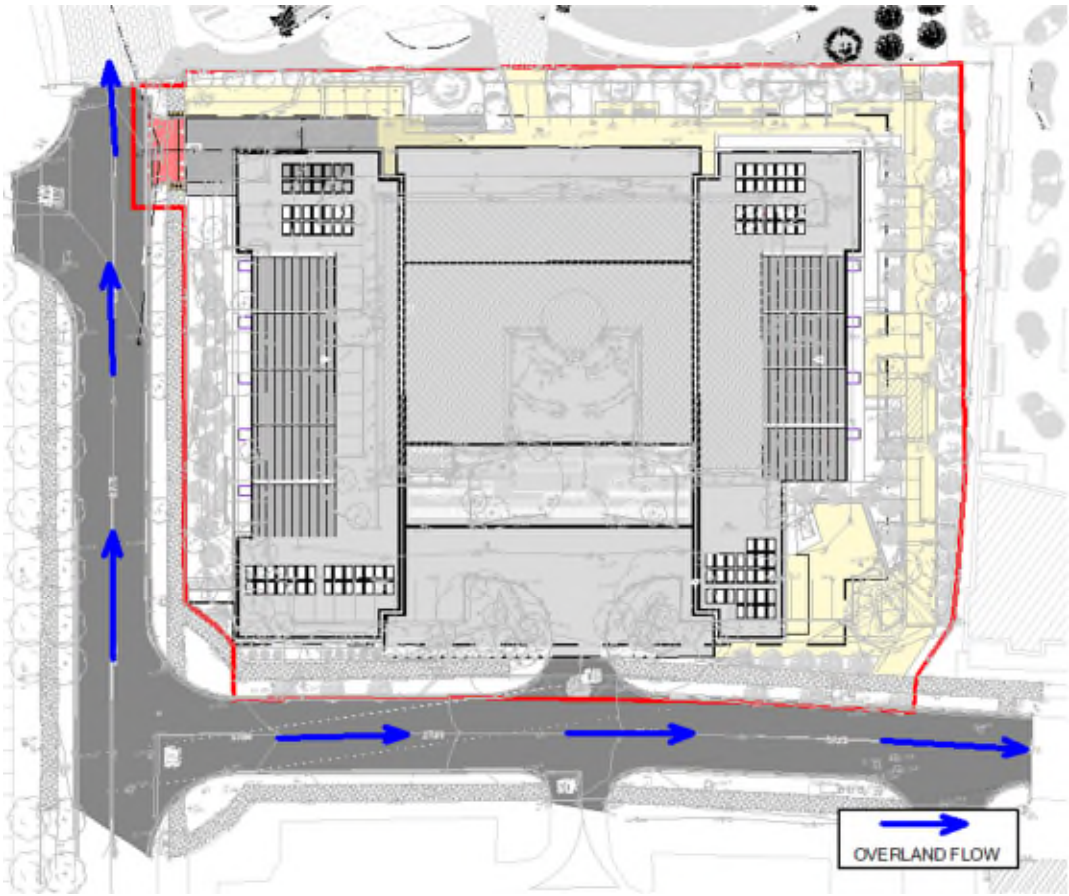

Figure 5.1 – Flood Exceedance (>1%AEP) Overland Flow Routes

5.4 Impact on Adjacent Areas

Adjacent areas will not be impacted by the development up to the 1% AEP flood event.

5.5 Climate Change

The potential impact of climate change has been allowed for as follows;

- Pluvial flood risk - attenuation storage design allows for a 20% increase in rainfall intensities, as recommended by the GDSDS.
- Pluvial flood risk – surface water network design allows for a 20% increase in flows, as recommended by the GDSDS.

5.6 Access and Egress During Flood Events.

Access and egress to the development for pedestrians / cyclists and to the basement carpark for motorised vehicles are located in Flood Zone C as defined by the OPW guidelines. As such, the site can be safely accessed during storms up to the 1% AEP event.

5.7 Residual Risks

Remaining residual flood risks, following the detailed assessment include the following;

1. Pluvial flooding from the private drainage system related to a pipe blockage, flood exceedance or mechanical failure.
2. Pluvial flooding from the development's drainage system for storms in excess of the 1% AEP storm event.

5.8 Mitigation Measures

Proposed mitigation measures to address residual flood risks are summarized below;

- Proposed drainage system to be maintained on a regular basis to reduce the risk of a blockage.
- During storm events exceeding the 1% AEP design capacity of the attenuation system, possible overland flow routing towards public roads located south of the site should not be blocked. At these locations, the site's boundaries should be permeable to facilitate flood routing onto Mayne River Avenue.

<u>Effectiveness of Mitigation Measures</u>

It is considered that the flood risk mitigation measures if implemented are sufficient to provide a suitable level of protection to the proposed development. A regularly maintained drainage system will ensure that it remains effective and in good working order should a large pluvial storm occur.

Should extreme pluvial flooding occur that exceeds the development's attenuation capacity (i.e. greater than 1%AEP), overland flow routes directed towards adjacent public roads are provided in order to protect the proposed development.

6.0 CONCLUSION

The Site-Specific Flood Risk Assessment for proposed development has been undertaken in accordance with the requirements of “The Planning System and Flood Risk Management, Guidelines for Planning Authorities” and its Technical Appendices.

Following the Flood Risk Assessment, it has been determined that the site is located in Flood Zone C as defined by the Guidelines.

It is concluded that the;

- Proposed residential development is appropriate for the site’s flood zone category.
- The sequential approach outlined in Planning System and Flood Risk Management Guidelines has been adhered to and that the ‘Avoid’ principal has been achieved.

In conclusion the proposed development is considered to have the required level of flood protection up to and including the 100 year return event.

Overland flow paths have been identified for pluvial flooding exceeding the capacity of the proposed surface water drainage network.

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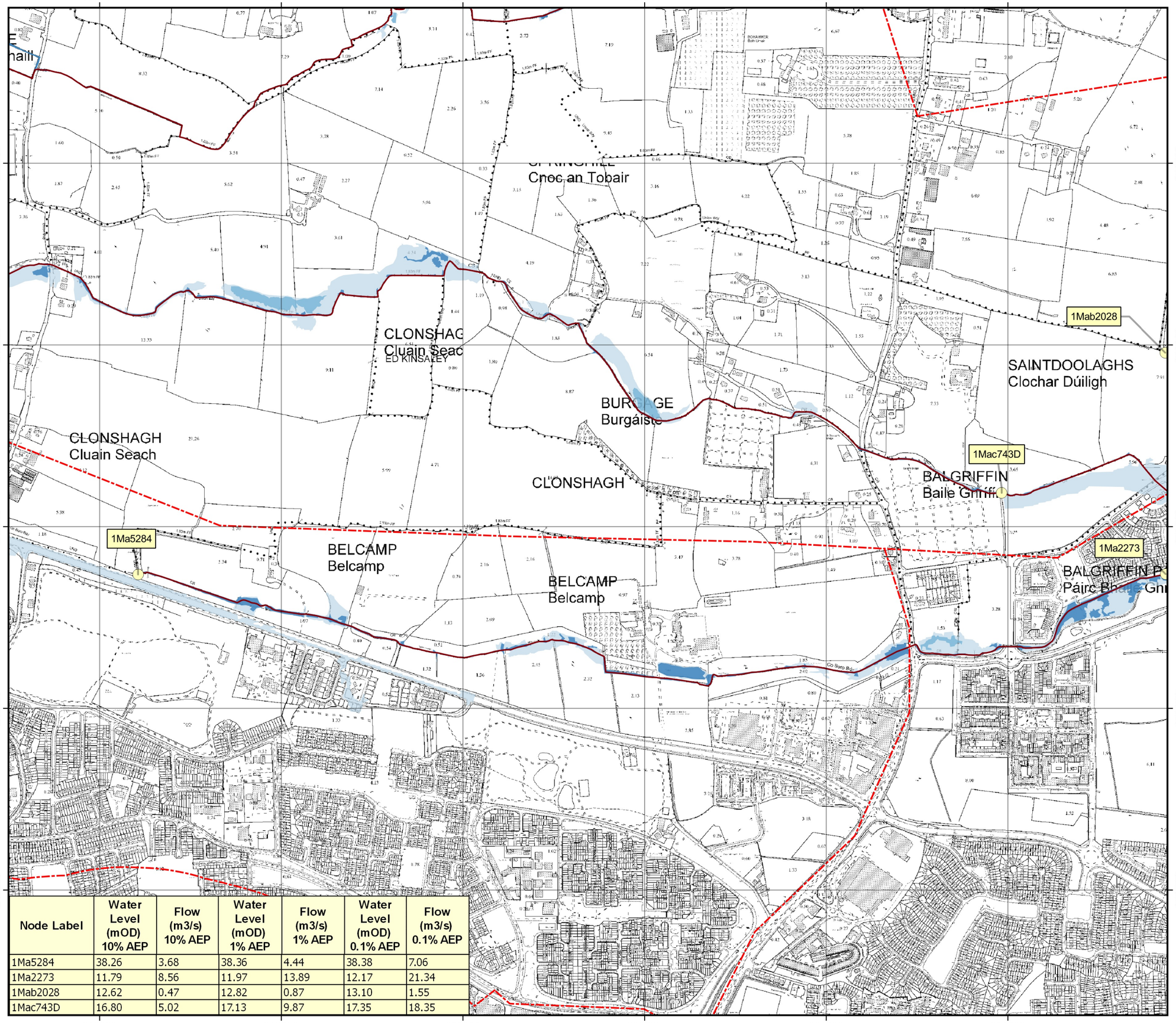
APPENDIX A

FLOOD RISK INFORMATION



Node Label	Water Level (mOD) 10% AEP	Flow (m3/s) 10% AEP	Water Level (mOD) 1% AEP	Flow (m3/s) 1% AEP	Water Level (mOD) 0.1% AEP	Flow (m3/s) 0.1% AEP
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1Ma2273	11.79	8.56	11.97	13.89	12.17	21.34
1Mab2028	12.62	0.47	12.82	0.87	13.10	1.55
1Mac743D	16.80	5.02	17.13	9.87	17.35	18.35

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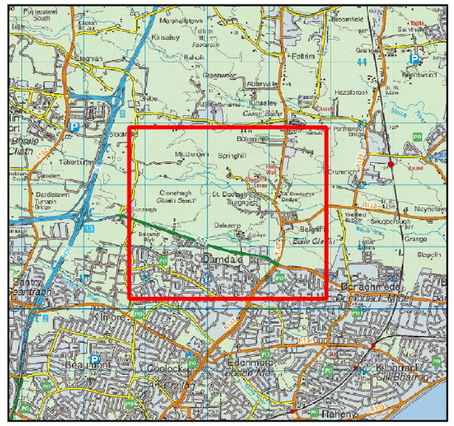
Location Plan:



LEGEND

- AFA Boundary
- Defended Area
- Modelled River Centreline
- Node Point
- 10% AEP Fluvial Extent (High Risk)
- 1% AEP Fluvial Extent (Medium Risk)
- 0.1% AEP Fluvial Extent (Low Risk)
- Flood Defence - Embankment
- Flood Defence - Wall
- Gate
- NODE123 — Node Label
- x.x% AEP — Standard of Protection of Flood Defence

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

The Office of Public Works
Jonathan Swift Street
Trim
Co. Meath

Project:

FINGAL EAST MEATH FRAM STUDY

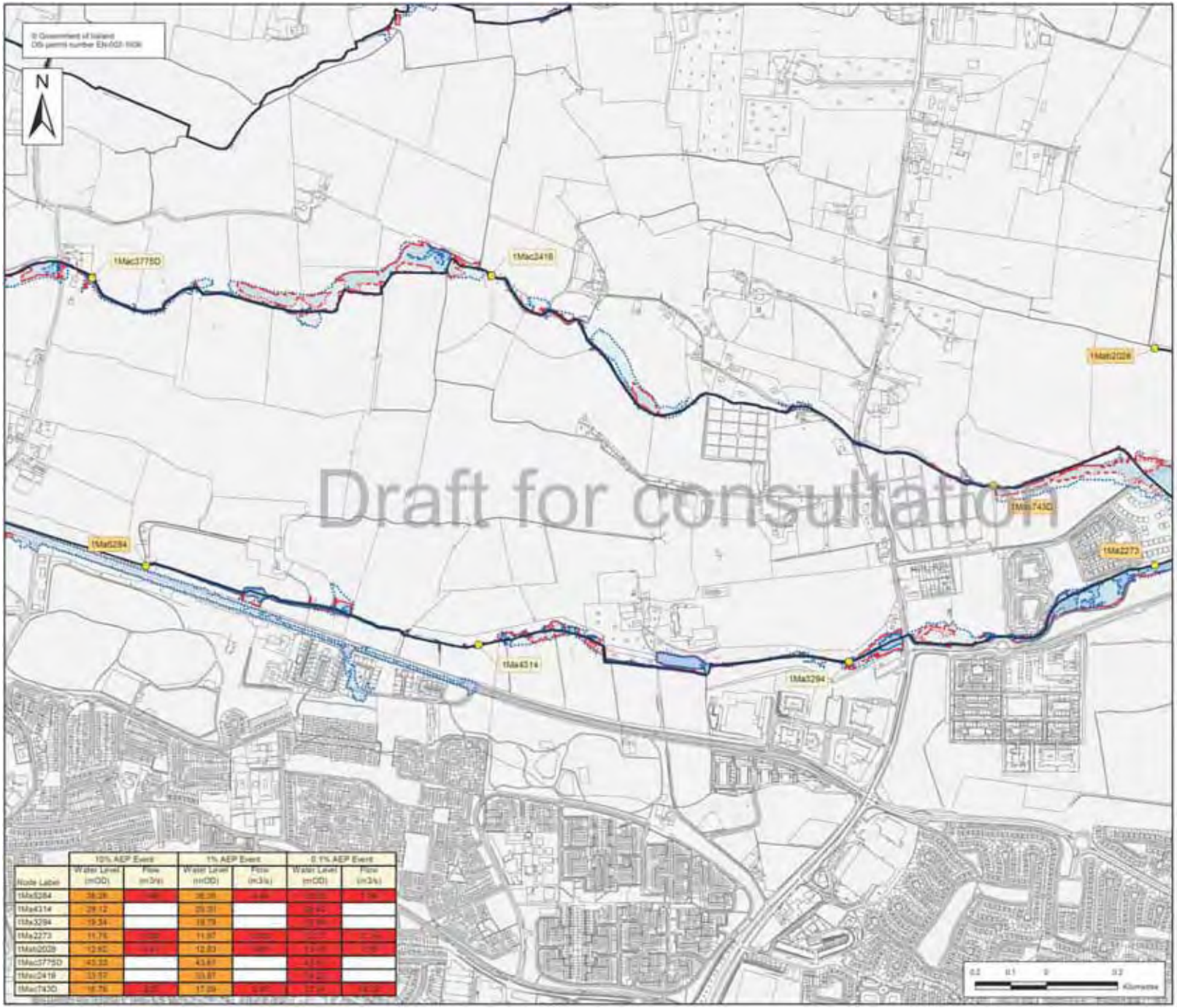
Map: **Mayne Model**
FLUVIAL FLOOD EXTENT MAP

Map Type:	EXTENT		
Source:	FLUVIAL		
Map Area:	HPW		
Scenario:	CURRENT		
Drawn by:	IH	Date:	Nov - 2017
Checked by:	JM	Date:	Nov - 2017
Approved by:	JM	Date:	Nov - 2017

Map No.:
MAY/HPW/EXT/CURS/002

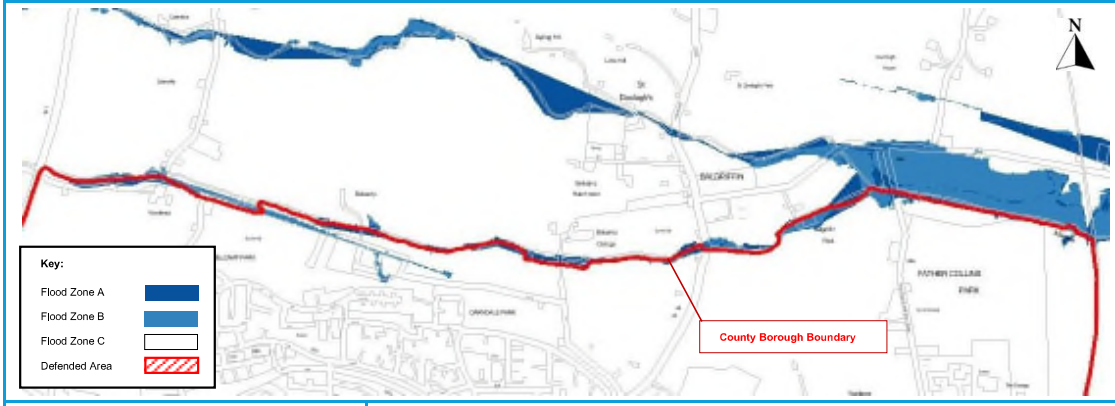
Revision: F1

Map Scale: 1:10,000 Plot Scale: 1:1 @ A3



Node Label	10% AEP Event		1% AEP Event		0.1% AEP Event	
	Water Level (mOD)	Flow (m3/s)	Water Level (mOD)	Flow (m3/s)	Water Level (mOD)	Flow (m3/s)
1Ma5284	36.28	[illegible]	36.35	[illegible]	[illegible]	[illegible]
1Ma4314	29.12		29.31		[illegible]	
1Ma3294	19.34		19.79		[illegible]	
1Ma2273	11.75	[illegible]	11.97	[illegible]	[illegible]	[illegible]
1Mac2028	12.82	[illegible]	12.83	[illegible]	[illegible]	[illegible]
1Mac3775D	43.33		43.67		[illegible]	
1Mac2418	33.57		33.87		[illegible]	
1Mac743D	16.76	[illegible]	17.29	[illegible]	[illegible]	[illegible]

Site: 29. Mayne: Dublin Belfast Railway Line – M50



Site Description	This area on the Mayne River which forms some of the boundary between Fingal County Council and Dublin City Council goes from the Dublin-Belfast Railway line in Snugborough through Balgriffin Park, south of Belcamp College adjacent to the N32 to Junction 3 on the M50. It has tidal influence roughly to the Malahide Road and fluvial and pluvial west of this. Development in this area is a mixture of mainly Residential and some Commercial with infill development of both. Parkland and sports development also features.
Benefitting from Defences (flood relief scheme works)	There are no formal defences in this area.
Sensitivity to Climate Change	Low – there is little difference in flood extents of Flood Zones A and B.
Residual Risk	Not applicable.
Historical Flooding	The flood maps attached are consistent with previous flooding of this section of the River Mayne.
Surface Water	All surface water in this area needs to be carefully managed and provision made for significant rainfall events during high river flows. Should development be permitted, best practice with regards to surface water management should be implemented across the development area, to limit surface water runoff to current values. Separation of surface water and foul sewage flows should be carried out where possible. All Developments shall have regard to the Pluvial Flood Maps in their Site Specific Flood Risk Assessment, see Flood ResilienCity Project, Volume 2 City Wide Pluvial Flood Risk Assessment at http://www.dublincity.ie/main-menu-services-water-waste-and-environment-drains-sewers-and-waste-water/flood-prevention-plans

Commentary on Flood Risk:

The flood extents indicate flow paths generally coming directly out of the river and re-entering the river downstream either directly or through the drainage network. These can be compounded with local pluvial flooding if heavy rainfall coincides with high river flows and high tides.

The flood maps were produced based on the OPW CFRAM Study for Fingal East Meath Catchments and they have been checked against historic flooding in the area.

Development Options:

The River Mayne flows along the boundary with Dublin City Council and Fingal County Council. Most of the Flood Risk Areas would be located outside of the DCC boundary. Part of the River that would be within DCC's boundary would be covered by the Clongriffin -

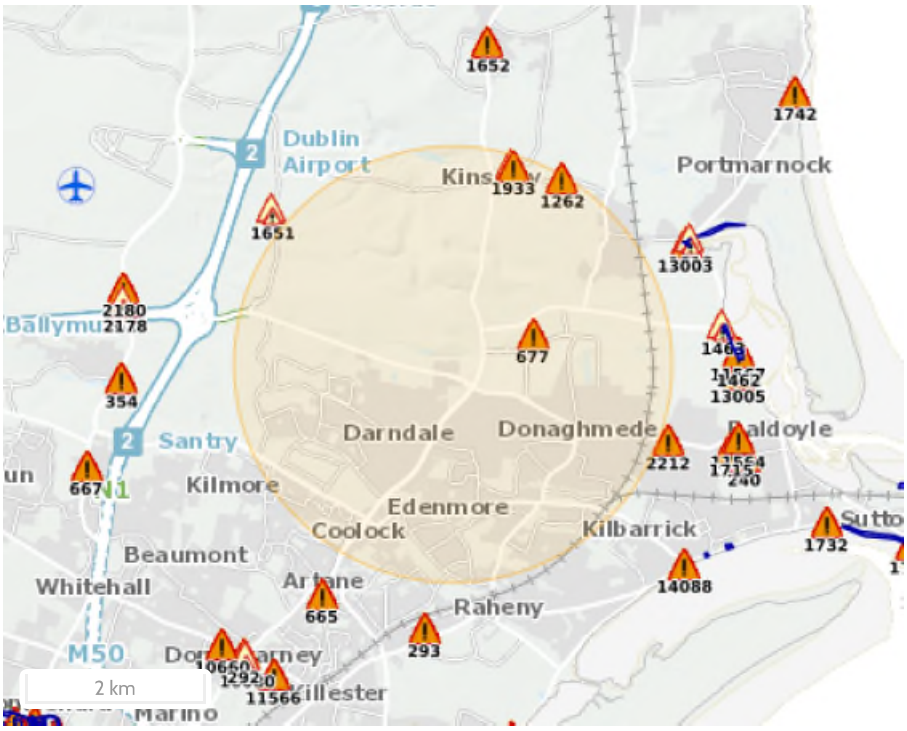
Site: 29. Mayne: Dublin Belfast Railway Line – M50
Belymayne (North Fringe) LAP 2012. Please refer to this for Development Options.
Justification Test for Development Plans • The land to the south of the River Mayne which forms the boundary with Fingal County Council is one of the areas identified as a Key Development Areas in the current plan. These represent significant areas of the inner and outer city with substantial development capacity and the potential to deliver the residential, employment and recreational needs of the city. The River Mayne runs along the boundary of Dublin City Council and Fingal County Council. Part of the area to the south of the River is covered by the Clongriffin- Belmayne Local Area Plan, 2012. • The areas located in Flood Zones A and B are primarily open space, which is water compatible and should be retained. The Justification Test is not applicable. This should be consolidated through future revisions to the local area plans. • New development within Flood Zone A or B cannot be justified. • Fingal County Council Planning should be consulted of any development close to its border which might have current or future flooding implications in Fingal.

Past Flood Event Local Area Summary Report

Report Produced: **6/7/2022 11:06**

This Past Flood Event Summary Report summarises all past flood events within 2.5 kilometres of the map centre.

This report has been downloaded from www.floodinfo.ie (the "**Website**"). The users should take account of the restrictions and limitations relating to the content and use of the Website that are explained in the Terms and Conditions. It is a condition of use of the Website that you agree to be bound by the disclaimer and other terms and conditions set out on the Website and to the privacy policy on the Website.



Map Legend

- Single Flood Event
- Recurring Flood Event
- Past Flood Event Extents
- Drainage Districts Benefited Lands*
- Land Commission Benefited Lands*
- Arterial Drainage Schemes Benefited Lands*

* Important: These maps do not indicate flood hazard or flood extent. Their purpose and scope is explained on Floodinfo.ie

4 Results

	Name (Flood_ID)	Start Date	Event Location
1.	Mayne Balgriffin Park June 1993 (ID-677)	10/06/1993	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		
2.	Sluice River Kinsealy Lane Recurring (ID-1933)	n/a	Exact Point
	Additional Information: Reports (2) Press Archive (0)		
3.	Kinsealy Lane Area Oct 2002 (ID-1616)	19/10/2002	Exact Point
	Additional Information: Reports (4) Press Archive (0)		
4.	Sluice Kinsaley Hall August 1986 (ID-1262)	24/08/1986	Approximate Point
	Additional Information: Reports (1) Press Archive (0)		

APPENDIX B

GROUND INVESTIGATIONS REPORT

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

Rosemount House

DBFL

Ground Investigation Report

July 2022

Directors: Fergal McNamara (MD), James Lombard, Conor Finnerty, Aisling McDonnell & Barry Sexton
Ground Investigations Ireland Limited | Registered in Ireland Company Regsitration No.: 405726

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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	Rosemount House
Engineer	DBFL
Client	Walls Construction
Project No	11468-02-22
Document Title	Ground Investigation Report

Rev.	Status	Author(s)	Reviewed By	Approved By	Office of Origin	Issue Date
A	Final	S Kealy	S Kealy	C Finnerty	Dublin	11 July 2022

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

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Appendix 1 Site Location Plan
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1.0 Preamble

On the instructions of DBFL Consulting Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd., between in March 2022 at the site of the proposed extension at Rosemount House, Malahide Road, Dublin 17.

2.0 Overview

2.1. Background

It is proposed to redevelop the existing Rosemount house with an extension, associated services, access roads and car parking at the proposed site. The site is currently occupied by an existing building. 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 2.60m BGL
- Carry out 2 No. Soakaways to determine a soil infiltration value to BRE digest 365
- Carry out 2 No. Cable Percussion boreholes to a maximum depth of 7.20m BGL
- Geotechnical 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 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 an 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. Soakaway Testing

The soakaway testing was carried out in selected trial pits at the locations shown in the exploratory hole location plan in Appendix 1. These pits were carefully excavated and filled with water to assess the infiltration characteristics of the proposed site. The pits were allowed to drain and the drop in water level was recorded over time as required by BRE Digest 365. The pits were logged prior to completing the soakaway test and were backfilled with arising's upon completion. The soakaway test results are provided in Appendix 3 of this Report.

3.4. Insitu Plate Bearing Test

The plate bearing tests were carried out using a 450mm 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 4 of this Report.

3.5. Cable Percussion Boreholes

The Cable Percussion Boreholes were drilled using a Dando 2000 drilling rig with regular in-situ testing and sampling undertaken to facilitate the production of geotechnical logs and laboratory testing.
The standard method of boring in soil for site investigation is known as the Cable Percussion method. It consists of using a Shell in non cohesive soils and a clay cutter in cohesive soils, both operated on a wire cable. Very hard soils, boulders and other hard obstructions are broken up by chiselling and the fragments removed with the Shell. Where ground conditions made it necessary, the borehole was lined with 200mm diameter steel casing. While the use of the Cable Percussion method of boring gives the maximum data on soil conditions, some mixing of laminated soil is inevitable. For this reason, thin lenses of granular material may not be noticed. Disturbed samples were taken from the boring tools at suitable depths, so that there is a representative sample at the top of each change in stratum and thereafter at regular intervals down the borehole until the next stratum was encountered. The disturbed samples were then sealed and sent to the laboratory where they were visually examined to confirm the description of the relevant strata.
Standard Penetration Tests were carried out in the boreholes. The results of these tests, together with the depths at which the tests were taken are shown on the accompanying borehole records. The test consists

of a thick wall sampler tube, 50mm external diameter, being driven into the soil by a monkey weighing 63.5kg and with a free drop of 760mm. For gravels and glacial till the driving shoe was replaced by a solid 60º cone. The Standard Penetration Test number referred to as the 'N' value is the number of blows required to drive the tube 300mm, after an initial penetration of 150mm. The number gives a guide to the consistency of the soil and can also be used to estimate the relative strength/density at the depth of the test and also to estimate the bearing capacity and compressibility of the soil. The cable percussion borehole logs are provided in Appendix 5 of this Report.

3.6. 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.
Chemical testing as required by the specification, including pH and sulphate testing was carried out by Element Materials Technology Laboratory in the UK.
Geotechnical testing consisting of moisture content, Atterberg limits, Particle Size Distribution (PSD) and hydrometer, Compaction tests were carried out in NMTL's Geotechnical Laboratory in Carlow.
The results of the laboratory testing are included in Appendix 6 of this Report.

4.0 Ground Conditions

4.1. General

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

The sequence of strata encountered were consistent across the site and generally comprised;

- Topsoil
- Made Ground
- Cohesive Deposits

TOPSOIL: Topsoil was encountered in all the exploratory holes and was present to a maximum depth of 0.40m BGL.

MADE GROUND: Made Ground deposits were encountered beneath the Topsoil and were present to a maximum depth of 1.80m BGL. These deposits were described generally as *brown sandy slightly gravelly CLAY with frequent cobbles and boulders and contained occasional fragments of concrete, red brick, glass and plastic or a dark grey slightly clayey fine to coarse angular to subangular Gravel with occasional pieces of rope and plastic.*

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Made Ground and were described typically as *brown sandy gravelly CLAY with occasional cobbles and boulders* overlying a *stiff or very stiff grey sandy 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. The strength of the cohesive deposits typically increased with depth and was firm to stiff or stiff below 1.0m BGL in the majority of the exploratory holes. These deposits had some, occasional or frequent cobble and boulder content where noted on the exploratory hole logs.

4.2. Groundwater

Groundwater strikes are noted on the exploratory hole logs where they occurred and where possible drilling was suspended for twenty minutes to allow the subsequent rise in groundwater to be recorded. We would point out that these exploratory holes did not remain open for sufficiently long periods of time to establish the hydrogeological regime and groundwater levels would be expected to vary with the time of year, rainfall, nearby construction and other factors.

4.3. Laboratory Testing

4.3.1. Geotechnical Laboratory Testing

The geotechnical testing carried out on soil samples recovered generally confirm the descriptions on the logs with the primary constituent of the cohesive deposits found to be a CLAY of low to intermediate plasticity. The Particle Size Distribution tests confirm that generally the cohesive deposits are well-graded with percentages of sands and gravels ranging between 23% and 42% generally with fines contents of 18 to 43%.

4.3.2. Chemical Laboratory Testing

The pH and sulphate testing carried out indicate that pH results are near neutral and that the water soluble sulphate results is low when compared to the guideline values from BRE Special Digest 1:2005. The samples tested classify the soil as a Design Sulphate Level DS-1.

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 allowable bearing capacity of 100 kN/m^2 is recommended for conventional strip or pad foundations on the stiff cohesive deposits at a depth of 1.5m BGL. If a higher bearing capacity is required we would recommend an allowable bearing capacity of 200 kN/m^2 on the stiff or very stiff deposits at 2.0m BGL.

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.

The pH and sulphate testing completed on samples recovered from the exploratory holes indicates the pH results are near neutral and the sulphate results are low, when compared to the guideline values from BRE Special Digest 1:2005. No special precautions are required for concrete foundations to prevent sulphate attack. The samples tested were below the limits of DS1 in the BRE Special Digest 1:2005.

5.3. External Pavements

The proposed pavements are recommended to be designed in accordance with the CBR test results included in the Appendices 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 will require to be appropriately battered or the sides supported due to the low strength of these deposits.

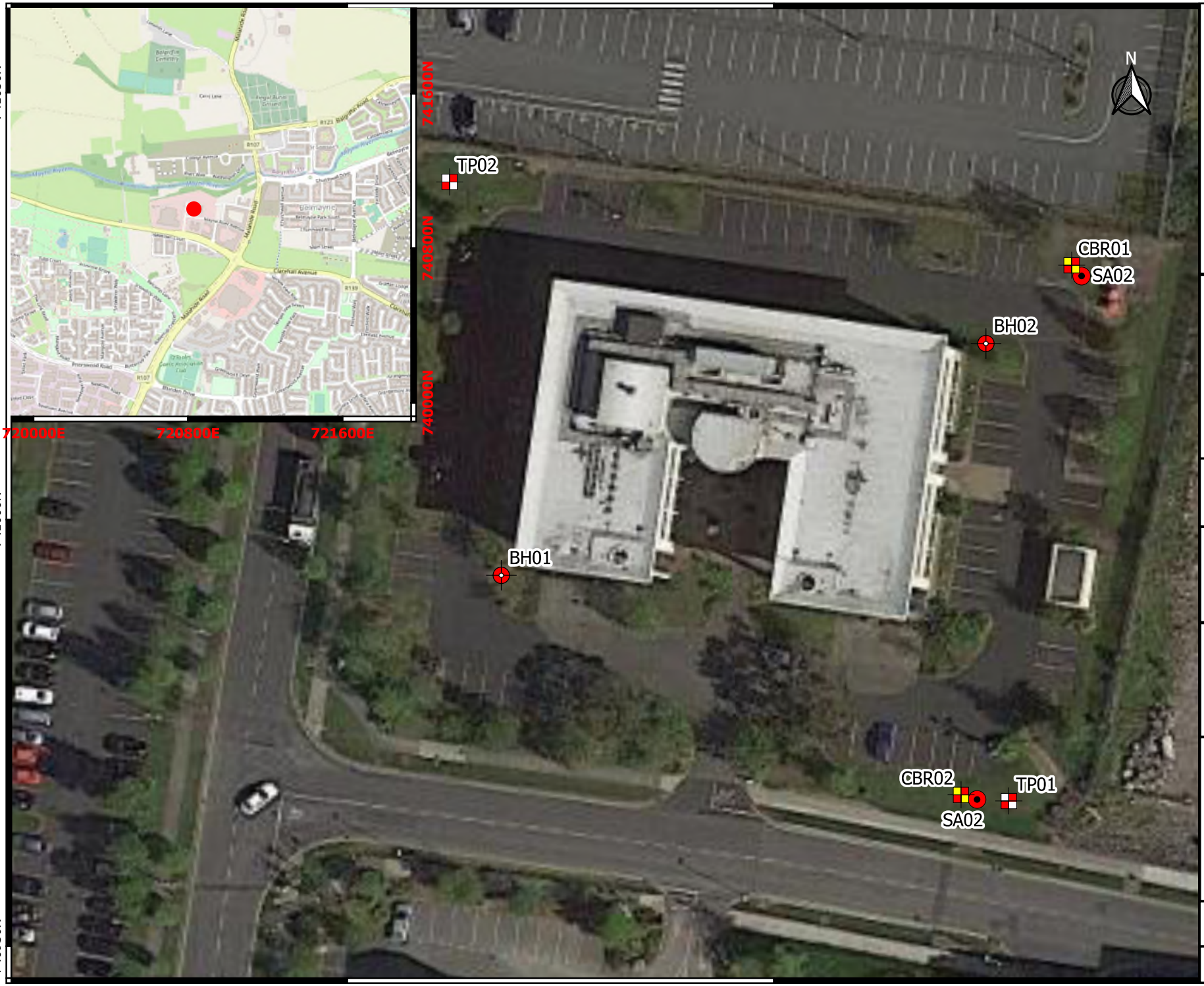
Any waste material to be removed off site should be disposed of to a suitably licenced landfill.

5.5. Soakaway Design

At the locations of SA01 and SA02 the water level dropped too slowly to allow calculation of 'f' the soil infiltration rate. These locations are therefore not recommended as suitable for soakaway design and construction.

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



Boreholes

Trial Pits

Plate Tests

Soakaways

Client:

Project Code:
11468-02-22

Project Title:
Rosemount House

Drawing Title:
Figure 1 Site Location

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Ground Investigations Ireland Ltd.
Catherinstown House,
Hazelhatch Road,

0 5 10 15 20 25 m

Drawn By: SK

Date: 11/07/2022

APPENDIX 2 – Trial Pit Records

www.gii.ie

Ground Investigations Ireland Ltd
www.gii.ie

Site Rosemount House			**Trial Pit Number** IT01
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** L x W x D 2.40m x 0.70m x 1.60m	**Ground Level (mOD)**	**Client** Walls Construction	**Job Number** 11468-02-22
	Location	**Dates** 03/03/2022	**Engineer** DBFL	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15) 0.15	TOPSOIL: Brown sandy gravelly Clay with rootlets and geogrid at base		
					(0.85) 1.00	MADE GROUND: Grey sandy fine to coarse angular to subangular Gravel with occasional pieces of plastic, cables and red brick		
					(0.60) 1.60	Firm to stiff dark brown sandy gravelly CLAY with lenses of brown fine Sand		
						Complete at 1.60m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Infiltration test carried out in trial pit upon completion

Scale (approx)	Logged By	Figure No.
1:25	M Keating	11468-02-22.IT01

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Site	Trial Pit Number
Rosemount House	IT02

Machine : JCB 3CX Method : Trial Pit	Dimensions L x W x D 2.20m x 0.60m x 1.50m	Ground Level (mOD)	Client Walls Construction	Job Number 11468-02-22
	Location	Dates 03/03/2022	Engineer DBFL	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15) 0.15	TOPSOIL: Brown sandy gravelly Clay with rootlets		
					(0.25) 0.40	MADE GROUND: Grey sandy fine to coarse angular to subangular Gravel with occasional pieces of plastic, cables and red brick		
					(0.20) 0.60	MADE GROUND: Grey sandy slightly clayey Gravel with occasional cobbles		
					(0.90) 1.50	MADE GROUND: Brown sandy slightly gravelly Clay with ocasional pieces of red brick and rebar		
						Complete at 1.60m		

Plan

Remarks

No groundwater encountered
Trial pit stable
Infiltration test carried out in trial pit upon completion

Scale (approx)	Logged By	Figure No.
1:25	M Keating	11468-02-22.IT02

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Site	Trial Pit Number
Rosemount House	TP01

Machine : JCB 3CX Method : Trial Pit	Dimensions L x W x D 2.60m x 0.80m x 2.600m	Ground Level (mOD)	Client Walls Construction	Job Number 11468-02-22
	Location	Dates 03/03/2022	Engineer DBFL	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30) 0.30	TOPSOIL: Brown sandy gravelly Clay with rootlets		
					(0.20) 0.50	MADE GROUND: Dark grey slightly clayey fine to coarse angular to subangular Gravel with occasional pieces of rope and plastic		
0.50	B				(0.20) 0.70	MADE GROUND: Brown/grey clayey gravelly fine to medium SAND		
1.00	B				(1.10) 1.80	MADE GROUND: Light brown slightly sandy slightly gravelly Clay		
2.00	B				(0.80) 2.60	Stiff dark brown mottled grey sandy gravelly CLAY with occasional cobbles and boulders		
						Complete at 2.60m		

Plan

Remarks

No groundwater encountered
Trial pit stable

Scale (approx)	Logged By	Figure No.
1:25	M Keating	11468-02-22.TP02

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Site Rosemount House			**Trial Pit Number** TP02
Machine : JCB 3CX **Method :** Trial Pit	**Dimensions** L x W x D 3.70m x 0.80m x 2.600m	**Ground Level (mOD)**	**Client** Walls Construction	**Job Number** 11468-02-22
	Location	**Dates** 03/03/2022	**Engineer** DBFL	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	TOPSOIL: Brown sandy gravelly Clay with rootlets		
0.50	B				(0.50) 0.70	MADE GROUND: Light brown gravelly fine to medium SAND		
1.00	B				(1.10) 1.80	Stiff dark brown sandy gravelly CLAY with occasional cobbles and boulders		
2.00	B				(0.80) 2.60	Stiff black slightly sandy slightly gravelly CLAY with occasional cobbles and boulders		
						Complete at 2.60m		

Plan

Remarks

No groundwater encountered
Trial pit stable

Scale (approx)	Logged By	Figure No.
1:25	M Keating	11468-02-22.TP02

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APPENDIX 3 – Soakaway Records

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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

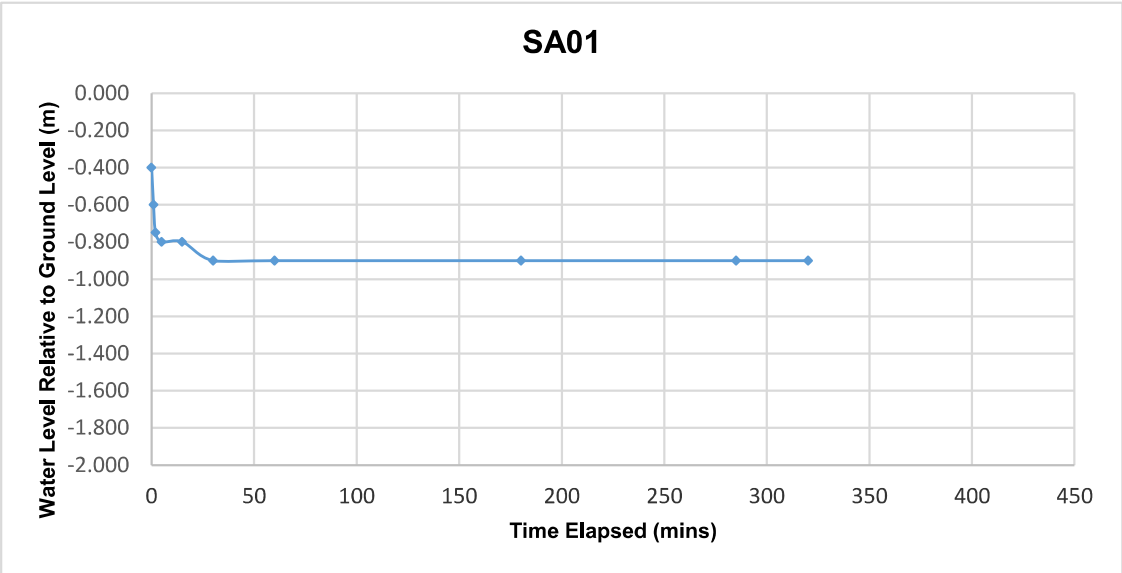
SA01

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.4m x 0.70m 1.60m (L x W x D)

Date	Time	Water level (m bgl)
03/03/2022	0	-0.400
03/03/2022	1	-0.600
03/03/2022	2	-0.750
03/03/2022	5	-0.800
03/03/2022	15	-0.800
03/03/2022	30	-0.900
03/03/2022	60	-0.900
03/03/2022	180	-0.900
03/03/2022	285	-0.900
03/03/2022	320	-0.900

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.40	2.000	1.600	0.8	1.6



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

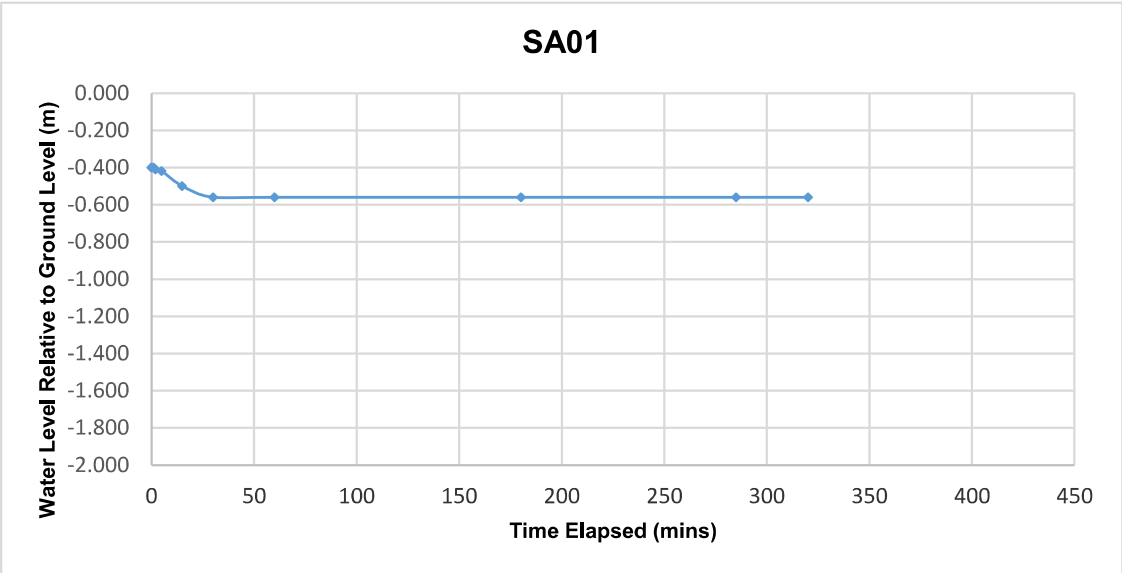
SA01

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.2m x 0.60m 1.50m (L x W x D)

Date	Time	Water level (m bgl)
03/03/2022	0	-0.400
03/03/2022	1	-0.400
03/03/2022	2	-0.410
03/03/2022	5	-0.420
03/03/2022	15	-0.500
03/03/2022	30	-0.560
03/03/2022	60	-0.560
03/03/2022	180	-0.560
03/03/2022	285	-0.560
03/03/2022	320	-0.560

***Soakaway failed - Pit backfilled**

Start depth	Depth of Pit	Diff	75% full	25%full
0.40	1.500	1.100	0.675	1.225

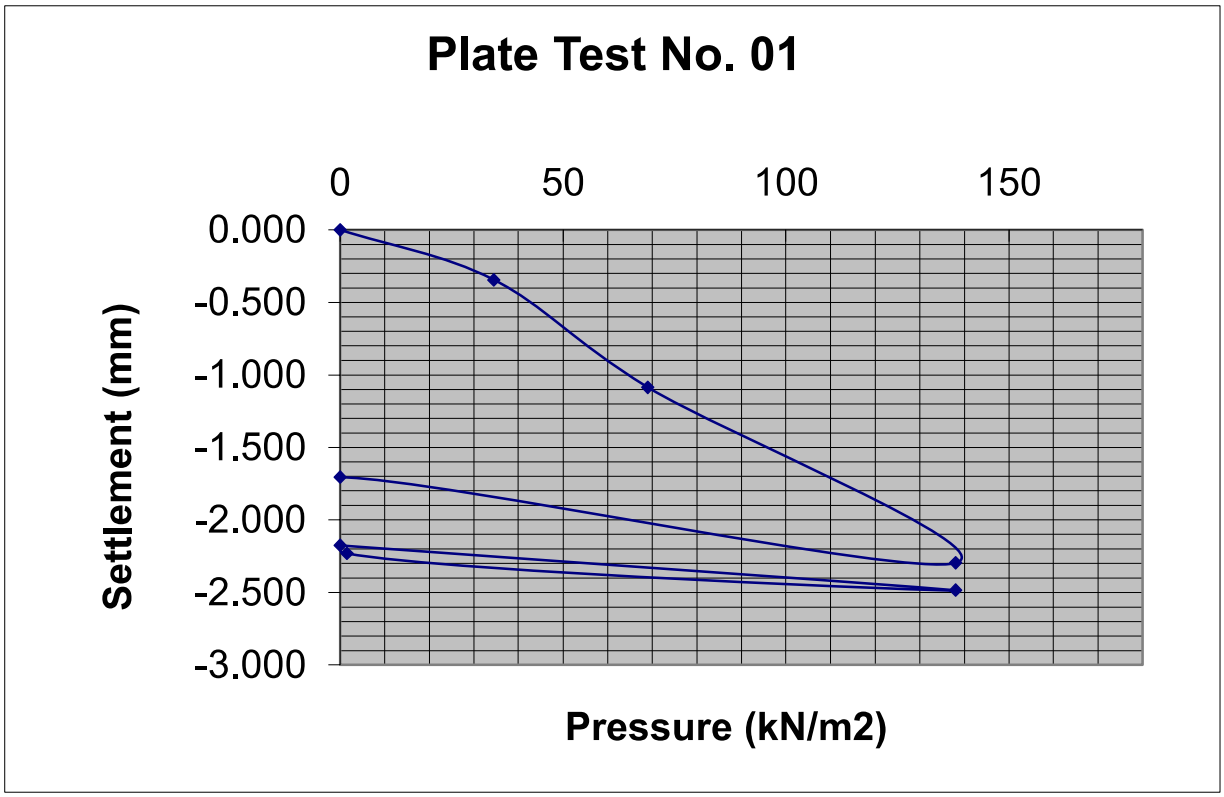


APPENDIX 4 – Plate Test Records

Applied Load	Gauge settlement
0	**0.000**
34.5	-0.345
69	-1.085
138	-2.295
0	-1.705
1.53	-2.23
138	-2.485
0	-2.175

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Rosemount House	**MATERIAL**	MADE GROUND: Grey sandy slightly clayey fine to coarse angular to subangular Gravel with occasional pieces of plastic
CONTRACT NO.	11468-02-22		
DATE	11/07/2022		
CLIENT	Walls Construction	**DEPTH**	0.50m BGL
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-01	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **42.97 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **88.81 MN/m2/m**

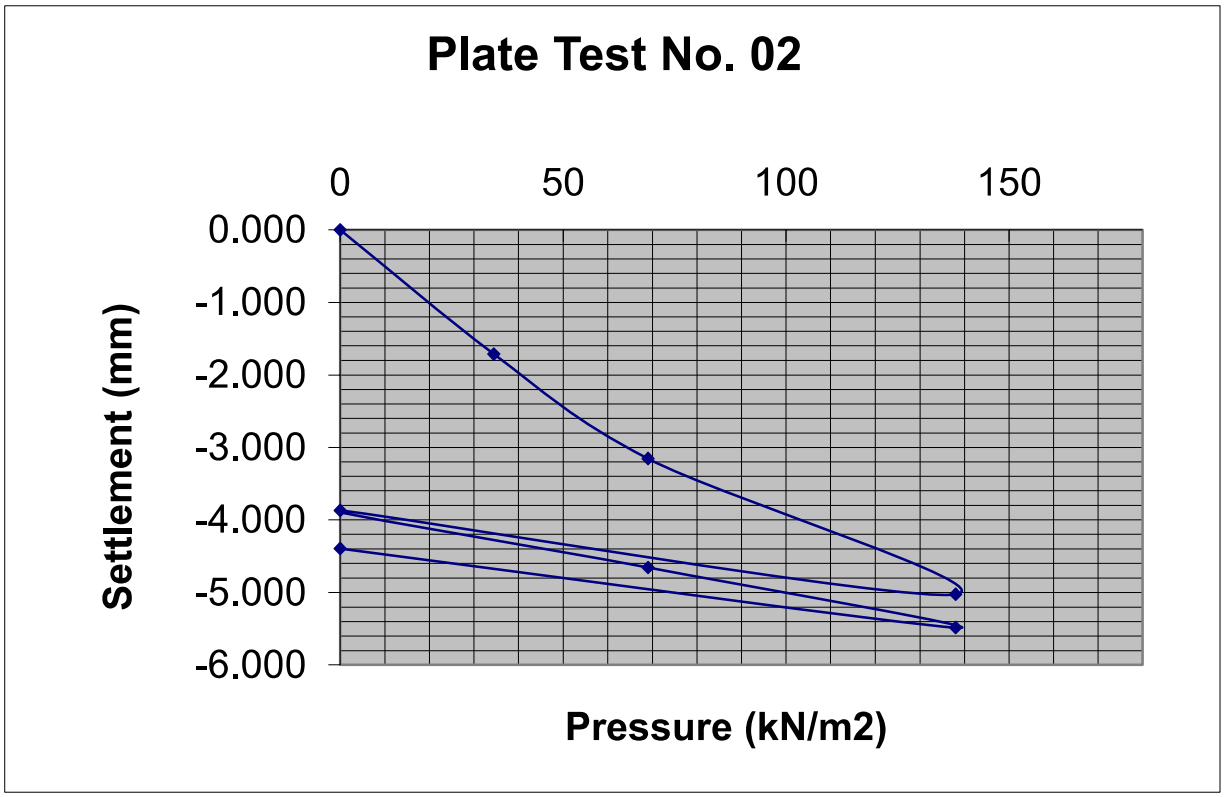
Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **6.53 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **22.96 %**

Applied Load	Gauge settlement
0	**0.000**
34.5	-1.715
69	-3.155
138	-5.025
0	-3.87
69	-4.655
138	-5.485
0	-4.395

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

LOCATION	Rosemount House	**MATERIAL**	MADE GROUND: Grey sandy slightly clayey fine to coarse angular to subangular Gravel
CONTRACT NO.	11468-02-22		
DATE	11/07/2022		
CLIENT	Walls Construction	**DEPTH**	0.50m BGL
PLATE DIAMETER	457mm	**NOTES**	
TEST NO.	CBR-02	**SAMPLES**	



Modulus of subgrade reaction, K (Initial) = **14.78 MN/m2/m**

Modulus of subgrade reaction, K (Reload) = **59.39 MN/m2/m**

Equivalent CBR(initial)in accordance with HD25/94 volume7 section2 = **1.03 %**

Equivalent CBR(reload)in accordance with HD25/94 volume7 section2 = **11.43 %**

APPENDIX 5 – Borehole Records

www.gii.ie

Ground Investigations Ireland Ltd
www.gii.ie

Site	Borehole Number
Rosemount House	BH01

Machine : Dando 2000	Casing Diameter	Ground Level (mOD)	Client	Job Number
Method : Cable Percussion	200mm cased to 5.00m		Walls Construction	11468-02-22
	Location	**Dates** 14/03/2022	**Engineer** DBFL	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.40) 0.40	Brown slightly sandy slightly gravelly Clay TOPSOIL		
						(0.20) 0.60	Grey sandy angular fine to coarse crushed rock FILL		
0.60	B					(0.40) 1.00	Firm greyish brown slightly sandy gravelly CLAY		
1.00-1.45	SPT(C) N=30			5,7/5,8,8,9		(0.80) 1.80	Very stiff brownish dark grey sandy gravelly CLAY with occasional cobbles		
1.50	B					(3.20) 5.00	Very stiff dark grey slightly sandy gravelly CLAY		1
2.00-2.45	SPT(C) N=36			6,5/7,8,10,11					
2.50	B								
3.00-3.45	SPT(C) 50/295			6,7/10,13,14,13					
3.50	B								
4.00-4.28	SPT(C) 50/125			7,15/24,26					
4.50	B								
5.00-5.15	SPT(C) 50/0			Water strike(1) at 4.80m, rose to 4.72m in 20 mins. 17,25/50			Refusal at 5.00m		

Remarks
Groundwater encountered at 4.80m BGL
Refusal at 5.00m BGL
Borehole backfilled on completion

Scale (approx)	Logged By
1:50	M.Sheehan

Figure No. 11468-02-22.BH01

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Ground Investigations Ireland Ltd
www.gii.ie

Site	Borehole Number
Rosemount House	**BH02**

Machine : Dando 2000	Casing Diameter	Ground Level (mOD)	Client	Job Number
Method : Cable Percussion	200mm cased to 7.20m		Walls Construction	11468-02-22
	Location	**Dates** 15/03/2022	**Engineer** DBFL	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
						(0.40)	Brown slightly sandy slightly gravelly Clay TOPSOIL		
						0.40			
						(0.50)	Grey angular fine to coarse crushed rock FILL		
						0.90			
1.00-1.45 1.00	SPT(C) N=13 B			3,2/2,2,4,5		(0.40)	POSSIBLE MADE GROUND: Greyish brown slightly sandy gravelly CLAY		
						1.30			
						1.40	Firm greyish brown slightly sandy gravelly CLAY		
						(0.60)	Firm dark grey slightly sandy slightly gravelly CLAY		
2.00-2.45 2.00	SPT(C) N=25 B			4,4/6,6,6,7		2.00	Stiff dark grey slightly sandy gravelly CLAY		
						(1.00)			
3.00-3.45 3.00	SPT(C) N=40 B			6,6/8,9,11,12		3.00	Very stiff dark grey slightly sandy gravelly CLAY		
4.00-4.34 4.00	SPT(C) 50/190 B			8,12/20,21,9 Water strike(1) at 4.20m, rose to 4.00m in 20 mins.		(2.00)			▼1 ▽1
5.00-5.27 5.10	SPT(C) 50/115 B			10,17/25,25		5.00	Very stiff dark grey sandy gravelly CLAY with occasional subangular to subrounded cobbles		
						(1.40)			
						6.40			
6.50-6.76 6.50	SPT(C) 50/105 B			13,20/28,22		(0.80)	Very stiff dark grey slightly sandy slightly gravelly CLAY		
						7.20	Refusal at 7.20m		

Remarks
Groundwater encountered at 4.20m BGL
Refusal at 7.20m BGL
Borehole backfilled on completion
Chiselling from 0.50m for .4 hours. Chiselling from 7.00m to 7.20m for .4 hours.

Scale (approx)	Logged By
1:50	M.Sheehan

Figure No. 11468-02-22.BH02

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APPENDIX 6 – Laboratory Testing

www.gii.ie

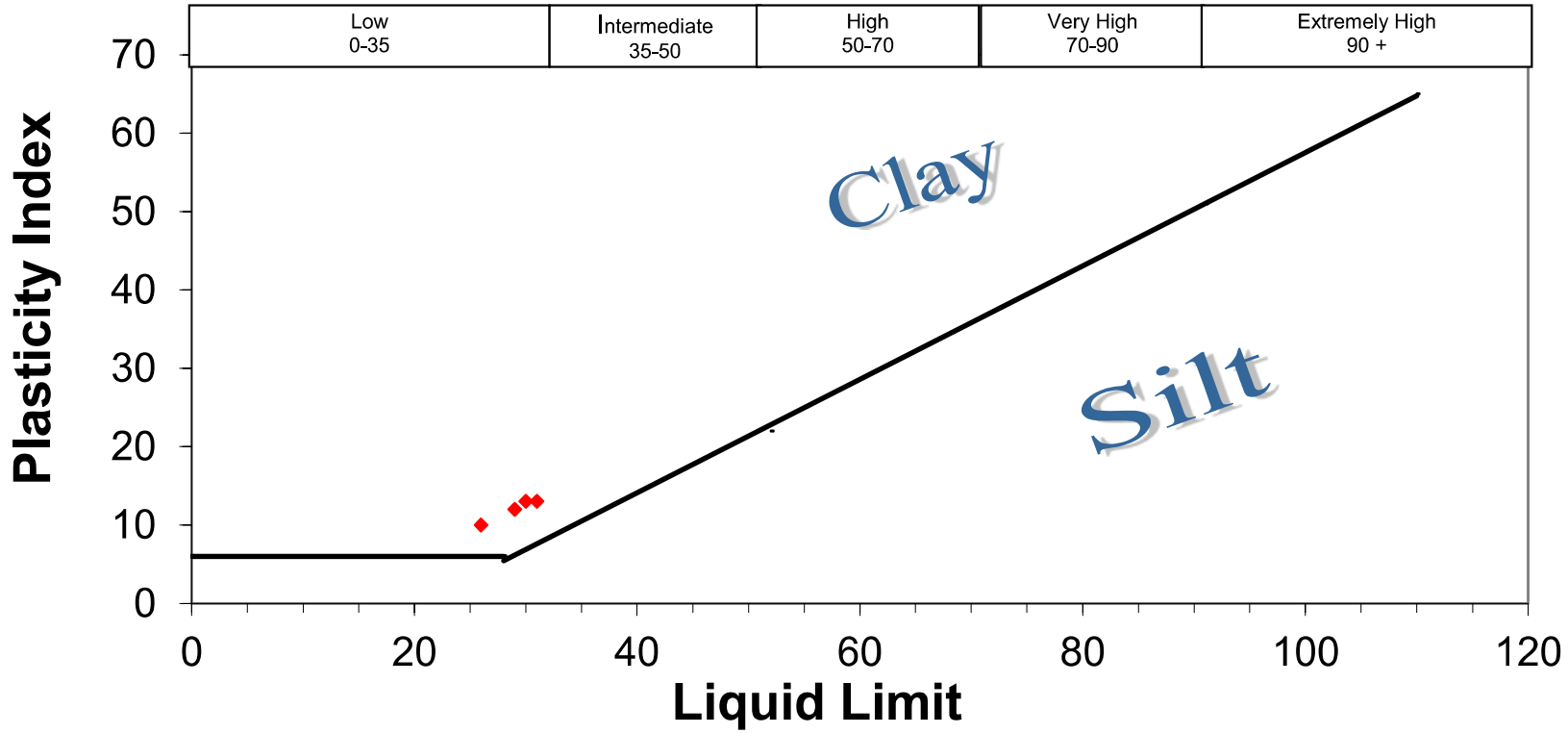
National Materials Testing Laboratory Ltd.

SUMMARY OF TEST RESULTS

				Particle			Index Properties		Bulk	Cell	Undrained Triaxial Tests		Lab	
BH/TP	Depth	sample	Moisture	Density	<425um	LL	PL	PI	Density	Presssure	Compressive	Strain at	Vane	Remarks
No	m	No.	%	Mg/m3	%	%	%	%	Mg/m3	kPa	Stress kPa	Failure %	kPa	
BH01	1.50	B	10.8		32.0	26	16	10						
BH01	3.50	B	13.2		59.1	29	17	12						
BH02	2.00	B	13.3		56.8	31	18	13						
BH02	4.00	B	12.7		55.2	30	17	13						

NMTL	Notes :	Job ref No.	NMTL 3539	GII Project ID:	11468-02-22
	1. All BS tests carried out using preferred (definitive) method unless otherwise stated.	Location	Rosemount House		

NMTL LTD **Unit 18c, Tullow Industrial Estate** **Tullow** **County Carlow** **Tel: 00353 59 9180822** **Mob: 00353 872575508** billa@nmtl.ie	**Contract:** Rosemount House **Client:** Ground Investigations Ireland Ltd **Engineer:** Stephen Kealy **GII Project ID** 11468-02-22 **Date:** 18/05/2022 **Tested By:** Sb **Checked:** Bc **Job ref No.** NMTL 3539

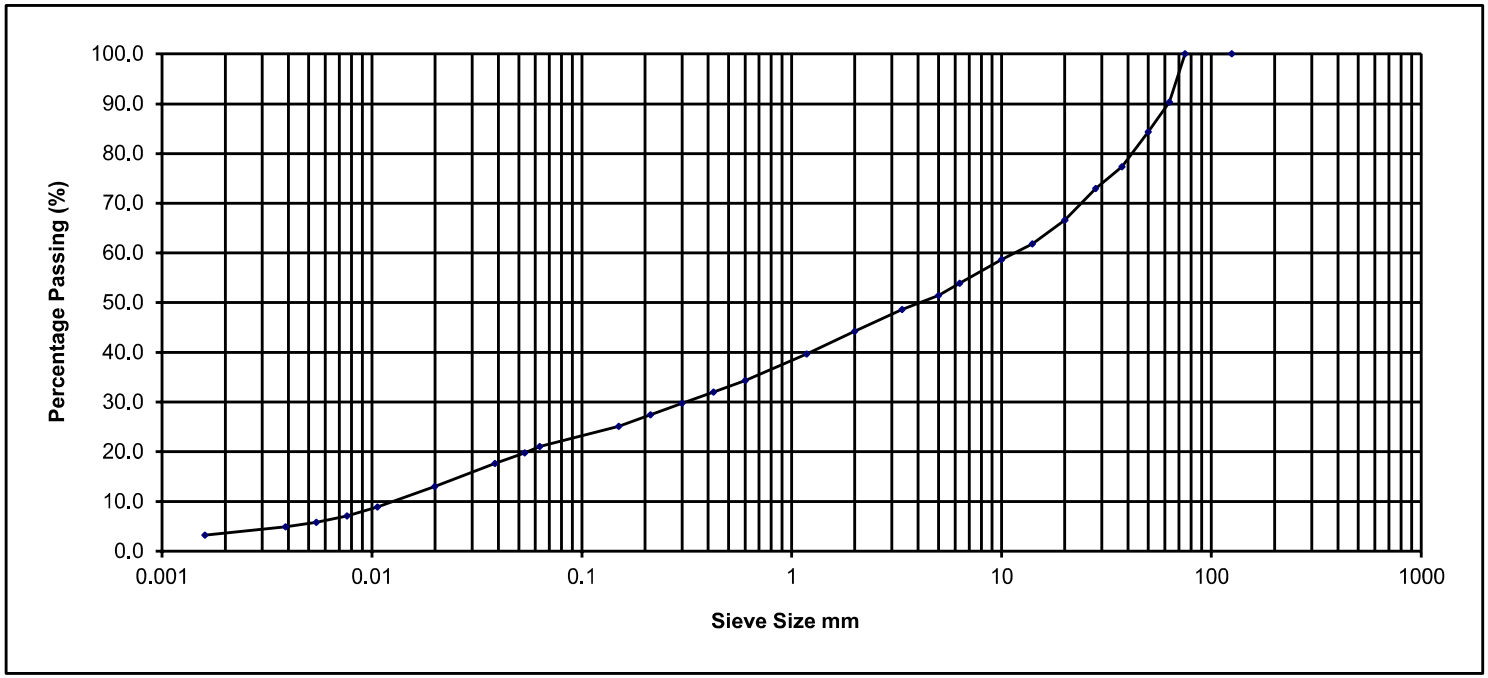


NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	90.4
50.000	84.4
37.500	77.3
28.000	72.9
20.000	66.6
14.000	61.8
10.000	58.7
6.300	53.9
5.000	51.4
3.350	48.6
2.000	44.2
1.180	39.7
0.600	34.3
0.425	32.0
0.300	29.8
0.212	27.5
0.150	25.1
0.063	21.0
0.053	19.7
0.038	17.7
0.020	13.0
0.011	8.9
0.008	7.1
0.005	5.8
0.004	4.9
0.002	3.2



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
3.2		17.8			23.2			46.2		9.6	0.0

Sample Description	Dark grey brown slightly sandy gravelly silty CLAY.	Project No.	NMTL 3539
		BH/TP No.	BH01
Project	Rosemount House	Sample No.	B
	GII PROJECT ID:11468-02-22	Depth	1.50m

Operator	Sb	Checked	Nc	Approved	Bc	Date sample tested	13/05/2022

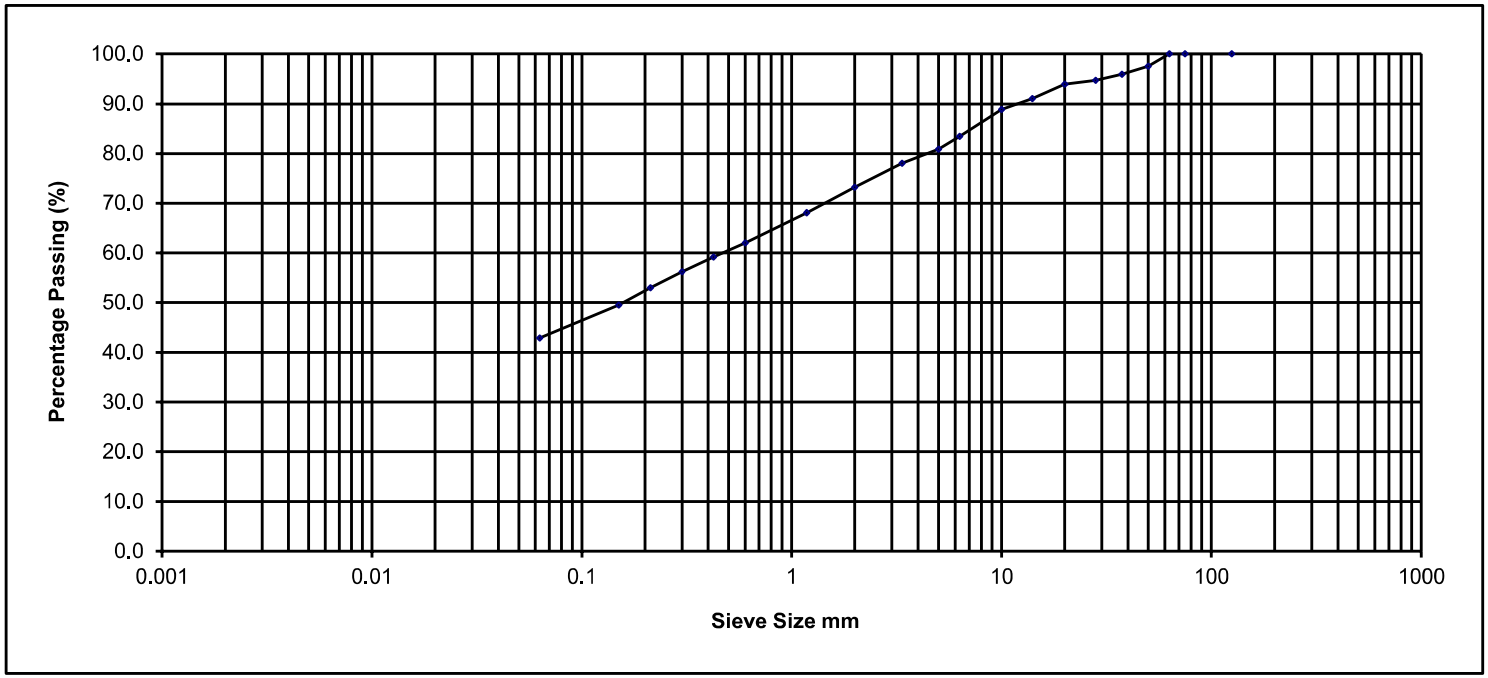
NM TL Ltd

NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	97.5
37.500	95.9
28.000	94.7
20.000	93.9
14.000	91.1
10.000	88.8
6.300	83.5
5.000	80.9
3.350	78.0
2.000	73.2
1.180	68.1
0.600	62.0
0.425	59.1
0.300	56.2
0.212	53.0
0.150	49.5
0.063	42.9



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
		42.9			30.3			26.8		0.0	0.0

Sample Description	Dark grey/black slightly gravelly slightly Sandy silty CLAY.	Project No.	NMTL 3539
		BH/TP No.	BH01
Project	Rosemount House	Sample No.	B
	GII PROJECT ID:11468-02-22	Depth	3.50m

Operator	Sb	Checked	Nc	Approved	Bc	Date sample tested	13/05/2022

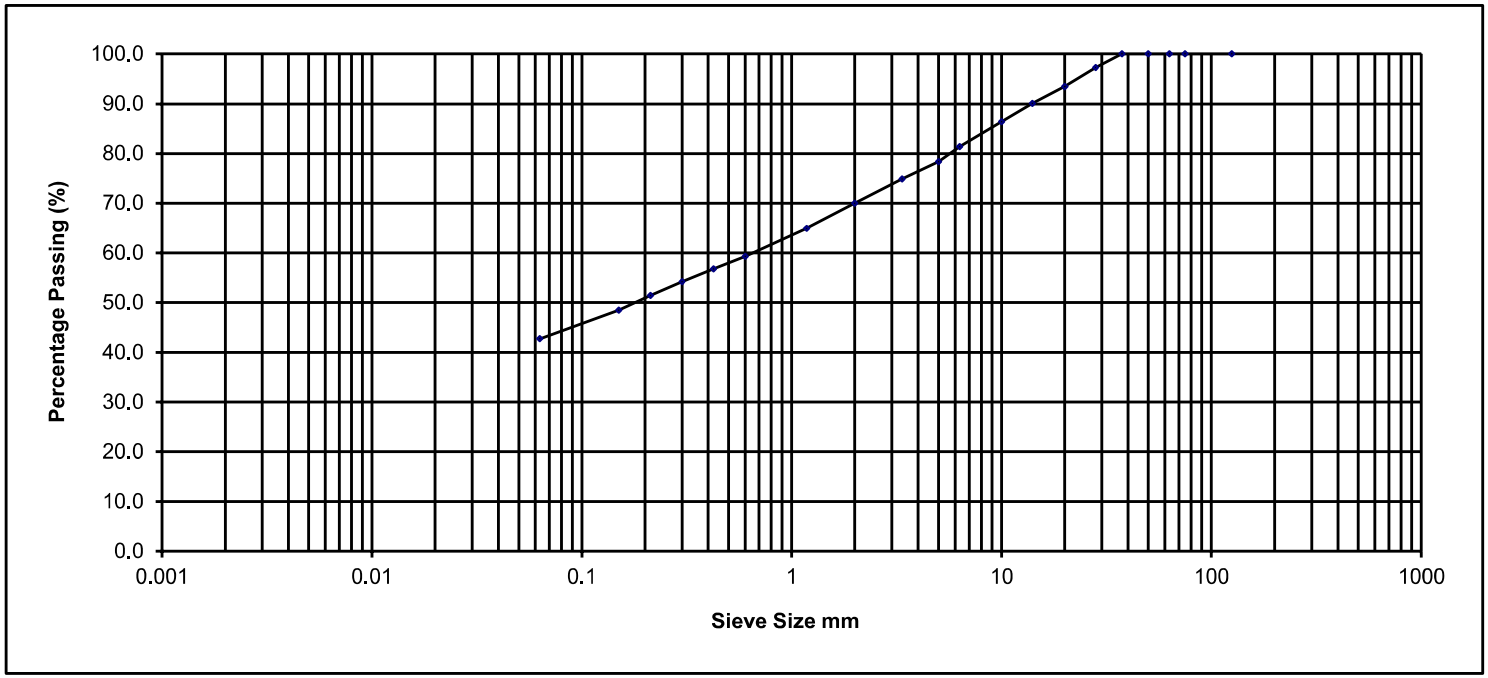
NM TL Ltd

NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	100.0
37.500	100.0
28.000	97.3
20.000	93.5
14.000	90.1
10.000	86.4
6.300	81.4
5.000	78.4
3.350	74.9
2.000	70.0
1.180	64.9
0.600	59.3
0.425	56.8
0.300	54.2
0.212	51.4
0.150	48.4
0.063	42.8



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
		Silt			Sand			Gravel			
		42.8			27.2			30.0		0.0	0.0

Sample Description Dark grey/black slightly sandy slightly gravelly silty CLAY.

Project Rosemount House

GII PROJECT ID:11468-02-22

Operator	Sb	Checked	Nc	Approved	Bc	Date sample tested	13/05/2022

Project No.	NMTL 3539
BH/TP No.	BH02
Sample No.	B
Depth	2.00m

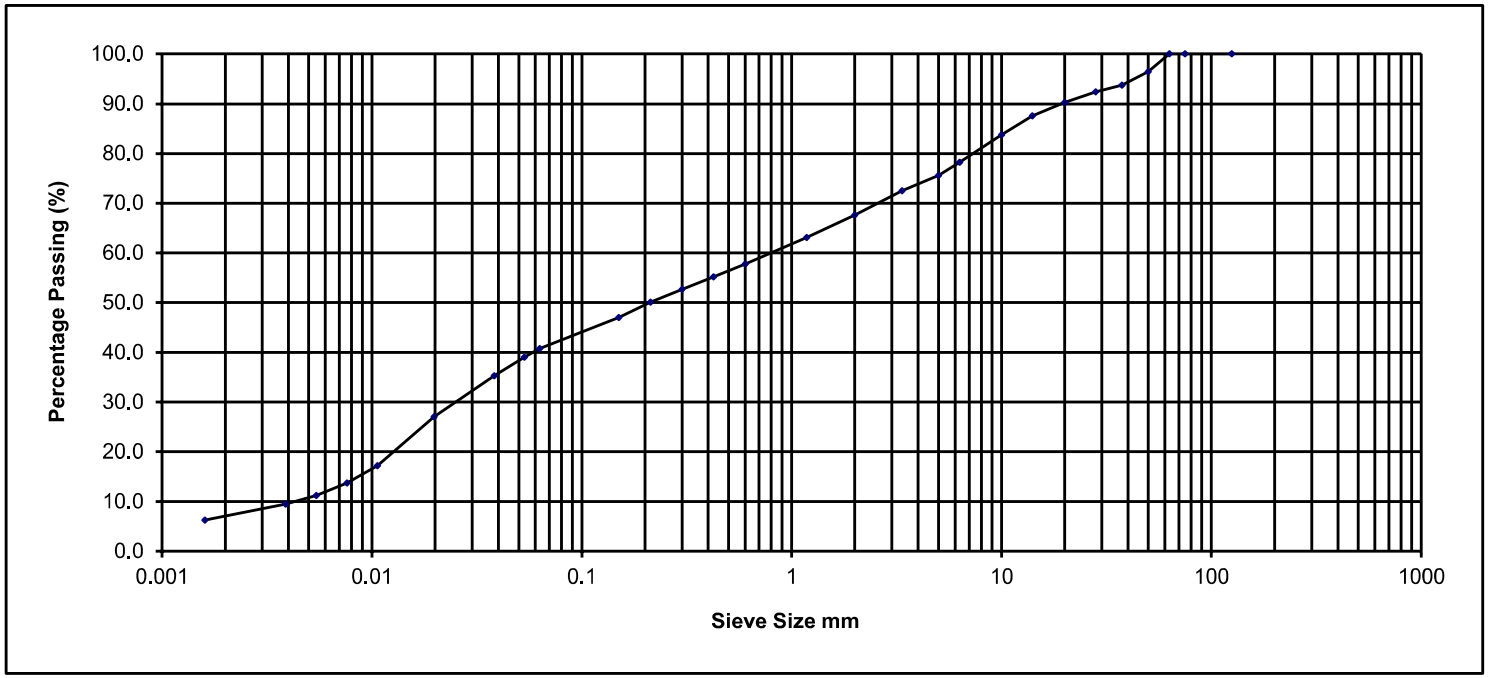
NM TL Ltd

NMTL Ltd

Determination of Particle Size Distribution

BS 1377 : 1990 : Part 2 : Clauses 9.2 & 9.5

Sieve Size mm	% Passing
125.000	100.0
75.000	100.0
63.000	100.0
50.000	96.4
37.500	93.7
28.000	92.4
20.000	90.3
14.000	87.6
10.000	83.8
6.300	78.2
5.000	75.6
3.350	72.5
2.000	67.7
1.180	63.1
0.600	57.7
0.425	55.2
0.300	52.7
0.212	50.1
0.150	46.9
0.063	40.8
0.053	39.0
0.038	35.3
0.020	27.0
0.011	17.3
0.008	13.8
0.005	11.3
0.004	9.5
0.002	6.3



Percentage Particle Size

Clay	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	Cobbles	Boulder
	Silt			Sand			Gravel				
6.3	34.5			26.9			32.3			0.0	0.0

Sample Description	Dark grey/black slightly sandy slightly gravelly silty CLAY.	Project No.	NMTL 3539
		BH/TP No.	BH02
Project	Rosemount House	Sample No.	B
	GII PROJECT ID:11468-02-22	Depth	4.00m

Operator	Sb	Checked	Nc	Approved	Bc	Date sample tested	13/05/2022

NM TL Ltd

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 :	Stephen Kealy
Date :	4th May, 2022
Your reference :	11468-02-22
Our reference :	Test Report 22/6695 Batch 1
Location :	Rosemount House
Date samples received :	25th April, 2022
Status :	Final Report
Issue :	1

Two samples were received for analysis on 25th April, 2022 of which two were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Liza Klebe
Project Co-ordinator

Element Materials Technology Environmental UK Limited
Registered in England and Wales
Registered Office: 3rd Floor Davidson Building, 5 Southampton Street, London WC2E 7HA
Company Registration No: 11371415

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 11468-02-22
Location: Rosemount House
Contact: Stephen Kealy
EMT Job No: 22/6695

Report : **Solid**

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

EMT Sample No.	1	2											
Sample ID	BH01	BH02											
Depth	1.50	2.00									Please see attached notes for all abbreviations and acronyms		
COC No / misc													
Containers	T	T											
Sample Date	21/04/2022	21/04/2022											
Sample Type	Soil	Soil											
Batch Number	1	1									LOD/LOR	Units	Method No.
Date of Receipt	25/04/2022	25/04/2022											
Sulphate as SO4 (2:1 Ext) #	0.0401	0.4694									<0.0015	g/l	TM38/PM20
pH #	8.88	8.25									<0.01	pH units	TM73/PM11

Please include all sections of this report if it is reproduced
All solid results are expressed on a dry weight basis unless stated otherwise.

Client Name: Ground Investigations Ireland
Reference: 11468-02-22
Location: Rosemount House
Contact: Stephen Kealy

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 22/6695						

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.: 22/6695

SOILS and ASH

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. Asbestos samples are retained for 6 months.

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. Ash samples are dried at 37°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.

STACK EMISSIONS

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 for Dioxins and Furans and Dioxin like PCBs has been performed on XAD-2 Resin, only samples which use this resin will be within our MCERTS scope.

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

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.
Laboratory records are kept for a period of no less than 6 years.

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.

Customer Provided Information

Sample ID and depth is information provided by the customer.

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.
*	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: 22/6695

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: 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: 2013I	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		AD	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