Blessington LRD

Site Specific Flood Risk Assessment

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Contents

1	INT	RODUCTION
	1.1	Background5
	1.2	Objectives
	1.3	Flood Risk Assessment Scope5
	1.4	Approach5
	1.5	Existing Site
	1.6	Proposed Development
2	PLA	ANNING SYSTEM FLOOD RISK MANAGEMENT GUIDELINES
	2.1	General
	2.2	Sequential Approach
	2.3	Flood Risk Assessment Stages
3	STA	AGE 1 – FLOOD RISK ASSESSMENT
	3.1	General10
	3.2	Information Sources
	3.2	.1 OPW National Flood Hazard Mapping and Benefitting Lands Mapping
	3.2	.2 Liffey Catchment Flood Risk Assessment and Management Study
	3.2	.3 Other Sources
	3.3	Source Pathway Receptor Model12
4	STA	AGE 2 – INITIAL FLOOD RISK ASSESSMENT13
	4.1	Initial Fluvial Flood Risk Assessment13
	4.2	Initial Pluvial Flood Risk Assessment14
	4.3	Initial Groundwater Flood Risk Assessment14
	4.4	Flood Zone Category
5	STA	AGE 3 – DETAILED FLOOD RISK ASSESSMENT

ŒL

5.1	General16
5.2	Surface Water Management Measures and SuDS16
5.3	SuDS Methodologies
5.4	Surface Water Attenuation and Storage17
5.5	Flood Risk Exceedance
5.6	Impact on Adjacent Areas
5.7	Climate Change
5.8	Access and Egress for Emergency Services During Flood Events
5.9	Residual Risks
5.10	Mitigation Measures
5.1	0.1 Effectiveness of Mitigation Measures19
6 CO	NCLUSIONS
Appen	dix A : Flood Hazard InformationA
Appen	dix B : GII SITE INVESTIGATION REPORTD

Figures

Figure 1-1 Site Location (Site Boundary Indicative Only)	6
Figure 1-2 Existing Watercourses – Extract from EPA Outline Mapping Service	7
Figure 2-1 Extract from The Planning System and Flood Risk Management Guidelines (Fig 3.	2:
Figure 4-1 CFRAM MAP EXTRACT	4
Figure 5-1 Flood Exceedance (>1%AEP) Overland Flow Routes	8

Tables

Table 3-1 Information Sources Consulted	10
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1 INTRODUCTION

1.1 Background

DBFL Consulting Engineers have been instructed to prepare a Site-Specific Flood Risk Assessment (SSFRA) to support the planning application for a proposed Large-Scale Residential Development of 233 No. residential units, 36 No. later living units, a medical centre, a pharmacy and a cafe on a 6.05 Ha site at lands in Blessington, Co. Wicklow.

The proposed site layout is shown on Road Layout drawing 230199-X-04-Z00-DTM-DR-DBFL-CE-1201.

This SSFRA should be read in conjunction with DBFL's Infrastructure Design Report (230199-DBFL-XX-XX-RP-C-0001).

1.2 Objectives

The objectives of this report are to inform the planning authority in relation to flood risk associated with the site.

The report will assess the site in accordance 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 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 lands in Blessington 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 Existing Site

From a high point in the Eastern corner of the site (+207.76) which extends towards the centre of the site, the sites falls towards its Southern, Western and Northern boundary

Gradients along the transitional strip range from 1:17 to 1:50.

Existing topographic survey information is shown in the background of the Proposed Roads Layout Plan (refer to DBFL Drawing No. 230199-X-04-Z00-DTM-DR-DBFL-CE-1201).



Figure 1-1 Site Location - main site area (Site Boundary Indicative Only)





Figure 1-2 Existing Watercourses – Extract from EPA Outline Mapping Service

1.6 Proposed Development

The proposed development comprises of 233 No. residential units, 36 No. later living units, a medical centre, a pharmacy and a cafe on a 6.05 Ha site (approx.). Refer to Architecture layout and Accommodation schedule for further detail.

The proposed development will also include the following associated engineering infrastructure:

- Provision of access points from the Blessington Inner Relief Road (along the site's North-Western boundary) facilitating primary vehicle access.
- A secondary access point will also be provided along the sites South western boundary.
- This access point will also facilitate permeability for pedestrians and cyclists, and additional access points will be provided along the sites boundaries .
- Provision of internal site roads including associated footpaths.
- Provision of surface water drainage, foul drainage and water supply infrastructure.
- Provision of internal site roads including associated footpaths.
- Provision of surface water drainage, foul drainage and water supply infrastructure.



2 PLANNING SYSTEM FLOOD RISK MANAGEMENT GUIDELINES

2.1 General

The Planning System and Flood Risk Management, Guidelines for Planning Authorities" and its Technical Appendices outline the requirements for a Site Specific Flood Risk Assessment.

Table 3.1 of the guidelines classify "dwelling houses" as "highly vulnerable development".

Table 3.2 of the guidelines indicates that "highly vulnerable development" are classified as "appropriate" once located in Flood Zone C i.e. where probability of flooding from rivers is low (less than 0.1% AEP or 1 in 1,000 year).

If a "highly vulnerable development" is to be located in Flood Zone A or Flood Zone B a Justification Test is required.

2.2 Sequential Approach

This SSFRA will initially use existing flood risk information to determine the flood zone category of the site i.e. to determine whether the development is considered appropriate or whether a justification test is required (see Figure 2.1 below).



Figure 2-1 Extract from The Planning System and Flood Risk Management Guidelines (Fig 3.2: Sequential Approach Mechanism in the Planning Process)



2.3 Flood Risk Assessment Stages

The stages of a Flood Risk Assessment as defined by "The Planning System and Flood Risk Management, Guidelines for Planning Authorities" and its Technical Appendices are as follows:

- Stage 1 Flood Risk Identification
- Stage 2 Initial Flood Risk Assessment
- Stage 3 Detailed Flood Risk Assessment

The following sections of this SSFRA follows this approach.



3 STAGE 1 – FLOOD RISK ASSESSMENT

3.1 General

The flood risk identification stage uses existing information to identify whether there may be any flooding or surface water management issues related to the site that may require further investigation.

3.2 Information Sources

Information sources consulted for the identification exercise are outlined in Table 3.1 below.

Information Source	Comments
Predictive and historic flood maps, and Benefiting Lands Maps, such as those at www.floods.ie and www.floodinfo.ie;	Information obtained (and reviewed) from www.floods.ie & www.floodinfo.ie (OPW websites)
Predictive flood maps produced under CFRAM Studies;	Information obtained (and reviewed) from www.floodinfo.ie (Liffey CFRAMS), fluvial flood depth, fluvial flood extents etc.
Previous Strategic Flood Risk Assessments;	Liffey CFRAM Study consulted.
Topographical maps, in particular digital elevation models produced by aerial survey or ground survey techniques;	Site topographic survey undertaken
Alluvial deposit maps of the Geological Survey of Ireland (which would allow the potential for the implementation of source control and infiltration techniques and for groundwater and overland flood risk to be assessed).	GSI maps consulted.
Walkover survey to assess potential sources of flooding, likely routes for flood waters and the site's key features, including flood defences, and their condition;	Walkover survey carried out.
'Liable to flood' markings on the old '6 Inch' maps;	Historic OSI maps consulted.
Trial Pit Logs from Site Investigations	GII carried out site investigation in January 2020

Table 3-1 Information Sources Consulted



3.2.1 OPW National Flood Hazard Mapping and Benefitting Lands 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. Also, no benefitting lands are identified in the vicinity of the site.

Note: Benefiting lands are lands that might benefit from implementation of a major drainage scheme or lands subject to flooding or poor drainage.

3.2.2 Liffey Catchment Flood Risk Assessment and Management Study

Extracts from the Blessington Fluvial Flood Extent are included in Appendix A (Flood Hazard Information) which indicates the extent of fluvial flooding in the vicinity of the site.

While the majority of the site indicates No Fluvial flooding on the site, there is a slight encroachment in the Northern corner of the site.

3.2.3 Other Sources

Other information sources were consulted to determine if there was any additional flood risk to the site including:

- Topographical surveys of the area the sites developable area is elevated above the predicated 0.1% APE fluvial flood event as shown in the Blessington Fluvial Flood Extents Maps (refer to Appendix A).
- Soils data from the GSI no alluvium deposits within the site boundary.
- Groundwater information from GSI no groundwater wells or springs are identified within the site.
- 6 inch OSI Map no evidence of flooding or marsh areas shown within the site.
- GII carried excavated 6 No. trial pits at the site in January 2020 (depths ranging from 1.5m to 3.0m). No groundwater was noted during the investigation. Trial pit logs are included in Appendix B of this report. Additional SI has also been commissioned but is not available at the time of the compilation of this report.
- Walkover survey no open drain or drainage channel was identified during walkover survey of the site.

Review of the 'other sources' of information noted above do not indicate evidence of flood risk to the site.



3.3 Source Pathway Receptor Model

A Source-Pathway-Receptor model has been produced to summarise 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 3.2 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	People and	Possible	Medium	Medium
	stream in	Property (the			
	northern corner	proposed			
	of site	development).			
Surface	Blockage and /	People and	Possible	Medium	Medium
Water	or surcharging	Property (the			
(Pluvial)	of the proposed	proposed			
	surface water	development).			
	drainage				
	network				
Human /	Failure of	People and	Possible	Medium	Medium
Mechanical	proposed SuDS	Property (the			
Error (Pluvial)	measures (e.g.	proposed			
	Hydrobrake	development).			
	failure)				
Groundwater	Rising	People and	Remote	Low	Low
	groundwater	Property (the			
	levels within the	proposed			
	site	development).			

Table 3-2 Source Pathway Receptor Analysis



4 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.

- Predominantly Low risk of fluvial flooding with the exception of the Northern corner where the risk is medium
- Medium risk of pluvial flooding (surface water and human / mechanical error)
- Low risk of groundwater flooding

The information sources identified in Section 3.2 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 Liffey CFRAM flood extents maps identify the location of the predicated 0.1% AEP, 1.0% AEP and 10% AEP fluvial flood extents associated with watercourses River Liffey in the vicinity of Blessington (refer to Appendix A).

Minor fluvial flooding encroaching in the Northern corner of the site is indicated on the CFRAMS maps. This area will not be developed upon and should not impact the development of the rest of the site.

The closest modelled node to the site is Node 09DPAR00268J, approximately 10m West of the site, see Figure 4-1 below.

The location of this node is shown on CFRAM Drawing E09BLE_EXFCD_F0_01 (Appendix A).

Node 09DPAR00268J, 10% AEP fluvial flood level	+198.92m
Node 09DPAR00268J, 1% AEP fluvial flood level	+199.25m
Node 09DPAR00268J, 0.1% AEP fluvial flood level	+199.69m
Lowest Proposed FFL	+201.31m

The lowest proposed FFL (+201.31) is 1.62m above the predicted 0.1% AEP fluvial flood event associated with Node 09DPAR00268J (+199.69m).

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Figure 4-1 CFRAM MAP EXTRACT

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 1:100 year 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, Hydrobrake failure etc.

4.3 Initial Groundwater Flood Risk Assessment

During the site walkover survey, no marshy ground was observed. No groundwater wells or marsh areas are located within the site (based on review of information available on the GSI and OSI



websites). This is consistent with Ground Investigation Irelands observations during trial pit excavations (see Section 3.2.3 Other Sources).

Therefore, the risk of groundwater flooding occurring at the site is considered negligible.

4.4 Flood Zone Category

Area in the Northern corner of the site is encroached upon by flood zone A is not proposed for development and will remain open space and therefore, no justification test is required.

On completion of Stage 2 – Initial Flood Risk Assessment, the majority of the site and all land proposed for development are 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 ("dwellings") is therefore considered appropriate as it is located in a Flood Zone C area.



5 STAGE 3 – DETAILED FLOOD RISK ASSESSMENT

5.1 General

As the Initial Flood Risk Assessment considers the proposed development 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 for Emergency Services during Flood Events.
- Residual Risks.
- Effectiveness of Flood Mitigation Measures.

5.2 Surface Water Management Measures and SuDS

The development's internal surface water network has been developed to heavily incorporate a multi phased SuDS treatment train, in order to mitigate surface water runoff to not exceed the allowable green field runoff rate while also providing a level of treatment, biodiversity and amenity.

The Primary discharge point for the development's Surface water network will discharge to the stream to the North, which will take flows from Catchment 2 and 3. While catchment 1 will discharge to an existing 300mm surface water drain in the Western corner of the site. all surface water discharged from the site will ultimately discharge to the Liffey.

For a full breakdown of all the proposed Surface water management network and SuDS features refer to Section 3 of the Infrastructure Design Report, (230199-DBFL-XX-XX-RP-C-0001).

Refer to DBFL Drawing 230199-X-05-Z00-DTM-DR-DBFL-CE-1301 Site Services Layoutand DBFL's Infrastructure Design Report for further detail in relation to the proposed SUDS Strategy.



5.3 SuDS Methodologies

The following methodologies are being implemented as part of a SuDS treatment train approach:

- Permeable parking and permeable surfaces in amenity areas.
- Road surfaces draining to tree pits and Bioretention/ Rain gardens (with high level overflow to the piped surface water network)
- Surface water runoff from house and duplex roofs will be routed to the proposed surface water pipe network via the stone reservoir beneath the permeable paved. Note, this detail does not rely on infiltration, the stone reservoir is intended to provide an additional element of attenuation storage.
- Filter drains to drain soft landscaping in garden areas.
- Attenuation of the 1 in 100 year return period storms in attenuation systems.
- Installation of a vortex flow control device (Hydrobrake or equivalent).
- Surface water discharge will also pass via a bypass separator.

5.4 Surface Water Attenuation and Storage

Attenuation volumes have been calculated based on a total allowable outflow rate of 15.0 L/Sec controlled by a vortex type flow control devices downstream of the attenuation systems.

Refer to DBFL's Infrastructure Design Report for further detail in relation to the proposed attenuation strategy.

5.5 Flood Risk Exceedance

During storms greater than the 1% AEP pluvial event, the development's drainage network design may be exceeded and areas with low ground levels will begin to flood.

Designed site levels fall from the high point along its Eastern boundary, towards the open space in the Northern and corner. Overland flow is therefore directed towards this open space in the Northern and corner (refer to Figure 5.1).





Figure 5-1 Flood Exceedance (>1%AEP) Overland Flow Routes

5.6 Impact on Adjacent Areas

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

Storms greater that the 1% AEP (exceeding the design capacity of the site's drainage system) may result in overland flow being directed towards open space areas and roads.

5.7 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 drainage system design allows for a 10% increase in flows, as recommended by the GDSDS.



5.8 Access and Egress for Emergency Services During Flood Events

The primary access route for motorised vehicles will be via the proposed junction with Blessington Inner Relief Road formed as part of this development.

A secondary access point in the South Western corner of the site is also proposed along the link Road.

Both of these access points are located in Flood Zone C; therefore, it is expected that the site can be safely accessed during storms up to the 1% AEP event.

5.9 Residual Risks

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

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

5.10 Mitigation Measures

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

- Proposed drainage system to be maintained on a regular basis to reduce the risk of a blockage.
- In the event of storms exceeding the 1% AEP design capacity of the attenuation system, possible overland flow routing towards open space areas should not be blocked (refer to Section 5.3).

5.10.1 Effectiveness of Mitigation Measures

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 is in excess of the development's attenuation capacity (i.e. greater than 1% AEP), then overland flow routes directed towards open space areas are provided in order to protect the proposed development.



6 CONCLUSIONS

The Site-Specific Flood Risk Assessment for the proposed development in Blessington was 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 all developable land within the site is located in Flood Zone C as defined by the Guidelines.

The area where flood Zone A encroachment on the site is not proposed for development and therefore does not affect the classification of the portion of the site which is being developed.

It is concluded that the;

- Proposed 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 surface water drainage network.



Appendix A : Flood Hazard Information







Appendix B : GII SITE INVESTIGATION REPORT



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Ground Investigations Ireland Blessington, Co. Wicklow DBFL Consulting Engineers Ground Investigation Report

January 2020



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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.





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GROUND INVESTIGATIONS IRELAND

Geotechnical & Environmental

CONTENTS

1.0	Preamble	.4
2.0	Overview	.4
2.1.	Background	.4
2.2.	Purpose and Scope	.4
3.0	Subsurface Exploration	. 5
3.1.	General	. 5
3.2.	Trial Pits	. 5
3.3.	Soakaway Testing	. 5
3.4.	Surveying	. 5
4.0	Ground Conditions	.6
4.1.	General	.6
4.2.	Groundwater	.7
5.0	Recommendations & Conclusions	. 8
5.1.	General	. 8
5.2.	Soakaway Design	. 8

APPENDICES

Appendix 1	Site Location Plan
Appendix 2	Trial Pit Records
Appendix 3	Soakaway Records



1.0 Preamble

On the instructions of DBFL Consulting Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd., in January 2020 at the site of the proposed residential development in Blessington, Co. Wicklow.

2.0 Overview

2.1. Background

It is proposed to construct a new residential development with associated services, access roads and car parking at the proposed site. The site is currently greenfield and is situated in Blessington, Co. Wicklow. 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 6 No. Trial Pits to a maximum depth of 3.00m BGL
- Carry out 6 No. Soakaways to determine a soil infiltration value to BRE digest 365
- 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 insitu 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 3T tracked 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. 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. 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 or Irish National Grid as required by the project specification. The coordinates and elevations are provided on the exploratory hole logs in the appendices 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 and are 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 0.30m BGL.

MADE GROUND: Made Ground deposits were encountered in TP01, TP02 and TP04 beneath the Topsoil and was present to a relatively consistent depth of between 0.40m and 0.80m BGL. These deposits were described generally as grey sandy clayey angular to subrounded fine to coarse Gravel or greyish brown slightly sandy gravelly Clay with occasional cobbles and boulders and contained occasional fragments of ceramic and plastic.

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Made Ground or Topsoil and were described typically as *brown* or *grey sandy gravelly CLAY with occasional cobbles*. 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 frequent cobble and boulder content where noted on the exploratory hole logs.

GRANULAR DEPOSITS: Granular deposits described as *greyish brown sandy subangular to subrounded fine to coarse GRAVEL* were encountered at the base of the cohesive deposits with lenses of *brown gravelly clayey fine to coarse SAND* encountered occasionally within the cohesive deposits. The secondary silt/clay constituents varied across the site and with depth while occasional, some or frequent cobble and boulder content also present where noted on the exploratory hole logs.

It should be noted that many of the trial pits where granular deposits or groundwater were encountered, experienced instability. This was described either as side wall spalling or as side wall collapse in the remarks section at the base of the trial pit logs.

4.2. 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.

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. Soakaway Design

Infiltration rates of f=5.25 x 10^{-6} m/s, f=2.81 x 10^{-5} m/s, f=9.65 x 10^{-5} m/s and f=1.72 x 10^{-5} m/s respectively were calculated for the soakaway locations IT03, IT04, IT05 and IT06. At the locations of IT01 and IT02 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.

APPENDIX 1 - Site Location Plan





697800E

697950E

698100E

APPENDIX 2 – Trial Pit Records



S	Grou	nd Inv	estigations Ire www.gii.ie	Ltd	Site Trial Pit Number TP01				
Machine: 3 Method : Tr	Tracked Excavator	Dimensio 2.50m (L	n s) x 0.70m (W) x 3.00m (D)	Ground	Level (mOD) 201.17	Client	Client		
		Location 6979	946.4 E 714833.8 N	Dates 30)/01/2020	Engineer DBFL Consulting Engineers		Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	D	escription	Legend Safe	
0.50	В			201.07	(0.10) (0.10) (0.10) (0.70) (0.70)	Brown slightly gravelly sar MADE GROUND: Greyish Clay with occasional suba subangular to subrounded	dy TOPSOIL brown slightly sandy gravell ngular cobbles. Gravel is fine to coarse	y	
1.50	В			200.37		Stiff grey slightly sandy gra subangular to subrounded subrounded fine to coarse	avelly CLAY with occasional cobbles. Gravel is subangu	lar to	
2.50	В			198 17	(2.20)				
						Complete at 3.00m			
Plan .		•			'	Remarks Trial Pit stable			
						No groundwater encountere Trial Pit terminated at 3.00m Trial Pit backfilled upon com	d during excavation BGL pletion		
· ·	· ·	·			· · ·				
						Scale (approx)	Logged By	Figure No.	

S	Grou	ind In	vestigations Ir www.gii.ie	eland	Ltd	Site Blessington, Co. Galway	Trial Pit Number TP02	
Machine : 3 Method : T	T Tracked Excavate rial Pit	Dimensi 2.20m (ions L) x 0.70m (W) x 2.70m (D)	Ground	Level (mOD) 201.43	Client		Job Number 9359-01-20
		Location 697	n 7926.7 E 714775.8 N	Dates 30	0/01/2020	Engineer DBFL Consulting Engineers		Sheet 1/1
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	D	escription	Kater Kater
1.00	в			201.23 200.73 198.73	(0.20) (0.50) (0.50) (0.50) (0.50) (2.00) (2.00) (2.00)	Brown slightly gravelly sar MADE GROUND: Greyish Clay with occasional suba plastic fragments. Gravel to coarse Stiff grey slightly sandy gr subangular to subrounded subrounded fine to coarse Complete at 2.70m	hdy TOPSOIL brown slightly sandy gravell ngular cobbles and occasion s subangular to subrounded avelly CLAY with occasional cobbles. Gravel is subangu	y al fine
Plan .		•		•	'	Remarks Trial Pit stable		
						No groundwater encountered Trial Pit terminated at 2.70m Trial Pit backfilled upon com	d during excavation BGL pletion	
		•		·				
· ·	· ·		· · ·		· · ·			
					<u>s</u>	Scale (approx) 1:25	Logged By PC	Figure No. 9359-01-20.TP02

S	Grou	ind Inv	vestigations Ire www.gii.ie	Ltd	Site Trial P Blessington, Co. Galway TP0					
Machine: 3 Method : T	T Tracked Excavato rial Pit	Dimension 1.90m (I	ons L) x 0.70m (W) x 2.70m (D)	Ground 2	Level (mOD) 201.92	Client		Job Number 9359-01-2	Job Number 9359-01-20	
		Location 697	933.4 E 714626.1 N	Dates 30)/01/2020	Engineer DBFL Consulting Engineers		Sheet 1/1	_	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	D	escription	Legend	Water	
				201.62	(0.30) 0.30 (0.80) (0.80)	Brown slightly gravelly sar Brown gravelly clayey fine subangular to subrounded subrounded fine to coarse	ndy TOPSOIL to coarse SAND with occas cobbles. Gravel is subangu	ional lar to		
1.00	В			200.82	1.10 	Firm brown slightly gravel subangular to subrounded	y sandy CLAY. Gravel is fine to coarse			
2.00	В			199.72	2.20	Greyish brown sandy suba coarse GRAVEL with occa cobbles	angular to subrounded fine to sional subangular to subrou	nded		
				199.22	2.70	Complete at 2.70m				
Plan		•		•	· · ·	Remarks	ide well applling			
						Trial Pit terminated at 2.70m Trial Pit backfilled upon com	d during excavation BGL pletion			
· ·				· ·	· · ·					
					· · · •	Scale (approx) 1:25	Logged By PC	Figure No. 9359-01-20.IT03	3	

	Grou	nd In	vestigations Ire www.gii.ie	Site Tr Blessington, Co. Galway 7				
Machine: 3 Method : T	T Tracked Excavator rial Pit	Dimensi 1.80m (ons L) x 0.65m (W) x 2.80m (D)	Ground 2	Level (mOD) 204.85	Client		Job Number 9359-01-2
		Location 698	1 3053.9 E 714653.3 N	Dates 30/01/2020		Engineer DBFL Consulting Engineers		Sheet 1/1
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	D	escription	Legend
0.50	В			204.65 204.45 204.15	(0.20) (0.20) (0.20) (0.20) (0.20) (0.30) (0.30) (0.30) (0.70) (0.40)	Brown slightly gravelly sar MADE GROUND: Grey sa subrounded fine to coarse Soft brown slightly gravelly subangular to subrounded Light brown gravelly claye subangular to subrounded	ndy TOPSOIL indy clayey angular to Gravel / sandy CLAY. Gravel is fine to coarse y fine to coarse SAND. Grave fine to coarse	rel is
1.50	в			203.75	(0.40)	Firm greyish brown slightly Gravel is subangular to su	/ gravelly slightly sandy CLA brounded fine to coarse	Y.
2.50	В			203.05	- 1.80 - 1.80 - (1.00)	Greyish brown sandy suba coarse GRAVEL with som cobbles	angular to subrounded fine t	
				202.05		Complete at 2.80m		
Plan	• •			•	1	Remarks	ide well enelling	
		•				Trial Pit terminated at 2.80m Trial Pit backfilled upon com	d during excavation BGL pletion	
 	· ·			• •				
					 s	Scale (approx) 1:25	Logged By PC	Figure No. 9359-01-20.TP04

	Grou	ind Inv	vestigations Ire www.gii.ie	land	Ltd	Site Blessington, Co. Galway	Trial Pit Number TP05	
Machine: 3 Method : T	T Tracked Excavato rial Pit	Dimension 1.95m (L	ons .) x 0.65m (W) x 2.20m (D)	Ground	Level (mOD) 205.75	Client		Job Number 9359-01-20
		Location 698	115.6 E 714714.3 N	Dates 30	0/01/2020	Engineer DBFL Consulting Engineer	rs	Sheet 1/1
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		Legend S
0.50	В			205.55	(0.20) 0.20 (0.60) 0.80	Brown slightly gravelly sar Firm brown slightly gravell subangular to subrounded Greyish brown sandy suba coarse GRAVEL with som	ndy TOPSOIL y slightly sandy CLAY. Grave fine to coarse angular to subrounded fine to e subangular to subrounded	el is
2.00	В			203.55	2.20	Complete at 2.20m	e subangular to subrounded	
Plan	· ·			•	'	Remarks		
						Trial Pit unstable; side wall on No groundwater encountere Trial Pit terminated at 2.20m Trial Pit backfilled upon com	conapse d during excavation I BGL pletion	
					s	Scale (approx) 1:25	Logged By	Figure No. 9359-01-20.TP05

S	Grou	Ind Inv	vestigations Ire www.gii.ie	eland	Ltd	Site Blessington, Co. Galway			Trial Pit Number TP06	
Machine: 3 Method : T	T Tracked Excavato rial Pit	r Dimension 1.80m (L	ons _) x 0.70m (W) x 2.40m (D)	Ground	Level (mOD) 205.88	Client			Job Number 9359-01-20	
		Location 698	036.4 E 714792.1 N	Dates 30)/01/2020	Engineer DBFL Consulting Engineers			Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description		I	Kater Vater	
1.50	в			205.68 205.38 205.18 205.18 203.68 203.68	(0.20) (0.30) (0.30) (0.30) (0.20)	Brown slightly gravelly san Soft brown slightly gravell rootlets Light brown gravelly claye subangular to subrounded Greyish brown sandy sub coarse GRAVEL with occa cobbles Brown clayey fine to coars Complete at 2.40m	e SAND	al rel is		
Plan	· · · · · · · · · · · · · · · · · · ·	· · ·	· · · · · ·	· · ·		Remarks Trial Pit unstable; side wall o No groundwater encountere Trial Pit terminated at 2.40m Trial Pit backfilled upon com	collapse d during excavation BGL pletion			
						1:25	PC	9359-0	1-20.TP06	

	Grou	nd In	vestigatio www.gii	ons Ire .ie	and Ltd			Site Blessington, Co. Galway			Trial Pit Number IT01	
Machine: 3 Method: T	T Tracked Excavato rial Pit	r Dimens 1.80m (ions (L) x 0.40m (W) x	1.80m (D)	Ground 2	Level (n 201.13	nOD)	Client			Job Number 9359-01-20	.0
		Location 697	n 7948.2 E 714838.	1 N	Dates 30/01/2020		0	Engineer DBFL Consulting Engineers			Sheet 1/1	
Depth (m)	Sample / Tests	Water Depth (m)	Field Red	cords	Level (mOD)	Dep (m (Thickr	oth) ness)	Description			Legend	AVALU
					201.03	- (Ç	0.10) 0.10 0.50)	Brown slightly gravelly sar MADE GROUND: Greyish Clay with occasional suba subangular to subrounded	ndy TOPSOIL brown slightly sandy gravel ngular cobbles. Gravel is fine to coarse	lly ,		
					200.53		0.60	Stiff grey slightly sandy gra subangular to subrounded subrounded fine to coarse	avelly CLAY with occasional cobbles. Gravel is subangu	ular to		
Plan					199.33		1.80	Trial Pit terminated to co Complete at 1.80m	nduct soakaway			
			· ·	•				Trial Pit stable No groundwater encountere Trial Pit terminated at 1.80m	d during excavation BGL to conduct soakaway			
								Trial Pit backfilled upon com	pletion of soakaway			
	· ·		· ·									
					. .		. s	icale (approx)	Logged By PC	Figure 9359-	9 No. 01-20.IT01	

S	Grou	nd In	vestigations Ire www.gii.ie	eland	Ltd	Site Blessington, Co. Galway		Trial Pit Number IT02
Machine: 3 Method : T	T Tracked Excavato rial Pit	r Dimensi 1.70m (ions L) x 0.40m (W) x 1.50m (D)	Ground	Level (mOD) 201.47) Client		Job Number 9359-01-20
		Location 697	n 7932.1 E 714776.4 N	Dates 30)/01/2020	Engineer DBFL Consulting Engineers		Sheet 1/1
Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness	Description		Legend S
				201.32	- (0.15) 2- 0.15 	Brown slightly gravelly sar MADE GROUND: Greyish Clay with occasional suba subangular to subrounded	ndy TOPSOIL brown slightly sandy gravel ngular cobbles. Gravel is fine to coarse	ly
				200.67	- - - - - - - - - - - - - - - - - - -	Stiff grey slightly sandy gr subangular to subrounded subrounded fine to coarse	avelly CLAY with occasional I cobbles. Gravel is subangu	lar to
				199.97	- (0.70) - (0.70) - (0.70) - (0.70) - (0.70) - (0.70) - (0.70)	Trial Pit terminated to co	nduct soakaway	
Plan						Complete at 1.50m		
						Trial Pit stable No groundwater encountere Trial Pit terminated at 1.50m Trial Pit backfilled upon com	ed during excavation I BGL to conduct soakaway Ipletion of soakaway	
· ·	· ·	•	· · ·		· · ·			
		·			•••	Scale (approx) 1:25	Logged By PC	Figure No. 9359-01-20.IT02