BLESSINGTON DEMESNE LRD

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

VOLUME III APPENDICES

August 2023

PREPARED ON BEHALF OF:

CAIRN HOMES PROPERTIES LTD

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APPENDIX 5A BAT SURVEY

ALTEMAR
Marine & Environmental Consultancy

Bat Fauna Impact Assessment for the

Proposed Blessington Demesne Town Park & Residential Development

25th August 2023

Prepared by: Bryan Deegan (MCIEEM) of Altemar Ltd.
On behalf of: Cairn Homes Properties Ltd.

Document Control Sheet			
Client	Cairn Homes Properties Ltd.		
Project	Proposed Blessington Demesne Town Park & Residential Development		
Report	Bat Fauna Assessment		
Date	25th August 2023		
Version	Author	Reviewed	Date
Planning	Bryan Deegan		25th August 2023

SUMMARY

Structure:	None. Proposed residential development on a greenfield site.
Location:	A site of 25.14 ha within the townlands of Blessington Demesne, Newpaddocks and Santryhill, Blessington, Co. Wicklow.
Bat species present:	Leisler's Bat (*Nyctalus leisleri*), Soprano Pipistrelle (*Pipistrellus pygmaeus*) and Common pipistrelle (*Pipistrellus pipistrellus sensu stricto)*. No bats were detected emerging from any of the onsite trees. However, it would be expected that the large mature trees on site have the potential to act a bat roosts as numerous trees have large cracks and hollows.
Proposed work:	Proposed Residential Development.
Impact on bats:	No buildings are noted on site. No bats emerging onsite trees were observed. Numerous large trees on site on site have the potential for bat roosting. It is not proposed to remove any large trees on site or impact on these areas through lighting. The trees to be removed as part of the proposed development are limited in their potential for bat roosts primarily as a result of their small size. Foraging be would expected to improve as landscaping matures as there would be an increase in foraging areas for insects. Foraging would be expected to continue on site. The mitigation measures outlined will reduce the potential for effects on the local bat population but may be reduced in the vicinity of the link road. The residual impact is considered to be minor adverse/not significant in the long term.
Survey by:	Bryan Deegan MCIEEM
Survey date:	10th August 2020, 9th september 2022 and 15th August 2023.

Background

Cairn Homes Properties Limited intend to apply for permission for a Large-Scale Residential Development at this site c. 25.14 ha on lands within the townlands of Blessington Demesne, Newpaddocks and Santryhill, Blessington, Co. Wicklow. The proposed development will consist of:

- 329 residential units including:
  - 270 two storey houses (28 no. 2-bed, 218 no. 3-bed, 24 no. 4 bed.) comprising of semi-detached and terraced units
  - 47 no. apartments (22 no. 1 bed, 25 no. 2 bed) provided within 1 no. four-storey block.
  - 12 no. duplex units within 1 no. three-storey blocks (6 no. 2 bed and 6 no. 3 bed units).
- Car and bicycle parking spaces to include:
  - 540 no. car parking spaces for the houses, 47 no. spaces for the apartments with 3 accessible parking spaces and 18 no. spaces for the duplex units with 2 accessible parking spaces.
  - 32 bicycle spaces for the duplex units and 81 spaces for the apartments.
- 10.65 ha Town Park;
- 0.74 ha public open space including pocket parks and playgrounds;
- 0.038 ha of communal open space (284sqm at Apartments, 96sqm at Duplex units);
- Two new vehicular access off Oak Drive and one new vehicular access off the Blessington Inner Relief Road
- infrastructure works to serve the housing development to include the internal road network;
- ESB substations/switchrooms, lighting, site drainage works and all ancillary site services and development works above and below ground; and
- temporary permission is also sought for the erection of three marketing signs (4.55 m high and 13.73 sqm each).

The development will also include:

- The extension of the Blessington Inner Relief Road (approx. 700m long) from the existing 4-arm roundabout at Blessington Demesne Lands, running north west of Blessington Business Park, and north of the Woodleigh residential area to a new four-arm roundabout junction on the N81 Dublin Road. The new roundabout will consolidate existing junctions with Hollyvalley, Doran's Pit and the Roadstone quarry site.
- A new junction will be provided to the Roadstone Quarry Access Road north of the road's alignment.
- The scheme will comprise a two-lane single carriageway road with cycle lanes and footpaths, landscaping and drainage works (including attenuation ponds & Sustainable Urban Drainage Systems (SUDS)); road signage and all ancillary site services and development works above and below ground.

The proposed site outline, location, and layout plan are demonstrated in Figures 1 & 2.

Landscape

The landscape strategy for the housing & public park elements of the proposed development has been prepared by Kevin Fitzpatrick Landscape Architecture to accompany this planning application. The proposed landscape masterplan (housing & public park) is demonstrated in Figures 3 & 4.

The landscape strategy for the Blessington Inner Link Street elements of the proposed development has been prepared by Cunnane Stratton Reynolds to accompany this planning application. The proposed landscape masterplan (Blessington Inner Link Street) is demonstrated in Figure 5.

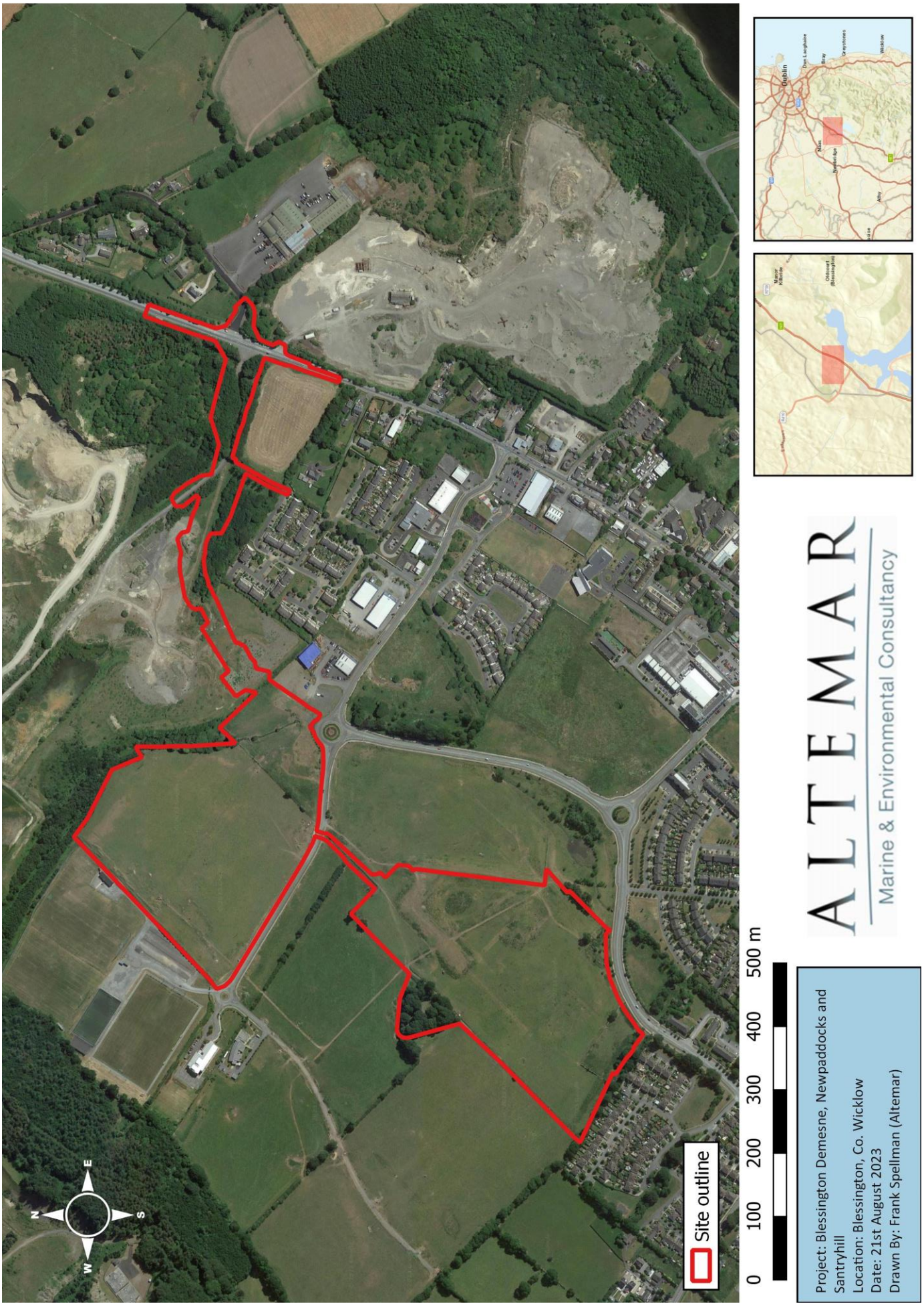

Figure 1. *Proposed site outline and location*

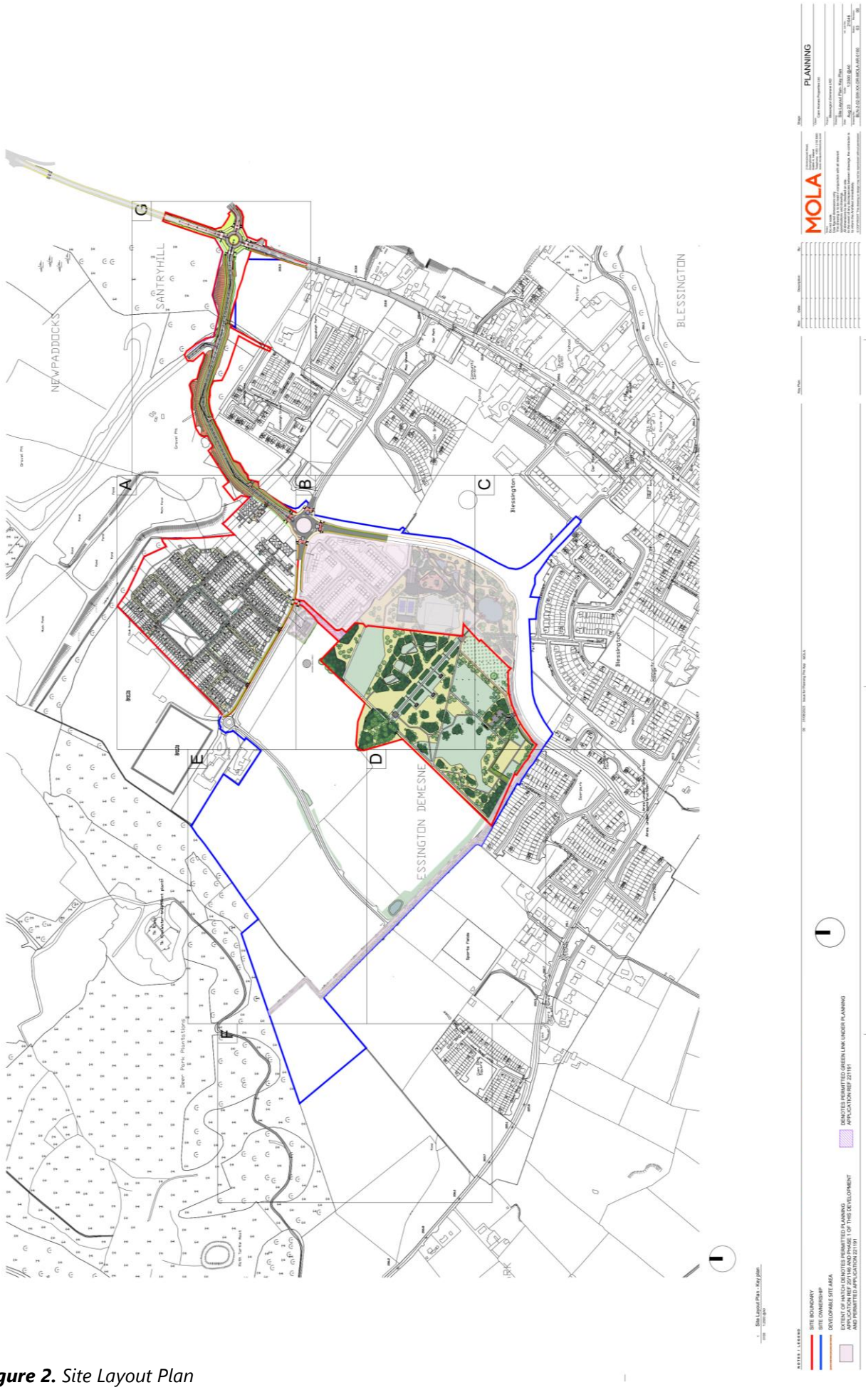

Figure 2. *Site Layout Plan*

Figure 3. *Proposed landscape masterplan (Housing)*

Figure 4. *Proposed landscape masterplan (Public Park)*

Figures 5a-5c. *Proposed landscape masterplan (Blessington Inner Link Street)*

Arborist

Residential & Parkland Development

A Tree Survey Report has been prepared by Cunnane Stratton Reynolds to accompany this planning application. This report details the following arboricultural impact of the residential and parkland elements of this proposed development:

'***Direct Loss of Trees***

None anticipated under Phase 2.

Indirect Impacts

Cognisance must also be given to indirect impacts - in particular care must be taken to ensure the proposed development and ancillary works do not represent an unacceptable conflict with the calculated 'Root Protection Area' (RPA's) of the existing trees outside of the site whose root zones may extend into the site area.

Disturbance of 'Root Protection Area' may just as readily kill or destabilise a tree over time, by means of root damage/severance and or earth compaction/covering preventing essential transfer of water, air and nutrients to roots.

The scheme has been designed to avoid unnecessary disturbance of the root protection areas of the trees and tree groups. Individually tagged trees have had their RPA calculated whilst an average development set-back distance has been adopted for groups, (based on estimated average requirements). Earthworks and excavations are generally excluded from these areas with the exception of two short section of pedestrian pathway proposed within the RPA's of T296/T298/T300 and also T350. In order to avoid damaging tree roots is proposed that these sections of footpath be constructed using a non-dig construction method and permeable gravel surface as detailed in Drawing 20320_T_103.

The protection of other trees during the construction phase relies on the use of tree protection fencing to exclude access to root protection areas thereby avoiding detrimental impacts such as ground compaction and physical damage to trees proposed for retention – please refer to drawing 20320_T_103 for details.

It is advised that the site manager carefully reviews the tree protection and removal drawing 20429_T_103, prior to commencement of works on site. The proposed tree protection measures should be in place from the outset prior to the commencement of works. Any queries should be raised with the project Arborist prior to commencement of works on site.

Provided proper these tree protection measures are adhered to it is not anticipated that any further trees will require removal due to indirect impacts.

Indirect Impacts

A number of footpaths are proposed within the landscape masterplan that pass close to or over RPA's. Where this occurs a non-dig construction method such as the use of 'Cellweb' must be specified in conjunction with a permeable surface finish to avoid damage to the RPA and ensuring that the transfer of air and water may continue satisfactorily through the soil below.

A concrete post and panel fence is proposed for the boundary treat adjacent to Hedgerow 3 which will minimise any potential conflict with e RPA to a negligible level. (A strip foundation for a block wall will not be compatible wit the retention of the hedge).

A review of the trees located along the boundary with the Deerpark residential area to the west of the site was also undertaken on the 29th June 2022. It was noted that since the previous inspection (March 2021) that many of trees were now clearly displaying early symptoms of Ash Dieback disease. Tree's displaying symptoms of Ash dieback include T203, T205, T209, T210, T211, T213, T214, T215, T216 & T350.

<u>Ash Dieback Disease</u>

Most of the Ash trees within the young tree groups are displaying the symptoms of Ash Dieback.'Ash dieback' is a disease caused by the Hymenoscyphus fraxineus fungi which is developing rapidly across Ireland since its presence was first detected in Ireland in 2012. The disease is spread by windborne spores and once a tree is infected it will lead to its terminal decline within a few years.

At present there is no available remedy and the outlook for the survival of Ash trees in Ireland is poor, with infection rates appearing to accelerate over the past couple of years.

It is hoped that genetic diversity may mean some trees might prove resistant to the disease, however there is still great uncertainty at this time regarding survival rates. The Woodland Trust estimate that at least 80% of Ash trees in the UK will die.

The retention or removal of Ash trees must therefore be viewed in the context of Ash Dieback disease, and the likelihood that at least 80% of Ash trees are likely to die over the coming years.

The proposed development offers an opportunity for a significant level of new tree planting which will mitigate any losses. It is suggested that suitable native species of high ecological value be considered.

Summary of Trees to be Removed'

Tree Class	Quantity
A Class Trees	0
B Class Trees	0
C Class Trees	0
U Class Trees	0
TOTAL	**0**

The tree classification & constraints plan, arboricultural impact assessment, and tree protection plan are demonstrated in Figures 6-8.

Blessington Inner Link Street

An Arboricultural Report has been prepared by Charles McCorkell Arborucultural Consultancy to accompany this planning application. This report details the following arboricultural impact of the Blessington Inner Link Street element of this proposed development:

'***Loss of trees -*** *The proposed development will require the removal of 53 trees, two groups of trees and the partial removal of seven groups of trees, two hedgerows and five woodlands. The proposed removals are specified within the Tree Work Schedule at Appendix A and are highlighted in the Tree Removals Plan at Appendix B.*

Of the 69 survey entries proposed to be removed or partially removed, 2 trees are of high quality and value (A Category), 11 trees, 1 hedgerow and 3 woodlands are of moderate quality and value (B Category) and 29 trees, 9 groups of trees, 2 woodlands and 1 hedgerow are of low quality and value (C Category) and 11 trees are of poor quality (U Category). A breakdown of trees and groups to be removed / partially removed according to their BS5837:2012 category is outlined in Figure 3.

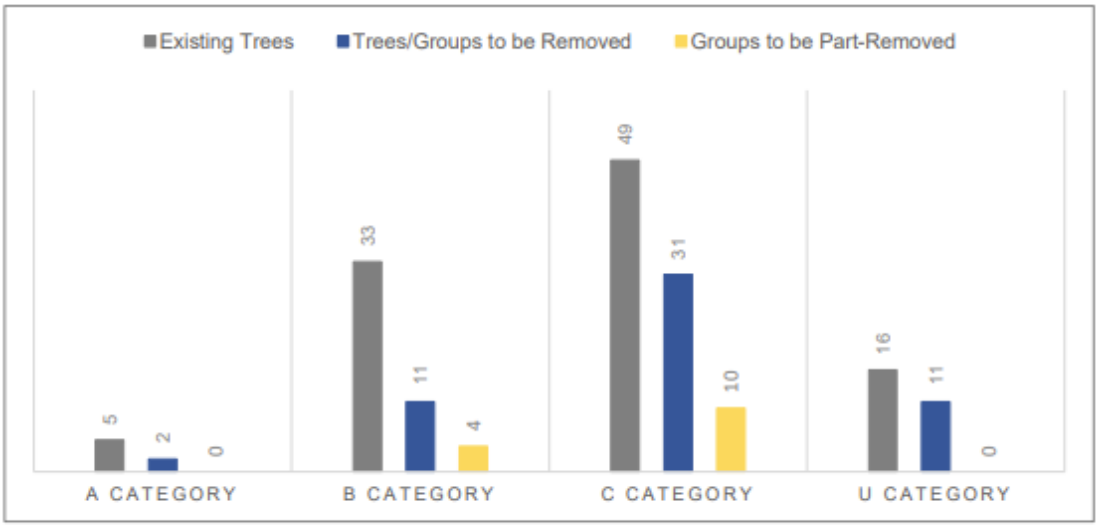

Figure 3: *Breakdown of tree removal required as part of the development.*

The proposed development requires the removal of a large number of trees. Although the majority of these removals are trees of low and poor quality, their loss will have a significant impact on the canopy cover of the immediate local area.

The visual impact the removal of trees will have on the local landscape character varies. There are a large number of trees located within private lands that are required to be removed. Many of these trees have limited visual public amenity value. There are certain areas though, where visually prominent trees of high public amenity value are required to be removed. The loss of such trees will have an impact on the appearance of the surrounding area and landscape in which they are located.

The proposal requires the removal of high and moderate quality beech trees that are of an ancient and late-mature age class. The loss of these trees will have a significant impact on the landscape character of the site, as they are notable landscape features that are of local historical and cultural value considering their age.

***Pruning works -** Pruning works are required to facilitate the development and for arboricultural reasons. These have been specified within the Tree Work Schedule at Appendix A.*

The proposed works include reducing lateral branches to provide sufficient clearance for the construction of the proposed roadway and for health and safety purposes. In addition, the removal of dead and suspended branches and the installation of flexible cable braces are required for arboricultural reasons due to the site's change of use.

The proposed works have been assessed and are not considered to be significant or detrimental to the health of the trees concerned or their visual appearance within the local area.

Prior to completing the proposed development works, a full tree condition assessment, with tree work recommendations, will be required for health and safety purposes. Any additional tre removals must be approved by the Local Planning Authority.

***Construction operations** – To facilitate the construction of the new roadway, excavation works within the RPAs of retained trees, as highlighted on the Tree Protection Plans at Appendix B, are required.*

The level of incursion within the RPAs of these trees has been assessed and is not considered to be significant. The excavation works are located at the furthest extent of their RPAs and although some root loss is likely to occur, it is highly unlikely to have an adverse impact on the long-term health or structural condition of the trees concerned.

As the excavation works are required within tree RPAs, they must be carried out under the supervision and guidance of the arboricultural consultant and any exposed roots must be cleanly pruned to the edge of the excavation line.

The proposal includes the installation of a new culvert within the RPA of the highquality beech tree T486. To minimise the impact on this tree, it is recommended that a pre-commencement meeting between the site engineer, arboricultural consultant and main contractor is held to review the design and construction method of the proposed drainage works within this tree's RPA.

***Tree protection measures** – All retained trees can be successfully protected during the proposed development works by using robust fencing measures which comply with the recommendations outlined within BS 5837:2012. The location and specification of all tree protection measures are highlighted on the Tree Protection Plan at Appendix B.'*

The tree classification & constraints plan, tree removals plan, and tree protection plan are demonstrated in Figures 9-11.

Figure 6. *Tree Classification & Constraints*

Figure 7. *Arboricultural Impact Assessment*

Figure 8. *Tree Protection Plan*

Figures 9a-9c. *Tree Survey & Constraints (Sheets 1-3)*

Figures 10a-10c. *Tree Removals Plan (Sheets 1-3)*

Figures 11a-11c. *Tree Protection Plan (Sheets 1-3)*

Lighting

An Outdoor Lighting Report has been prepared by Sabre Electrical Services Ltd. to accompany this planning application. Extensive consultations took place between Altemar and Sabre in relation to the proposed lighting on site and the retention of bat foraging. No lighting is popoosed in the openspace areas. Following consultation with Sabre, it was outlined that the paths section along the Eastern boundary and South to the proposed new relief road (BIIR) are lit with 2200°K colour temp LEDS with the luminaires fitted with rear shield / baffle. Sabre have also included proposed lighting columns along the existing BIIR and existing HID along Oak Drive. The

Calculation Grids

ID	Grid Name	X	Y	X' Length	Y' Length	X' Spacing	Y' Spacing
1	Grid 1	697900.71	715206.67	200.64	312.91	1.50	1.50
2	Grid 2	697762.65	715060.18	200.64	312.91	1.50	1.50
3	Grid 3	697894.52	714976.35	207.00	163.00	1.50	1.50
4	Grid 4	697992.18	715182.01	67.49	75.00	1.50	1.50
5	Grid 5	698049.11	715133.03	67.49	75.00	1.50	1.50
6	Grid 6	697959.23	715132.46	99.00	105.00	1.50	1.50
7	Grid 7	698156.24	715083.63	336.49	202.00	1.50	1.50
8	Grid 8	698322.82	715114.03	336.49	373.00	1.50	1.50

Luminaires

Luminaire A Data

Supplier	C U Phosco
Type	E950-28-P4A-730-C600-16W
Lamp(s)	730N
Lamp Flux (klm)	2.25
File Name	E950-28-P4A-730-C0600-16W.ies
Maintenance Factor	0.82
Imax70,80,90(cd/klm)	659.3, 183.1, 0.3
No. in Project	68

Luminaire B Data

Supplier	C U Phosco
Type	E950-28-R3A-730-C250-8W
Lamp(s)	730N
Lamp Flux (klm)	1.00
File Name	E950-28-R3A-730-C0250-8W.ies
Maintenance Factor	0.82
Imax70,80,90(cd/klm)	716.7, 30.5, 0.3
No. in Project	11

Luminaire C Data

Supplier	C U Phosco
Type	E950-28-F2A-730-C600-16W
Lamp(s)	730N
Lamp Flux (klm)	2.28
File Name	E950-28-F2A-730-C0600-16W.ies
Maintenance Factor	0.82
Imax70,80,90(cd/klm)	623.6, 113.9, 0.3
No. in Project	9

Luminaire D Data

Supplier	
Type	E950-28-R3A-822-BB-A0300-9W
Lamp(s)	822N
Lamp Flux (klm)	0.77
File Name	E950-28-R3A-822-BB-A0300-9W.ies
Maintenance Factor	0.82
Imax70,80,90(cd/klm)	771.1, 25.8, 0.3
No. in Project	14

lighting report outlines the following lighting data:

Luminaire E Data

Supplier	C U Phosco
Type	E950-28-A2P-730-C600-16W
Lamp(s)	730N
Lamp Flux (klm)	1.93
File Name	E950-28-A2P-730-C0600-16W.ies
Maintenance Factor	0.82
Imax70,80,90(cd/klm)	546.5, 57.5, 1.1
No. in Project	1

Luminaire F Data

Supplier	C U Phosco
Type	P863-128-R2E-730-W3-800-101W
Lamp(s)	730SS
Lamp Flux (klm)	13.96
File Name	P863-128-R2E-730-W3-800-101W.ies
Maintenance Factor	0.82
Imax70,80,90(cd/klm)	463.7, 84.3, 0.0
No. in Project	27

Luminaire G Data

Supplier	
Type	2695 SNN-1C#
Lamp(s)	1 ST 150 17500 2000 E40
LampFlux(klm)/Colour	17.50 1950 / 23
File Name	Arc 2695 SNN 1C# 1 ST 150 17500 1950 E 40.ldt
Maintenance Factor	0.82
Imax70,80,90(cd/klm)	344.0, 99.0, 3.0
No. in Project	9

Luminaire H Data

Supplier	C U Phosco
Type	P863-128-F2B-730-W3-800-101W
Lamp(s)	730SS
Lamp Flux (klm)	13.54
File Name	P863-128-F2B-730-W3-800-101W.ies
Maintenance Factor	0.82
Imax70,80,90(cd/klm)	461.8, 61.8, 0.8
No. in Project	14

The proposed public lighting layout is demonstrated in Figures 12 & 13.

Figure 12. *Public Lighting Layout (Sheet 1)*

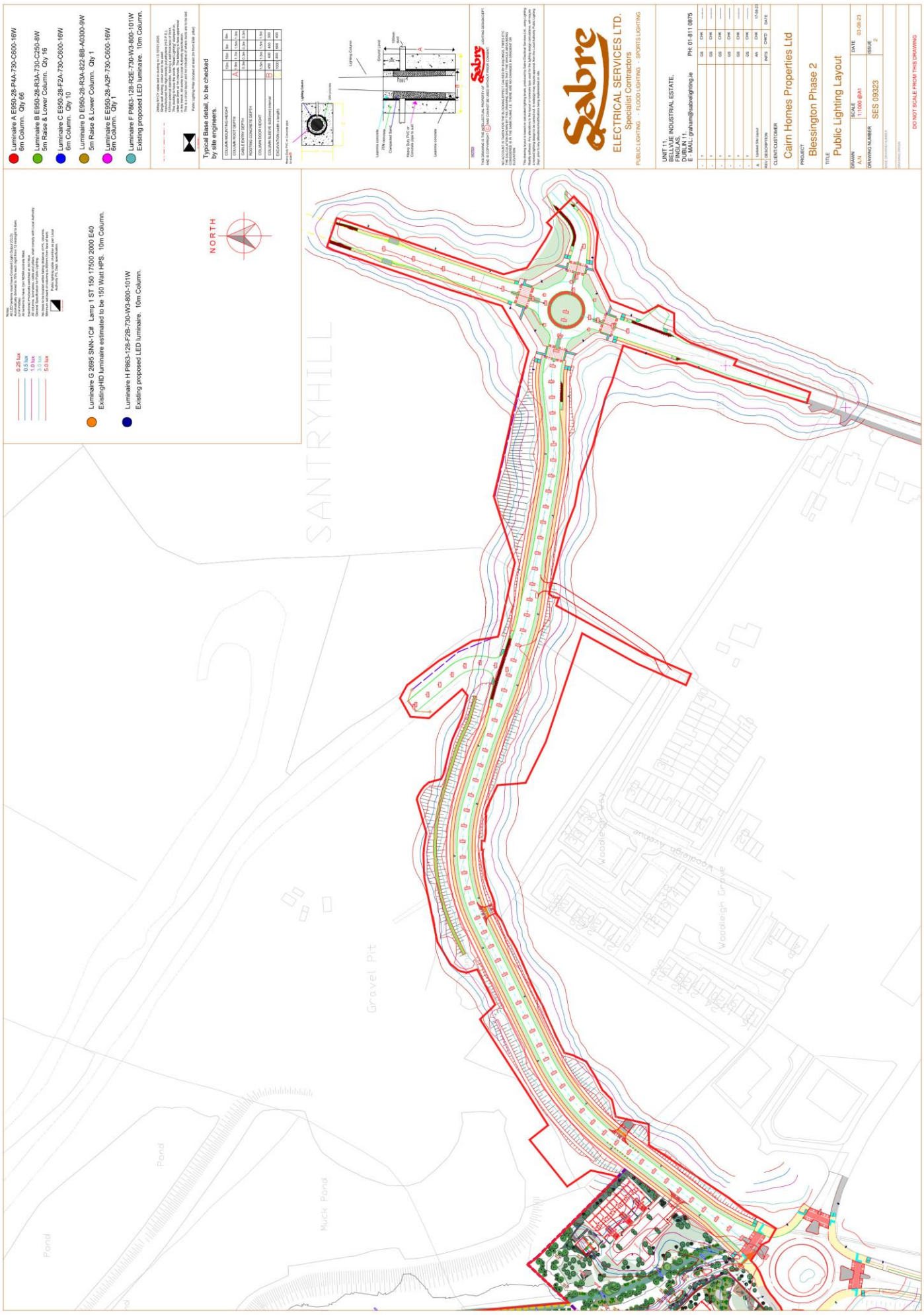

Figure 13. *Public Lighting Layout (Sheet 2)*

Competency of Assessor

This report has been prepared by Bryan Deegan MSc, BSc (MCIEEM). Bryan has over 28 years of experience providing ecological consultancy services in Ireland. He has extensive experience in carrying out a wide range of bat surveys including dusk emergence, dawn re-entry and static detector surveys. He also has extensive experience reducing the potential impact of projects that involve external lighting on Bats. Bryan trained with Conor Kelleher author of the Bat Mitigation Guidelines for Ireland (Kelleher and Marnell (2022)) and Bryan is currently providing bat ecology (impact assessment and enhancement) services to Dun Laoghaire Rathdown County Council primarily on the Shanganagh Park Masterplan. The desk and field surveys were carried out having regard to the guidance: Bat Surveys for Professional Ecologists – Good Practice Guidelines 3rd Edition (Collins, J. (Ed.) 2016) and Marnell, Kelleher and Mullen (2022), Bat Mitigation Guidelines for Ireland V2 (which update and replace the Bat Mitigation Guidelines for Ireland published in 2006).

Legislative Context

Wildlife Act 1976 (as amended by, inter alia, the Wildlife (Amendment) Act 2000).

Bats in Ireland are protected by the Wildlife (Amendment) Act 2000. Based on this legislation it is an offence to wilfully interfere with or destroy the breeding or resting place of any species of bat. Under this legislation it is an offence to "*Intentionally kill, injure or take a bat, possess or control any live or dead specimen or anything derived from a bat, wilfully interfere with any structure or place used for breeding or resting by a bat, wilfully interfere with a bat while it is occupying a structure or place which it uses for that purpose. "*

Habitats Directive- Council Directive 92/43/EEC 1992 on the conservation of natural habitats and of wild fauna and flora has been transposed into Irish Law, including, via, *inter alia*, the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended). See Art.73 of the 2011 Regulations which revokes the 1997 Regulations.

Annex II of the Council Directive 92/43/EEC 1992 on the conservation of natural habitats and of wild fauna and flora (EC Habitats Directive) lists animal and plant species of Community interest, the conservation of which requires the designation of Special Areas of Conservation (SACs); Annex IV lists animal and plant species of Community interest in need of strict protection. All bat species in Ireland are listed on Annex IV of the Directive, while the Lesser Horseshoe Bat (*Rhinolophus hipposideros*) is protected under Annex II which related to the designation of Special Areas of Conservation for a species.

Under the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended), all bat species are listed under the First Schedule and, pursuant to, *inter alia*, Part 6 and Regulation 51, it is an offence to:

- Deliberately capture or kill a bat;
- Deliberately disturb a bat particularly during the period of breeding, hibernating or migrating;
- Damage or destroy a breeding site or resting place of a bat;
- Keep, sell, transport, exchange, offer for sale or offer for exchange any bat taken in the wild.

Bat survey

This report presents the results of a site visit by Bryan Deegan (MCIEEM) on the 10th August 2020, 9th September 2022 and 15th August 2023. Bat emergent and detector surveys was carried out. Trees on site were examined for bat roosting potential.

Survey methodology

As outlined in Marnell et al. 2022 '*The presence of a large maternity roost can normally be determined on a single visit at any time of year, provided that the entire structure is accessible and that any signs of bats have not been removed by others. However, most roosts are less obvious. A visit during the summer or autumn has the advantage that bats may be seen or heard. Buildings (which for this definition exclude cellars and other underground structures) are rarely used for hibernation alone, so droppings deposited by active bats provide the best clues. Roosts of species which habitually enter roof voids are probably the easiest to detect as the droppings will normally be readily visible. Roosts of crevice-dwelling species may require careful searching and, in some situations, the opening up of otherwise inaccessible areas. If this is not possible, best judgement might have to be used and a precautionary approach adopted. Roosts used by a small number of bats, as opposed to large maternity sites, can be particularly difficult to detect and may require extensive searching backed up by bat detector surveys (including static detectors) or emergence counts.'* In relation to the factors influencing survey results the guidelines outlines the following *'During the winter, bats will move around to find sites that present the optimum environmental conditions for their age, sex and bodyweight and some species will only be found in underground sites when the weather is particularly cold. During the summer, bats may be reluctant to leave their roost during heavy rain or when the temperature is unseasonably low, so exit counts should record the conditions under which they were made. Similarly, there may be times when females with young do not emerge at all or emerge only briefly and return while other bats are still emerging thus confusing the count. Within roosts, bats will move around according to the temperature and may or may not be visible on any particular visit. Bats also react to disturbance, so a survey the day after a disturbance event, may give a misleading picture of roost usage.'*

The survey involved the methodologies outlined in Collins (2016) which included the roost inspection methodologies i.e. external methodology outlined in section 5.2.4.1 and the internal survey outlines in section 5.2.4.2 of the guidelines. In addition, the methodologies for Presence absence surveys (Section 7) was carried out for dust emergent surveys.'

As outlined in Collins (2016) 'The bat active period is generally considered to be between April and October inclusive (although the season is likely to be shorter in northern latitudes). However, because bats wake up during mild conditions, bat activity can also be recorded during winter months.'

Survey Results

Trees as potential bat roosts.

A ground level roost assessment was carried and used to examine the trees on site for features that could form bat roosts. Potential roosting features include heavy ivy growth, broken limbs, areas of decay, vertical or horizontal cracks, cracks in bark etc. All trees on site were assessed for bat roosting potential. Numerous large trees on site on site have the potential for bat roosting. In particular the the following trees were considered to be of moderate bat roosting potential and are due to be removed:

Tree	**Species**	**Feature**
T510	Ash	Cavity
T500	Beech	Decay and bark

Emergent/detector surveys.

Emergent/detector surveys were carried out by Bryan Deegan on the 10th August 2020, 9th September 2022 and 15th August 2023.

The detector surveys were undertaken within the active bat season and the transects covered the entire site multiple times during the night. Weather conditions were good with mild temperatures greater than 10°C after sunset. Winds were light and there was no rainfall. Insects were observed in flight during the survey. As outlined in Collins (2016) in relation to weather conditions '*The aim should be to carry out surveys in conditions that are close to optimal (sunset temperature 10°C or above, no rain or strong wind.), particularly when only one survey is planned…. Where surveys are carried out when the temperature at sunset is below 10°C should be justified by the ecologist and the effect on bat behaviour considered.*' There were no constraints in relation to the surveys carried out. All areas of the site were accessible and weather conditions were optimal for bat assessments.

Bat detector survey were carried out onsite using a*n Echo meter touch 2 Pro* detector to determine bat activity. Bats were identified by their ultrasonic calls coupled with behavioural and flight observations.

As seen in Figures 14-16 bat activity on site was relatively high in specific places where insects are likely to be plentiful and have the ability to swarm. Three species were noted on site :

- Common pipistrelle (*Pipistrellus pipistrellus*)
- Soprano pipistrelle (*Pipistrellus pygmaeus*)
- Leisler's bat (*Nyctalus leisleri*)

No bats were detected emerging from any of the onsite trees. However, it would be expected that the large mature trees on site have the potential to act a bat roosts as several trees have large cracks and cavities.

Figure 14. Soprano pipistrelle(blue) and Leisler's bat (yellow) feeding activity and main area of bat roosting potential (orange). Potential Leisler's Bat roost (single red circle) (August 2020 survey).

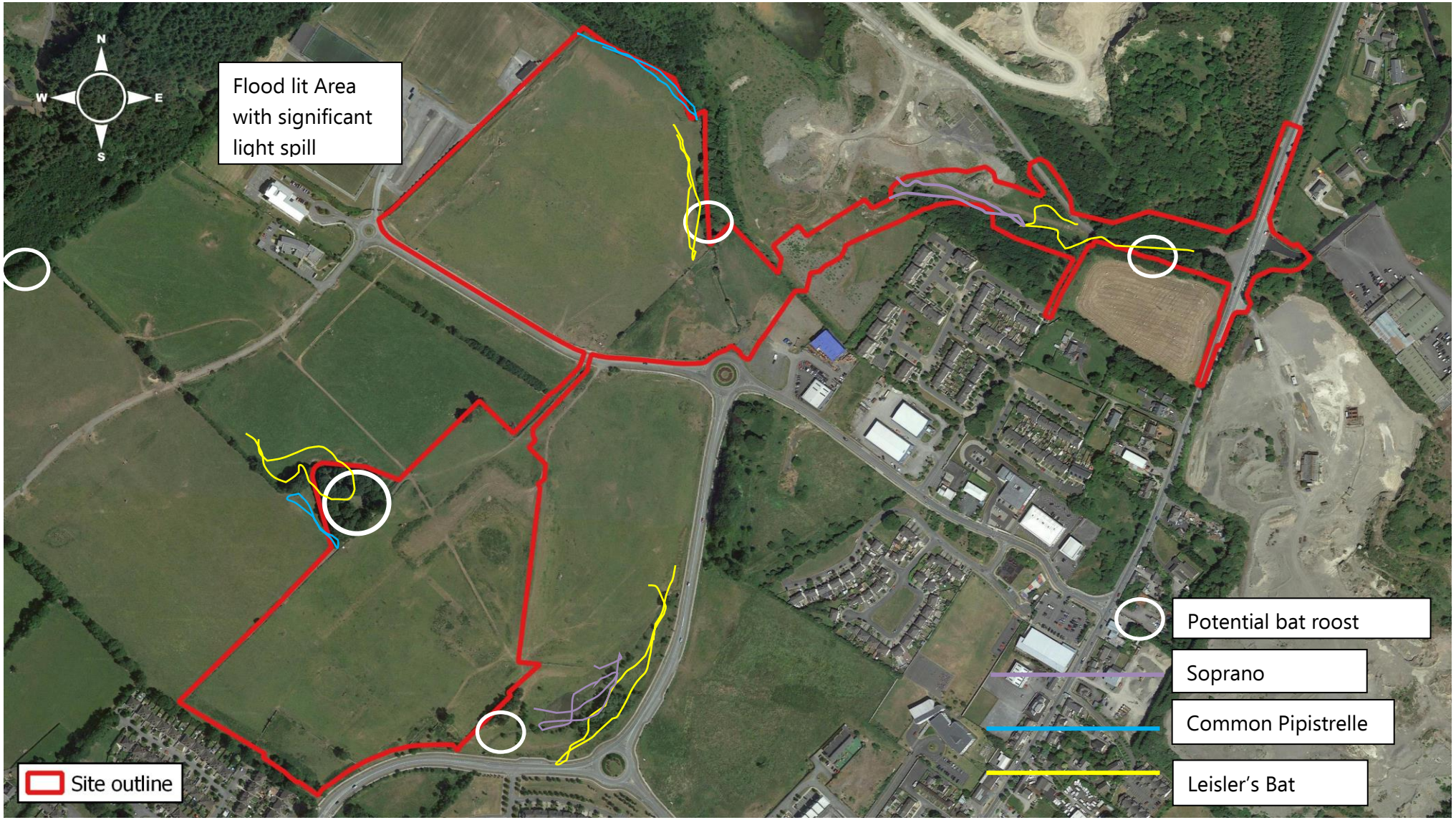

Figure 15. Soprano pipistrelle(blue) and Leisler's bat (yellow) feeding activity and main area of bat roosting potential (orange). Potential Leisler's Bat roost (single blue circle) (9th September 2022 survey)

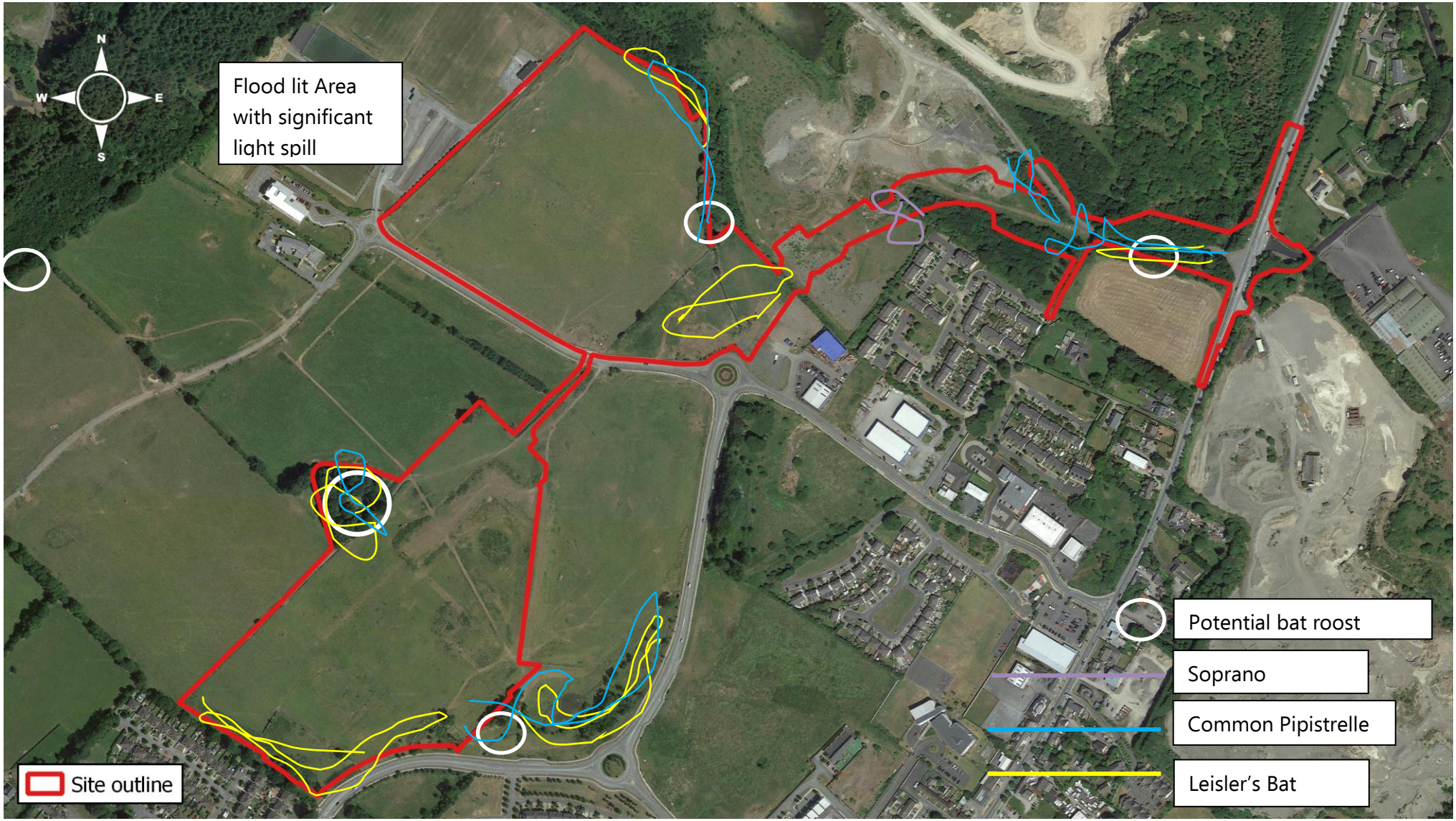

Figure 16. Soprano pipistrelle(blue) and Leisler's bat (yellow) feeding activity and main area of bat roosting potential (orange). Potential Leisler's Bat roost (single blue circle) (August 2023 survey)

Bat Assessment Findings

Review of local bat records

The review of existing bat records (sourced from Bat Conservation Ireland's National Bat Records Database) within the 2km^2 grids (Reference grids N91S & N91X) encompassing the study area reveals that four of the nine known Irish species have been observed locally (Table 1). The National Biodiversity Data Centre's online viewer was consulted in order to determine whether there have been recorded bat sightings in the wider area. This is visually represented in Figures 17 & 18. The following species were noted in the wider area: Brown Long-eared Bat (*Plecotus auritus*), Soprano Pipistrelle (*Pipistrellus pygmaeus*), Daubenton's Bat (*Myotis daubentonii*), and Lesser Noctule (*Nyctalus leisleri*) (Figures 17 & 18).

Species Name	Record Count	Date of last record	Note
N91S			
Pipistrelle (Pipistrellus pipistrellus sensu lato)	1	08/05/2008	National Bat Database of Ireland
N91X			
Daubenton's Bat (Myotis daubentonii)	1	30/08/2008	National Bat Database of Ireland
Lesser Noctule (Nyctalus leisleri)	1	30/08/2008	National Bat Database of Ireland
Pipistrelle (Pipistrellus pipistrellus sensu lato)	2	30/08/2008	National Bat Database of Ireland
Soprano Pipistrelle (Pipistrellus pygmaeus)	2	30/08/2008	National Bat Database of Ireland

Figure 17. Daubenton's Bat (*Myotis daubentonii*) (yellow) and Brown Long-eared Bat (*Plecotus auritus*) (purple) (Source NBDC) (Site location – red circle)

Figure 18. Soprano Pipistrelle (*Pipistrellius pygmaeus*) (yellow), Lesser Noctule (*Nyctalus leisleri*) (purple), and both Leisler's Bat and Soprano Pipistrelle (orange) (Source NBDC) (Site location – red circle)

Evaluation of Results

The bat surveys comply with bat survey guidance documentation including Marnell et al (2022) and Collins (2016). No bats were observed emerging from trees on site. Bat activity was noted consistently in primarly wooded areas on site by a Lesser Noctule (Leislers), common pipistrelle and soprano pipistrelle bats. The site and particularly the corridors proximate to wooded areas are currently in use by three common species of bat.

Potential Impact of the development on Bats

There are no buildings of bat roosting potential on site. No trees of high bat roosting potential are to be felled as part of the proposal. However, two trees of moderate roosting potential are to be lost as a result of the proposed road development. The majority of the wooded areas, where foraging was noted, are to be retained and lighting has been controlled by design and will be compliant with bat lighting guidelines. Back spill protection will be in place in the vicinity of the riparian corridors and in areas of bat foraging. Additional tree planting is included in sensitive areas. The link road will be lit and numerous trees are to be lost in this area. Most of these are not of signifigance to bats as these include coniferous species. Even though the road lighting has been designed to be compliant with bat lighting guidelines, it would be expected that road traffic in this area would introduce additional lighting in this area which would deter bats from foraging. The loss of native trees in this area and the widening og the road in this area will also lead to a loss of insects on which bats will forage. The species of bat on site are relatively common species and would be expected to continue to be present on site. However, there is likely to be lower activity in the vidinity of the link road. Mitigation measures will need to be in place to limit the potential effect of the development on bats.

Mitigation Measures

As outlined in Marnell et al. (2022) "*Mitigation should be proportionate. The level of mitigation required depends on the size and type of impact, and the importance of the population affected*." In addition as outlined in Marnell et. al (2022) '*Mitigation for bats normally comprises the following elements:*

- *Avoidance of deliberate, killing, injury or disturbance – taking all reasonable steps to ensure works do not harm individuals by altering working methods or timing to avoid bats. The seasonal occupation of most roosts provides good opportunities for this*
- *Roost creation, restoration or enhancement – to provide appropriate replacements for roosts to be lost or damaged*
- *Long-term habitat management and maintenance – to ensure the population will persist*
- *Post-development population monitoring – to assess the success of the scheme and to inform management or remedial operations.'*

As no evidence of a confirmed bat roost was noted in any of the onsite trees, there is also no requirement for a *National Parks and Wildlife Service* derogation licence application to allow the planned works.

- Lighting has involved mitigation through design and will be restricted to key areas and will not be within foraging zones. Lighting will be placed where necessary for mainlining movement within key areas of site and open space areas including the pond will not be lit.
- Landscaping has involved mitigation through design by increasing the number of trees on site and the inclusion of additional planting of trees along the link road. It would not be expected that the beneficial effects of these trees would not be seen until the medium to long term.
- Lighting during construction will be carried out in consultation with the project ecologist and treelines or wooded areas will not be lit.
- 10 bat boxes will be places on site. These will be placed in discussion with the project ecologist and will be used to enhance existing foraging areas on site.
- A pre construction bat assessment will be carried out on all trees to be felled. In the majority of cases this will involve a gound based assessment. However, in relation to trees T510 and T500 and any other trees that may have become of moterate or high potential in the interim, primarily due to storm damage, these will need a detailed inspection. Should bats be found roosting in any trees to be felled a derogation licence will be required from NPWS and conditions, if any, complied with.
- A post construction lighting compliance assessment will be carried out.

Predicted Residual Impact of Planned Development on Bats

No buildings are noted on site. No bats emerging onsite trees were observed. Numerous large trees on site on site have the potential for bat roosting. It is not proposed to remove any large trees on site or impact on these areas through lighting. The trees to be removed as part of the proposed development are limited in their potential for bat roosts primarily as a result of their small size. Foraging be would expected to improve as landscaping matures as there would be an increase in foraging areas for insects.

Foraging would be expected to continue on site. The mitigation measures outlined will reduce the potential for effects on the local bat population but may be reduced in the vicinity of the link road. The residual impact is considered to be minor adverse/not significant in the long term.

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APPENDIX 5B WINTERING BIRD SURVEY

Appendix 5.B –Blessington Demesne (Cairn Homes) Winter Bird Surveys 2021-2022

Introduction

Between November 2021 and March 2022, a total of 10 winter bird surveys were conducted at lands at Blessington Demesne, north of Blessington, Co Wicklow by Hugh Delaney, a freelance ecologist (Birds primarily) with an experienced background in bird surveying on numerous sites with ecological consultancies over 10+ years. Hugh, a lifelong birder, is local to the Dun Laoghaire-Rathdown area in Dublin and is especially familiar with the bird life and its ecology in the environs going back over 30 years.

Winter Bird Survey Methodology

Winter bird surveys are conducted from soon after sunrise until late in the afternoon before sunset, the site is monitored throughout the day and all bird species utilizing the site recorded, including species flying through overhead. Checks are also made on suitable habitat nearby or adjacent the site for comparative purposes and to monitor any interchange of birds between sites. Target species (species of more special interest) utilizing the site will be mapped and estimates of the time these species frequented the site recorded.

Site Location

Figure 1 Blessington Demesne (Cairn Homes site) -Site boundary in red.

Site Description

The site comprises mainly pastoral grazing lands, with well-cropped grass across the site. At the south of the site a small well-vegetated pond/marsh patch exists, fed by a spring from a culvert at Oak Drive. Some larger trees and bushes existing at the south end of the site with a small wooded patch at the west side of the site.

Specific site survey methodology

Site checked throughout the day with excellent overview vantage point observations made from Oak Drive in the east and south and site traversed several times daily via access road to the north.

Survey results

November 15th, 2021

Sunrise- 07.50hrs/Sunset 16.28hrs. Weather – Wind F2 West, Cloud 6/8, Dry, 9c, Excellent visibility. On-site 08.30hrs – 16.15hrs.

Species recorded – Black-headed Gull, Herring Gull, Robin, Blue Tit, Great Tit, Long-tailed Tit, Jackdaw, Rook, Magpie, Hooded Crow, Chaffinch, Blackbird, Song Thrush, Wren, Goldfinch, Linnet, Woodpigeon, Dunnock, Pied Wagtail, Meadow Pipit, Stonechat.

Observations from 08.30hrs – 12.00hrs –

Small numbers (<15) of Black-headed Gull observed from Oak Drive at the east foraging on the main site area, with a maximum count of 15 observed from 09.20-09.40hrs. Single Herring Gulls (in total c.6) noted passing over the site but not observed foraging on-site. Small numbers of Meadow Pipit (<10) observed foraging on-site mainly at the south end intermittently during the morning. Corvid species were dominated by Jackdaw with a peak count of 24 at 11.15hrs.

Observations from 12.00hrs – 16.15hrs –

Black-headed Gulls again observed foraging on-site with a peak count of 17 at 13.35hrs, 2 Herring Gull noted foraging with a flock of 10 Black-headed Gull at 14.15hrs. Passerines mainly confined to south end of site with Stonechat (<3), Pied Wagtail (<2), Chaffinch (<8), Blue Tit (<4), Long-tailed Tit (<2) and Woodpigeon (<5) noted. Linnet flock (<12) noted foraging at the east corner of site at Oak Drive at 15.00hrs. Peak count of 18 Jackdaw on-site foraging at 14.30hrs, smaller numbers of Rook (<10) and Hooded Crow (<4) noted.

Additional species recorded in the north section of site-

Fieldfare (<10), Sparrowhawk (<1) and Buzzard (<2).

November 27th, 2021

Sunrise- 08.11hrs/Sunset 16.13hrs. Weather – Wind F3 Northwest, Cloud 6/8, Dry, 6c, Excellent visibility. On-site 08.30hrs – 16.00hrs.

Species recorded – Black-headed Gull, Herring Gull, Buzzard, Robin, Blue Tit, Great Tit, Coal Tit, Jackdaw, Rook, Magpie, Hooded Crow, Chaffinch, Blackbird, Song Thrush, Mistle Thrush, Wren, Goldfinch, Linnet, Redpoll, Woodpigeon, Dunnock, Pied Wagtail, Meadow Pipit, Stonechat.

Observations from 08.30hrs – 12.00hrs –

A Buzzard was observed foraging at the south end of site on ground from 09.25-0935hrs. Peak counts of foraging gulls on-site were (<12) Black-headed Gull at 10.15hrs and (<3) Herring Gull at 10.40hrs. Redpoll (<5) were observed foraging in trees at the south end at 10.05hrs. Mistle Thrush (<3), Stonechat (<2), Song Thrush (<2), Meadow Pipit (<8) were all noted foraging intermittently at the east and north end of the site during the morning. Two Buzzard were observed soaring over the north end of the main site area at 11.15hrs. Other passerine species were all recorded in the trees at west side of main site area and at the south end of the site.

Observations from 12.00hrs – 16.00hrs –

Peak count of 16 Black-headed Gull noted foraging in center and north end of the main site area at 13.30hrs. Buzzard was recorded soaring over the south end of the site at 12.30hrs (<1 bird) and the north end at 14.45hrs (<2 birds). Foraging flock of Goldfinch (<15) and Linnet (<8) noted at east side of the site intermittently during afternoon. Peak counts of Jackdaw (<20) at 15.00hrs, Rook (<15) at 12.50hrs and Hooded Crow (<5) at 14.10hrs. Meadow Pipit (<4 minimum) noted foraging at the south end of the site.

Additional species recorded in the north section of site-

Coal Tit (<3), Bullfinch (<3) and Buzzard (<1).

December 13th, 2021

Sunrise- 08.32hrs/Sunset 16.06hrs. Weather – Wind F1 North, Cloud 6/8, Dry, 5c, Excellent visibility. On-site 09.00hrs – 15.45hrs.

Species recorded – Black-headed Gull, Herring Gull, Buzzard, Robin, Blue Tit, Great Tit, Long-tailed Tit, Jackdaw, Rook, Magpie, Hooded Crow, Chaffinch, Blackbird, Song Thrush, Mistle Thrush, Redwing, Fieldfare, Goldcrest, Wren, Goldfinch, Linnet, Woodpigeon, Dunnock, Pied Wagtail, Stonechat, Meadow Pipit, Snipe.

Observations from 09.00hrs – 12.00hrs –

A foraging flock of Redwing (<20) and Fieldfare (<12) were noted at the north and east side of the main site area from 09.40hrs-10.45hrs. A Buzzard was noted soaring over the north end at 10.20hrs. Foraging Gulls at the main site area included a peak of 14 Black-headed Gull at the north end at 09.30hrs and 4 Herring Gull also at the north end of main site area at 10.30hrs. Meadow Pipit (<10), Linnet (<5), Goldcrest (<1), Long-tailed Tit (<4), Blackbird (<2), Wren (<2), Dunnock (<1), Robin (<2) and Woodpigeon (<15) were all recorded at south end and west side of main site area.

Observations from 12.00hrs – 15.45hrs –

Foraging flock of minimum 10 Redwing noted at north and east side of site intermittently during afternoon. No foraging Gulls noted with small numbers of Black-headed and Herring passing west over site. Two Buzzard noted soaring over the west side of the main site area at 13.55hrs. A Snipe was flushed at the southeast corner of the site near pond area at 15.00hrs. Minimum of 6 Meadow Pipit noted foraging at south end of the site during afternoon.

Additional species recorded in the north section of site-

Buzzard (<2), Siskin (<1), Grey Wagtail (<1) and Lesser black-backed Gull (<2).

December 28th, 2021

Sunrise- 08.40hrs/Sunset 16.13hrs. Weather – Wind F3 West, Cloud 3/8, Dry,7c, Excellent visibility. On-site 09.00hrs – 16.00hrs.

Species recorded – Black-headed Gull, Common Gull, Herring Gull, Robin, Blue Tit, Great Tit, Jackdaw, Rook, Magpie, Hooded Crow, Raven, Chaffinch, Blackbird, Song Thrush, Mistle Thrush, Redwing, Goldcrest, Wren, Goldfinch, Siskin, Woodpigeon, Dunnock, Pied Wagtail, Stonechat, Meadow Pipit.

Observations from 09.00hrs – 12.00hrs –

A foraging flock of Black-headed Gull (<16), Common Gull (<4) and Herring Gull (<2) was noted at the middle and north end of the main site area from 09.45-11.00hrs. Two Raven were noted foraging at the west side of the main site area at 10.25hrs. Small numbers of Jackdaw (<10), Rook (<8), Hooded Crow (<2) and Magpie (<3) noted foraging mainly at eastern side of the main site area. 5 Redwing were noted foraging at the west side of the site at 11.10hrs. Meadow Pipit (<4), Stonechat (<2), Chaffinch (<7), Goldfinch (<8) and Song Thrush (<2) were all noted at the south end of the main site area.

Observations from 12.00hrs – 16.00hrs –

Small numbers of Black-headed Gull (<8) and Common Gull (<3) observed foraging in center and north side of the main site area intermittently during the afternoon. Two Buzzard were observed soaring over the west side of the site at 12.18hrs. Goldcrest (<2), Meadow Pipit (<5), Blue Tit (<3), Blackbird (<1), Song Thrush (<2) and Stonechat (<1) were observed foraging at the south end of the site during the afternoon.

Additional species recorded in the north section of site-

Fieldfare (<4) and Buzzard (<2).

January 5th, 2022

Sunrise- 08.39hrs/Sunset 16.22hrs. Weather – Wind F3 West, Cloud 5/8, Dry, 2c, Excellent visibility. On-site 08.45hrs – 15.45hrs.

Species recorded – Black-headed Gull, Common Gull, Herring Gull, Buzzard, Robin, Blue Tit, Jackdaw, Rook, Magpie, Hooded Crow, Chaffinch, Blackbird, Song Thrush, Mistle Thrush, Redwing, Fieldfare, Wren, Goldfinch, Redpoll, Woodpigeon, Dunnock, Grey Wagtail, Pied Wagtail, Stonechat, Meadow Pipit, Grey Heron.

Observations from 08.45hrs – 12.00hrs –

At the south end of the main site Redwing (<6), Fieldfare (<2), Chaffinch (<6), Song Thrush (<3), Goldfinch (<2), Redpoll (<3) and a Grey Heron at the pond area were noted foraging at 09.20-10.00hrs. A Grey wagtail, 3 Mistle Thrush l and 6 Meadow Pipit were observed foraging at the east

side of the main site. No foraging Gulls were noted on-site with small numbers passing west and south over the site. Small numbers (<10) of Woodpigeon noted foraging at the north end and west side of the site.

Observations from 12.00hrs – 15.45hrs –

Foraging Gulls comprised Black-headed (<10) and Common Gull (<8) at the middle and north end of the site intermittently during the afternoon. Two Buzzards were noted landing onto west side of the main site to forage from 13.30-14.15hrs. Meadow Pipit (<3), Stonechat (<1), Pied Wagtail (<1), Redpoll (<6), Goldfinch (<15), Wren (<1) and Blue Tit (<2) were noted foraging at the south and east of the main site during afternoon.

Additional species recorded in the north section of site-

Raven (<1), Siskin (<4) and Skylark (<3).

January 30th, 2022

Sunrise- 08.12hrs/Sunset 17.04hrs. Weather – Wind F2 Southwest, Cloud 8/8, Light showers, 6c, Excellent visibility. On-site 08.30hrs – 16.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Lesser black-backed Gull, Buzzard, Robin, Blue Tit, Jackdaw, Rook, Magpie, Hooded Crow, Chaffinch, Starling, Blackbird, Song Thrush, Mistle Thrush, Redwing, Wren, Goldfinch, Bullfinch, Redpoll, Woodpigeon, Dunnock, Grey Wagtail, Pied Wagtail, Stonechat, Meadow Pipit.

Observations from 08.30hrs – 12.00hrs –

A foraging flock of Black-headed Gull (<15) and Herring Gull (<2) were present at the centre and west side of the main site from 10.25-11.30hrs. Two Grey wagtail were noted at the culvert on Oak Drive at the east side of site at 11.10hrs. One Buzzard was noted soaring over the west site at 10.05hrs and 11.45hrs. At the south side of the main site Redwing (<2), Mistle Thrush (<1), Stonechat (<1), Goldfinch (<15), Bullfinch (<1) and Redpoll (<3) were noted foraging intermittently during the morning.

Observations from 12.00hrs – 16.30hrs –

Two Lesser black-backed Gulls passed north over the site at 13.10hrs. A foraging flock of Black-headed Gull (<20) was present at the north end of the main site from 14.00-14.40hrs. A flock of Starling (<40) were noted foraging intermittently in center and west of site during the afternoon.

Additional species recorded in the north section of site-

Sparrowhawk (<1) and Raven (<2).

February 12th, 2022

Sunrise- 07.49hrs/Sunset 17.29hrs. Weather – Wind F3 Southwest, Cloud 6/8, Dry, 6c, Excellent visibility. On-site 08.30hrs – 16.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Robin, Blue Tit, Jackdaw, Rook, Magpie, Hooded Crow, Raven, Chaffinch, Starling, Blackbird, Song Thrush, Mistle Thrush, Fieldfare, Wren, Goldfinch,

Siskin, Redpoll, Reed Bunting, Woodpigeon, Dunnock, Grey Wagtail, Pied Wagtail, Stonechat, Meadow Pipit.

Observations from 08.30hrs – 12.00hrs-

Two Buzzard were noted soaring over the north side of the site at 10.15hrs. No gulls noted foraging on-site with small numbers of Black-headed and Herring passing over the site. Three Raven were observed foraging at the west side of the site at 10.50hrs. A foraging flock of Chaffinch (<10), Goldfinch (<15) and Siskin (<1) were noted foraging around the tree clump at the west side of the main area of the site. A peak of 25 Jackdaw and 12 Rook were noted foraging at the east side of the main site at 14.10hrs.

Observations from 12.00hrs – 16.30hrs –

Fieldfare (<2), Song Thrush (<1), Stonechat (<1), Reed Bunting (<1), Meadow Pipit (<4), Pied Wagtail (<3), Dunnock (<2) and Blackbird (<1) was noted foraging intermittently at the south side of the site. A flock of foraging Black-headed Gull (<8) were present at the north end of the site at 15.05hrs.

Additional species recorded in the north section of site-

Redwing (<15) and Buzzard (<1).

February 20th, 2022

Sunrise- 07.32hrs/Sunset 17.45hrs. Weather – Wind F3 Southwest, Cloud 5/8, Light showers, 5c, Excellent visibility. On-site 08.15hrs – 16.00hrs.

Species recorded – Black-headed Gull, Common Gull, Robin, Blue Tit, Jackdaw, Rook, Magpie, Hooded Crow, Buzzard, Chaffinch, Starling, Blackbird, Song Thrush, Mistle Thrush, Wren, Goldfinch, Siskin, Redpoll, Bullfinch, Woodpigeon, Dunnock, Grey Wagtail, Pied Wagtail, Stonechat, Meadow Pipit, Snipe.

Observations from 08.15hrs – 12.00hrs –

Two Snipe were flush from the pond area at the southeast corner of the site at 09.25hrs. A foraging flock of Black-headed Gull (<12) and Common Gull (<3) were present at the west side of the site from 10.05hrs, present intermittently for the duration of the morning. Mistle Thrush (<4), Redwing (<5), Grey wagtail (<1) and Meadow Pipit were observed foraging at the east side of the site. Jackdaw (<10), Rook (<15) and Hooded Crow (<5) were observed at the northeast of the site.

Observations from 12.00hrs – 16.00hrs –

At the south side of the main site area Meadow Pipit (<8), Pied Wagtail (<2), Goldfinch (<10), Chaffinch (<8), Wren (<1) and Robin (<1) were recorded during the afternoon. A flock of Starling (<50) were noted foraging in the center and west of the main site area. A Buzzard was observed perched on the tree clump at the west of the main site area at 14.40hrs. No foraging Gulls were noted.

Additional species recorded in the north section of site-

Fieldfare (<22), Skylark (<2) and Buzzard (<1).

March 7th, 2022

Sunrise- 06.58hrs/Sunset 18.14hrs. Weather – Wind F3 Southeast, Cloud 5/8, Dry, 5c, Excellent visibility. On-site 08.30hrs – 17.00hrs.

Species recorded – Black-headed Gull, Herring Gull, Lesser black-backed Gull, Robin, Blue Tit, long-tailed Tit, Jackdaw, Rook, Magpie, Hooded Crow, Buzzard, Chaffinch, Starling, Blackbird, Song Thrush, Mistle Thrush, Wren, Goldfinch, Siskin, Redpoll, Bullfinch, Woodpigeon, Dunnock, Grey Wagtail, Pied Wagtail, Stonechat, Meadow Pipit.

Observations from 08.30hrs – 12.00hrs

Foraging flock of Black-headed Gull (<8) present at the north end of the main site area from 09.00-10.30hrs. 4 Lesser black-backed Gulls were noted moving north over the site during the morning (likely migrating birds). A pair of Buzzard were noted soaring/displaying at the west side of the site at 10.35hrs. At the south end of the site Mistle Thrush (<2), Stonechat (<1), Pied Wagtail (<2), Long-tailed Tit (<6) and Meadow Pipit (<5) were noted foraging. A flock of Woodpigeon (<25) was noted foraging at the west side of the site at 11.15hrs.

Observations from 12.00hrs – 17.00hrs –

No foraging Gulls were noted foraging on-site during the afternoon, small numbers of Black-headed and Herring Gull passing over the site. 3 Lesser black-backed Gull were noted moving north. Buzzard again displaying (<2 birds) at the west side of the site at 13.00hrs.

Additional species recorded in the north section of site-

Sparrowhawk (<1), Grey heron (<1), Collared Dove (<2), Redwing (<5) and Coal Tit (<1).

March 25th, 2022

Sunrise- 06.15hrs/Sunset 18.47hrs. Weather – Wind F1 North, Cloud 4/8, Dry, 5c, Excellent visibility. On-site 08.30hrs – 16.30hrs.

Species recorded – Black-headed Gull, Herring Gull, Robin, Blue Tit, long-tailed Tit, Jackdaw, Rook, Magpie, Hooded Crow, Raven, Buzzard, Chaffinch, Starling, Blackbird, Song Thrush, Mistle Thrush, Wren, Goldfinch, Redpoll, Reed Bunting, Woodpigeon, Dunnock, Grey Wagtail, Pied Wagtail, Goldcrest, Stonechat, Meadow Pipit.

Observations from 08.30hrs -12.00hrs-

No foraging Gulls noted on-site in the morning with a flock of Woodpigeon (<20) at the west side of the main site area foraging and a flock of Starling (<30) at the east side. Small numbers of Black-headed and Herring (<10 each) passing through the site. At the south side of the site Meadow Pipit (<8), Pied Wagtail (<2), Song Thrush (<3), Goldcrest (<2) and Chaffinch (<8) were noted. Two Raven were noted intermittently foraging at the north end of the main site.

Observations from 12.00hrs-16.30hrs-

Buzzard (<2) noted displaying/soaring at the west side at 13.10hrs and 14.05hrs. No foraging Gulls noted on-site. Small numbers of Starling (<25) and Woodpigeon (<15) foraging in center and north end of main site area. At the south end of the site Meadow Pipit (<4), Reed Bunting (<1), Grey Wagtail (<1), Goldfinch (<10), Blackbird (<3) and Redpoll (<1) were recorded.

Additional species recorded in the north section of site-

Siskin (<5), Bullfinch (<2), Buzzard (<1) and Lesser black-backed Gull (<3).

Comments and observations on the survey results

38 bird species were recorded at Blessington Demesne lands during the 10 winter bird surveys from November 2021-March 2022. In the context of wintering bird species that are red listed as species of conservation concern in the revised Birdwatch Ireland List of birds of conservation concern in Ireland (2020-2026) Redwing and Snipe were recorded, Redwing in occasional small foraging flocks and over the course of the surveys 3 Snipe on-site. Three gull species listed in the amber wintering species category were recorded, these being Black-headed, Herring and Lesser black-backed Gull. Lesser black-backed Gull was noted passing through the site and not foraging on-site. Results from the surveys suggest that the site is not an ex-situ foraging or roosting site for species of qualifying interest from nearby Special protection areas (SPA's).

APPENDIX 6A Ground Investigation Ireland, 2022. Ground Investigation Report – Proposed Development, Blessington Phase 3, Co. Wicklow (GII, 2022)

GROUND INVESTIGATIONS IRELAND
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Ground Investigations Ireland

Proposed Development, Blessington Phase 3, County Wicklow

Cairn Homes

Ground Investigation Report

December 2022

GROUND INVESTIGATIONS IRELAND
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A	Draft	P. Moloney	F. McNamara	F. McNamara	Dublin	21 December 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.

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CONTENTS

APPENDICES

1.0 Preamble

On the instructions of DBFL Consulting Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd., between in September 2022 at the site of the proposed residential development in Blessington, County 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 however a portion in one corner of the site is occupied by a temporary car park. 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 3 No. Cable Percussion boreholes to a maximum depth of 8mBGL
- Carry out 11 No. Trial Pits to a maximum depth of 3.10mBGL
- Carry out 6 No. Soakaways to determine a soil infiltration value to BRE digest 365
- Carry out 11 No. Dynamic Probes to determine soil strength/density characteristics
- Geotechnical & Environmental Laboratory testing
- Report with recommendations

3.0 Subsurface Exploration

3.1. General

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

3.2. Trial Pits

The trial pits were excavated using a 6T 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 4 of this Report.

3.4. Dynamic Probing

The dynamic probe tests (DPH) were carried out at the locations shown in the location plan in Appendix 1 in accordance with B.S. 1377: Part 9 1990. The test consists of mechanically driving a cone with a 50kg weight in 100mm intervals and monitoring the number of blows required. An equivalent Standard Penetration Test (SPT) 'N' value may be calculated by dividing the total number of blows over a 300mm drive length by 1.5. The dynamic probe logs are provided in Appendix 3 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. Surveying

The exploratory hole locations have been recorded using a KQ GEO Technologies KQ-M8 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.

3.5. Laboratory Testing

Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design.
Environmental & Chemical testing as required by the specification, including the Rilta Suite and pH and sulphate testing was carried out by Element Materials Technology Laboratory in the UK. The Rilta suite testing includes both Solid Waste and Leachate Waste Acceptance Criteria.
The results of the environmental and chemical 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 variable across the site and generally comprised;

- Topsoil
- Granular Deposits
- Cohesive Deposits

TOPSOIL: Topsoil was encountered in all the exploratory holes and was present to a maximum depth of 0.20mBGL.

COHESIVE DEPOSITS: Cohesive deposits were encountered and were described typically as *brown slightly sandy slightly gravelly CLAY.* 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 or firm stiff below 1.00mBGL in the majority of the exploratory holes.

GRANULAR DEPOSITS: Granular deposits were encountered within the cohesive deposits and were typically described *brown clayey gravelly fine to coarse SAND and brown sandy fine to coarse GRAVEL.* Occasional cobble and boulder content were also present where noted on the exploratory hole logs. Based on the SPT N values the deposits are typically medium dense becoming dense with depth in the majority of the exploratory holes.

4.2. Insitu Strength Testing

The correlated DPH N blow counts indicate that the cohesive deposits are firm to depths of between 0.10m to 1.45mBGL in the majority of the exploratory holes. BH-03 recorded low blow counts in the soft cohesive deposits between depths of 0.10m to 1.45mBGL. The correlated DPH N blow counts indicate that the granular deposits are medium dense or dense in the majority of the exploratory holes.

4.3. Groundwater

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

4.4. Laboratory Testing

4.4.1. 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.

4.4.2. Environmental Laboratory Testing

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

The suite also includes those parameters specified in the EU Council Decision establishing criteria for the acceptance of waste at Landfills (Council Decision 2003/33/EC), which for the solid samples are total organic carbon (TOC), speciated aliphatic and aromatic petroleum hydrocarbons, BTEX, phenol, polychlorinated biphenyls (PCB) and PAH.

As part of the suite a leachate is generated from the solid sample which is analysed for antimony, arsenic, barium, cadmium, chromium, copper, lead, mercury, molybdenum, nickel, selenium, zinc, chloride, fluoride, soluble sulphate, sulphide, phenols, dissolved organic carbon (DOC) and total dissolved solids (TDS).

While the laboratory report provides a comparison with the waste acceptance criteria limits it does not provide a waste classification of the material sampled nor does it comment on any potentially hazardous properties of the materials tested. The possibility for contamination, not revealed by the testing undertaken should be borne in mind particularly where Made Ground deposits are present or the previous site use or location indicate a risk of environmental variation. A waste classification report is recommended to be carried out to provide an interpretation of the laboratory data should any material be required to be disposed of off site.

The results of the environmental and chemical laboratory testing are included in Appendix 6 of this Report.

5.0 Recommendations & Conclusions

5.1. General

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

5.2. Foundations

Allowable bearing capacities are available for conventional strip or pad foundations on the deposits at the depths outlined in the table below. 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.

	Allowable Bearing Capacities (ABC) kN/m^2						
DPH	**ABC**	**Depth**	**Comment**	**DPH**	**ABC**	**Depth**	**Comment**
No.	**kN/m^2**	**m BGL**		**No.**	**kN/m^2**	**m BGL**	
DPH-01	100	1.30	**Granular**	**DPH-07**	100	1.30	**Cohesive**
DPH-02	100	2.70	**Granular**	**DPH-08**	100	1.00	**Granular**
DPH-03	100	1.10	**Granular**	**DPH-09**	100	1.40	**Granular**
DPH-04	90	2.70	**Granular**	**DPH-10**	100	2.70	**Granular**
DPH-05	80	3.60	**Granular**	**DPH-11**	100	1.00	**Granular**
DPH-06	90	2.20	**Cohesive**				

	Allowable Bearing Capacities (ABC) kN/m^2						
BH	**ABC**	**Depth**	**Comment**	**BH**	**ABC**	**Depth**	**Comment**
No.	**kN/m^2**	**m BGL**		**No.**	**kN/m^2**	**m BGL**	
BH-01	80	1.00	**Cohesive**	**BH-03**	100	2.45	**Granular**
BH-02	100	1.40	**Cohesive**				

5.3. 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 1.25mBGL or is required to permit man entry. Excavations in the soft cohesive deposits will require to be appropriately battered or the sides supported due to the low strength of these deposits. Any excavations which penetrate the granular deposits will require to be appropriately battered or the sides supported and are likely to require dewatering due to the groundwater seepages noted in the exploratory hole logs in the Appendices of this Report.

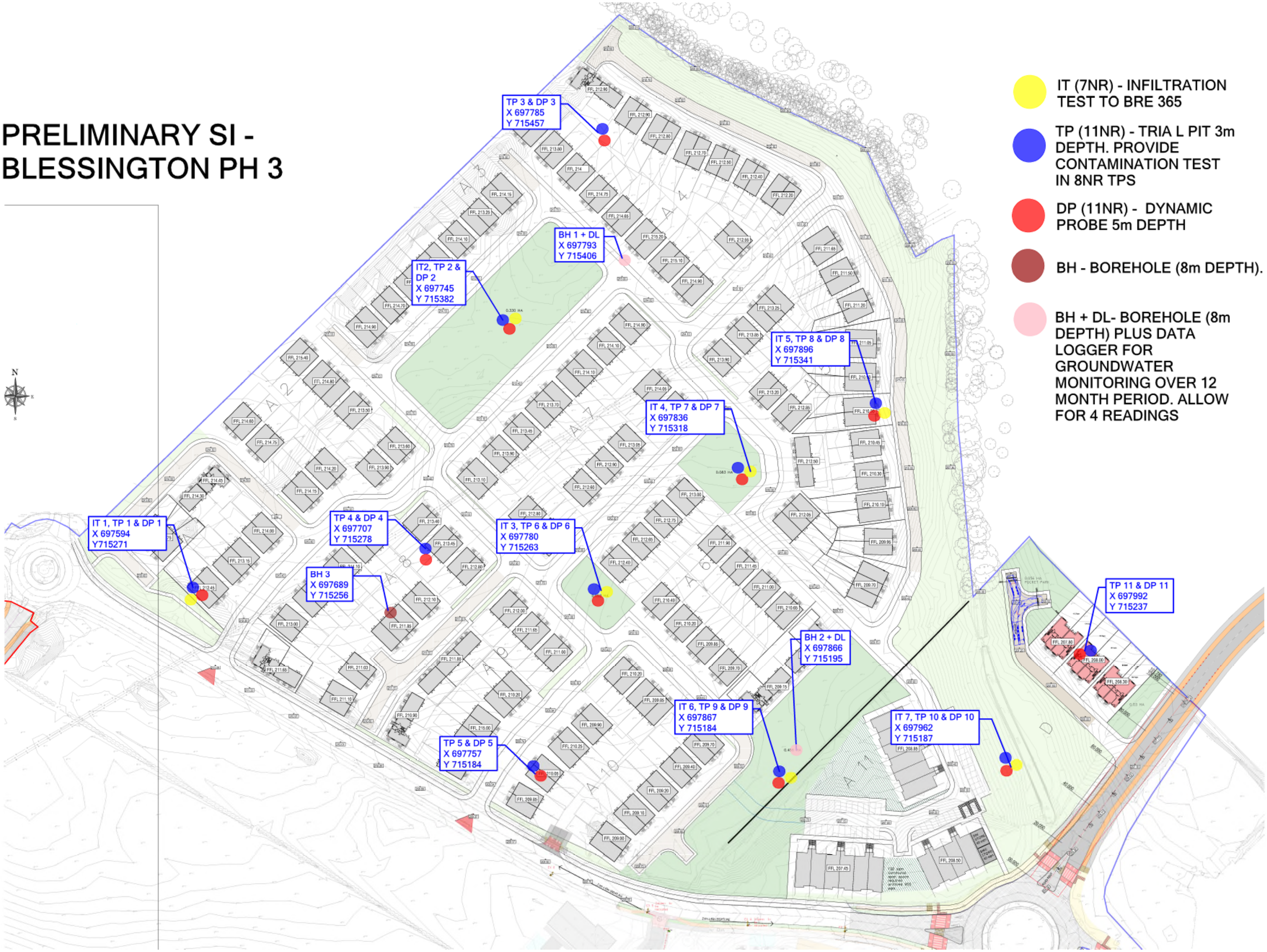
5.4. Soakaway Design

Infiltration rates of f=8.512 x 10^{-5} m/s, f=2.625 x 10^{-5} m/s, f=1.333 x 10^{-5} m/s, f=1.334 x 10^{-5} m/s, f=1.754 x 10^{-5} m/s and 4.371 x 10^{-4} m/s respectively were calculated for the soakaway locations IT-01, IT-02, IT-03, IT-04, IT-05 and IT-06. These locations are therefore 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

PRELIMINARY SI - BLESSINGTON PH 3



IT (7NR) - INFILTRATION TEST TO BRE 365

TP (11NR) - TRIA L PIT 3m DEPTH. PROVIDE CONTAMINATION TEST IN 8NR TPS

DP (11NR) - DYNAMIC PROBE 5m DEPTH

BH - BOREHOLE (8m DEPTH).

BH + DL- BOREHOLE (8m DEPTH) PLUS DATA LOGGER FOR GROUNDWATER MONITORING OVER 12 MONTH PERIOD. ALLOW FOR 4 READINGS

APPENDIX 2 – Trial Pit Records

Ground Investigations Ireland Ltd
www.gii.ie

Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** TP01
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (2.00m x 0.60m x 3.00m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697594 E 715271 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	Brown TOPSOIL		
					(0.70) 0.90	Soft to firm brown slightly sandy slightly gravelly CLAY		
					(0.30) 1.20	Soft brown slightly sandy slightly gravelly CLAY with occasional cobbles		
					(1.10) 2.30	Dense brown clayey slightly gravelly SAND with frequent cobbles		
2.50	B				(0.70) 3.00	Dense light brown SAND		
						Complete at 3.00m		

Plan

Remarks

Pit complete at 3.00m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.TP01

TP-01

Ground Investigations Ireland Ltd

www.gii.ie

Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** TP02
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (2.00m x 0.70m x 3.00m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697745 E 715382 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Brown TOPSOIL		
						Soft brown slightly sandy slightly gravelly CLAY		
					(0.90)			
					1.00	Loose light brown slightly silty SAND		
1.50	B				(1.70)			
					2.70	Medium dense light brown slightly silty SAND		
					(0.30)			
					3.00	Complete at 3.00m		

Plan

Remarks

Pit complete at 3.00m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.TP02

TP-02

Ground Investigations Ireland Ltd
www.gii.ie

Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** TP03
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (1.80m x 0.60m x 3.00m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697785 E 715457 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.05	Brown TOPSOIL		
					(0.65)	Loose brown slightly sandy GRAVEL with occasional cobbles		
					0.70			
					(0.20)	Loose brown gravelly cobbly SAND with rare boulders		
					0.90			
					(0.30)	Medium dense brown gravelly cobbly SAND with rare boulders		
					1.20			
2.00	B				(1.80)	Dense brown gravelly cobbly SAND with rare boulders		
					3.00	Complete at 3.00m		

Plan

Remarks

Pit complete at 3.00m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.TP03

TP-03

Ground Investigations Ireland Ltd
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Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** TP04
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (2.30m x 0.80m x 3.00m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697707 E 715278 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Brown TOPSOIL		
					(0.20) 0.30	Soft brown slightly sandy slightly gravelly CLAY		
					(0.40) 0.70	Soft to firm brown slightly sandy slightly gravelly CLAY		
					(0.30) 1.00	Loose brown clayey SAND		
					(0.50) 1.50	Firm brown slightly silty CLAY		
2.50	B				(1.20) 2.70	Loose light brown slightly silty SAND		
					(0.30) 3.00	Medium dense light brown slightly silty SAND		
						Complete at 3.00m		

Plan

Remarks

Pit complete at 3.00m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.TP04

TP-04

Ground Investigations Ireland Ltd
www.gii.ie

Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** TP05
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (2.30m x 0.80m x 3.00m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697757 E 715184 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Brown TOPSOIL		
					(1.10) 1.20	Soft brown slightly sandy slightly gravelly CLAY with rare cobbles		
					(0.60) 1.80	Very soft brown slightly sandy slightly gravelly CLAY with rare cobbles		
					(0.60) 2.40	Very soft brown slightly sandy slightly gravelly CLAY with rare boulders		
2.50	B				(0.60) 3.00	Very loose brown slightly gravelly SAND		
						Complete at 3.00m		

Plan

Remarks

Pit complete at 3.00m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.TP05

TP-05

Ground Investigations Ireland Ltd
www.gii.ie

Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** TP06
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (1.80m x 0.60m x 3.00m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697780 E 715263 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.05	Brown TOPSOIL		
					(0.55)	Soft brown slightly sandy slightly gravelly CLAY		
					0.60			
					(0.30)	Firm to light brown slightly sandy CLAY		
					0.90			
					(0.30)	Soft to firm light brown slightly sandy CLAY		
					1.20			
					(0.50)	Very soft to light brown slightly sandy CLAY		
1.50	B				1.70			
					(0.40)	Soft to firm light brown CLAY		
					2.10			
					(0.30)	Firm light brown CLAY		
					2.40			
					(0.60)	Stiff light brown CLAY		
					3.00			
						Complete at 3.00m		

Plan

Remarks

Pit complete at 3.10m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.TP06

TP-06

Ground Investigations Ireland Ltd

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Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** TP07
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (1.90m x 0.60m x 3.00m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697836 E 715341 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Brown TOPSOIL		
					(0.50)	Stiff brown slightly sandy slightly gravelly CLAY		
					0.60			
					(0.80)	Firm brown slightly sandy slightly gravelly CLAY		
					1.40			
					(0.70)	Dense brown gravelly cobbly SAND		
					2.10			
2.50	B				(0.90)	Stiff light brown slightly sandy slightly gravelly cobbly CLAY		
					3.00			
						Complete at 3.00m		

Plan

Remarks

Pit complete at 3.00m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.TP07

TP-07

Ground Investigations Ireland Ltd
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Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** TP08
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (2.20m x 0.60m x 3.00m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697896 E 715341 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Brown TOPSOIL		
					(0.50)	Loose brown slightly sandy cobbly GRAVEL		
					0.60			
					(0.40)	Medium dense brown slightly sandy cobbly GRAVEL		
1.00	B				1.00			
					(1.40)	Medium dense brown slightly gravelly cobbly SAND Gravel is fine to coarse subangular to subrounded		
					2.40			
					(0.60)	Dense brown slightly gravelly cobbly SAND		
					3.00	Complete at 3.00m		

Plan

Remarks

Pit complete at 3.00m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.TP08

TP-08

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Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** TP09
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (2.00m x 0.80m x 3.00m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697867 E 715184 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Brown TOPSOIL		
					(0.20) 0.30	Soft slightly sandy slightly gravelly CLAY		
					(0.30) 0.60	Soft to firm slightly sandy slightly gravelly CLAY		
					(0.60) 1.20	Very soft slightly sandy slightly gravelly CLAY		
					(0.30) 1.50	Medium dense light brown clayey gravelly SAND with occasional cobbles		
					(0.50) 2.00	Dense light brown clayey gravelly SAND with occasional cobbles		
2.00	B				(1.00) 3.00	Dense light brown gravelly cobbly SAND		
						Complete at 3.00m		

Plan

Remarks

Pit complete at 3.00m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.TP09

TP-09

Ground Investigations Ireland Ltd
www.gii.ie

Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** TP10
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (2.10m x 0.70m x 3.10m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697962 E 715187 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Brown TOPSOIL		
					(1.90)	Soft brown slightly sandy slightly gravelly CLAY		
1.50	B				2.00			
					(0.50)	Loose brown clayey slightly gravelly SAND		
					2.50			
					(0.20)	Loose brown slightly sandy GRAVEL		
					2.70			
					(0.40)	Medium dense brown slightly sandy GRAVEL		
					3.10			
						Complete at 3.10m		

Plan

Remarks

Pit complete at 3.10m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.TP10

TP-10

Ground Investigations Ireland Ltd
www.gii.ie

Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** TP11
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (2.90m x 0.60m x 3.00m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697992 E 715237 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Brown TOPSOIL		
					(0.20) 0.30	Soft brown slightly sandy slightly gravelly CLAY		
					(0.30) 0.60	Soft to firm brown slightly sandy slightly gravelly CLAY		
					(0.30) 0.90	Stiff brown slightly sandy slightly gravelly CLAY		
					(0.80) 1.70	Dense light brown fine to coarse angular to subangular slightly sandy GRAVEL		
2.50	B				(1.30) 3.00	Dense brown gravelly cobbly SAND		
						Complete at 3.00m		

Plan

Remarks

Pit complete at 3.00m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.TP09

TP-11

APPENDIX 3 – Dynamic Probe Records

Ground Investigations Ireland Ltd
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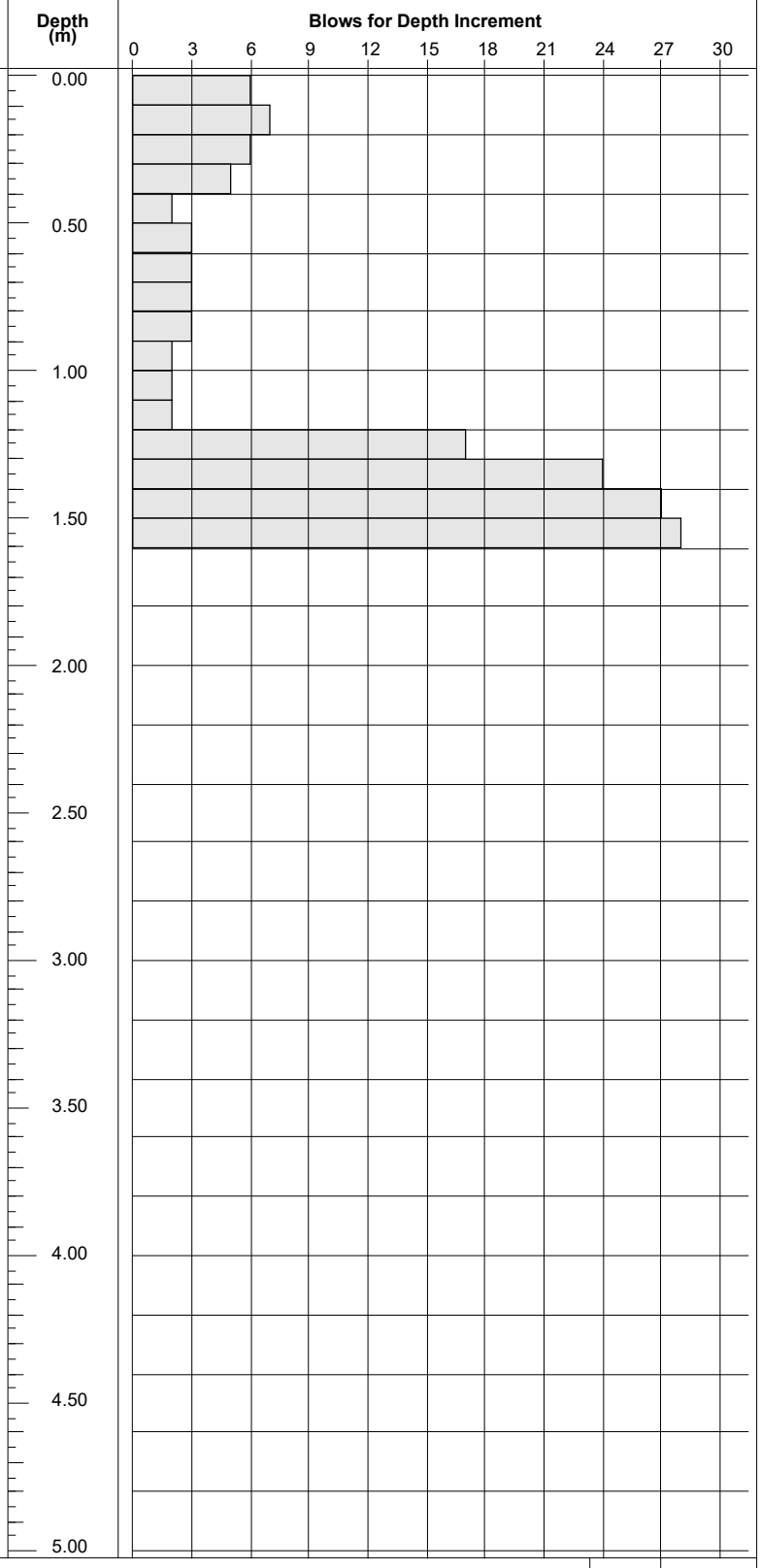
Site	Probe Number
Propsoed Development - Blessington, County Wicklow	DPH-01

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Pobe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50Kg	Diameter 43.7mm, Angle 90°		Cairn Homes	12122-08-22
	Location (Handheld GPS)	**Dates** 28/09/2022-29/09/2022	**Engineer** DBFL Consulting Engineers	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	6		
0.10-0.20	7		
0.20-0.30	6		
0.30-0.40	5		
0.40-0.50	2		
0.50-0.60	3		
0.60-0.70	3		
0.70-0.80	3		
0.80-0.90	3		
0.90-1.00	2		
1.00-1.10	2		
1.10-1.20	2		
1.20-1.30	17		
1.30-1.40	24		
1.40-1.50	27		
1.50-1.60	28		



Remarks

Scale (approx)	Logged By
1:25	AG

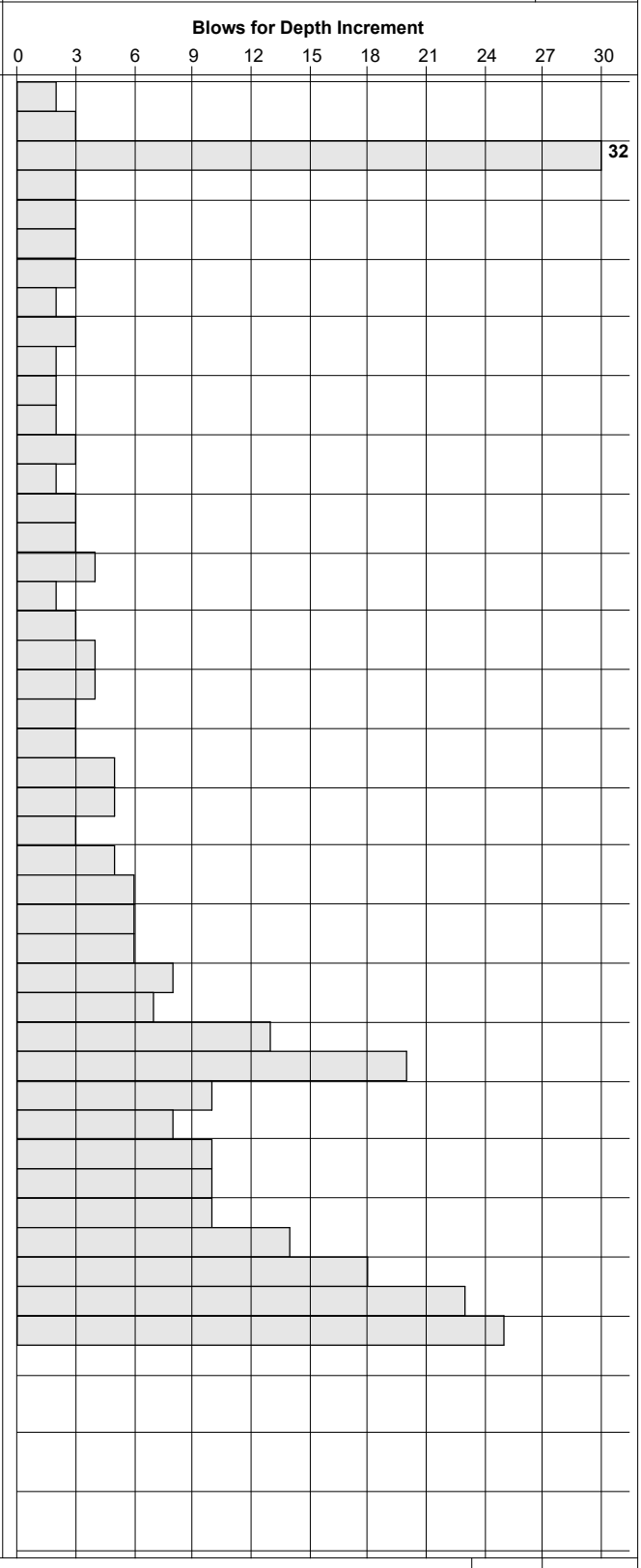
Figure No.
12122-08-22.DPH-01

Ground Investigations Ireland Ltd

www.gii.ie

Site Propsoed Development - Blessington, County Wicklow				**Probe Number** DPH-02
Method Dynamic Pobe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.7mm, Angle 90°	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS)	**Dates** 28/09/2022-29/09/2022	**Engineer** DBFL Consulting Engineers	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	2		
0.10-0.20	3		
0.20-0.30	32		
0.30-0.40	3		
0.40-0.50	3		
0.50-0.60	3		
0.60-0.70	3		
0.70-0.80	2		
0.80-0.90	3		
0.90-1.00	2		
1.00-1.10	2		
1.10-1.20	2		
1.20-1.30	3		
1.30-1.40	2		
1.40-1.50	3		
1.50-1.60	3		
1.60-1.70	4		
1.70-1.80	2		
1.80-1.90	3		
1.90-2.00	4		
2.00-2.10	4		
2.10-2.20	3		
2.20-2.30	3		
2.30-2.40	5		
2.40-2.50	5		
2.50-2.60	3		
2.60-2.70	5		
2.70-2.80	6		
2.80-2.90	6		
2.90-3.00	6		
3.00-3.10	8		
3.10-3.20	7		
3.20-3.30	13		
3.30-3.40	20		
3.40-3.50	10		
3.50-3.60	8		
3.60-3.70	10		
3.70-3.80	10		
3.80-3.90	10		
3.90-4.00	14		
4.00-4.10	18		
4.10-4.20	23		
4.20-4.30	25		



Remarks

Scale (approx)	Logged By
1:25	AG

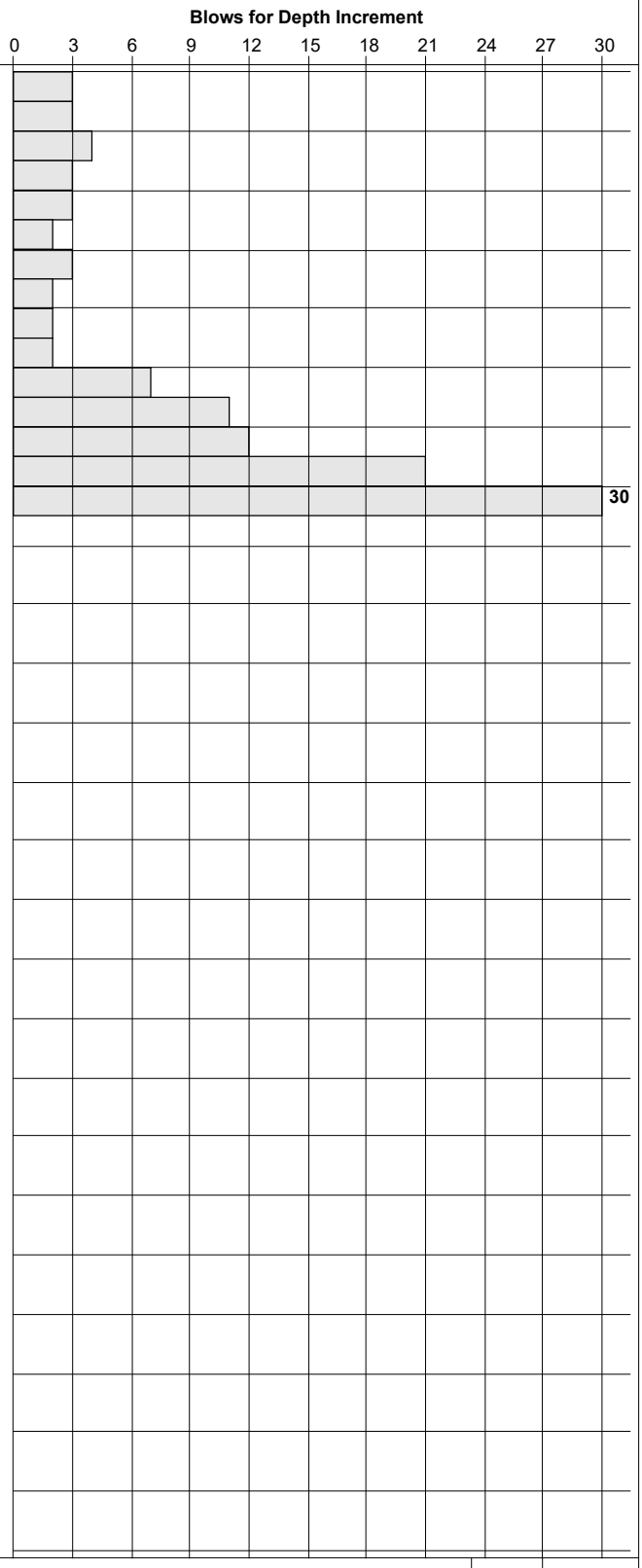
Figure No. 12122-08-22.DPH-02

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Propsoed Development - Blessington, County Wicklow	DPH-03

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Pobe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50Kg	Diameter 43.7mm, Angle 90°		Cairn Homes	12122-08-22
	Location (Handheld GPS)	**Dates** 28/09/2022-29/09/2022	**Engineer** DBFL Consulting Engineers	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	3		
0.10-0.20	3		
0.20-0.30	4		
0.30-0.40	3		
0.40-0.50	3		
0.50-0.60	2		
0.60-0.70	3		
0.70-0.80	2		
0.80-0.90	2		
0.90-1.00	2		
1.00-1.10	7		
1.10-1.20	11		
1.20-1.30	12		
1.30-1.40	21		
1.40-1.50	30		



Remarks

Scale (approx)	Logged By
1:25	AG

Figure No.
12122-08-22.DPH-03

Ground Investigations Ireland Ltd
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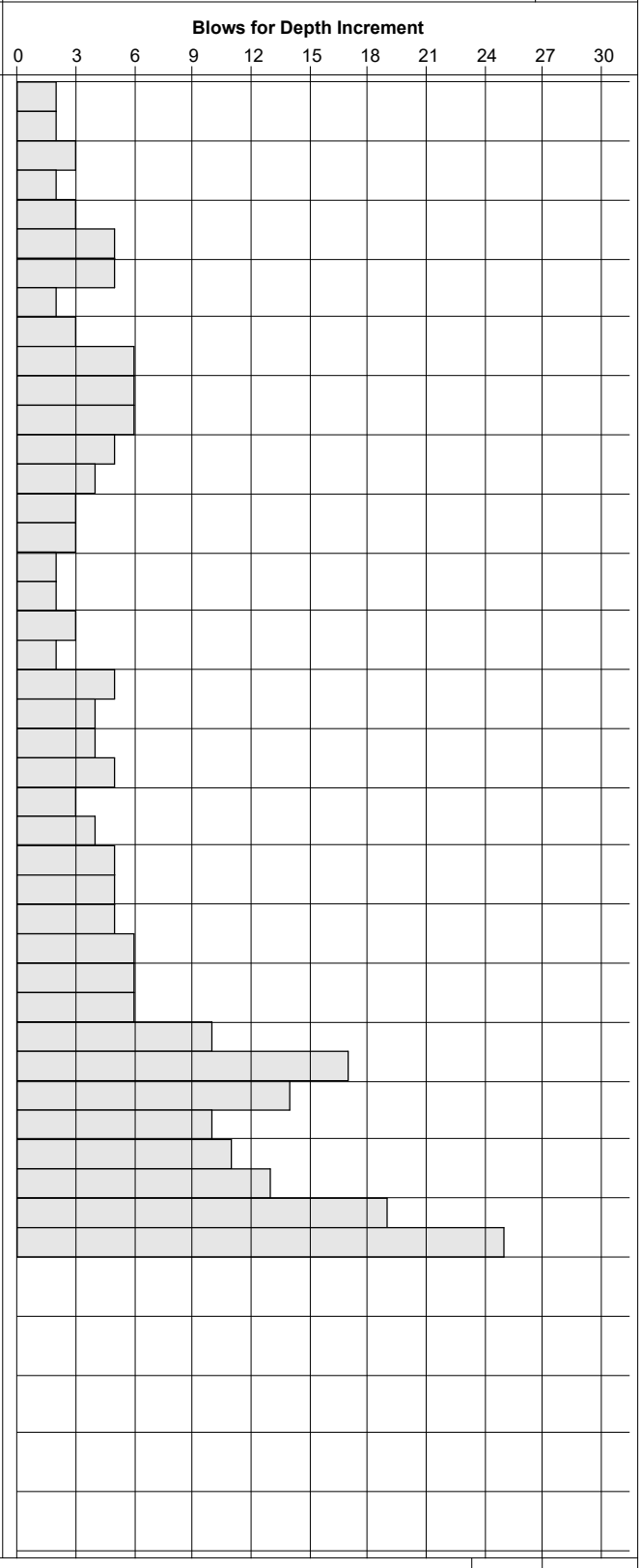
Site Propsoed Development - Blessington, County Wicklow				**Probe Number** DPH-04
Method Dynamic Pobe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.7mm, Angle 90°	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS)	**Dates** 28/09/2022-29/09/2022	**Engineer** DBFL Consulting Engineers	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	2		
0.10-0.20	2		
0.20-0.30	3		
0.30-0.40	2		
0.40-0.50	3		
0.50-0.60	5		
0.60-0.70	5		
0.70-0.80	2		
0.80-0.90	3		
0.90-1.00	6		
1.00-1.10	6		
1.10-1.20	6		
1.20-1.30	5		
1.30-1.40	4		
1.40-1.50	3		
1.50-1.60	3		
1.60-1.70	2		
1.70-1.80	2		
1.80-1.90	3		
1.90-2.00	2		
2.00-2.10	5		
2.10-2.20	4		
2.20-2.30	4		
2.30-2.40	5		
2.40-2.50	3		
2.50-2.60	4		
2.60-2.70	5		
2.70-2.80	5		
2.80-2.90	5		
2.90-3.00	6		
3.00-3.10	6		
3.10-3.20	6		
3.20-3.30	10		
3.30-3.40	17		
3.40-3.50	14		
3.50-3.60	10		
3.60-3.70	11		
3.70-3.80	13		
3.80-3.90	19		
3.90-4.00	25		



Remarks

Scale (approx)	Logged By
1:25	AG

Figure No. 12122-08-22.DPH-03

Ground Investigations Ireland Ltd
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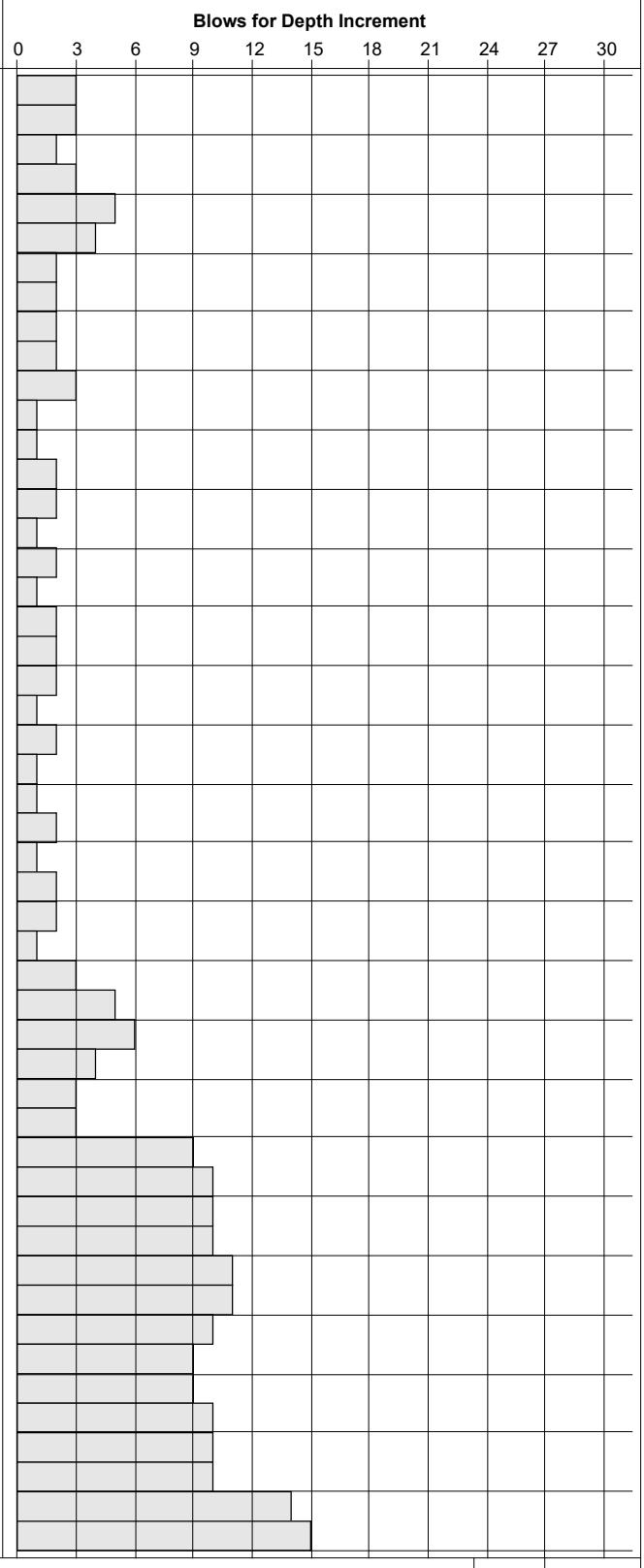
Site	Probe Number
Propsoed Development - Blessington, County Wicklow	DPH-05

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Pobe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50Kg	Diameter 43.7mm, Angle 90°		Cairn Homes	12122-08-22
	Location (Handheld GPS)	**Dates** 28/09/2022-29/09/2022	**Engineer** DBFL Consulting Engineers	**Sheet** 1/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	3		
0.10-0.20	3		
0.20-0.30	2		
0.30-0.40	3		
0.40-0.50	5		
0.50-0.60	4		
0.60-0.70	2		
0.70-0.80	2		
0.80-0.90	2		
0.90-1.00	2		
1.00-1.10	3		
1.10-1.20	1		
1.20-1.30	1		
1.30-1.40	2		
1.40-1.50	2		
1.50-1.60	1		
1.60-1.70	2		
1.70-1.80	1		
1.80-1.90	2		
1.90-2.00	2		
2.00-2.10	2		
2.10-2.20	1		
2.20-2.30	2		
2.30-2.40	1		
2.40-2.50	1		
2.50-2.60	2		
2.60-2.70	1		
2.70-2.80	2		
2.80-2.90	2		
2.90-3.00	1		
3.00-3.10	3		
3.10-3.20	5		
3.20-3.30	6		
3.30-3.40	4		
3.40-3.50	3		
3.50-3.60	3		
3.60-3.70	9		
3.70-3.80	10		
3.80-3.90	10		
3.90-4.00	10		
4.00-4.10	11		
4.10-4.20	11		
4.20-4.30	10		
4.30-4.40	9		
4.40-4.50	9		
4.50-4.60	10		
4.60-4.70	10		
4.70-4.80	10		
4.80-4.90	14		
4.90-5.00	15		



Remarks

Scale (approx)	Logged By
1:25	AG

Figure No.
12122-08-22.DPH-05

Ground Investigations Ireland Ltd
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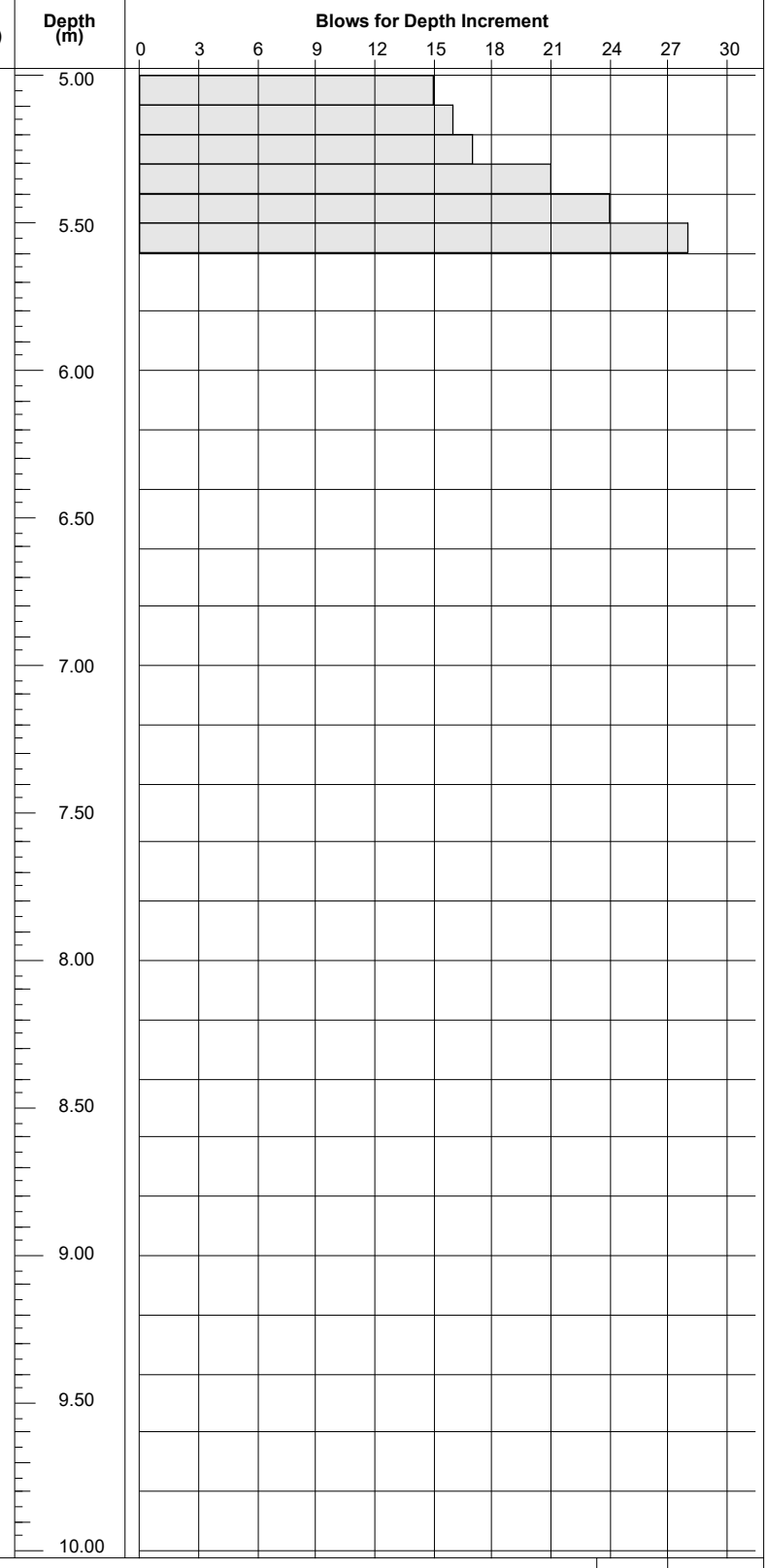
Site	Probe Number
Propsoed Development - Blessington, County Wicklow	DPH-05

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Pobe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50Kg	Diameter 43.7mm, Angle 90°		Cairn Homes	12122-08-22
	Location (Handheld GPS)	**Dates** 28/09/2022-29/09/2022	**Engineer** DBFL Consulting Engineers	**Sheet** 2/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
5.00-5.10	15		
5.10-5.20	16		
5.20-5.30	17		
5.30-5.40	21		
5.40-5.50	24		
5.50-5.60	28		



Remarks

Scale (approx)	Logged By
1:25	AG

Figure No.
12122-08-22.DPH-05

Ground Investigations Ireland Ltd
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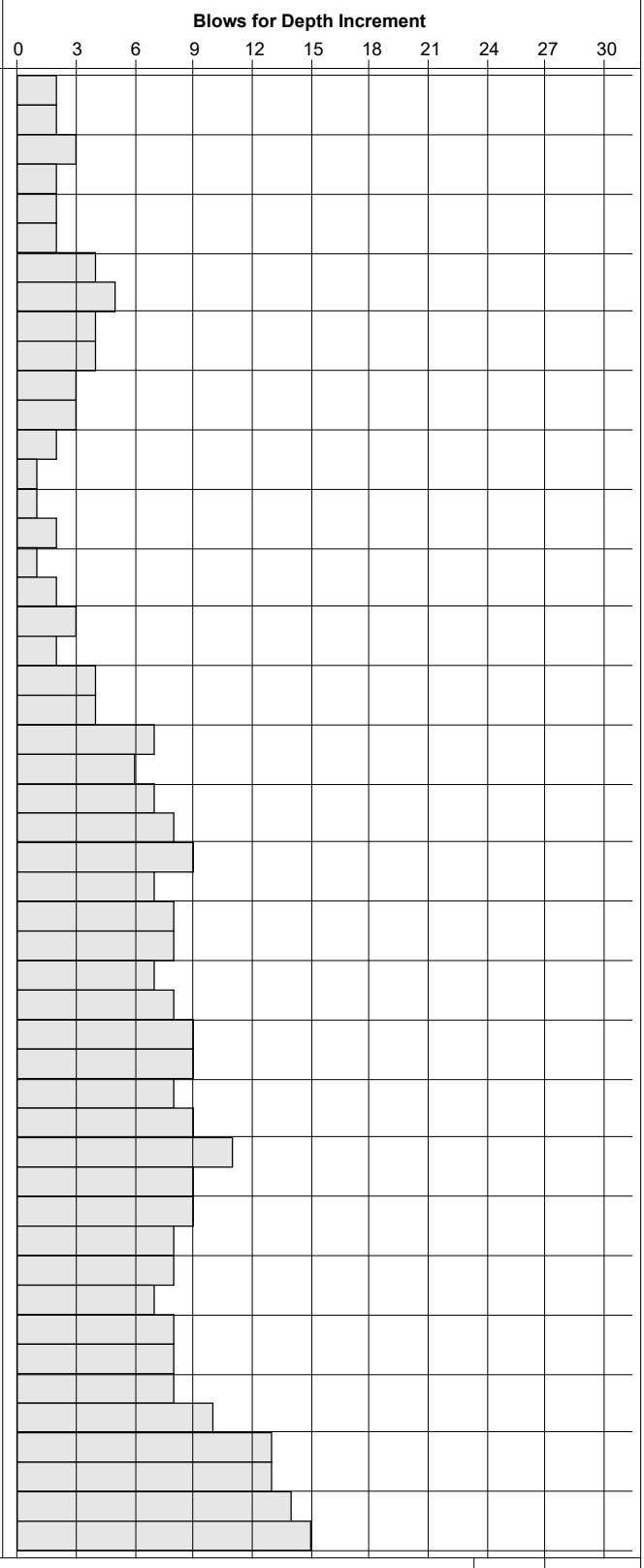
Site Propsoed Development - Blessington, County Wicklow				**Probe Number** DPH-06
Method Dynamic Pobe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.7mm, Angle 90°	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS)	**Dates** 28/09/2022-29/09/2022	**Engineer** DBFL Consulting Engineers	**Sheet** 1/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	2		
0.10-0.20	2		
0.20-0.30	3		
0.30-0.40	2		
0.40-0.50	2		
0.50-0.60	2		
0.60-0.70	4		
0.70-0.80	5		
0.80-0.90	4		
0.90-1.00	4		
1.00-1.10	3		
1.10-1.20	3		
1.20-1.30	2		
1.30-1.40	1		
1.40-1.50	1		
1.50-1.60	2		
1.60-1.70	1		
1.70-1.80	2		
1.80-1.90	3		
1.90-2.00	2		
2.00-2.10	4		
2.10-2.20	4		
2.20-2.30	7		
2.30-2.40	6		
2.40-2.50	7		
2.50-2.60	8		
2.60-2.70	9		
2.70-2.80	7		
2.80-2.90	8		
2.90-3.00	8		
3.00-3.10	7		
3.10-3.20	8		
3.20-3.30	9		
3.30-3.40	9		
3.40-3.50	8		
3.50-3.60	9		
3.60-3.70	11		
3.70-3.80	9		
3.80-3.90	9		
3.90-4.00	8		
4.00-4.10	8		
4.10-4.20	7		
4.20-4.30	8		
4.30-4.40	8		
4.40-4.50	8		
4.50-4.60	10		
4.60-4.70	13		
4.70-4.80	13		
4.80-4.90	14		
4.90-5.00	15		



Remarks

Scale (approx)	Logged By
1:25	AG

Figure No. 12122-08-22.DPH-06

Ground Investigations Ireland Ltd
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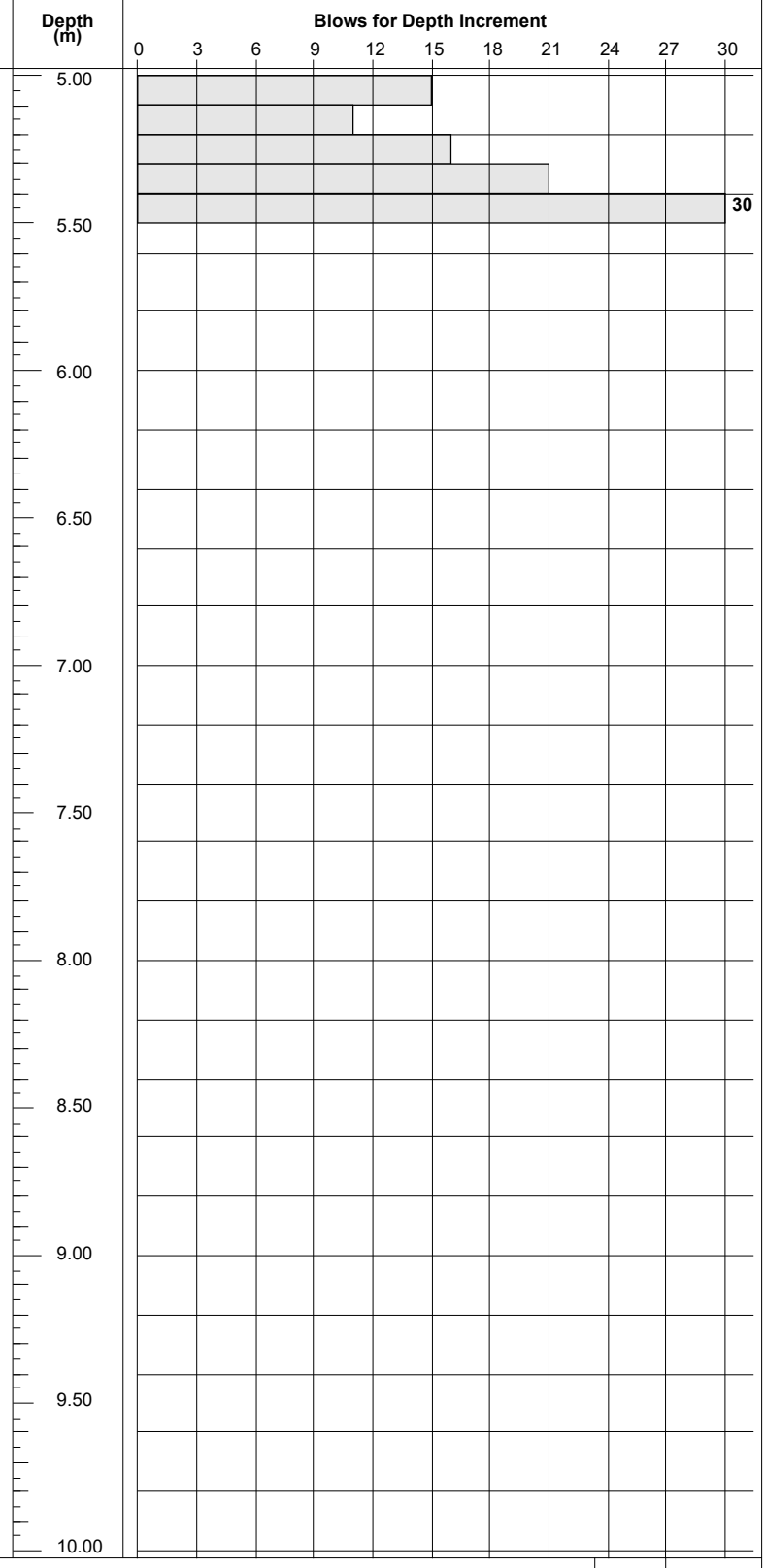
Site	Probe Number
Propsoed Development - Blessington, County Wicklow	DPH-06

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Pobe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50Kg	Diameter 43.7mm, Angle 90°		Cairn Homes	12122-08-22
	Location (Handheld GPS)	**Dates** 28/09/2022-29/09/2022	**Engineer** DBFL Consulting Engineers	**Sheet** 2/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
5.00-5.10	15		
5.10-5.20	11		
5.20-5.30	16		
5.30-5.40	21		
5.40-5.50	30		



Remarks

Scale (approx)	Logged By
1:25	AG

Figure No.
12122-08-22.DPH-06

Ground Investigations Ireland Ltd
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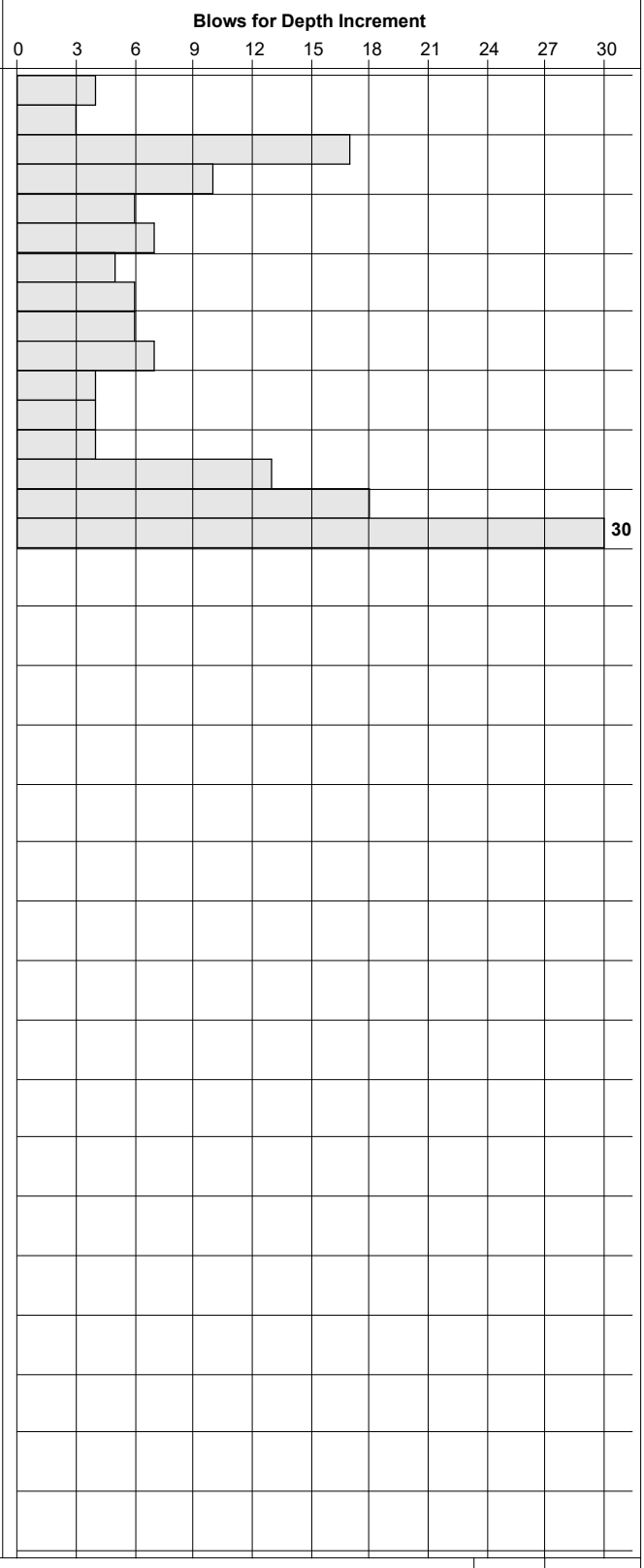
Site	Probe Number
Propsoed Development - Blessington, County Wicklow	DPH-07

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Pobe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50Kg	Diameter 43.7mm, Angle 90°		Cairn Homes	12122-08-22
	Location (Handheld GPS)	**Dates** 28/09/2022-29/09/2022	**Engineer** DBFL Consulting Engineers	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	4		
0.10-0.20	3		
0.20-0.30	17		
0.30-0.40	10		
0.40-0.50	6		
0.50-0.60	7		
0.60-0.70	5		
0.70-0.80	6		
0.80-0.90	6		
0.90-1.00	7		
1.00-1.10	4		
1.10-1.20	4		
1.20-1.30	4		
1.30-1.40	13		
1.40-1.50	18		
1.50-1.60	30		



Remarks

Scale (approx)	Logged By
1:25	AG

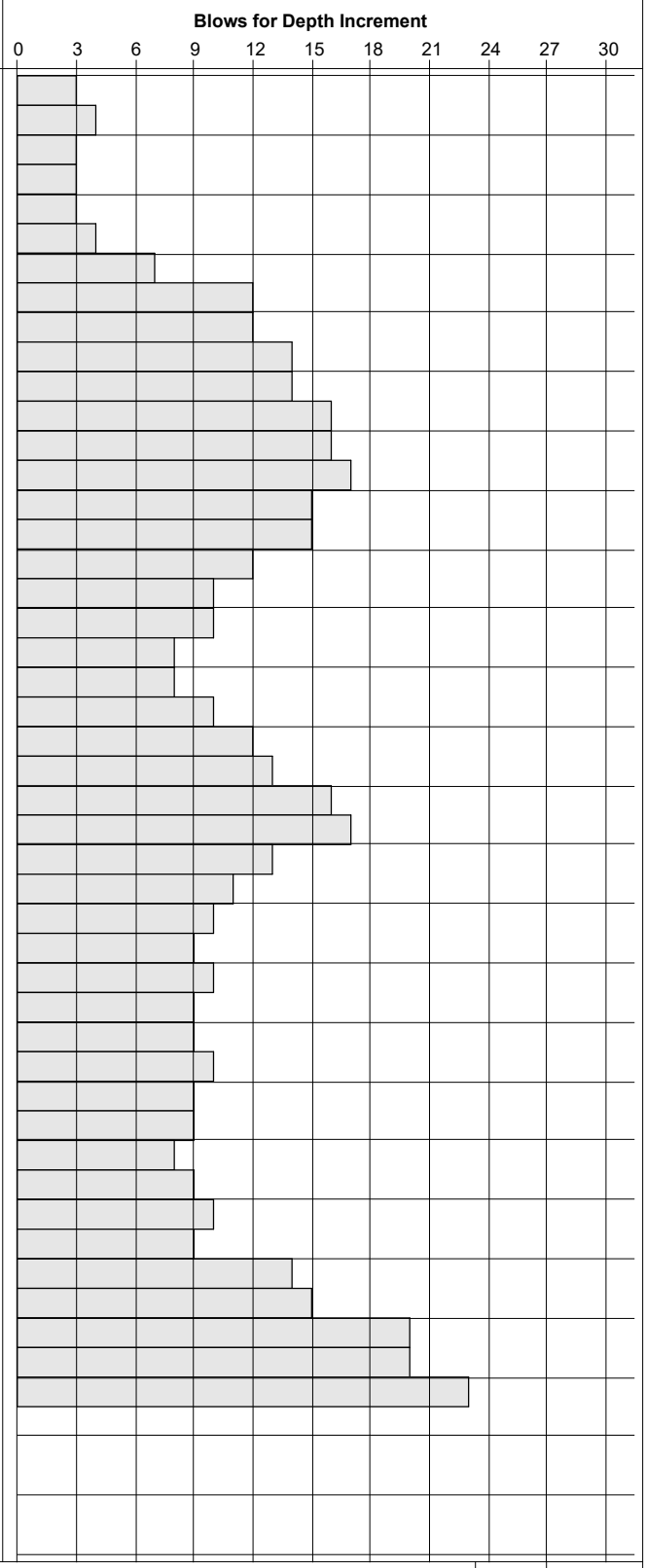
Figure No.
12122-08-22.DPH-07

Ground Investigations Ireland Ltd
www.gii.ie

Site	Probe Number
Propsoed Development - Blessington, County Wicklow	DPH-08

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Pobe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50Kg	Diameter 43.7mm, Angle 90°		Cairn Homes	12122-08-22
	Location (Handheld GPS)	**Dates** 28/09/2022-29/09/2022	**Engineer** DBFL Consulting Engineers	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	3		
0.10-0.20	4		
0.20-0.30	3		
0.30-0.40	3		
0.40-0.50	3		
0.50-0.60	4		
0.60-0.70	7		
0.70-0.80	12		
0.80-0.90	12		
0.90-1.00	14		
1.00-1.10	14		
1.10-1.20	16		
1.20-1.30	16		
1.30-1.40	17		
1.40-1.50	15		
1.50-1.60	15		
1.60-1.70	12		
1.70-1.80	10		
1.80-1.90	10		
1.90-2.00	8		
2.00-2.10	8		
2.10-2.20	10		
2.20-2.30	12		
2.30-2.40	13		
2.40-2.50	16		
2.50-2.60	17		
2.60-2.70	13		
2.70-2.80	11		
2.80-2.90	10		
2.90-3.00	9		
3.00-3.10	10		
3.10-3.20	9		
3.20-3.30	9		
3.30-3.40	10		
3.40-3.50	9		
3.50-3.60	9		
3.60-3.70	8		
3.70-3.80	9		
3.80-3.90	10		
3.90-4.00	9		
4.00-4.10	14		
4.10-4.20	15		
4.20-4.30	20		
4.30-4.40	20		
4.40-4.50	23		



Remarks

Scale (approx)	Logged By
1:25	AG

Figure No.
12122-08-22.DPH-08

Ground Investigations Ireland Ltd
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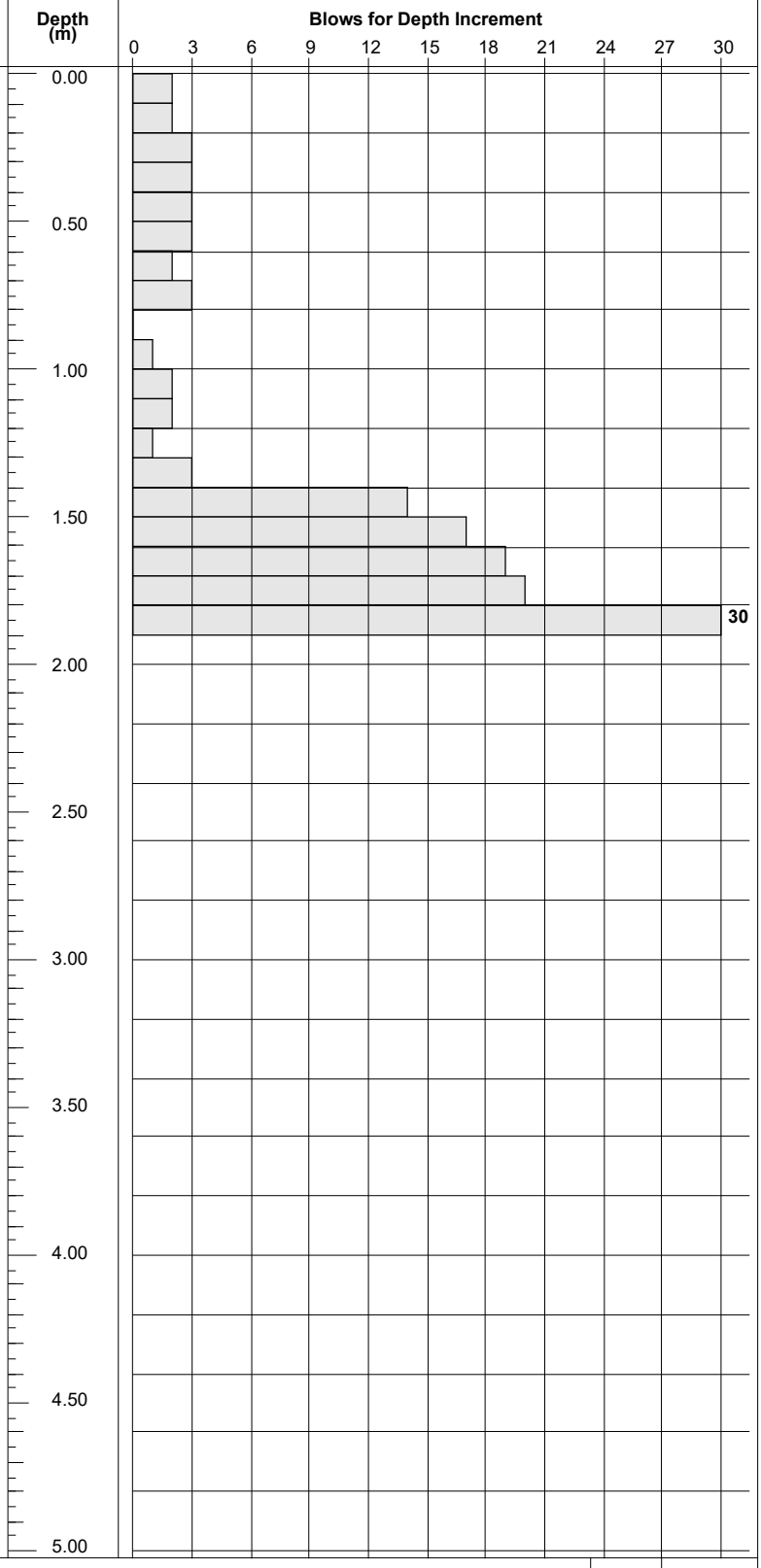
Site	Probe Number
Propsoed Development - Blessington, County Wicklow	DPH-09

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Pobe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50Kg	Diameter 43.7mm, Angle 90°		Cairn Homes	12122-08-22
	Location (Handheld GPS)	**Dates** 28/09/2022-29/09/2022	**Engineer** DBFL Consulting Engineers	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	2		
0.10-0.20	2		
0.20-0.30	3		
0.30-0.40	3		
0.40-0.50	3		
0.50-0.60	3		
0.60-0.70	2		
0.70-0.80	3		
0.80-0.90	0		
0.90-1.00	1		
1.00-1.10	2		
1.10-1.20	2		
1.20-1.30	1		
1.30-1.40	3		
1.40-1.50	14		
1.50-1.60	17		
1.60-1.70	19		
1.70-1.80	20		
1.80-1.90	30		



Remarks

Scale (approx)	Logged By
1:25	AG

Figure No.
12122-08-22.DPH-09

Ground Investigations Ireland Ltd
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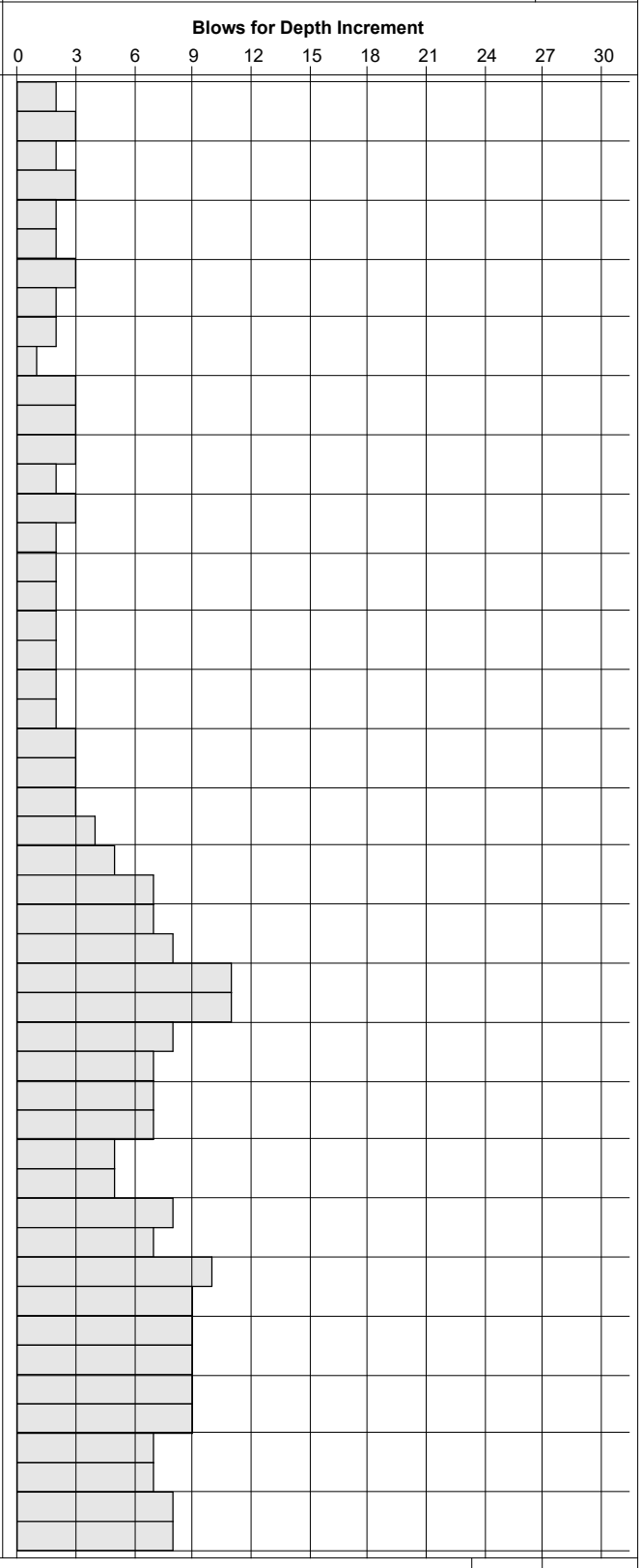
Site Propsoed Development - Blessington, County Wicklow				**Probe Number** DPH-10
Method Dynamic Pobe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50Kg	**Cone Dimensions** Diameter 43.7mm, Angle 90°	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS)	**Dates** 28/09/2022-29/09/2022	**Engineer** DBFL Consulting Engineers	**Sheet** 1/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	2		
0.10-0.20	3		
0.20-0.30	2		
0.30-0.40	3		
0.40-0.50	2		
0.50-0.60	2		
0.60-0.70	3		
0.70-0.80	2		
0.80-0.90	2		
0.90-1.00	1		
1.00-1.10	3		
1.10-1.20	3		
1.20-1.30	3		
1.30-1.40	2		
1.40-1.50	3		
1.50-1.60	2		
1.60-1.70	2		
1.70-1.80	2		
1.80-1.90	2		
1.90-2.00	2		
2.00-2.10	2		
2.10-2.20	2		
2.20-2.30	3		
2.30-2.40	3		
2.40-2.50	3		
2.50-2.60	4		
2.60-2.70	5		
2.70-2.80	7		
2.80-2.90	7		
2.90-3.00	8		
3.00-3.10	11		
3.10-3.20	11		
3.20-3.30	8		
3.30-3.40	7		
3.40-3.50	7		
3.50-3.60	7		
3.60-3.70	5		
3.70-3.80	5		
3.80-3.90	8		
3.90-4.00	7		
4.00-4.10	10		
4.10-4.20	9		
4.20-4.30	9		
4.30-4.40	9		
4.40-4.50	9		
4.50-4.60	9		
4.60-4.70	7		
4.70-4.80	7		
4.80-4.90	8		
4.90-5.00	8		



Remarks

Scale (approx)	Logged By
1:25	AG

Figure No. 12122-08-22.DPH-10

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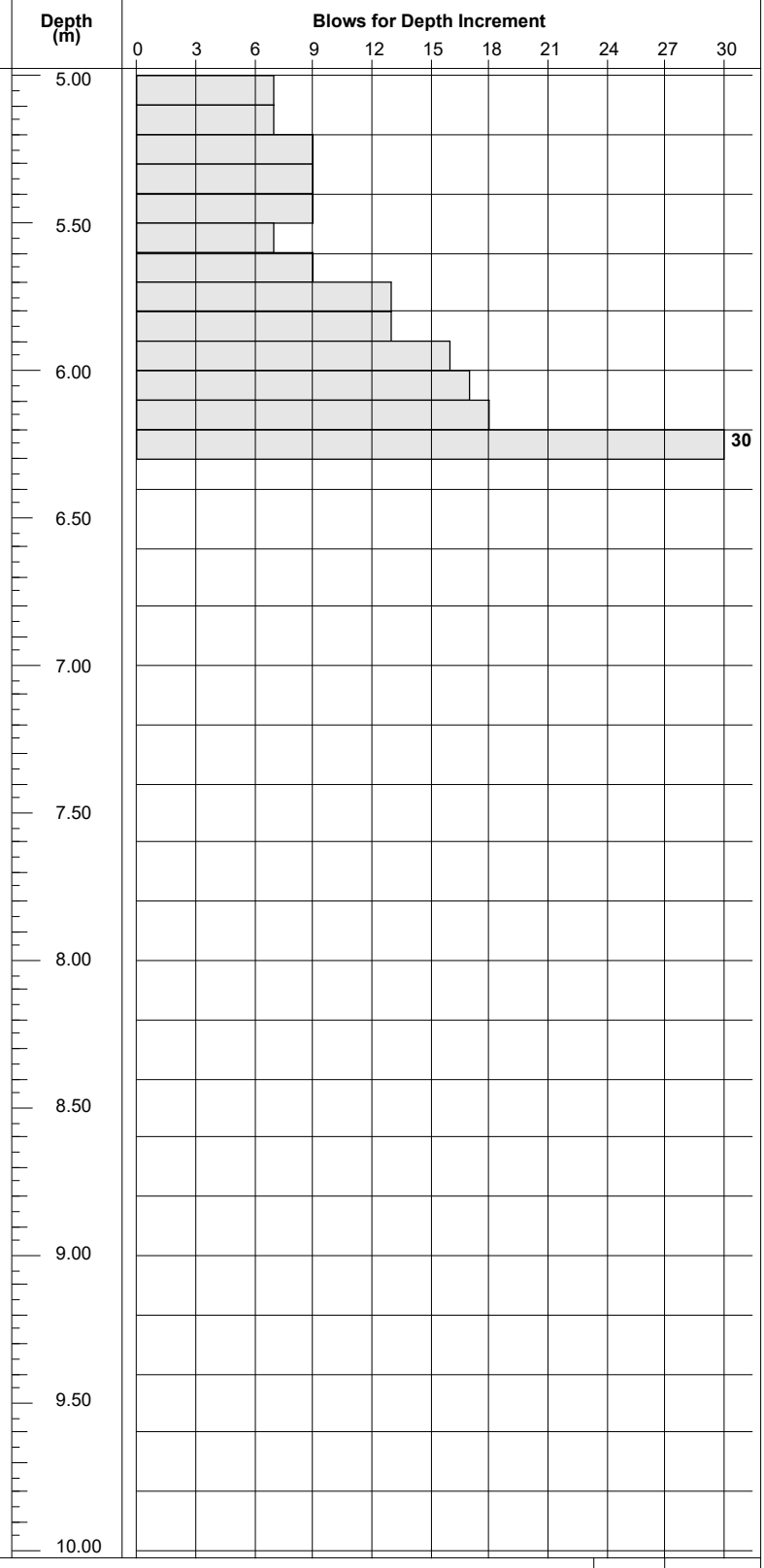
Site	Probe Number
Propsoed Development - Blessington, County Wicklow	DPH-10

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Pobe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50Kg	Diameter 43.7mm, Angle 90°		Cairn Homes	12122-08-22
	Location (Handheld GPS)	**Dates** 28/09/2022-29/09/2022	**Engineer** DBFL Consulting Engineers	**Sheet** 2/2

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
5.00-5.10	7		
5.10-5.20	7		
5.20-5.30	9		
5.30-5.40	9		
5.40-5.50	9		
5.50-5.60	7		
5.60-5.70	9		
5.70-5.80	13		
5.80-5.90	13		
5.90-6.00	16		
6.00-6.10	17		
6.10-6.20	18		
6.20-6.30	30		



Remarks

Scale (approx)	Logged By
1:25	AG

Figure No.
12122-08-22.DPH-10

Ground Investigations Ireland Ltd
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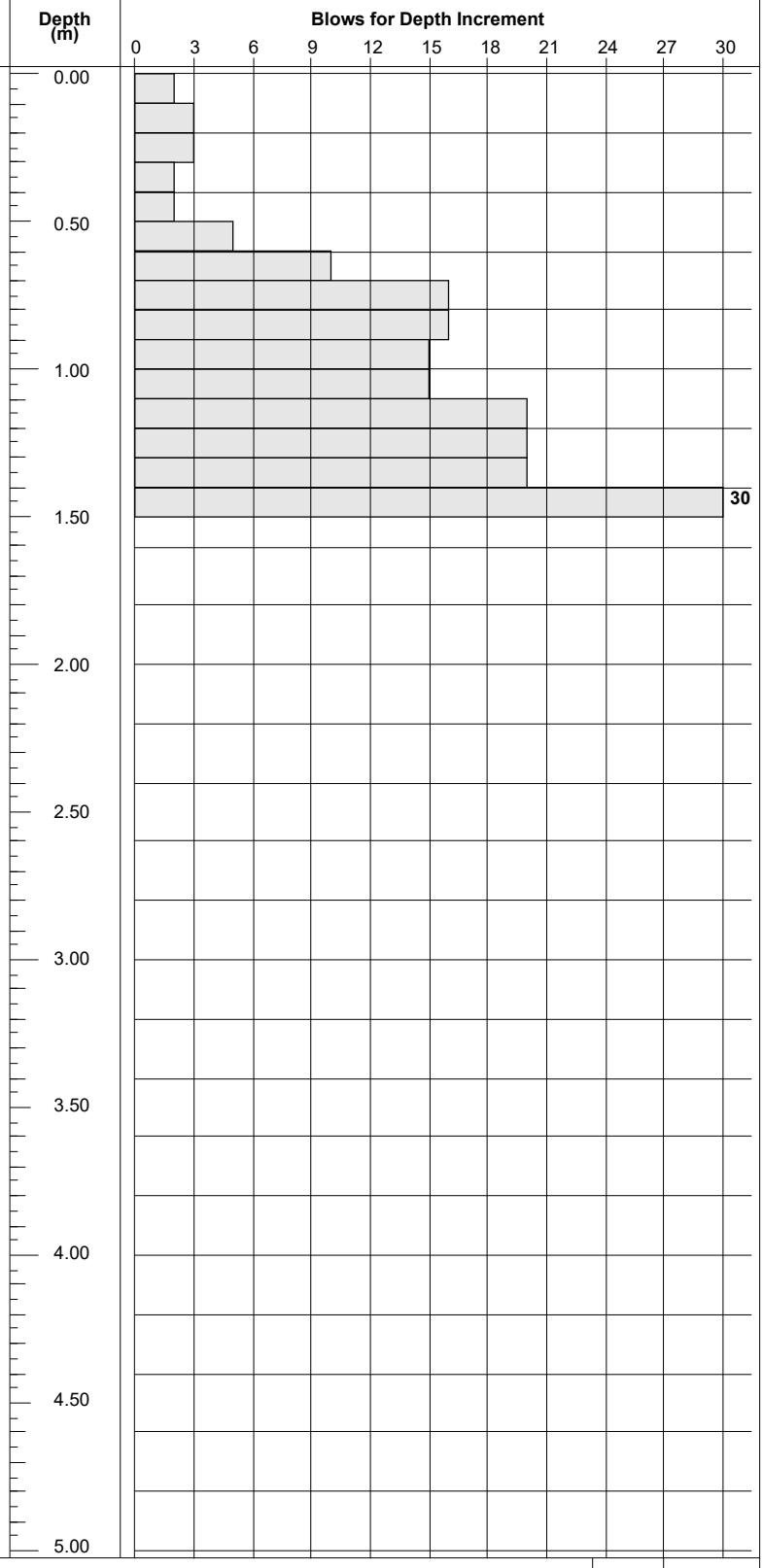
Site	Probe Number
Propsoed Development - Blessington, County Wicklow	DPH-11

Method	Cone Dimensions	Ground Level (mOD)	Client	Job Number
Dynamic Pobe Heavy (DPH) Hammer Drop Height 500mm Hammer Weight 50Kg	Diameter 43.7mm, Angle 90°		Cairn Homes	12122-08-22
	Location (Handheld GPS)	**Dates** 28/09/2022-29/09/2022	**Engineer** DBFL Consulting Engineers	**Sheet** 1/1

Depth (m)	Blows for Depth Increment	Field Records	Level (mOD)
0.00-0.10	2		
0.10-0.20	3		
0.20-0.30	3		
0.30-0.40	2		
0.40-0.50	2		
0.50-0.60	5		
0.60-0.70	10		
0.70-0.80	16		
0.80-0.90	16		
0.90-1.00	15		
1.00-1.10	15		
1.10-1.20	20		
1.20-1.30	20		
1.30-1.40	20		
1.40-1.50	30		



Remarks

Scale (approx)	Logged By
1:25	AG

Figure No.
12122-08-22.DPH-11

APPENDIX 4 – Soakaway Records

Ground Investigations Ireland Ltd

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Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** IT01
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (1.90m x 0.70m x 3.00m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697594 E 715271 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.20) 0.20	Brown TOPSOIL		
					(0.70) 0.90	Soft to firm brown slightly sandy slightly gravelly CLAY		
					(0.30) 1.20	Soft brown slightly sandy slightly gravelly CLAY with occasional cobbles		
					(1.10) 2.30	Dense brown clayey slightly gravelly SAND with frequent cobbles		
					(0.70) 3.00	Dense light brown SAND		
						Complete at 3.00m		

Plan

Remarks

Pit complete at 3.00m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.IT01

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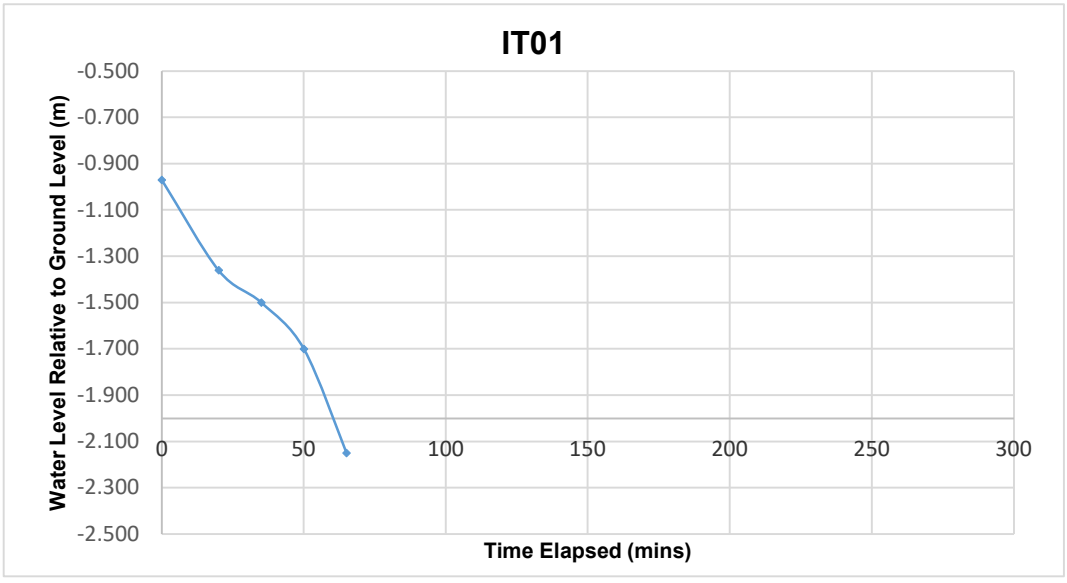
IT01

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 1.90m x 0.70m 3.00m (L x W x D)

Date	Time	Water level (m bgl)
29/09/2022	0	-0.970
29/09/2022	20	-1.360
29/09/2022	35	-1.500
29/09/2022	50	-1.700
29/09/2022	65	-2.150

Start depth	Depth of Pit		Diff	75% full	25%full
0.97	**3.000**		**2.030**	**1.4775**	**2.4925**
Length of pit (m)	Width of pit (m)			75-25Ht (m)	Vp75-25 (m3)
1.900	0.700			1.015	1.35
Tp75-25 (from graph) (s)		**2400**		50% Eff Depth	ap50 (m2)
				1.015	6.608
f =	**8.512E-05**	**m/s**			



IT-01

Ground Investigations Ireland Ltd

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Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** IT02
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (2.50m x 0.70m x 3.00m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697745 E 715382 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Brown TOPSOIL		
					(0.90)	Soft brown slightly sandy slightly gravelly CLAY		
					1.00	Loose light brown slightly silty SAND		
					(1.70)			
					2.70	Medium dense light brown slightly silty SAND		
					(0.30)			
					3.00	Complete at 3.00m		

Plan

Remarks

Pit complete at 3.00m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.IT02

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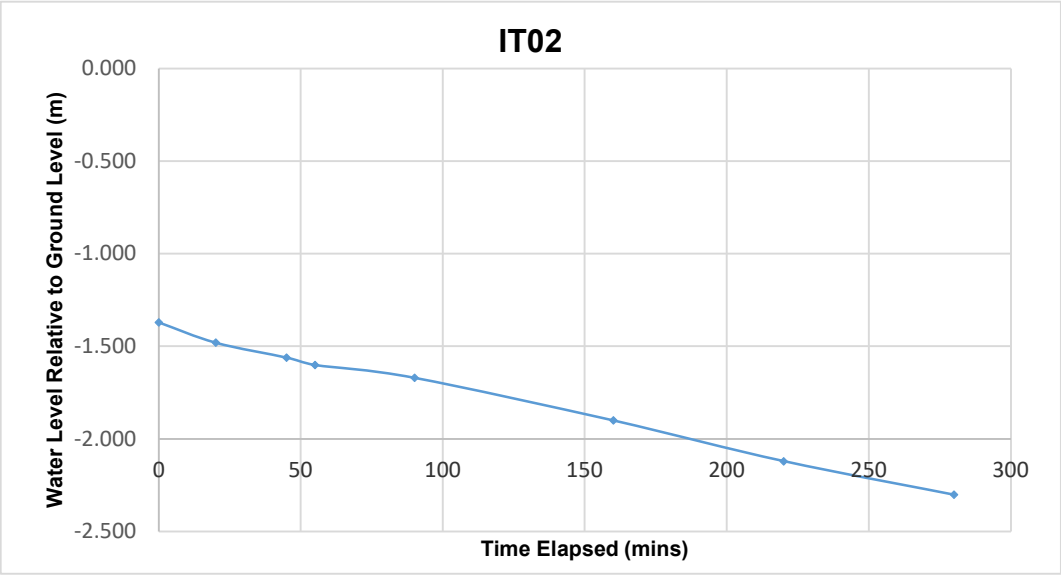
IT02

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.50m x 0.70m 3.00m (L x W x D)

Date	Time	Water level (m bgl)
29/09/2022	0	-1.370
29/09/2022	20	-1.480
29/09/2022	45	-1.560
29/09/2022	55	-1.600
29/09/2022	90	-1.670
29/09/2022	160	-1.900
29/09/2022	220	-2.120
29/09/2022	280	-2.300

Start depth	Depth of Pit		Diff	75% full	25%full
1.37	**3.000**		**1.630**	**1.7775**	**2.5925**
Length of pit (m)	Width of pit (m)			75-25Ht (m)	Vp75-25 (m3)
2.500	0.700			0.815	1.43
Tp75-25 (from graph) (s)		**7800**		50% Eff Depth	ap50 (m2)
				0.815	6.966
f =	**2.625E-05**	**m/s**			



IT-02

Ground Investigations Ireland Ltd

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Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** IT03
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (2.20m x 0.70m x 3.00m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697780 E 715263 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					0.05	Brown TOPSOIL		
					(0.55)	Soft brown slightly sandy slightly gravelly CLAY		
					0.60			
					(0.30)	Firm light brown slightly sandy CLAY		
					0.90			
					(0.30)	Soft to firm light brown slightly sandy CLAY		
					1.20			
					(0.50)	Very soft light brown slightly sandy CLAY		
					1.70			
					(0.40)	Soft to firm light brown CLAY		
					2.10			
					(0.30)	Firm light brown CLAY		
					2.40			
					(0.60)	Stiff light brown CLAY		
					3.00			
						Complete at 3.00m		

Plan

Remarks

Pit complete at 3.00m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.IT03

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IT03

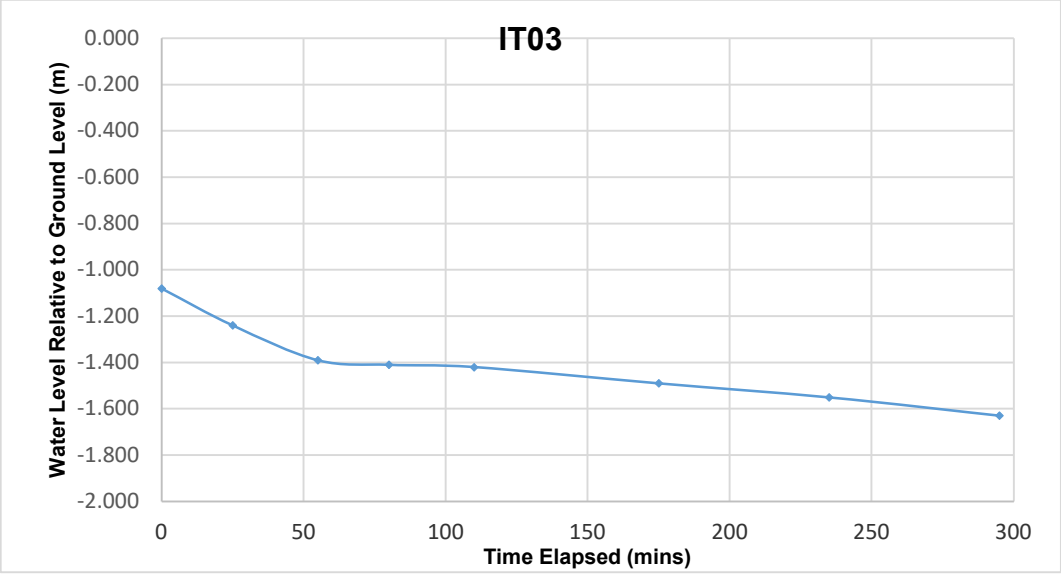
Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.20m x 0.70m 3.00m (L x W x D)

Date	Time	Water level (m bgl)
29/09/2022	0	-1.080
29/09/2022	25	-1.240
29/09/2022	55	-1.390
29/09/2022	80	-1.410
29/09/2022	110	-1.420
29/09/2022	175	-1.490
29/09/2022	235	-1.550
29/09/2022	295	-1.630

Start depth	Depth of Pit		Diff	75% full	25%full
1.08	**3.000**		**1.920**	**1.56**	**2.52**

Length of pit (m)	Width of pit (m)		75-25Ht (m)	Vp75-25 (m3)
2.200	0.700		0.960	1.48
Tp75-25 (from graph) (s)		**15600**	50% Eff Depth	ap50 (m2)
			0.960	7.108

f = 1.333E-05 m/s



IT-03

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Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** IT04
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (2.20m x 0.70m x 3.00m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697836 E 715318 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Brown TOPSOIL		
					(0.50) 0.60	Stiff brown slightly sandy slightly gravelly CLAY		
					(0.60) 1.20	Firm brown slightly sandy slightly gravelly CLAY		
					(0.90) 2.10	Stiff brown gravelly cobbly CLAY		
					(0.90) 3.00	Stiff light brown slightly gravelly CLAY		
						Complete at 3.00m		

Plan

Remarks

Pit complete at 3.00m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.IT04

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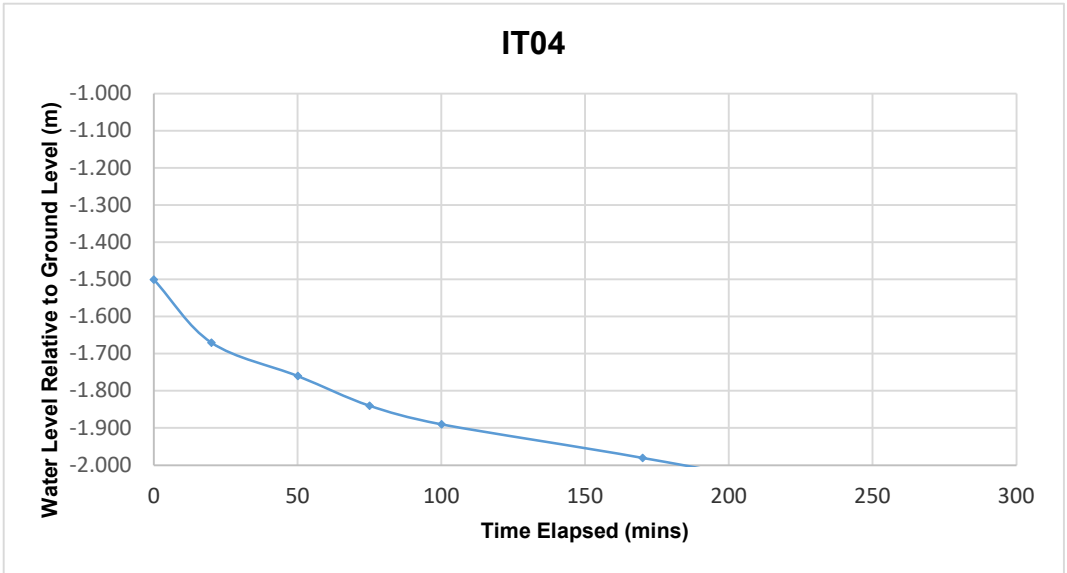
IT04

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.20m x 0.70m 3.00m (L x W x D)

Date	Time	Water level (m bgl)
29/09/2022	0	-1.500
29/09/2022	20	-1.670
29/09/2022	50	-1.760
29/09/2022	75	-1.840
29/09/2022	100	-1.890
29/09/2022	170	-1.980
29/09/2022	230	-2.070
29/09/2022	290	-2.180

Start depth	Depth of Pit		Diff	75% full	25%full
1.50	**3.000**		**1.500**	**1.875**	**2.625**

Length of pit (m)	Width of pit (m)		75-25Ht (m)	Vp75-25 (m3)
2.200	0.700		0.750	1.16
Tp75-25 (from graph) (s)		**14700**	50% Eff Depth	ap50 (m2)
			0.750	5.89
f =	**1.334E-05**	**m/s**		



IT-04

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Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** IT05
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (2.30m x 0.70m x 3.00m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697896 E 715341 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.15) 0.15	Brown TOPSOIL		
					(0.45) 0.60	Loose brown slightly sandy cobbly GRAVEL		
					(0.40) 1.00	Medium dense brown slightly sandy cobbly GRAVEL		
					(1.40) 2.40	Medium dense brown slightly gravelly cobbly SAND		
					(0.60) 3.00	Dense brown slightly gravelly cobbly SAND		
						Complete at 3.00m		

Plan

Remarks

Pit complete at 3.00m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.IT05

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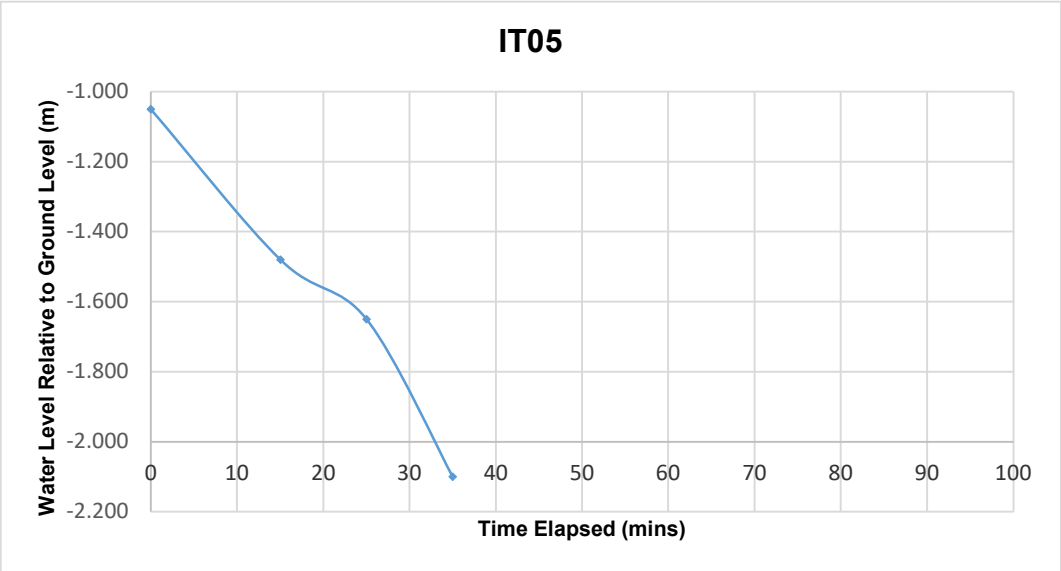
IT05

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.30m x 0.70m 3.00m (L x W x D)

Date	Time	Water level (m bgl)
29/09/2022	0	-1.050
29/09/2022	15	-1.480
29/09/2022	25	-1.650
29/09/2022	35	-2.100

Start depth	Depth of Pit		Diff	75% full	25%full
1.05	**3.000**		**1.950**	**1.5375**	**2.5125**

Length of pit (m)	Width of pit (m)		75-25Ht (m)	Vp75-25 (m3)
2.300	0.700		0.975	1.57
Tp75-25 (from graph) (s)		**1200**	50% Eff Depth	ap50 (m2)
			0.975	7.46
f =	**1.754E-04**	**m/s**		



IT-05

Ground Investigations Ireland Ltd
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Site Propsoed Development - Blessington, County Wicklow			**Trial Pit Number** IT06
Machine : 6T Excavator **Method :** Trial Pit	**Dimensions** (2.10m x 0.70m x 3.00m) (Lx W x D)	**Ground Level (mOD)**	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location (Handheld GPS) 697867 E 715318 N	**Dates** 28/09/2022-29/09/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.10) 0.10	Brown TOPSOIL		
					(0.20) 0.30	Soft brown slightly sandy slightly gravelly CLAY		
					(0.30) 0.60	Soft to firm brown slightly sandy slightly gravelly CLAY		
					(0.60) 1.20	Very soft brown slightly sandy slightly gravelly CLAY		
					(0.30) 1.50	Medium dense light brown clayey slightly gravelly SAND		
					(0.50) 2.00	Dense light brown clayey slightly gravelly SAND		
					(1.00) 3.00	Dense light brown gravelly cobbly SAND		
						Complete at 3.00m		

Plan

Remarks

Pit complete at 3.00m
No groundwater encountered
Trial pit stable
Trial pit backfilled upon completion

Scale (approx)	Logged By	Figure No.
1:25	MK	12122-08-22.IT06

GROUND INVESTIGATIONS IRELAND
Geotechnical & Environmental

Catherinestown House,
Hazelhatch Road,
Newcastle,
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D22 YD52

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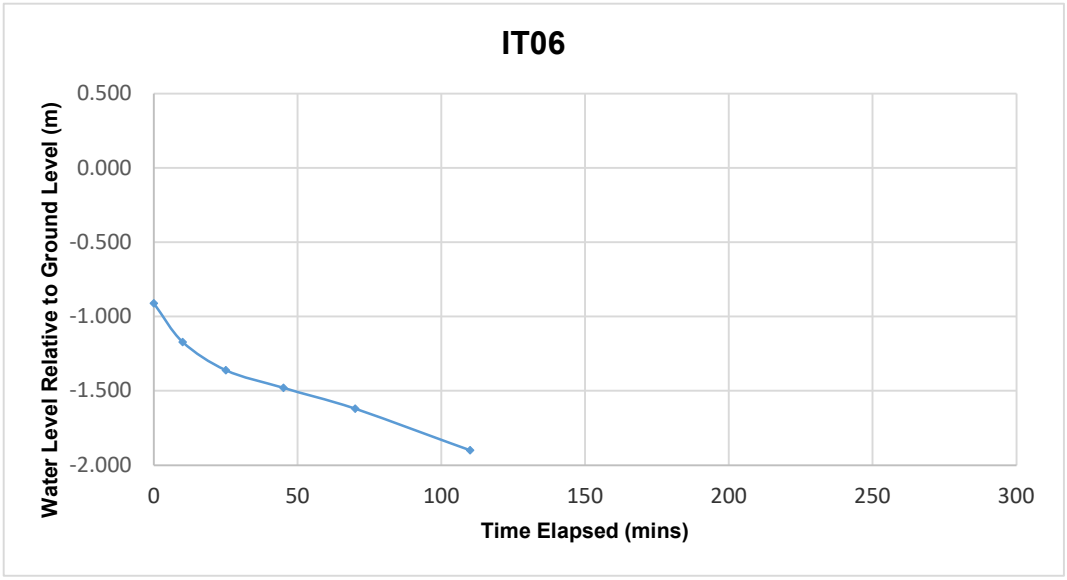
IT06

Soakaway Test to BRE Digest 365
Trial Pit Dimensions: 2.10m x 0.70m 3.00m (L x W x D)

Date	Time	Water level (m bgl)
29/09/2022	0	-0.910
29/09/2022	10	-1.170
29/09/2022	25	-1.360
29/09/2022	45	-1.480
29/09/2022	70	-1.620
29/09/2022	110	-1.900

Start depth	Depth of Pit		Diff	75% full	25%full
0.91	**3.000**		**2.090**	**1.4325**	**2.4775**

Length of pit (m)	Width of pit (m)		75-25Ht (m)	Vp75-25 (m3)
2.100	0.700		1.045	1.54
Tp75-25 (from graph) (s)		**4800**	50% Eff Depth	ap50 (m2)
			1.045	7.322
f =	**4.371E-05**	**m/s**		



IT-06

APPENDIX 5 – Cable Percussion Records

Ground Investigations Ireland Ltd

www.gii.ie

Site Propsoed Development - Blessington, County Wicklow			**Borehole Number** BH-01
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 6.30m	**Ground Level (mOD)** 214.81	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location 697791.3 E 715402.9 N	**Dates** 07/12/2022-08/12/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					214.61	(0.20) 0.20	Brown TOPSOIL			
0.50	B						Firm brown slightly sandy slightly gravelly silty CLAY			
1.00-1.45 1.00	SPT(C) N=10 B			1,2/2,3,3,2		(1.20)				
					213.41	1.40	Medium dense brown sandy fine to coarse subangular to subrounded GRAVEL.			
						(0.60)				
2.00-2.45 2.00	SPT(C) N=12 B			2,3/2,2,3,5	212.81	2.00	Medium dense brown slightly clayey sandy fine to coarse subangular to subrounded GRAVEL with occasional subangular to subrounded cobbles.			
3.00-3.45 3.00	SPT(C) N=17 B			3,4/3,4,5,5		(2.45)				
4.00-4.45 4.00	SPT(C) N=21 B			4,5/5,6,5,5						
					210.36	4.45	Dense brown slightly clayey sandy fine to coarse subangular to subrounded GRAVEL with occasional subangular to subrounded cobbles.			
5.00-5.45 5.00	SPT(C) N=39 B			5,6/7,7,11,14		(1.85)				
6.00-6.45 6.00	SPT(C) N=50 B			4,7/10,40	208.51	6.30	Refusal at 6.30mBGL			

Remarks
No groundwater encountered
Refusal at 6.30mBGL due to obstruction
Borehole backfilled on completion
Chiselling from 6.30m to 6.30m for 1 hour.

Scale (approx)	Logged By
1:50	PM

Figure No. 12122-08-22.BH-01

Ground Investigations Ireland Ltd
www.gii.ie

Site Propsoed Development - Blessington, County Wicklow			**Borehole Number** BH-02
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 8.00m	**Ground Level (mOD)** 208.57	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location 697861.7 E 715195 N	**Dates** 06/12/2022-07/12/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water	Instr
					208.47	0.10	Brown TOPSOIL			
0.50	B					(1.35)	Firm brown sandy gravelly CLAY.			
1.00-1.45 1.00	SPT(C) N=10 B			1,2/2,3,2,3						
					207.12	1.45	Stiff brown sandy gravelly CLAY.			
						(0.55)				
2.00-2.45 2.00	SPT(C) N=18 B			2,3/5,4,5,4	206.57	2.00	Medium dense brown sandy fine to coarse subangular to subrounded GRAVEL with occasional subangular to subrounded cobbles.			
3.00-3.45 3.00	SPT(C) N=23 B			3,4/5,5,6,7		(2.45)				
4.00-4.45 4.00	SPT(C) N=27 B			3,5/7,5,7,8						
					204.12	4.45	Medium dense brown sandy fine to coarse subangular to subrounded GRAVEL with occasional subangular to subrounded cobbles.			
						(0.55)				
5.00-5.45 5.00	SPT(C) N=50 B			5,7/6,9,14,21	203.57	5.00	Dense brown sandy fine to coarse subangular to subrounded GRAVEL with occasional subangular to subrounded cobbles.			
						(1.45)				
6.00-6.45 6.00	SPT(C) N=42 B			4,5/7,9,11,15						
					202.12	6.45	Medium dense brown sandy fine to coarse subangular to subrounded GRAVEL with occasional subangular to subrounded cobbles.			
						(0.55)				
7.00-7.45 7.00	SPT(C) N=21 B			3,4/5,5,6,5	201.57	7.00	Medium dense brown slightly slightly gravelly fine to coarse SAND.			
						(1.00)				
8.00-8.45 8.00	SPT(C) N=20 B			4,5/5,4,5,6	200.57	8.00	Complete at 8.00mBGL			

Remarks
No groundwater encountered
Borehole complete and backfilled on completion at 8.00mBGL

Scale (approx)	Logged By
1:50	PM

Figure No. 12122-08-22.BH-02

Ground Investigations Ireland Ltd

www.gii.ie

Site Propsoed Development - Blessington, County Wicklow			**Borehole Number** BH-03
Machine : Dando 2000 **Method :** Cable Percussion	**Casing Diameter** 200mm cased to 8.00m	**Ground Level (mOD)** 212.38	**Client** Cairn Homes	**Job Number** 12122-08-22
	Location 697692.4 E 715253.8 N	**Dates** 05/12/2022	**Project Contractor** Ground Investigations Ireland	**Sheet** 1/1

Depth (m)	Sample / Tests	Casing Depth (m)	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					212.28	0.10	Brown TOPSOIL		
							Soft brown slightly gravelly sandy CLAY.		
0.50	B					(1.35)			
1.00-1.45 1.00	SPT(C) N=6 B			1,1/1,2,1,2					
					210.93	1.45	Firm brown slightly gravelly sandy CLAY.		
2.00-2.45 2.00	SPT(C) N=10 B			2,3/2,2,3,3		(1.00)			
					209.93	2.45	Medium dense brown slightly clayey gravelly fine to coarse SAND.		
3.00-3.45 3.00	SPT(C) N=13 B			2,3/3,4,3,3					
						(2.25)			
4.00-4.45 4.00	SPT(C) N=15 B			3,3/4,3,4,4					
					207.68	4.70	Medium dense brown sandy fine to coarse subangular to subrounded GRAVEL.		
5.00-5.45 5.00	SPT(C) N=17 B			3,3/4,5,4,4					
6.00-6.45 6.00	SPT(C) N=16 B			3,4/3,4,4,5					
						(3.30)			
7.00-7.45 7.00	SPT(C) N=17 B			2,3/4,4,4,5					
8.00-8.45 8.00	SPT(C) N=13 B			5,4/3,3,3,4	204.38	8.00	Complete at 8.00mBGL		

Remarks
No groundwater encountered
Borehole complete and backfilled on completion at 8.00mBGL

Scale (approx)	Logged By
1:50	PM

Figure No. 12122-08-22.BH-03

APPENDIX 6 – Laboratory Testing

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

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

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

Attention :	Patrick Moloney
Date :	23rd November, 2022
Your reference :	12122-08-22
Our reference :	Test Report 22/18593 Batch 1
Location :	Blessington Sl
Date samples received :	11th November, 2022
Status :	Final Report
Issue :	1

Eight samples were received for analysis on 11th November, 2022 of which eight were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:

Bruce Leslie
Project Manager

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12122-08-22
Location: Blessington Sl
Contact: Patrick Moloney
EMT Job No: 22/18593

Report : Solid

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

EMT Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32			LOD/LOR	Units	Method No.
Sample ID	TP-01	TP-02	TP-05	TP-06	TP-08	TP-09	TP-10	TP-11					
Depth	2.50	1.50	2.50	1.50	1.00	2.00	1.50	2.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022					
Antimony	<1	1	1	3	<1	<1	1	<1			<1	mg/kg	TM30/PM15
Arsenic #	8.9	13.2	12.0	17.6	9.6	5.9	9.7	9.3			<0.5	mg/kg	TM30/PM15
Barium #	42	45	61	115	90	24	90	53			<1	mg/kg	TM30/PM15
Cadmium #	1.2	1.7	1.8	3.6	1.0	1.4	1.8	1.1			<0.1	mg/kg	TM30/PM15
Chromium #	23.5	25.2	28.8	48.1	19.0	19.0	31.8	23.8			<0.5	mg/kg	TM30/PM15
Copper #	16	23	22	49	14	13	18	17			<1	mg/kg	TM30/PM15
Lead #	21	22	28	45	14	15	12	15			<5	mg/kg	TM30/PM15
Mercury #	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM30/PM15
Molybdenum #	0.9	1.2	0.9	1.4	0.7	0.5	0.8	1.3			<0.1	mg/kg	TM30/PM15
Nickel #	27.5	32.2	41.5	108.4	22.2	19.3	32.5	23.4			<0.7	mg/kg	TM30/PM15
Selenium #	<1	<1	<1	<1	<1	<1	<1	1			<1	mg/kg	TM30/PM15
Zinc #	95	88	121	260	76	73	90	65			<5	mg/kg	TM30/PM15
PAH MS													
Naphthalene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Acenaphthylene	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Acenaphthene #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/kg	TM4/PM8
Fluorene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Phenanthrene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Fluoranthene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Pyrene #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM4/PM8
Benzo(a)anthracene #	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06	<0.06			<0.06	mg/kg	TM4/PM8
Chrysene #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	mg/kg	TM4/PM8
Benzo(bk)fluoranthene #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07			<0.07	mg/kg	TM4/PM8
Benzo(a)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Indeno(123cd)pyrene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Dibenzo(ah)anthracene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Benzo(ghi)perylene #	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
Coronene	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04	<0.04			<0.04	mg/kg	TM4/PM8
PAH 6 Total #	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22			<0.22	mg/kg	TM4/PM8
PAH 17 Total	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64			<0.64	mg/kg	TM4/PM8
Benzo(b)fluoranthene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/kg	TM4/PM8
Benzo(k)fluoranthene	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	mg/kg	TM4/PM8
Benzo(j)fluoranthene	<1	<1	<1	<1	<1	<1	<1	<1			<1	mg/kg	TM4/PM8
PAH Surrogate % Recovery	87	98	95	100	93	97	95	95			<0	%	TM4/PM8
Mineral Oil (C10-C40) (EH_CU_1D_AL)	<30	<30	<30	<30	<30	<30	<30	<30			<30	mg/kg	TM5/PM8/PM16

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 12122-08-22
Location: Blessington Sl
Contact: Patrick Moloney
EMT Job No: 22/18593

Report : Solid

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

EMT Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32			LOD/LOR	Units	Method No.
Sample ID	TP-01	TP-02	TP-05	TP-06	TP-08	TP-09	TP-10	TP-11					
Depth	2.50	1.50	2.50	1.50	1.00	2.00	1.50	2.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022					
TPH CWG													
Aliphatics													
>C5-C6 (HS_1D_AL)#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C6-C8 (HS_1D_AL)#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C8-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C10-C12 (EH_CU_1D_AL)#	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>C12-C16 (EH_CU_1D_AL)#	<4	<4	<4	<4	<4	<4	<4	<4			<4	mg/kg	TM5/PM8/PM16
>C16-C21 (EH_CU_1D_AL)#	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>C21-C35 (EH_CU_1D_AL)#	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>C35-C40 (EH_1D_AL)	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
Total aliphatics C5-40 (EH+HS_1D_AL)	<26	<26	<26	<26	<26	<26	<26	<26			<26	mg/kg	TM5/TM36/PM8/PM12/PM16
>C6-C10 (HS_1D_AL)	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>C10-C25 (EH_1D_AL)	<10	<10	<10	<10	<10	<10	<10	<10			<10	mg/kg	TM5/PM8/PM16
>C25-C35 (EH_1D_AL)	<10	<10	<10	<10	<10	<10	<10	<10			<10	mg/kg	TM5/PM8/PM16
Aromatics													
>C5-EC7 (HS_1D_AR)#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC7-EC8 (HS_1D_AR)#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC8-EC10 (HS_1D_AR)#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC10-EC12 (EH_CU_1D_AR)#	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2			<0.2	mg/kg	TM5/PM8/PM16
>EC12-EC16 (EH_CU_1D_AR)#	<4	<4	<4	<4	<4	<4	<4	<4			<4	mg/kg	TM5/PM8/PM16
>EC16-EC21 (EH_CU_1D_AR)#	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>EC21-EC35 (EH_CU_1D_AR)#	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
>EC35-EC40 (EH_1D_AR)	<7	<7	<7	<7	<7	<7	<7	<7			<7	mg/kg	TM5/PM8/PM16
Total aromatics C5-40 (EH+HS_1D_AR)	<26	<26	<26	<26	<26	<26	<26	<26			<26	mg/kg	TM5/TM36/PM8/PM12/PM16
Total aliphatics and aromatics(C5-40) (EH+HS_CU_1D_Total)	<52	<52	<52	<52	<52	<52	<52	<52			<52	mg/kg	TM5/TM36/PM8/PM12/PM16
>EC6-EC10 (HS_1D_AR)#	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM36/PM12
>EC10-EC25 (EH_1D_AR)	<10	<10	<10	<10	<10	<10	<10	<10			<10	mg/kg	TM5/PM8/PM16
>EC25-EC35 (EH_1D_AR)	<10	<10	<10	<10	<10	<10	<10	<10			<10	mg/kg	TM5/PM8/PM16
MTBE#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
Benzene#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
Toluene#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
Ethylbenzene#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
m/p-Xylene#	<5	<5	<5	9	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
o-Xylene#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM36/PM12
PCB 28#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 52#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 101#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 118#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 138#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 153#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
PCB 180#	<5	<5	<5	<5	<5	<5	<5	<5			<5	ug/kg	TM17/PM8
Total 7 PCBs#	<35	<35	<35	<35	<35	<35	<35	<35			<35	ug/kg	TM17/PM8

Please see attached notes for all abbreviations and acronyms

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12122-08-22
Location: Blessington Sl
Contact: Patrick Moloney
EMT Job No: 22/18593

Report : Solid

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

EMT Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32			LOD/LOR	Units	Method No.
Sample ID	TP-01	TP-02	TP-05	TP-06	TP-08	TP-09	TP-10	TP-11					
Depth	2.50	1.50	2.50	1.50	1.00	2.00	1.50	2.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022					
Natural Moisture Content	16.5	20.4	17.9	26.4	7.7	9.7	11.6	7.3			<0.1	%	PM4/PM0
Moisture Content (% Wet Weight)	14.2	16.9	15.2	20.9	7.1	8.8	10.4	6.8			<0.1	%	PM4/PM0
Hexavalent Chromium #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3			<0.3	mg/kg	TM38/PM20
Sulphate as SO4 (2:1 Ext) #	-	-	0.0031	0.0037	-	-	-	-			<0.0015	g/l	TM38/PM20
Chromium III	23.5	25.2	28.8	48.1	19.0	19.0	31.8	23.8			<0.5	mg/kg	NONE/NONE
Total Organic Carbon #	0.16	0.31	0.17	0.24	0.11	0.14	0.23	0.19			<0.02	%	TM21/PM24
pH #	8.90	8.60	8.75	8.54	8.98	8.90	8.25	8.84			<0.01	pH units	TM73/PM11
Mass of raw test portion	0.1044	0.111	0.1081	0.1196	0.0976	0.0978	0.109	0.0951				kg	NONE/PM17
Mass of dried test portion	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.09				kg	NONE/PM17

Please see attached notes for all abbreviations and acronyms

Client Name: Ground Investigations Ireland
Reference: 12122-08-22
Location: Blessington Sl
Contact: Patrick Moloney
EMT Job No: 22/18593

Report : CEN 10:1 1 Batch

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32			LOD/LOR	Units	Method No.
Sample ID	TP-01	TP-02	TP-05	TP-06	TP-08	TP-09	TP-10	TP-11					
Depth	2.50	1.50	2.50	1.50	1.00	2.00	1.50	2.50					
COC No / misc													
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T					
Sample Date	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022					
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil					
Batch Number	1	1	1	1	1	1	1	1					
Date of Receipt	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022					
Dissolved Antimony #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002			<0.002	mg/l	TM30/PM17
Dissolved Antimony (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	mg/kg	TM30/PM17
Dissolved Arsenic #	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025			<0.0025	mg/l	TM30/PM17
Dissolved Arsenic (A10) #	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025			<0.025	mg/kg	TM30/PM17
Dissolved Barium #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003			<0.003	mg/l	TM30/PM17
Dissolved Barium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM30/PM17
Dissolved Cadmium #	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005	<0.0005			<0.0005	mg/l	TM30/PM17
Dissolved Cadmium (A10) #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005			<0.005	mg/kg	TM30/PM17
Dissolved Chromium #	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015	<0.0015			<0.0015	mg/l	TM30/PM17
Dissolved Chromium (A10) #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015			<0.015	mg/kg	TM30/PM17
Dissolved Copper #	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007	<0.007			<0.007	mg/l	TM30/PM17
Dissolved Copper (A10) #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07			<0.07	mg/kg	TM30/PM17
Dissolved Lead #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005			<0.005	mg/l	TM30/PM17
Dissolved Lead (A10) #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			<0.05	mg/kg	TM30/PM17
Dissolved Molybdenum #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002			<0.002	mg/l	TM30/PM17
Dissolved Molybdenum (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	mg/kg	TM30/PM17
Dissolved Nickel #	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002			<0.002	mg/l	TM30/PM17
Dissolved Nickel (A10) #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			<0.02	mg/kg	TM30/PM17
Dissolved Selenium #	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003	<0.003			<0.003	mg/l	TM30/PM17
Dissolved Selenium (A10) #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			<0.03	mg/kg	TM30/PM17
Dissolved Zinc #	<0.003	<0.003	<0.003	0.010	0.004	<0.003	<0.003	<0.003			<0.003	mg/l	TM30/PM17
Dissolved Zinc (A10) #	<0.03	<0.03	<0.03	0.10	0.04	<0.03	<0.03	<0.03			<0.03	mg/kg	TM30/PM17
Mercury Dissolved by CVAF #	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001	<0.00001			<0.00001	mg/l	TM61/PM0
Mercury Dissolved by CVAF #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001			<0.0001	mg/kg	TM61/PM0
Phenol	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01			<0.01	mg/l	TM26/PM0
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			<0.1	mg/kg	TM26/PM0
Fluoride	<0.3	0.4	<0.3	<0.3	<0.3	<0.3	0.3	<0.3			<0.3	mg/l	TM173/PM0
Fluoride	<3	4	<3	<3	<3	<3	3	<3			<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<0.5	<0.5	<0.5	<0.5	<0.5	1.5	<0.5	<0.5			<0.5	mg/l	TM38/PM0
Sulphate as SO4 #	<5	<5	<5	<5	<5	15	<5	<5			<5	mg/kg	TM38/PM0
Chloride #	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3			<0.3	mg/l	TM38/PM0
Chloride #	<3	<3	<3	<3	<3	<3	<3	<3			<3	mg/kg	TM38/PM0
Dissolved Organic Carbon	<2	3	<2	4	2	<2	2	<2			<2	mg/l	TM60/PM0
Dissolved Organic Carbon	<20	30	<20	40	20	<20	20	<20			<20	mg/kg	TM60/PM0
pH	8.19	8.06	8.00	7.90	8.18	8.11	8.13	8.18			<0.01	pH units	TM73/PM0
Total Dissolved Solids #	<35	40	<35	<35	<35	<35	49	<35			<35	mg/l	TM20/PM0
Total Dissolved Solids #	<350	400	<350	<350	<350	<350	490	<350			<350	mg/kg	TM20/PM0

Element Materials Technology

Client Name: Ground Investigations Ireland
Reference: 12122-08-22
Location: Blessington SI
Contact: Patrick Moloney
EMT Job No: 22/18593

Report : EN12457_2

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

Please see attached notes for all abbreviations and acronyms

EMT Sample No.	1-4	5-8	9-12	13-16	17-20	21-24	25-28	29-32							
Sample ID	TP-01	TP-02	TP-05	TP-06	TP-08	TP-09	TP-10	TP-11							
Depth	2.50	1.50	2.50	1.50	1.00	2.00	1.50	2.50							
COC No / misc															
Containers	V J T	V J T	V J T	V J T	V J T	V J T	V J T	V J T							
Sample Date	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022	09/11/2022							
Sample Type	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil							
Batch Number	1	1	1	1	1	1	1	1							
Date of Receipt	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022	11/11/2022			Inert	Stable Non-reactive	Hazardous	LOD LOR	Units	Method No.
Solid Waste Analysis																
Total Organic Carbon #	0.16	0.31	0.17	0.24	0.11	0.14	0.23	0.19			3	5	6	<0.02	%	TM21/PM24
Sum of BTEX	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025			6	-	-	<0.025	mg/kg	TM36/PM12
Sum of 7 PCBs #	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035	<0.035			1	-	-	<0.035	mg/kg	TM17/PM8
Mineral Oil	<30	<30	<30	<30	<30	<30	<30	<30			500	-	-	<30	mg/kg	TM5/PM8/PM16
PAH Sum of 6 #	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22	<0.22			-	-	-	<0.22	mg/kg	TM4/PM8
PAH Sum of 17	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64	<0.64			100	-	-	<0.64	mg/kg	TM4/PM8
CEN 10:1 Leachate																
Arsenic #	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025	<0.025			0.5	2	25	<0.025	mg/kg	TM30/PM17
Barium #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			20	100	300	<0.03	mg/kg	TM30/PM17
Cadmium #	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005			0.04	1	5	<0.005	mg/kg	TM30/PM17
Chromium #	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015	<0.015			0.5	10	70	<0.015	mg/kg	TM30/PM17
Copper #	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07	<0.07			2	50	100	<0.07	mg/kg	TM30/PM17
Mercury #	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001			0.01	0.2	2	<0.0001	mg/kg	TM61/PM0
Molybdenum #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			0.5	10	30	<0.02	mg/kg	TM30/PM17
Nickel #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			0.4	10	40	<0.02	mg/kg	TM30/PM17
Lead #	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05			0.5	10	50	<0.05	mg/kg	TM30/PM17
Antimony #	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02			0.06	0.7	5	<0.02	mg/kg	TM30/PM17
Selenium #	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03	<0.03			0.1	0.5	7	<0.03	mg/kg	TM30/PM17
Zinc #	<0.03	<0.03	<0.03	0.10	0.04	<0.03	<0.03	<0.03			4	50	200	<0.03	mg/kg	TM30/PM17
Total Dissolved Solids #	<350	400	<350	<350	<350	<350	490	<350			4000	60000	100000	<350	mg/kg	TM20/PM0
Dissolved Organic Carbon	<20	30	<20	40	20	<20	20	<20			500	800	1000	<20	mg/kg	TM60/PM0
Dry Matter Content Ratio	86.2	80.8	82.9	75.2	92.7	92.3	82.3	94.7			-	-	-	<0.1	%	NONE/PM4
Moisture Content 105C (% Dry Weight)	16.0	23.8	20.6	32.9	7.9	8.3	21.5	5.6			-	-	-	<0.1	%	PM4/PM0
pH #	8.90	8.60	8.75	8.54	8.98	8.90	8.25	8.84			-	-	-	<0.01	pH units	TM73/PM11
Phenol	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			1	-	-	<0.1	mg/kg	TM26/PM0
Fluoride	<3	4	<3	<3	<3	<3	3	<3			10	150	500	<3	mg/kg	TM173/PM0
Sulphate as SO4 #	<5	<5	<5	<5	<5	15	<5	<5			1000	20000	50000	<5	mg/kg	TM38/PM0
Chloride #	<3	<3	<3	<3	<3	<3	<3	<3			800	15000	25000	<3	mg/kg	TM38/PM0

Client Name: Ground Investigations Ireland

Reference: 12122-08-22

Location: Blessington Sl

Contact: Patrick Moloney

Matrix : Solid

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	EPH Interpretation
22/18593	1	TP-01	2.50	1-4	No interpretation possible
22/18593	1	TP-02	1.50	5-8	No interpretation possible
22/18593	1	TP-05	2.50	9-12	No interpretation possible
22/18593	1	TP-06	1.50	13-16	No interpretation possible
22/18593	1	TP-08	1.00	17-20	No interpretation possible
22/18593	1	TP-09	2.00	21-24	No interpretation possible
22/18593	1	TP-10	1.50	25-28	No interpretation possible
22/18593	1	TP-11	2.50	29-32	No interpretation possible

Client Name: Ground Investigations Ireland
Reference: 12122-08-22
Location: Blessington Sl
Contact: Patrick Moloney

Note:

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

The LOQ of the Asbestos Quantification is 0.001% dry fibre of dry mass of sample.

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

Where trace asbestos is reported the amount of asbestos will be <0.1%.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analyst Name	Date Of Analysis	Analysis	Result
22/18593	1	TP-01	2.50	4	Matthew Turner	22/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	22/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	22/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	22/11/2022	**Asbestos Type**	NAD
22/18593	1	TP-02	1.50	8	Matthew Turner	22/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	22/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	22/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	22/11/2022	**Asbestos Type**	NAD
22/18593	1	TP-05	2.50	12	Matthew Turner	22/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	22/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	22/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	22/11/2022	**Asbestos Type**	NAD
22/18593	1	TP-06	1.50	16	Matthew Turner	22/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	22/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	22/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	22/11/2022	**Asbestos Type**	NAD
22/18593	1	TP-08	1.00	20	Anthony Carman	22/11/2022	**General Description (Bulk Analysis)**	Brown Soil/Stones
					Anthony Carman	22/11/2022	**Asbestos Fibres**	NAD
					Anthony Carman	22/11/2022	**Asbestos ACM**	NAD
					Anthony Carman	22/11/2022	**Asbestos Type**	NAD
22/18593	1	TP-09	2.00	24	Anthony Carman	22/11/2022	**General Description (Bulk Analysis)**	Brown Soil/Stones
					Anthony Carman	22/11/2022	**Asbestos Fibres**	NAD
					Anthony Carman	22/11/2022	**Asbestos ACM**	NAD
					Anthony Carman	22/11/2022	**Asbestos Type**	NAD
22/18593	1	TP-10	1.50	28	Matthew Turner	22/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	22/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	22/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	22/11/2022	**Asbestos Type**	NAD
22/18593	1	TP-11	2.50	32	Matthew Turner	22/11/2022	**General Description (Bulk Analysis)**	Brown soil/Stone
					Matthew Turner	22/11/2022	**Asbestos Fibres**	NAD
					Matthew Turner	22/11/2022	**Asbestos ACM**	NAD
					Matthew Turner	22/11/2022	**Asbestos Type**	NAD

Client Name: Ground Investigations Ireland
Reference: 12122-08-22
Location: Blessington Sl
Contact: Patrick Moloney

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Analysis	Reason
No deviating sample report results for job 22/18593						

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.: 22/18593

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: 22/18593

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

EMT Job No: 22/18593

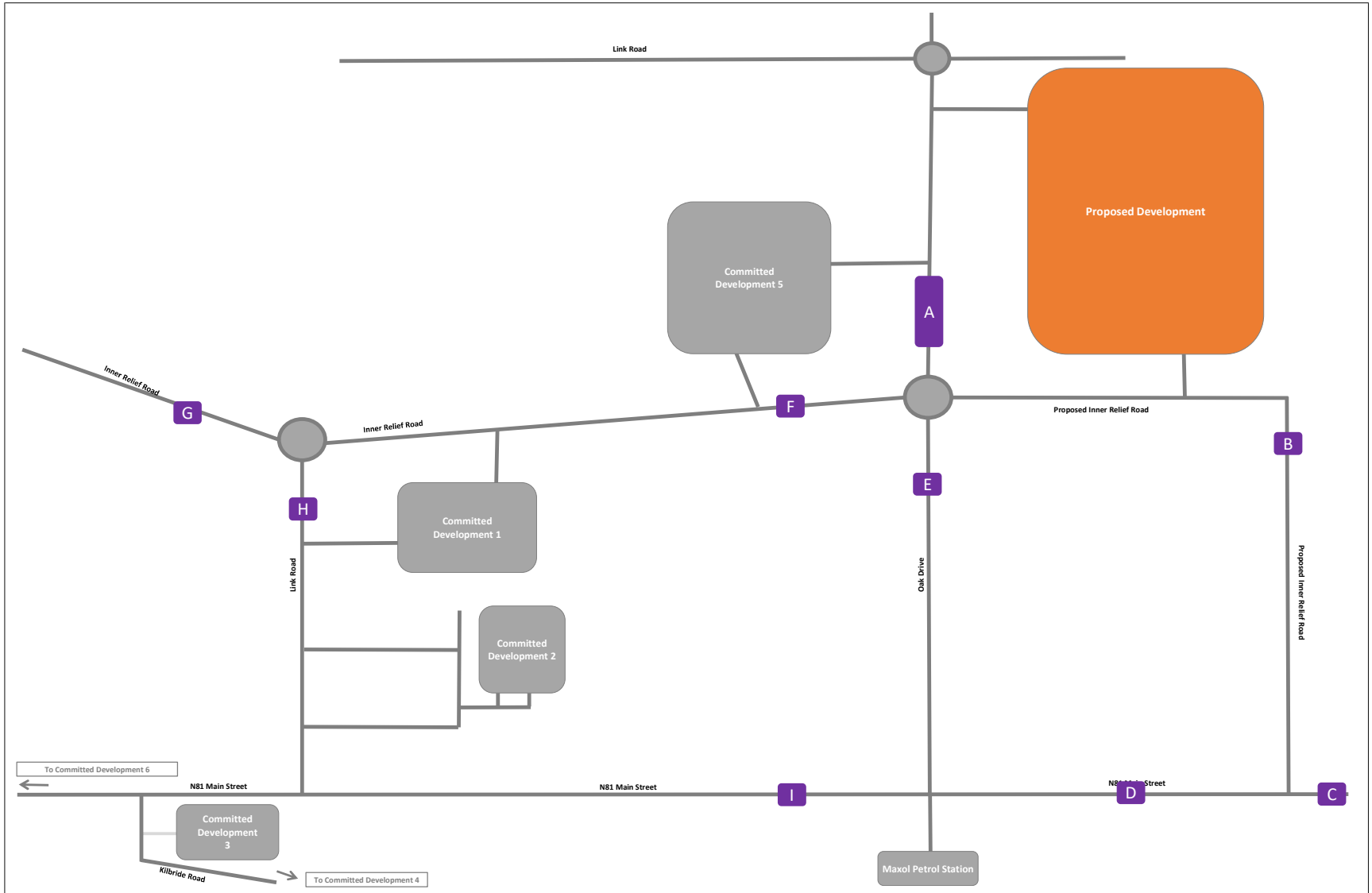
Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/SANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM0	No preparation is required.			AR	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.			AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes		AD	Yes
TM30	Determination of Trace Metals by ICP-OES (Inductively Coupled Plasma – Optical Emission Spectrometry): WATERS by Modified USEPA Method 200.7, Rev. 4.4, 1994; Modified EPA Method 6010B, Rev.2, Dec 1996; Modified BS EN ISO 11885:2009: SOILS by Modified USEP 6010B, Rev.2, Dec.1996; Modified EPA Method 3050B, Rev.2, Dec.1996	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.	Yes		AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B v2:1996. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GCFID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results will be re-run using GC-MS to double check, when requested.	PM12	Modified US EPA method 5021A v2:2014. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 2013I	PM0	No preparation is required.	Yes		AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods: Chloride 325.2 (1978), Sulphate 375.4 (Rev.2 1993), o-Phosphate 365.2 (Rev.2 1993), TON 353.1 (Rev.2 1993), Nitrite 354.1 (1971), Hex Cr 7196A (1992), NH4+ 350.1 (Rev.2 1993) – All anions comparable to BS ISO 15923-1: 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
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		AR	Yes
TM60	TC/TOC analysis of Waters by High Temperature Combustion followed by NDIR detection. Based on the following modified standard methods: USEPA 9060A (2002), APHA SMEWW 5310B:1999 22nd Edition, ASTM D 7573, and USEPA 415.1.	PM0	No preparation is required.			AR	Yes

EMT Job No: 22/18593

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
TM61	Determination of Mercury by Cold Vapour Atomic Fluorescence - WATERS: Modified USEPA Method 245.7, Rev 2, Feb 2005. SOILS: Modified USEPA Method 7471B, Rev.2, Feb 2007	PM0	No preparation is required.	Yes		AR	Yes
TM65	Asbestos Bulk Identification method based on HSG 248 Second edition (2021)	PM42	Modified SCA Blue Book V.12 draft 2017 and WM3 1st Edition v1.1:2018. Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM0	No preparation is required.			AR	Yes
TM73	Modified US EPA methods 150.1 (1982) and 9045D Rev. 4 - 2004) and BS1377-3:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes		AR	No
TM173	Analysis of fluoride by ISE (Ion Selective Electrode) using modified ISE method 9214 - 340.2 (EPA 1998)	PM0	No preparation is required.			AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes
NONE	No Method Code	PM17	Modified method BS EN12457-2:2002 As received solid samples are leached with water in a 10:1 water to soil ratio for 24 hours, the moisture content of the sample is included in the ratio.			AR	
NONE	No Method Code	PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465:1993(E) and BS1377-2:1990.			AR	

APPENDIX 6B Site Investigation Ltd. Report on a Site Investigation for Blessington – Phase 3 at Oak Road, Blessington, Co. Wicklow (SIL, 2023)

APPENDIX 8A AADTs



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Project : Proposed Residential Development
Blessington Demesne, Co. Wicklow

DRG. Title : AADT Calculation
Link Map

Key:
AM Peak Hour (08:15-09:15)
PM Peak Hour (17:30-18:30)

Dwn:	Ckd:	Date:
SK	HG	19/07/2023

Ref: p220145\calcs\excel\transport

Figure:

Rev:

Region:	Mid-East

	AM	PM
24hr Factor	0.074	0.087
Weekly Index	0.97	
Monthly Index	0.97	

AM Peak Hour (08:15-09:15)
PM Peak Hour (17:30-18:30)
Survey Date: Tuesday 25th April 2023

2023 Construction AADT	
Total Vehicles	
AM & PM Peak	33
24 hr Total	208
AADT	196
HGVs	
AM & PM Peak	8
24 hr Total	50
AADT	47

Speed Limit by Link (km/h)								
A	B	C	D	E	F	G	H	I
50	50	80	60	50	50	50	50	50

Construction Impact on Base AADT								
A	B	C	D	E	F	G	H	I
7.4%	0.0%	1.6%	1.6%	4.2%	0%	0%	0%	0%

Do-Minimum Scenario - Total Vehicles

AM Peak	A	B	C	D	E	F	G	H	I
2023 Base	214	0	950	950	402	464	573	254	811
2026 DM	249	0	1133	1133	519	559	647	292	889
2031 DM	264	0	1202	1202	548	593	689	311	948
2041 DM	277	0	1257	1257	572	620	722	325	995
PM Peak	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2023 Base	238	0	1130	1130	386	488	580	251	992
2026 DM	281	0	1359	1359	531	606	667	297	1089
2031 DM	298	0	1442	1442	559	642	709	316	1161
2041 DM	312	0	1507	1507	581	670	743	330	1218
Total Peak Hr	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2023 Base	452	0	2080	2080	788	952	1153	505	1803
2026 DM	530	0	2492	2492	1050	1165	1314	590	1978
2031 DM	563	0	2644	2644	1107	1235	1399	627	2110
2041 DM	589	0	2764	2764	1152	1290	1465	656	2213
24hr Flow	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2023 Base	2816	0	12960	12960	4910	5931	7184	3146	11234
2026 DM	3300	0	15526	15526	6539	7261	8189	3674	12323
2031 DM	3506	0	16473	16473	6898	7694	8714	3904	13144
2041 DM	3668	0	17219	17219	7180	8036	9127	4085	13791
Average Hourly Flow	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2023 Base	117	0	540	540	205	247	299	131	468
2026 DM	137	0	647	647	272	303	341	153	513
2031 DM	146	0	686	686	287	321	363	163	548
2041 DM	153	0	717	717	299	335	380	170	575
AADT	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2023 Base	2650	0	12194	12194	4619	5581	6759	2960	10570
%HGV	**0.2%**	**0.0%**	**4.6%**	**4.6%**	**3.0%**	**2.6%**	**1.7%**	**1.0%**	**3.9%**
2026 DM	3105	0	14609	14609	6153	6832	7705	3457	11595
%HGV	**0.2%**	**0.0%**	**4.3%**	**4.3%**	**2.6%**	**2.4%**	**1.7%**	**0.9%**	**4.0%**
2031 DM	3298	0	15500	15500	6490	7240	8199	3673	12367
%HGV	**0.2%**	**0.0%**	**4.8%**	**4.8%**	**2.9%**	**2.7%**	**1.9%**	**1.1%**	**4.4%**
2041 DM	3451	0	16201	16201	6756	7561	8588	3844	12976
%HGV	**0.3%**	**0.0%**	**5.5%**	**5.5%**	**3.3%**	**3.1%**	**2.1%**	**1.2%**	**5.0%**

Do-Minimum Scenario - HGVs

AM Peak	A	B	C	D	E	F	G	H	I
2023 Base	1	0	73	73	21	22	17	3	47
2026 DM	1	0	82	82	23	25	19	3	53
2031 DM	1	0	96	96	28	29	22	4	62
2041 DM	2	0	115	115	33	35	27	5	74
PM Peak	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2023 Base	0	0	23	23	3	3	3	2	23
2026 DM	0	0	26	26	3	3	3	2	26
2031 DM	0	0	30	30	4	4	4	3	30
2041 DM	0	0	36	36	5	5	5	3	36
Total Peak Hr	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2023 Base	1	0	96	96	24	25	20	5	70
2026 DM	1	0	107	107	27	28	22	6	78
2031 DM	1	0	127	127	32	33	26	7	92
2041 DM	2	0	151	151	38	39	31	8	110
24hr Flow	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2023 Base	6	0	598	598	150	156	125	31	436
2026 DM	7	0	668	668	167	174	139	35	487
2031 DM	8	0	788	788	197	205	164	41	575
2041 DM	10	0	942	942	235	245	196	49	687
Average Hourly Flow	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2023 Base	0	0	25	25	6	6	5	1	18
2026 DM	0	0	28	28	7	7	6	1	20
2031 DM	0	0	33	33	8	9	7	2	24
2041 DM	0	0	39	39	10	10	8	2	29
AADT	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2023 Base	6	0	563	563	141	147	117	29	410
2026 DM	7	0	629	629	157	164	131	33	459
2031 DM	8	0	742	742	185	193	155	39	541
2041 DM	9	0	886	886	221	231	185	46	646

Do-Something Scenario - Total Vehicles

AM Peak	A	B	C	D	E	F	G	H	I
2026 DS	351	242	1202	953	380	630	727	300	839
2031 DS	366	251	1271	1013	403	667	772	318	895
2041 DS	379	258	1326	1060	421	696	808	333	939
PM Peak	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2026 DS	423	289	1456	1154	369	690	761	312	1037
2031 DS	440	299	1538	1225	390	728	807	330	1106
2041 DS	454	306	1603	1282	406	758	843	344	1161
Total Peak Hr	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2026 DS	773	531	2658	2107	749	1320	1488	611	1876
2031 DS	806	549	2809	2238	793	1395	1579	648	2001
2041 DS	832	564	2929	2342	828	1454	1651	677	2100
24hr Flow	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2026 DS	4818	3308	16558	13125	4664	8224	9270	3808	11689
2031 DS	5024	3423	17504	13947	4940	8690	9837	4038	12468
2041 DS	5186	3514	18250	14594	5157	9058	10284	4219	13081
Average Hourly Flow	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2026 DS	201	138	690	547	194	343	386	159	487
2031 DS	209	143	729	581	206	362	410	168	519
2041 DS	216	146	760	608	215	377	428	176	545
AADT	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2026 DS	4533	3112	15579	12349	4389	7738	8722	3583	10998
%HGV	**0.4%**	**2.5%**	**4.1%**	**4.6%**	**2.6%**	**2.4%**	**1.7%**	**0.9%**	**4.0%**
2031 DS	4727	3221	16470	13123	4648	8177	9256	3799	11731
%HGV	**0.4%**	**2.7%**	**4.6%**	**5.1%**	**2.8%**	**2.6%**	**1.9%**	**1.0%**	**4.4%**
2041 DS	4879	3307	17172	13732	4853	8522	9676	3969	12308
%HGV	**0.4%**	**3.1%**	**5.2%**	**5.8%**	**3.3%**	**3.0%**	**2.2%**	**1.2%**	**5.0%**

Do-Something Scenario - HGVs

AM Peak	A	B	C	D	E	F	G	H	I
2026 DS	3	12	84	71	16	27	22	3	50
2031 DS	3	14	98	84	19	32	26	4	59
2041 DS	4	16	117	101	23	39	31	5	70
PM Peak	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2026 DS	0	1	26	25	3	4	4	2	25
2031 DS	0	1	30	29	4	5	5	3	30
2041 DS	0	1	36	35	4	5	5	3	36
Total Peak Hr	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2026 DS	3	13	109	96	19	31	26	6	75
2031 DS	3	15	129	113	23	37	30	7	88
2041 DS	4	18	153	136	27	44	36	8	106
24hr Flow	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2026 DS	19	81	681	599	119	195	160	35	467
2031 DS	21	94	801	707	140	230	189	41	550
2041 DS	22	109	954	845	168	274	225	49	657
Average Hourly Flow	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2026 DS	1	3	28	25	5	8	7	1	19
2031 DS	1	4	33	29	6	10	8	2	23
2041 DS	1	5	40	35	7	11	9	2	27
AADT	**A**	**B**	**C**	**D**	**E**	**F**	**G**	**H**	**I**
2026 DS	18	77	641	564	112	183	151	33	439
2031 DS	19	88	754	665	132	216	178	39	518
2041 DS	21	103	898	795	158	258	212	46	618

APPENDIX 8B Energy Statement and Part L Compliance

Energy Statement and Part L Compliance Approach

Proposed Residential Development, at Blessington Demesne, Newpaddocks and Santryhill, Blessington, Co. Wicklow

August 2023

Waterman Moylan Consulting Engineers Limited
Block S Eastpoint Business Park, Alfie Byrne Road, Dublin D03 H3F4
www.waterman-moylan.ie

Client Name:	Cairn Homes Properties Limited.
Document Reference:	22-094r.002 Energy Statement
Project Number:	22-094

Quality Assurance – Approval Status

This document has been prepared and checked in accordance with
Waterman Group's IMS (BS EN ISO 9001: 2015, BS EN ISO 14001: 2015)

Issue	Date	Prepared by	Checked by	Approved by
Draft	18-08-23	N. Coughlan	A. Brophy	
1	24-08-23	N. Coughlan	A. Brophy	N. Coughlan

Comments

Disclaimer

This report has been prepared by Waterman Moylan, with all reasonable skill, care and diligence within the terms of the Contract with the Client, incorporation of our General Terms and Condition of Business and taking account of the resources devoted to us by agreement with the Client.

We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above.

This report is confidential to the Client and we accept no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report at its own risk.

Content

1. Introduction

Waterman Moylan Engineering Consultants have been appointed by Cairn Homes Properties to prepare this Energy Statement and Part L Compliance Approach report as part of the planning documentation for a proposed residential development on lands at Blessington, Co. Wicklow.

Cairn Homes Properties Limited intend to apply for permission for a Large-Scale Residential Development at this site c. 25.14 ha on lands within the townlands of Blessington Demesne, Newpaddocks and Santryhill, Blessington, Co. Wicklow. The proposed development will consist of 329 residential units (270 no. houses, 47 no. apartments and 12. Duplex units), 10.65 ha town park and the extension of the Blessington Inner Relief Road from the existing roundabout at Blessington Demesne to the N81, north of the Woodleigh residential estate. An Environmental Impact Assessment Report and a Natura Impact Statement have been prepared in respect of the proposed development.

This report identifies the energy standards with which the proposed development will have to comply and also sets out the overall strategy that will be adopted to achieve these energy efficiency targets.

The dwellings will be required to minimise overall energy use and to incorporate an adequate proportion of renewable energy in accordance with Building Regulations Part L 2022, Conservation of Energy & Fuel (hereinafter referred to as "*Part L 2022 Dwellings*").

2. Building Regulations Part L 2022 Dwellings

Compliance with Building Regulations *Part L 2022 Dwellings* is broken down into six distinct categories, known as Regulation 8; parts (a) to (f).

A summary of each of these parts as listed in Technical Guidance Document L 2022 is provided below together with a description of what is required to demonstrate compliance and suggested routes to meeting the required standards.

2.1 Regulation 8 Part (a)

The regulation requires that:

> *Providing that the energy performance of the building is such as to limit the calculated primary energy consumption and related carbon dioxide (CO2) to that of a nearly zero energy building within the meaning of the Directive insofar as is reasonably practicable.*

Part (a) is the overarching compliance target which stipulates the required overall reduction in energy consumption and carbon emissions for new dwellings.

This requires that the energy consumption and carbon emissions of every dwelling is assessed using the DEAP software and that reductions of 70% in energy consumption and 65% in carbon emissions are achieved. The baseline against which this reduction is to be measured is considered to be a dwelling which is constructed to perfectly comply with the 2005 version of Building Regulations Part L.

The ratio of the energy consumed by the proposed dwelling to a similar dwelling constructed to 2005 energy efficiency standards is referred to as the “Energy Performance Co-efficient”

2.2 Regulation 8 Part (b)

The regulation requires that:

> *Providing that, the nearly zero or very low amount of energy required is covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby;*

This requires that all new dwellings are provided with a renewable energy source. The regulations state that 20% of the total energy consumed within the dwelling must be provided from renewable thermal sources (solar thermal, biomass, heat pumps) or renewable electrical sources (Photovoltaic, Micro-wind).

In practical terms, for a multiple unit development, this requirement is usually met by incorporating PV panels at roof level, incorporating air source heat pump technology or by adding an element of biomass or micro-Combined Heat & Power (CHP) to a district heating scheme.

Where CHP is included, the renewable energy is considered to be the waste heat which is generated as a by-product of the electricity produced. Specific calculation methods are set out within TGD *Part L 2022 Dwellings* which detail how compliance should be demonstrated.

2.3 Regulation 8 Part (c)

The regulation requires that:

> *Limiting heat loss and, where appropriate, availing of heat gain through the fabric of the building;*

This requires that the fabric of the building is designed to minimise heat loss from the building and that the air permeability of the structure limits the unwanted passage of air into the building.

Typical compliant U-Values are as follows.

Pitched roof	0.16 W/m^{2}K
Flat roof	0.20 W/m^{2}K
Walls	0.18 W/m^{2}K
Floor	0.18 W/m^{2}K
Windows	1.4 W/m^{2}K

The u-values of individual elements can be relaxed if required provided that compensatory measures are taken on other elements and that the overall area weighted u-value for the entire dwelling is the same as it would have been if all individual elements had complied.

The thermal bridging details of junctions in the envelope of the building (floor-wall; wall-window; wall-roof, etc) must also be designed and constructed in accordance with the guidance set out in Limiting Thermal Bridging and Air Infiltration – Acceptable Construction Details

Every dwelling must also be subjected to an air pressure test to determine the air tightness. All dwellings must achieve and air tightness of less than 5m^3/m^2/hour when tested at 50 Pascals. In multiple dwelling developments with repeating apartment types, testing can be conducted on a representative sample of units in accordance with Table 1.5.4.3 of TGD *Part L 2022 Dwellings*.

2.4 Regulation 8 Parts (d & e)

The regulation requires that:

> *Providing and commissioning energy efficient space and water heating systems with efficient heat sources and effective controls;*
>
> *Providing that all oil and gas fired boilers shall meet a minimum seasonal efficiency of 90%;*

These require that gas or oil-fired boilers are at least 90% efficient and that heating controls allow independent time control of the heating (2 zones for dwellings larger than 100m^2) and hot water. Heating in each zone should also be controlled by room thermostats (in the case of heating) and cylinder stats (in the case of hot water).

2.5 Regulation 8 Parts (f)

The regulation requires that:

> *Providing to the dwelling owner sufficient information about the building, the fixed building services and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and energy than is reasonable.*

This requires that information is provided to the dwelling owner which relates to the effective and efficient operation of the systems installed in that dwelling. Instructions on how to control the heating & hot water systems based on time and temperature requirements.

2.6 Requirements for Common Areas

Section 0.1.2.3 requires that:

Where a new dwelling forms part of a larger building, the guidance in this document applies to the individual dwelling, and the relevant guidance in Technical Guidance Document L - Conservation of Fuel and Energy – Buildings other than dwellings applies to the non-dwelling parts of the building

2.7 L2A & S.I No 393 of 2021 Regulation 5 Part (f) – Electric Vehicle Charging

The regulation requires that:

> *(a) A multi-unit building containing one, or more than one, dwelling that is new shall have installed ducting infrastructure (consisting of conduits for electrical cables) for each car parking space, to enable the subsequent installation of recharging points for electric vehicles where the parking space is:*
>
> > *(i) located inside the building concerned, or*
> >
> > *(ii) is within the curtilage of the building concerned.*
>
> *(c) A new building that is a dwelling, other than where the dwelling forms part of a multi-unit building, where a parking space is located within the curtilage of the dwelling, shall have installed appropriate electric vehicle recharging infrastructure to enable the subsequent installation of recharging points for electric vehicles.*

This requires that ducting provision for the future installation of car charging point be made in all carparks with more than 10 parking spaces associated with multi-unit residential buildings. It also requires that individual / own-door dwellings which have on curtilage parking are provided with ducting infrastructure to allow the future installation of e-car charging.

3. Building Fabric

Before considering efficient building services or renewable energy systems, the form and fabric of a building must be assessed and optimised so as to reduce the energy demand for heating, lighting and ventilation. Target performance levels have been identified by the design team and are presented below.

3.1 Elemental U-Values

The U-Value of a building element is a measure of the amount of heat energy that will pass through the constituent element of the building envelope. Increasing the insulation levels in each element will reduce the heat lost during the heating season and this in turn will reduce the consumption of fuel and the associated carbon emissions and operating costs.

It is the intention of the design team to exceed the requirements of the building regulations. Target U-Values are identified below.

U-Values	**Range of Target Values Proposed**	**Part L 2022 (Dwellings) Compliant Values**
Floor	0.10 to 0.18 W/m^{2}K	0.18W/m^{2}K
Roof (Flat)	0.12 to 0.20 W/m^{2}K	0.20 W/m^{2}K
Roof (Pitched)	0.10 to 0.16 W/m^{2}K	0.16 W/m^{2}K
Walls	0.10 to 0.18 W/m^{2}K	0.18 W/m^{2}K
Windows	0.9 to 1.4 W/m^{2}K	1.4W/m^{2}K

3.2 Air Permeability

A major consideration in reducing the heat losses in a building is the air infiltration. This essentially relates to the ingress of cold outdoor air into the building and the corresponding displacement of the heated internal air. This incoming cold air must be heated if comfort conditions are to be maintained. In a traditionally constructed building, infiltration can account for 30 to 40 percent of the total heat loss, however construction standards continue to improve in this area.

With good design and strict on-site control of building techniques, infiltration losses can be significantly reduced, resulting in equivalent savings in energy consumption, emissions and running costs.

In order to ensure that a sufficient level of air tightness is achieved, air permeability testing will be specified in tender documents, with the responsibility being placed on the main contractor to carry out testing and achieve the targets identified in the tender documents.

A design air permeability target of **3 m3/m2/hr** has been identified for the houses on the site.

The air permeability testing will be carried out in accordance with BS EN 13829:2001 ‘Determination of air permeability of buildings, fan pressurisation method’ and CIBSE TM23: 2000 ‘Testing buildings for air leakage”

3.3 Thermal Bridging

Thermal bridges occur at junctions between planar elements of the building fabric and are typically defined as areas where heat can escape the building fabric due to a lack of continuity of the insulation in the adjoin elements.

Careful design and detailing of the manner in which insulation is installed at these junctions can reduce the rate at which the heat escapes. Standard good practice details are available and are known as Acceptable Construction Details (ACDs). Adherence to these details is known to reduce the rate at which heat is lost.

The rate at which heat is lost is quantified by the Thermal Bridging Factor of the dwelling and measured in W/m2K. The Thermal Bridging Factor is used in the overall dwelling Part L calculation, this value can be entered in three different ways:

0.15W/m^2K	Used where the ACDs are not adhered to
0.08W/m^2K	Used where the ACDs are fully adhered to
< 0.08 W/m^2K	Used where the thermal details are thermally modelled and considered to perform better than the ACDs

It is intended that the ACDs will be adhered where suitable benchmarks exist and/or that thermal modelling will be carried out for any non-standard junction details within proposed development.

4. Heat Sources & Renewable Energy Options & Proposals

All new dwellings must meet overall energy performance levels (as defined by the Energy Performance Coefficient - EPC) and must have a portion of their annual energy demand provided by renewable energy sources.

The renewable energy source can be thermal energy such as solar thermal collection, biomass boilers or heat pumps or it can be electrical energy as generated by photovoltaic solar panels or wind turbines. The minimum renewable energy contributions defined in Part L 2022 Part (b) is 20% of the total energy consumption for the dwelling.

Two main fuel sources are generally available for developments of this nature, natural gas and electricity. Each present distinct options for compliance with the new standards. Solutions involving gas as the primary fuel source will typically include a solar technology such as PV panels to meet the renewable energy requirements while solutions relying on electricity will include heat pump technology.

The options presented below set out the options for the dwellings proposed for the site. The final selection and combination of technologies will most likely be selected from these options based on a more in-depth technical and financial appraisal of the technologies which will be carried out during detailed design.

4.1 Houses - Air Source Heat Pumps

Air source heat pumps (ASHPs) utilise grid supplied electricity to extract thermal energy from a heat source, in this case, the external ambient air. While the electricity consumed is obviously not renewable energy, the efficiency at which a heat pump operates allows a significant portion of the heat delivered to be considered as renewable energy. The amount of heat considered to be renewable is determined by the efficiency of the heat pump and the “primary energy conversion factor” for grid supplied electricity. Typically, approximately 40% to 50% of the heat supplied is considered to be renewable energy.

Air source heat pumps require an indoor and an outdoor component. The outdoor unit is the evaporator which extracts the thermal energy from the ambient air while the indoor unit typically includes the heating buffer tanks and the hot water cylinder for the dwelling. The outdoor unit is typically located in the back garden of a dwelling.

In recent years, the design of ASHPs has improved bringing about higher efficiencies and reduced costs. This, in turn, has led to an increase use of this technology in large scale housing developments. Certified seasonal efficiencies of some models can exceed 500% meaning that the use of this technology can easily deliver compliance with current Part L requirements.

4.2 Apartments Option 1 –Exhaust Air Heat Pumps

Exhaust Air heat pumps (EAHPs) operate in a very similar manner to the more conventional air source heat pumps and utilise grid supplied electricity to extract thermal energy from a heat source, in this case, the internal air within the apartment. The internal air is extracted from kitchens and wet rooms and is drawn into the heat pump via ductwork in the ceiling void. The heat pump extracts heat from this air before expelling it from the apartment.

As noted in Section 4.2 above, the electricity consumed is not renewable energy but the efficiency at which a heat pump operates allows a significant portion of the heat delivered to the dwelling be considered as renewable.

There are a number of manufacturers offering products of this type and the certified seasonal efficiencies of some models can exceed 450% in heating mode and 170% to 190% in hot water mode. These

efficiencies can deliver Part L 2022 compliance in most circumstances but in some instances may need supplementary PV panels in order to meet the required energy targets.

There is no requirement for a separate Mechanical Extract Ventilation (MEV) systems when an exhaust air heat pump is used as the heat pump draws the air from all wet rooms in the same manner as an MEV system would. The fan will run continuously to ensure that the minimum ventilation rates are maintained and the supply air to the dwelling is provided through trickle vents in each habitable room.

4.3 Apartments Option 2 – Electric Heaters, Hot Water Heat Pumps, Heat Recovery Ventilation & PV Panels

This approach includes the provision of electric storage and/or convector heaters in the living & sleeping areas to meet all of the space heating requirements with electric towel rads provided in main bathrooms and en-suites.

The hot water demand is met by a hot water heat pump which utilise grid supplied electricity to extract thermal energy from a heat source in a similar manner to an Exhaust Air Heat Pump. The heat pump is ducted directly to the external façade through insulated supply & exhaust ductwork and uses external air for the hot water needs. It can use up to 3 times less electricity than direct acting water heaters and produces renewable energy to aid Part L compliance.

Heat Recovery Ventilation would then be provided in order meet the ventilation needs of the apartments. Air is extracted from wet rooms and supplied to living spaces via a central unit which contains supply and extract fans and a heat exchanger. This system recovers the heat from the warm air being extracted from the dwelling and uses the heat recovered to raise the temperature of the incoming air stream leading to improved overall efficiency.

PV panels are also then needed to improve the overall renewable energy contribution and improve the overall energy performance of the dwellings. Generally, 1 or 2 PV panels will be required for each apartment.

4.4 Apartment Corridors/Landlord Areas

In accordance with the requirements of Part L 2022, the common areas within the apartment blocks are required to meet the requirements of Part L 2022 for “Buildings Other Than Dwellings”. Under Part L 2022, a portion (10% to 20%) of the energy demand of the common areas must be met by a renewable energy source. The energy demand within these spaces will be exclusively provided by electrical energy (lighting, space heating & lifts etc) so a photovoltaic array would be best suited to meet this renewable energy demand.

5. Proposed Solutions

The preceding sections of this report set out the regulatory requirements with which the scheme will have to comply while identifying a number of technologies and design approaches that may be utilised to achieve compliance.

The building fabric standards and the technology solutions discussed will all be assessed in greater detail during the detailed design stage of the project. A cost benefit analysis of all these available solutions will be carried out to determine the correct balance between an efficient building envelope and the most appropriate combination of technology and renewable energy systems.

The proposed approach to achieving Part L Compliance will be based on a combination of the solutions below once a detailed analysis has been completed at detailed design stage. A final decision will be made once capital costs, renewable targets and regulation compliance have all been compared to find the most appropriate solution.

5.1 Energy in Use Measures

The most likely overall solution that will be implemented will include the following measures

- Meet or exceed minimum U-Value standards
- Achieve a high level of air tightness (typically $3m^3/m^2/hr$)
- Ensure thermal bridging details are designed to meet the performance of the ACDs or an equivalent standard.
- Provide an appropriate combination of technologies to ensure energy consumption is in line with Part L 2022 requirements. For the houses, this will be achieved using air source heat pumps while for the apartments, on of the two approaches described in Section 4 will be adopted.
- Install centralised mechanical ventilation systems to ensure adequate ventilation rates are achieved in the dwelling which maximising the benefits of the airtight construction while ensuing air quality is maintained.

6. Power & Telecommunications

6.1 ESB Networks

ESB Networks have been contacted and an existing ESB network map for the area surrounding the proposed development has been obtained. Refer to Appendix A. There is an existing Medium Voltage (10kV) Network on Oak Drive to the south of the proposed development which will be used to provide power to the site. A formal application for connection will be made after planning permission is granted.

There are also High Voltage (38KV) overhead lines traversing the site from north to south. Consultation with ESB Networks has taken place and a strategy for the diversion & undergrounding of these overhead cables has been agreed.

In order to achieve this undergrounding, a new ESB pylon will be erected at the northern end of the site to allow the overhead lines to drop to below ground. Ducting will be provided through the site and beyond the red line boundary at the southern extremity of the site where a new triple end pole structure will be erected on adjacent lands.

Refer to the Landscape Architects drawings for details for the proposed location of the new pylon. ESB standard pylon details are included in Appendix B of this report. ESB have indicated that a 12m pylon will be required.

6.2 Siro

Siro Broadband is a joint venture between ESB Networks and Vodafone which utilises the ESB duct infrastructure to provide high speed fibre broadband to residential properties.

Once the ESB designs have been issued for the scheme, Siro will engage and outline thei

The Siro infrastructure will allow for multiple broadband providers.

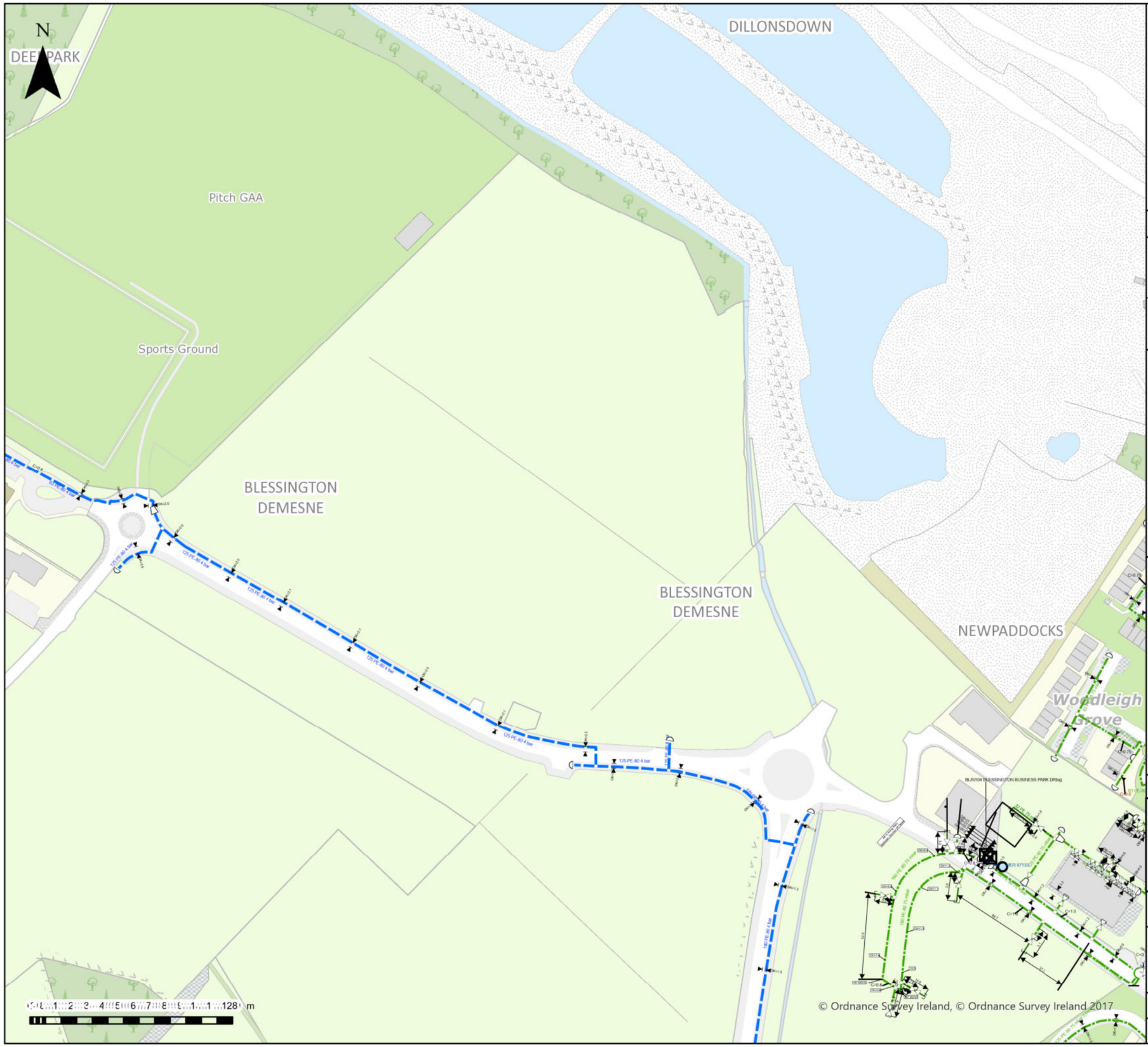
6.3 Virgin Media

Virgin Media have been contacted and an existing Virgin Media map for the area surrounding the proposed development has been obtained. Refer to Appendix A.

There is existing Virgin Media Networks infrastructure in the vicinity of the site which has the capacity to cater for this new development.

A formal application cannot be made at this stage but will be made as soon as the planning permission is granted and it is expected that Virgin Media “Fibre to the Home” broadband will be available for the site.

Appendix A – Utility Maps



Important Safety Notice: Damage to gas pipelines can result in serious injury or death. Gas network information is provided as a general guide. The exact location and depth of medium or low pressure distribution gas pipes must be verified on site by carrying out necessary investigations, including, for example, hand digging trial holes along the route of the pipe. Service pipes are not generally shown but their presence should always be anticipated.

High pressure transmission pipelines are shown in red. If a transmission pipeline is identified within 10m of any intended excavations then work must not proceed before GNI has been consulted. The true location and depth of a transmission pipeline must be verified on site by a representative of GNI. Contact can be made through 1800 427 747.

All work in the vicinity of the gas network must be completed in accordance with the current edition of the Health and Safety Authority publication, 'Code of Practice For Avoiding Danger From Underground Services' which is available from the Health and Safety Authority (0818 289 389) or can be downloaded at www.hsa.ie.

Legal Notice: Gas Networks Ireland (GNI) and its affiliates, accept no responsibility for the accuracy of any information contained in this document including data concerning location and technical designation of the gas distribution and transmission network (the"Information"). The Information should not be relied on for accurate distance or depth of cover measurements.

Any representations and warranties, express or implied, are excluded to the fullest extent permitted by law. No liability shall be accepted for any loss or damage including, without limitation,direct, indirect or consequential loss, arising out of or in connection with the use or re-use of the Information.

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- Aurora Telecom Duct
- Aurora Telecom Sub Duct
- Aurora Telecom Inserted Gas Pipe

Aurora TELECOM

Aurora Telecom Queries - 01-8926166 (Office Hours)
Aurora_Network_Queries@gasnetworks.ie
Aurora Telecom Emergency Only 1800 427399 / 01 2030120

- Transmission Pipe (High Pressure)
- Transmission Pipe (Construction Issue)
- Distribution Pipe (Medium Pressure)
- Distribution Pipe (Low Pressure)
- Service Pipe (Medium Pressure)
- Service Pipe (Low Pressure)
- Strategic Pipe (Medium Pressure)
- Strategic Pipe (Low Pressure)
- Inserted
- Abandoned Pipe

C=?	Cover (depth in metres)		Pressure Monitor
CP	CP Test Point		Protection (Slabbing)
	End Cap		Protection (Sleeve)
	Hot Tap		Reducer
	Installation		Service Terminator
	Valve		Tee
	Mains Verification**		Transition

** Please contact GNI on 1800-427747 for specific information

DIAL BEFORE YOU DIG 1800 42 77 47
In Emergency call 1800 20 50 50 Gas Networks Ireland

Gas Networks Ireland

GAS NETWORK INFORMATION

Description: test

Location: 697827,715274

Plot Date: 26/07/2023 13:39	Scale: 2500 @ A3
Plotted By: 6257	Ref ID: *6257_26072023133947*

ESB Networks

TITLE: 20230726-058_A3

COLOUR CODE:

- BLACK - 38KV & HIGHER VOLTAGE OVERHEAD LINES
- GREEN - MV(10KV/20KV) OVERHEAD LINES
- BLUE - LV (400V/230V) OVERHEAD LINES
- CYAN - 38KV & HIGHER VOLTAGE UNDERGROUND CABLE ROUTES
- RED - MV/LV (10KV/20KV/400V/230V) UNDERGROUND CABLE ROUTES

DATE: 26-Jul-2023

** SCALE: 1:2500

** SCALE WHEN PRINTED ON AN A3 PAGE
XY COORDINATES DISPLAYED IN IRISH GRID COORDINATE SYSTEM

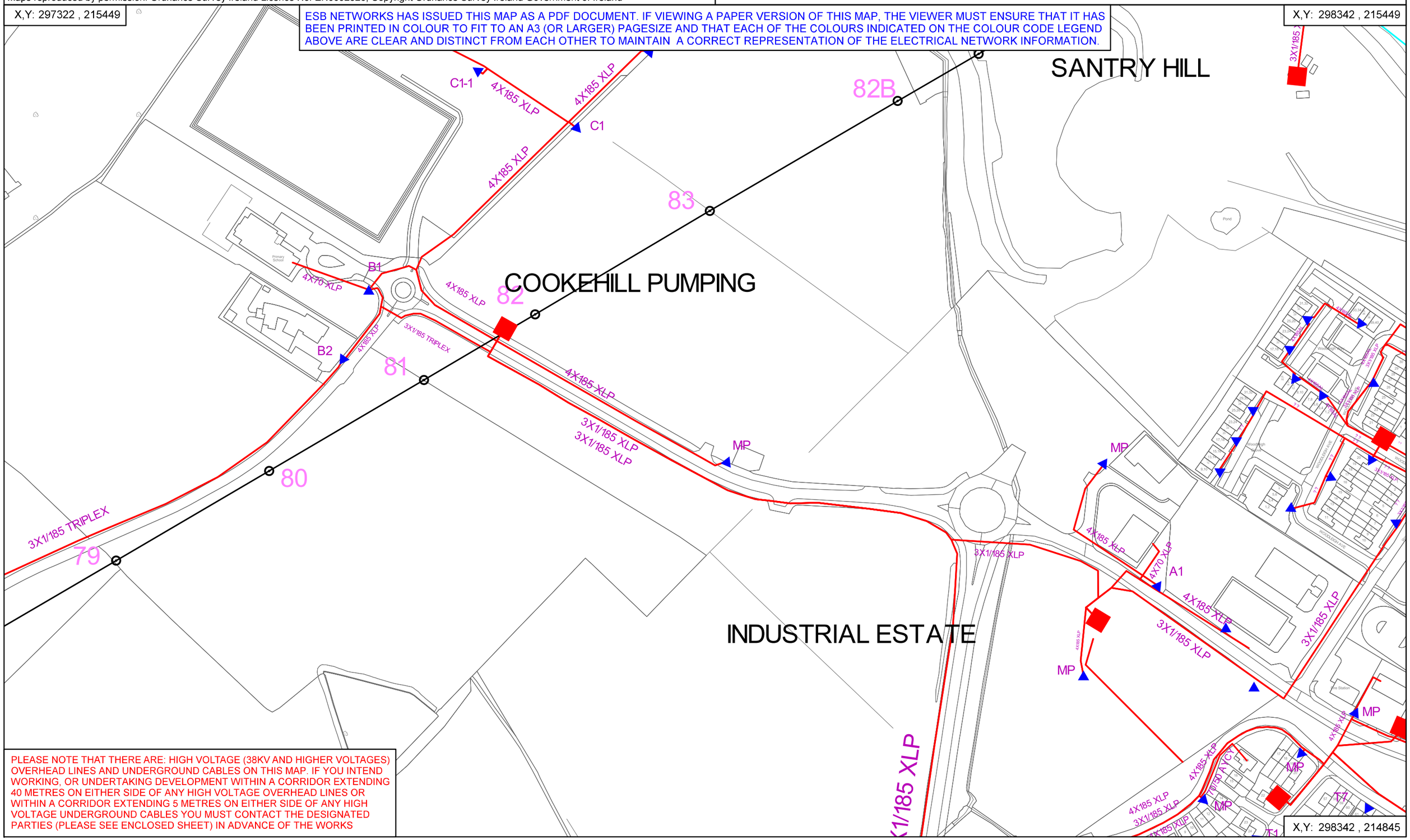
WARNING

THIS MAP INDICATES THE APPROXIMATE LOCATION OF ESB TRANSMISSION (400KV, 220KV, 110KV, 38KV) AND DISTRIBUTION (20KV, 10KV, 230V/400V) UNDERGROUND CABLES AND OVERHEAD LINES IN THE GENERAL AREA OF THE PROPOSED WORKS. ESB NETWORKS TAKES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE MAP. IT IS THE USER'S RESPONSIBILITY TO INDEPENDENTLY VERIFY THE INFORMATION AND THE LOCATION OF UNDERGROUND CABLES AND OVERHEAD LINES. LOW VOLTAGE (230V/400V) SERVICE CABLES (E.G. HOUSE SERVICES, FACTORY/SHOP SERVICES, PUBLIC LIGHTING LAMP SERVICES, ETC) ARE NOT INCLUDED BUT THEIR PRESENCE SHOULD BE ANTICIPATED. THE DEPTHS OF UNDERGROUND CABLES MUST NEVER BE ASSUMED. ADDITIONAL MORE DETAILED INFORMATION IS AVAILABLE FOR HIGH VOLTAGE TRANSMISSION UNDERGROUND CABLES (38KV, 110KV, 220KV, 400KV) FROM THE LOCAL ESB NETWORKS TRANSMISSION REPRESENTATIVE - SEE ATTACHED LIST FOR CONTACT DETAILS OR CALL 1800 372 757. NO WORK SHOULD BE CARRIED OUT IN THE VICINITY OF 38KV OR HIGHER VOLTAGE UNDERGROUND CABLES WITHOUT PRIOR CONSULTATION WITH ESB NETWORKS. BEFORE ANY MECHANICAL EXCAVATION IS UNDERTAKEN, THE ACTUAL LOCATION OF ALL UNDERGROUND ELECTRICITY CABLES MUST BE ESTABLISHED AND VERIFIED ON THE SITE USING: (A) UP-TO-DATE MAP RECORDS; (B) CABLE LOCATER EQUIPMENT OPERATED IN BOTH POWER AND RADIO MODES; (C) CAREFUL HAND DIGGING OF TRIAL HOLES USING 'SAFE DIGGING PRACTICE'. REFER ALSO TO 'HSA CODE OF PRACTICE FOR AVOIDING DANGER FROM UNDERGROUND SERVICES'. ESB TAKES NO RESPONSIBILITY FOR AND SHALL BEAR NO LIABILITY, HOWSOEVER ARISING, IN RELATION TO ANY DAMAGE, INJURY/DEATH OR LOSS OF SUPPLY AS A RESULT OF DAMAGE OR INTERFERENCE WITH ITS NETWORKS.

X,Y: 297322 , 215449

ESB NETWORKS HAS ISSUED THIS MAP AS A PDF DOCUMENT. IF VIEWING A PAPER VERSION OF THIS MAP, THE VIEWER MUST ENSURE THAT IT HAS BEEN PRINTED IN COLOUR TO FIT TO AN A3 (OR LARGER) PAGESIZE AND THAT EACH OF THE COLOURS INDICATED ON THE COLOUR CODE LEGEND ABOVE ARE CLEAR AND DISTINCT FROM EACH OTHER TO MAINTAIN A CORRECT REPRESENTATION OF THE ELECTRICAL NETWORK INFORMATION.

X,Y: 298342 , 215449



PLEASE NOTE THAT THERE ARE: HIGH VOLTAGE (38KV AND HIGHER VOLTAGES) OVERHEAD LINES AND UNDERGROUND CABLES ON THIS MAP. IF YOU INTEND WORKING, OR UNDERTAKING DEVELOPMENT WITHIN A CORRIDOR EXTENDING 40 METRES ON EITHER SIDE OF ANY HIGH VOLTAGE OVERHEAD LINES OR WITHIN A CORRIDOR EXTENDING 5 METRES ON EITHER SIDE OF ANY HIGH VOLTAGE UNDERGROUND CABLES YOU MUST CONTACT THE DESIGNATED PARTIES (PLEASE SEE ENCLOSED SHEET) IN ADVANCE OF THE WORKS

X,Y: 298342 , 214845

A3

Sports
Ground

Club House

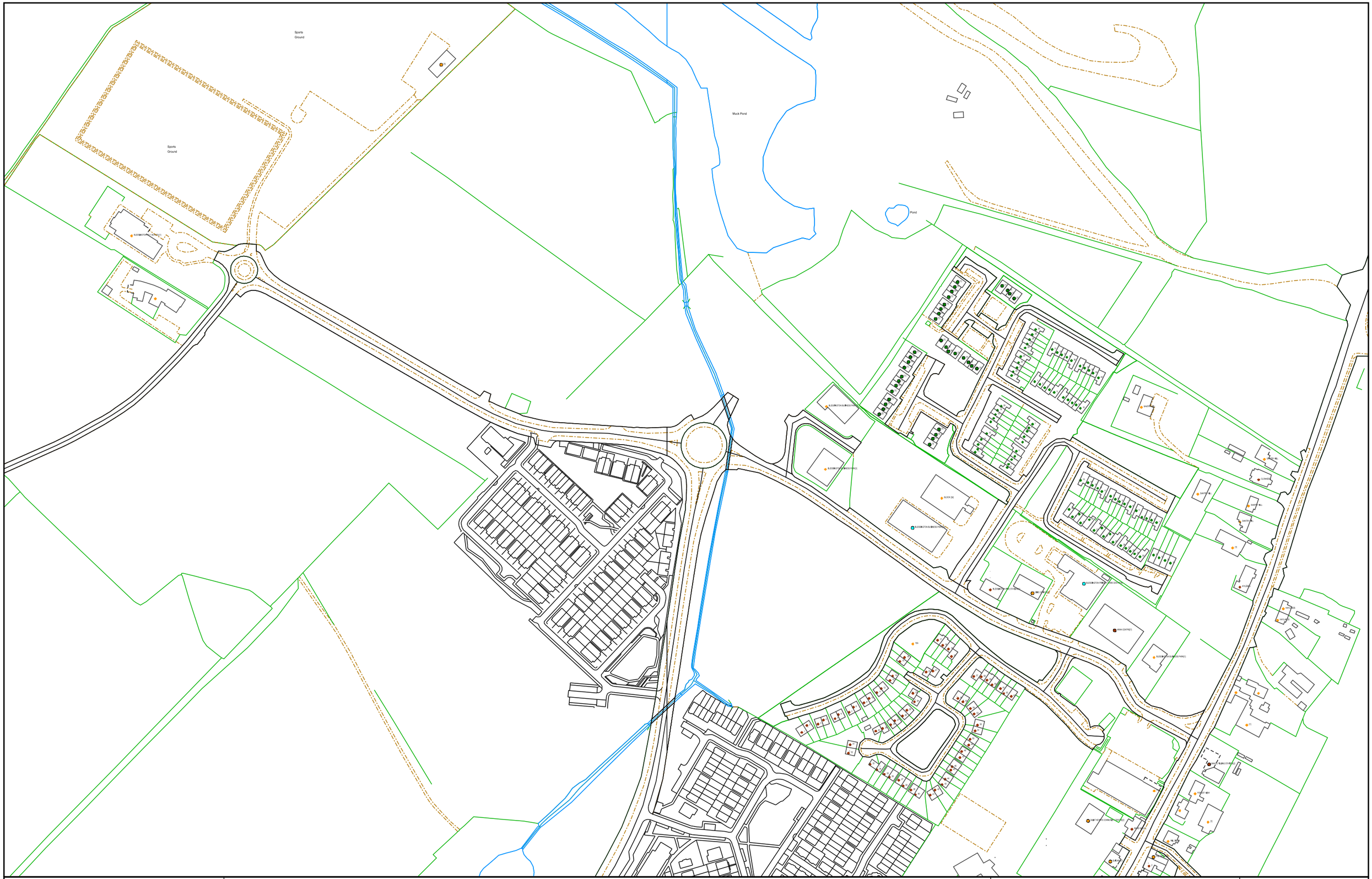
Muck Pond

1314
1376
1377
1416
1375
1411
1412
1708

2x100PP
1x100PP
2x100PP
2x100PP
2x100PP
2x100PP
2x100PP
2x100PP
1x100PP

BSN1
IC1

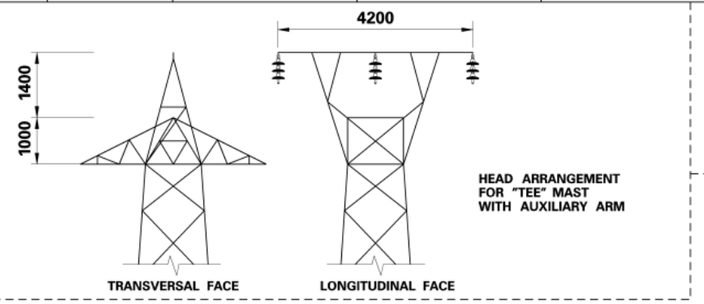
open eir Civil Engineering Infrastructure Service	Scale: 1:1500	Irish National Grid Co-Ordinates Centre XY: 297882 m, 215275 m
	Date 26/07/2023	Smallworld Powered by GE



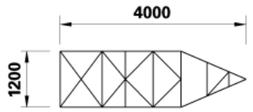
Unit 7, Westgate Business Park, Ballymount, Dublin 24.	PROJECT NAME DESIGNED BY:	Ordnance Survey Ireland Licence No. EN0023805 (c) Ordnance Survey Ireland and Government of Ireland Produced on: 31/07/2023	@ A3

Appendix B – ESB Pylon - Typical Details

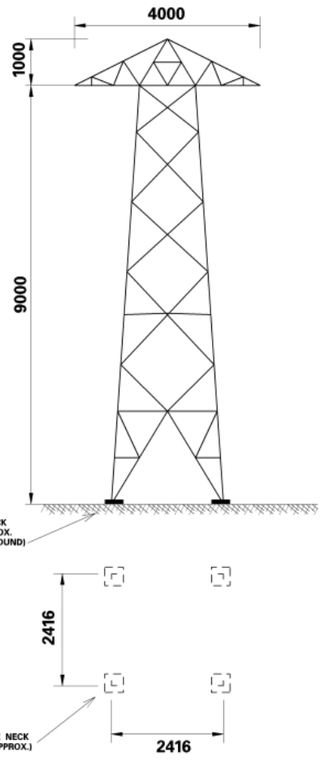
A3 CAD | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10



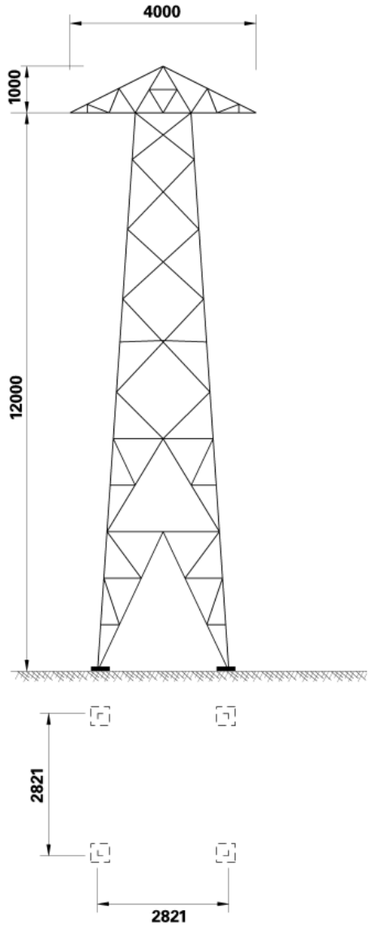
HEAD ARRANGEMENT FOR "TEE" MAST WITH AUXILIARY ARM



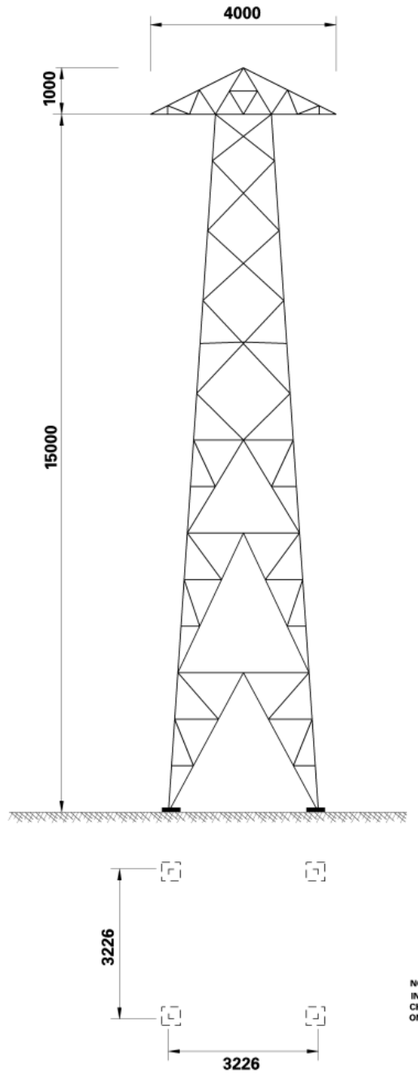
CROSSARM PLAN



BASE FOOTPRINT (9M MAST)



BASE FOOTPRINT (12M MAST)



BASE FOOTPRINT (15M MAST)

NOTES :
INTERNAL BRACING MAY CHANGE DEPENDING ON SUPPLIER.

Rev	Revision Description

Purpose of issue – Preliminary unless indicated
Tender ☐ Client Approval ☐ Construction ☐ As-built ☐ Revised ☐

ESB International
ESBI Engineering & Facility Management Ltd
Stephen Court, 18/21 St Stephen's Green, Dublin 2 Ireland
Telephone + 353-1-703 8000 Fax + 353-1-661-5359
www.esbi.ie
Registered Office as above
Registered in Ireland No. 155249

Client: ESB NETWORKS

Project: GENERIC LINES DOCUMENTS

Contract: N/A

Production Unit: High Voltage Engineering

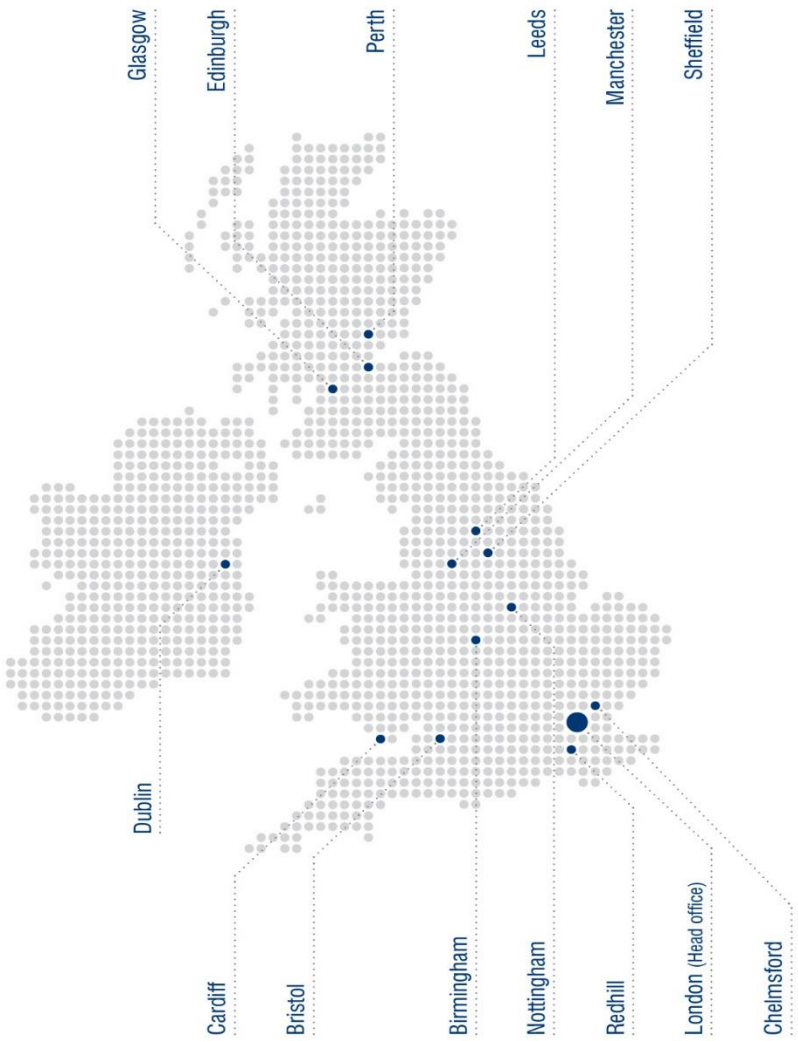
Drawing Title: 38kV LINES /PLANNING APPLICATION
TYPE "F"
LATTICE STEEL MAST TYPE 54D
9M, 12M, 15M HEIGHTS

Drawn	Produced	Verified	Approved	Approved date
E.Lawlor	E.Lawlor	J.Eustace	P.Ennis	29/08/08

Client Ref	No. of Shts	Size	Scale
TC205748		A3	1:100

Drawing Number: PG567–D020–213–007–000 (SHEET, REV)

UK and Ireland Office Locations



APPENDIX 9A NOISE CONTOUR MAPS

Redkite Environmental

Do Something 2041
Predicted Road Noise
Levels @4m Height

Lden dBA

Noise level
Lden
in dB(A)

	<= 45
45 <	<= 50
50 <	<= 55
55 <	<= 60
60 <	<= 65
65 <	<= 70
70 <	<= 75
75 <	

Redkite Environmental

Do Minimum 2026
Predicted Road Noise
Levels @4m Height

Lden dBA

Noise level
Lden
in dB(A)

N

	<= 45
45 <	<= 50
50 <	<= 55
55 <	<= 60
60 <	<= 65
65 <	<= 70
70 <	<= 75
75 <	

Redkite Environmental

Do Something 2026
Predicted Road Noise
Levels @4m Height

Lden dBA

Noise level
Lden
in dB(A)

	<= 45
45 <	<= 50
50 <	<= 55
55 <	<= 60
60 <	<= 65
65 <	<= 70
70 <	<= 75
75 <	

Redkite Environmental

Predicted Road Noise Levels Do Something 2041 @4m Height LAeq,16hour 07:00 - 23:00

Noise level 07:00 - 23:00 in dB(A)

N

	<= 45
45 <	<= 50
50 <	<= 55
55 <	<= 60
60 <	<= 65
65 <	<= 70
70 <	<= 75
75 <	

Redkite Environmental

Do Something 2041
Predicted Road Noise
Levels @4m
LAeq,8hour
23:00 - 07:00

Noise level
23:00 - 07:00
in dB(A)

	<= 35
35 <	<= 40
40 <	<= 45
45 <	<= 50
50 <	<= 55
55 <	<= 60
60 <	<= 65
65 <	

Redkite Environmental

Do Minimum 2041
Predicted Road Noise
Levels @4m Height

Lden dBA

Noise level
Lden
in dB(A)

	<= 45
45 <	<= 50
50 <	<= 55
55 <	<= 60
60 <	<= 65
65 <	<= 70
70 <	<= 75
75 <	

Redkite Environmental

Existing Road Noise Levels @4m Height

Lden dBA

Noise level Lden in dB(A)

N

	<= 45
45 <	<= 50
50 <	<= 55
55 <	<= 60
60 <	<= 65
65 <	<= 70
70 <	<= 75
75 <	