

ENVIRONMENTAL IMPACT ASSESSMENT REPORT

VOLUME III TECHNICAL APPENDICES



PROPOSED RESIDENTIAL DEVELOPMENT

AT

Phase 1A Clonburris SDZ

Prepared by



In Conjunction with

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Archaeology**

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APPENDIX A – CULTURAL HERITAGE

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Appendix 13.1 Archaeological Sites Within 250m of the Proposed Development Area

SMR NO.:	DU017-036
RMP STATUS:	Scheduled for inclusion in the next revision of the RMP
TOWNLAND:	Cappagh
PARISH:	Clondalkin
BARONY:	Uppercross
I.T.M.:	705830/ 732592
CLASSIFICATION:	Enclosure
DIST. TO SITE:	Zone of notification partially within the proposed development area
DESCRIPTION:	Situated in rough pasture on fairly level ground N of a stream. An aerial photograph taken in 1971 (FSI 206/5/4) shows a cropmark of an elongated oval enclosure (est. dims. NE-SW c. 34m; NW-SE c. 22m). Not visible at ground level.
REFERENCE:	www.archaeology.ie/SMR file

SMR NO.:	DU017-035
RMP STATUS:	Scheduled for inclusion in the next revision of the RMP
TOWNLAND:	Clonburris Little
PARISH:	Clondalkin
BARONY:	Uppercross
I.T.M.:	705409/ 732272
CLASSIFICATION:	Enclosure
DIST. TO SITE:	Zone of notification partially within the proposed development area
DESCRIPTION:	In field of rough pasture bordering the canal. An aerial photograph (FSI 1971/224-6) shows a horseshoe-shaped enclosure. No visible at ground level
REFERENCE:	www.archaeology.ie/SMR file

Appendix 13.2 Architectural Sites Within 250m of the Proposed Development Area

RPS NO.	122
NIAH NO.	11205011
TOWNLAND	Cappagh
PARISH	Clondalkin
BARONY	Uppercross
I.T.M.	705792,732234
CLASSIFICATION	Omer Lock House
DIST. FROM DEVELOPMENT	Immediately south of the proposed development area
DESCRIPTION	<p>Description</p> <p>Detached three-bay two-storey gable-fronted former lock-keeper's house, c.1790, now derelict. Roughcast rendered limestone rubble walls with cut stone architrave, sills, string courses and door surround. Shallow recessed arch framing centre of each elevation. Unroofed and partially overgrown.</p> <p>Appraisal</p> <p>This handsome, symmetrical lock keeper's house, which may have been designed by Thomas Omer, is one of a group along the Grand Canal. Though in poor condition, it retains its original proportions and some materials. Its presence enhances the area both visually and historically.</p>
REFERENCE	South Dublin County Development Plan 2016–2022/ NIAH Survey

RPS NO.	128
NIAH NO.	11205012
TOWNLAND	Clonburris Great
PARISH	Clondalkin
BARONY	Uppercross
I.T.M.	705878,732214
CLASSIFICATION	11th Lock
DIST. FROM DEVELOPMENT	c. 22m south

DESCRIPTION	Description Single-stage canal lock, c.1780, with coursed limestone walls having limestone coping. Timber and iron lock gates to either end. Timber mooring post at intervals between gates.
	Appraisal A standard-type canal lock retaining original materials and finishes, set in a tranquil location with the nearby lock keeper's house. A valuable element of the overall canal group.
REFERENCE	South Dublin County Development Plan 2016–2022/ NIAH Survey

RPS NO.	123
NIAH NO.	11205013
TOWNLAND	Clonburris Great
PARISH	Clondalkin
BARONY	Uppercross
I.T.M.	706124,732205
CLASSIFICATION	10th Lock
DIST. FROM DEVELOPMENT	c. 34m south
DESCRIPTION	Description Single-stage canal lock, c.1780, with coursed limestone walls, rendered between gates, having limestone coping. Timber and iron lock gates to either end. Timber mooring post at intervals between gates.
	Appraisal A standard-type canal lock retaining original materials and finishes. It adds a welcome historical dimension to the rapidly developing vicinity, and is a valuable element of the overall canal group.
REFERENCE	South Dublin County Development Plan 2016–2022/ NIAH Survey

Appendix 13.3 Legislation Protecting the Archaeological Resource

Protection of Cultural Heritage

The cultural heritage in Ireland is safeguarded through national and international policy designed to secure the protection of the cultural heritage resource to the fullest possible extent (Department of Arts, Heritage, Gaeltacht and the Islands 1999, 35). This is undertaken in accordance with the provisions of the European Convention on the Protection of the Archaeological Heritage (Valletta Convention), ratified by Ireland in 1997.

The Archaeological Resource

The National Monuments Act 1930 to 2014 and relevant provisions of the National Cultural Institutions Act 1997 are the primary means of ensuring the satisfactory protection of archaeological remains, which includes all man-made structures of whatever form or date except buildings habitually used for ecclesiastical purposes. A National Monument is described as 'a monument or the remains of a monument the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto' (National Monuments Act 1930 Section 2). A number of mechanisms under the National Monuments Act are applied to secure the protection of archaeological monuments. These include the Register of Historic Monuments, the Record of Monuments and Places, and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

Ownership and Guardianship of National Monuments

The Minister may acquire national monuments by agreement or by compulsory order. The state or local authority may assume guardianship of any national monument (other than dwellings). The owners of national monuments (other than dwellings) may also appoint the Minister or the local authority as guardian of that monument if the state or local authority agrees. Once the site is in ownership or guardianship of the state, it may not be interfered with without the written consent of the Minister.

Register of Historic Monuments

Section 5 of the 1987 Act requires the Minister to establish and maintain a Register of Historic Monuments. Historic monuments and archaeological areas present on the register are afforded statutory protection under the 1987 Act. Any interference with sites recorded on the register is illegal without the permission of the Minister. Two months' notice in writing is required prior to any work being undertaken on or in the vicinity of a registered monument. The register also includes sites under Preservation Orders and Temporary Preservation Orders. All registered monuments are included in the Record of Monuments and Places.

Preservation Orders and Temporary Preservation Orders

Sites deemed to be in danger of injury or destruction can be allocated Preservation Orders under the 1930 Act. Preservation Orders make any interference with the site illegal. Temporary Preservation Orders can be attached under the 1954 Act. These perform the same function as a Preservation Order but have a time limit of six months, after which the situation must be reviewed. Work may only be undertaken on or in the vicinity of sites under Preservation Orders with the written consent, and at the discretion, of the Minister.

Record of Monuments and Places

Section 12(1) of the 1994 Act requires the Minister for Arts, Heritage, Gaeltacht and the Islands (now the Minister for the Department of Housing, Local Government and Heritage) to establish and maintain a record of monuments and places where the Minister believes that such monuments exist. The record comprises a list of monuments and relevant places and a map/s showing each monument and relevant place in respect of each county in the state. All sites recorded on the Record of Monuments and Places receive statutory protection under the National Monuments Act 1994. All recorded monuments on the proposed development site are represented on the accompanying maps.

Section 12(3) of the 1994 Act provides that 'where the owner or occupier (other than the Minister for Arts, Heritage, Gaeltacht and the Islands) of a monument or place included in the Record, or any other person, proposes to carry out, or to cause or permit the carrying out of, any work at or in relation to such a monument or place, he or she shall give notice in writing to the Minister of Arts, Heritage, Gaeltacht and the Islands to carry out work and shall not, except

in case of urgent necessity and with the consent of the Minister, commence the work until two months after giving of notice’.

Under the National Monuments (Amendment) Act 2004, anyone who demolishes or in any way interferes with a recorded site is liable to a fine not exceeding €3,000 or imprisonment for up to 6 months. On summary conviction and on conviction of indictment, a fine not exceeding €10,000 or imprisonment for up to 5 years is the penalty. In addition, they are liable for costs for the repair of the damage caused.

In addition to this, under the European Communities (Environmental Impact Assessment) Regulations 1989, Environmental Impact Statements (EIS) are required for various classes and sizes of development project to assess the impact the proposed development will have on the existing environment, which includes the cultural, archaeological and built heritage resources. These document’s recommendations are typically incorporated into the conditions under which the proposed development must proceed, and thus offer an additional layer of protection for monuments which have not been listed on the RMP.

The Planning and Development Act 2000, as amended

Under planning legislation, each local authority is obliged to draw up a Development Plan setting out their aims and policies with regard to the growth of the area over a five-year period. They cover a range of issues including archaeology and built heritage, setting out their policies and objectives with regard to the protection and enhancement of both. These policies can vary from county to county. The Planning and Development Act 2000 recognises that proper planning and sustainable development includes the protection of the archaeological heritage. Conditions relating to archaeology may be attached to individual planning permissions.

South Dublin County Council Development Plan, 2016-2022

South County Dublin contains a large number of buildings, structures and sites of architectural, historic and/or artistic importance, in addition to numerous archaeological sites. This significant archaeological and architectural heritage is a valuable resource adding to the historical and cultural character of the County. The Development Plan contains policies which are intended to ensure the protection of this heritage. Village Design Statements can be utilised as a tool to guide development in smaller centres. It should be noted that archaeological sites and archaeological zones of interest are identified by a recorded monument reference number on the land use zoning maps. The recorded monument reference numbers are taken from the Record of Monuments and Places for Dublin, published by Department of the Environment, Heritage and Local Government.

HCL1 Objective 1:

To protect, conserve and enhance natural, built and cultural heritage features and restrict development that would have a significant negative impact on these assets.

HCL2 Objective 1:

To favour the preservation in-situ of all sites, monuments and features of significant historical or archaeological interest in accordance with the recommendations of the Framework and Principles for the Protection of Archaeological Heritage, DAHGI (1999), or any superseding national policy document.

HCL2 Objective 2:

To ensure that development is designed to avoid impacting on archaeological heritage that is of significant interest including previously unknown sites, features and objects.

HCL2 Objective 3:

To protect and enhance sites listed in the Record of Monuments and Places and ensure that development in the vicinity of a Recorded Monument or Area of Archaeological Potential does not detract from the setting of the site, monument, feature or object and is sited and designed appropriately.

HCL2 Objective 4:

To protect and preserve the archaeological value of underwater archaeological sites including associated features and any discovered battlefield sites of significant archaeological potential within the County.

HCL2 Objective 5:

To protect historical burial grounds within South Dublin County and encourage their maintenance in accordance with conservation principles.

It is the policy of the Council to promote the County's cultural heritage.

HCL18 Objective 1:

To work towards establishing an environment for promoting cross cultural understanding, racial harmony, mutual understanding and appreciation of all religious and ethnic traditions through the County.

HCL18 Objective 2:

To promote the Irish Language and favour its use in the promotion of the Villages Initiative.

HCL18 Objective 3:

To promote local heritage, the naming of any new residential development will reflect the local and historical context of its siting, and should include the use of the Irish language.

Appendix 13.4 Legislation Protecting the Architectural Resource

The main laws protecting the built heritage are the *Architectural Heritage (National Inventory) and National Monuments (Miscellaneous Provisions) Act 1999* and the *Local Government (Planning and Development) Acts 1963–1999*, which has now been superseded by the *Planning and Development Act, 2000*. The Architectural Heritage Act requires the Minister to establish a survey to identify, record and assess the architectural heritage of the country. The background to this legislation derives from Article 2 of the 1985 Convention for the Protection of Architectural Heritage (Granada Convention). This states that:

For the purpose of precise identification of the monuments, groups of structures and sites to be protected, each member state will undertake to maintain inventories of that architectural heritage.

The National Inventory of Architectural Heritage (NIAH) was established in 1990 to fulfil Ireland's obligation under the Granada Convention, through the establishment and maintenance of a central record, documenting and evaluating the architecture of Ireland (NIAH Handbook 2005:2). As inclusion in the inventory does not provide statutory protection, the survey information is used in conjunction with the *Architectural Heritage Protection Guidelines for Planning Authorities* to advise local authorities on compilation of a Record of Protected Structures as required by the *Planning and Development Act, 2000*.

Protection under the Record of Protected Structures and County Development Plan

Structures of architectural, cultural, social, scientific, historical, technical or archaeological interest can be protected under the Planning and Development Act, 2000, where the conditions relating to the protection of the architectural heritage are set out in Part IV of the act. This act superseded the *Local Government (Planning and Development) Act, 1999*, and came into force on 1st January 2000.

The Act provides for the inclusion of Protected Structures into the planning authorities' development plans and sets out statutory regulations regarding works affecting such structures. Under new legislation, no distinction is made between buildings formerly classified under development plans as List 1 and List 2. Such buildings are now all regarded as 'Protected Structures' and enjoy equal statutory protection. Under the Act the entire structure is protected, including a structure's interior, exterior, attendant grounds and also any structures within the attendant grounds.

The Act defines a Protected Structure as (a) a structure, or (b) a specified part of a structure which is included in a Record of Protected Structures (RPS), and, where that record so indicates, includes any specified feature which is in the attendant grounds of the structure and which would not otherwise be included in this definition. Protection of the structure, or part thereof, includes conservation, preservation, and improvement compatible with maintaining its character and interest. Part IV of the act deals with architectural heritage, and Section 57 deals specifically with works affecting the character of Protected Structures or proposed Protected Structures and states that no works should materially affect the character of the structure or any element of the structure that contributes to its special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest. The Act does not provide specific criteria for assigning a special interest to a structure. However, the National Inventory of Architectural Heritage (NIAH) offers guidelines to its field workers as to how to designate a building with a special interest, which are not mutually exclusive. This offers guidance by example rather than by definition:

Archaeological

It is to be noted that the NIAH is biased towards post-1700 structures. Structures that have archaeological features may be recorded, providing the archaeological features are incorporated within post-1700 elements. Industrial fabric is considered to have technical significance, and should only be attributed archaeological significance if the structure has pre-1700 features.

Architectural

A structure may be considered of special architectural interest under the following criteria:

- Good quality or well executed architectural design
- The work of a known and distinguished architect, engineer, designer, craftsman
- A structure that makes a positive contribution to a setting, such as a streetscape or rural setting

- Modest or vernacular structures may be considered to be of architectural interest, as they are part of the history of the built heritage of Ireland.
- Well-designed decorative features, externally and/or internally

Historical

A structure may be considered of special historical interest under the following criteria:

- A significant historical event associated with the structure
- An association with a significant historical figure
- Has a known interesting and/or unusual change of use, e.g. a former workhouse now in use as a hotel
- A memorial to a historical event.

Technical

A structure may be considered of special technical interest under the following criteria:

- Incorporates building materials of particular interest, i.e. the materials or the technology used for construction
- It is the work of a known or distinguished engineer
- Incorporates innovative engineering design, e.g. bridges, canals or mill weirs
- A structure which has an architectural interest may also merit a technical interest due to the structural techniques used in its construction, e.g. a curvilinear glasshouse, early use of concrete, cast-iron prefabrication.
- Mechanical fixtures relating to a structure may be considered of technical significance.

Cultural

A structure may be considered of special cultural interest under the following criteria:

- An association with a known fictitious character or event, e.g. Sandycove Martello Tower, which featured in Ulysses.
- Other structure that illustrate the development of society, such as early schoolhouses, swimming baths or printworks.

Scientific

A structure may be considered of special scientific interest under the following criteria:

- A structure or place which is considered to be an extraordinary or pioneering scientific or technical achievement in the Irish context, e.g. Mizen Head Bridge, Birr Telescope.

Social

A structure may be considered of special social interest under the following criteria:

- A focal point of spiritual, political, national or other cultural sentiment to a group of people, e.g. a place of worship, a meeting point, assembly rooms.
- Developed or constructed by a community or organisation, e.g. the construction of the railways or the building of a church through the patronage of the local community
- Illustrates a particular lifestyle, philosophy, or social condition of the past, e.g. the hierarchical accommodation in a country house, philanthropic housing, vernacular structures.

Artistic

A structure may be considered of special artistic interest under the following criteria:

- Work of a skilled craftsman or artist, e.g. plasterwork, wrought-iron work, carved elements or details, stained glass, stations of the cross.
- Well-designed mass-produced structures or elements may also be considered of artistic interest.

(From the NIAH Handbook 2003 & 2005 pages 15–20)

The Local Authority has the power to order conservation and restoration works to be undertaken by the owner of the protected structure if it considers the building to be in need of repair. Similarly, an owner or developer must make a written request to the Local Authority to carry out any works on a protected structure and its environs, which will be reviewed within three months of application. Failure to do so may result in prosecution.

South Dublin County Development Plan 2016-2022

It is the objective of South Dublin County Council:

HCL3 Objective 1:

To ensure the protection of all structures (or parts of structures) and the immediate surroundings including the curtilage and attendant grounds of structures contained in the Record of Protected Structures.

HCL3 Objective 2:

To ensure that all development proposals that affect a Protected Structure and its setting including proposals to extend, alter or refurbish any Protected Structure are sympathetic to its special character and integrity and are appropriate in terms of architectural treatment, character, scale and form. All such proposals shall be consistent with the Architectural Heritage Guidelines for Planning Authorities, DAHG (2011) including the principles of conservation.

HCL3 Objective 3:

To address dereliction and encourage the rehabilitation, renovation, appropriate use and re-use of Protected Structures.

HCL3 Objective 4:

To prevent demolition and inappropriate alteration of Protected Structures.

HCL4 Objective 1:

To avoid the removal of structures and distinctive features that positively contribute to the character of Architectural Conservation Areas including buildings, building features, shop fronts, boundary treatments, street furniture, landscaping and paving.

HCL4 Objective 2:

To ensure that new development, including infill development, extensions and renovation works within or adjacent to an Architectural Conservation Area (ACA) preserves or enhances the special character and visual setting of the ACA including vistas, streetscapes and roofscapes.

HCL4 Objective 3:

To address dereliction and promote appropriate and sensitive reuse and rehabilitation of buildings, building features and sites within Architectural Conservation Areas.

HCL4 Objective 4:

To reduce and prevent visual and urban clutter within Architectural Conservation Areas including, where appropriate, traffic management structures, utility structures and all signage.

HCL4 Objective 5:

To support public realm improvements proposed within Architectural Conservation Areas under South Dublin County Council's Villages Initiative subject to compliance with the Architectural Heritage Protection Guidelines for Planning Authorities (DAHG, 2011).

HCL5 Objective 1:

To retain existing houses that, while not listed as Protected Structures, are considered to contribute to historic character, local character, visual setting, rural amenity or streetscape value within the County.

HCL5 Objective 2:

To ensure that the redevelopment of older buildings, including extensions and renovation works do not compromise or erode the architectural interest, character or visual setting of such buildings including surrounding housing estates or streetscapes.

HCL5 Objective 3:

To encourage the retention, rehabilitation, renovation and re-use of older buildings and their original features where such buildings and features contribute to the visual setting, collective interest or character of the surrounding area.

HCL5 Objective 4:

To ensure that infill development is sympathetic to the architectural interest, character and visual amenity of the area.

Appendix 13.5 Impact Assessment and the Cultural Heritage Resource

Potential Impacts on Archaeological and Historical Remains

Impacts are defined as 'the degree of change in an environment resulting from a development' (Environmental Protection Agency 2003: 31). They are described as profound, significant or slight impacts on archaeological remains. They may be negative, positive or neutral, direct, indirect or cumulative, temporary or permanent.

Impacts can be identified from detailed information about a project, the nature of the area affected and the range of archaeological and historical resources potentially affected. Development can affect the archaeological and historical resource of a given landscape in a number of ways.

- Permanent and temporary land-take, associated structures, landscape mounding, and their construction may result in damage to or loss of archaeological remains and deposits, or physical loss to the setting of historic monuments and to the physical coherence of the landscape.
- Archaeological sites can be affected adversely in a number of ways: disturbance by excavation, topsoil stripping and the passage of heavy machinery; disturbance by vehicles working in unsuitable conditions; or burial of sites, limiting accessibility for future archaeological investigation.
- Hydrological changes in groundwater or surface water levels can result from construction activities such as de-watering and spoil disposal, or longer-term changes in drainage patterns. These may desiccate archaeological remains and associated deposits.
- Visual impacts on the historic landscape sometimes arise from construction traffic and facilities, built earthworks and structures, landscape mounding and planting, noise, fences and associated works. These features can impinge directly on historic monuments and historic landscape elements as well as their visual amenity value.
- Landscape measures such as tree planting can damage sub-surface archaeological features, due to topsoil stripping and through the root action of trees and shrubs as they grow.
- Ground consolidation by construction activities or the weight of permanent embankments can cause damage to buried archaeological remains, especially in colluviums or peat deposits.
- Disruption due to construction also offers in general the potential for adversely affecting archaeological remains. This can include machinery, site offices, and service trenches.

Although not widely appreciated, positive impacts can accrue from developments. These can include positive resource management policies, improved maintenance and access to archaeological monuments, and the increased level of knowledge of a site or historic landscape as a result of archaeological assessment and fieldwork.

Predicted Impacts

The severity of a given level of land-take or visual intrusion varies with the type of monument, site or landscape features and its existing environment. Severity of impact can be judged taking the following into account:

- The proportion of the feature affected and how far physical characteristics fundamental to the understanding of the feature would be lost;
- Consideration of the type, date, survival/condition, fragility/vulnerability, rarity, potential and amenity value of the feature affected;
- Assessment of the levels of noise, visual and hydrological impacts, either in general or site-specific terms, as may be provided by other specialists.

Appendix 13.6 Mitigation Measures and the Cultural Heritage Resource

Potential Mitigation Strategies for Cultural Heritage Remains

Mitigation is defined as features of the design or other measures of the proposed development that can be adopted to avoid, prevent, reduce or offset negative effects.

The best opportunities for avoiding damage to archaeological remains or intrusion on their setting and amenity arise when the site options for the development are being considered. Damage to the archaeological resource immediately adjacent to developments may be prevented by the selection of appropriate construction methods. Reducing adverse effects can be achieved by good design, for example by screening historic buildings or upstanding archaeological monuments or by burying archaeological sites undisturbed rather than destroying them. Offsetting adverse effects is probably best illustrated by the full investigation and recording of archaeological sites that cannot be preserved *in situ*.

Definition of Mitigation Strategies

Archaeological Resources

The ideal mitigation for all archaeological sites is preservation *in situ*. This is not always a practical solution, however. Therefore, a series of recommendations are offered to provide ameliorative measures where avoidance and preservation *in situ* are not possible.

Archaeological Test Trenching can be defined as ‘a limited programme of intrusive fieldwork which determines the presence or absence of archaeological features, structures, deposits, artefacts or ecofacts within a specified area or site on land, inter-tidal zone or underwater. If such archaeological remains are present field evaluation defines their character, extent, quality and preservation, and enables an assessment of their worth in a local, regional, national or international context as appropriate’ (ClfA 2014a).

Full Archaeological Excavation can be defined as ‘a programme of controlled, intrusive fieldwork with defined research objectives which examines, records and interprets archaeological deposits, features and structures and, as appropriate, retrieves artefacts, ecofacts and other remains within a specified area or site on land, inter-tidal zone or underwater. The records made and objects gathered during fieldwork are studied and the results of that study published in detail appropriate to the project design’ (ClfA 2014b).

Archaeological Monitoring can be defined as ‘a formal programme of observation and investigation conducted during any operation carried out for non-archaeological reasons. This will be within a specified area or site on land, inter-tidal zone or underwater, where there is a possibility that archaeological deposits may be disturbed or destroyed. The programme will result in the preparation of a report and ordered archive (ClfA 2014c).

Underwater Archaeological Assessment consists of a programme of works carried out by a specialist underwater archaeologist, which can involve wade surveys, metal detection surveys and the excavation of test pits within the sea or riverbed. These assessments are able to access and assess the potential of an underwater environment to a much higher degree than terrestrial based assessments.

Architectural Resource

The architectural resource is generally subject to a greater degree of change than archaeological sites, as structures may survive for many years but their usage may change continually. This can be reflected in the fabric of the building, with the addition and removal of doors, windows and extensions. Due to their often more visible presence within the landscape than archaeological sites, the removal of such structures can sometimes leave a discernible ‘gap’ with the cultural identity of a population. However, a number of mitigation measures are available to ensure a record is made of any structure that is deemed to be of special interest, which may be removed or altered as part of a proposed development.

Conservation Assessment consists of a detailed study of the history of a building and can include the surveying of elevations to define the exact condition of the structure. These assessments are carried out by Conservation

Architects and would commonly be carried out in association with proposed alterations or renovations on a Recorded Structure.

Building Survey may involve making an accurate record of elevations (internal and external), internal floor plans and external sections. This is carried out using a EDM (Electronic Distance Measurer) and GPS technology to create scaled drawings that provide a full record of the appearance of a building at the time of the survey.

Historic Building Assessment is generally specific to one building, which may have historic significance, but is not a Protected Structure or listed within the NIAH. A full historical background for the structure is researched and the site is visited to assess the standing remains and make a record of any architectural features of special interest. These assessments can also be carried out in conjunction with a building survey.

Written and Photographic record provides a basic record of features such as stone walls, which may have a small amount of cultural heritage importance and are recorded for prosperity. Dimensions of the features are recorded with a written description and photographs as well as some cartographic reference, which may help to date a feature.

APPENDIX B – MATERIAL ASSETS - TRAFFIC

Figure 1 – 2018 Do Nothing (A1)

Figure 3 – 2025 Do Nothing (A2)

Figure 5 – 2040 Do Nothing (A3)

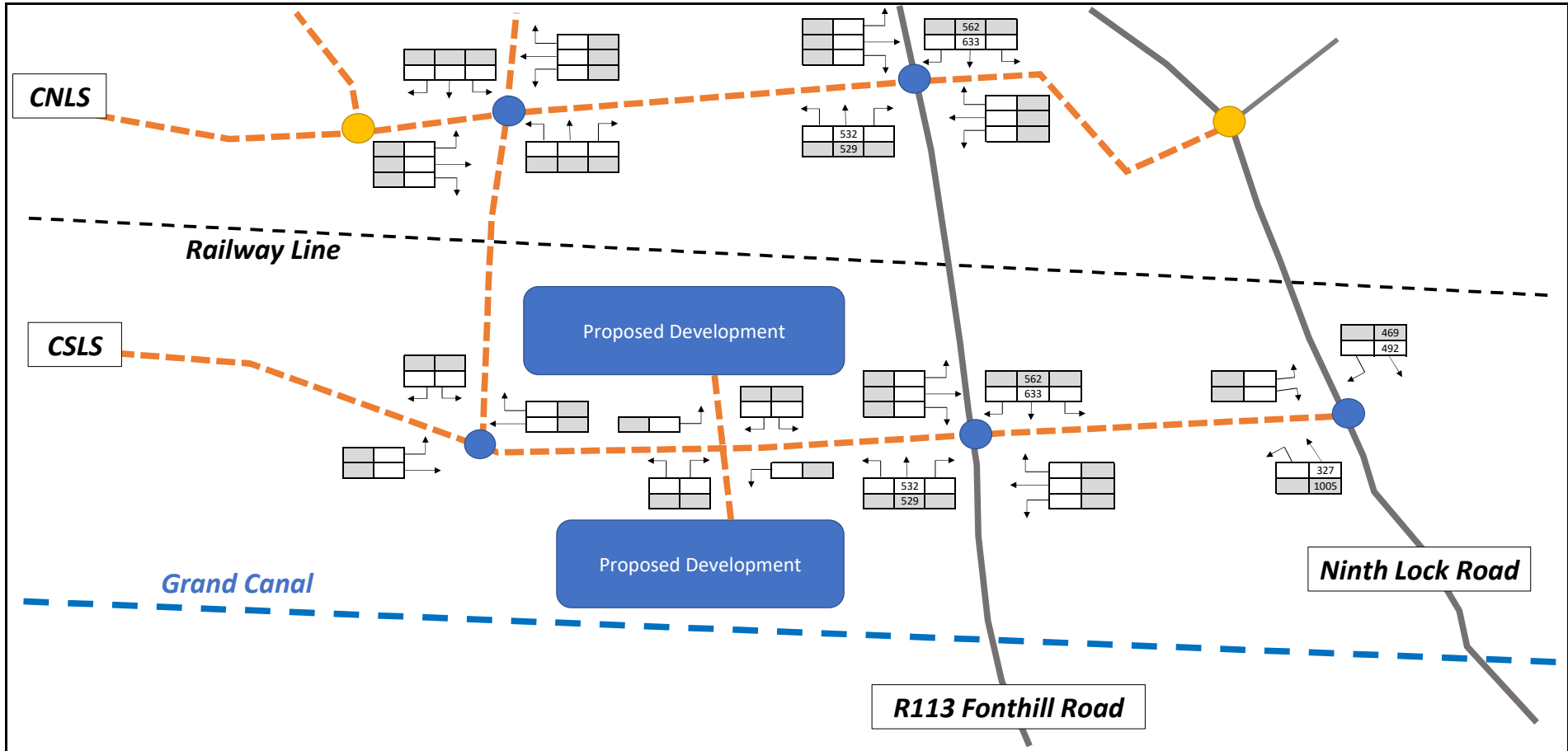
Figure 2 – 2018 Do Minimum (B1)


Figure 4 – 2025 Do Minimum (B2)

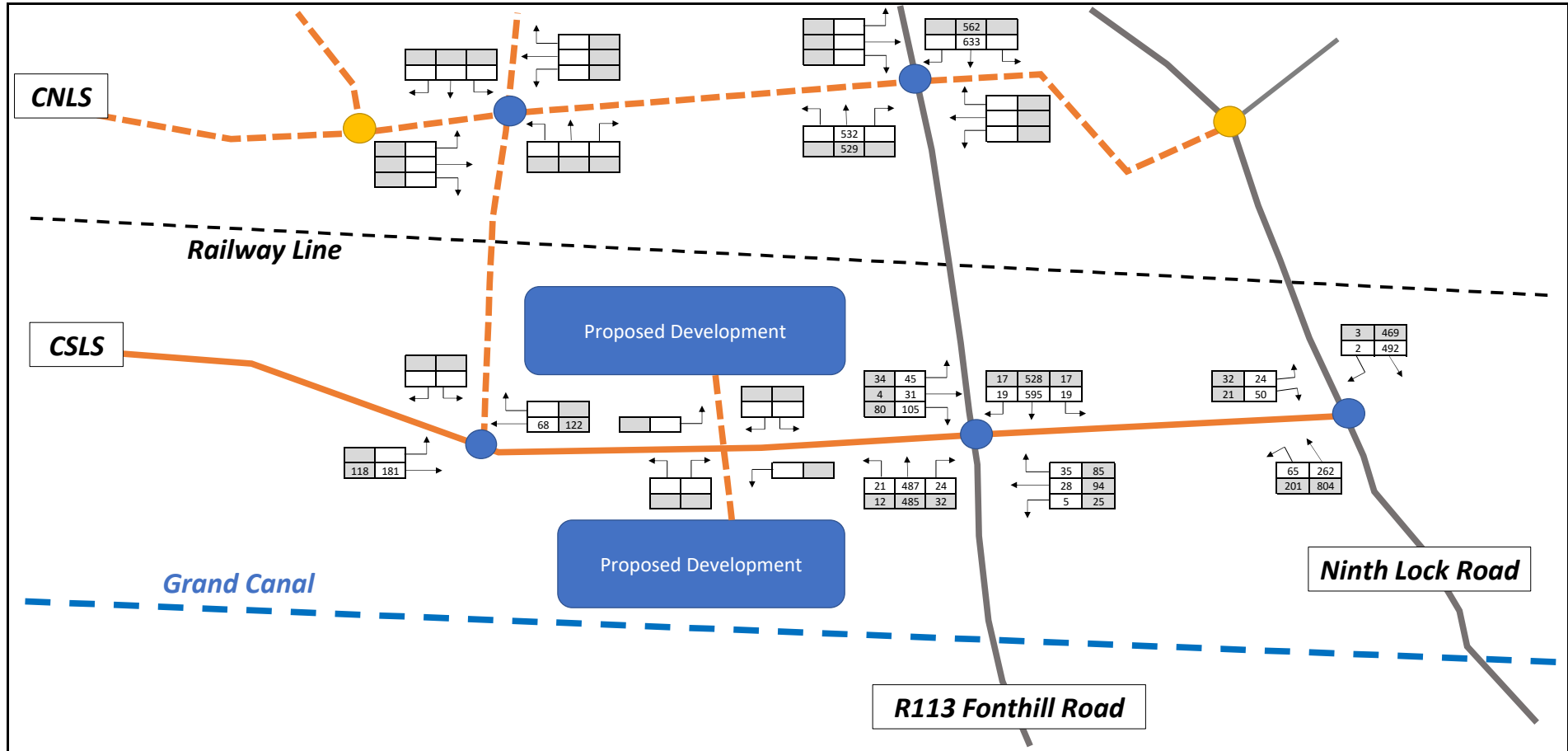
Figure 6 – 2040 Do Minimum (B3)


Figure 9 – 2025 Do Something (C1)

Figure 10 – 2040 Do Something (C2)



 DBFL Consulting Engineers	Dublin Office: Ormond House, Upper Ormond Quay, Dublin 7 phone: +353 1 400 4000 Waterford Office: Suite 8b, The Atrium, Maritana Gate, Canada St phone: +353 51 309 500 email: info@dbfl.ie website: www.dbfl.ie	Project : Proposed Residential Development Clonburris SDZ	Key: <div style="display: flex; justify-content: space-between;"> <div> <div style="border: 1px solid black; width: 20px; height: 10px; background-color: white; margin-bottom: 2px;"></div> AM Peak Hour (0800 to 0900) </div> <div> <div style="border: 1px solid black; width: 20px; height: 10px; background-color: lightgrey; margin-bottom: 2px;"></div> PM Peak Hour (1700 to 1800) </div> </div> <div style="margin-top: 5px;"> <div style="display: flex; align-items: center;"> <div style="width: 10px; height: 10px; background-color: blue; border-radius: 50%; margin-right: 5px;"></div> Junction Being Assessed </div> <div style="display: flex; align-items: center;"> <div style="width: 10px; height: 10px; background-color: yellow; border-radius: 50%; margin-right: 5px;"></div> Junction outside Assessment </div> </div>	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%;">Dwn: DG</td> <td style="width: 33%;">Ckd: DPM</td> <td style="width: 33%;">Date: 12/07/2021</td> </tr> <tr> <td colspan="3">Ref: p162119/calcs/excel/Traffic</td> </tr> <tr> <td>Figure: 1</td> <td colspan="2">Rev: -</td> </tr> </table>	Dwn: DG	Ckd: DPM	Date: 12/07/2021	Ref: p162119/calcs/excel/Traffic			Figure: 1	Rev: -	
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Ref: p162119/calcs/excel/Traffic													
Figure: 1	Rev: -												
DRG. Title : Network Traffic Flows - Vehicles 2018 Base Flows													

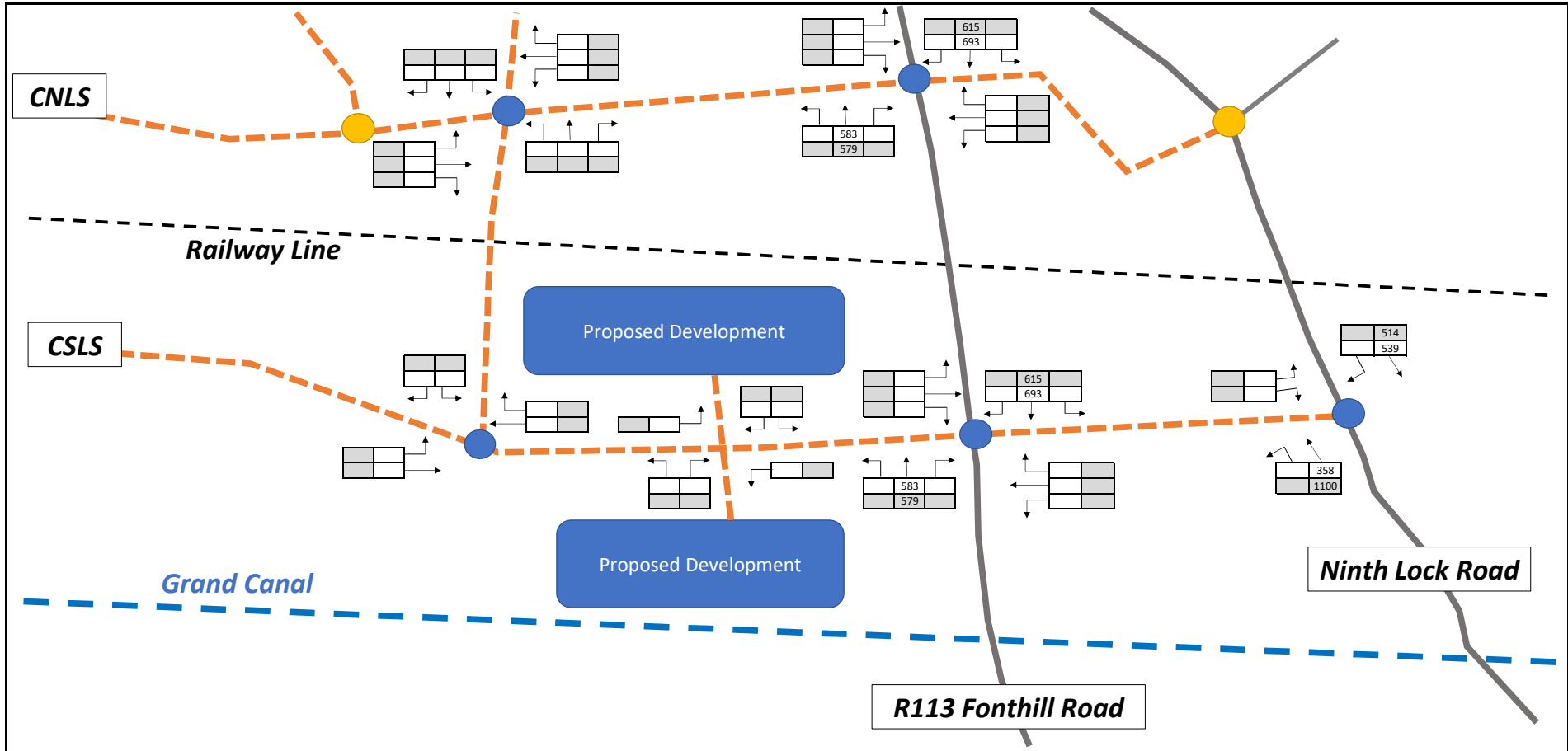


 DBFL Consulting Engineers	Dublin Office: Ormond House, Upper Ormond Quay, Dublin 7 phone: +353 1 400 4000	Project : Proposed Residential Development Clonburris SDZ	Key: <div style="display: flex; justify-content: space-between;"> <div> <div style="border: 1px solid black; width: 15px; height: 15px; background-color: white; margin-right: 5px;"></div> AM Peak Hour (0800 to 0900)</div> <div style="border: 1px solid black; width: 15px; height: 15px; background-color: lightgrey; margin-right: 5px;"></div> PM Peak Hour (1700 to 1800)</div>
---	---	--	---

●

 Junction Being Assessed

●




DBFL Consulting Engineers

Dublin Office:
Ormond House, Upper Ormond Quay, Dublin 7
phone: +353 1 400 4000







Waterford Office:
Suite 8b, The Atrium, Maritana Gate, Canada St
phone: +353 51 309 500

email: info@dbfl.ie
website: www.dbfl.ie

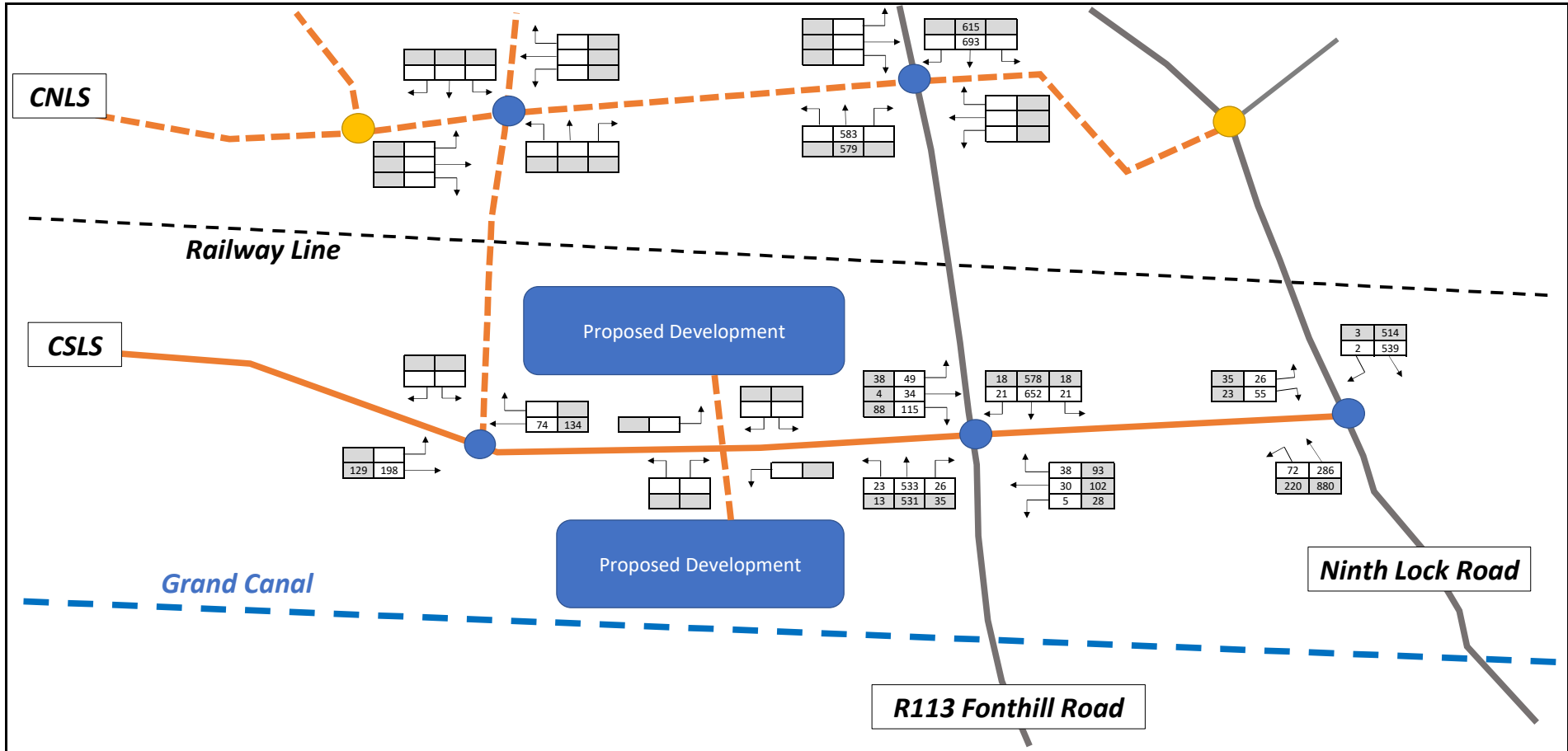
Project :
Proposed Residential Development
Clonburris SDZ

DRG. Title :
Network Traffic Flows - Vehicles
2025 Do Nothing Flows

Key:

-  AM Peak Hour (0800 to 0900)
-  PM Peak Hour (1700 to 1800)
-  Junction Being Assessed
-  Junction outside Assessment
-  Existing Network
-  Proposed SDZ Network

Dwn: DG	Ckd: DPM	Date: 12/07/2021
Ref: p162119/calcs/excel/Traffic		
Figure: 3	Rev: -	



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phone: +353 1 400 4000

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phone: +353 51 309 500

email: info@dbfl.ie
website: www.dbfl.ie

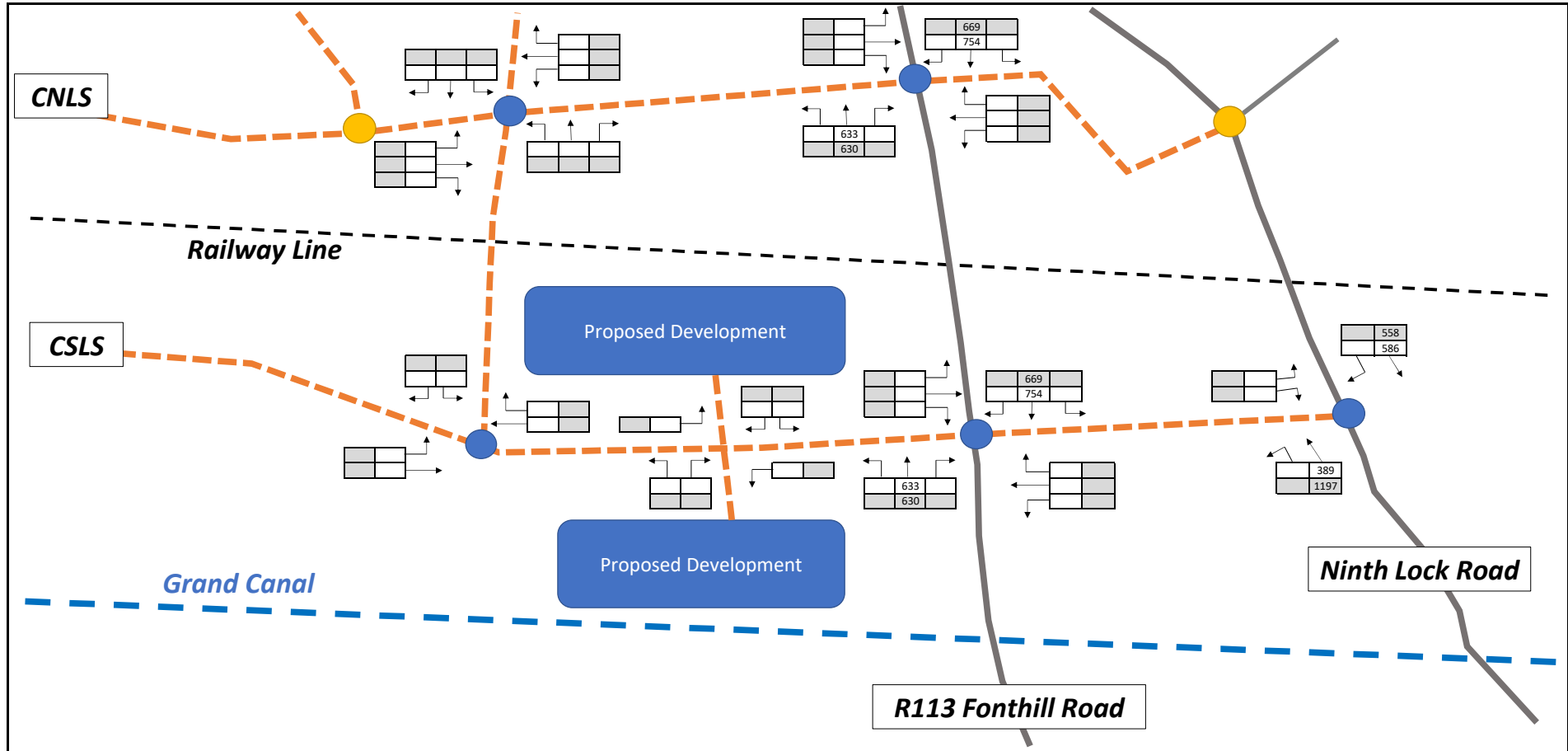
Project :
Proposed Residential Development
Clonburris SDZ








DRG. Title :
Network Traffic Flows - Vehicles
2025 Do Nothing Flows with CSLS

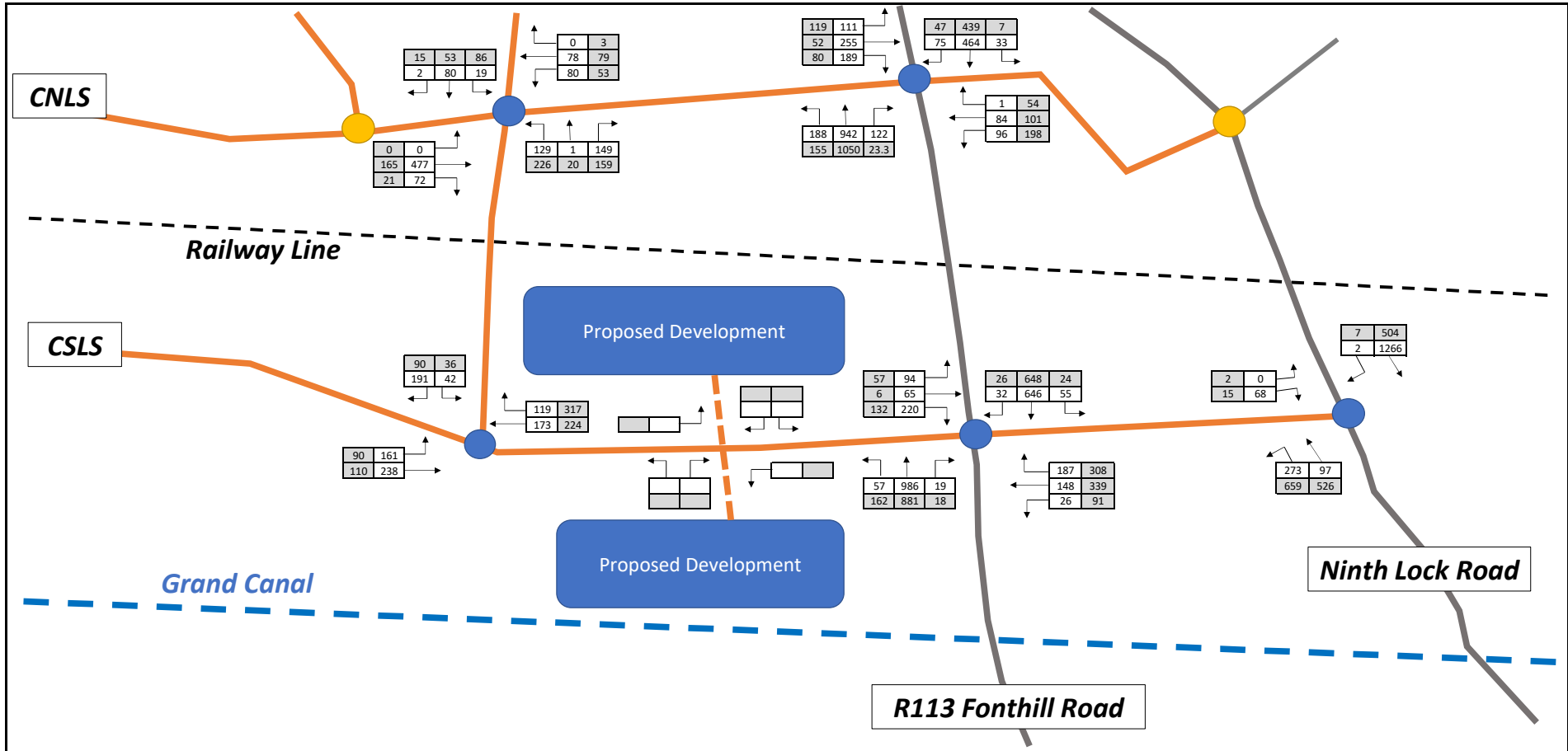
Key:

- AM Peak Hour (0800 to 0900)
- PM Peak Hour (1700 to 1800)
- Junction Being Assessed
- Junction outside Assessment
- Existing Network
- Proposed SDZ Network

Dwn: DG	Ckd: DPM	Date: 12/07/2021
Ref: p162119/calcs/excel/Traffic		
Figure: <b style="font-size: 24px;">4	Rev: -	



 DBFL Consulting Engineers	Dublin Office: Ormond House, Upper Ormond Quay, Dublin 7 phone: +353 1 400 4000	Project : Proposed Residential Development Clonburris SDZ	Key: <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p> AM Peak Hour (0800 to 0900)</p> <p> PM Peak Hour (1700 to 1800)</p> <p> Junction Being Assessed</p> <p> Junction outside Assessment</p> </div> <div style="width: 45%;"> <p> Existing Network</p> <p> Proposed SDZ Network</p> </div> </div>	<table border="1" style="width: 100%; text-align: center;"> <tr> <td>Dwn:</td> <td>Ckd:</td> <td>Date:</td> </tr> <tr> <td>DG</td> <td>DPM</td> <td>12/07/2021</td> </tr> <tr> <td colspan="3">Ref:</td> </tr> <tr> <td colspan="3">p162119/calcs/excel/Traffic</td> </tr> <tr> <td colspan="2">Figure:</td> <td>Rev:</td> </tr> <tr> <td colspan="2" style="font-size: 24pt;">5</td> <td style="text-align: center;">-</td> </tr> </table>	Dwn:	Ckd:	Date:	DG	DPM	12/07/2021	Ref:			p162119/calcs/excel/Traffic			Figure:		Rev:	5		-
	Dwn:	Ckd:	Date:																			
	DG	DPM	12/07/2021																			
Ref:																						
p162119/calcs/excel/Traffic																						
Figure:		Rev:																				
5		-																				
Waterford Office: Suite 8b, The Atrium, Maritana Gate, Canada St phone: +353 51 309 500 email: info@dbfl.ie website: www.dbfl.ie	DRG. Title : Network Traffic Flows - Vehicles 2040 Do Nothing Flows																					



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phone: +353 51 309 500

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website: www.dbfl.ie

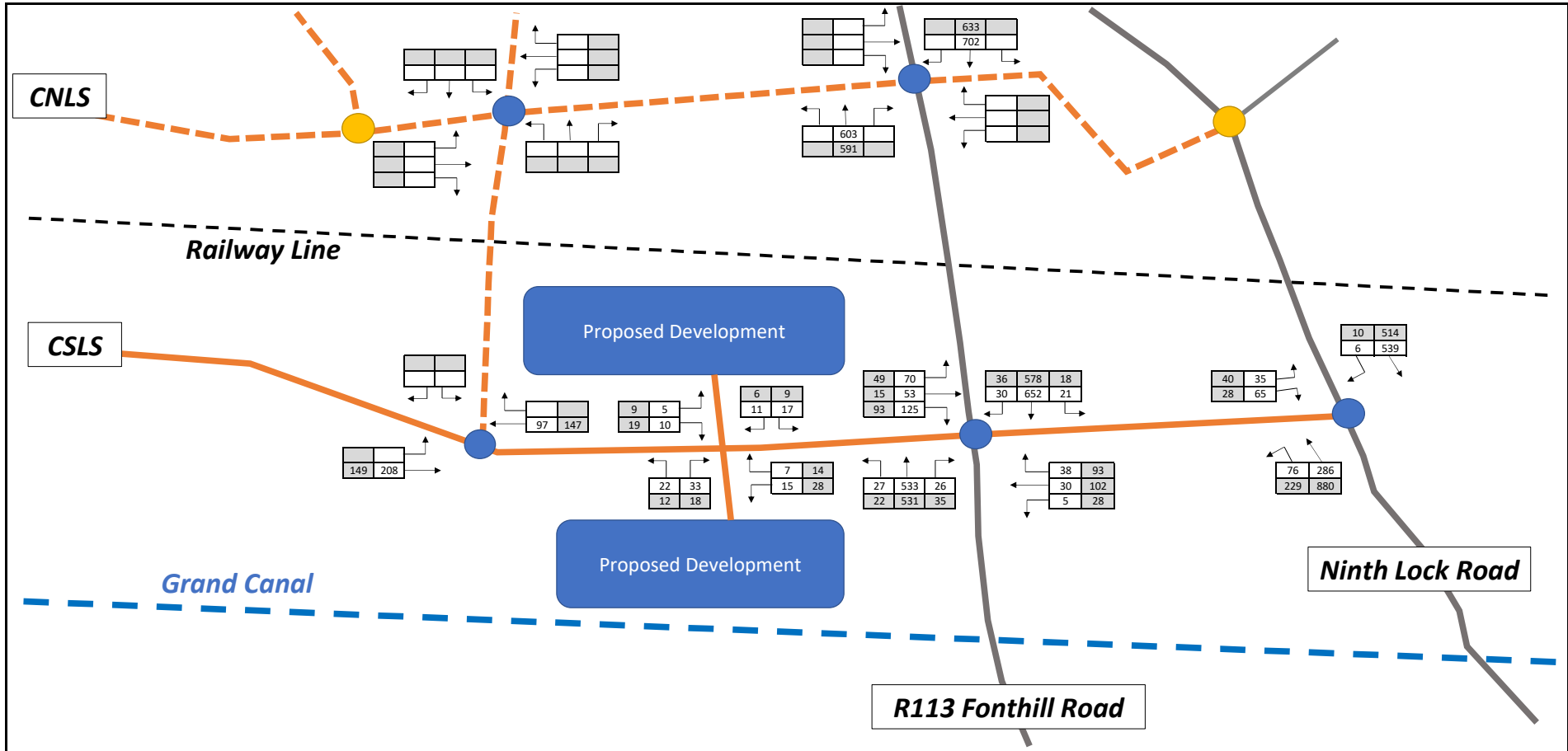
Project :
Proposed Residential Development
Clonburris SDZ








DRG. Title :
Network Traffic Flows - Vehicles
2040 Do Nothing Flows with full SDZ

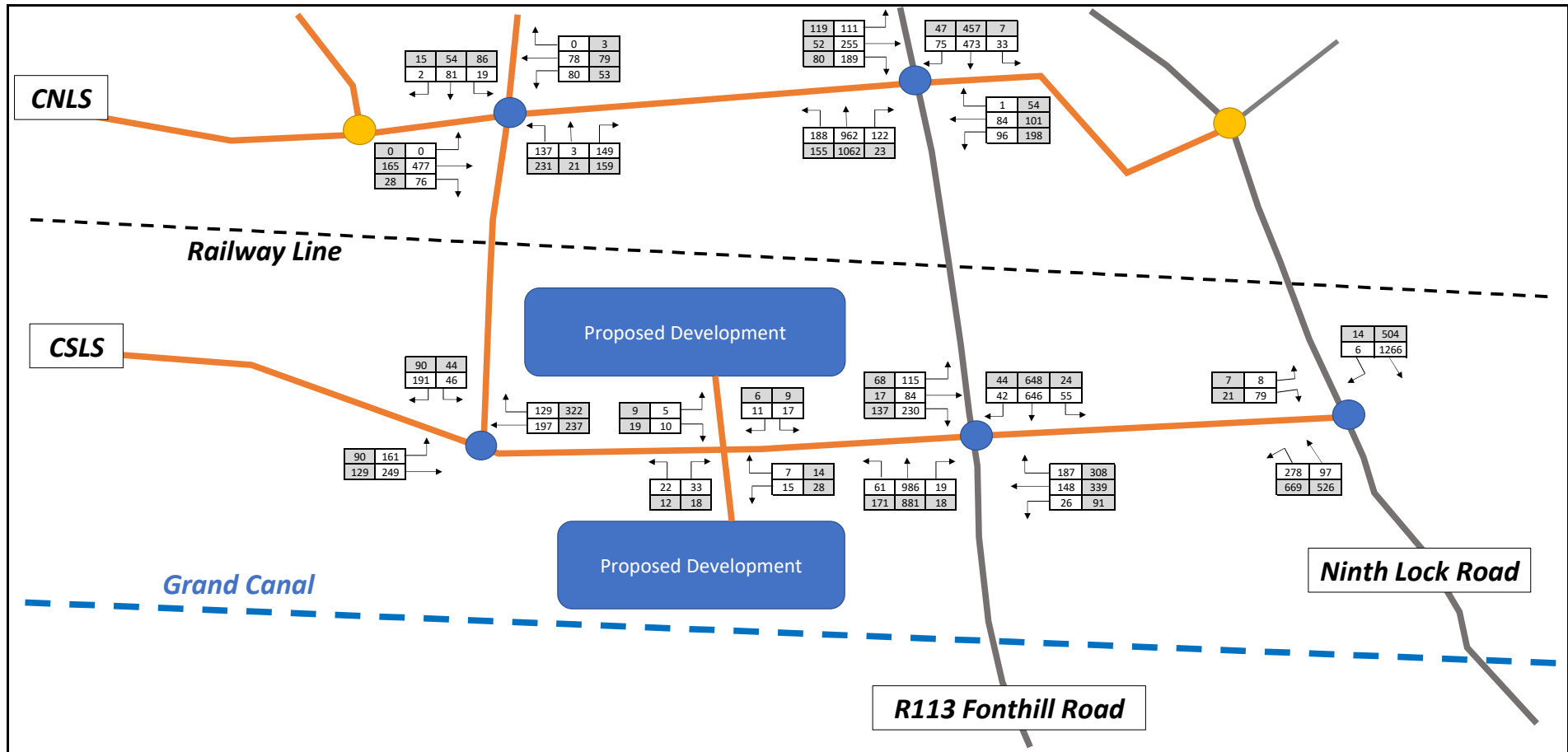
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- AM Peak Hour (0800 to 0900)
- PM Peak Hour (1700 to 1800)
- Junction Being Assessed
- Junction outside Assessment
- Existing Network
- Proposed SDZ Network

Dwn: DG	Ckd: DPM	Date: 12/07/2021
Ref: p162119/calcs/excel/Traffic		
Figure: 6	Rev: -	



 DBFL Consulting Engineers	Dublin Office: Ormond House, Upper Ormond Quay, Dublin 7 phone: +353 1 400 4000	Project : Proposed Residential Development Clonburris SDZ	Key:  AM Peak Hour (0800 to 0900)  PM Peak Hour (1700 to 1800)  Junction Being Assessed  Junction outside Assessment	Dwn: DG Ckd: DPM Date: 12/07/2021
	Waterford Office: Suite 8b, The Atrium, Maritana Gate, Canada St phone: +353 51 309 500 email: info@dbfl.ie website: www.dbfl.ie	DRG. Title : Network Traffic Flows - Vehicles 2025 Do Something Flows with CSLS	 Existing Network  Proposed SDZ Network	Ref: p162119/calcs/excel/Traffic
				Figure: 9 Rev: -



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website: www.dbfl.ie

Project :
Proposed Residential Development
Clonburris SDZ

DRG. Title :
Network Traffic Flows - Vehicles
2040 Do Something Flows with full SDZ

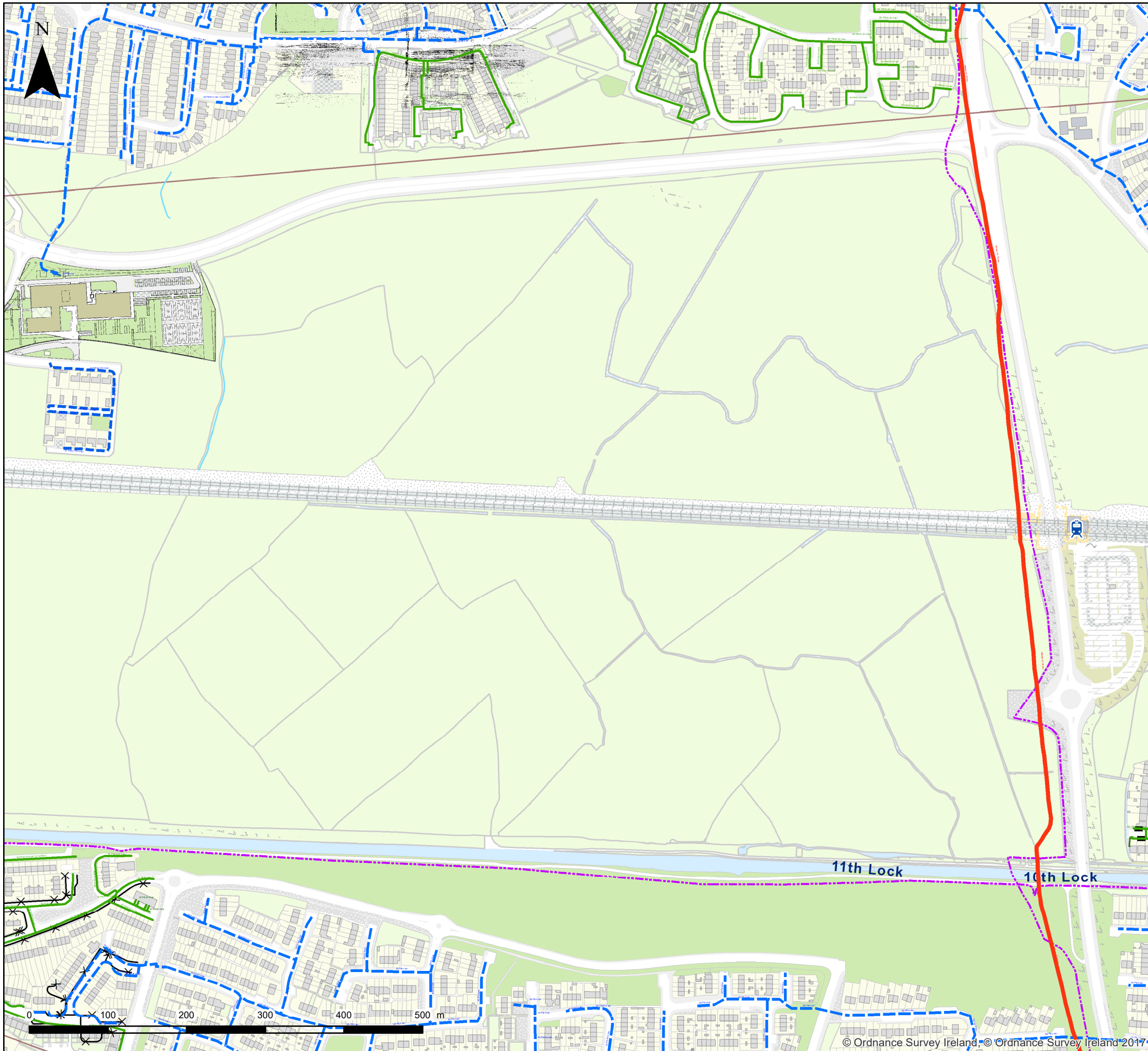
Key:

- AM Peak Hour (0800 to 0900)
- PM Peak Hour (1700 to 1800)
- Junction Being Assessed
- Junction outside Assessment
- Existing Network
- Proposed SDZ Network

Dwn: DG	Ckd: DPM	Date: 12/07/2021
Ref: p162119/calcs/excel/Traffic		
Figure: 10	Rev: -	

APPENDIX C – MATERIAL ASSETS - UTILITIES

Appendix - Utility Maps ESB, Gas Networks Ireland, EIR.



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 (1890 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.

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 — Aurora Telecom Duct


 — Aurora Telecom Sub Duct


 — Aurora Telecom Inserted Gas Pipe


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)



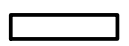

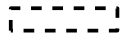








 Service Pipe (Low Pressure)

 Strategic Pipe (Medium Pressure)

 Strategic Pipe (Low Pressure)

 Inserted

 Abandoned Pipe

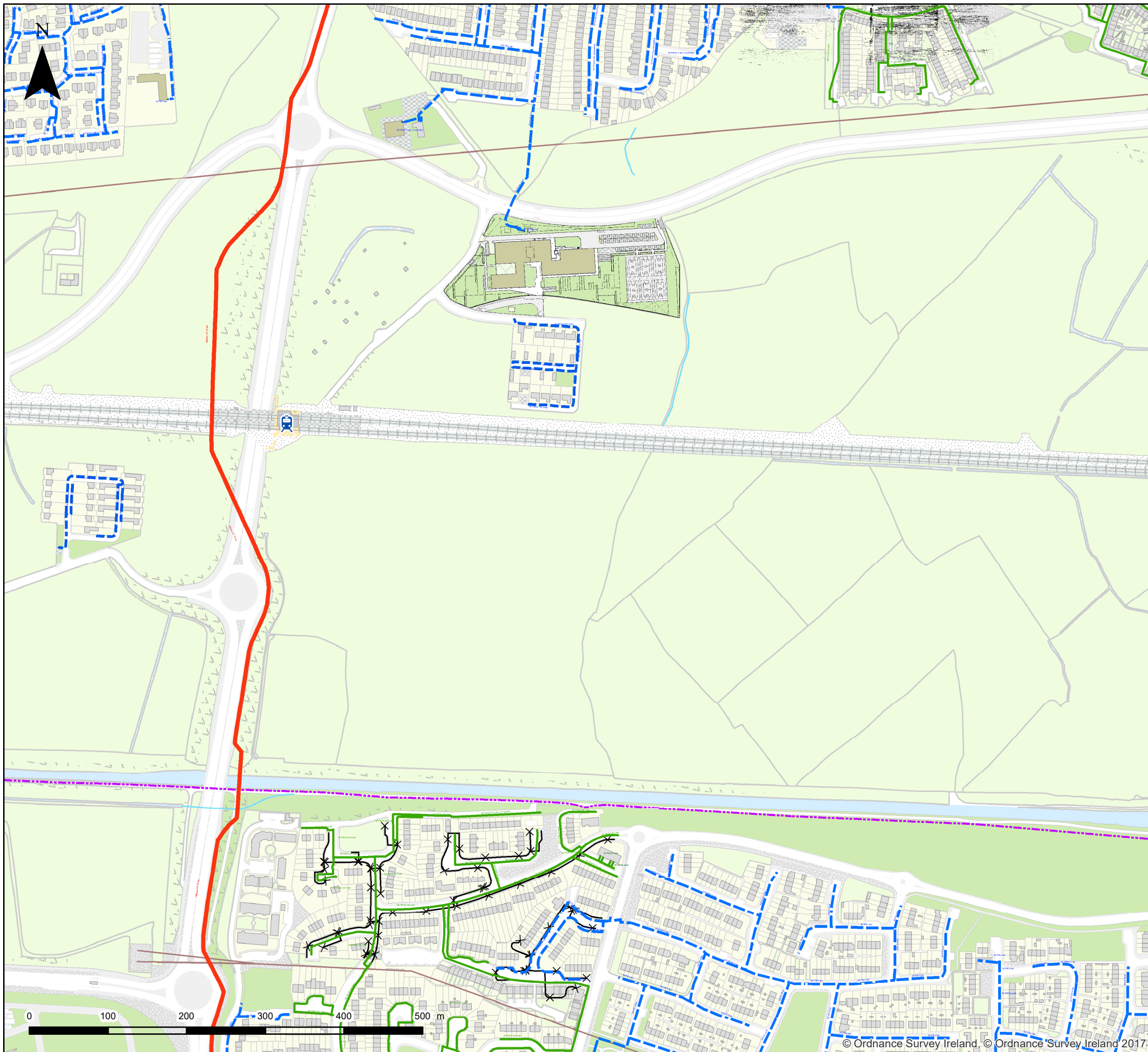
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	CP Test Point		Protection (Slabbing)
	End Cap		Protection (Sleeve)
	Hot Tap		Reducer
	Installation		Service Terminator
	Valve		Tee
	Mains Verification**		Transition

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




GAS NETWORK INFORMATION

Description:	
Location:	705514,732647
Plot Date:	20/09/2021 14:35
Scale:	5000 @ A3
Plotted By:	3529
Ref ID:	3529_20092021143516



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.


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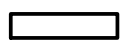

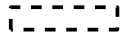








 Aurora Telecom Duct

 Aurora Telecom Sub Duct

 Aurora Telecom Inserted Gas Pipe

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

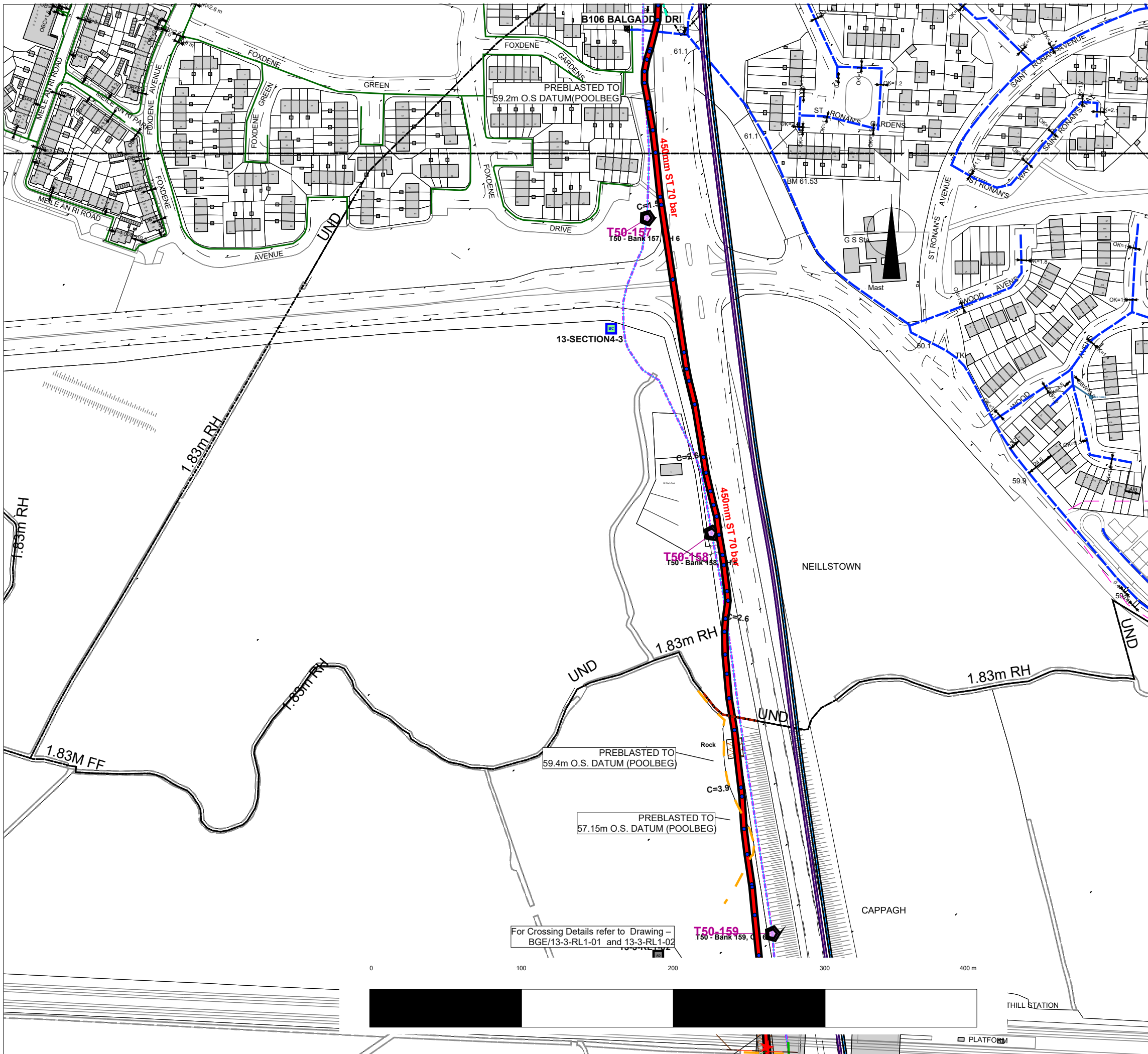
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	End Cap		Protection (Sleeve)
	Hot Tap		Reducer
	Installation		Service Terminator
	Valve		Tee
	Mains Verification**		Transition

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




GAS NETWORK INFORMATION

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Plot Date:	20/09/2021 14:44
Scale:	5000 @ A3
Plotted By:	3529
Ref ID:	3529_20092021144420



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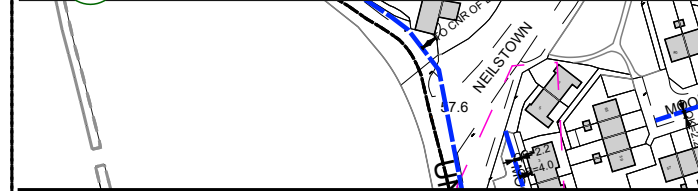
High pressure transmission pipelines are shown in red. If a transmission pipeline is identified within 10m of any intended excavations then work must not proceed before GNI has been consulted. The true location and depth of a transmission pipeline must be verified on site by a representative of GNI.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

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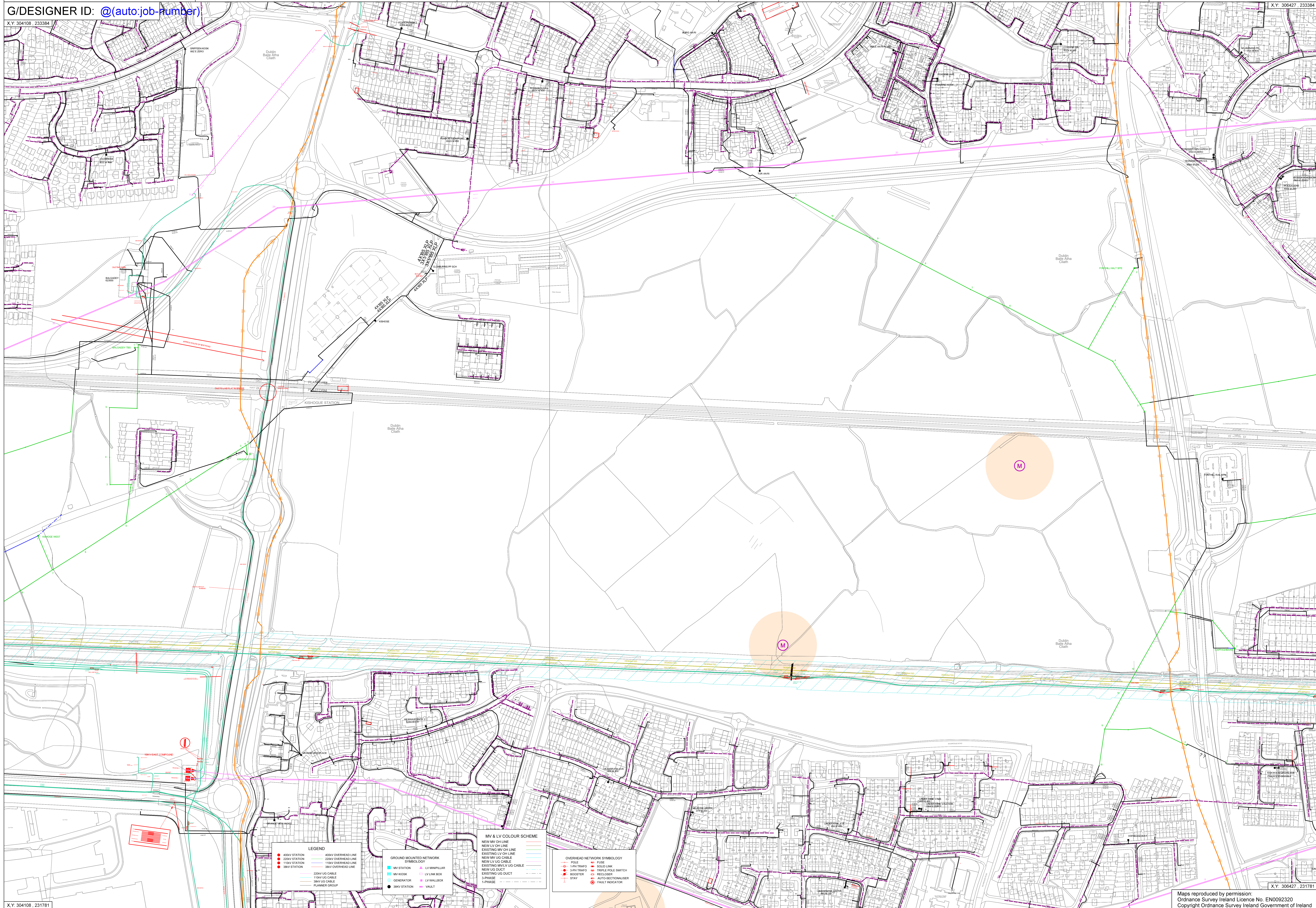
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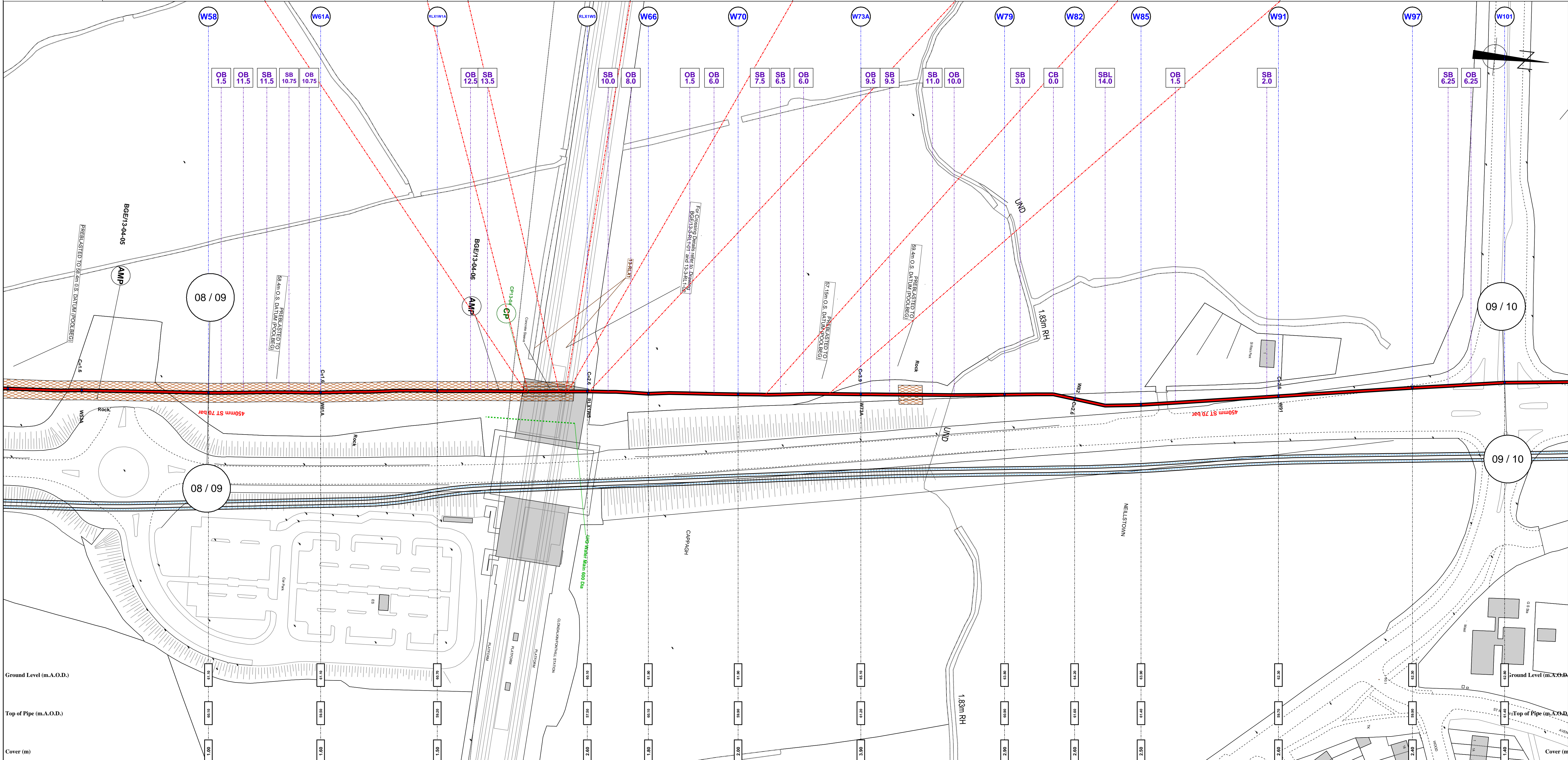
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Transmission Pipe (In Use)	Landowner Boundary
Transmission Heavy Metal Pipe	Transected Boundary
Transmission Pipe (Construction)	Crossing Intersection (Road)
Transmission Pipe (Discontinuation)	Land Drain
Valves	Electrical Utility
Seal	Water Utility
Cover	Telcom Utility
Down End	Foul Water
Nitrogen Fill Point	Drain
Pipe Support	Archaeological Site
Pipeline Marker Post	Ground Condition
Post	Installation (Location)
Production	Installation (Concept)
Reducer	Associated Drawing File
Tea	Associated Drawing File (Bar Chart)
Transition	Customer
Valve	Leak Survey (1 Month)
Wall	Leak Survey (1 Year)
Cathodic Protection	Incident
CP AC Discharge	Data Capture Problem Point
CP Anode	Hypodermic Control Point
CP Cable	
CP High Voltage Earthing	
CP Insulation Joint	
CP Lug	
CP Transformer Rectifier	
CP Marker	



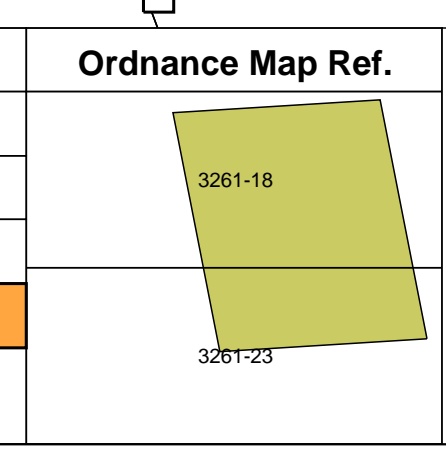
Design Department - CORK			
GAS TRANSMISSION NETWORK INFORMATION			
Issue:	WMCE - GNI/DLE/6773		
Location:	Clonburris		
Plot Date:	31/08/21	Contact:	1800-427747
Plotted by:	D O'S	Scale:	1:2500



TOWNLAND	CAPPAGH				NEILLSTOWN			
LAND OWNER	W.CASEY LTD. 1 STOKES PLACE, ST.STEPHENS GREEN, DUBLIN 2	C.I.E. SECRETARY'S OFFICE, HEUSTON STATION, DUBLIN 8	C.I.E. SECRETARY'S OFFICE, HEUSTON STATION, DUBLIN 8	CROSSMORE LTD 8/ 9 ANGLESEA STREET, DUBLIN 2	DUBLIN CORPORATION CITY HALL, CORK HILL, DUBLIN	DUBLIN CORPORATION CITY HALL, CORK HILL, DUBLIN		DUBLIN CORPORATION CITY HALL, CORK HILL, DUBLIN
OCCUPIER			13-RLX1					
WAYLEAVE NO.	13	12		12	14	15		15
WAYLEAVE LENGTH	407	58		58	64	1358		1358
SECTION	4	4	4	4	4	4	4	4



ALL DIMENSIONS IN METRES	
Length of Pipe this Dwg :	680m
Date Pipe Laid :	01/08/1984
Diameter of Pipe :	450mm
Area Classification as per I.S.328 :	R S T



LEGEND	
	MARKER POST
	PLAN AERIAL MARKER POST
	DISHED AERIAL MARKER POST
	CATHODIC PROTECTION POST
	C.P. SURFACE BOX
	HEAVY WALL PIPE
	TRANSITION PIPE
	LAI DRAIN
	WELD NUMBER
	REPAIR WELD
	COVER TO PIPE SERVICE
	SIDE BEND RIGHT
	SIDE BEND LEFT
	SAG BEND
	OVER BEND

PROXIMITY DETAILS:
NOTES:
1. ALL LEVELS ARE RELATED TO O.S. DATUM (POOLED)
2. CHANGE IS MEASURED ALONG CENTRE LINE OF PIPE ON PLAN.
3. ALL BENDS WHICH OCCUR IN THE PIPELINE ARE CLEARLY NOTED IN THE LONGITUDINAL SECTION.
4. COVER TO SERVICES IS CIRCLED.

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ISSUE	BY	DATE	APPD	REVISION

JOB: NEP 1 (Brownsbarn to Abbotstown)

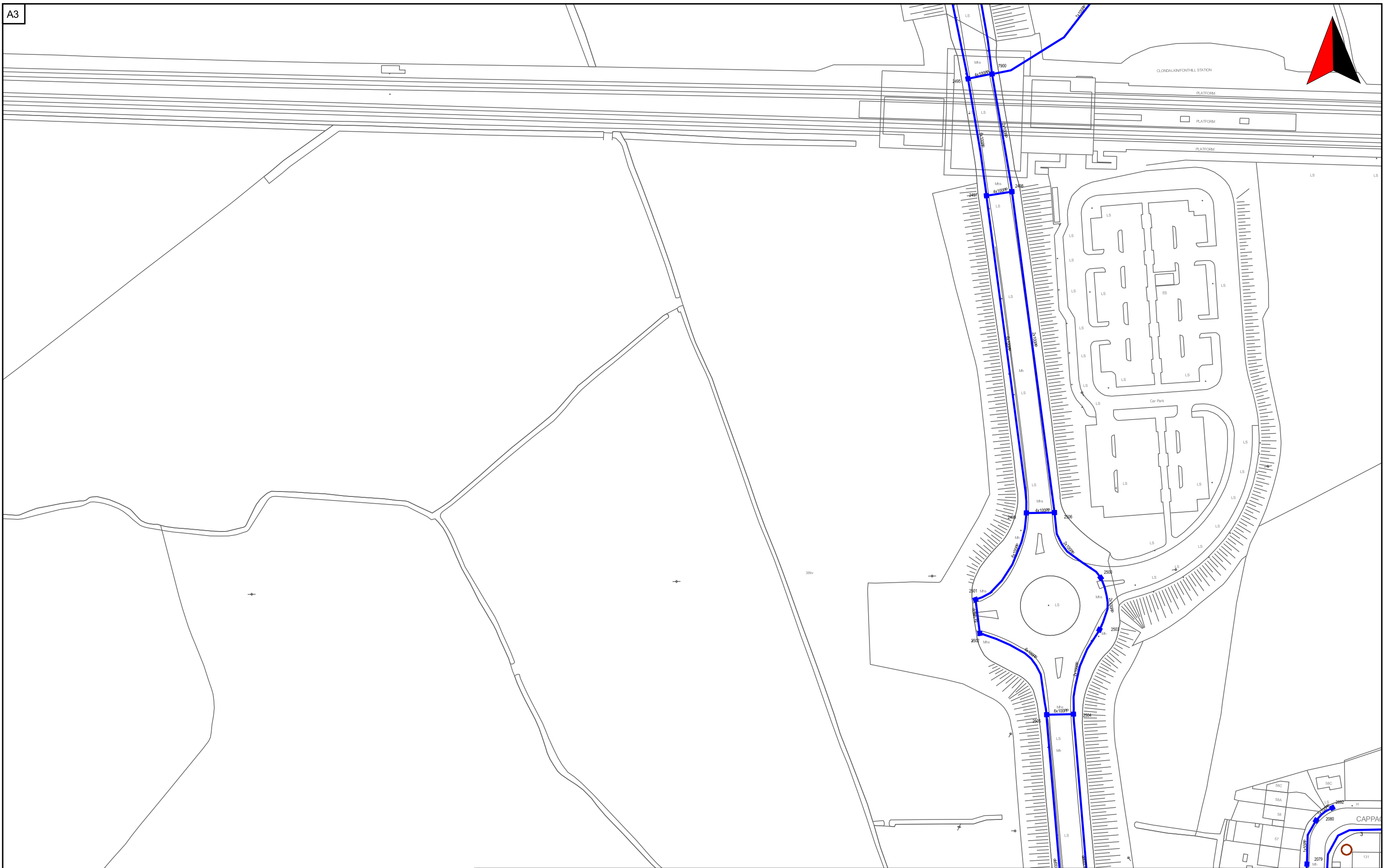
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Drawn by: N/A
Checked by: R. Murphy
Approved by: G. Murtagh

Gas Networks Ireland

Design Department - CORK

DRAWING NUMBER: BGE/13/AL/9



open eir Civil Engineering Infrastructure Service

Scale: 1:1500

Irish National Grid Co-Ordinates
Centre XY: 306053 m, 232458 m

Date
05/08/2021

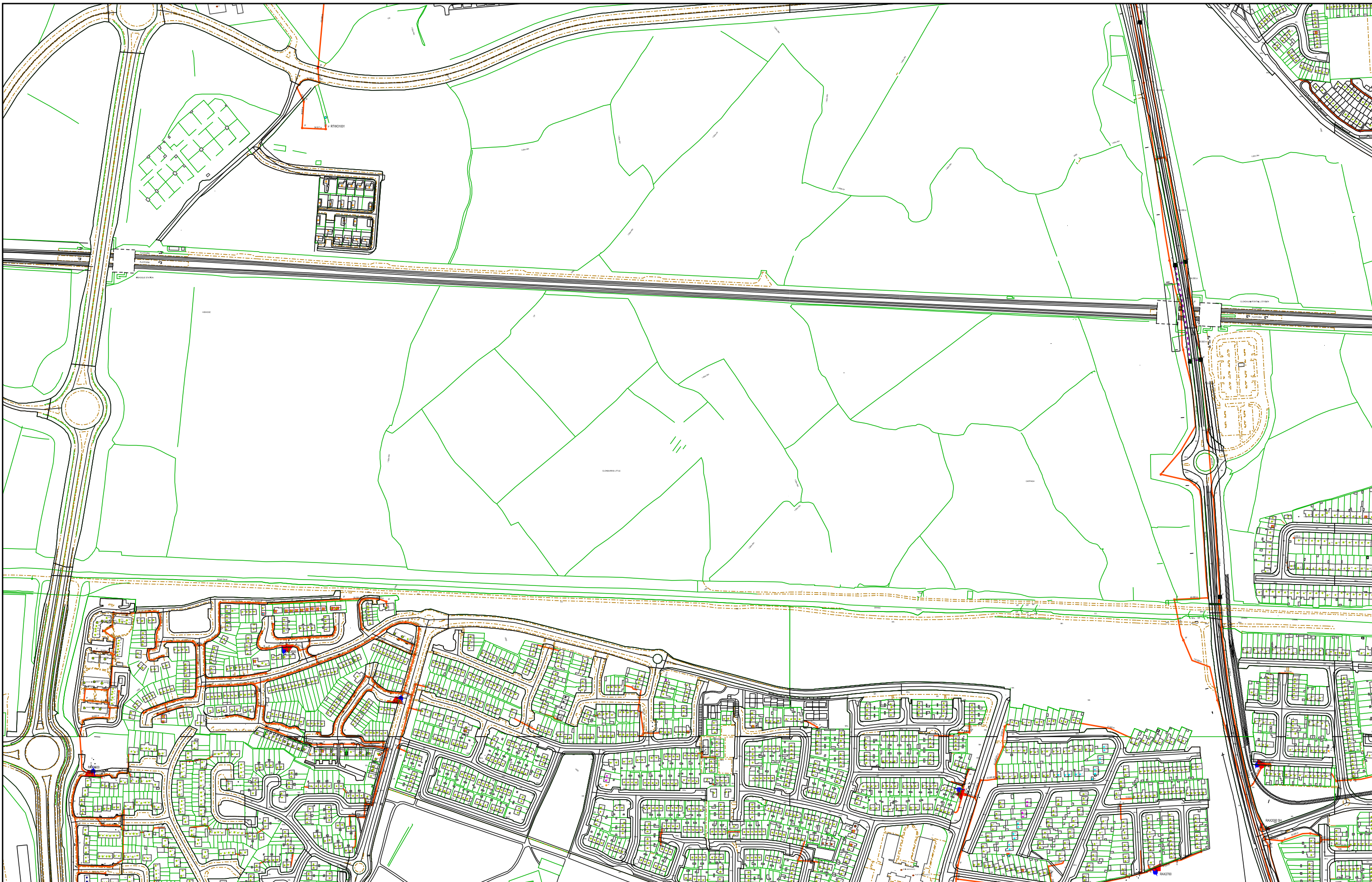
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Produced on: 06/08/2021



@ A3

APPENDIX D – LANDSCAPE AND VISUAL

Photomontages (3D Design Bureau) – Note A3 Booklet with application

Image Title: Baseline VVM 1



Image Title: Proposed VVM 1



Image Title: Proposed & Neighbouring VVM 1



Image Title: Baseline VVM 2



Image Title: Proposed VVM 2



Image Title: Proposed & Neighbouring VVM 2



Image Title: Baseline VVM 3



Image Title: Proposed VVM 3



Image Title: Proposed & Neighbouring VVM 3



Image Title: Baseline VVM 4



Image Title: Proposed VVM 4



Image Title: Proposed & Neighbouring VVM 4

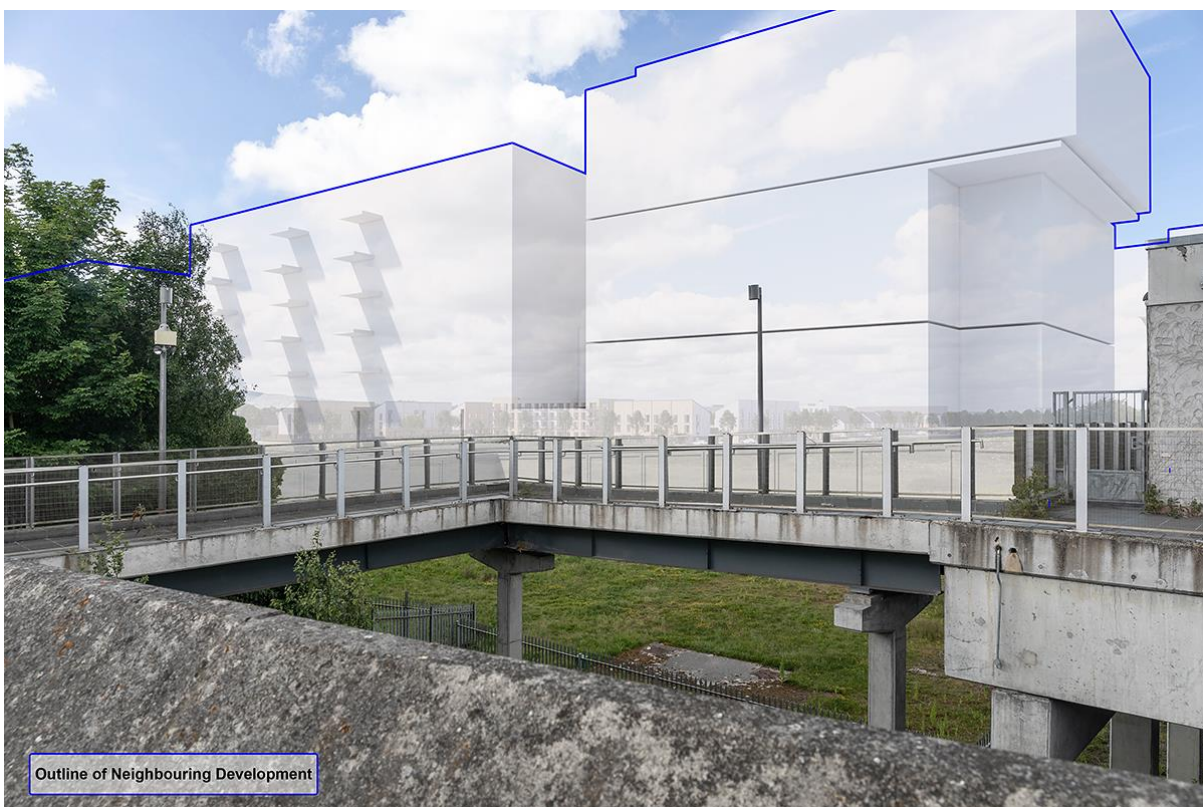


Image Title: Baseline VVM 5



Image Title: Proposed VVM 5



Image Title: Proposed & Neighbouring VVM 5



Image Title: Baseline VVM 6



Image Title: Proposed VVM 6



Image Title: Proposed & Neighbouring VVM 6



Image Title: Baseline VVM 7



Image Title: Proposed VVM 7



Image Title: Proposed & Neighbouring VVM 7



Image Title: Baseline VVM 8



Image Title: Proposed VVM 8



Image Title: Proposed & Neighbouring VVM 8



Image Title: Baseline VVM 9



Image Title: Proposed VVM 9



Image Title: Proposed & Neighbouring VVM 9



Image Title: Baseline VVM 10



Image Title: Proposed VVM 10



Image Title: Proposed & Neighbouring VVM 10



Outline of Neighbouring Development

Image Title: Baseline VVM 11



Image Title: Proposed VVM 11



Image Title: Proposed & Neighbouring VVM 11



Image Title: Baseline VVM 12



Image Title: Proposed VVM 12



Image Title: Proposed & Neighbouring VVM 12



Image Title: Baseline VVM 13



Image Title: Proposed VVM 13



Image Title: Proposed & Neighbouring VVM 13



Image Title: Baseline VVM 14



Image Title: Proposed VVM 14



Image Title: Proposed & Neighbouring VVM 14

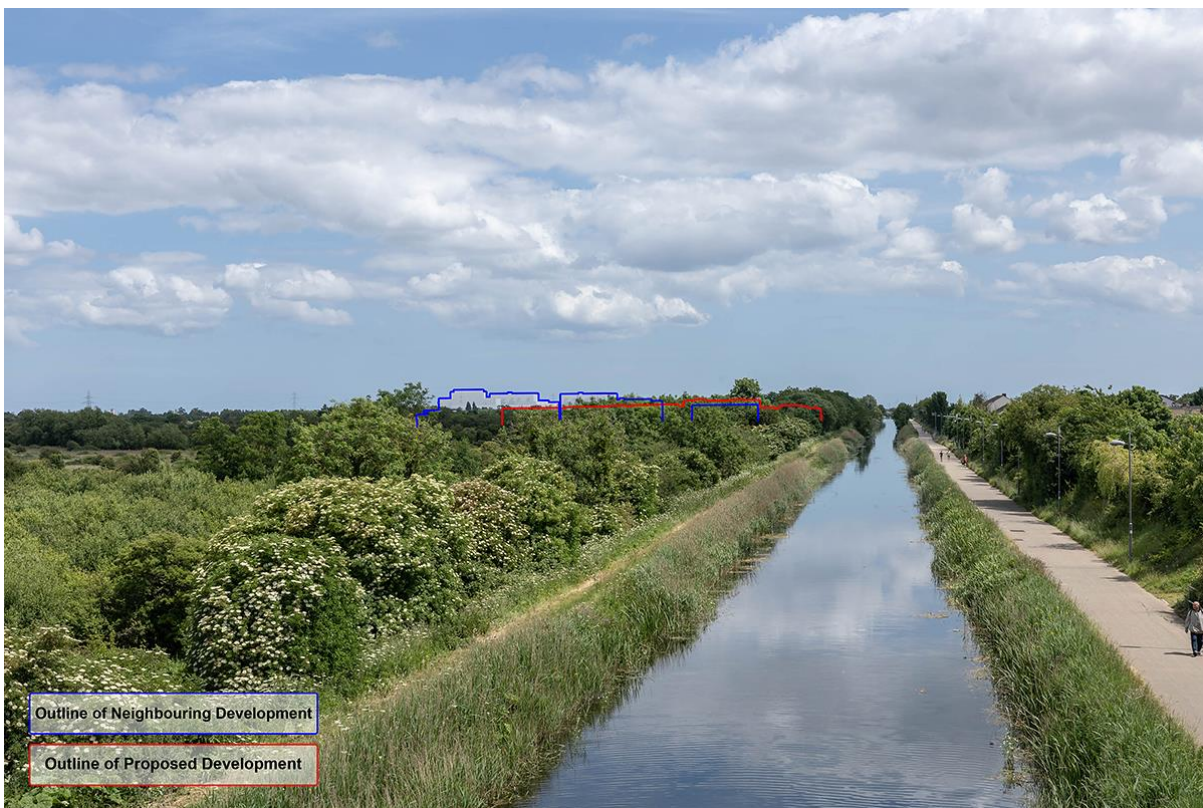


Image Title: Baseline VVM 15



Image Title: Proposed VVM 15



Outline of Proposed Development

Image Title: Proposed & Neighbouring VVM 15



Image Title: Baseline VVM 16



Image Title: Proposed VVM 16



Image Title: Proposed & Neighbouring VVM 16



APPENDIX E – LAND AND SOILS

SI Summary Report



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Ground Investigations Ireland

Clonburriss Phase 1A

DBFL

Ground Investigation Report

October 2021





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



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GROUND INVESTIGATIONS IRELAND

Geotechnical & Environmental

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APPENDICES

Appendix 1	Site Location Plan
Appendix 2	Trial Pit Records
Appendix 3	Soakaway Records
Appendix 4	Dynamic Probe Records
Appendix 5	Plate Test Records
Appendix 6	Rotary Core Records
Appendix 7	Laboratory Testing
Appendix 8	Groundwater Monitoring



1.0 Preamble

On the instructions of DBFL Consulting Engineers, a site investigation was carried out by Ground Investigations Ireland Ltd., between July and October 2021 at the site of the proposed Residential Development in Clonburris, Cappagh, Dublin.

2.0 Overview

2.1. Background

It is proposed to construct a Residential Development with associated services, access roads and car parking at the proposed site. The site is currently greenfield and is situated on the between the Grand Canal and Railway line west of Fonthill Train Station in Cappagh, Dublin. 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 211 No. Trial Pits to a maximum depth of 3.10m BGL
- Carry out 32 No. Plate Bearing Test to ascertain subgrade modulus
- Carry out 10 No. Soakaways to determine a soil infiltration value to BRE digest 365
- Carry out 216 No. Dynamic Probes to determine soil strength/density characteristics
- Carry out 32 No. Rotary Core Boreholes to a maximum depth of 6.80m BGL
- Installation of 10 No. Groundwater monitoring wells
- 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 JCB 3CX excavator at the locations shown in the exploratory hole location plan in Appendix 1. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged and photographed by a Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered, and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 2 of this Report.

3.3. Soakaway Testing

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

3.4. 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 63.50kg 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 4 of this Report.

3.5. Insitu Plate Bearing Test

The plate bearing tests were carried out using a 305mm or 450mm diameter plate at the locations shown on the site plan in Appendix 1. The plate was loaded in increments using a hydraulic jack and an excavator to provide a reaction and the displacement was monitored in accordance with BS1377 Part 9 using independently mounted digital strain gauges. The constrained modulus and equivalent CBR are calculated in accordance with HD29/75 and are provided on the test reports in Appendix 5 of this Report.

3.6. Rotary Boreholes

The rotary coring was carried out by a track mounted T44 Beretta rig at the locations shown on the location plan in Appendix 1. The rotary boreholes were completed from the ground surface or alternatively, where noted on the individual borehole log, from the base of the cable percussion borehole where a temporary liner was installed to facilitate follow-on rotary coring.

The T44 Beretta is equipped with rubber tracks which allow for short travel on pavement surfaces avoiding any damage to the surface. The T44 Beretta utilises a triple tube core barrel system operated using a

wireline drilling process. The outer barrel is rotated by the drill rods and at its lower end, carries the coring bit. The inner barrel is mounted on a swivel so that it does not rotate during the process. The third barrel or liner is placed within the second one to retain the core intact and to preserve as much as possible the fabric of the drilling stratum. The core is cut by the coring bit and passes to the inner liner. The core is brought up to the surface within the inner barrel on a small diameter wire rope or line attached to the “overshoot” recovery tool which is then placed into a core box in order of recovery. A drilling fluid, typically air mist or water flush is passed from the surface through hollow drill rods to the drill bit, and is used to cool the drill bit. Temporary casing is used in some situations to support unstable ground or to seal off fissures or voids. It should be noted that the rotary coring can only achieve limited recovery in overburden, particularly granular or weakly cemented strata due to the flushing medium washing away the cohesive fraction during coring. The recovery achieved, where required is noted on the borehole logs and core photographs are provided to allow assessment of the core recovered. The rotary borehole logs are provided in Appendix 6 of this Report.

3.7. Surveying

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

3.8. Groundwater Monitoring Installations

Groundwater Monitoring Installation were installed upon the completion of the boreholes to enable sampling and the determination of the equilibrium groundwater level. The typical groundwater monitoring installation consists of a 50mm HDPE slotted pipe with a pea gravel response zone and bentonite seal installed to the Engineers specification. Where required the standpipe is sealed with a gas tap and finished with a durable steel cover fixed in place with a concrete surround. The installation details are provided on the exploratory hole logs in the appendices of this Report.

3.9. Laboratory Testing

Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design.

Environmental & Chemical testing as required by the specification, including the Rilta Suite, pH and sulphate testing was carried out by Element Materials Technology Laboratory in the UK. The Rilta suite testing includes both Solid Waste and Leachate Waste Acceptance Criteria.

Geotechnical testing consisting of moisture content, Atterberg limits, Particle Size Distribution (PSD), out in PROSOILS Geotechnical Laboratory in the UK.

The results of the laboratory testing are included in Appendix 7 of this Report.

4.0 Ground Conditions

4.1. General

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

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

- Topsoil
- Made Ground
- Cohesive Deposits
- Granular Deposits
- Weathered Bedrock
- Bedrock

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

MADE GROUND: Made Ground deposits were encountered beneath the Topsoil and were present to a relatively consistent depth of between 0.5m and 1.4m BGL. These deposits were described generally as *brown slightly sandy slightly gravelly CLAY with occasional cobbles and boulders and contained occasional fragments of red brick.*

COHESIVE DEPOSITS: Cohesive deposits were encountered beneath the Made Ground and were described typically as *brown or grey brown slightly sandy slightly gravelly CLAY with occasional cobbles and boulders* overlying a *stiff dark grey slightly sandy slightly gravelly CLAY with occasional cobbles and boulders*. The secondary sand and gravel constituents varied across the site and with depth, with granular lenses occasionally present in the glacial till matrix. The strength of the cohesive deposits typically increased with depth and was firm to stiff or stiff. These deposits had some, occasional or frequent cobble and boulder content where noted on the exploratory hole logs.

GRANULAR DEPOSITS: The granular deposits were generally encountered below the cohesive deposits. The central portion of the site has a higher proportion of granular deposits found both above and below the cohesive deposits. The granular deposits were typically described as *Grey brown or brown very clayey sandy sub rounded to sub angular fine to coarse GRAVEL with occasional cobbles and rare boulders or grey brown very clayey very gravelly fine to coarse SAND*. The secondary sand/gravel and silt/clay constituents varied across the site and with depth while occasional or frequent cobble and boulder content also present where noted on the exploratory hole logs.

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

WEATHERED BEDROCK: In the majority of exploratory holes weathered rock was encountered which was digable with the large excavator to a depth of up to 1.0m below the top of the stratum. The trial pits were terminated upon encountering the more competent bedrock, in which further excavation became more difficult. This material was recovered typically as angular gravel and cobbles of Limestone/Mudstone however there was some variability in the fracture spacing and the ease at which the excavator could progress. Some clay and sand were also present with the rock mass either from weathering or as infilling to fractures which were opened upon excavation.

BEDROCK: The rotary core boreholes recovered weak to strong grey/dark grey fine to medium grained laminated LIMESTONE interbedded with weak black fine grained laminated Mudstone. This is typical of the Calp Formation, which is noted on the geological mapping to the east of the proposed site. Rare visible pyrite veins were noted during logging which are typically present within the Calp Limestone. The depth to rock varies from 1.15m BGL to the west of the site in RC06 to a maximum of 3.60m BGL in RC28 to the east of the site. The total core recovery is good, typically 100% with some of the uppermost runs dropping to 80 or 90%. The SCR and RQD both are relatively poor in the upper weathered zone, often recovered as non-intact, however both indices show an increase with depth in each of the boreholes.

4.2. Insitu Strength Testing

The correlated DPH blow counts indicate that the overburden deposits are generally firm or firm to stiff to depth of 1.0m to 1.2m BGL and become firm or firm to stiff with depth. To the north and southeast of the site there are many locations where firm or firm to stiff deposits are encountered at depths greater than 1.50m BGL.

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. For this reason, standpipes were installed in RC03, RC05, RC08, RC14, RC17, RC19, RC21, RC25, RC27 and RC29 to allow the equilibrium groundwater level to be determined. The groundwater monitoring is included in Appendix 8 of this Report.

4.4. Laboratory Testing

4.4.1. Geotechnical Laboratory Testing

The geotechnical testing carried out on soil samples recovered generally confirm the descriptions on the logs with the primary constituent of the cohesive deposits found to be a CLAY of low to intermediate plasticity. The Particle Size Distribution tests confirm that generally the cohesive deposits are gap-graded with percentages of sands and gravels ranging between 12% and 44% generally with fines contents of 33% to 76%.

The Particle Size Distribution tests confirm that generally the granular deposits are gap graded with percentages of sands/gravels and silt/clay typically between 15% and 22% with a gravel/sand content of typically 8% to 72%.

4.4.2. Chemical Laboratory Testing

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

4.4.3. Environmental Laboratory Testing

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

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

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

While the laboratory report provides a comparison with the waste acceptance criteria limits it does not provide a waste classification of the material sampled nor does it comment on any potentially hazardous properties of the materials tested. The possibility for contamination, not revealed by the testing undertaken should be borne in mind particularly where Made Ground deposits are present or the previous site use or location indicate a risk of environmental variation. The waste classification report is included under the cover of a separate report by Ground Investigations Ireland

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

5.0 Recommendations & Conclusions

5.1. General

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

5.2. Foundations

At the location of the proposed housing structures an allowable bearing capacity of 125 kN/m² is recommended for conventional strip or pad foundations on the stiff cohesive deposits at the depths outlined in the table below *Figure.1*.

A lower bearing capacity of 80 kN/m² is achievable at shallow depths in many of the dynamic probe locations. Areas where the recommended allowable bearing capacity is greater than 1.20m BGL are highlighted in the table. *Figure.1*

The possibility for variation in the depth of the made ground or soft cohesive deposits in the vicinity of these foundations should be considered and foundation inspections should be carried out. Any soft spots encountered at the proposed foundation depths should be excavated and replaced with lean mix concrete.

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

Allowable Bearing Capacities (ABC) kN/m ²											
DP	ABC	Depth	ABC	Depth	Comment	DP	ABC	Depth	ABC	Depth	Comment
No.	kN/m ²	m BGL	kN/m ²	m BGL		No.	kN/m ²	m BGL	kN/m ²	m BGL	
DPSH001	80	0.50	125	0.50		DPSH051	80	1.9	125	2.10	Soft deposits present
DPSH002	80	0.50	125	0.50		DPSH052	80	0.6	125	0.60	
DPSH003	80	0.50	125	2.10	Soft deposits present	DPSH053	80	0.8	125	0.80	
DPSH004	80	1.10	125	1.30		DPSH054	80	0.5	125	1.80	
DPSH005	80	0.50	125	0.50		DPSH055	80	0.6	125	0.60	
DPSH006	80	0.50	125	0.50		DPSH056	80	1.3	125	1.30	Soft deposits present
DPSH007	80	0.50	125	0.50		DPSH057	80	0.6	125	1.60	
DPSH008	80	1.50	125	1.50		DPSH058	80	0.5	125	1.80	

DPSH009	80	0.50	125	1.00		DPSH059	80	1.5	125	2.00	Loose deposits present
DPSH010	50	0.80	125	1.60	Loose deposits present	DPSH060	80	0.6	125	0.60	
DPSH011	80	0.50	125	0.50		DPSH061	80	0.5	125	1.00	
DPSH012	80	0.50	125	0.50		DPSH062	80	0.5	125	2.20	
DPSH013	80	1.00	125	1.00		DPSH063	80	0.5	125	0.50	
DPSH014	80	1.50	125	1.50	Loose deposits present	DPSH064	80	1.4	125	1.40	Soft deposits present
DPSH015	80	0.50	125	0.50		DPSH065	80	0.5	125	1.70	
DPSH016	80	0.50	125	0.50		DPSH066	80	0.5	125	1.80	
DPSH017	80	0.50	125	0.50		DPSH067	80	0.6	125	1.90	
DPSH018	60	1.20	125	1.20	M/G to 1.20m	DPSH068	80	1.8	125	1.80	Soft deposits present
DPSH019	80	0.60	125	0.60		DPSH069	80	0.5	125	0.50	
DPSH020	50	0.60	125	2.40	Loose deposits present	DPSH070	80	0.5	125	0.50	
DPSH021	80	0.60	125	0.60		DPSH071	80	0.5	125	1.00	
DPSH022	80	0.60	125	0.60		DPSH072	80	0.6	125	0.60	
DPSH023	80	1.80	125	1.80	Soft deposits present	DPSH073	80	0.6	125	0.60	
DPSH024	80	0.50	125		DPH - TBC	DPSH074	80	0.5	125	0.50	
DPSH025	80	1.60	125	1.60	Loose deposits present	DPSH075	80	0.5	125	0.50	
DPSH026	80	0.60	125	0.60		DPSH076	80	0.8	125	0.80	
DPSH027	80	1.30	125	1.30	Soft deposits present	DPSH077	80	0.5	125	0.50	
DPSH028	80	0.60	125	0.60		DPSH078	80	0.5	125	0.50	
DPSH029	80	0.90	125	0.90		DPSH079	80	0.5	125	0.50	
DPSH030	80	0.50	125	0.50		DPSH080	80	2.1	125	2.10	Soft deposits present
DPSH031	80	0.50	125	0.50		DPSH081	80	0.5	125	1.60	
DPSH032	80	0.50	125	1.90	Soft deposits present	DPSH082	80	0.5	125	0.50	
DPSH033	80	0.50	125	0.50		DPSH083	80	1.4	125	1.70	Soft deposits present
DPSH034	80	0.60	125	1.60		DPSH084	80	0.5	125	0.50	
DPSH035	80	1.20	125	1.50	M/G to 1.20m	DPSH085	80	0.5	125	0.50	
DPSH036	80	0.50	125	0.50		DPSH086	80	1.5	125	2.30	Soft deposits present
DPSH037	80	1.30	125	1.90	M/G to 1.30m	DPSH087	50	0.5	125	2.00	loose deposits present
DPSH038	80	0.70	125	0.70		DPSH088	80	1.4	125	1.40	
DPSH039	80	0.60	125	1.40		DPSH089	80	0.6	125	1.20	
DPSH040	80	2.60	125	2.60	DPH - TBC	DPSH090	50	0.6	125	1.80	Soft deposits present
DPSH041	80	2.40	125	2.40	Soft deposits present	DPSH091	80	0.5	125	0.50	

DPSH042	80	0.50	125		DPH - TBC	DPSH092	50	0.5	125	1.80	
DPSH043	80	1.50	125	1.90		DPSH093	80	0.5	125	0.50	
DPSH044	80		125	2.10	DPH - TBC	DPSH094	50	0.7	125	1.90	
DPSH045	80	0.50	125	0.50		DPSH095	80	0.7	125	1.50	
DPSH046	80	0.50	125	2.30		DPSH096	80	1.8	125	1.80	Soft deposits present
DPSH047	80	2.40	125	2.40	Soft deposits present	DPSH097	50	0.5	125	2.00	
DPSH048	80	2.00	125	2.20	Soft deposits present	DPSH098	50	1.0	125	1.90	
DPSH049	80	0.50	125	2.20		DPSH099	80	0.5	125	2.80	
DPSH050	80	0.50	125	1.80		DPSH100	80	0.6	125	2.50	

Allowable Bearing Capacities (ABC) kN/m2											
DP	ABC	Depth	ABC	Depth	Comment	DP	ABC	Depth	ABC	Depth	Comment
No.	kN/m2	m BGL	kN/m2	m BGL		No.	kN/m2	m BGL	kN/m2	m BGL	
DPSH101	80	0.60	125	1.20		DPSH156	80		125	1.80	
DPSH102	80	2.60	125	2.60	M/G to 1.20m BGL- Soft deposits present	DPSH157	80	1.80	125	1.80	soft deposits present
DPSH103	80	0.50	125	1.00		DPSH158	80	1.40	125	1.40	loose deposits present
DPSH104	80	1.90	125	1.90	loose deposits present	DPSH159	80	1.20	125	1.90	
DPSH105	80	0.70	125	1.90		DPSH160	80	1.70	125	2.00	soft deposits present
DPSH106	80	0.50	125	2.00		DPSH161	80	1.20	125		M/G to 1.20m BGL
DPSH107	80	2.10	125	2.10	loose deposits present	DPSH162	80	1.90	125	1.90	loose deposits present
DPSH108	80	1.30	125	1.80	M/G to 1.30m BGL	DPSH163	80	0.60	125	0.90	
DPSH109	80	0.50	125	0.50		DPSH164	80	1.80	125	1.80	soft deposits present
DPSH110	80	1.30	125	1.60	soft deposits present	DPSH165	80	1.60	125	1.60	soft deposits present
DPSH111	80	1.60	125	1.60		DPSH166	80	0.50	125	1.50	
DPSH112	80	0.50	125	0.50		DPSH167	80	0.50	125	0.50	
DPSH113	80	1.10	125	1.70		DPSH168	80	1.40	125	1.40	
DPSH114	80	1.80	125	2.10	soft deposits present	DPSH169	80	1.90	125	2.50	loose deposits present

DPSH115	80	0.50	125	0.50		DPSH170	80	1.30	125	2.20	
DPSH116	80	0.50	125	1.80		DPSH171	80	1.90	125	1.90	
DPSH117	80	0.50	125	1.80		DPSH172	80	1.60	125	1.70	soft deposits present
DPSH118	80	1.90	125	1.90	soft deposits present	DPSH173	80	0.50	125	0.50	
DPSH119	80	1.50	125	1.50	soft deposits present	DPSH174	80	0.80	125	1.50	
DPSH120	80	1.90	125	1.90		DPSH175	80	0.50	125	1.90	
DPSH121	80	1.90	125	1.90	soft deposits present	DPSH176	80	0.50	125	1.70	
DPSH122	80	0.50	125	0.50		DPSH177	80	1.70	125	1.90	soft deposits present
DPSH123	80	1.20	125	1.50		DPSH178	80	1.90	125	2.10	loose deposits present
DPSH124	80	1.40	125	1.70	soft deposits present	DPSH179	80	1.20	125	1.80	
DPSH125	80	1.90	125	1.90	soft deposits present	DPSH180	80	1.80	125	2.30	
DPSH126	80	1.90	125	1.90	loose deposits present	DPSH181	80	2.00	125	2.10	soft deposits present
DPSH127	80	0.60	125	0.70		DPSH182	80	2.40	125	2.40	soft deposits present
DPSH128	80	0.50	125	0.50		DPSH183	80	2.10	125	2.10	soft deposits present
DPSH129	80	1.20	125	1.20		DPSH184	80	0.70	125	1.00	
DPSH130	80	0.50	125	1.20		DPSH185	80	0.80	125	2.10	
DPSH131	80		125		TBC	DPSH186	80	0.50	125	0.50	
DPSH132	80		125		TBC	DPSH187	50	1.00	125	2.70	
DPSH133	80		125		TBC	DPSH188	80	0.50	125	1.60	
DPSH134	80		125		TBC	DPSH189	80	1.30	125	1.70	
DPSH135	80		125		TBC	DPSH190	80	0.50	125	0.80	
DPSH136	80		125		TBC	DPSH191	80	1.50	125	1.50	
DPSH137	80		125		TBC	DPSH192	80	1.80	125	1.80	soft deposits present
DPSH138	80		125		TBC	DPSH193	80	1.00	125	1.00	
DPSH139	80	0.50	125	0.50		DPSH194	80	1.50	125	1.50	M/G to 1.40m BGL

DPSH140	80	0.50	125	0.50		DPSH195	80	0.70	125	2.30	
DPSH141	80	0.50	125	1.80		DPSH196	80	1.60	125	1.80	soft deposits present
DPSH142	80	1.40	125	1.50		DPSH197	50	2.10	125	2.20	soft deposits present
DPSH143	80	1.90	125	1.90	loose deposits present	DPSH198	80	1.60	125	1.60	
DPSH144	80	0.50	125	0.50		DPSH199	80	2.40	125	2.70	M/G to 2.00m BGL
DPSH145	80	0.50	125	1.20		DPSH200	80	1.80	125	2.00	soft deposits present
DPSH146	80	0.50	125	1.50		DPSH201	50	0.90	125	1.70	
DPSH147	80	1.90	125	1.90		DPSH202	50	0.50	125	2.00	
DPSH148	80	1.60	125	1.60	soft deposits present	DPSH203	80	0.50	125	0.50	
DPSH149	80	1.20	125	1.70		DPSH204	80	0.90	125	1.70	
DPSH150	80	0.50	125	1.60		DPSH205	80	n/a	125	n/a	Made Ground
DPSH151	80	1.40	125	1.50	loose deposits present	DPSH206	80	0.50	125	1.80	
DPSH152	80	1.10	125	1.20		DPSH207	80	1.40	125	1.60	soft deposits present
DPSH153	80	1.00	125	1.20		DPSH208	80	0.50	125	1.80	
DPSH154	80	1.20	125	1.20		DPSH209	80	1.00	125	1.70	
DPSH155	80	1.80	125	1.80	loose deposits present	DPSH210	80	0.50	125	1.20	
						DPSH211	50	0.80	125	2.10	

Figure 1

At the location of the proposed apartment structures an allowable bearing capacity of 250 kN/m² is recommended for conventional strip or pad foundations on Rock deposits at the depths outlined in the table below *Figure 2*.

Allowable Bearing Capacities (ABC) kN/m ²											
BH	ABC	Depth	ABC	Depth	Comment	BH	ABC	Depth	ABC	Depth	Comment
No.	kN/m ²	m BGL	kN/m ²	m BGL		No.	kN/m ²	m BGL	kN/m ²	m BGL	
RC01	120	1.00	250	3.30	Rock	RC17	200	1.00	250	2.60	Rock
RC02	125	1.00	250	2.30	Rock	RC18	120	1.00	250	2.10	Rock
RC03	100	1.00	250	2.40	Rock	RC19	120	1.00	250	2.30	Rock
RC04	100	1.00	250	2.00	Rock	RC20	150	1.00	250	2.10	Rock
RC05	200	1.00	250	2.00	Rock	RC21	110	1.00	250	2.60	Rock
RC06	200	1.00	250	1.20	Rock	RC22	200	1.00	250	2.60	Rock
RC07	200	1.00	250	2.30	Rock	RC23	200	1.00	250	2.60	Rock
RC08	180	1.00	250	2.10	Rock	RC24	140	1.00	250	4.60	Rock
RC09	120	1.00	250	2.40	Rock	RC25	150	1.00	250	4.60	Rock
RC10	200	1.00	250	2.10	Rock	RC26	180	1.00	250	2.30	Rock
RC11	120	1.00	250	2.10	Rock	RC27	140	1.00	250	2.20	Rock
RC12	200	1.00	250	2.10	Rock	RC28	130	1.00	250	3.60	Rock
RC13	200	1.00	250	2.60	Rock	RC29	200	1.00	250	2.30	Rock
RC14	200	1.00	250	1.80	Rock	RC30	130	1.00	250	2.00	Rock
RC15	200	1.00	250	1.80	Rock	RC31	200	1.00	250	2.40	Rock
RC16	200	1.00	250	1.65	Rock	RC32	160	1.00	250	2.10	Rock

Figure 2

In any part of the site, should part of the foundation be on rock we would recommend that all the foundations of the unit in question be lowered to the competent rock stratum to avoid differential settlement.

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

5.3. External Pavements

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

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

5.4. Excavations

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

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

Any excavations which penetrate the granular deposits will require to be appropriately battered or the sides supported and are likely to require dewatering due to the groundwater seepages noted in the exploratory hole logs in the Appendices of this Report.

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

Excavations in the upper cohesive and weathered rock deposits are expected to be excavatable with conventional excavation equipment, with zones of more intact bedrock below this depth requiring rock breaking techniques. The JCB excavator was generally able to excavate to depths of 0.9m to 1.0m below the top of the weathered rock, and became difficult to excavate within the confines of the trial pit on encountering the more competent rock.

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

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

5.5. Soakaway Design

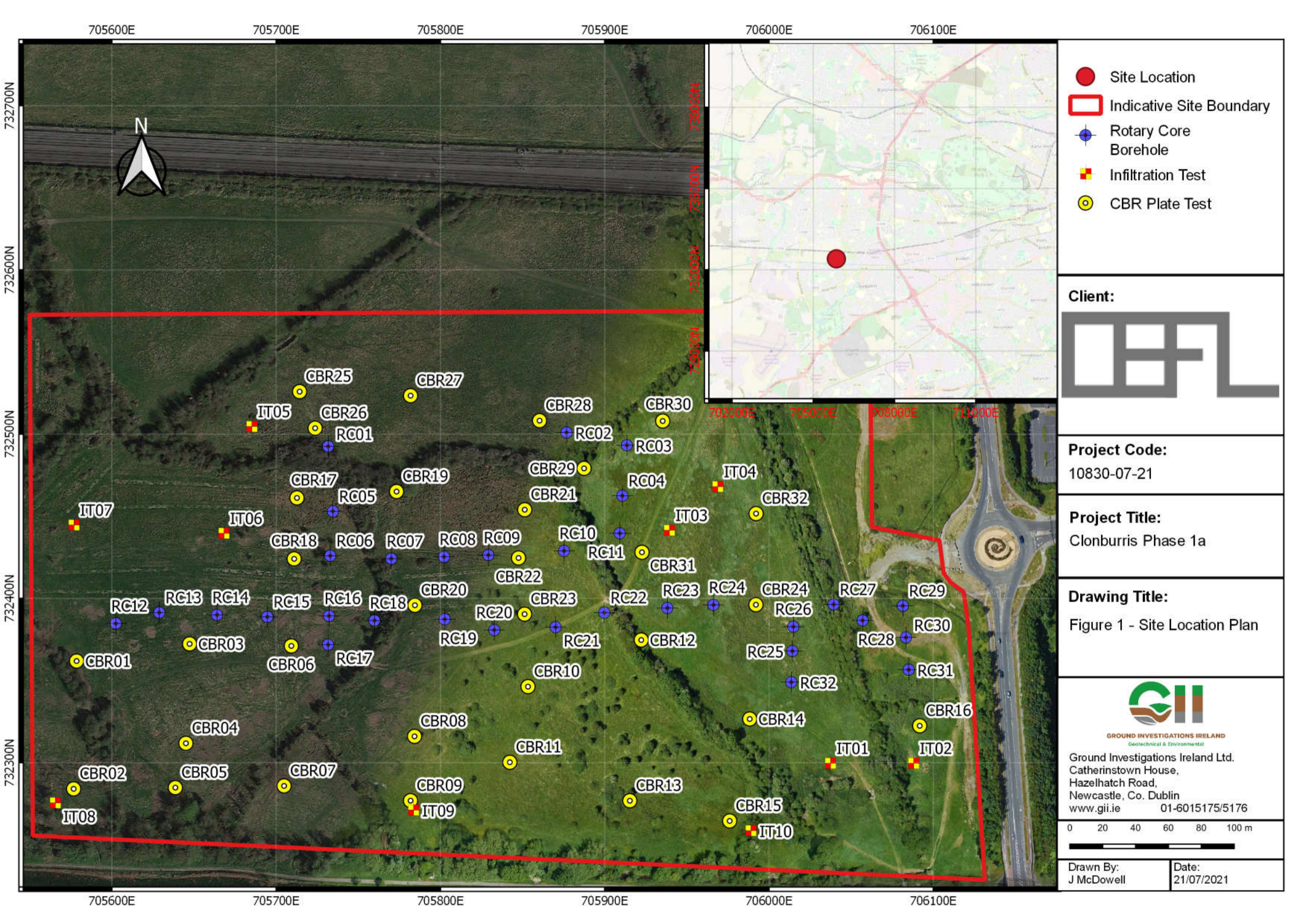
At the locations of IT01, IT02, IT03, IT04, IT05, IT06, IT07, IT08, IT09 and IT10 the water level dropped too slowly to allow calculation of 'f' the soil infiltration rate. These locations are therefore not recommended as suitable for soakaway design and construction.

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

APPENDIX 1 - Site Location Plan



www.gii.ie



- Site Location
- Indicative Site Boundary
- ⊕ Rotary Core Borehole
- Infiltration Test
- CBR Plate Test

Client:



Project Code:
10830-07-21

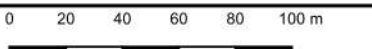
Project Title:
Clonburris Phase 1a

Drawing Title:
Figure 1 - Site Location Plan



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Geotechnical & Environmental

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



Drawn By: J McDowell Date: 21/07/2021

705600E

705700E

705800E

705900E

732500N

732400N

732300N

705600E

705700E

705800E

705900E



- Site Location
- Indicative Site Boundary
- ⊠ Trial Pit with Dynamic Probe



Client:



Project Code:
10830-07-21

Project Title:
Clonburris Phase 1a

Drawing Title:
Figure 2a - Site Location Plan



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0 12 24 36 48 60 m

Drawn By:
J McDowell

Date:
21/07/2021

705900E

706000E

706100E

732500N

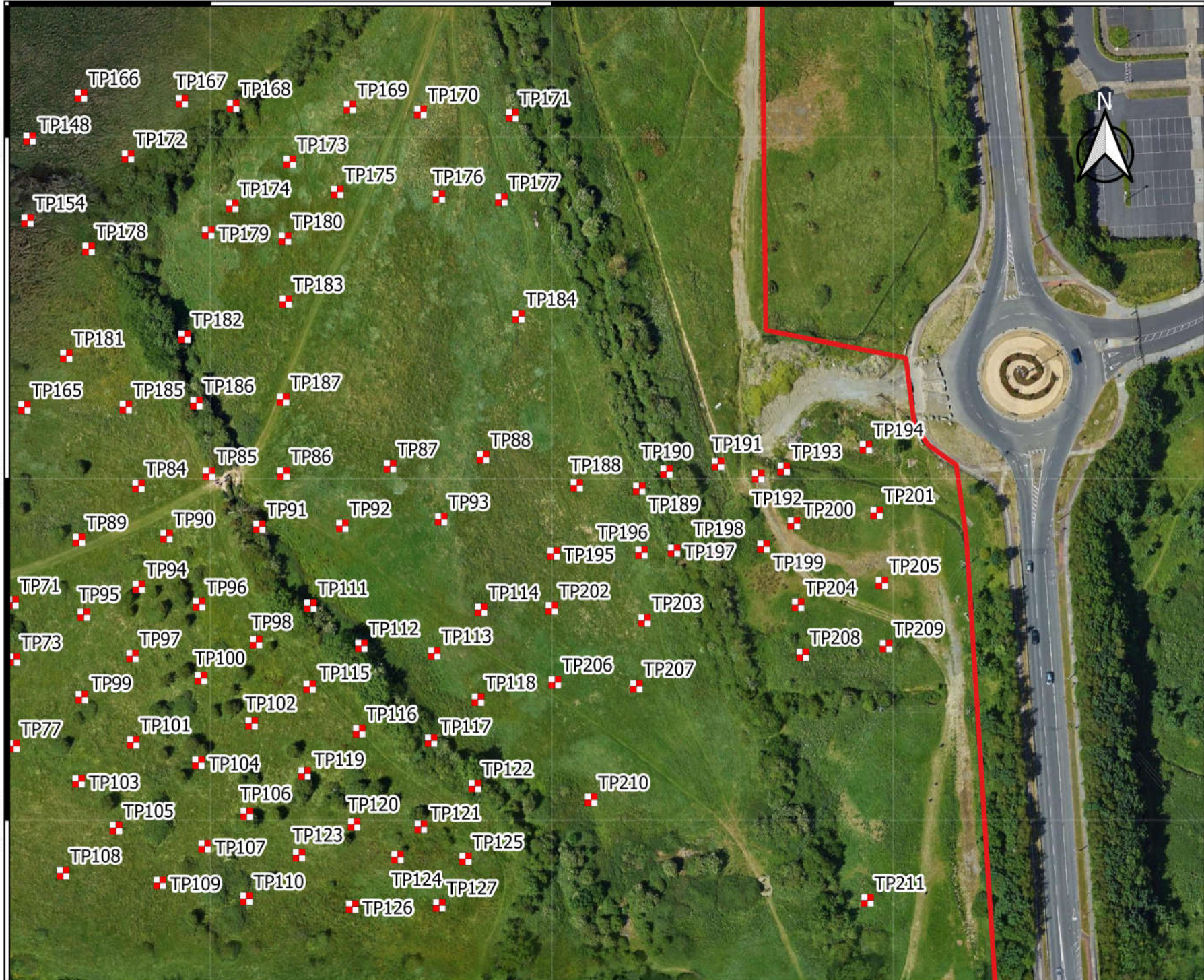
732400N

732300N

705900E

706000E

706100E



- Site Location
- Indicative Site Boundary
- Trial Pit with Dynamic Probe



Client:



Project Code:

10830-07-21

Project Title:

Clonburris Phase 1a

Drawing Title:

Figure 2b - Site Location Plan



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0 12 24 36 48 60 m

Drawn By:
J McDowell

Date:
21/07/2021

APPENDIX F – BIODIVERSITY

Appendix F1 Wintering Bird Survey – André Robinson (independent ornithologist). Emmi Virkki of Scott Cawley Ltd.

Appendix F2 Barn Owl Survey – André Robinson (independent ornithologist). Emmi Virkki of Scott Cawley Ltd.

Appendix F3 Badger/Mammal Survey – Dr. Chris Small

Appendix F4 Non-Avian Fauna Winter Survey – Dr. Chris Small/Bryan Deegan

Appendix F5 Bat Survey – Dr. Tina Aughney/Mr. Shaun Boyle

Appendix F1 Wintering Bird Survey – André Robinson (independent ornithologist). Emmi Virkki of Scott Cawley Ltd.



**Wintering Bird Survey Report
for Clonburris Strategic Development Zone
at Clonburris, Co. Dublin**

Prepared for Goodrock Project Management Limited

Document Control

Project Title	Wintering Bird Survey Report, Clonburris Strategic Development Zone, Clonburris, Co. Dublin			
Document Title	Wintering Bird Survey Report	Project No.	200246	
Revision	Issue Date	Author	Reviewed By	Approved By
11	03/09/2021	EV	NB	AS

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This report has been prepared by Scott Cawley Ltd. in accordance with the particular instructions and requirements of our agreement with the Client, the project's budgetary and time constraints and in line with best industry standards. The methodology adopted and the sources of information used by Scott Cawley Ltd. in providing its services are outlined in this report. The scope of this report and the services are defined by these circumstances.

Where the conclusions and recommendations contained within this document are based upon information provided by others than Scott Cawley Ltd., no liability is accepted on the validity or accuracy of that information. It is assumed that all relevant information has been provided by those parties from whom it has been requested and that the information is true and accurate. No independent verification of any documentation or information supplied by others has been made.

The conclusions presented in this report represent Scott Cawley Ltd.'s best professional judgement based on review of site conditions observed during the site visit (if applicable) and the relevant information available at the time of writing. Scott Cawley Ltd. has used reasonable skill, care and diligence in compiling this report and no warranty is provided as to the report's accuracy.

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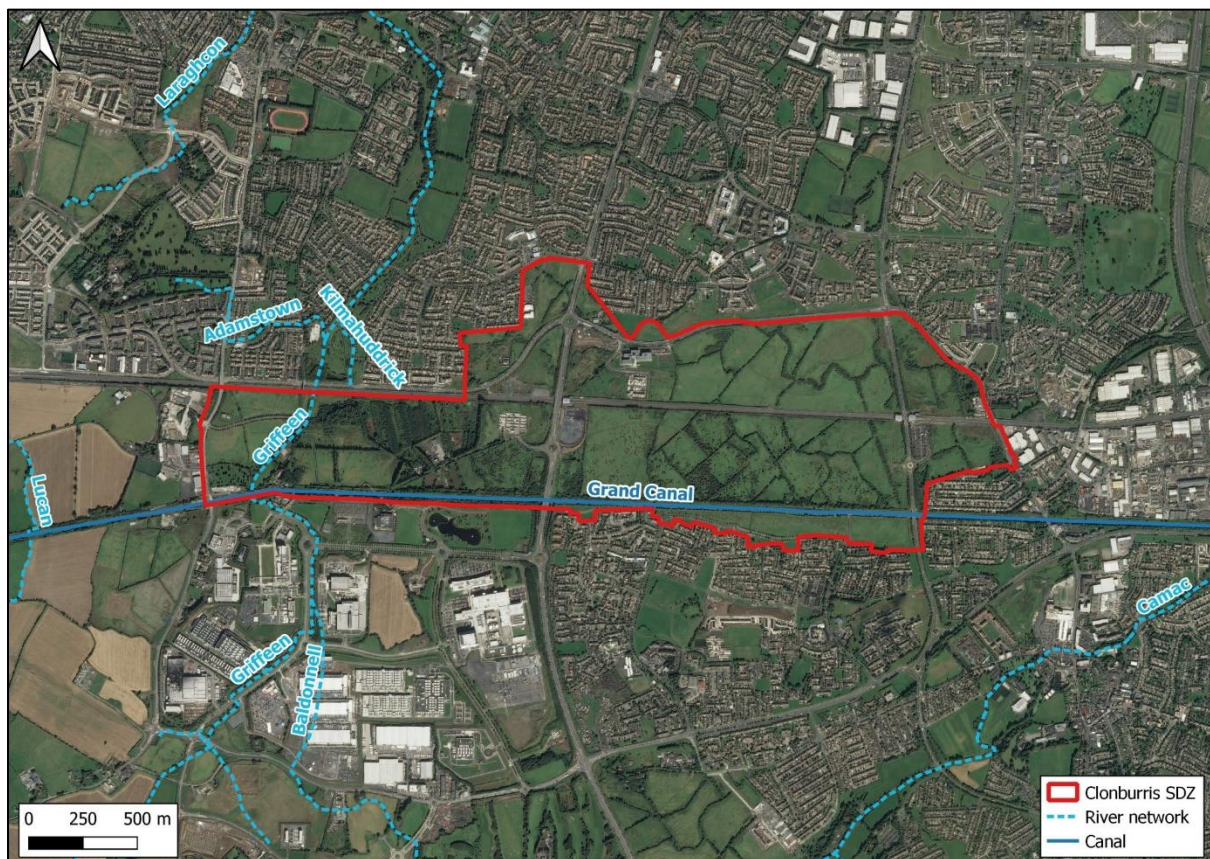
Appendix I – Desk Study Results

Appendix II – Results of Survey Observations

1 Introduction

- 1 This Wintering Bird Survey Report was authored by Emmi Virkki of Scott Cawley Ltd.
- 2 It provides an overview of the wintering bird baseline for lands at Clonburris Strategic Development Zone (from hereafter referred to as 'Clonburris SDZ'), Clonburris, Co. Dublin (refer to Figure 1 for location) for the season 2020/21. This wintering bird survey baseline will be utilised to inform any future planning applications in the Clonburris SDZ within the red line boundary illustrated in Figure 1, below.
- 3 The Clonburris SDZ spans 280 hectares, and is located west of Dublin between Lucan, Clondalkin and Liffey Valley. The area is comprised of areas of unmanaged grassland, with field boundaries demarcated by hedgerows, treelines, and scrub. Hardstanding areas within the SDZ include the South Dublin County Council (SDCC) depot, the R113 car park at Clondalkin / Fonthill railway station and associated paved areas and roads. There are two waterbodies located within the SDZ: the Griffeen River, which intersects the SDZ to the west - from the Lucan Pitch and Putt Club in the south-western corner to the Griffeen Valley Park to the north, and, the Grand Canal which runs near the southern boundary of the SDZ. The adjacent lands and wider environs are largely urban in nature, consisting of residential and commercial areas to north, east and south. The areas to west, beyond existing commercial developments, are agricultural in nature.

Figure 1 Clonburris SDZ in relation to the surrounding environment



- 4 Wintering waterbirds such as geese, gulls and waders are one of the most numerous avifauna in the Irish landscape during winter months between September and March. Most of them use coastal and inland wetland habitats for foraging and/or roosting, but some also take the advantage of drier habitats such as amenity grasslands. For example, Brent goose *Branta bernicla hrota* can be regularly found foraging on amenity grasslands such as football pitches in the greater Dublin area, alongside with other species such as waders curlew *Numenius arquata*, lapwing *Vanellus vanellus* and oystercatcher *Haematopus ostralegus*, and gull species black-headed gull *Chroicocephalus ridibundus* and herring gull *Larus argentatus*. Many of

the wintering bird species in Ireland are listed as the Special Conservation Interest (SCI) species of Special Protection Areas (SPAs) under the Directive 2009/147/EEC; hereafter, referred to as the 'Birds Directive'. In addition, several of them are Red-listed, such as curlew, lapwing and oystercatcher, or Amber-listed, such as black-headed gull and herring gull, on the Bird of Conservation Concern¹ in Ireland.

- 5 The Clonburris SDZ is not located within, or adjacent to any SPA, with the nearest SPA (South Dublin Bay and River Tolka Estuary SPA) located in Dublin Bay, c. 11.8km east of the SDZ lands, however it is considered to have suitable foraging habitat (i.e. open grasslands) for wintering bird species, and therefore it is important to assess the impacts on SCI populations of SPAs that may use the SDZ lands for foraging. This ensures that adequate mitigation measures are provided and adhered to where necessary, and that the conservation objectives of SCI species of SPAs in the vicinity of the Clonburris SDZ are not undermined.
- 6 The assessment of the site's importance to wintering bird populations is completed through comparing the maximum number of birds present at a particular site, against the criterion of it holding 1% or more of the international and national populations. According to the Ramsar Convention on Wetlands, a wetland is considered to be internationally important if it regularly holds at least 1% of the individuals in a population of one species, or 20,000 or more individuals of that species². Additionally if a site holds 1% or more of the estimated national population, the site can be considered to be of national importance to that particular species. Any site regularly supporting these numbers potentially qualifies for designation under national legislation, the Birds Directive and/or the Ramsar Convention.
- 7 The purpose of the report is to:
 - Establish the presence/absence and use of the Clonburris SDZ lands and surrounding area by wintering birds; and,
 - To understand the importance of the Clonburris SDZ lands and surrounding area for wintering birds, including those SCI species for which SPAs have been designated.

2 Planning, Policy and Legislation

- 8 The collation of ecological baseline data and the preparation of this assessment has had regard to the following legislation and policy documents. This is not an exhaustive list but the most relevant legislative and policy basis for the purposes of preparing this Wintering Bird Survey Report.
- 9 The following international legislation is relevant to planning applications within the Clonburris SDZ:
 - Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora; hereafter, referred to as the 'Habitats Directive'. The Habitats Directive is the legislation under which the Natura 2000 network³ was established and special areas of conservation (SACs) are designated for the protection of natural habitat types listed in Annex I, and habitats of the species listed in Annex II, of that directive.

¹ Gilbert, G., Stanbury, A. & Lewis, L. (2021) *Birds of Conservation Concern in Ireland 4: 2020-2026*. Irish Birds 43: 1-22 (2021).

² Information on 1% species thresholds of wintering bird species can be found at: www.bto.org.

³ The Natura 2000 network is a European network of important ecological sites, as defined under Article 3 of the Habitats Directive 92/43/EEC, which comprises both special areas of conservation and special protection areas. Special conservation areas are sites hosting the natural habitat types listed in Annex I, and habitats of the species listed in Annex II, of the Habitats Directive, and are established under the Habitats Directive itself. Special protection areas are established under Article 4 of the Birds Directive 2009/147/EC for the protection of endangered species of wild birds. The aim of the network is to aid the long-term survival of Europe's most valuable and threatened species and habitats.

In Ireland these sites are designed as *European sites* - defined under the Planning Acts and/or the Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special area of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

- Directive 2009/147/EEC; hereafter, referred to as the ‘Birds Directive’. The Birds Directive is the legislation under which special protection areas (SPAs) are designated for the protection of endangered species of wild birds listed in Annex I of that directive.
- 10 The following national legislation is relevant to planning applications within the Clonburris SDZ in the context of wintering wetland bird SCIs of European sites:
- Wildlife Acts 1976 to 2021; hereafter collectively referred to as the ‘Wildlife Acts’. The Wildlife Acts are the principal pieces of legislation at national level for the protection of wildlife and for the control of activities that may harm wildlife. All bird species, 22 other animal species or groups of species, and 86 species of flora are protected under this legislation.
 - Planning and Development Acts 2000 to 2021; hereafter collectively referred to as the ‘Planning and Development Acts’. This piece of legislation is the basis for Irish planning. Under the legislation, development plans (usually implemented at local authority level) must include mandatory objectives for the conservation of natural heritage and for the conservation of European Sites. It also sets out the requirements in relation to environmental assessment with respect to planning matters, including transposition of the Habitats and Birds Directive into Irish law.
 - European Communities (EC) (Birds and Natural Habitats) Regulations 2011 to 2015; hereafter the ‘Birds and Habitats Regulations’. This legislation transposes the Habitats and Birds Directives into Irish law. It also contains regulations (49 and 50) that deal with invasive species (those included within the Third Schedule of the regulations).
- 11 The following plans and policies are relevant to planning applications within the Clonburris SDZ:
- National Biodiversity Action Plan 2017-2021 (Department of Culture Heritage and the Gaeltacht, 2017)
 - South Dublin County Council Development Plan 2016-2022 (Dublin City Council, 2016)
 - Draft Biodiversity Action Plan for South Dublin County 2020-2026 (South Dublin County Council, 2020)
 - Clonburris Strategic Development Zone: Planning Scheme (South Dublin County Council, 2019)
 - Biodiversity Management Plan to Inform the Parks and Landscape Strategy of Clonburris SDZ (Scott Cawley, 2021)

3 Methodology

3.1 Author Statement

- 12 This report was authored by Emmi Virkki of Scott Cawley Ltd., and reviewed by Dr Niamh Burke of Coiscéim Consulting and Andrew Speer of Scott Cawley Ltd. Survey methodologies followed a standard established methodology described in Section 3.3. All surveys were completed by an independent ornithologist, André Robinson.
- 13 Emmi Virkki is a Senior Consultant Ecologist with Scott Cawley Ltd. She obtained an honours degree in Environmental Biology, from University College Dublin and a Masters degree in Environmental Science from the same institution. Emmi is a member and volunteer of BirdWatch Ireland, and a member of the British Trust for Ornithology, the Irish Bryophyte Group, the Botanical Society of Britain and Ireland, and Bat Conservation Ireland. She has five years of professional experience working in ecology in Ireland and has worked with clients at both government and private levels. Emmi’s specialism is ornithology, but she is also skilled in protected flora and fauna, invasive species and habitat surveys. She has conducted ecological survey and assessment (Ecological Impact Assessment, Appropriate Assessment and Biodiversity Chapters of Environmental Impact Assessment Reports) of linear infrastructure, residential, commercial and industrial projects.

- 14 Niamh Burke is Principal Ecologist with Coiscéim Ecology. She holds a BSc in Natural Sciences with Environmental Science and a PhD in salmonid ecology. She is a Chartered Environmentalist (CEnv) with the Society for the Environment (Soc Env) and a Full Member of the CIEEM. Niamh is a senior scientist with academic research and consulting experience in terrestrial ecology, aquatic ecology and fluvial geomorphology. She is an experienced project manager with a full working knowledge of EIA, the planning process and relevant environmental legislation, both national and European. With a specialism in aquatic habitats, she also has experience of terrestrial species' surveys and mitigation approaches. In her extensive consultancy roles, she has acted as reviewer for all ecological reporting and ensured consistency of standards and approach.
- 15 Andrew Speer is a Technical Director at Scott Cawley Ltd. with over 15 years' professional ecological consultancy experience in preparing Ecological Impact Assessments (EclAs). Andrew is a Full Member of the Chartered Institute of Ecology and Environmental Management (CIEEM) and holds a BSc (Hons) in Zoology from the National University of Ireland Galway, a Pg Dip in Geographic Information Systems (GIS) from the University of Ulster and an Adv Dip in Planning & Environmental Law from King's Inns. He has extensive experience in ecological impact assessment and has been the lead author on numerous EclA reports, Screening for Appropriate Assessment Reports, Natura Impact Statements (NISs) and Natura Impact Reports (NIRs). Andrew also provides technical review and due diligence of EclA and AA documentation for public and local authorities to aid their decision-making process.

3.2 Desk Study

- 16 A desk study was undertaken in November 2020 prior to the commencement of field work and updated in July 2021 following the completion of field work and during the preparation of the survey report. The purpose of the desk study was to collate available information on the local ecological environment. The following resources were used to inform the assessment presented in this report:
- Records of wetland bird species for the 10km grid square O03 within which the Clonburris SDZ is located in, as held by the National Biodiversity Data Centre www.biodiversityireland.ie – refer to Appendix I for all desk study records
 - Irish Wetland Bird Survey (I-WeBS) summary data. Summary data was downloaded from the BirdWatch Ireland website at <https://birdwatchireland.ie/our-work/surveys-research/research-surveys/irish-wetland-bird-survey/> - refer to Appendix I for this data
 - Ordnance Survey Ireland mapping and aerial photography from <http://map.geohive.ie/>
 - Information on the conservation status of birds in Ireland from *Birds of Conservation Concern in Ireland* (Gilbert *et al.*, 2021)
 - Publicly available information on inland feeding sites for Light-bellied Brent Geese *Branta bernicla hrota* (herein referred to as Brent Geese) in the Dublin area contained within (Benson, 2009), Scott Cawley (2017) and Enviroguide (2020).
 - The results of previous wintering bird surveys carried out in the Clonburris SDZ presented in *Winter Bird Survey of Clonburris SDZ* (Roughan & O'Donovan Consulting Engineers, 2020).
- 17 It is Scott Cawley Ltd.'s understanding that a three-year project studying the movements and behaviour of wintering bird species in Dublin Bay, and funded in part by the four Dublin local authorities (Dublin City Council, South Dublin County Council, Dún Laoghaire-Rathdown County Council, and Fingal County Council), is ongoing. The data was not publicly available at the time of writing of this report.

3.3 Field Survey

- 18 Wintering bird surveys were undertaken between October and November 2020 and February and March 2021 by André Robinson, an independent ornithologist, using a methodology adapted from the *Bird Monitoring Methods - A Manual of Techniques for Key UK Species*⁴. The area between the railway line and

⁴ Gilbert, G., Gibbons, D.W. & Evans, J. (1998) *Bird Monitoring Methods - A Manual of Techniques for Key UK Species*. RSPB: Sandy

the Grand Canal within the Clonburris SDZ was divided into eastern and western sections from R136. and transects covering the entire area were walked during daylight hours. The eastern and western sections were surveyed on consecutive days. Survey details are presented in Table 1.

Table 1 Details of wintering bird surveys undertaken within the Clonburris SDZ

Date	Survey Area	Survey Time	Weather Conditions
29/10/2020	Eastern section	09:30-16:30	Dry overcast weather, with temperatures around 13°C.
30/10/2020	Western section	07:15-14:00	Overcast weather with occasional showers and temperatures around 10°C.
19/11/2020	Eastern section	09:00-15:30	Partially overcast dry weather with light breeze and temperatures around 7°C.
20/11/2020	Western section	08:00-14:15	Overcast dry weather with light breeze and temperatures around 11°C.
01/02/2021	Western section	08:00-15:20	Overcast weather with light breeze and light rain towards the end and temperatures around 5°C.
02/02/2021	Eastern section	08:00-16:30	Overcast weather with light breeze and occasional light showers and temperatures around 9°C.
27/02/2021	Western section	08:00-16:30	Partially overcast dry weather with light breeze and temperatures around 7°C.
28/02/2021	Eastern section	07:15-14:30	Partially overcast dry weather with light breeze and temperatures around 6°C.
26/03/2021	Western section	07:00-14:30	Partially overcast weather with light breeze, light hail showers and temperatures around 8°C.
27/03/2021	Eastern section	07:00-14:00	Overcast dry weather with moderate breeze and temperatures around 6°C.

- 19 Birds were identified by sight and sound, and general location and activity were recorded using the British Trust for Ornithology (BTO) species and activity codes. The survey area was surveyed visually using binoculars/scope along the walked transect. Where present and readable, ring codes of birds were collected. The surveyor kept to the margins of fields in the site so as to ensure that their presence did not prevent birds landing on site.
- 20 The results of field surveys have been contextualised against the I-WeBS peak counts at the nearest I-WeBS site, the populations of SCI species at the nearest SPA designated for them, and against the 1% threshold of the international and/or national population of each species⁵ as contained within Lewis *et al.* (2019). As gull species recording is optional during the I-WeBS counts and the national population thresholds are based on numbers recorded during the I-WeBS, there are no national population estimates against which to compare the gull peak counts, and therefore this comparison has been omitted for this species group.

3.3.1 Survey Limitations

- 21 It must be acknowledged that the surveys of the lands were undertaken across a single wintering bird survey season. It is possible that the number and frequency of use of inland feeding sites varies across the

⁵ The 1% criterion is applied to identify sites of international and national importance for birds

wintering bird season, based on forage resource, disturbance levels, changes to site suitability and other environmental factors. Desktop sources of information have been referenced to overcome this limitation.

- 22 It was not possible to complete wintering bird surveys in December 2020 and January 2021, due to a health and safety issue in the Clonburris SDZ lands during the surveys carried out in November 2020. Surveys were suspended until the health and safety issue was resolved. Surveys programmed for January 2021 were postponed until the beginning of February 2021, which resulted in two sets of survey visits during this month (Table 1). Considering the small areas of suitable wintering bird foraging habitat (i.e. open short grassland) within the Clonburris SDZ lands and the abundance of better quality foraging habitat (i.e. amenity grasslands) within the wider Dublin area, and the relatively low numbers of wintering bird species being recorded within the lands during *Winter Bird Survey of Clonburris SDZ* (Roughan & O'Donovan Consulting Engineers, 2020) and during the October and November 2020 survey visits by Scott Cawley Ltd., this is not deemed to be a limitation that affects the robustness of the survey data to inform any future impact assessment.

4 Wintering Bird Baseline

- 23 The results of desk study searches are presented in full in Appendix I of this report, while the full set of survey observations are included as Appendix II of this report. The results of desk and field surveys are summarised in this section of the report.

4.1 European sites

- 24 There are 12 European sites designated for bird species within 20km of the Clonburris SDZ and its immediate vicinity (see Figure 2). Of these, seven (South Dublin Bay and River Tolka Estuary SPA, North Bull Island SPA, Baldoyle Bay SPA, Malahide Estuary SPA, Rogerstown Estuary SPA and Poulaphouca Reservoir SPA) are designated for wintering SCI bird populations. The remaining five (Howth Head Coast SPA, Ireland's Eye SPA, Lambay Island SPA, Dalkey Islands SPA and Wicklow Mountains SPA) are designated for breeding SCI bird populations.

Figure 2 Clonburris SDZ in the context of European sites designated for bird within 20km



4.2 SCI Species

- 25 Records of 34 species of wetland birds, for which European sites have been designated in Ireland, were returned from the search of the NBDC database for the 10km grid square O03. The records have been reproduced in Appendix I of this report.
- 26 The following eleven SCI species of European sites were observed either flying over or foraging within the within the survey area in the 2020/2021 wintering bird season:
- Black-headed gull *Chroicocephalus ridibundus*
 - Cormorant *Phalacrocorax carbo*
 - Common gull *Larus canus*
 - Coot *Fulica atra*
 - Grey heron *Ardea cinerea*
 - Herring Gull *Larus argentatus*
 - Lapwing *Vanellus vanellus*
 - Lesser black-backed gull *Larus fuscus*
 - Little grebe *Tachybaptus ruficollis*
 - Mallard *Anas platyrhynchos*
 - Tufted duck *Aythya fuligula*
- 27 Of these species, one species (lapwing) is Red-listed (i.e. of High Conservation Concern) and eight species (black-headed gull, cormorant, common gull, coot, herring gull, lesser black-backed gull, mallard and tufted

duck) are Amber-listed (i.e. of Medium Conservation Concern) on the Bird of Conservation Concern in Ireland¹. The only Green-listed (i.e. of Low Conservation Concern) species of the SCI species recorded during the surveys was grey heron.

28 In terms of frequency and location of records of SCI species within the survey area:

- Common gull and herring gull were the most frequent visitors to the Clonburris SDZ, with observations of the species on all 10 survey dates, followed by black-headed gull with observations on nine survey dates. Common gull was recorded loafing in the pond in the Grange Castle Business Park, adjacent to the Grand Canal, whereas besides being recorded in the pond with common gull, herring gull was also recorded flying across the SDZ lands, on the ground in one of the grasslands and along the Grand Canal. Similarly to common gull and herring gull, black-headed gull was recorded swimming in the pond in the Grange Castle Business Park, and also flying across the SDZ lands and on the ground in grasslands throughout the SDZ lands.
- Cormorant were recorded on five out of the 10 survey dates flying along the Grand Canal in November 2020, and February and March 2021. Cormorant was also recorded foraging within the waterbody on one occasion.
- Coot was recorded in the pond in the Grange Castle Business Park during three survey visits and once in the Grand Canal November 2020, and February and March 2021.
- Grey heron was recorded during seven survey visits during all survey months. Most records were of the species either perching and/or foraging along the Grand Canal, or flying over the SDZ lands and or foraging in a flooded grassland area adjacent to the Kishoge roundabout.
- Lapwing were recorded during four survey visits. This species was present in large flocks of up to 200 individuals in the grasslands in the eastern section of the Clonburris SDZ in October and November 2020 and February 2021.
- Lesser black-backed gull was recorded during survey visits in October 2020 and February and March 2021, with most of the records of the species being it flying over the SDZ lands, one record from the pond in the Grange Castle Business Park and another from grasslands in the north-eastern section of the SDZ lands.
- Little grebe and mallard were recorded during seven and eight survey visits, respectively, either in the pond in the Grange Castle Business Park or in the Grand Canal. Mallard were also seen flying over the SDZ lands. Both species were present throughout all survey months.
- Tufted duck were recorded during three survey visits in the pond in the Grange Castle Business Park in February and March 2021.

4.2.1 SCI Species in the Context of European Sites

- 29 Wetland bird species are mobile and can regularly travel up to 20km between roosting and feeding sites (Scottish Natural Heritage, 2016). For this reason, it is possible that birds observed at Clonburris SDZ could belong to populations of SCI species associated with European sites up to 20km from the survey area.
- 30 Considering the generic conservation objective for SPAs is to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for each SPA, the ten SCI species observed foraging within or flying over the survey are discussed in more detail in the subsections set out below.

4.2.1.1 Black-headed gull *Chroicocephalus ridibundus* [A179]

Desk Study Results for Black-headed Gull

- 31 Black-headed gull *Chroicocephalus ridibundus* [A179] is a SCI species for which the following European sites within 20km of the SDZ lands have been designated:

- South Dublin Bay and River Tolka Estuary SPA (004024), c. 11.7km north-east of the SDZ lands. This European site encompasses the coastal and intertidal zones of Dublin Bay extending between the Bull Wall in the north and Dún Laoghaire West Pier in the south. The baseline population of black-headed gull in the European site, based on the five-year mean peak counts for the period 1995/96-1999/2000, is listed as 3,040 birds in the Conservation Objectives Supporting Document (NPWS, 2014a). South Dublin Bay and River Tolka Estuary SPA (004024) is listed as the fourth most important site in the country for this species. The status of their wintering populations is considered Unfavourable due to decline in their numbers.
 - North Bull Island SPA (004006), c. 14.8km north-east of the SDZ lands. This European site encompasses the coastal fringes of the North Bull Island, and surrounding intertidal and coastal zones extending between the North Bull wall in the south and Howth Head in the north. The baseline population of black-headed gull in the European site, based on the five-year mean peak counts for the period 1995/96-1999/2000, is listed as 2,196 birds in the Site Synopsis document (NPWS, 2014b). The site hosts a population of national importance for the species.
- 32 There is potential that some members of the South Dublin Bay and River Tolka Estuary SPA and North Bull Island SPA wintering populations utilise the Clonburris SDZ lands for forage during the winter months, considering the SDZ lands are within the 20km foraging range. This species is a commonly encountered urban bird species, with large populations residing in the urban area around Dublin.
- 33 There are previous records for black-headed gull within c. 2km of the Clonburris SDZ lands on the NBDC database. The most recent record on the NBDC database is from 2013.

Field Survey Results for Black-headed Gull

- 34 Black-headed gull were observed within the survey area on nine survey dates (see Figure 3 for locations of records). During all these survey visits, a small number of birds (<20 birds) were observed flying within the Clonburris SDZ lands. Larger flocks of the species (>20 birds) were observed on three dates between February and March 2021 (full list of observations included in Appendix II of this report). The peak count for black-headed gull foraging and/roosting in or adjacent to the Clonburris SDZ lands was 142 birds at the pond in the Grange Castle Business Park observed on 1st February 2021.

Figure 3 Records of black-headed gull from the wintering bird surveys carried out between October 2020 and March 2021



Black-Headed Gull at Clonburris SDZ in the context of European sites

- 35 The nearby European sites have been designated for wintering populations of black-headed gull as opposed to their breeding populations.
- 36 In relation to wintering populations of the species in the vicinity and the nearest SPAs, the peak count of birds (142 individuals) within the survey area potentially represents:
- 5.4% of the wintering population in Dublin Bay, referencing the I-WeBS mean peak count of 2,642 birds for the period 2011/2013– 2017/18 (See Appendix I).
 - 4.7% of the wintering SCI populations of the South Dublin Bay and River Tolka Estuary SPA, referencing the five-year mean peak count for the period 1995/96-1999/2000 of 3,040 birds in the Conservation Objectives Supporting Document (NPWS, 2014a).
 - 6.5% of the wintering SCI populations of the North Bull Island SPA, referencing the five-year mean peak count for the period 1995/96-1999/2000 of 2,196 birds in the Conservation Objectives Supporting Document (NPWS, 2014b).
- 37 According to Lewis *et al.* (2019), 1% of the international population of black-headed gull is 31,000 birds. The peak count of birds utilising the survey area did not reach or exceed this number in the 2020/21 survey season. The peak count of 142 birds observed in the survey area represents 0.46% of the 1% international population of the species.

4.2.1.2 Cormorant *Phalacrocorax carbo* [A017]

Desk Study Results for Cormorant

- 38 Cormorant *Phalacrocorax carbo* [A017] is a SCI species for which there are no European sites designated for their wintering populations within 20km of the Clonburris SDZ lands. The nearest European sites designated for their breeding populations are:
- Ireland's Eye SPA (004117), c. 23.3km north-east of the SDZ lands. The European site encompasses the island of Ireland's Eye and the surrounding coastal waters. Cormorant breed on the island in nationally important numbers (306 pairs) (NPWS, 2018a).
 - Lambay Island SPA (004069), c. 29.9km north-east of the SDZ lands. The European site encompasses Lambay Island and its surrounding coastal waters. Cormorant breed on the island in internationally important numbers (675 pairs), with smaller number of birds (29) overwintering at the site (NPWS, 2018b).
- 39 Although there are no European sites designated for wintering populations of cormorant within 20km of the Clonburris SDZ lands, there is potential that some individuals of the Ireland's Eye or Lambay Island breeding population utilise the section of the Grand Canal that runs along the southern boundary of the Clonburris SDZ lands for foraging during winter months, considering some individuals winter inland⁶.
- 40 There are previous records for cormorant within c. 2km of the Clonburris SDZ lands on the NBDC database. The most recent record on the NBDC database is from 2015.

Field Survey Results for Cormorant

- 41 Cormorant activity was mainly concentrated along the Grand Canal, which runs along the southern boundary of the Clonburris SDZ lands (see Figure 4 for locations of records). Observations were generally of a single individual flying either west or east along the Grand Canal, as opposed to across the Clonburris SDZ lands. On a single occasion, one individual was observed foraging in the Grand Canal on the 2nd February 2021.

⁶ Information on cormorant wintering habits available at: www.birdwatchireland.com.

Figure 4 Records of cormorant from the wintering bird surveys carried out between October 2020 and March 2021



Cormorant at Clonburris SDZ in the context of European sites

- 42 It is worth bearing in mind that nearby European sites, Ireland’s Eye SPA (004117) and Lambay Island SPA (004069) have been designated for their breeding populations of cormorant as opposed to their wintering populations. The surveys undertaken to inform this report related to the winter season, and it is not clear how the wintering population relates to the breeding populations at Ireland’s Eye and Lambay Island in this instance.
- 43 In relation to wintering populations of the species in the vicinity, the peak count of birds (one individual) within the survey area potentially represents:
- 0.7% of the wintering population at Ireland’s Eye, referencing the I-WeBS mean peak count of 136 birds over the period 2013/14 - 2017/18 (See Appendix I).
 - 0.5% of the wintering population at Lambay Island, referencing the I-WeBS mean peak count of 200 birds over the period 2013/14 - 2017/18 (See Appendix I).
- 44 According to Lewis *et al.* (2019), 1% of the international and national populations of cormorant are 1,200 and 110 birds, respectively. The peak count of birds utilising the survey area did not reach or exceed this number in the 2020/21 survey season. The peak count of one bird observed in the survey area represents 0.08% of the 1% of the international and 0.91% of the national population of the species.

4.2.1.3 Common Gull *Larus canus* [A182]

Desk Study Results for Common Gull

- 45 Common gull *Larus canus* [A182] is a SCI species for which there are no European sites designated for their wintering populations within 20km of the Clonburris SDZ lands. The nearest European sites designated for their populations is:
- Dundalk Bay SPA (004026), c. 59.4km north-east of the SDZ lands. Dundalk Bay is a large open shallow sea bay with extensive saltmarshes and intertidal sand/mudflats, extending some 16 km from Castletown River on the Cooley Peninsula, in the north, to Annagassan/Salterstown in the south. The baseline population of common gull in the European site, based on the five-year mean peak counts for the period 1995/96-1999/2000, is listed as 551 birds in the Site Synopsis document (NPWS, 2014c). The site hosts a population of national importance for the species.
- 46 Considering the distance to the Dundalk Bay SPA, it is unlikely that the individuals recorded within the Clonburris SDZ lands form a part of this, or any other, SPA population. This species is relatively commonly encountered in urban areas during winter months.
- 47 There are previous records for common gull within c. 2km of the Clonburris SDZ lands on the NBDC database. The most recent record on the NBDC database is from 2011.

Field Survey Results for Common Gull

- 48 Common gull were observed in the survey area on all 10 survey dates (see Figure 5 for locations of records). On the vast majority of survey visits, a small number of birds (<5 birds) were observed flying across the Clonburris SDZ lands. Slightly larger flocks of the species (>5 birds) were observed on three dates between February and March 2021 (full list of observations included in Appendix II of this report). The peak count for common gull foraging and/roosting in or adjacent to the Clonburris SDZ lands was 22 birds at the pond in the Grange Castle Business Park observed on 1st February 2021.

Figure 5 Records of common gull from the wintering bird surveys carried out between October 2020 and March 2021



Common gull at Clonburris SDZ in the context of European sites

- 49 There are no European sites designated for wintering or breeding populations of common gull within 20km of the Clonburris SDZ lands, and therefore the individuals recorded within the survey area are unlikely to form part of SPA populations. The nearest designated site is the Dundalk Bay SPA, located c. 59.4km north-east of the survey area.
- 50 In relation to wintering populations of the species in the vicinity, the peak count of birds (22 individuals) in within the survey area potentially represents:
- 4.1% of the wintering population in Dublin Bay, referencing the I-WeBS mean peak count of 536 birds for the period 2011/2013– 2017/18 (See Appendix I).
- 51 According to Lewis *et al.* (2019), 1% of the international population of common gull is 16,400 birds. The peak count of birds utilising the survey area did not reach or exceed this number in the 2020/21 survey season. The peak count of 22 birds observed in the survey area represents 0.1% of the 1% international population of the species.

4.2.1.4 Coot *Fulica atra* [A125]

Desk Study Results for Coot

- 52 Coot *Fulica atra* [A125] is a SCI species for which there are no European sites designated for their wintering populations within 20km of the Clonburris SDZ lands. The nearest European sites designated for their populations is:
- Lough Ennell SPA (004044), c. 63km north-west of the Clonburris SDZ lands. The European site Lough Ennell is a large, limestone lake located south of Mullingar in Co. Westmeath. The baseline population of coot in the European site, European site, based on the five-year mean peak counts for the period 1995/96-1999/2000, is listed as 433 birds in the Site Synopsis document (NPWS, 2014d). The site hosts a population of national importance for the species
- 53 Considering the distance to the Lough Ennell SPA, it is unlikely that the individuals recorded within the Clonburris SDZ lands form a part of this, or any other, SPA population. This species is relatively common in waterbodies of urban areas throughout the year.
- 54 There are previous records for coot within c. 2km of the Clonburris SDZ lands on the NBDC database. The most recent record on the NBDC database is from 2011.

Field Survey Results for Coot

- 55 Coot were observed within the survey area on four occasions in November 2020 and February and March 2021 (see Figure 6 for locations of records). Three of these observations involved a small number of birds (up to 22 individuals) foraging and swimming in the pond in the Grange Castle Business Park, located adjacent to the Grand Canal and the Clonburris SDZ lands. One of the records were of a perching bird along the Grand Canal. The peak count for coot was from the pond where 22 birds were observed on the 1st February 2021.

Figure 6 Records of coot from the wintering bird surveys carried out between October 2020 and March 2021



Coot at Clonburris SDZ in the context of European sites

- 56 There are no European sites designated for wintering or breeding populations of coot within 20km of the Clonburris SDZ lands, and therefore the individuals recorded within the survey area are unlikely to form part of SPA populations. The nearest designated site is the Lough Ennell SPA, located c. 63km north-west of the survey area.
- 57 In relation to wintering populations of the species in the vicinity, the peak count of birds (22 individuals) in within the survey area potentially represents:
 - 16.2% of the wintering population in Dublin Bay, referencing the I-WeBS mean peak count of 136 birds for the period 2011/2013– 2017/18 (See Appendix I).
- 58 According to Lewis *et al.* (2019), 1% of the international and national populations of coot are 15,500 and 190 birds, respectively. The peak count of birds utilising the survey area did not reach or exceed this number in the 2020/21 survey season. The peak count of 22 birds observed in the survey area represents 0.14% of the 1% international and 11.6% of the national population of the species.

4.2.1.5 Grey Heron *Ardea cinerea* [A028]

Desk Study Results for Grey Heron

- 59 Grey heron *Ardea cinerea* [A028] is a SCI species for which there are no European sites designated for their wintering populations within 20km of the Clonburris SDZ lands. The nearest European sites designated for their populations is:
- Wexford Harbour and Slobbs SPA (004076), c. 93.7km south of the Clonburris SDZ lands. Wexford Harbour is the lowermost part of the estuary of the River Slaney, a major river that drains much of the south-east region. The site is divided between the natural estuarine habitats of Wexford Harbour, the reclaimed polders known as the North and South 'Slobbs', and the tidal section of the River Slaney. The seaward boundary extends from the Rosslare peninsula in the south to the area just west of The Raven Point in the north. The baseline population of grey heron in the European site, based on the five-year mean peak counts for the period 1995/96-1999/2000, is listed as 52 birds in the Site Synopsis document (NPWS, 2014e).
- 60 Considering the distance to the Wexford Harbour and Slobbs SPA, and that grey heron are generally sedentary in Ireland, meaning they do not travel long distances between their breeding and wintering grounds⁷, the population of birds in the Clonburris SDZ lands are unlikely to form part of this, or any other, European site population.
- 61 There are previous records for grey heron within c. 2km of the Clonburris SDZ lands on the NBDC database. The most recent record on the NBDC database is from 2017.

Field Survey Results for Grey Heron

- 62 Single grey herons were observed foraging in and along the Grand Canal on seven survey dates (see Figure 7). The birds were also noted flying over the Clonburris SDZ lands and once foraging at a flooded grassland near the Kishoge roundabout.

⁷ From information on Grey Heron *Ardea cinerea* published on the BirdWatch Ireland website <https://birdwatchireland.ie/birds/grey-Heron/>. Accessed 13th June 2021

Figure 7 Records of grey heron from the wintering bird surveys carried out between October 2020 and March 2021



Grey Heron at Clonburris SDZ in the context of European sites

- 63 There are no European sites designated for wintering or breeding populations of grey heron within 20km of the Clonburris SDZ lands, and therefore the individuals recorded within the survey area are unlikely to form part of SPA populations. The nearest designated site is the Wexford Harbour and Slobbs SPA, located c. 63.7km south of the SDZ lands.
- 64 In relation to wintering populations of the species in the vicinity, the peak count of birds (one individual) within the survey area potentially represents:
 - 4.8% of the wintering population in Dublin Bay, referencing the I-WeBS mean peak count of 42 birds for the period 2011/2013– 2017/18 (See Appendix I).
- 65 According to Lewis *et al.* (2019), 1% of the international and national populations of grey heron are 5,000 and 25 birds, respectively. The peak count of birds utilising the survey area did not reach or exceed this number in the 2020/21 survey season. The peak count of two birds observed in the survey area represents 0.04% of the 1% international and 4% of the national population of the species.

4.2.1.6 Herring Gull *Larus argentatus* [A184]

Desk Study Results for Herring Gull

- 66 Herring gull *Larus argentatus* [A148] is a SCI species for which there are no European sites designated for their wintering populations within 20km of the Clonburris SDZ lands. The nearest European sites designated for their populations are:
- Ireland's Eye SPA (004117), c. 23.3km north-east of the SDZ lands. The European site encompasses the island of Ireland's Eye and the surrounding coastal waters. Ireland's Eye is an important breeding site for herring gull, and has a population of 250 birds (NPWS, 2018a).
 - Lambay Island SPA (004069), c. 29.9km north-east of the SDZ lands. The European site encompasses Lambay Island and its surrounding coastal waters. Lambay Island is an important breeding site for herring gull, and has a population of 1,806 birds (NPWS, 2018b).
- 67 Considering the distance to the Ireland's Eye SPA and Lambay Island SPA, it is unlikely that the individuals recorded within the Clonburris SDZ lands form a part of this, or any other, SPA population. This species is relatively commonly encountered in urban areas during winter months.
- 68 There are previous records for herring gull within c. 2km of the Clonburris SDZ lands on the NBDC database. The most recent record on the NBDC database is from 2012.

Field Survey Results for Herring Gull

- 69 Herring gull were observed within the survey area on all ten survey dates (see Figure 8 for locations of records). On the vast majority of survey visits, a small number of birds ranging from one individual to up to 22 individuals were seen flying across the survey area. Larger flocks of the species (29 to 58 individuals) were observed on three dates between February and March 2021 in the pond in the Grange Castle Business Park, adjacent to the Grand Canal and the Clonburris SDZ (full list of observations included in Appendix II of this report). The peak count for herring gull observed within or adjacent to the Clonburris SDZ was 58 individuals observed on the 27th March 2021.

Figure 8 Records of herring gull from the wintering bird surveys carried out between October 2020 and March 2021



Herring Gull at Clonburris SDZ in the context of European sites

- 70 There are no European sites designated for wintering or breeding populations of herring gull within 20km of the Clonburris SDZ lands, and therefore the individuals recorded within the survey area are unlikely to form part of SPA populations. The nearest designated sites are the Ireland’s Eye SPA, located c. 23.3km north-east, and the Lambay Island SPA, c. 29.9km north-east of the survey area.
- 71 In relation to wintering populations of the species in the vicinity, the peak count of birds within the SDZ potentially represents:
 - 12.3% of the wintering population in Dublin Bay, referencing the I-WeBS mean peak count of 471 birds for the period 2011/2013– 2017/18 (See Appendix I).
 - 29% of the wintering population at Ireland’s Eye, referencing the I-WeBS mean peak count of 200 birds over the period 2011/2013– 2017/18 (See Appendix I).
- 72 According to Lewis *et al.* (2019), 1% of the international population of herring gull is 14,400 birds. The peak count of birds utilising the survey area did not reach or exceed this number in the 2020/21 survey season. The peak count of 58 birds observed in the survey area represents 0.4% of the 1% international population of the species.

4.2.1.7 Lapwing *Vanellus vanellus* [A142] XXEE

Desk Study Results for Lapwing

- 73 Lapwing *Vanellus vanellus* [A142] is a SCI species for which there are no European sites designated for their wintering populations within 20km of the Clonburris SDZ lands. The nearest European sites designated for their populations is:
- Dundalk Bay SPA (004026), c. 59.4km north-east of the Clonburris SDZ lands. The European site is a large open shallow sea bay with extensive saltmarshes and intertidal sand/mudflats, extending approximately 16km from Castletown River on the Cooley Peninsula, in the north, to Annagassan/Salterstown in the south. The baseline population of lapwing in the European site, based on the five-year mean peak counts for the period 1995/96-1999/2000, is listed as 4,892 birds in the Site Synopsis document (NPWS, 2014c). The site hosts a population of national importance for the species.
- 74 Considering the distance to the nearest designated site for lapwing and the typical foraging range of species, individuals recorded within the Clonburris SDZ are unlikely to form part of the Dundalk Bay SPA or any other SPA population.
- 75 There are previous records for lapwing within c. 2km of the Clonburris SDZ lands on the NBDC database. The most recent record is from 2011.

Field Survey Results for Lapwing

- 76 Lapwing were observed within the survey area on four of the ten survey dates (see Figure 9 for locations of records). Flocks ranging in size from 5 individuals to 200 were recorded flying over the survey area after taking off from the SDZ lands (full list of observations included in Appendix II of this report). A peak flock of 120 individuals was recorded landed within the Clonburris SDZ towards the centre of the site on 2nd February 2021. A peak count of 200 individuals was recorded flying over the site on the same day.

Figure 9 Records of lapwing from the wintering bird surveys carried out between October 2020 and March 2021



Lapwing at Clonburris SDZ in the context of European sites

- 77 There are no European sites designated for wintering or breeding populations of lapwing within 20km of the Clonburris SDZ lands, and therefore the individuals recorded within the survey area are unlikely to form part of SPA populations. The nearest designated sites is the Dundalk Bay SPA, located c. 59.4km north-east of the survey area.
- 78 In relation to wintering populations of the species in the vicinity, the peak count of birds (up to 200 individuals) within the SDZ potentially represents:
- 327.87% of the wintering population in Dublin Bay, referencing the I-WeBS mean peak count of 61 birds for the period 2011/2013– 2017/18 (See Appendix I).
- 79 According to Lewis *et al.* (2019), 1% of the international and national populations of lapwing are 72,300 and 850 birds, respectively. The peak count of birds utilising the survey area did not reach or exceed this number in the 2020/21 survey season. The peak count of 200+ birds observed in the survey area represents 0.28% of the 1% international and 23.5% of the national population of the species.

4.2.1.8 Lesser black-backed gull *Larus fuscus* [A183]

Desk Study Results for Lesser Black-Backed Gull

- 80 Lesser black-backed gull *Larus fuscus* [A183] is a SCI species for which the following European sites within 20km of the SDZ lands have been designated:
- Poulaphouca Reservoir SPA (004063), c. 16.9km south-west of the SDZ lands. This European site is located in the western foothills of the Wicklow Mountains and covers an area of approximately 20 square kilometres. It is the largest inland water body in the mid-east and south-east regions. The baseline population of lesser black-backed gull in the European site, based on the five-year mean

peak counts for the period 1995/96-1999/2000, is listed as 651 birds in the Site Synopsis document (NPWS, 2014f). The site hosts a population of national importance for the species.

- 81 Considering the Poulaphouca Reservoir SPA is within c. 20km of the SDZ lands, there is potential that some members of the SPA wintering populations utilise the SDZ lands for forage during the winter months.
- 82 There are previous records for lesser black-backed gull within c. 2km of the Clonburris SDZ lands on the NBDC database. The most recent record is from 2011.

Field Survey Results for Lesser black-backed gull

- 83 Lesser black-backed gull were observed within the survey area on seven of the ten survey dates (see Figure 10 for locations of records). On the vast majority of survey visits, a small number of birds ranging from one individual to up to three individuals were seen flying across the survey area (full list of observations included in Appendix II of this report). The peak count for lesser black-backed gull, of three individuals, was observed within or adjacent to the Clonburris SDZ on the 30th October 2020, 28th February 2021, 27th March 2021 and 28th March 2021.

Figure 10 Records of lesser black-backed gull from the wintering bird surveys carried out between October 2020 and March 2021



Lesser black-backed gull at Clonburris SDZ in the context of European sites

- 84 There is one European site designated for wintering populations of lesser black-backed gull within 20km of the Clonburris SDZ lands. The nearest designated sites is the Poulaphouca Reservoir SPA, c. 16.9km south-west of the survey area.
- 85 In relation to wintering populations of the species in the vicinity and the nearest SPA, the peak count of birds (three individuals) within the survey area potentially represents:
 - 25% of the wintering population in Dublin Bay, referencing the I-WeBS mean peak count of 12 birds for the period 2011/2013– 2017/18 (See Appendix I).

- 0.5% of the wintering SCI populations of the Poulaphouca Reservoir SPA, referencing the five-year mean peak count for the period 1995/96-1999/2000 of 651 birds in the Conservation Objectives Supporting Document (NPWS, 2014f).

86 According to Lewis *et al.* (2019), 1% of the international population of lesser black-backed gull is 5,500⁸ birds. The peak count of birds utilising the survey area did not reach or exceed this number in the 2020/21 survey season. The peak count of three birds observed in the survey area represents 0.05% of the 1% international population of the species.

4.2.1.9 Little grebe *Tachybaptus ruficollis* [A004]

Desk Study Results for Little Grebe

87 Little grebe *Tachybaptus ruficollis* [A004] is a SCI species for which there are no European sites designated for their wintering populations within 20km of the Clonburris SDZ lands. The nearest European sites designated for their populations is:

- Wexford Harbour and Slobs SPA (004076), c. 93.7km south of the Clonburris SDZ lands. Wexford Harbour is the lowermost part of the estuary of the River Slaney, a major river that drains much of the south-east region. The site is divided between the natural estuarine habitats of Wexford Harbour, the reclaimed polders known as the North and South 'Slobs', and the tidal section of the River Slaney. The seaward boundary extends from the Rosslare peninsula in the south to the area just west of The Raven Point in the north. The baseline population of little grebe in the European site, based on the five-year mean peak counts for the period 1995/96-1999/2000, is listed as 82 birds in the Site Synopsis document (NPWS, 2014e).

88 Considering the distance to the nearest designated site for little grebe and the typical foraging range of species, individuals recorded within the Clonburris SDZ are unlikely to form part of the Wexford Harbour and Slobs SPA or any other SPA population.

89 There are previous records for little grebe within c. 2km of the Clonburris SDZ lands on the NBDC database. The most recent record is from 2012.

Field Survey Results for Little Grebe

90 Little grebe were observed within the survey area on seven of the ten survey dates (see Figure 11 for locations of records). A small number of birds ranging from one individual to up to six individuals were observed swimming and along the Grand Canal on five survey dates. The birds were also noted in the pond in the Grange Castle Business Park, adjacent to the Grand Canal and the Clonburris SDZ. At this pond a peak count of eight individuals was observed on 28th February 2021.

⁸ *graellsii*, W. Europe (br)

Figure 11 Records of little grebe from the wintering bird surveys carried out between October 2020 and March 2021



Little grebe at Clonburris SDZ in the context of European sites

- 91 There are no European sites designated for wintering or breeding populations of little grebe within 20km of the Clonburris SDZ lands, and therefore the individuals recorded within the survey area are unlikely to form part of SPA populations. The nearest designated sites is the Wexford Harbour and Slobs SPA, c. 93.7km south of the survey area.
- 92 In relation to wintering populations of the species in the vicinity, the peak count of birds (eight individuals) within the survey area potentially represents:
- 266.67% of the wintering population in Dublin Bay, referencing the I-WeBS mean peak count of three birds for the period 2011/2013– 2017/18 (See Appendix I).
- 93 According to Lewis *et al.* (2019), 1% of the international and national populations of little grebe are 4,700 and 20 birds, respectively. The peak count of birds utilising the survey area did not reach or exceed this number in the 2020/21 survey season. The peak count of eight birds observed in the survey area represents 0.2% of the 1% international and 40% of the national population of the species.

4.2.1.10 Mallard *Anas platyrhynchos* [A053]

Desk Study Results for Mallard

- 94 Mallard *Anas platyrhynchos* [A053] is a SCI species for which there are no European sites designated for their wintering populations within 20km of the Clonburris SDZ lands. The nearest European sites designated for their populations is:
- Dundalk Bay SPA (004026), c. 59.4km north-east of the Clonburris SDZ lands. The European site is a large open shallow sea bay with extensive saltmarshes and intertidal sand/mudflats, extending

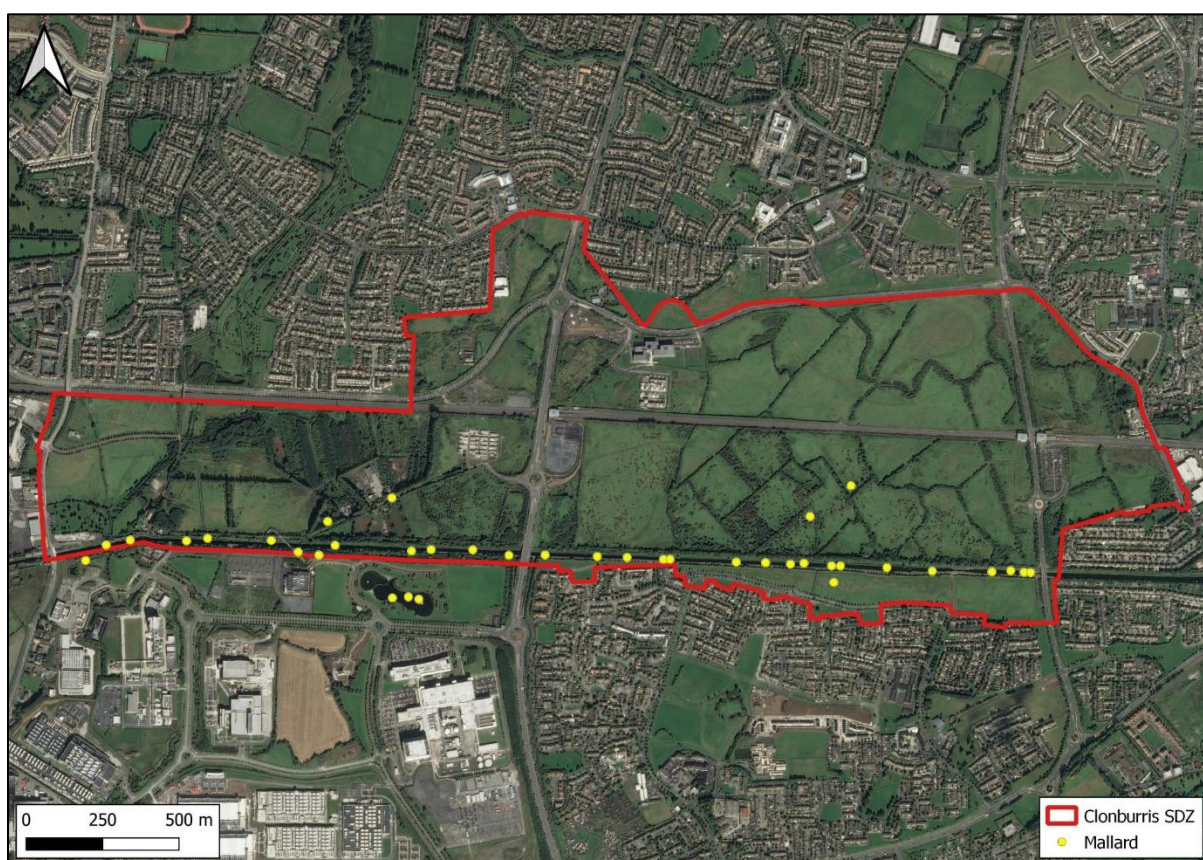
approximately 16km from Castletown River on the Cooley Peninsula, in the north, to Annagassan/Salterstown in the south. The baseline population of mallard in the European site, based on the five-year mean peak counts for the period 1995/96-1999/2000, is listed as 765 birds in the Site Synopsis document (NPWS, 2014c). The site hosts a population of national importance for the species.

- 95 Considering the distance to the nearest designated site for mallard and the typical foraging range of species, individuals recorded within the Clonburris SDZ are unlikely to form part of the Dundalk Bay SPA or any other SPA population.
- 96 There are previous records for mallard within c. 2km of the Clonburris SDZ lands on the NBDC database. The most recent record is from 2016.

Field Survey Results for Mallard

- 97 Mallard were observed within the survey area on eight of the ten survey dates (see Figure 12 for locations of records). A small number of birds ranging from one individual to up to nine individuals were observed along the Grand Canal on eight dates between October 2020 and March 2021. Mallard were recorded on three survey dates between February and March 2021 in the pond in the Grange Castle Business Park, adjacent to the Grand Canal and the Clonburris SDZ. At this pond a peak count of 57 individuals was observed on 1st February 2021.

Figure 12 Records of mallard from the wintering bird surveys carried out between October 2020 and March 2021



Mallard at Clonburris SDZ in the context of European sites

- 98 There are no European sites designated for wintering or breeding populations of mallard within 20km of the Clonburris SDZ lands, and therefore the individuals recorded within the survey area are unlikely to form

part of SPA populations. The nearest designated sites is the Dundalk Bay SPA, located c. 59.4km north-east of the survey area.

- 99 In relation to wintering populations of the species in the vicinity and the nearest SPA, the peak count of birds (57 individuals) within the survey area potentially represents:
- 56.4% of the wintering population in Dublin Bay, referencing the I-WeBS mean peak count of 101 birds for the period 2011/2013– 2017/18 (See Appendix I).
- 100 According to Lewis *et al.* (2019), 1% of the international and national population of mallard are 53,000 and 280 birds, respectively. The peak count of birds utilising the survey area did not reach or exceed this number in the 2020/21 survey season. The peak count of 57 birds observed in the survey area represents 0.1% of the 1% international and 20.4% of the national population of the species.

4.2.1.11 Tufted Duck *Aythya fuligula* [A067]

Desk Study Results for Tufted Duck

- 101 Tufted duck *Aythya fuligula* [A067] is a SCI species for which there are no European sites designated for their wintering populations within 20km of the Clonburris SDZ lands. The nearest European site designated for their populations is:
- Lough Ennell SPA (004044), c. 63km north-west of the Clonburris SDZ lands. The European site is a large, limestone lake located south of Mullingar in Co. Westmeath. It has a length of approximately 6.5km along its long axis and is mostly about 2km wide. The baseline population of tufted duck in the European site, based on the five-year mean peak counts for the period 1995/96-1999/2000, is listed as 1,303 birds in the Site Synopsis document (NPWS, 2014d). The population of tufted duck represents over 3% of the all-Ireland population. The site hosts a population of national importance for the species.
- 102 Considering the distance to the nearest designated site for tufted duck and the typical foraging range of species, individuals recorded within the Clonburris SDZ are unlikely to form part of the Lough Ennell SPA or any other SPA population.
- 103 There are previous records for tufted duck within c. 2km of the Clonburris SDZ lands on the NBDC database. The most recent record is from 2011.

Field Survey Results for Tufted Duck

- 104 Tufted duck were observed within the survey area on three of the ten survey dates (see Figure 13 for locations of records). A small number of birds ranging from two individuals to up to fourteen individuals were recorded on three survey dates between February and March 2021 in the pond in the Grange Castle Business Park, adjacent to the Grand Canal and the Clonburris SDZ. At this pond a peak count of 14 individuals was observed on 1st February 2021.

Figure 13 Records of tufted duck from the wintering bird surveys carried out between October 2020 and March 2021



Tufted duck at Clonburris SDZ in the context of European sites

- 105 There are no European sites designated for wintering or breeding populations of tufted duck within 20km of the Clonburris SDZ lands, and therefore the individuals recorded within the survey area are unlikely to form part of SPA populations. The nearest designated sites is Lough Ennell SPA, located c. 63km north-west of the survey area.
- 106 In relation to wintering populations of the species in the vicinity, the peak count of birds (14 individuals) within the survey area potentially represents:
- 1,400% of the wintering population in the Grand Canal, referencing the I-WeBS mean peak count of 1 individual bird for the period 2011/2013– 2017/18 (See Appendix I).
- 107 According to Lewis *et al.* (2019), 1% of the international and national populations of tufted duck are 8,900 and 270 birds, respectively. The peak count of birds utilising the survey area did not reach or exceed this number in the 2020/21 survey season. The peak count of 14 birds observed in the survey area represents 0.15% of the 1% international and 5.2% of the national population of the species.

4.3 Other Species (Non-SCI Species)

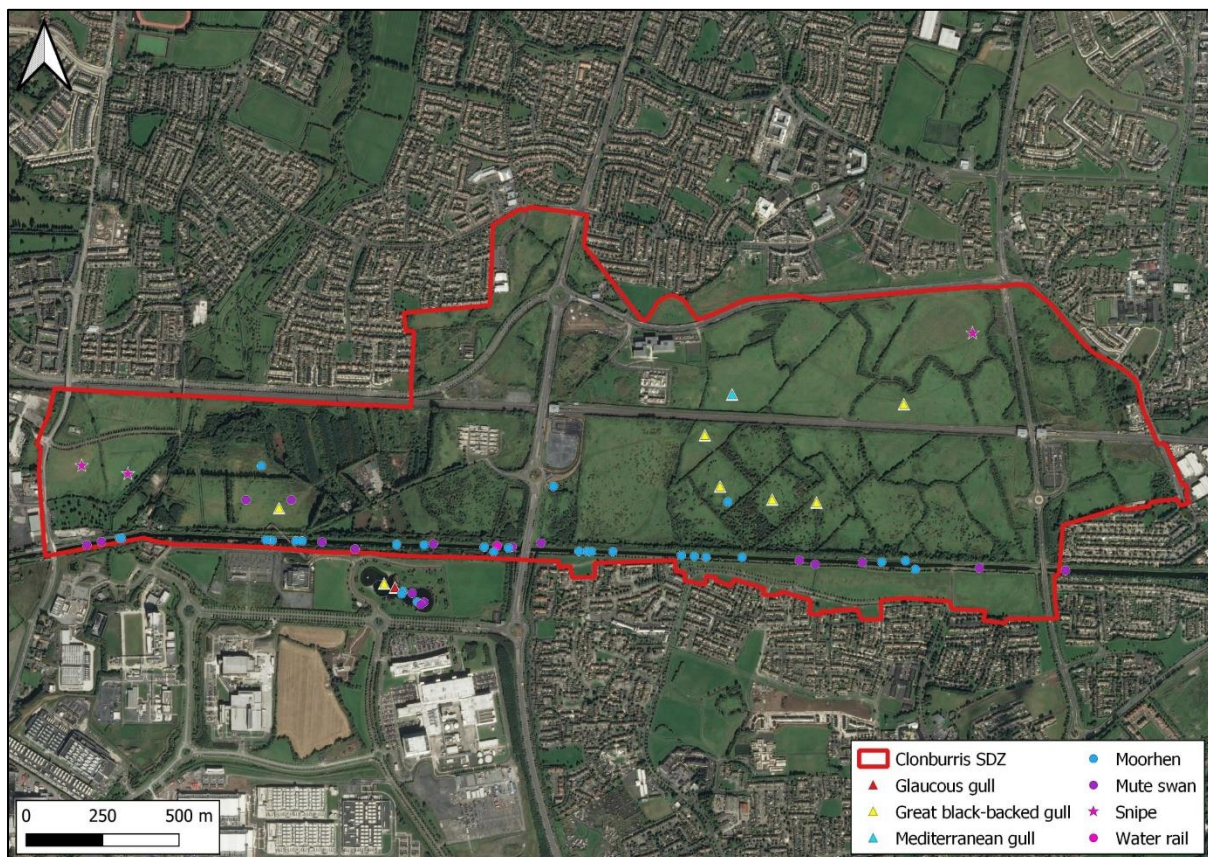
4.3.1 Non-SCI Wetland Bird Species

- 108 In addition, to the wintering SCI species, the following non-SCI wetland bird species were also recorded at the Clonburris SDZ lands and its immediate vicinity (see Figure 14 for locations of records): great-black backed gull *Larus marinus*, Mediterranean gull *Ichthyaetus melanocephalus*, moorhen *Gallinula chloropus*, mute swan *Cygnus olor*, snipe *Gallinago gallinago* and water rail *Rallus aquaticus*. A rarer wintering bird species which is infrequently recorded in Ireland, glaucous gull *Larus hyperboreus*, was also encountered

in the Clonburris SDZ lands during the wintering bird surveys. This species is a scarce winter visitor of higher latitudes.

- 109 Of the above species, one (snipe) is Red-listed (i.e. of High Conservation Concern), and two (Mediterranean gull and mute swan) Amber-listed (i.e. of Medium Conservation Concern) on the Bird of Conservation Concern in Ireland¹. The remaining species are Green-listed, i.e. of low conservation concern. Mediterranean gull is also listed on the Annex I of the Birds Directive, however there are no European sites designated for this species in Ireland.
- 110 None of these species were present in flocks that would represent 1% of the international and/or the national population of their species.

Figure 14 Records of non-SCI wetland bird species from the wintering bird surveys carried out between October 2020 and March 2021



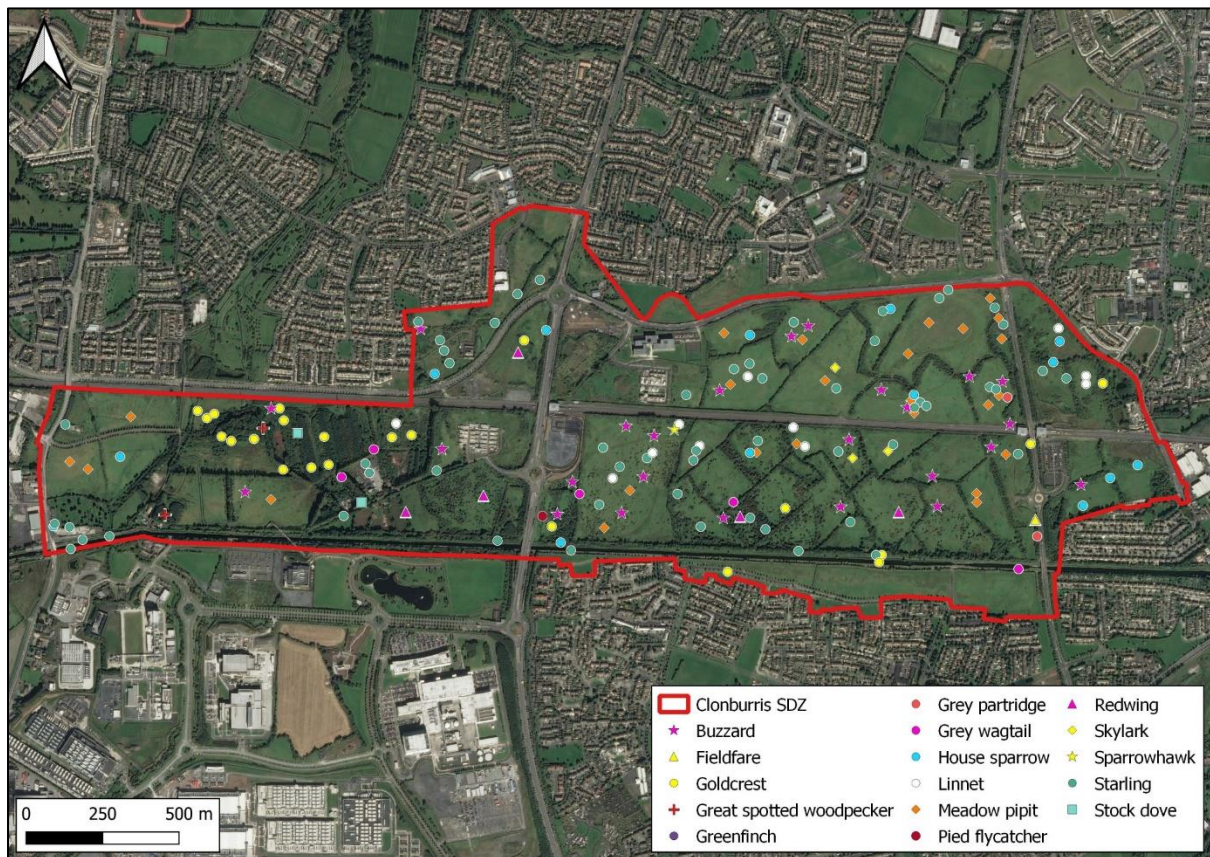
4.3.2 Other Non-SCI Species

- 111 Wintering bird survey methodologies, such as that used for I-WeBS, generally do not require you to record other than wetland bird species, although, for example some passerine species migrate in Ireland from mainland to spend their winter here. Other species recorded during the wintering bird surveys included (see Figure 15 for locations of records) : fieldfare *Turdus pilaris*, goldcrest *Regulus regulus*, greenfinch *Carduelis chloris*, grey wagtail *Motacilla cinerea*, house sparrow *Passer domesticus*, linnets *Carduelis cannabina*, meadow pipit *Anthus pratensis*, pied flycatcher *Ficedula hypoleuca*, redwing *Turdus iliacus*, robin *Erithacus rubecula*, skylark *Alauda arvensis* and starling *Sturnus vulgaris*. In addition, great spotted woodpecker *Dendrocopos major* and stock dove *Columba oenas* were recorded twice each in the woodlands in the western section, and grey partridge *Perdix perdix* once in the grasslands in the far eastern section, of the Clonburris SDZ lands. Raptor species buzzard *Buteo buteo* was recorded 25 times across the Clonburris SDZ lands and its immediate vicinity, and sparrowhawk *Accipiter nisus* once in the grasslands east of the Kishoge station. Of the aforementioned species, fieldfare and redwing, are regular winter

visitors from Northern Europe, whereas others can be encountered in Ireland throughout the year, although some individuals recorded during the wintering bird surveys may belong to migratory populations of the mainland Europe.

- 112 Of the above species, five (grey partridge, grey wagtail, meadow pipit, redwing and stock dove) are Red-listed (i.e. of High Conservation Concern), and seven (goldcrest, greenfinch, house sparrow, linnet, pied flycatcher, skylark and starling) Amber-listed (i.e. of Medium Conservation Concern) on the Bird of Conservation Concern in Ireland¹. The remaining species are Green-listed, i.e. of low conservation concern.

Figure 15 Records of other non-SCI species from the wintering bird surveys carried out between October 2020 and March 2021



4.4 Disturbance

- 113 With regard to disturbance during the wintering bird surveys, most of the Clonburris SDZ lands are open to public, and for all of the 2020/21 winter bird survey season, walkers, dog walkers and cyclists were regularly present within the survey area throughout each survey visit.
- 114 Considering the wintering bird surveys were carried out as walked transects rather than carrying them out from vantage point surveys, and the scarcity of wintering birds within the Clonburris SDZ lands, disturbance events were not recorded separately.

5 Conclusions

- 115 Wintering bird surveys carried out between November 2020 and March 2021 recorded 34 species in the Clonburris SDZ lands and its immediate vicinity. Of these species, 12 were wintering species listed as SCIs of nearby European sites, of which one species is Red-listed (i.e. of High Conservation Concern) and eight species Amber-listed (i.e. of Medium Conservation Concern) on the Bird of Conservation Concern in Ireland¹. In addition, eight non-SCI wetland bird species and 17 other bird species (e.g. passerines and raptors), of which six are Red-listed and nine Amber-listed, were recorded within or immediately adjacent to the Clonburris SDZ lands during the surveys.
- 116 Observations of SCI and non-SCI wetland wintering bird species within the survey area were contextualised against the populations of these species in nearby European sites (SCI species only) and/or against their numbers in terms of international and national population thresholds, where available. The peak counts of these species present in the survey area during the wintering bird surveys were less than 1% of the international population. With regard to the national population thresholds for these species, the numbers of five species exceeded the 1% of the national threshold: coot (present at 11.6% of the national population of the species), lapwing (23.5%), little grebe (40%), mallard (20.4%) and tufted duck (5.2%). It should be noted that the records for peak counts exceeding the national threshold for coot, little grebe, mallard and tufted duck were from outside the Clonburris SDZ lands, from the pond in the Grange Castle Business Park, leaving lapwing as the only species whose numbers exceeded the national threshold within the Clonburris SDZ land.
- 117 Lapwing is a bird species of High Conservation Concern which has seen long-term declines since the beginning of I-WeBS counts (Lewis *et al.*, 2019). Lapwing was present in the Clonburris SDZ lands in flock sizes varying mostly between 30 and up to 200+ individuals, with one flock consisting of only five individuals. In addition to the peak count of lapwings exceeding the national threshold for the species, the numbers recorded present over three times the I-WeBS peak count numbers recorded in Dublin Bay for the period of 2011/13 – 2017/18. Considering they are known to spend winters in non-wetland habitats, such as grasslands, away from European sites designated for them (Lewis *et al.*, 2019), and they were present in comparatively large flock sizes in the Clonburris SDZ, the grasslands within the Clonburris SDZ lands represent a relatively large, undisturbed feeding and/or roosting resource for lapwing in a largely built up area in the Greater Dublin Area.
- 118 In conclusion, the Clonburris SDZ and lands in its immediate vicinity support a variety of gull, wader and waterfowl species during winter months, with the most notable species of them being the Red-listed lapwing that can be present in large flocks. Considering these flocks of lapwing comprised of more than 1% of the national populations on one occasion, the Clonburris SDZ lands are deemed to be of local importance to this particular species. This conclusion takes into consideration the relatively small area of suitable habitat contained within the SDZ lands in comparison to suitable habitat found to the west of the Clonburris SDZ.
- 119 The survey findings of this report will be valid for approximately 12-18 months following the Chartered Institute of Ecology and Environmental Management (CIEEM) *Advice Note On the Lifespan of Ecological Reports & Surveys* (CIEEM, 2019)⁹.

⁹ CIEEM (2019). *Advice Note on the Lifespan of Ecological Reports & Survey*. Available online at <https://cieem.net/wp-content/uploads/2019/04/Advice-Note.pdf>

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Appendix I – Desk Study Results

Wetland Bird Survey Records for O03 10km Grid Square, returned from the National Biodiversity Data Centre Database

A search for all species records contained within the O03 10km grid square was returned on 20th July 2021. The records have been reviewed by Emmi Virkki of Scott Cawley and only records relating to wetland birds are presented in the table, below. A proportion of records are of rare / vagrant species and / or historical records.

Appendix I - Table 1: Wetland bird records for the 10km grid square O03, as returned from the NBDC database

Species name	Record count	Date of last record	Title of dataset
Black-crowned Night Heron <i>Nycticorax nycticorax</i>	1	08/11/1865	Rare birds of Ireland
Black-headed Gull <i>Chroicocephalus ridibundus</i>	17	25/10/2013	Birds of Ireland
Common Coot <i>Fulica atra</i>	11	31/12/2011	Bird Atlas 2007 - 2011
Common Crane <i>Grus grus</i>	2	25/06/2009	Rare birds of Ireland
Common Moorhen <i>Gallinula chloropus</i>	29	16/09/2017	Birds of Ireland
Common Pochard <i>Aythya ferina</i>	4	31/12/2011	Bird Atlas 2007 - 2011
Common Redshank <i>Tringa totanus</i>	2	31/12/2011	Bird Atlas 2007 - 2011
Common Snipe <i>Gallinago gallinago</i>	6	17/12/2016	Birds of Ireland
Eurasian Curlew <i>Numenius arquata</i>	2	29/02/1984	The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84.
Eurasian Oystercatcher <i>Haematopus ostralegus</i>	1	29/02/1984	The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84.
Eurasian Teal <i>Anas crecca</i>	4	31/12/2011	Bird Atlas 2007 - 2011
Eurasian Wigeon <i>Anas penelope</i>	3	31/12/2011	Bird Atlas 2007 - 2011
Eurasian Woodcock <i>Scolopax rusticola</i>	1	29/02/1984	The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84.
European Golden Plover <i>Pluvialis apricaria</i>	3	31/12/2011	Bird Atlas 2007 - 2011
Gadwall <i>Anas strepera</i>	2	31/12/2011	Bird Atlas 2007 - 2011
Goosander <i>Mergus merganser</i>	2	31/12/2011	Bird Atlas 2007 - 2011
Great Black-backed Gull <i>Larus marinus</i>	4	31/12/2011	Bird Atlas 2007 - 2011
Great Cormorant <i>Phalacrocorax carbo</i>	15	30/04/2015	Birds of Ireland
Great Crested Grebe <i>Podiceps cristatus</i>	1	31/07/1972	The First Atlas of Breeding Birds in Britain and Ireland: 1968-1972.
Grey Heron <i>Ardea cinerea</i>	34	29/08/2017	Birds of Ireland
Herring Gull <i>Larus argentatus</i>	10	18/05/2012	Ireland's BioBlitz

Iceland Gull <i>Larus glaucooides</i>	1	31/12/2011	Bird Atlas 2007 - 2011
Lesser Black-backed Gull <i>Larus fuscus</i>	4	31/12/2011	Bird Atlas 2007 - 2011
Little Egret <i>Egretta garzetta</i>	4	12/10/2017	Birds of Ireland
Little Grebe <i>Tachybaptus ruficollis</i>	17	19/05/2012	Ireland's BioBlitz
Mallard <i>Anas platyrhynchos</i>	43	13/03/2016	Birds of Ireland
Mandarin Duck <i>Aix galericulata</i>	2	15/04/2015	Birds of Ireland
Mew Gull <i>Larus canus</i>	6	31/12/2011	Bird Atlas 2007 - 2011
Mute Swan <i>Cygnus olor</i>	19	31/12/2011	Bird Atlas 2007 - 2011
Northern Lapwing <i>Vanellus vanellus</i>	6	31/12/2011	Bird Atlas 2007 - 2011
Northern Pintail <i>Anas acuta</i>	2	31/12/2011	Bird Atlas 2007 - 2011
Tufted Duck <i>Aythya fuligula</i>	13	31/12/2011	Bird Atlas 2007 - 2011
Whiskered Tern <i>Chlidonias hybrida</i>	1	31/12/1839	Rare birds of Ireland
Whooper Swan <i>Cygnus cygnus</i>	1	31/12/2011	Bird Atlas 2007 - 2011

I-WeBS Summary Data Downloaded from BirdWatch Ireland for OU310 Grand Canal (Dublin)

The mean is based only on the most recent 5-season period, *i.e.* for the period 2013/14 - 2017/18. Columns populated left blank indicate seasons when no counts were carried out, while blank cells show that a species was absent. Counts that are poor quality are represented by an asterisk.

Appendix I - Table 2: I-WeBS summary data for OU310 Grand Canal (Dublin)

Species	1% national	1% international	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	MEAN
Mute Swan	90.00	100.00				17*				92	105	95	97
Light-bellied Brent Goose	350.00	400.00				15*							0
Mallard	280.00	53000.00				62*				79	103	80	87
Feral/hybrid Mallard type						7*				2	6		3
Tufted Duck	270.00	8900.00								2	1	1	1
Cormorant	110.00	1200.00				1*				2	2	1	2
Grey Heron	25.00	5000.00				1*				4	6	2	4
Moorhen						26*				36	66	32	45
Coot	190.00	15500.00				1*						1	0
Black-headed Gull						144*				111	271	157	180
Common Gull						29*					1	1	1
Lesser Black-backed Gull						4*					1		0
Herring Gull						62*				1	9	33	14
Great Black-backed Gull						5*							0

I-WeBS Summary Data Downloaded from BirdWatch Ireland for OU403 Baldoyle Bay

The mean is based only on the most recent 5-season period, *i.e.* for the period 2013/14 - 2017/18. Columns populated by 0 indicate seasons when no counts were carried out, while blank cells show that a species was absent. Counts that are poor quality are represented by an asterisk.

Appendix I - Table 3: I-WeBS summary data for OU403 Baldoyle Bay

Species	1% National	1% International	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	MEAN
Arctic Tern			8	24									0
Bar-tailed Godwit	170	1500	131	105				162	150	48	59	38	91
Black-headed Gull								242	281	52	120	13	142
Black-tailed Godwit	200	1100	175	270				389	139	296	172	189	237
Common Gull								64	11	4	61	3	29
Common Sandpiper				2									0
Common Scoter	110	7500	27	130				16	7				5
Common Tern			12	52									0
Cormorant	110	1200	14	20				10	4	3	4	1	4
Curlew	350	7600	138	148				90	61	106	49	44	70
Curlew Sandpiper			4	12									0
Dunlin	460	13300	300	110				750	233	300	403	537	445
Egyptian Goose										1			0
Golden Plover	920	9300	750	672				2500	450	2000	1200		1230
Goldeneye	40	11400		15									0
Great Black-backed Gull								7	15	10	9	9	10
Great Crested Grebe	30	6300	22	63				124	189				63
Great Northern Diver	20	50	2	5				1	2				1
Green Sandpiper			2	1									0
Greenshank	20	3300	32	25				6	11	3	6	7	7
Grey Heron	25	5000	14	32				5	7	7	4	6	6

Species	1% National	1% International	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	MEAN
Grey Plover	30	2000	112	166				55	28	8	25	10	25
Herring Gull								47	91	58	112	48	71
Kingfisher			2	3									0
Knot	160	5300	47	112				553		19	600	800	394
Lapwing	850	72300	287	550				372	300	137	392	180	276
Lesser Black-backed Gull								4	18	1	1	1	5
Light-bellied Brent Goose	350	400	1120	956				580	588	342	753	663	585
Little Egret	20	1100	40	56				18	3	7	21	25	15
Little Grebe	20	4700		5				1				3	1
Long-tailed Duck				2									0
Mallard	280	53000	193	249				67	102	106	71	60	81
Mute Swan	90	100								2		2	1
Oystercatcher	610	8200	1014	880				277	1113	219	117	144	374
Pintail	20	600	23	12				4	4				2
Red-breasted Merganser	25	860	14	23				6	5	2	4		3
Redshank	240	2400	330	284				144	152	125	96	154	134
Red-throated Diver	20	3000	5	2				14	64				16
Ringed Plover	120	540	150	168				34	59	123	4		44
Roseate Tern				12									0
Sanderling	85	2000	31	29				6					1
Sandwich Tern			37	31									0
Shag								7			1		2
Shelduck	100	2500	357	238				52	97	88	127	105	94
Shoveler	20	650									1		0
Snipe			17										0
Teal	360	5000	163	218				145	160	108	131	48	118

Species	1% National	1% International	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	MEAN
Turnstone	95	1400	126	139				17	12	13	10	4	11
Whimbrel			1	7									0
Wigeon	560	14000	125	178				54	54	32	266	332	148

I-WeBS Summary Data Downloaded from BirdWatch Ireland for OU408 Broadmeadow (Malahide) Estuary

The mean is based only on the most recent 5-season period, *i.e.* for the period 2013/14 - 2017/18. Columns populated by 0 indicate seasons when no counts were carried out, while blank cells show that a species was absent. Counts that are poor quality are represented by an asterisk.

Appendix I - Table 4: I-WeBS summary data for OU408 Broadmeadow (Malahide) Estuary

Species	1% National	1% International	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	MEAN
Mute Swan	90	100	110	114	108	90	47	50	89	58	66	61	65
Whooper Swan	150	340	9			2		1					0
Black Swan									1				0
Greenland White-fronted Goose	100	190			1								0
Bar-headed Goose				1	1								0
Barnacle Goose	160	810			1								0
Light-bellied Brent Goose	350	400	1856	898	1411	943	1980	710	464	824	1565	1000	913
Shelduck	100	2500	246	341	479	8	262	120	222	303	569	321	307
Wigeon	560	14000	150	42	168		157		2	67	94	215	76
Gadwall	20	1200			2		120	4				4	2
Teal	360	5000	142	99	670	41	112	119	87	141	232	196	155
Mallard	280	53000	178	176	379	95	220	112	92	92	134	110	108
Pintail	20	600	72	66	72		29	6		15	23	39	17
Shoveler	20	650	14	6	50					9	24	30	13
Pochard	110	2000	18	35	8		2						0
Tufted Duck	270	8900	2	15	8				1				0

Scaup	25	3100	1		4				3		5	1	2
Long-tailed Duck					1		3				1		0
Common Scoter	110	7500	300	278			30						0
Goldeneye	40	11400	105	126	93	51	66	36	92	31	43	50	50
Red-breasted Merganser	25	860	39	161	78	87	57	80	35	26	237	23	80
Species	1% National	1% International	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	MEAN
Ruddy Duck					1								0
Red-throated Diver	20	3000	8				4					3	1
Great Northern Diver	20	50		3				3		2			1
Little Grebe	20	4700	8	13	28	23	21	8	33	26	33	84	37
Great Crested Grebe	30	6300	96	54	44	34	120	60	72	84	83	54	71
Slavonian Grebe											1		0
Cormorant	110	1200	58	42	28	6	101	101	42	86	127	99	91
Shag			130	66	30		32	8	9	5	12	2	7
Little Egret	20	1100	26	17	3	2	17	13	16	35	35	22	24
Grey Heron	25	5000	28	77	20	12	19	19	27	26	30	21	25
Moorhen			3	7	12	4	4	6	9	4	3	6	6
Coot	190	15500	2		12								0
Oystercatcher	610	8200	1529	1285	1471	78	1300	1833	1355	1291	1523	1242	1449
Ringed Plover	120	540	16	14	25		71			13	152	240	81
Golden Plover	920	9300	1310	72	1000	260	1000	200	5		337	36	116
Grey Plover	30	2000	155	150	169	3	140	9	6	100	38	82	47
Lapwing	850	72300	434	315	642	1180	900	590	681	63	331	213	376
Knot	160	5300	331	354	870	4	440	110	49	9	202	800	234
Sanderling	85	2000	4		1		2	80	46		13	2	28
Curlew Sandpiper							2						0
Dunlin	460	13300	1173	416	1365	23	480	94	121	300	1489	445	490
Ruff			4	1	1	4	1	2	5			1	2

Jack Snipe							1					1	0
Snipe			44	5	46	20	25	56	25	36	25	3	29
Black-tailed Godwit	200	1100	366	478	258	296	355	206	167	121	293	245	206
Bar-tailed Godwit	170	1500	200	358	286	62	213	133	14	60	93	107	81
Curlew	350	7600	240	545	330	1	500	244	83	246	363	349	257
Species	1% National	1% International	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	MEAN
Common Sandpiper			6	3	4	1	17		1				0
Green Sandpiper								27					5
Spotted Redshank			1						1				0
Greenshank	20	3300	59	29	26	26	43	64	30	34	46	43	43
Redshank	240	2400	589	459	364	87	374	171	130	363	487	575	345
Turnstone	95	1400	139	175	175	23	221	94	85	75	79	98	86
Little Gull			1										0
Black-headed Gull			1072	930	565	479	368	659	571	496	424	294	489
Common Gull			221	187	228	149	70	71	16	184	75	126	94
Lesser Black-backed Gull			28	5	5	4	3	15	8	196	20	6	49
Herring Gull			77	66	68	55	139	110	95	118	187	389	180
Iceland Gull						2							0
Great Black-backed Gull			18	20	20	15	44	93	9	42	71	69	57
Sandwich Tern			26	84	3	2	50	12		2	42		11
Common Tern				1									0

I-WeBS Summary Data Downloaded from BirdWatch Ireland for OU407 Rogerstown Estuary

The mean is based only on the most recent 5-season period, *i.e.* for the period 2012/13 – 2017/18. Columns populated by 0 indicate seasons when no counts were carried out, while blank cells show that a species was absent. Counts that are poor quality are represented by an asterisk.

Appendix I - Table 5: I-WeBS summary data for OU407 Rogerstown Estuary

Species	1% National	1% International	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	MEAN
Mute Swan	90	100	6	3			4	2	2	2	2	2	2
Whooper Swan	150	340			2					12	13	1	5
Pink-footed Goose										8			2
Greenland White-fronted Goose	100	190				3							0
Greylag Goose	35	980	87	134	19	33	89	5	33	95	30	17	36
Barnacle Goose	160	810	1										0
Brent Goose			1										0
Dark-Bellied Brent Goose								1					0
Light-bellied Brent Goose	350	400	2652	2749	1051	2661	1395	2217	1047	2662	2829	2197	2190
Ruddy Shelduck				1									0
Shelduck	100	2500	809	886	730	752	793	877	652	624	687	531	674
Wigeon	560	14000	580	690	490	813	585	686	1342	1532	1094	1695	1270
Gadwall	20	1200	1				2		3	2	4	7	3
Teal	360	5000	1054	1003	1448	1211	1469	685	2008	967	857	1280	1159
Mallard	280	53000	248	319	109	182	198	172	260	220	168	174	199
Pintail	20	600	16	6	2		1		4	5	2		2
Shoveler	20	650	79	36	21	26	34	42	15	25	33	20	27
Pochard	110	2000	2										0
Scaup	25	3100		27									0

Species	1% National	1% International	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	MEAN
Eider	55	9800										1	0
Common Scoter	110	7500									8		2
Goldeneye	40	11400	1	1	1		6						0
Red-breasted Merganser	25	860	26	30	16	30	22	20	39	23	36	25	29
Red-throated Diver	20	3000	2	1		4	1	2	4	1	1	1	2
Great Northern Diver	20	50	1					2					0
Little Grebe	20	4700	12	18	10	24	15	15	22	25	15	20	19
Great Crested Grebe	30	6300	3	46	1	4	14	5	22	3	2	1	7
Cormorant	110	1200	55	77	23	17	33	32	21	27	29	53	32
Shag			28	28	44	40	47	36	21	11	10	17	19
Little Egret	20	1100	41	42	1	43	48	57	46	55	43	52	51
Grey Heron	25	5000	34	24	6	24	24	17	21	16	20	20	19
Great White Egret										1			0
Glossy Ibis											1		0
Spoonbill											3		1
Water Rail			1	1						1			0
Moorhen				3		1	1	8	5	2	2	3	4
Coot	190	15500					2	3		2	3	4	2
Oystercatcher	610	8200	1199	2024	1781	2116	2491	1531	1519	1697	1057	1161	1393
Ringed Plover	120	540	190	153	113	105	284	167	161	125	144	215	162
American Golden Plover				1									0
Golden Plover	920	9300	6590	664	40	530	3300	130	2000	2050	2152	700	1406
Grey Plover	30	2000	283	223	210	371	242	151	120	64	199	192	145
Lapwing	850	72300	5820	1268	710	2855	5805	897	2099	5185	2845	1290	2463

Species	1% National	1% International	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	MEAN
Knot	160	5300	500	501	88	190	256	30	130	89	12	175	87
Sanderling	85	2000	14	30	6	20	300	31	1	130	76	35	55
Little Stint			1			1		3		1			1
Curlew Sandpiper				6		1	4			1		1	0
Purple Sandpiper	20	110	7	76	5	6	3	72	32	4	3		22
Dunlin	460	13300	2546	3151	1061	1904	1860	581	2264	3469	2356	1381	2010
Ruff				1			1			2	2	9	3
Jack Snipe											2		0
Snipe			35	37	10	4	20	9	5	24	8	8	11
Woodcock								1					0
Black-tailed Godwit	200	1100	1138	568	148	450	883	597	237	191	1113	1201	668
Bar-tailed Godwit	170	1500	31	126	1	76	44	120	149	99	676	100	229
Whimbrel			1	2		2	28	1	1	1	3	16	4
Curlew	350	7600	1055	803	33	922	518	684	600	625	530	888	665
Common Sandpiper			2										0
Green Sandpiper										1			0
Spotted Redshank			1	1			1						0
Greenshank	20	3300	40	50	14	83	32	36	35	59	64	48	48
Lesser Yellowlegs									1				0
Redshank	240	2400	907	987	378	1104	689	844	945	1007	597	880	855
Turnstone	95	1400	77	81	95	176	224	207	110	223	84	173	159
Mediterranean Gull				1			1	1			1		0
Black-headed Gull			764	1314	136	457	310	602	448	458	428	391	465
Common Gull			80	419	73	142	175	256	343	159	247	152	231

Species	1% National	1% International	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	MEAN
Lesser Black-backed Gull			3	29	35	76	3	1	38	9	4	11	13
Herring Gull			906	596	45	739	189	237	300	332	488	1405	552
Great Black-backed Gull			170	119	16	107	84	106	37	53	109	27	66
Sandwich Tern			70	100			104	58	245	82	25	14	85
Roseate Tern							1						0
Common Tern			2					1	4	41			9
Kingfisher			1	1		1	12	2	1		5	1	2
SPECIES	1% NATIONAL	1% INTERNATIONAL	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	MEAN
Mute Swan	90	100	6	3			4	2	2	2	2	2	2

I-WeBS Summary Data Downloaded from BirdWatch Ireland for OU951 Ireland's Eye

The mean is based only on the most recent 5-season period, *i.e.* for the period 2010/11 - 2014/15. Columns populated by 0 indicate seasons when no counts were carried out, while blank cells show that a species was absent. Counts that are poor quality are represented by an asterisk.

Appendix I - Table 6: I-WeBS summary data for OU951 Ireland's Eye

Species	1% National	1% International	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	MEAN
Black-headed Gull								50		6			19
Common Gull			10					60					20
Cormorant	110	1200	20					200		150			117
Curlew	350	7600	25					30	6*	5			12
Dunlin	460	13300						10					3
Great Black-backed Gull			200					250	200*	200			150
Greenshank	20	3300	1					1		2			1
Grey Heron	25	5000	2					1		1			1
Herring Gull			200					300	200*	300			200
Light-bellied Brent Goose	350	400	50					100		200			100
Little Egret	20	1100	2							1			0
Mallard	280	53000						5					2
Mediterranean Gull									1*				0
Oystercatcher	610	8200	100					200	150*	100			100
Purple Sandpiper	20	110	5					10		15			8
Redshank	240	2400	10					25	10*	25			17
Red-throated Diver	20	3000						2					1
Ringed Plover	120	540						10	5*	4			5
Sanderling	85	2000						60					20
Sandwich Tern			2						15*				0

Species	1% National	1% International	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	MEAN
Shag								150		60			70
Shelduck	100	2500								20			7
Turnstone	95	1400	60					80	20*	150			77
Whimbrel			2							1			0

I-WeBS Summary Data Downloaded from BirdWatch Ireland for OU903 Lambay Island

The mean is based only on the most recent 5-season period, *i.e.* for the period 2010/11 - 2014/15. Columns populated by 0 indicate seasons when no counts were carried out, while blank cells show that a species was absent. Counts that are poor quality are represented by an asterisk.

Appendix I - Table 7: I-WeBS summary data for OU903 Lambay Island

Species	1% National	1% International	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	MEAN
Bar-tailed Godwit	170	1500		2									0
Black-headed Gull			200*	10				50		5*			25
Common Gull				20									0
Cormorant	110	1200		50				200		20*			100
Curlew	350	7600	6*	200	100			350		200*			175
Golden Plover	920	9300			100								0
Great Black-backed Gull								300		400*			150
Great Northern Diver	20	50		2									0
Grey Heron	25	5000						2		1*			1
Herring Gull								300		500*			150
Lapwing	850	72300		100	10								0
Light-bellied Brent Goose	350	400		400	350					400*			0
Mallard	280	53000						10					5
Mediterranean Gull			1*	1				1					0
Oystercatcher	610	8200	10*	100	100			100		250*			50
Purple Sandpiper	20	110						2		10*			1
Redshank	240	2400		25	15			30		10*			15
Red-throated Diver	20	3000						2		2*			1
Ringed Plover	120	540		2						2*			0
Sandwich Tern			4*										0

Species	1% National	1% International	2008/09	2009/10	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16	2016/17	2017/18	MEAN
Shag								200		150*			100
Shelduck	100	2500	6*							4*			0
Turnstone	95	1400	5*	25	50			60		50*			30
Whimbrel				2	1			10		8*			5

I-WeBS Summary Data Downloaded from BirdWatch Ireland for OU404 Dublin Bay

The mean is based only on the most recent 5-season period, *i.e.* for the period 2013/14 - 2017/18. Columns populated by 0 indicate seasons when no counts were carried out, while blank cells show that a species was absent. Counts that are poor quality are represented by an asterisk.

Appendix I - Table 8: I-WeBS summary data for OU404 Dublin Bay

Species	1% National	1% International	2006/07	2007/08	2008 / 09	2009 / 10	2010 / 11	2011 / 12	2012 / 13	2013 / 14	2014 / 15	2015 / 16	2017/18	MEAN
Arctic Tern			2					3						0
Bar-tailed Godwit	150.00	1200.00	2231	2138	1260	1540	1745	1917	2141	1710	1658	2173	1934	2026
Black-headed Gull		20000.00	3766	4358	3738	2234	2356	2269	1907	2649	1259	2768	3802	2642
Black-necked Grebe								4						0
Black-tailed Godwit	190.00	610.00	664	936	698	1449	1375	927	1362	1768	873	2185	1479	1516
Common Gull		16400.00	549	298	685	579	573	410	309	985	272	890	321	536
Common Scoter	140.00	5500.00		2	30		80	20	10	42		40	65	33
Common Tern			173	15	23		14	38	3	39		1	2	9
Common/ Arctic Tern				400*				163						21
Coot	220.00	17500.00	1										199	136
Cormorant	120.00	1200.00	309	182	82	211	98	151	53	198	41	71	494	850
Curlew	350.00	8400.00	1374	1017	742	1240	688	1169	874	932	1424	567		0
Curlew Sandpiper		10000.00						1	1				7484	5730
Dunlin	570.00	13300.00	7453	6124	6443	4270	6490	3559	4163	5907	3603	3376		0
Feral/hybrid Mallard type								2	1					1
Gadwall	20.00	600.00			4	19				2	2			0
Glaucous Gull		2200.00			1								2501	1298
Golden Plover	1200.00	9300.00	1020	162	2500	1360	430	390	404	1080	742	1155		1
Goldeneye	60.00	11500.00	23	23	6	6	5	11	6		2	1*	2	0

Species	1% National	1% International	2006/07	2007/08	2008 / 09	2009 / 10	2010 / 11	2011 / 12	2012 / 13	2013 / 14	2014 / 15	2015 / 16	2017/18	MEAN
Great Black-backed Gull		4200.00	637	180	141	84	124	358	116	190	52	263	115	154
Great Crested Grebe	40.00	3500.00	97	198	105	255	421	930	254	755	143	307	60	292
Great Northern Diver	20.00	50.00	3	2		8		2		3		5	2	2
Greenshank	20.00	2300.00	33	47	68	28	43	40	46	34	47	78	47	48
Green-winged Teal						1								0
Grey Heron	25.00	2700.00	44	33	31	54	30	28	15	68	40	44	29	42
Grey Plover	30.00	2500.00	751	202	265	394	293	200	307	310	452	240	248	299
Herring Gull		10200.00	497	262	314	422	341	519	135	490	261	538	607	471
Kingfisher			1			1	1			1		1		0
Knot	280.00	4500.00	4519	5802	5832	4105	2799	3435	3022	4547	4950	2495		0
Lapwing	1100.00	20000.00	56	26	64	191	44	120	67	52	54	143	6555	4879
Lesser Black-backed Gull		5500.00	475	14	4	19	195	28	25	5	20	16	32	61
Light-bellied Brent Goose	360.00	400.00	2017	3819	4445	5536	3292	4102	6134	3717	4862	4195	14	12
Little Egret	20.00	1300.00	29	69	100	87	73	48	19	59	69	59	3331	4105
Little Grebe	20.00	4000.00					5	1	9	1	5		87	69
Little Gull		1100.00					1	1					4	3
Little Tern			1											0
Long-tailed Duck		17250.00		1					2	1				1
Mallard	290.00	20000.00	91	67	58	97	138	151	52	97	106	120	111	101
Mediterranean Gull		770.00	16	33	70	27	8	113	23	39	27	64	6	41
Moorhen		20000.00	4	9	4	6	7	7	5	5		5	2	3
Mute Swan	90.00		5		3	7	6	2	2	5	6	9	12	8

Species	1% National	1% International	2006/07	2007/08	2008 / 09	2009 / 10	2010 / 11	2011 / 12	2012 / 13	2013 / 14	2014 / 15	2015 / 16	2017/18	MEAN
Oystercatcher	690.00	8200.00	3327	2933	3946	4324	2804	3408	3025	3074	3315	3588	3521	3508
Pintail	20.00	600.00	150	179	117	162	173	212	160	200	150	124	222	177
Purple Sandpiper	20.00	710.00		1	2		16	4	3	2	1	2		1
Red-breasted Merganser	20.00	1700.00	43	56	109	58	63	114	50	60	57	69	53	64
Red-necked Grebe										1				0
Redshank	300.00	3900.00	1758	2856	3621	2639	2790	2509	2077	2460	1889	1648	2274	1940
Red-throated Diver	20.00	3000.00	12	7	9	5	16	8	8	7	2	7	5	5
Ring-billed Gull		20000.00			1		1	2	1					0
Ringed Plover	100.00	730.00	849	355	146	267	205	314	217	139	121	109	285	172
Roseate Tern								3						0
Sanderling	60.00	1200.00	692	609	434	674	300	411	405	510	266	841	800	558
Sandwich Tern			342	122	38	2	43	6	23	52		8	9	14
Scaup	65.00	3100.00				2								0
Shag		2000.00	7	7	35	2	25	19	23	36	3	71	22	30
Shelduck	120.00	3000.00	761	1036	866	1142	821	603	731	961	2927	744	1611	1611
Shoveler	30.00	400.00	104	111	76	249	73	101	79	126	97	115	144	120
Slavonian Grebe		55.00					1							0
Snipe		20000.00	1		2	16	18	12	62	20		31	57	32
Spotted Redshank		900.00	1					1		1		3		1
Teal	340.00	5000.00	925	823	785	980	1358	909	981	1378	1233	1291	1092	1330
Tufted Duck	310.00	12000.00			1									0
Turnstone	95.00	1400.00	356	292	380	329	392	349	227	466	250	584	334	384
Unidentified Gull								10	85					0

Species	1% National	1% International	2006/07	2007/08	2008 / 09	2009 / 10	2010 / 11	2011 / 12	2012 / 13	2013 / 14	2014 / 15	2015 / 16	2017/18	MEAN
Unidentified Tern			244											0
Water Rail			1	1				1						1
Whimbrel		6700.00			1		1		1	2	4		918	1351
Wigeon	630.00	15000.00	518	1302	663	1911	806	610	445	691	2201	1106		1
Yellow-legged Gull									1	1		2		1

Appendix II – Results of Survey Observations

Activity codes: HU – Hunting/Feeding; WA – Walking; FL – Flying; OG – On ground; GL – Gliding; PE – Perching; SO – Soaring; PR – Preening; WP – With prey; SW – Swimming; RO – Roosting

Appendix II - Table 1: Record of survey observations – consisting of both flight lines and point observations.

Date	BTO Code	Species	No. Of Birds	Activity	BoCCI
30/10/2020	BH	Black-headed Gull	3	PE	Amber
30/10/2020	HG	Herring Gull	1	FL	Amber
30/10/2020	FF	Fieldfare	2	PE	Green
30/10/2020	P.	Grey Partridge	1	PE	Red
30/10/2020	HG	Herring Gull	1	FL	Amber
30/10/2020	H.	Heron	1	SW	Green
30/10/2020	H.	Heron	1	SW	Green
30/10/2020	MH	Moorhen	2	OG	Green
30/10/2020	BH	Black-headed Gull	1	FL	Amber
30/10/2020	MH	Moorhen	1	FW	Green
30/10/2020	MA	Mallard	3	FW	Amber
30/10/2020	MS	Mute Swan	3	FW	Amber
30/10/2020	MA	Mallard	2	SW	Amber
30/10/2020	CM	Common Gull	1	FL	Amber
30/10/2020	BH	Black-headed Gull	15	FL	Amber
30/10/2020	H.	Heron	1	FL	Green
30/10/2020	BH	Black-headed Gull	2	FL	Amber
30/10/2020	LG	Little Grebe	2	FW	Green
30/10/2020	MH	Moorhen	1	SW	Green
30/10/2020	BH	Black-headed Gull	16	FL	Amber
30/10/2020	HS	House Sparrow	20	PE	Amber
30/10/2020	HG	Herring Gull	3	FL	Amber
30/10/2020	PF	Pied Flycatcher	1	PE	Amber
30/10/2020	BH	Black-headed Gull	3	FL	Amber
30/10/2020	GL	Grey Wagtail	1	OG	Red
30/10/2020	GR	Greenfinch	2	FL	Amber
30/10/2020	MP	Meadow Pipit	2	FL	Red
30/10/2020	HG	Herring Gull	1	FL	Amber
30/10/2020	HG	Herring Gull	6	FL	Amber
30/10/2020	BZ	Buzzard	1	FL	Green
30/10/2020	HG	Herring Gull	2	FL	Amber
30/10/2020	LI	Linnet	6	FL/PE	Amber
30/10/2020	SG	Starling	6	FL	Amber
30/10/2020	LB	Lesser Black-backed Gull	1	FL	Amber
30/10/2020	SH	Sparrowhawk	1	FL	Green
30/10/2020	BH	Black-headed Gull	2	FL	Amber
30/10/2020	LI	Linnet	11	FL	Amber
30/10/2020	SG	Starling	4	FL	Amber
30/10/2020	LI	Linnet	3	FL	Amber
30/10/2020	MP	Meadow Pipit	4	OG/FL	Red

Date	BTO Code	Species	No. Of Birds	Activity	BoCCI
30/10/2020	GR	Greenfinch	3	PE	Amber
30/10/2020	GR	Greenfinch	2	PE	Amber
30/10/2020	SG	Starling	6	FL	Amber
30/10/2020	S.	Skylark	1	FL	Amber
30/10/2020	HG	Herring Gull	1	FL	Amber
30/10/2020	BH	Black-headed Gull	4	FL	Amber
30/10/2020	LB	Lesser Black-backed Gull	3	FL	Amber
30/10/2020	MP	Meadow Pipit	2	FL	Red
30/10/2020	MP	Meadow Pipit	3	FL	Red
30/10/2020	RE	Redwing	16	PE	Red
30/10/2020	GR	Greenfinch	3	PE	Amber
30/10/2020	GC	Goldcrest	2	PE	Amber
30/10/2020	BH	Black-headed Gull	1	FL	Amber
30/10/2020	MH	Moorhen	1	OG	Green
30/10/2020	GL	Grey Wagtail	1	OG/WA	Red
30/10/2020	L.	Lapwing	50+	FL	Red
30/10/2020	SG	Starling	3	FL	Amber
30/10/2020	HG	Herring Gull	1	FL	Amber
30/10/2020	L.	Lapwing	30	FL	Red
30/10/2020	GC	Goldcrest	2	PE	Amber
30/10/2020	HG	Herring Gull	1	FL	Amber
30/10/2020	BH	Black-headed Gull	3	FL	Amber
30/10/2020	BZ	Buzzard	2	PE/FL	Green
30/10/2020	MP	Meadow Pipit	3	OG	Red
30/10/2020	MP	Meadow Pipit	2	FL	Red
30/10/2020	SG	Starling	5	FL	Amber
30/10/2020	SG	Starling	5	FL	Amber
30/10/2020	MP	Meadow Pipit	2	FL	Red
30/10/2020	S.	Skylark	1	FL	Amber
30/10/2020	MP	Meadow Pipit	1	OG	Red
30/10/2020	SG	Starling	12	FL	Amber
30/10/2020	LI	Linnet	4	FL	Amber
30/10/2020	BH	Black-headed Gull	2	FL	Amber
30/10/2020	HS	House Sparrow	4	PE	Amber
30/10/2020	LB	Lesser Black-backed Gull	1	FL	Amber
30/10/2020	SG	Starling	7	PE	Amber
30/10/2020	BH	Black-headed Gull	1	FL	Amber
30/10/2020	HS	House Sparrow	2	PE	Amber
30/10/2020	HG	Herring Gull	1	FL	Amber
30/10/2020	SG	Starling	16	PE	Amber
30/10/2020	HG	Herring Gull	1	FL	Amber
30/10/2020	SG	Starling	1	PE	Amber
30/10/2020	SG	Starling	10	PE	Amber
30/10/2020	MP	Meadow Pipit	1	PE	Red
30/10/2020	SG	Starling	5	FL	Amber
30/10/2020	GC	Goldcrest	1	PE	Amber
30/10/2020	LI	Linnet	4	FL	Amber

Date	BTO Code	Species	No. Of Birds	Activity	BoCCI
30/10/2020	LB	Lesser Black-backed Gull	1	FL	Amber
30/10/2020	BZ	Buzzard	1	PE	Green
30/10/2020	HG	Herring Gull	1	FL	Amber
30/10/2020	HG	Herring Gull	1	FL	Amber
30/10/2020	BH	Black-headed Gull	2	FL	Amber
30/10/2020	HG	Herring Gull	1	FL	Amber
30/10/2020	HG	Herring Gull	1	FL	Amber
30/10/2020	HS	House Sparrow	14	PE	Amber
29/10/2020	BH	Black-headed Gull	1	FL	Amber
29/10/2020	H.	Heron	1	FL	Green
29/10/2020	LG	Little Grebe	4	SW	Green
29/10/2020	H.	Heron	1	OG	Green
29/10/2020	BH	Black-headed Gull	1	FL	Amber
29/10/2020	HG	Herring Gull	2	FL	Amber
29/10/2020	H.	Heron	1	OG	Green
29/10/2020	BH	Black-headed Gull	6	FL	Amber
29/10/2020	MS	Mute Swan	4	SW	Amber
29/10/2020	H.	Heron	1	FL	Green
29/10/2020	MS	Mute Swan	1	SW	Amber
29/10/2020	LG	Little Grebe	4	SW	Green
29/10/2020	BH	Black-headed Gull	3	FL	Amber
29/10/2020	HG	Herring Gull	1	FL	Amber
29/10/2020	BH	Black-headed Gull	4	FL	Amber
29/10/2020	LI	Linnet	1	PE/FL	Amber
29/10/2020	HG	Herring Gull	2	FL	Amber
29/10/2020	BH	Black-headed Gull	3	FL	Amber
29/10/2020	GL	Grey Wagtail	1	FL/OG	Red
29/10/2020	GL	Grey Wagtail	1	OG	Red
29/10/2020	BH	Black-headed Gull	6	FL	Amber
29/10/2020	GC	Goldcrest	1	PE	Amber
29/10/2020	LB	Lesser Black-backed Gull	1	FL	Amber
29/10/2020	HG	Herring Gull	1	FL	Amber
29/10/2020	SN	Snipe	4	OG	Red
29/10/2020	HG	Herring Gull	2	FL	Amber
29/10/2020	HG	Herring Gull	3	FL	Amber
29/10/2020	BZ	Buzzard	1	FL	Green
29/10/2020	BH	Black-headed Gull	5	FL	Amber
29/10/2020	HG	Herring Gull	1	FL	Amber
29/10/2020	SD	Stock Dove	6	PE	Red
29/10/2020	HG	Herring Gull	3	FL	Amber
29/10/2020	RE	Redwing	6	FL	Red
29/10/2020	HG	Herring Gull	3	FL	Amber
29/10/2020	SG	Starling	30	FL	Amber
29/10/2020	SG	Starling	40	FL	Amber
29/10/2020	HG	Herring Gull	1	FL	Amber
29/10/2020	SG	Starling	10	FL	Amber
29/10/2020	SG	Starling	20	FL	Amber

Date	BTO Code	Species	No. Of Birds	Activity	BoCCI
29/10/2020	BZ	Buzzard	1	OG/PE	Green
29/10/2020	HG	Herring Gull	1	FL	Amber
29/10/2020	SG	Starling	30	FL	Amber
29/10/2020	HG	Herring Gull	1	FL	Amber
29/10/2020	CM	Common Gull	1	FL	Amber
28/02/2021	SG	Starling	4	PE	Amber
28/02/2021	MH	Moorhen	1	SW	Green
28/02/2021	MA	Mallard	2	SW	Amber
28/02/2021	SG	Starling	4	PE	Amber
28/02/2021	MA	Mallard	2	SW	Amber
28/02/2021	MH	Moorhen	1	SW	Green
28/02/2021	BH	Black-headed Gull	4	FL	Amber
28/02/2021	CM	Common Gull	1	FL	Amber
28/02/2021	LG	Little Grebe	1	SW	Green
28/02/2021	MH	Moorhen	1	SW	Green
28/02/2021	MA	Mallard	1	FL	Amber
28/02/2021	CM	Common Gull	1	FL	Amber
28/02/2021	BH	Black-headed Gull	4	FL	Amber
28/02/2021	GR	Greenfinch	1	PE	Amber
28/02/2021	MH	Moorhen	1	SW	Green
28/02/2021	HG	Herring Gull	1	FL	Amber
28/02/2021	MA	Mallard	9	FL	Amber
28/02/2021	SG	Starling	2	FL	Amber
28/02/2021	RE	Redwing	6	OG	Red
28/02/2021	GR	Greenfinch	1	PE	Amber
28/02/2021	SG	Starling	1	FL	Amber
28/02/2021	GR	Greenfinch	1	PE	Amber
28/02/2021	GR	Greenfinch	1	PE	Amber
28/02/2021	CA	Cormorant	1	FL	Amber
28/02/2021	GC	Goldcrest	2	FL/PE	Amber
28/02/2021	GC	Goldcrest	1	PE	Amber
28/02/2021	GC	Goldcrest	2	PE	Amber
28/02/2021	GC	Goldcrest	1	PE	Amber
28/02/2021	GR	Greenfinch	1	PE	Amber
28/02/2021	GR	Greenfinch	1	PE	Amber
28/02/2021	MS	Mute Swan	2	FL	Amber
28/02/2021	MS	Mute Swan	3	FL	Amber
28/02/2021	HG	Herring Gull	2	FL	Amber
28/02/2021	HS	House Sparrow	4	FL	Amber
28/02/2021	SG	Starling	20	OG/FL	Amber
28/02/2021	GR	Greenfinch	1	PE	Amber
28/02/2021	HG	Herring Gull	1	FL	Amber
28/02/2021	GZ	Glaucous Gull	1	SW?	Green
28/02/2021	TU	Tufted Duck	8	SW	Amber
28/02/2021	MS	Mute Swan	4	OG/SW	Amber
28/02/2021	LB	Lesser Black-backed Gull	3	OG	Amber
28/02/2021	LG	Little Grebe	8	SW	Green

Date	BTO Code	Species	No. Of Birds	Activity	BoCCI
28/02/2021	MH	Moorhen	2	SW	Green
28/02/2021	GB	Great Black-backed Gull	1	SW	Green
28/02/2021	CO	Coot	11	SW	Amber
28/02/2021	CM	Common Gull	12	SW	Amber
28/02/2021	HG	Herring Gull	31	FL/SW	Amber
28/02/2021	MA	Mallard	16	SW	Amber
28/02/2021	BH	Black-headed Gull	120	FL/SW	Amber
27/03/2021	SG	Starling	6	FL	Amber
27/03/2021	H.	Heron	1	RO	Green
27/03/2021	CM	Common Gull	2	PE	Amber
27/03/2021	MA	Mallard	1	SW	Amber
27/03/2021	MA	Mallard	2	FL	Amber
27/03/2021	SG	Starling	1	FL	Amber
27/03/2021	LB	Lesser Black-backed Gull	1	FL	Amber
27/03/2021	HG	Herring Gull	1	FL	Amber
27/03/2021	H.	Heron	1	OG/FL	Green
27/03/2021	CM	Common Gull	1	FL	Amber
27/03/2021	BH	Black-headed Gull	2	FL	Amber
27/03/2021	MS	Mute Swan	2	SW	Amber
27/03/2021	MA	Mallard	5	SW	Amber
27/03/2021	HG	Herring Gull	3	OG	Amber
27/03/2021	BH	Black-headed Gull	1	FL	Amber
27/03/2021	HG	Herring Gull	2	FL	Amber
27/03/2021	LB	Lesser Black-backed Gull	1	FL	Amber
27/03/2021	LB	Lesser Black-backed Gull	2	FL	Amber
27/03/2021	LB	Lesser Black-backed Gull	2	FL	Amber
27/03/2021	LB	Lesser Black-backed Gull	1	FL	Amber
27/03/2021	LB	Lesser Black-backed Gull	1	FL	Amber
27/03/2021	MA	Mallard	1	SW	Amber
27/03/2021	SG	Starling	1	PE	Amber
27/03/2021	SG	Starling	2	FL	Amber
27/03/2021	MA	Mallard	2	SW	Amber
27/03/2021	HG	Herring Gull	2	FL	Amber
27/03/2021	MA	Mallard	4	FL	Amber
27/03/2021	LB	Lesser Black-backed Gull	1	FL	Amber
27/03/2021	BH	Black-headed Gull	1	FL	Amber
27/03/2021	HG	Herring Gull	6	FL	Amber
27/03/2021	LB	Lesser Black-backed Gull	3	FL	Amber
27/03/2021	BZ	Buzzard	1	FL	Green
27/03/2021	MA	Mallard	16	FL	Amber
27/03/2021	HG	Herring Gull	2	FL	Amber
27/03/2021	LB	Lesser Black-backed Gull	2	FL	Amber
27/03/2021	GS	Great Spotted Woodpecker	1	FL	Green
27/03/2021	GC	Goldcrest	1	PE	Amber
27/03/2021	LB	Lesser Black-backed Gull	1	FL	Amber
27/03/2021	MP	Meadow Pipit	2	OG/FL	Red
27/03/2021	HG	Herring Gull	3	FL	Amber

Date	BTO Code	Species	No. Of Birds	Activity	BoCCI
27/03/2021	MP	Meadow Pipit	1	FL	Red
27/03/2021	LG	Little Grebe	6		Green
27/03/2021	MH	Moorhen	3		Green
27/03/2021	LB	Lesser Black-backed Gull	2		Amber
27/03/2021	TU	Tufted Duck	2		Amber
27/03/2021	MS	Mute Swan	4		Amber
27/03/2021	MA	Mallard	13		Amber
27/03/2021	CO	Coot	6		Amber
27/03/2021	BH	Black-headed Gull	21		Amber
27/03/2021	CM	Common Gull	8		Amber
27/03/2021	HG	Herring Gull	34+ 24		Amber
27/03/2021	HS	House Sparrow	3	PE	Amber
27/03/2021	HG	Herring Gull	2	FL	Amber
27/03/2021	GC	Goldcrest	1	PE	Amber
27/03/2021	HG	Herring Gull	3	FL	Amber
27/03/2021	LB	Lesser Black-backed Gull	2	FL	Amber
27/03/2021	CM	Common Gull	1		Amber
27/03/2021	HG	Herring Gull	4		Amber
27/02/2021	HG	Herring Gull	1	FL	Amber
27/02/2021	MA	Mallard	1	SW	Amber
27/02/2021	BH	Black-headed Gull	5	FL	Amber
27/02/2021	MA	Mallard	2	SW	Amber
27/02/2021	MA	Mallard	2	SW	Amber
27/02/2021	MS	Mute Swan	1	SW	Amber
27/02/2021	MH	Moorhen	1	SW	Green
27/02/2021	HG	Herring Gull	1	FL	Amber
27/02/2021	SG	Starling	3	FL	Amber
27/02/2021	MH	Moorhen	1	SW	Green
27/02/2021	HG	Herring Gull	3	PE	Amber
27/02/2021	MA	Mallard	1	SW	Amber
27/02/2021	MA	Mallard	2	SW	Amber
27/02/2021	MH	Moorhen	1	SW	Green
27/02/2021	H.	Heron	1	OG	Green
27/02/2021	LB	Lesser Black-backed Gull	1	FL	Amber
27/02/2021	GR	Greenfinch	1	PE	Amber
27/02/2021	HG	Herring Gull	2	FL	Amber
27/02/2021	MP	Meadow Pipit	2	PE/FL	Red
27/02/2021	GR	Greenfinch	1	PE	Amber
27/02/2021	HG	Herring Gull	4	FL	Amber
27/02/2021	RE	Redwing	8	PE	Red
27/02/2021	BH	Black-headed Gull	2	FL	Amber
27/02/2021	GB	Great Black-backed Gull	1	FL	Green
27/02/2021	HS	House Sparrow	2	FL	Amber
27/02/2021	GB	Great Black-backed Gull	1	FL	Green
27/02/2021	LI	Linnet	2	FL/PE	Amber
27/02/2021	MP	Meadow Pipit	14	FL	Red
27/02/2021	LB	Lesser Black-backed Gull	2	FL	Amber

Date	BTO Code	Species	No. Of Birds	Activity	BoCCI
27/02/2021	LI	Linnet	1	PE	Amber
27/02/2021	S.	Skylark	1	FL/GL	Amber
27/02/2021	BZ	Buzzard	1	FL	Green
27/02/2021	SG	Starling	5	FL	Amber
27/02/2021	GR	Greenfinch	1	FL	Amber
27/02/2021	HG	Herring Gull	1	FL	Amber
27/02/2021	LB	Lesser Black-backed Gull	1	FL	Amber
27/02/2021	BZ	Buzzard	1	FL	Green
27/02/2021	HG	Herring Gull	1	FL	Amber
27/02/2021	CM	Common Gull	1	FL	Amber
27/02/2021	HG	Herring Gull	2	FL	Amber
27/02/2021	LB	Lesser Black-backed Gull	1	FL	Amber
27/02/2021	GR	Greenfinch	1	PE	Amber
27/02/2021	BZ	Buzzard	1	FL	Green
27/02/2021	SG	Starling	25	PE	Amber
27/02/2021	BH	Black-headed Gull	3	FL	Amber
27/02/2021	MP	Meadow Pipit	3	OG	Red
27/02/2021	P.	Grey Partridge	1	PE	Red
27/02/2021	BH	Black-headed Gull	2	FL	Amber
27/02/2021	HG	Herring Gull	1	FL	Amber
27/02/2021	GB	Great Black-backed Gull	1	FL	Green
27/02/2021	HG	Herring Gull	1	FL	Amber
27/02/2021	BZ	Buzzard	1	FL	Green
27/02/2021	HG	Herring Gull	1	FL	Amber
27/02/2021	GR	Greenfinch	1	PE	Amber
27/02/2021	LB	Lesser Black-backed Gull	1	FL	Amber
27/02/2021	CM	Common Gull	1	FL	Amber
27/02/2021	GR	Greenfinch	3	FL	Amber
27/02/2021	HG	Herring Gull	1	FL	Amber
27/02/2021	BH	Black-headed Gull	1	FL	Amber
27/02/2021	HG	Herring Gull	3	FL	Amber
27/02/2021	LB	Lesser Black-backed Gull	1	FL	Amber
27/02/2021	LB	Lesser Black-backed Gull	1	FL	Amber
27/02/2021	LB	Lesser Black-backed Gull	1	PE	Amber
27/02/2021	MP	Meadow Pipit	20	OG/FL	Red
27/02/2021	SG	Starling	6	FL	Amber
27/02/2021	HG	Herring Gull	1	FL	Amber
27/02/2021	MP	Meadow Pipit	1	FL	Red
27/02/2021	BH	Black-headed Gull	3	OG	Amber
27/02/2021	HS	House Sparrow	4	PE	Amber
27/02/2021	HG	Herring Gull	4	FL	Amber
27/02/2021	HG	Herring Gull	1	FL	Amber
27/02/2021	HS	House Sparrow	10	PE/FL	Amber
26/03/2021	SG	Starling	2	FL	Amber
26/03/2021	MA	Mallard	2	FL	Amber
26/03/2021	MA	Mallard	3	FL	Amber
26/03/2021	H.	Heron	1	FL	Green

Date	BTO Code	Species	No. Of Birds	Activity	BoCCI
26/03/2021	HG	Herring Gull	1	FL	Amber
26/03/2021	H.	Heron	1	FL	Green
26/03/2021	LB	Lesser Black-backed Gull	1	FL	Amber
26/03/2021	HG	Herring Gull	1	FL	Amber
26/03/2021	SG	Starling	1	FL	Amber
26/03/2021	GR	Greenfinch	1	FL	Amber
26/03/2021	HG	Herring Gull	1	FL	Amber
26/03/2021	MA	Mallard	2	SW	Amber
26/03/2021	CA	Cormorant	1	FL	Amber
26/03/2021	H.	Heron	1	PE/FL	Green
26/03/2021	HG	Herring Gull	7	FL	Amber
26/03/2021	HG	Herring Gull	6	FL	Amber
26/03/2021	MA	Mallard	1	SW	Amber
26/03/2021	MH	Moorhen	1	SW	Green
26/03/2021	MA	Mallard	2	SW	Amber
26/03/2021	CM	Common Gull	1	FL	Amber
26/03/2021	HG	Herring Gull	2	FL	Amber
26/03/2021	GC	Goldcrest	1	PE	Amber
26/03/2021	LI	Linnet	1	FL	Amber
26/03/2021	HG	Herring Gull	1	FL	Amber
26/03/2021	SG	Starling	2	FL	Amber
26/03/2021	GR	Greenfinch	2	FL	Amber
26/03/2021	SG	Starling	3	FL	Amber
26/03/2021	BZ	Buzzard	1	FL	Green
26/03/2021	SG	Starling	32	FL	Amber
26/03/2021	BZ	Buzzard	1	FL	Green
26/03/2021	HG	Herring Gull	1	FL	Amber
26/03/2021	HG	Herring Gull	1	FL	Amber
26/03/2021	LB	Lesser Black-backed Gull	1	LB	Amber
26/03/2021	SG	Starling	36	FL	Amber
26/03/2021	MA	Mallard	1	FL	Amber
26/03/2021	HG	Herring Gull	3	FL	Amber
26/03/2021	GB	Great Black-backed Gull	1	FL	Green
26/03/2021	BZ	Buzzard	1	FL/PE	Green
26/03/2021	HG	Herring Gull	1	FL	Amber
26/03/2021	BZ	Buzzard	2	FL	Green
26/03/2021	SG	Starling	11	FL	Amber
26/03/2021	HG	Herring Gull	1	FL	Amber
26/03/2021	LB	Lesser Black-backed Gull	1	FL	Amber
26/03/2021	LB	Lesser Black-backed Gull	2	FL	Amber
26/03/2021	SG	Starling	2	FL	Amber
26/03/2021	HG	Herring Gull	1	FL	Amber
26/03/2021	LB	Lesser Black-backed Gull	1	FL	Amber
26/03/2021	MP	Meadow Pipit	3	FL	Red
26/03/2021	HG	Herring Gull	1	FL	Amber
26/03/2021	LB	Lesser Black-backed Gull	1	FL	Amber
26/03/2021	HG	Herring Gull	1	FL	Amber

Date	BTO Code	Species	No. Of Birds	Activity	BoCCI
26/03/2021	HG	Herring Gull	2	FL	Amber
26/03/2021	SG	Starling	6	FL	Amber
26/03/2021	LB	Lesser Black-backed Gull	3	FL	Amber
26/03/2021	MP	Meadow Pipit	4	FL	Red
26/03/2021	HG	Herring Gull	18	FL	Amber
26/03/2021	SG	Starling	3	FL	Amber
26/03/2021	HG	Herring Gull	22	FL	Amber
26/03/2021	HS	House Sparrow	14	PE/FL	Amber
26/03/2021	GR	Greenfinch	1	FL	Amber
26/03/2021	HG	Herring Gull	2	FL	Amber
20/11/2020	BH	Black-headed Gull	5	FL	Amber
20/11/2020	BH	Black-headed Gull	1	FL	Amber
20/11/2020	CM	Common Gull	1	FL	Amber
20/11/2020	BH	Black-headed Gull	3	FL	Amber
20/11/2020	BH	Black-headed Gull	3	FL	Amber
20/11/2020	BH	Black-headed Gull	2	FL	Amber
20/11/2020	SG	Starling	3	FL	Amber
20/11/2020	BH	Black-headed Gull	3	FL	Amber
20/11/2020	MS	Mute Swan	4	SW	Amber
20/11/2020	HG	Herring Gull	2	FL	Amber
20/11/2020	LG	Little Grebe	6	SW	Green
20/11/2020	HG	Herring Gull	1	FL	Amber
20/11/2020	CA	Cormorant	1	FL	Amber
20/11/2020	HG	Herring Gull	1	FL	Amber
20/11/2020	BH	Black-headed Gull	2	FL	Amber
20/11/2020	BH	Black-headed Gull	2	FL	Amber
20/11/2020	BH	Black-headed Gull	1	FL	Amber
20/11/2020	CA	Cormorant	1	FL	Amber
20/11/2020	BH	Black-headed Gull	1	FL	Amber
20/11/2020	MH	Moorhen	1	SW	Green
20/11/2020	H.	Heron	1	FL	Green
20/11/2020	H.	Heron	1	OG	Green
20/11/2020	CM	Common Gull	1	FL	Amber
20/11/2020	CA	Cormorant	1	FL	Amber
20/11/2020	MH	Moorhen	1	SW	Green
20/11/2020	HG	Herring Gull	1	FL	Amber
20/11/2020	MH	Moorhen	1	SW	Green
20/11/2020	HG	Herring Gull	1	FL	Amber
20/11/2020	MA	Mallard	5	FL	Amber
20/11/2020	CA	Cormorant	1	FL	Amber
20/11/2020	BH	Black-headed Gull	1	FL	Amber
20/11/2020	HG	Herring Gull	1	FL	Amber
20/11/2020	H.	Heron	1	OG/FL	Green
20/11/2020	CO	Coot	1	OG	Amber
20/11/2020	WA	Water Rail	1	OG	Green
20/11/2020	BH	Black-headed Gull	1	FL	Amber
20/11/2020	H.	Heron	2	OG/FL	Green

Date	BTO Code	Species	No. Of Birds	Activity	BoCCI
20/11/2020	HG	Herring Gull	1	FL	Amber
20/11/2020	MH	Moorhen	1	SW	Green
20/11/2020	LG	Little Grebe	6	SW	Green
20/11/2020	CM	Common Gull	3	FL	Amber
20/11/2020	CM	Common Gull	3	FL	Amber
20/11/2020	BH	Black-headed Gull	4	FL	Amber
20/11/2020	HG	Herring Gull	3	FL	Amber
20/11/2020	BH	Black-headed Gull	1	FL	Amber
20/11/2020	CM	Common Gull	2	FL	Amber
20/11/2020	BH	Black-headed Gull	4	FL	Amber
20/11/2020	BH	Black-headed Gull	1	FL	Amber
20/11/2020	HG	Herring Gull	1	FL	Amber
20/11/2020	HG	Herring Gull	4	FL	Amber
20/11/2020	BH	Black-headed Gull	3	FL	Amber
20/11/2020	BH	Black-headed Gull	1	OG	Amber
20/11/2020	HG	Herring Gull	1	FL	Amber
20/11/2020	HS	House Sparrow	4	PE	Amber
20/11/2020	SG	Starling	10	PE	Amber
20/11/2020	HG	Herring Gull	1	FL	Amber
20/11/2020	BH	Black-headed Gull	2	FL	Amber
20/11/2020	BH	Black-headed Gull	1	FL	Amber
20/11/2020	HG	Herring Gull	1	FL	Amber
20/11/2020	HG	Herring Gull	1	FL	Amber
20/11/2020	RE	Redwing	1	PE	Red
20/11/2020	BZ	Buzzard	1	OG/FL	Green
20/11/2020	GC	Goldcrest	2	PE	Amber
20/11/2020	GC	Goldcrest	2	PE	Amber
20/11/2020	HG	Herring Gull	1	FL	Amber
20/11/2020	BH	Black-headed Gull	1	FL	Amber
20/11/2020	GC	Goldcrest	1	PE	Amber
20/11/2020	GC	Goldcrest	2	PE	Amber
20/11/2020	GC	Goldcrest	1	PE	Amber
20/11/2020	BH	Black-headed Gull	1	FL	Amber
20/11/2020	BH	Black-headed Gull	1	FL	Amber
20/11/2020	H.	Heron	1	FL	Green
20/11/2020	GB	Great Black-backed Gull	1	FL	Green
20/11/2020	MP	Meadow Pipit	6	FL	Red
20/11/2020	MH	Moorhen	1	OG	Green
20/11/2020	BH	Black-headed Gull	2	FL	Amber
20/11/2020	BH	Black-headed Gull	1	FL	Amber
20/11/2020	HG	Herring Gull	1	FL	Amber
20/11/2020	HG	Herring Gull	2	FL	Amber
20/11/2020	HG	Herring Gull	1	FL	Amber
20/11/2020	HG	Herring Gull	1	FL	Amber
20/11/2020	BH	Black-headed Gull	1	FL	Amber
20/11/2020	MP	Meadow Pipit	5	OG/FL	Red
20/11/2020	BH	Black-headed Gull	2	FL	Amber

Date	BTO Code	Species	No. Of Birds	Activity	BoCCI
20/11/2020	SN	Snipe	1	OG/FL	Red
19/11/2020	MH	Moorhen	3	OG	Green
19/11/2020	GC	Goldcrest	1	FL	Amber
19/11/2020	SG	Starling	3	FL	Amber
19/11/2020	HG	Herring Gull	1	FL	Amber
19/11/2020	GC	Goldcrest	1	PE	Amber
19/11/2020	BH	Black-headed Gull	1	FL	Amber
19/11/2020	MS	Mute Swan	2	OG	Amber
19/11/2020	BH	Black-headed Gull	1	FL	Amber
19/11/2020	GC	Goldcrest	2	PE	Amber
19/11/2020	MH	Moorhen	1	SW	Green
19/11/2020	MH	Moorhen	1	SW	Green
19/11/2020	CA	Cormorant	1	FL	Amber
19/11/2020	MH	Moorhen	1	FL	Green
19/11/2020	MH	Moorhen	1	SW	Green
19/11/2020	LG	Little Grebe	5	SW	Green
19/11/2020	BH	Black-headed Gull	1	FL	Amber
19/11/2020	BH	Black-headed Gull	2	FL	Amber
19/11/2020	BZ	Buzzard	1	PE/FL	Green
19/11/2020	BZ	Buzzard	1	FL/OG	Green
19/11/2020	SG	Starling	10	FL	Amber
19/11/2020	BH	Black-headed Gull	2	FL	Amber
19/11/2020	HG	Herring Gull	1	FL	Amber
19/11/2020	GR	Greenfinch	1	PE	Amber
19/11/2020	BZ	Buzzard	1	FL	Green
19/11/2020	L.	Lapwing	60	FL	Red
19/11/2020	BZ	Buzzard	1	FL	Green
19/11/2020	CA	Cormorant	1	FL	Amber
19/11/2020	HG	Herring Gull	1	FL	Amber
19/11/2020	HG	Herring Gull	1	FL	Amber
19/11/2020	BZ	Buzzard	1	FL	Green
19/11/2020	HG	Herring Gull	1	FL	Amber
19/11/2020	CM	Common Gull	1	FL	Amber
19/11/2020	HG	Herring Gull	2	FL	Amber
19/11/2020	L.	Lapwing	60	FL/OG	Red
19/11/2020	SG	Starling	3	FL	Amber
19/11/2020	CM	Common Gull	1	FL	Amber
19/11/2020	BZ	Buzzard	1	FL	Green
19/11/2020	SG	Starling	3	FL	Amber
19/11/2020	MU	Mediterranean Gull	1	FL	Amber
19/11/2020	HG	Herring Gull	1	FL	Amber
19/11/2020	SG	Starling	6	OG	Amber
19/11/2020	BH	Black-headed Gull	1	FL	Amber
19/11/2020	CM	Common Gull	1	FL	Amber
19/11/2020	MP	Meadow Pipit	2	FL	Red
19/11/2020	BZ	Buzzard	1	HU	Green

Date	BTO Code	Species	No. Of Birds	Activity	BoCCI
19/11/2020	BH	Black-headed Gull	1	FL	Amber
19/11/2020	MP	Meadow Pipit	6	FL	Red
19/11/2020	MP	Meadow Pipit	1	FL	Red
19/11/2020	SN	Snipe	4	OG/FL	Red
19/11/2020	HG	Herring Gull	1	FL	Amber
19/11/2020	HG	Herring Gull	2	FL	Amber
19/11/2020	HG	Herring Gull	1	FL	Amber
19/11/2020	LI	Linnet	15	FL	Amber
19/11/2020	HG	Herring Gull	1	FL	Amber
19/11/2020	BH	Black-headed Gull	1	FL	Amber
02/02/2021	CA	Cormorant	1	FL	Amber
02/02/2021	MS	Mute Swan	1	SW	Amber
02/02/2021	MA	Mallard	2	SW	Amber
02/02/2021	GL	Grey Wagtail	1	FL	Red
02/02/2021	MS	Mute Swan	1	SW/HU	Amber
02/02/2021	CA	Cormorant	1	SW/HU	Amber
02/02/2021	HG	Herring Gull	1	FL	Amber
02/02/2021	BH	Black-headed Gull	14	FL	Amber
02/02/2021	MA	Mallard	2	OG	Amber
02/02/2021	CA	Cormorant	1	FL	Amber
02/02/2021	MA	Mallard	1	SW	Amber
02/02/2021	MA	Mallard	2	SW	Amber
02/02/2021	BH	Black-headed Gull	1	FL	Amber
02/02/2021	MA	Mallard	1	SW	Amber
02/02/2021	MA	Mallard	2	SW	Amber
02/02/2021	HG	Herring Gull	22	FL	Amber
02/02/2021	MS	Mute Swan	1	FL	Amber
02/02/2021	CM	Common Gull	1	FL	Amber
02/02/2021	HG	Herring Gull	1	PE	Amber
02/02/2021	BH	Black-headed Gull	1	FL	Amber
02/02/2021	BZ	Buzzard	1	FL/PE	Green
02/02/2021	BH	Black-headed Gull	13	FL	Amber
02/02/2021	GR	Greenfinch	3	FL	Amber
02/02/2021	HG	Herring Gull	2	FL	Amber
02/02/2021	LB	Lesser Black-backed Gull	1	FL	Amber
02/02/2021	HG	Herring Gull	2	FL	Amber
02/02/2021	SG	Starling	4	FL	Amber
02/02/2021	BH	Black-headed Gull	2	FL	Amber
02/02/2021	HG	Herring Gull	1	FL	Amber
02/02/2021	BH	Black-headed Gull	6	FL	Amber
02/02/2021	CM	Common Gull	1	FL	Amber
02/02/2021	BH	Black-headed Gull	2	FL	Amber
02/02/2021	L.	Lapwing	200+	FL	Red
02/02/2021	SG	Starling	3	FL	Amber
02/02/2021	HG	Herring Gull	2	FL	Amber
02/02/2021	BH	Black-headed Gull	4	FL	Amber

Date	BTO Code	Species	No. Of Birds	Activity	BoCCI
02/02/2021	L.	Lapwing	120+	FL	Red
02/02/2021	BH	Black-headed Gull	2	FL	Amber
02/02/2021	SG	Starling	6	FL	Amber
02/02/2021	GR	Greenfinch	2	PE	Amber
02/02/2021	GB	Great Black-backed Gull	1	FL	Green
02/02/2021	MA	Mallard	2	FL	Amber
02/02/2021	HG	Herring Gull	2	FL	Amber
02/02/2021	BH	Black-headed Gull	20	FL	Amber
02/02/2021	CM	Common Gull	4	FL	Amber
02/02/2021	BH	Black-headed Gull	16	FL	Amber
02/02/2021	BZ	Buzzard	2	PE	Green
02/02/2021	MP	Meadow Pipit	3	FL/OG	Red
02/02/2021	BH	Black-headed Gull	6	FL	Amber
02/02/2021	MP	Meadow Pipit	5	PE	Red
02/02/2021	BH	Black-headed Gull	1	FL	Amber
02/02/2021	SG	Starling	80	FL	Amber
02/02/2021	HG	Herring Gull	2	FL	Amber
02/02/2021	BH	Black-headed Gull	4	OG	Amber
02/02/2021	BH	Black-headed Gull	8	FL/OG	Amber
02/02/2021	BH	Black-headed Gull	10	FL	Amber
02/02/2021	SG	Starling	20	FL	Amber
02/02/2021	HG	Herring Gull	2	FL	Amber
02/02/2021	BH	Black-headed Gull	4	FL	Amber
02/02/2021	BZ	Buzzard	1	PE/OG/FL	Green
02/02/2021	HG	Herring Gull	1	FL	Amber
02/02/2021	SG	Starling	16	FL	Amber
02/02/2021	BH	Black-headed Gull	6	OG	Amber
02/02/2021	L.	Lapwing	70	FL	Red
02/02/2021	HS	House Sparrow	10	PE	Amber
02/02/2021	HG	Herring Gull	2	FL	Amber
02/02/2021	BH	Black-headed Gull	8	OG	Amber
02/02/2021	BH	Black-headed Gull	3	FL	Amber
02/02/2021	LI	Linnet	6	PE/FL	Amber
02/02/2021	BH	Black-headed Gull	6	FL	Amber
02/02/2021	HS	House Sparrow	16	PE/FL	Amber
02/02/2021	HG	Herring Gull	1	FL	Amber
01/02/2021	SG	Starling	2	PE	Amber
01/02/2021	HS	House Sparrow	4	PE	Amber
01/02/2021	MS	Mute Swan	2	SW	Amber
01/02/2021	MA	Mallard	2	FL	Amber
01/02/2021	BH	Black-headed Gull	50	FL	Amber
01/02/2021	MH	Moorhen	1	SW	Green
01/02/2021	BH	Black-headed Gull	2	FL	Amber
01/02/2021	H.	Heron	1	OG	Green
01/02/2021	MA	Mallard	2	SW	Amber
01/02/2021	BH	Black-headed Gull	2	FL	Amber
01/02/2021	MS	Mute Swan	1	FL	Amber

Date	BTO Code	Species	No. Of Birds	Activity	BoCCI
01/02/2021	MA	Mallard	3	FL	Amber
01/02/2021	MH	Moorhen	1	SW	Green
01/02/2021	BH	Black-headed Gull	1	FL	Amber
01/02/2021	BH	Black-headed Gull	2	FL	Amber
01/02/2021	BH	Black-headed Gull	2	FL	Amber
01/02/2021	BH	Black-headed Gull	3	FL	Amber
01/02/2021	BH	Black-headed Gull	4	FL	Amber
01/02/2021	BH	Black-headed Gull	6	FL	Amber
01/02/2021	MH	Moorhen	1	SW	Green
01/02/2021	BH	Black-headed Gull	2	FL	Amber
01/02/2021	HG	Herring Gull	1	FL	Amber
01/02/2021	CM	Common Gull	1	FL	Amber
01/02/2021	HG	Herring Gull	1	FL	Amber
01/02/2021	L.	Lapwing	5	FL	Red
01/02/2021	HG	Herring Gull	1	FL	Amber
01/02/2021	GC	Goldcrest	1	PE	Amber
01/02/2021	SD	Stock Dove	1	FL	Red
01/02/2021	BH	Black-headed Gull	1	FL	Amber
01/02/2021	CM	Common Gull	1	FL	Amber
01/02/2021	GC	Goldcrest	1	PE	Amber
01/02/2021	GS	Great Spotted Woodpecker	1	PE	Green
01/02/2021	GC	Goldcrest	1	PE	Amber
01/02/2021	CM	Common Gull	1	FL	Amber
01/02/2021	L.	Lapwing	120+	OG/FL	Red
01/02/2021	HG	Herring Gull	1	FL	Amber
01/02/2021	SG	Starling	15	FL	Amber
01/02/2021	HG	Herring Gull	1	FL	Amber
01/02/2021	BH	Black-headed Gull	142	SW/RO/PR	Amber
01/02/2021	TU	Tufted Duck	14	SW	Amber
01/02/2021	CO	Coot	22	SW	Amber
01/02/2021	LG	Little Grebe	6	SW	Green
01/02/2021	MS	Mute Swan	4	SW	Amber
01/02/2021	MH	Moorhen	8	SW	Green
01/02/2021	MA	Mallard	57	SW	Amber
01/02/2021	HG	Herring Gull	29	SW/RO/PR	Amber
01/02/2021	CM	Common Gull	22	SW/RO/PR	Amber

Appendix F2 Barn Owl Survey – André Robinson (independent ornithologist). Emmi Virkki of Scott Cawley Ltd.



Barn Owl Survey Report
for Clonburris Strategic Development Zone
at Clonburris, Co. Dublin

Prepared for Goodrock Project Management Limited

Document Control

Project Title	Barn Owl Survey Report, Clonburris Strategic Development Zone, Clonburris, Co. Dublin			
Document Title	Barn Owl Survey Report	Project No.	200246	
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This report has been prepared by Scott Cawley Ltd. in accordance with the particular instructions and requirements of our agreement with the Client, the project's budgetary and time constraints and in line with best industry standards. The methodology adopted and the sources of information used by Scott Cawley Ltd. in providing its services are outlined in this report. The scope of this report and the services are defined by these circumstances.

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The conclusions presented in this report represent Scott Cawley Ltd.'s best professional judgement based on review of site conditions observed during the site visit (if applicable) and the relevant information available at the time of writing. Scott Cawley Ltd. has used reasonable skill, care and diligence in compiling this report and no warranty is provided as to the report's accuracy.

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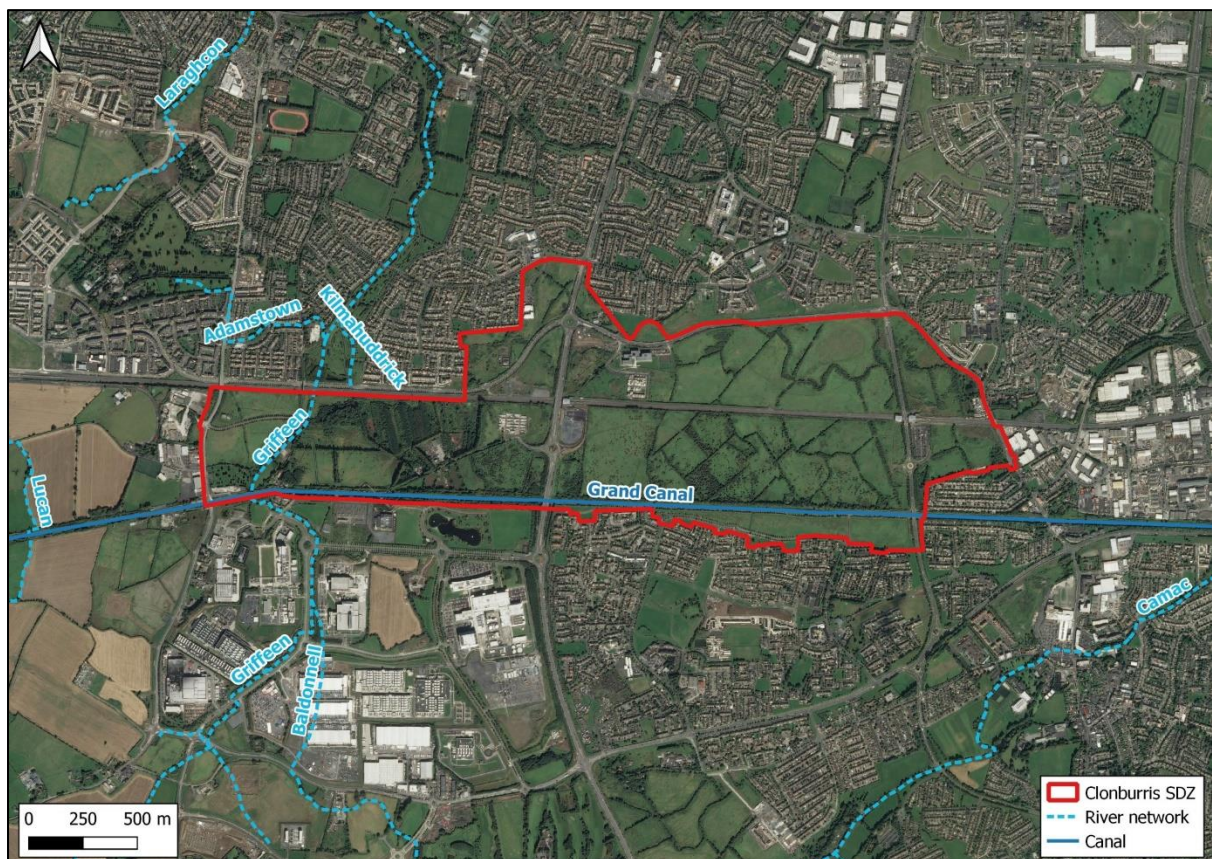
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Appendix I – Clonburriss SDZ Habitat Map

1 Introduction

- 1 This Barn Owl Survey Report was authored by Emmi Virkki of Scott Cawley Ltd. and provides an overview of the barn owl survey baseline for lands at Clonburris Strategic Development Zone (from hereafter referred to as 'Clonburris SDZ' and 'SDZ'), Clonburris, Co. Dublin (refer to Figure 1 for location) for the season 2020/21. This barn owl survey baseline will be utilised to inform future planning applications in the Clonburris SDZ within the red line boundary illustrated in Figure 1, below.
- 2 The Clonburris SDZ spans c.280ha, and is located west of Dublin between Lucan, Clondalkin and Liffey Valley. They mostly comprise of areas of unmanaged grassland, with field boundaries demarcated by hedgerows, treelines, and scrub. Hardstanding areas within the SDZ comprise of for example South Dublin County Council (SDCC) depot, the R113 car park at Clondalkin/Fonthill railway station and associated paved areas and roads. There are two waterbodies located within the SDZ: the Griffeen River, which intersects the SDZ to the west, from the Lucan Pitch and Putt Club in the south-western corner to the Griffeen Valley Park to the north, and the Grand Canal which runs near the southern boundary of the SDZ. The adjacent lands and wider environs are largely urban in nature consisting of residential and commercial areas to north, east and south. The areas to west, beyond existing commercial developments, are agricultural in nature.

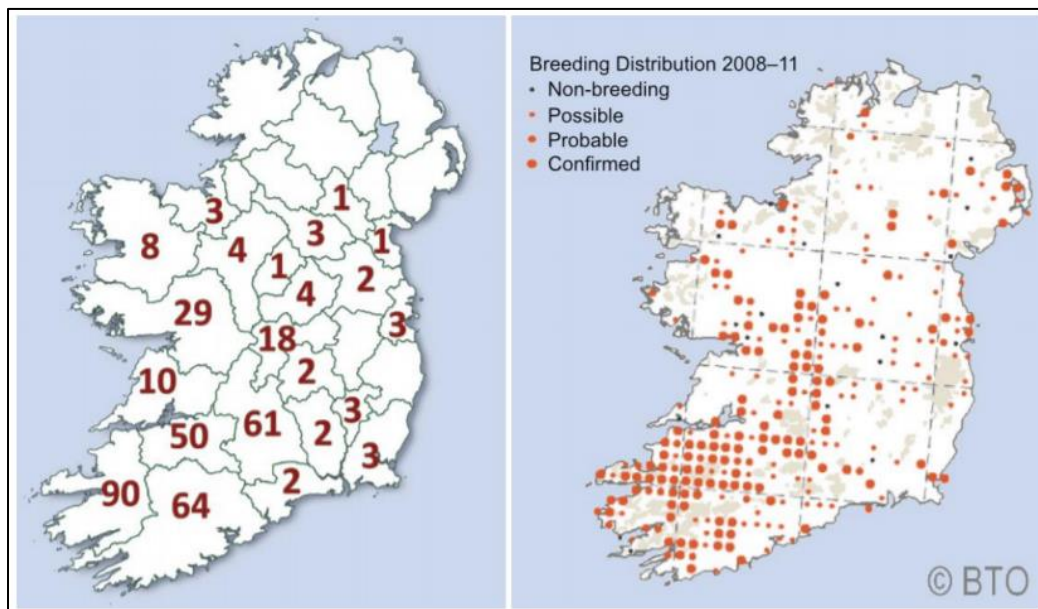
Figure 1 Clonburris SDZ in relation to the surrounding environment



1.1 Background

- 3 Barn owl *Tyto alba* populations have gone through extensive declines over recent decades and as a consequence, the species is currently a Red-listed Bird of Conservation Concern¹ in Ireland. The main driver of the decline is thought to be intensification of agriculture, which has reduced prey abundance within foraging habitat (Lusby and O’Clery, 2014). Furthermore, the decline has been accelerated due to the increased use and exposure to rodenticides, to increased mortality due to expansion of the major national road network and to the loss of nesting and roosting sites to development (Lusby and O’Clery, 2014). Barn owls are sedentary; typically occupying one territory throughout their lives, and they can be found nesting in large dry cavities in buildings, bale stacks, trees and in fissures in rocks, as well as purpose-built barn owl nest boxes (Hardey *et al.*, 2013). Their breeding season home ranges can reach up to 6km from their nest site, and sometimes even further, when they are foraging for food (Lusby and O’Clery, 2014). Barn owl is an open lowland, farmland species, and therefore habitat found within these home ranges generally include areas of rough, tussocky grassland favoured by their prey species (e.g. rats, mice, voles and shrews), but the species may also forage in areas with little or no rough grassland in close proximity to their nest site, as well as in young conifer plantations (Hardey *et al.*, 2013).
- 4 Barn owl are widespread in Ireland, however the majority of known Irish barn owl sites are concentrated in west and south-west of the country (see Figure 2). There were only three known barn owl sites in Co. Dublin between 2006 and 2016, with confirmed and/or probably breeding pairs located in northern Co. Dublin between 2008 and 2011.

Figure 2 The number of barn owl sites per county in Ireland recorded by BirdWatch Ireland between 2006 and 2016 (left). The breeding range of barn owls in Ireland recorded by the Bird Atlas (2007-2011) (right) (TII, 2017)



- 5 Barn owl are protected under the Wildlife Acts and it is an offence to disturb birds while on their nests, or to wilfully take, remove, destroy, injure or mutilate their eggs or nests. Therefore it is important to establish if barn owl are breeding in an area with previous sighting of the species, in order to prevent disturbance to breeding pairs and their nests, and in worst case scenario, nest abandonment. If barn owl are found to be present, impacts on the species can be kept to minimum by adhering to appropriate mitigation measures provided by the project ecologist or by contacting a barn owl specialist from BirdWatch Ireland.

¹ Gilbert, G., Stanbury, A. & Lewis, L. (2021) *Birds of Conservation Concern in Ireland 4: 2020-2026*. Irish Birds 43: 1-22 (2021).

- 6 The purpose of the report is to:
- Establish the presence/absence and use of the Clonburris SDZ lands and surrounding area by barn owl;
 - Understand the importance of the Clonburris SDZ lands and surrounding area for barn owls; and,
 - Complete the barn owl survey requirement for future development within the SDZ lands stated in the Clonburris SDZ Biodiversity Management Plan (BMP) (Scott Cawley, 2021).

2 Planning, Policy and Legislation

- 7 The collation of ecological baseline data and the preparation of this assessment has had regard to the following legislation and policy documents. This is not an exhaustive list but the most relevant legislative and policy basis for the purposes of preparing this Barn Owl Survey Report.
- 8 The following international legislation is relevant to planning applications within the Clonburris SDZ:
- Council Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Fauna and Flora; hereafter, referred to as the ‘Habitats Directive’. The Habitats Directive is the legislation under which the Natura 2000 network² was established and special areas of conservation (SACs) are designated for the protection of natural habitat types listed in Annex I, and habitats of the species listed in Annex II, of that directive.
 - Directive 2009/147/EEC; hereafter, referred to as the ‘Birds Directive’. The Birds Directive is the legislation under which special protection areas (SPAs) are designated for the protection of endangered species of wild birds listed in Annex I of that directive.
- 9 The following national legislation is relevant to planning applications within the Clonburris SDZ:
- Wildlife Acts 1976 to 2021; hereafter collectively referred to as the ‘Wildlife Acts’. The Wildlife Acts are the principal pieces of legislation at national level for the protection of wildlife and for the control of activities that may harm wildlife. All bird species, 22 other animal species or groups of species, and 86 species of flora are protected under this legislation.
 - Planning and Development Acts 2000 to 2021; hereafter collectively referred to as the ‘Planning and Development Acts’. This piece of legislation is the basis for Irish planning. Under the legislation, development plans (usually implemented at local authority level) must include mandatory objectives for the conservation of natural heritage and for the conservation of European Sites. It also sets out the requirements in relation to environmental assessment with respect to planning matters, including transposition of the Habitats and Birds Directive into Irish law.
 - European Communities (EC) (Birds and Natural Habitats) Regulations 2011 to 2015; hereafter the ‘Birds and Habitats Regulations’. This legislation transposes the Habitats and Birds Directives into Irish law. It also contains regulations (49 and 50) that deal with invasive species (those included within the Third Schedule of the regulations).
- 10 The following plans and policies are relevant to planning applications within the Clonburris SDZ:

² The Natura 2000 network is a European network of important ecological sites, as defined under Article 3 of the Habitats Directive 92/43/EEC, which comprises both special areas of conservation and special protection areas. Special conservation areas are sites hosting the natural habitat types listed in Annex I, and habitats of the species listed in Annex II, of the Habitats Directive, and are established under the Habitats Directive itself. Special protection areas are established under Article 4 of the Birds Directive 2009/147/EC for the protection of endangered species of wild birds. The aim of the network is to aid the long-term survival of Europe's most valuable and threatened species and habitats.

In Ireland these sites are designed as *European sites* - defined under the Planning Acts and/or the Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special area of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

- National Biodiversity Action Plan 2017-2021 (Department of Culture Heritage and the Gaeltacht, 2017). The National Biodiversity Action Plan is the foundation of biodiversity policy in Ireland and it promotes the importance of the wide range of ecosystems, habitats and species to society as a whole through the concepts of natural accounting and an increased recognition of the value of ecosystem services.
- South Dublin County Council Development Plan 2016-2022 (Dublin City Council, 2016). The development plan lists objectives to protect and enhance biodiversity within the county. These objectives include maintaining and enhancing the biodiversity value of habitats and avoiding of adverse impacts on rare and threatened species within the county boundaries.
- Draft Biodiversity Action Plan for South Dublin County 2020-2026 (South Dublin County Council, 2020). The biodiversity action plan incorporates the objectives presented in the National Biodiversity Action Plan into a county-specific biodiversity action plan, which sets a plan to protect and enhance biodiversity across the county.
- Clonburris Strategic Development Zone: Planning Scheme (South Dublin County Council, 2019). The planning scheme sets out specific biodiversity objectives to protect and enhance biodiversity within the Clonburris SDZ.
- Biodiversity Management Plan to Inform the Parks and Landscape Strategy of Clonburris SDZ (Scott Cawley, 2021) . The BMP provides biodiversity objectives specific to the Clonburris SDZ, as well as additional measures to enhance the biodiversity value of the lands. It also contains objectives specific to barn owl.

3 Methodology

3.1 Author Statement

- 11 This report was authored by Emmi Virkki of Scott Cawley Ltd. and reviewed by Niamh Burke of Coiscéim Ecology and Andrew Speer of Scott Cawley Ltd. Survey methodologies were designed and supervised by Scott Cawley Ltd. (Emmi Virkki) and surveys were completed by an independent ornithologist, André Robinson.
- 12 Emmi Virkki is a Senior Consultant Ecologist with Scott Cawley Ltd. She obtained an honours degree in Environmental Biology, from University College Dublin and a Masters degree in Environmental Science from the same institution. Emmi is a member and volunteer of BirdWatch Ireland, and a member of the British Trust for Ornithology, the Irish Bryophyte Group, the Botanical Society of Britain and Ireland, and Bat Conservation Ireland. She has five years of professional experience working in ecology in Ireland and has worked with clients at both government and private levels. Emmi's specialism is ornithology, but she is also skilled in protected flora and fauna, invasive species and habitat surveys. She has conducted ecological survey and assessment (Ecological Impact Assessment, Appropriate Assessment and Biodiversity Chapters of Environmental Impact Assessment Reports) of linear infrastructure, residential, commercial and industrial projects.
- 13 Niamh Burke is Principal Ecologist with Coiscéim Ecology. She holds a BSc in Natural Sciences with Environmental Science and a PhD in salmonid ecology. She is a Chartered Environmentalist (CEnv) with the Society for the Environment (Soc Env) and a Full Member of the CIEEM. Niamh is a senior scientist with academic research and consulting experience in terrestrial ecology, aquatic ecology and fluvial geomorphology. She is an experienced project manager with a full working knowledge of EIA, the planning process and relevant environmental legislation, both national and European. With a specialism in aquatic habitats, she also has experience of terrestrial species' surveys and mitigation approaches. In her extensive consultancy roles, she has acted as reviewer for all ecological reporting and ensured consistency of standards and approach.
- 14 Andrew Speer is a Technical Director at Scott Cawley Ltd. with over 15 years' professional ecological consultancy experience in preparing Ecological Impact Assessments (EclAs). Andrew is a Full Member of the Chartered Institute of Ecology and Environmental Management (CIEEM) and holds a BSc (Hons) in

Zoology from the National University of Ireland Galway, a Pg Dip in Geographic Information Systems (GIS) from the University of Ulster and an Adv Dip in Planning & Environmental Law from King’s Inns. He has extensive experience in ecological impact assessment and has been the lead author on numerous EclA reports. Andrew also provides technical review and due diligence of EclA documentation for public and local authorities to aid their decision-making process.

3.2 Desk Study

15 A desk study was undertaken in November 2020 prior to the commencement of field work and updated in July 2021 following the completion of field work. The purpose of the desk study was to collate available information on the local ecological environment and existing records of barn owls in Clonburris SDZ and area of up to c. 6km from the SDZ lands. A 6km buffer was used as it is the maximum home range considered for barn owl in Lusby and O’Clery (2014). The following resources were used to inform the assessment presented in this report:

- Records of barn owl for the 10km grid square O03, as held by the National Biodiversity Data Centre (NBDC) www.biodiversityireland.ie and National Parks and Wildlife Services (NPWS)
- Ordnance Survey Ireland mapping and aerial photography from <http://map.geohive.ie/>
- Information on the conservation status of birds in Ireland from *Birds of Conservation Concern in Ireland* (Gilbert *et al.*, 2021)
- The results of previous surveys carried out in the Clonburris SDZ presented in *Ecological Survey of Clonburris Strategic Development Zone, Clondalkin, Co. Dublin* (FERS, 2018), *Winter Bird Survey of Clonburris SDZ* (Roughan & O’Donovan Consulting Engineers, 2020), and Biodiversity Chapter in an Environmental Impact Assessment Report (EIAR) for a road infrastructure development within the Clonburris SDZ (Scott Cawley Ltd, 2020).
- The records of poisoned barn owls in Co. Dublin area in the NPWS report *R.A.P.T.O.R. – Recording and Addressing Persecution and Threats to Our Raptors* (NPWS, 2018)
- Publicly available records of barn owl within, and/or adjacent to, the Clonburris SDZ through other sources such as planning applications and survey reports.

3.3 Field Survey

- 16 Surveys of barn owl utilising the Clonburris SDZ lands were undertaken between November 2020 and June 2021 by an independent ornithologist, André Robinson.
- 17 Survey methodology was adapted from *Raptors: A Field Guide for Surveys and Monitoring* by Hardey *et al.* (2013) and *Barn Owl Surveying Standards for National Road Projects* by Transport Infrastructure Ireland (TII) (2017). To assess the site’s importance to breeding barn owl, the breeding season visit schedule from Hardey *et al.* (2013) (see Table 1) was followed, where feasible.

Table 1 Timing of barn owl surveys from Hardey *et al.* (2013)

Visit number	Visit timing	Purpose of survey visit
Visit 1	November to January	To check for suitable nesting sites and signs of occupancy
Visit 2	April to June	To locate active nests with eggs. Note CAUTION about timing of visits
Visit 3	May to June	To check for young and late/second clutches
Visit 4 (Two or more visits may be required)	July to August (October)	To check for fledged young and late nests/second clutches

- 18 The Clonburris SDZ lands were systematically searched for suitable nest sites. Suitable nest sites (e.g. old buildings, trees with large cavities) were assessed for their potential for breeding barn owl and checks for signs of occupancy (e.g. chicks, eggs, droppings, pellets, white wash, moulted feathers) were completed at these sites. Where potential nest sites were located high off the ground, binoculars were used in the assessment. Each suitable nest site was assessed as 'Low', 'Moderate' or 'High' based on its potential to hold a barn owl nest within. The assessment was based on the potential nest site having a suitable entry and exit point for barn owls, surrounding habitat, lighting around the nest sites, levels of disturbance and presence of signs of occupancy. Follow on visits were carried out at potential nest sites on subsequent visits.
- 19 A habitat suitability survey was undertaken within the Clonburris SDZ to identify all areas that have the potential to provide foraging habitat for barn owl. The habitat suitability assessment was based on the habitats potential to support prey species populations, in terms of suitable habitats for them to shelter and breed in³. Following this criteria, the habitats were assessed as 'Moderate' or 'High' suitability for foraging barn owl.
- 20 Dusk vantage point surveys were undertaken on the 1 and 2 February, and the 18 June 2021. The surveys in February 2021 commenced at sunset, whereas the survey on the 18th June 2021 commenced an hour prior to sunset. All the dusk surveys were carried out for three hours during dry and clear weather. The vantage points were positioned in locations with good views of foraging habitat and/or potential nest and/or roosting sites. The survey area was surveyed visually using binoculars/scope from the vantage point, ensuring the surveyor was out of sight of potential passing barn owls.
- 21 The survey details are provided in Table 2 and the locations of vantage points in Figure 3.

Table 2 Barn owl survey details

³ The Barn Owl Trust (2012) *Barn Owl Conservation Handbook*, Pelagic Publishing, Exeter.

Survey Date	Purpose of survey visit	Time (@ sunset)	Weather
12/11/2020	Walkover survey to check for suitable nesting sites and signs of occupancy.	N/A	N/A
01/02/2021	Vantage point surveys to determine territory/nest occupancy (adjacent to the Grange Castle – labelled as 'VP1' in Figure 3).	17:00-20:30 (@ 17:09)	Dry, overcast weather with temperatures around 3°C and moderate breeze.
02/02/2021	Vantage point surveys to determine territory/nest occupancy (adjacent to potential feeding area to the west – labelled as 'VP2' in Figure 3).	17:00-20:30 (@ 17:11)	Dry, overcast weather with temperatures around 5°C and light breeze.
18/06/2021	Internal inspection of Grange Castle to determine presence of young/late clutches.	N/A	N/A
18/06/2021	Dusk vantage point survey to check for fledged young (adjacent to Kishoge railway station – labelled as 'VP3' in Figure 3).	21:00-00:00 (@ 21:57)	Dry, mild weather with temperatures around 11°C and very light breeze.

Figure 3 The location of barn owl survey vantage points within and adjacent to Clonburris SDZ



3.3.1 Survey Limitations

- 22 The survey schedule differed slightly of the that presented in Hardey *et al.* (2013) (see Table 1) as no signs of recent occupancy were recorded at the potential nest sites in November and no active nests were identified during the subsequent visits. It must be acknowledged that the surveys of the lands were undertaken across a single breeding season. Considering that barn owls are sedentary and typically use the same nesting and roosting sites from year-to-year (Hardey *et al.*, 2013), the lack of number of suitable nest sites for the species within the lands, and the absence of recent signs of barn owl nesting in the only site considered suitable for a nesting pair within the Clonburris SDZ, this is not deemed to be a significant constraint. A monitoring programme has been recommended on a precautionary basis in Section 6, following the Clonburris SDZ BMP (Scott Cawley, 2021).

4 Barn Owl Baseline

4.1 Desk Study

- 23 The NBDC holds six records for barn owl within the 10km grid square, O03, in which the Clonburris SDZ lands are located in. Five of the records are records from *The First Atlas of Breeding Birds in Britain and Ireland: 1968-1972* (one record), *The First Atlas of Wintering Birds in Britain and Ireland: 1981/82-1983/84* (one record), *The Second Atlas of Breeding Birds in Britain and Ireland: 1988-1991* (one record), and *Bird Atlas 2007 – 2011* (two records). In addition, there is one record from public from April 2014. No location has been indicated for any of the Bird Atlas records, however, the record from public is from the Farmleigh Park, Phoenix Park, located c. 4.4km north-east of the Clonburris SDZ lands.
- 24 There were no records of barn owl within the NPWS database.
- 25 Literature review on records of barn owls within the Clonburris SDZ lands and areas within c. 5km of the Clonburris SDZ in Co. Dublin resulted in seven records:
- There is one record of a poisoned barn owl from northern County Dublin, from 10km grid square O25, in the NPWS report *R.A.P.T.O.R. – Recording and Addressing Persecution and Threats to Our Raptors* (2018) from 2014.
 - Clifton Scannell Emerson Associates (CSEA) carried out surveys for the Grand Canal Greenway (Hazelhatch bridge to 12th Lock) in 2018. A barn owl was recorded flying over the canal and scrub habitat to the south of the canal, before flying to south-west over the Brownstown townland, c. 2km west of the Clonburris SDZ.
 - Surveys carried out in Clonburris SDZ by FERS Ltd. in July 2018, recorded a juvenile barn owl within the lands.
 - A barn owl was recorded on three occasions during Scott Cawley Ltd. bat survey within the Clonburris SDZ in June 2020:
 - One individual flying around near the woodland area adjacent to the Kildare railway line;
 - One individual on two separate occasions, either flying or perching in the hedgerows along to the grassland adjacent to the Grand Canal to the east.
 - An Observer's reference from An Bord Pleanála (ABP) application for Clonsilla Strategic Housing Development at Porterstown Road, Kellystown, Clonsilla, Dublin 15 (ABP reference: ABP-309622-21) of a possible barn owl sighting by a local person using the old Porterstown National School house as a nesting location in the past, with a note saying that the window (i.e. entrance location of the owl into the building) has since been boarded up from 2021. The old schoolhouse is located c. 4.8km north-east of the Clonburris SDZ lands, along the Royal Canal.
- 26 The barn owl records from the Clonburris SDZ are mapped in Figure 4.

Figure 4 A general location of barn owl records within the Clonburris SDZ from desk study.



4.2 Field Survey

4.2.1 Potential nest sites

- 27 Six potential barn owl nesting and/or roosting sites were identified within the Clonburris SDZ and its immediate vicinity (see Figure 5). All these comprise of buildings. One of these, the Grange Castle, was considered highly suitable in terms of potential nesting sites within the castle, four were considered of moderate potential, and one of low potential. Signs of owl use were only recorded at the Grange Castle, where six very old pellets and one relatively recent owl pellet were discovered on the ground around the castle on the 12th November 2020.

Figure 5 Location of potential nesting and/or roosting sites within the Clonburris SDZ



- 28 There are no trees with suitable dry, large cavities for nesting barn owls located within the Clonburris SDZ.
- 29 As the Grange Castle (see Plate 1) was the only potential nesting and/or roosting site with signs of owl use in its proximity, it was inspected internally on the 18th June 2021, to determine if it was currently used by barn owls. The castle comprises three floors: the ground floor, and the first and second floors, which mainly consist of a steel frame, with one area covered with hardcore. All these are accessed by an old stone staircase in the corner of the building.

Plate 1 Grange Castle⁴

- 30 Two barn owl boxes, which were installed in 2020, can be found in the top floors (see Plate 2). There were no signs of recent barn owl nesting and/or roosting activity within the nest boxes or the castle. There are unknown number of jackdaw pairs nesting in the castle, with at least one nest inside the chimney and possibly another inside the upper barn owl box. According to locals, a pair of kestrels has nested in the castle before, and they have also observed barn owls in the surroundings in the past years. One old owl pellet which was estimated to be more than 6 months old, was located within the castle (see Plate 3). No owl pellets were identified outside the castle during the survey visit in June 2021. It should be noted that the castle and its surroundings were renovated in 2020, and that spotlights had been installed around the castle since surveys carried out in November 2020, potentially resulting in the displacement of barn owl from the structure.

⁴ More images of the Grange Castle can be found at: <http://irelandinruins.blogspot.com/>.

Plate 2 Barn owl boxes located in the second and third floor of the Grange Castle



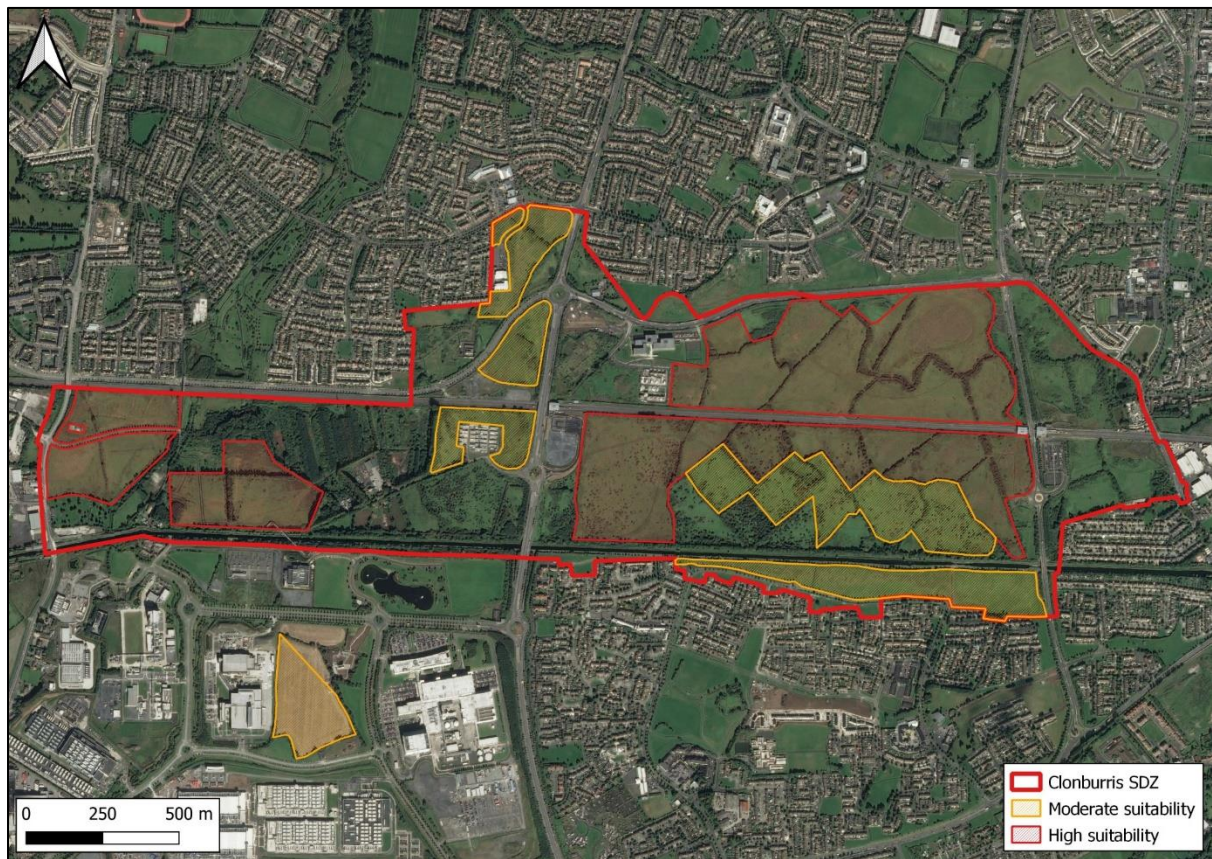
Plate 3 Old owl pellet (>6 months old) found inside the Grange Castle



4.2.2 Suitable feeding sites

- 31 The Clonburris SDZ has relatively large areas of suitable foraging habitat for barn owls. Area of c. 90ha were considered to be highly suitable for foraging barn owls, whereas c. 45ha were considered to be of moderate suitability (see Figure 6). The remaining areas were considered to be of negligible suitability for barn owls due to suboptimal vegetation, which would either hinder its ability to hunt, or where it was unlikely to provide habitat for a large number of prey species (small rodents), e.g. dense scrub and/or woodland, or buildings and artificial surfaces.

Figure 6 Areas considered suitable for foraging barn owl within the Clonburris SDZ



- 32 The majority of the areas considered Highly or Moderately suitable for foraging barn owl comprise of Fossitt⁵ habitat dry meadows and grassy verges (GS2) alone, or are interspersed with scrub (WS1), and/or small areas of recolonising bare ground (ED3). Areas comprised of improved grassland (amenity) (GA2) and an agricultural land to the south of the Grand Canal, were also assessed to be of Moderate suitability.
- 33 Dry meadows and grassy verges habitat is the dominant habitat type across the SDZ lands, and it is likely to hold a good population of prey species for foraging barn owl. Full habitat map for Clonburris SDZ is provided in Appendix I.

⁵ Fossitt, J.A. (2000) *A Guide to Habitats in Ireland*. Heritage Council, Kilkenny.

Plate 4 Dry meadows and grassy verges habitat in the Clonburris SDZ



4.2.3 Vantage point surveys

34 No barn owl were recorded during the vantage point surveys.

5 Conclusions

- 35 Barn owl were not observed foraging within the Clonburris SDZ lands during any survey dates between October 2020 and June 2021, however there are desk study records of individuals within the SDZ lands. One of the desk study records is for a juvenile barn owl. Considering that juvenile barn owls start to disperse from their nesting sites after fledging in September (Lusby and O'Clery, 2014), and that the record for a juvenile at this site is from July 2018, this may indicate the presence of a breeding pair within the Clonburris SDZ in 2018, as any juveniles present would not yet have been ready to disperse from their nest site. The Grange Castle, the only site deemed highly suitable for nesting barn owl, is located c. 1.3km north-east of the juvenile barn owl sighting and across the Grand Canal, and therefore it is unlikely that this juvenile barn owl was from a potentially active nest at the Grange Castle in 2018, considering the distance, the presence of the Grand Canal and the roads between the two locations, and the juveniles inability to fly properly yet.
- 36 Although there is one suitable barn owl nesting site located adjacent to the Clonburris SDZ lands at the Grange Castle and a sighting of a juvenile barn owl within the SDZ lands, indicating suitable foraging habitat for breeding barn owls, there was no evidence during the 2021 surveys of recent use of the Grange Castle nesting site. It is unlikely that the Grange Castle has recently been used by roosting barn owls either, considering that only one old pellet was found and a confirmed roosting site would be categorised as a regular roost if more than 10 pellets were present and as an occasional roost if less than 10 pellets were present (Barn Owl Trust, 2012). In addition, it cannot be said for certain if this pellet was of a barn owl, or, of another owl species, such as long-eared owl *Asio otus* (Green-listed Bird of Conservation Concern^{Error! Bookmark not defined.}), which was sighted and/or heard on six occasions within the Clonburris SDZ lands during Scott Cawley Ltd. surveys in 2020. Long-eared owl adults and juveniles were recorded during raptor surveys in June 2020 and during bat surveys in July and August 2020. Considering that barn owl prefer dark nesting sites (Hardey *et al.*, 2013), their absence from this potential nesting site may be due to recent installation (2020) of spotlights around the castle, which would act as a deterrent. It may have been that barn owl nested and/or roosted in the castle prior to the installation of the spotlights in 2020.
- 37 Considering that barn owl home ranges can reach up to c. 6km during breeding season, it may be that the barn owls sighted in June 2020 belong to a local breeding population of barn owls; however no active nest sites were identified within the Clonburris SDZ lands during the surveys undertaken between November 2020 and June 2021. According to Lusby and O'Clery (2014), female barn owl typically remain continuously at the nest, while males are out hunting and/or roosting away from it. Therefore, it may be that the barn owls sighted in June 2020 were hunting males, with a nesting site within c. 6km radius of Clonburris SDZ.
- 38 In conclusion, barn owl was not confirmed to be breeding within the Clonburris SDZ during the surveys undertaken between November 2020 and June 2021, however the presence of the species cannot be ruled out due to sighting records within the SDZ lands from recent years, and due to a potential barn owl pellet found at the Grange Castle. The survey findings of this report will be valid for approximately 12-18 months following the Chartered Institute of Ecology and Environmental Management (CIEEM) *Advice Note On the Lifespan of Ecological Reports & Surveys* (CIEEM, 2019)⁶.

⁶ CIEEM (2019). *Advice Note on the Lifespan of Ecological Reports & Survey*. Available online at <https://cieem.net/wp-content/uploads/2019/04/Advice-Note.pdf>

6 Recommendations

- 39 There is a possibility that a breeding pair(s) of barn owl may have moved in the Clonburris SDZ lands since June 2021. Therefore it is recommended that pre-construction surveys are carried out at all of the locations deemed suitable for nesting and/or roosting barn owl (refer to Figure 5).
- 40 Furthermore, any development within the Clonburris SDZ will follow appropriate actions in relation to barn owl contained within the Clonburris SDZ BMP. These are listed in Table 3 and
- 41 Table 4 below.

Table 3 Overarching Objective specific to barn owl in the Clonburris SDZ Biodiversity Management Plan (Scott Cawley, 2021)

Biodiversity Objectives for Habitat Retention	
Overarching Objectives	
HR03	<p>Proposed developments within the Clonburris SDZ must be subject to an Ecological Impact Assessment (EclA) and the EclA must set out appropriate biodiversity mitigation compensation and enhancement measures in line with SDZ and BMP requirements. This does not absolve the proposed development/developer from carrying out other statutory environmental assessments that may be required. The Ecological Impact Assessment should include but may not be limited to the following:</p> <p>An assessment of potential impacts on bird species, including breeding birds, wintering birds, <u>barn owl</u> and kingfisher. Bird surveys must be carried out in the appropriate season;</p> <p>An assessment of potential impacts on bat species. Bat surveys must be carried out in the main season of bat activity (May-August inclusive);</p> <p>An assessment of potential impacts on mammals. Mammal surveys must cover the proposed development site and lands at least 150m from the proposed development site boundary;</p> <p>An assessment of potential impacts on amphibians. Amphibian surveys must be carried out if there is suitable habitat (i.e. wetlands) present on or near the proposed development site;</p> <p>An assessment of potential impacts on habitats and habitat connectivity within the lands;</p> <p>Consideration must be given to whether impact assessment on other species is required for a proposed development e.g. white-clawed crayfish, common lizard etc.</p>

Table 4 Biodiversity Actions specific to barn owl in the Clonburris SDZ Biodiversity Management Plan (Scott Cawley, 2021)

Biodiversity Actions for Birds	
Overarching Actions	
Bi03	All developments within the SDZ which require the demolition of buildings must assess the potential impacts of the development on birds that nest in buildings such as <u>barn owls</u> , swallows, swifts and house martins (all of which have been recorded within the SDZ).
Barn Owl	
Bi06	Developments within the Clonburris SDZ must consider impacts on barn owl <i>Tyto alba</i> which is likely to breed within the lands, which must be addressed through the EclA being prepared for the proposed development (as per the requirements of HR02 of this BMP). Particular attention must be given to sites which have suitable nesting habitat i.e.

	<p>derelict buildings, barns or sheds on the lands or suitable foraging habitat i.e. rough grassland, hedgerows, woodland edges and wetlands. Specialist barn owl surveys will be required where suitable barn owl habitat is present.</p> <p>Where a development will impact on barn owl breeding and foraging sites, suitable mitigation must be outlined in the EClA. This might include measures such as but not limited to, the installation of barn owl boxes. Birdwatch Ireland should be consulted in relation to any development which may potentially impact upon barn owl's breeding or foraging habitat and feedback sought on suitable mitigation measures relevant to the level of impact predicted.</p>
Bi07	<p>The parks onsite should be managed to retain suitable foraging habitat for barn owl. A network of rough grassland habitat, particularly that is associated with wetland habitat should be retained throughout the parks.</p>

- 42 As per the Clonburris BMP Monitoring Action BiM02 (see Table 5), continued monitoring of barn owl activity within the SDZ lands should be carried out annually to assess the impacts on the local barn owl population and the effectiveness of mitigation measures applied. This should include monitoring of habitat determined suitable for foraging barn owl and of suitable nest sites, as well as those habitat areas enhanced for barn owl foraging.

Table 5 Monitoring Action specific to barn owl in the Clonburris SDZ Biodiversity Management Plan (Scott Cawley, 2021)

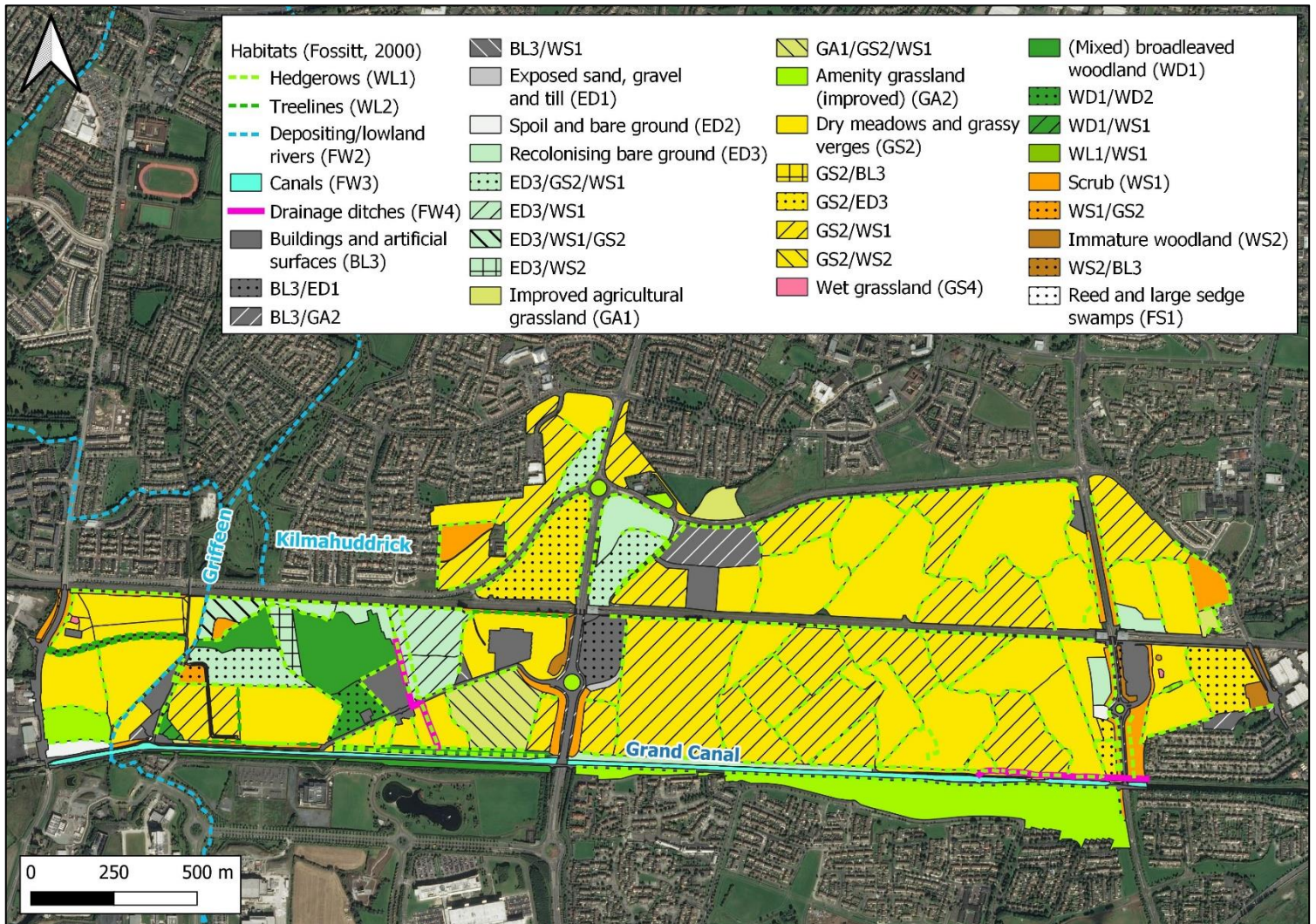
Monitoring Action	
BiM02	<p>An annual monitoring programme for <u>barn owl</u> should be implemented due to the protections afforded to this species. Methodology should follow guidance outlined in <i>Raptors: A Field Guide for Surveys and Monitoring</i> by Hardey <i>et al.</i> (2013). In summary, surveyor(s) must carry out up to four survey visits:</p> <p>First visit between November and January;</p> <p>Second visit between April to June;</p> <p>Third visit between May to June; and,</p> <p>Fourth visit between July and August.</p> <p>Additional surveys may be required depending on survey findings (refer to Hardey <i>et al.</i> 2013). All potential nesting sites within suitable habitat should be visited. In addition, if nesting barn owls are suspected to be present at a suitable nest site, dusk surveys must be carried out to confirm their presence.</p>

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Appendix I – Clonburris SDZ habitat map

Figure 1 Clonburris SDZ habitat map



Appendix F3 Badger/Mammal Survey – Dr. Chris Small

PROPOSED RESIDENTIAL DEVELOPMENT AT CLONBURRIS, CO. DUBLIN

BADGER / MAMMAL SURVEY

Report prepared for

ALTEMAR LTD.

by

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1. RECEIVING ENVIRONMENT

1.1 INTRODUCTION

An application is being prepared for a residential development at a large site in Clonburris, Co. Dublin (South Dublin County Council). The property is situated between the Grand Canal and the main railway line between Dublin and Kildare. There is a railway station just to the east of the site (Clondalkin Fonthill). Also adjacent to the site is Kishogue railway station (between Adamstown and the Clondalkin Fonthill stations) which as yet is not open. The site is bounded to the west by Grange Castle Road and to the east by the R113.

This survey and report was prepared prior to issue of any detailed development proposals for the site. The site is to be utilised for residential development along with road and other necessary infrastructure.



Figure 1. Map of local area and development site.

This report presents the results of a badger and non-avian fauna study conducted in August 2020 (excluding bats). Mammal surveys are best conducted in winter months when vegetation has died back (especially so for badgers *Meles meles* and otters *Lutra lutra*). At the request of the client, two portions of the site were surveyed in summer (Figure 2).

1.2 SITE SURVEY

The survey was conducted on the 16th of August 2020 in fair to good weather conditions (overcast, rain and drizzle then mostly dry later, calm). The site was searched for badger setts, signs of badger activity, and signs or dwellings of other mammals. The two blocks outlined in orange (W and E, refer Figures 2 and 3) were searched as thoroughly as possible.

The Grand Canal was walked along the north bank and searched for otter and other faunal signs in its full length alongside the larger site. In addition, the larger site area (red outline) was walked following paths and tracks on site in order to obtain an overview of faunal potential; areas of potential interest were checked.

Survey of fauna was carried out by means of a thorough search within the site. Presence of mammals is indicated principally by their signs, such as dwellings, feeding signs or droppings - though direct observations are also occasionally made.

The nature and type of habitats present are also indicative of the species likely to be present. The field survey was supplemented by evaluation of relevant literature and existing information.

1.3 SURVEY CONSTRAINTS

Badger and otter survey is best conducted in late winter when vegetation has died back. Hence at the season of survey in August conditions were not ideal. Bramble *Rubus fruticosus* agg. cover on site was dense along many of the hedgerows on site, hence portions of the site were difficult to search with many portions of hedgerows and treeline inaccessible. Whilst cover was high, the presence of badgers on site is usually clear from tracks, paths and foraging signs.

1.4 GENERAL DESCRIPTION OF AREA AND HABITATS

The larger development site is approximately 64 ha in extent. The two parcels of land surveyed in summer 2020 c. 18 ha in area (outlined in orange in Figure 1 below. In the text below, these areas are referred to as W and E – for west and east respectively). The survey did include a walkover of the larger area to assess its potential for fauna also. The railway line is to the north and the Grand Canal to the south.



Figure 2. Development site at Clonburris

The area is almost entirely flat (rising slightly to the north), at an elevation of c. 60m asl. The Grand Canal to the south is elevated a little above the surrounding landscape at the south of the site. The Grange Castle road to the west is raised above the landscape of the site with a steep embankment down to the site. The railway line to the north is at a level a little above that of the site. The Grand Canal is a designated conservation area (pNHA 002104).

The larger site is composed principally of grassland that has had little grazing in recent years. A few horses were seen grazing on site but no evidence of cattle having been pastured there for several years. The grasslands may be best described as rank improved grassland with encroaching scrub of bramble and willow. There are portions of the grasslands which are akin to meadow with a more diverse flora.

The site is divided into a number of fields, most of which are bounded by hedgerow dominated by hawthorn, most with extensive bramble scrub. There are some treelines within these boundaries. Most treelines are dominated by ash *Fraxinus excelsior*, willow *Salix spp.*, elder *Sambucus nigra* and hawthorn *Crataegus monogyna*, with sycamore occasional. Alongside the Grand Canal the hedgerow/treeline has similar composition with tall ash trees present and also willow species.

The hedgerows on site are associated with single banks or ditches with banks either side. These ditches were dry at time of survey bar a ditch running along the site to the north of the Grand Canal – which was wet in part with *Phragmites communis* present in part. There is a drain at the far west of the site alongside the road embankment there – in area A.

At site E, there is drainage through a culvert under the towpath from the Canal (to maintain the Canal's water level). The flow is directed into a stream which runs eastwards and parallel to the Canal and which is present adjacent to site E.



Figure 3. Sites W and E at the Clonburris development site. Watercourses (drains, streams, and Grand Canal) also shown.

A number of vehicle tracks are present on site and also paths created by pedestrians, cyclists and motorbikes. The site seems to have been popular for off-roading vehicles and within the larger site were seen a number of burnt out wrecks of cars.

1.5 DESIGNATED CONSERVATION AREAS

The Grand Canal is a designated conservation area (pNHA no. 002104). The Canal provides a linear habitat for a variety of species, and is of principal importance as a wildlife corridor, extending into the Dublin conurbation to the east. It adjoins the site to the south and is slightly elevated above the lands on site, with a vegetated bank on the northern side. There is a towpath on the north side of the Canal adjoining the site and an amenity walkway on the southern side of the Canal. The scrub and woodland habitats along the Canal add to the attributes of this wildlife corridor. There are no other designated conservation areas in the vicinity.

1.6 FAUNA

1.6.1 Common species

The survey yielded few signs of mammals other than foxes *Vulpes vulpes* and rabbits *Oryctolagus cuniculus*. Rabbits were particularly plentiful over the whole site. There was presence of rabbits at area W but they were very common in area E, with several warrens present in the banks of hedgerow boundaries.

Fox signs (droppings) were found at several locations on site whilst no den was found. The mammal paths on site were attributed mostly to rabbits but they would be in use by foxes also. Paths and tracks used by humans were present throughout the site in all areas.

Also noted were signs of brown rat *Rattus norvegicus* and fieldmouse *Apodemus sylvaticus*. Other species that will be present include the hedgehog *Erinaceus europaeus* and pygmy shrew *Sorex minutus*. The house mouse *Mus musculus* is likely to be present as it does occur in agricultural areas and in association with residential areas. The Irish hare *Lepus timidus hibernicus* was not observed on site. The Irish stoat *Mustela erminea hibernica* is potential on site but probably absent due to the mostly urban nature of areas surrounding the site.

No signs of squirrels were seen - both red squirrel *Sciurus vulgaris* and grey squirrel *Sciurus carolinensis* may occur occasionally but are likely to be infrequent, transient, animals given the lack of mature woodland on site. They may, nevertheless, utilise wildlife corridors such as that along the Grand Canal.

Species such as badger, Irish stoat *Mustela erminea hibernica*, otter, hedgehog *Erinaceus europaeus* and pygmy shrew *Sorex minutus* are protected by the Wildlife Acts (1976 to 2012).

Other fauna of interest include common frogs *Rana temporaria* and common lizards *Lacerta vivipara*. Frogs are to be expected on site as they are common in the Irish countryside and the rank grasslands provide good foraging habitat. However, few pools were seen on site and few of the ditches on site were wet so there is some but limited potential for frog breeding sites. The common or viviparous lizard occurs in many habitats in Ireland and is potentially present on site.

A list of faunal species expected on site is included in the Appendices.

1.6.2 Otter and mink

Otters are known to be present on the Grand Canal and have been reported on the Canal within urbanised areas of Dublin. Otter signs were observed on the Grand Canal at Grange and also Clonburris by Dr. Smal in 2002; otters have been recorded (Biodiversity.ie mapping) at i) 12th lock (Adamstown) west of the Clonburris site, ii) Clondalkin, east of the Clonburris site, iii) Ballyfermot, iv) Inchicore, v) Kilmnainham, vi) Dolphin's Barn, vii) Ranelagh and viii) Ringsend.

However, no otter signs were found along the Canal or at nearby locks in survey in 2020. There are no watercourses suitable for otters *within* the site.

In 2002, mink *Mustela vison* scats were also found along the River Griffin c. 2km to the south-west of the Clonburris site and had been observed there also.

1.6.3 Badgers

Whilst search of the hedgerows and treelines was constrained by the scrub vegetation at this season, where larger ditches were associated with banks on one of both sides, these often had rabbit burrows. This kind of location is very suitable for badger setts, but none were found. There were no signs of badgers in areas W and E – with no latrines, no strong badger paths and no signs of rooting. Badgers mark their territories with dung deposited at particular sites - pits - referred to as latrines. Latrines would be expected where badger activity is frequent whilst seasonal constraints made search for latrines difficult.

A local resident who walks or cycles the subject site on most days reported seeing a badger close to the railway line in the past, but not at areas W and E.

Badgers are widespread in the Irish countryside and it is likely that badgers from adjoining areas will forage over the site on occasion and may use both the Grand Canal and the railway line as wildlife corridors also.

Badgers live in social groups and defend territories that may be very extensive (c. 100-200 ha). The focus of the social group is the breeding sett (main sett) and other, usually smaller setts, are scattered through the territory. Average badger group size in Ireland is estimated at 4-6 badgers (Smal, 1995) in lowland agricultural areas, but group size may vary from 2 to c.12 or more. The density of badgers in Ireland is c. 0.5 social groups per km² (Smal, 1995).

1.6.4 Species of conservation interest

1.6.4.1 Common species

Observed or expected are protected species such as hedgehog *Erinaceous europaeus*, pygmy shrew *Sorex minutus*, frog *Rana temporaria* and perhaps common lizard *Lacerta vivipara*. These species are common and generally ubiquitous in Irish agricultural landscapes.

Species such as badger, Irish stoat, Irish hare, otter, hedgehog and pygmy shrew are protected by the Wildlife Acts (1976 to 2012).

1.6.4.2 Badgers

No signs of badgers were found on site and the species appears to be absent, whilst occasional transient or foraging animals would be expected from time to time. The present survey was constrained by season – high vegetation in summer.

1.6.4.2.1 Legal status and conservation issues - badgers

A number of mammalian species are protected under the Wildlife Act (1976) and Wildlife [Amendment] Acts (2000, 2012).¹ These include the badger (which is also a Red Data Book species). However, the badger is a relatively common species and ubiquitous through much of the Irish countryside (Smal, 1995).

It is standard best practice to make special provisions for badgers affected by development; whilst the species is common in much of the Irish landscape, badgers are notable for their practice of constructing large underground tunnel and chamber systems (setts). Provisions are made for their humane removal or for their conservation on site where feasible or practicable. No active setts were noted on site; the Wildlife [Amendment] Act (2000) protects all setts (as resting places).

1.6.4.3 Otters

The presence of otters along the Grand Canal is known from previous studies and other records. The Grand Canal is a wildlife corridor that requires protection to ensure maintenance of otter populations along its length. The present survey was constrained by season – high vegetation in summer.

1.6.4.3.1 Legal status and conservation issues – otters and crayfish

Otters are protected under the Irish Wildlife Acts and are also listed under Annex II and Annex IV of the EU Habitats Directive.

Whilst otters are relatively common in Ireland (a European stronghold for this species) and they do occur on most rivers in this country, their presence within urban fringes and into urban areas is one of interest. The Canal provides an important wildlife corridor for this species.

¹ Note that the Wildlife Act (1976) and the Wildlife Amendment Act (2000) allow exemptions for certain types of development [page 32, 2000 Act: “it shall not be an offence for a person - ...while constructing a road, or building operation or work of engineering construction, or while constructing or carrying on such other operation or work as may be prescribed, *unintentionally* to kill or injure such an animal or *unintentionally* to destroy or injure the breeding place or resting place of such an animal...”]

2. CONSIDERATIONS

2.1 MAMMALS

A number of mammalian species are protected under the Wildlife Act (1976) and Wildlife [Amendment] Act (2000), some of which are present on-site, or are likely to be present, or are known to forage on-site or near the site. These include otter, pygmy shrew, hedgehog, Irish stoat, common frog and smooth newt. The badger may be present on site also. Those species observed or expected on-site may be considered as generally common species and widespread through much of the Irish countryside. It is an offence to intentionally interfere with or destroy the breeding or resting place of these species, though there are certain exemptions under the Wildlife Acts for road and housing developments and other construction works.

The otter is protected under the EU Habitats Directive. The following mammalian species known on or immediately adjacent to the site are also included in the Mammal Red List Red Data Book listings as Near Threatened (Marnell *et al*, 2009): otter and red squirrel. Other mammalian, amphibian and reptilian species are classed as of Least Concern (refer also King *et al*, 2011).

2.1.1 Otter

Otters utilise this portion of the Grand Canal and are known to forage along the Canal at Clonburris. Presently, the banks of the Canal provide a refuge and foraging habitat for this protected species. The survey was constrained by seasonal vegetation and needs to be repeated.

2.1.2 Badger

Badgers were not found on site, but they may forage on site on occasion. The survey was constrained by seasonal vegetation and needs to be repeated.

2.2 POTENTIAL IMPACTS ON ADJOINING AREAS

There is not anticipated to be any significant impact on adjoining areas arising from this proposal. The nature of the impacts arising from this development are [largely] immediately local upon vertebrate species utilising the site.

The Grand Canal adjoining the site to the south is a designated conservation area. The Grand Canal and its vegetated corridor is considered to comprise a valuable wildlife habitat, and any impacts upon this corridor may be considered as likely to be measurable. The wildlife corridor comprises the Canal itself and its associated vegetated verges, including the adjoining scrub, hedgerow and treeline vegetation.

The proposal, without adequate mitigation, could have some impact on species utilising the Grand Canal along this portion of its length through diminution of habitat quality for a number of mammalian species utilising the Canal and its adjacent vegetation as a wildlife corridor.

3. MITIGATION MEASURES AND RECOMMENDATIONS

Standard mitigation measures, as would apply to any large scale development, should be adopted in the construction of this development. These include habitat retention where feasible, limiting season of disturbance to trees and vegetation so as to reduce impacts on breeding species, to provide for habitat replacement and enhancement, and measures to reduce pollution and sedimentation into watercourses during construction and operation phases.

The non-avian fauna survey requires to be repeated at appropriate season.

3.1 PROTECTION OF BADGERS AND OTHER NON-AVIAN FAUNA

There were seasonal constraints in that most portions of the hedgerow/treeline areas could not be searched thoroughly due to high vegetation/bramble scrub.

- 1) An additional badger survey should be conducted at appropriate season to ensure there are no badger setts on site. This is best conducted in late winter months when vegetation has died back (late December to mid April).
- 2) Scrub clearance – i.e. removal of scrub, hedgerows and treelines - should be monitored by a faunal expert to ensure that no other burrows or setts exist on site and to ascertain if any are occupied by badgers.
- 3) An additional otter survey should be conducted at appropriate season to ensure there are no otter holts on site. This is best conducted in late winter months when vegetation has died back (late December to mid April).
- 4) An additional faunal survey should be conducted in early spring (late February to March) to check the site for frog and smooth newt breeding habitat (ponds, pools).
- 5) Any additional surveys will also record other species of interest, e.g. Irish hares etc.

3.1.1 Protection of badgers if present

Should badgers be found to be occupying any burrows or setts on site, then they will be considered as active resting places and would be protected under the Irish Wildlife Acts. Badgers in such setts may be removed (by a suitably qualified faunal expert) under licence from NPWS.

Standard procedures for evacuation of and removal of setts shall be followed (refer National Roads Authority, 2005, Guidelines for the treatment of badgers prior to the construction of national roads schemes. NRA, Dublin).

3.1.2 Protection of otters if present

Should otters be found to be occupying any holts on site, then they will be considered as active resting places and would be protected under the Irish Wildlife Acts.

Mitigation measures will be required (refer National Roads Authority, 2006, Guidelines for the treatment of otters prior to the construction of national roads schemes. NRA, Dublin)

3.1.3 Protection of other fauna

Practical measures can be taken to protect frogs and smooth newts if present on site.

Generally, measures to protect other species, such as hedgehog and pygmy shrew etc. are impractical.

3.2 PROTECTION OF THE GRAND CANAL AND OTHER LINEAR WILDLIFE CORRIDORS

The Grand Canal is a designated conservation area (pNHA no. 2104). It provides a refuge for species protected under the EU Habitats Directive – in particular otters (and freshwater crayfish).

- 1 the existing southern boundary hedgerow/treeline habitats, adjacent to the Canal, should be maintained.
- 2 the linear wildlife corridor should be protected from development in so far as is possible, by means of provision of a Buffer Zone. This should, preferably, be as wide as possible, with site design, amenity areas, and landscaping proposals placing priority upon the wildlife corridor along the Canal.
- 3 amenity areas or other open areas could be incorporated into design proposals to add to the Buffer Zone adjoining the Grand Canal. Light impacts from the development on the Canal and its buffer zone should be limited in so much as is



- possible.
- 4 additional amenity or other (wildlife enhancement) planting could also be included within a buffer zone adjoining the Grand Canal. Additional planting would provide further screening from the proposed development (planting of native trees and shrubs).
 - 5 consideration should be given to maintaining a wildlife corridor along the railway line. This may be achieved by a buffer zone of the existing scrub and hedgerow vegetation and additional planting. This would also serve as screening for properties on the development.



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5. APPENDICES

5.1 Appendix: list of vertebrates and adjudged status (preliminary)

Species		Status in study area	Comments	Legal status Irish status (Red Lists for Ireland) ^{2 3}
Mammals				
Insectivora				
hedgehog	<i>Erinaceus europaeus</i>	Potential	Likely to be present	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Least concern
pygmy shrew	<i>Sorex minutus</i>	Present, common	Present, frequent on pastures and wet grasslands; also occurs in woodlands, scrub etc.	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Least concern
Greater white-toothed shrew	<i>Crocidura russula</i>	Absent	Not known in this part of Ireland	Introduced species, not protected.
Lagomorpha				
rabbit	<i>Oryctolagus cuniculus</i>	Common	Numerous active burrows	None. Not protected
Irish hare	<i>Lepus timidus hibernicus</i>	Absent	No signs found on site, some potential	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Open season (RoI): 26 September - 28 February. Least concern

² Ireland Red List no. 3 – Terrestrial mammals. National Parks & Wildlife Service, Dept. of Environment, Heritage and Local Government (2009).

³ Ireland Red List no. 5 – Amphibians, Reptiles and Freshwater Fish. National Parks & Wildlife Service, Dept. of Environment, Heritage and Local Government (2011).

Rodentia

wood mouse/long-tailed field mouse	<i>Apodemus sylvaticus</i>	Present, common	Known on site, widespread. Occurs in all terrestrial habitats.	None. Not protected
house mouse	<i>Mus domesticus</i> (<i>Mus musculus</i>)	Likely ⁴	Likely to occur in the locality. Usually associated with agriculture or domestic dwellings.	None. Not protected
brown rat	<i>Rattus norvegicus</i>	Present	Known on site, widespread. Occurs in many terrestrial habitats.	None. Not protected
black rat	<i>Rattus rattus</i>	Absent	Rare species, absent from this part of Ireland	None. Not protected Least concern
bank vole	<i>Clethrionomys glareolus</i>	Absent	Range restricted to south-west but spreading	None. Not protected
red squirrel	<i>Sciurus vulgaris</i>	Absent/potential	Red squirrel may be absent from the study area, due to presence of grey squirrel	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Near threatened. Least concern
grey squirrel	<i>Sciurus carolinensis</i>	Potential	Potential in woodland and treeline habitats	None. Not protected

Carnivora

fox	<i>Vulpes vulpes</i>	Present, common.	Signs present throughout	None. Not protected
badger	<i>Meles meles</i>	Absent, potential	No signs but reported sighting near railway line. No setts found to date	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Least concern
pine marten	<i>Martes martes</i>	Absent	Potential but unlikely	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Least concern
Irish stoat	<i>Mustela erminea hibernica</i>	Scarce	Scarce. A species that is widespread but infrequent in the Irish countryside.	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Least concern
otter	<i>Lutra lutra</i>	Present on Grand Canal	Absent on site, but present close to site	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000, EU Habitats Directive [92/43/EEC] Annex II and IV. CITES Appendix 1. Near threatened.

⁴ House mouse is frequent in arable areas and close to dwellings (Fairley & Smal, 1987).

American mink	<i>Neovison vison</i> (<i>Mustela vison</i>)	Present. Not common.	Occasional, infrequent. In association with aquatic habitats. One scat found on site.	Introduced species. Not protected
Artiodactyla				
red deer	<i>Cervus elaphus</i>	Absent	Not known in this area.	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Open seasons. Least concern
sika deer	<i>Cervus nippon</i>	Absent	Not known in this area.	Introduced species. Open seasons. Hybrids. Open seasons.
red/sika hybrids	<i>Cervus elaphus/nippon</i>	Absent	Not known in this area	
fallow deer	<i>Dama dama</i>	Absent	Not known in this area	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Open seasons. Least concern
wild feral goat	<i>Capra hircus</i>	Absent	Absent in this part of Ireland	Not protected Introduced species
Chinese muntjac deer	<i>Muntiacus reevesi</i>	Absent	Not known in this area	
Amphibians				
common or smooth newt	<i>Lissotriton vulgaris</i> (<i>Triturus vulgaris</i>)	Absent/unlikely	No suitable ponds found on site	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000 Least concern
frog	<i>Rana temporaria</i>	Certain	Widespread nationally. No potential breeding sites noted at time of survey	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000, EU Habitats Directive [92/43/EEC] Annex V Least concern
Reptiles				
common lizard	<i>Zootoca vivipara</i> (<i>Lacerta vivipara</i>)	Potential	Widespread nationally. Occurs in many open habitat types including lowlands. A species hard to observe.	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000 Least concern

**5.2 APPENDIX:
PHOTOGRAPHIC RECORD**

Plate 1. Far west of site W, with railing adjacent to the Castle Grange Road. View to north.



Plate 2. Embankment adjacent to Castle Grange Road, view to south. A drainage ditch and culvert is present with species rich grassland alongside..



Plate 3. View to east from the drainage ditch, far west of site W. Grassland and hawthorn scrub.

Plate 4. Rank grassland and hawthorn scrub at west of site W, view to south towards treeline at Grand Canal. Willow scrub to west towards the drainage ditch.



Plate 5. Rank grassland and off-road vehicle track. Hawthorn scrub and hedgerow (to right).



Plate 6. Wet ditch present parallel to the Grand Canal at edge of site W.

Plates 7. Rank grassland and hawthorn scrub, with hedgerow/treeline adjacent to Grand Canal on right; view to east. Within site W.



Plate 8. Dense hawthorn and bramble scrub with rank grassland – the hedgerow on the right forms the boundary of site W at its east.



Plate 9. The Grand Canal, view to west.



Plate 10. Run-off drain and pool from Grand Canal, adjacent to site E.

Plate 11. Access path to site E. View towards north from Grand Canal.



Plate 12. View of Canal and locks at east, with view to west.



Plate 13. Outflow stream from Grand Canal; this stream runs eastwards and parallel from the Grand Canal adjacent to site E.

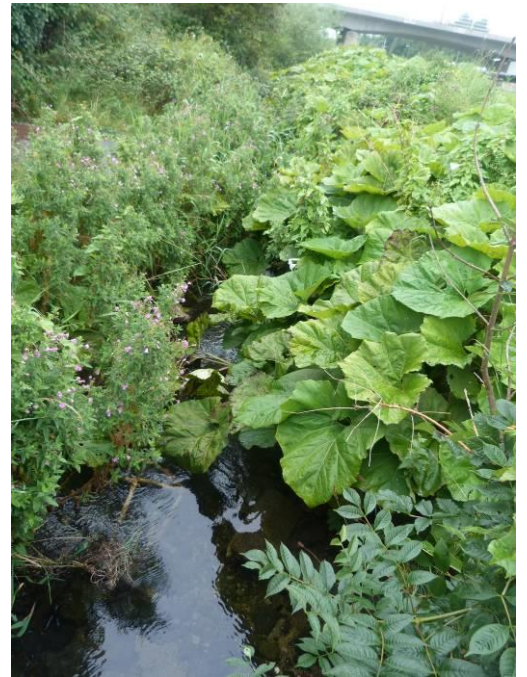


Plate 14. Rank grassland at east side of site E, view northwards. The treeline to the right has been planted along the side of the R113.



Plate 15. Track just at north end of site E. Scrubby hedgerow boundary on left, and waste ground/soil to right.



Plate 16. Scrubby hedgerow and
rushy grassland within site E.



Plate 17. Scrubby hedgerow, rough
grassland and hedgerow scrub within site E.



Plate 18. Rabbit warren within a
bank and ditch at a hedgerow within
site E at the east.



Plate 19. View of treeline at edge of site near the Grand Canal, view to west. Note scrub and thistle dominated grassland.



Plate 20. Central part of site E. Rank grassland with hawthorn scrub.



Plate 21. A scrubby hedgerow and track at western side of site E.





Appendix F4 Non-Avian Fauna Winter Survey – Dr. Chris Small/Bryan Deegan

PROPOSED RESIDENTIAL DEVELOPMENT AT CLONBURRIS, CO. DUBLIN

NON-AVIAN FAUNA WINTER SURVEY

Report prepared for

ALTEMAR LTD.

by

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1. RECEIVING ENVIRONMENT

1.1 INTRODUCTION

An application is being prepared for a residential development at a large site in Clonburris, Co. Dublin (South Dublin County Council). The property is situated between the Grand Canal and the main railway line between Dublin and Kildare. There is a railway station just to the east of the site (Clondalkin Fonthill). Further west, away from the site surveyed, is Kishogue railway station (between Adamstown and the Clondalkin Fonthill stations) which is not open as yet.

This survey and report was prepared prior to issue of any detailed development proposals for the site. The site is to be utilised for residential development along with road and other necessary infrastructure.



Figure 1. Map of local area. The development site (subject of this survey) is at the east of the area pictured (refer Figure 3 below).

This report presents the results of a badger and non-avian fauna study conducted in March 2021 (excluding bats). Mammal surveys are best conducted in winter months when vegetation has died back and before scrub cover re-grows in spring (especially so for badgers *Meles meles* and otters *Lutra lutra*). This survey was carried out within the appropriate survey window.

A previous survey in the area had been conducted in August 2020, with a walkover of most of the area between the Grange Castle Road at the west and the R113 at the east. Two specific blocks were surveyed in more detail at that time; the eastern block (block E, refer Figure 2 below) is located within the study area of the 2 blocks surveyed in March 2021 and the subject of this report. The August survey was conducted outside of the optimal season for badger and mammal survey. The results of that earlier survey are referred to where appropriate in this report.

1.2 SITE SURVEY

The survey was conducted on the 22nd and 23rd March 2021 in good weather conditions (overcast, cool, dry, light breeze). The survey was conducted by Dr. Chris Smal and assistant ecologist Li-Ann Smal. The site was searched for badger setts, signs of badger activity, and signs or dwellings of other mammals. The two blocks outlined in orange and purple (refer Figure 3) were searched as thoroughly as possible.



Figure 2. Areas surveyed in August 2020, which included walkover of the entire area between the two roads, the railway line and the Canal.



Figure 3. These two blocks (orange and purple) were surveyed in March 2021.

In August 2020, the Grand Canal was walked along the north bank and searched for otter and other faunal signs in its full length alongside the larger site. In addition, the larger site area was walked following paths and tracks on site in order to obtain an overview of faunal potential. In March 2021, the Grand Canal adjacent to the site was surveyed also.

Survey of fauna was carried out by means of a thorough search within the site. Presence of mammals is indicated principally by their signs, such as dwellings, feeding signs or droppings - though direct observations are also occasionally made.

The nature and type of habitats present are also indicative of the species likely to be present. The field survey was supplemented by evaluation of relevant literature and existing information.

1.3 SURVEY CONSTRAINTS

Badger and otter survey is best conducted in late winter when vegetation has died back. The survey conducted in March 2021 was within the appropriate season for survey with limited new growth of bramble *Rubus fruticosus* agg. and other cover.



Nevertheless, bramble cover on site was dense along many of the hedgerows on site, hence parts of the site remained difficult to search with many portions of hedgerows and treeline inaccessible. Whilst cover was high, the presence of badgers on site is usually clear from tracks, paths and foraging signs.

1.4 GENERAL DESCRIPTION OF AREA AND HABITATS

The development site (orange and purple areas) is approximately 31 ha in extent.

The area is almost entirely flat (rising slightly to the north), at an elevation of c. 60m asl. The Grand Canal to the south is elevated a little above the surrounding landscape. The R113 road to the east is raised above the landscape of the site with a steep embankment down to the site (at southern part). The railway line to the north is at a level a little above that of the site. The Grand Canal is a designated conservation area (pNHA 002104).

The site is composed principally of grassland that has had little grazing in recent years. A few horses were seen grazing on site but no evidence of cattle having been pastured there for several years. The grasslands may be best described as rank improved grassland with encroaching scrub of bramble and willow. There are portions of the grasslands which are akin to meadow with a more diverse flora.

The site is divided into a number of fields, most of which are bounded by hedgerow dominated by hawthorn, most with extensive bramble scrub. There are some treelines within these boundaries. Most treelines are dominated by ash *Fraxinus excelsior*, willow *Salix spp.*, elder *Sambucus nigra* and hawthorn *Crataegus monogyna*, with sycamore occasional. Alongside the Grand Canal the hedgerow/treeline has similar composition with tall ash trees present and also willow species. Some areas of scrub along hedgerows had been cleared prior to the survey in March 2021 (see photographs in the Appendices).

The hedgerows on site are associated with single banks or ditches with banks either side. The ditches were mostly damp at time of survey and several had running water within them (March 2021).

At the south-east, there is drainage through a culvert under the towpath from the Canal (to maintain the Canal's water level). The flow is directed into a stream which runs eastwards and parallel to the Canal and which is present adjacent to the site (shown on Figures 2 and 3).

A number of vehicle tracks are present on site and also paths created by pedestrians, cyclists and motorbikes. The site seems to have been popular for off-roading vehicles and a number of burnt out wrecks of cars were seen within the larger site.

1.5 DESIGNATED CONSERVATION AREAS

The Grand Canal is a designated conservation area (pNHA no. 002104). The Canal provides a linear habitat for a variety of species, and is of principal importance as a wildlife corridor, extending into the Dublin conurbation to the east. It adjoins the site to the south and is slightly elevated above the lands on site, with a vegetated bank on its northern side. There is a towpath on the north side of the Canal adjoining the site and an amenity walkway on the southern side of the Canal. The scrub and woodland habitats along the Canal add to the attributes of this wildlife corridor. There are no other designated conservation areas in the vicinity.

1.6 FAUNA

1.6.1 Common species

The survey yielded few signs of mammals other than foxes *Vulpes vulpes* and rabbits *Oryctolagus cuniculus*. Rabbits were particularly plentiful over the whole site. There was presence of rabbits in all parts of the survey area, with many burrows and several warrens present in the banks of hedgerow boundaries and pockets of scrub.

Fox signs (droppings) were found at several locations on site whilst no den was found (a local resident reported having seen cubs earlier in the year but the den's location was not found). The mammal paths on site were attributed mostly to rabbits but they would be in use by foxes also. Paths and tracks in regular use by humans were present throughout the site in all areas.

Also noted were signs of brown rat *Rattus norvegicus* and fieldmouse *Apodemus sylvaticus*. Other species that will be present include the hedgehog *Erinaceus europaeus* and pygmy shrew *Sorex minutus*. The house mouse *Mus musculus* is likely to be present as it does occur in agricultural areas and in association with residential areas. The Irish hare *Lepus timidus hibernicus* was not observed on site. The Irish stoat *Mustela erminea hibernica* is potential on site but probably absent due to the mostly urban nature of areas surrounding the site.

No signs of squirrels were seen - both red squirrel *Sciurus vulgaris* and grey squirrel *Sciurus carolinensis* may occur occasionally but are likely to be infrequent, transient, animals given the lack of mature woodland on site. They may, nevertheless, utilise wildlife corridors such as that along the Grand Canal.

In summer 2020, it was noted that frogs *Rana temporaria* are to be expected on site as they are common in the Irish countryside and the rank grasslands provide good foraging habitat. At that time, few pools were seen on site and very few of the ditches on site were wet. In March 2021, a number of frog breeding sites were identified (with tadpoles present). These were situated in smaller pools in wet ditches and at several larger pools which had formed next to some of the wetter drains.

The common or viviparous lizard *Zootoca vivipara* occurs in many habitats in Ireland and is potentially present on site.

Species such as badger, Irish stoat *Mustela erminea hibernica*, otter, hedgehog *Erinaceus europaeus* and pygmy shrew *Sorex minutus* are protected by the Wildlife Acts (1976 to 2012). Also protected are common frogs and common lizards.

A list of faunal species expected on site is included in the Appendices. Observations of interest are mapped on Figure 4 below.



Figure 4. Faunal signs observed on site in March 2021. Note that not all pools are marked – only those at which frog spawn or tadpoles were observed are included. Rabbit burrows and warrens were present throughout and not all are marked on the map. There were mammal and human paths present throughout the site so most have not been marked – the mammal paths near the otter spraint site are marked.

1.6.2 Otter and mink

Otters are known to be present on the Grand Canal and have been reported on the Canal within urbanised areas of Dublin. Otter signs were observed on the Grand Canal at Grange and also at Clonburris by Dr. Smal in 2002; otters have been recorded (Biodiversity.ie mapping) at i) 12th lock (Adamstown) west of the Clonburris site, ii) Clondalkin, east of the Clonburris site, iii) Ballyfermot, iv) Inchicore, v) Kilmnainham, vi) Dolphin's Barn, vii) Ranelagh and viii) Ringsend.

Whilst no otter signs were found during survey in August 2020, one otter spraint was observed in March 2021 - on the overflow channel at the south-east of the site.

In 2002, mink *Mustela vison* scats were also found along the River Griffin c. 2km to the south-west of the Clonburris site and had been observed there also.

1.6.3 Badgers

Search of the hedgerows and treelines was constrained by the scrub vegetation in both the summer survey of 2020 and in winter survey in early 2021. There were no signs of badgers in any of the areas surveyed in 2020 and in 2021: no latrines, no strong badger paths and no signs of rooting (feeding signs). Badgers mark their territories with dung deposited at particular sites referred to as latrines. Latrines would be expected where badger activity is frequent whilst scrub cover did make search for latrines difficult.

Most of the larger ditches associated with banks on one of both sides. This kind of location is very suitable for badger setts, but none were found. Instead, rabbit burrows and larger rabbit warrens were very frequent throughout.

A local resident who walks or cycles the subject site on most days reported seeing a badger close to the railway line in the past but not in the areas surveyed in March 2021.

Badgers are widespread in the Irish countryside and it is likely that badgers from adjoining areas will forage over the site on occasion and may use both the Grand Canal and the railway line as wildlife corridors also.

Badgers live in social groups and defend territories that may be very extensive (c. 100-200 ha). The focus of the social group is the breeding sett (main sett) and other, usually smaller setts, are scattered through the territory. Average badger group size in Ireland is estimated at 4-6 badgers (Smal, 1995) in lowland agricultural areas, but group size may vary from 2 to c.12 or more. The density of badgers in Ireland is c. 0.5 social groups per km² (Smal, 1995).

1.6.4 Species of conservation interest

1.6.4.1 Common species

Observed or expected are protected species such as frog *Rana temporaria*, hedgehog *Erinaceus europaeus*, pygmy shrew *Sorex minutus*, and perhaps common lizard *Lacerta vivipara*. These species are common and generally ubiquitous in Irish agricultural landscapes.

Species such as common frog, badger, otter, Irish stoat, Irish hare, hedgehog and pygmy shrew are protected by the Wildlife Acts (1976 to 2012).

1.6.4.2 Badgers

No signs of badgers were found on site and the species appears to be absent, whilst occasional transient or foraging animals would be expected from time to time.

1.6.4.2.1 Legal status and conservation issues - badgers

A number of mammalian species are protected under the Wildlife Act (1976) and Wildlife [Amendment] Acts (2000, 2012).¹ These include the badger (which is also a Red Data Book species). However, the badger is a relatively common species and ubiquitous through much of the Irish countryside (Smal, 1995).

¹ Note that the Wildlife Act (1976) and the Wildlife Amendment Act (2000) allow exemptions for certain types of development [page 32, 2000 Act: "it shall not be an offence for a person - ...while constructing a road, or building operation or work of

It is standard best practice to make special provisions for badgers affected by development; whilst the species is common in much of the Irish landscape, badgers are notable for their practice of constructing large underground tunnel and chamber systems (setts). Provisions are made for their humane removal or for their conservation on site where feasible or practicable. No active setts were noted on site; the Wildlife [Amendment] Act (2000) protects all setts (as resting or breeding places).

1.6.4.3 Otters

The presence of otters along the Grand Canal is known from previous studies and other records. Otter presence on site was ascertained in survey of March 2021, with one spraint found at the south-east. No holts were found on site but could potentially be present in dense scrub at the south of the site (adjacent to towpath).

The Grand Canal is a wildlife corridor that requires protection to ensure maintenance of otter populations along its length.

1.6.4.3.1 Legal status and conservation issues – otters

Otters are protected under the Irish Wildlife Acts and are also listed under Annex II and Annex IV of the EU Habitats Directive.

Whilst otters are relatively common in Ireland (a European stronghold for this species) and they do occur on most rivers in this country, their presence within urban fringes and into urban areas is one of interest. The Canal provides an important wildlife corridor for this species.

1.6.4.4 Common frogs

Common frogs were found to be breeding at various locations on site. They would also forage over the grassland areas and in scrub areas also.

1.6.4.4.1 Legal status and conservation issues – common frogs

The common frog is protected by the Wildlife Acts (1976 to 2012).

engineering construction, or while constructing or carrying on such other operation or work as may be prescribed, *unintentionally* to kill or injure such an animal or *unintentionally* to destroy or injure the breeding place or resting place of such an animal...”]



2. CONSIDERATIONS

2.1 MAMMALS AND AMPHIBIANS

A number of mammalian species are protected under the Wildlife Act (1976) and Wildlife [Amendment] Act (2000), some of which are present on-site, or are likely to be present, or are known to forage on-site or near the site. These include otter, pygmy shrew, hedgehog, Irish stoat, common frog and smooth newt. The badger may be present on site on occasion.

Those species observed or expected on-site may be considered as generally common species and widespread through much of the Irish countryside. It is an offence to intentionally interfere with or destroy the breeding or resting place of these species, though there are certain exemptions under the Wildlife Acts for road and housing developments and other construction works.

The otter is protected under the EU Habitats Directive and is included in the Mammal Red List as Near Threatened (Marnell *et al*, 2019). Other mammalian, amphibian and reptilian species are classed as of Least Concern or are not protected species (refer also King *et al*, 2011).

The proposed development will lead to loss of frog foraging habitat and frog breeding sites in channels, drains and pools.

2.1.1 Otter

Otters utilise this portion of the Grand Canal and are known to forage along the Canal at Clonburris. Presently, the banks of the Canal provide a refuge and foraging habitat for this protected species. Otter presence was ascertained on the channel at the south-east of the site. No holts were found on site but could be present in dense scrub at the south of the site (adjacent to towpath).

2.1.2 Badger

The survey was constrained by scrub vegetation but no signs of badgers were found anywhere on site and it may be considered that the species is not present on site. Badgers may forage on site on occasion.

2.2 POTENTIAL IMPACTS ON ADJOINING AREAS

There is not anticipated to be any significant impact on adjoining areas arising from this proposal. The nature of the impacts arising from this development are [largely] immediately local upon vertebrate species utilising the site.

The Grand Canal adjoining the site to the south is a designated conservation area. The Grand Canal and its vegetated corridor is considered to comprise a valuable wildlife habitat, and any impacts upon this corridor may be considered as likely to be measurable. The wildlife corridor comprises the Canal itself and its associated vegetated verges, including the adjoining scrub, hedgerow and treeline vegetation.

The proposal, without adequate mitigation, could have some impact on species utilising the Grand Canal along this portion of its length through diminution of habitat quality for a number of mammalian species utilising the Canal and its adjacent vegetation as a wildlife corridor.

3. MITIGATION MEASURES AND RECOMMENDATIONS

Standard mitigation measures, as would apply to any large scale development, should be adopted in the construction of this development. These include habitat retention where feasible, limiting season of disturbance to trees and vegetation so as to reduce impacts on breeding species, to provide for habitat replacement and enhancement, and measures to reduce pollution and sedimentation into watercourses during construction and operation phases.

3.1 PROTECTION OF BADGERS

There were constraints in that most large portions of the hedgerow/treeline areas could not be searched thoroughly due to high vegetation/bramble scrub.

- 1) If there is an elapsed period of time between this survey and construction commencing (e.g. 18 months), then the badger survey may need to be repeated – as badgers may establish setts in the interim period.

- 2) It is recommended that scrub clearance – i.e. removal of scrub, hedgerows and treelines - should be monitored by a faunal expert to ensure that no badger setts exist on site and to ascertain if any are occupied by badgers.
- 3) Should badgers be found to be occupying any burrows or setts on site, then they will be considered as active resting places and would be protected under the Irish Wildlife Acts.
- 4) Badgers in such setts may be removed (by a suitably qualified faunal expert) under licence from NPWS.
- 5) Standard procedures for evacuation of and removal of setts shall be followed (refer National Roads Authority, 2005, Guidelines for the treatment of badgers prior to the construction of national roads schemes. NRA, Dublin).

3.1.1 Protection of otters

Otter presence was ascertained along the channel at the south-east and they will also occur on the Grand Canal. No holts are expected on site but could potentially be present in the boundary treeline and ditch at the far south of the site (adjacent to towpath).

- 1) The wildlife corridor of hedgerow and treeline at the south of the site should be considered as a wildlife corridor and protected from disturbance and development. This will serve to protect otters also.
- 2) Note that otters are utilising the outflow channel (from the Grand Canal) at the south of the site. This channel requires protection to serve as a wildlife corridor for otters and other wildlife.
- 3) Should otters be found to be occupying any holts on site, then they will be considered as active resting places and would be protected under the Irish Wildlife Acts.
- 4) In this circumstance, mitigation measures be required (refer National Roads Authority, 2006, Guidelines for the treatment of otters prior to the construction of national roads schemes).

3.1.2 Protection of common frogs

Several frog breeding sites were identified on site in March 2021. The breeding season for frogs is from late January/February through to June or mid-July. Spawn and tadpoles are present in pools and ponds over this period, sometimes for longer.

- 1) The period of construction at or near affected breeding sites should exclude the breeding period.
- 2) If this is not possible then a licence will be required to remove frogs, spawn and tadpoles from affected pools and ponds, and the frogs etc. translocated to other suitable habitat in the locality. Such translocations require licence from NPWS.
- 3) The proposed development will lead to significant loss of frog foraging habitat and frog breeding sites in channels, drains and pools. These losses should be ameliorated by provision of artificial ponds or pools (or wet ditches) and these should preferably be created at early stages of site development.
- 4) These measures may entail some works outside of the site area shown in Figure 3. Additional frog breeding pools could be created in adjacent grassland or as part of landscaping measures on site.
- 5) The creation of artificial ponds etc. should be conducted outside of the frog breeding season (to avoid mortality within existing pools and drains on site) and with due care to minimise impacts on both frog foraging habitats and frog breeding sites during their construction. Frog ponds should be created in advance of the frog translocation measures.

3.1.3 Protection of other fauna

Generally, measures to protect other species, such as hedgehog and pygmy shrew etc. are impractical.

3.2 PROTECTION OF THE GRAND CANAL AND OTHER LINEAR WILDLIFE CORRIDORS

The Grand Canal is a designated conservation area (pNHA no. 2104). It provides a refuge for species protected under the EU Habitats Directive – in particular otters (and freshwater crayfish).

- 1) the existing southern boundary hedgerow/treeline habitats, adjacent to the Canal, should be maintained.



- 2 the linear wildlife corridor should be protected from development in so far as is possible, by means of provision of a Buffer Zone. This should, preferably, be as wide as possible, with site design, amenity areas, and landscaping proposals placing priority upon the wildlife corridor along the Canal.
- 3 amenity areas or other open areas could be incorporated into design proposals to add to the Buffer Zone adjoining the Grand Canal. Light impacts from the development on the Canal and its buffer zone should be limited in so much as is possible.
- 4 additional amenity or other (wildlife enhancement) planting could also be included within a buffer zone adjoining the Grand Canal. Additional planting would provide further screening from the proposed development (planting of native trees and shrubs).
- 5 consideration should be given to maintaining a wildlife corridor along the railway line. This may be achieved by a buffer zone of the existing scrub and hedgerow vegetation and additional planting. This would also serve as screening for properties on the development.

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5. APPENDICES

5.1 Appendix: list of vertebrates and adjudged status

Species		Status in study area	Comments	Legal status Irish status (Red Lists for Ireland) ^{2 3}
Mammals				
Insectivora				
hedgehog	<i>Erinaceus europaeus</i>	Potential	Very likely to be present	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Least concern
pygmy shrew	<i>Sorex minutus</i>	Certain, common	Present, frequent on pastures and wet grasslands; also occurs in woodlands, scrub etc.	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Least concern
Greater white-toothed shrew	<i>Crocidura russula</i>	Absent	Not known in this part of Ireland	Introduced species, not protected.
Lagomorpha				
rabbit	<i>Oryctolagus cuniculus</i>	Very common	Numerous active burrows and also warrens	None. Not protected
Irish hare	<i>Lepus timidus hibernicus</i>	Absent	No signs found on site, limited potential	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Open season (RoI): 26 September - 28 February. Least concern

² Ireland Red List no. 12 – Terrestrial mammals. National Parks & Wildlife Service, Dept. of Environment, Heritage and Local Government (2019).

³ Ireland Red List no. 5 – Amphibians, Reptiles and Freshwater Fish. National Parks & Wildlife Service, Dept. of Environment, Heritage and Local Government (2011).

Rodentia

wood mouse/long-tailed field mouse	<i>Apodemus sylvaticus</i>	Present, common	Known on site, widespread. Occurs in all terrestrial habitats.	None. Not protected
house mouse	<i>Mus domesticus</i> (<i>Mus musculus</i>)	Likely ⁴	Likely to occur in the locality. Usually associated with agriculture or domestic dwellings.	None. Not protected
brown rat	<i>Rattus norvegicus</i>	Present	Known on site, widespread. Occurs in many terrestrial habitats.	None. Not protected
black rat	<i>Rattus rattus</i>	Absent	Rare species, absent from this part of Ireland	None. Not protected Least concern
bank vole	<i>Clethrionomys glareolus</i>	Absent	Range restricted to south-west but spreading	None. Not protected
red squirrel	<i>Sciurus vulgaris</i>	Absent/potential	Red squirrel may be absent from the study area, due to presence of grey squirrel	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Near threatened. Least concern
grey squirrel	<i>Sciurus carolinensis</i>	Potential	Potential in woodland and treeline habitats	None. Not protected

Carnivora

fox	<i>Vulpes vulpes</i>	Present, common.	Signs present throughout	None. Not protected
badger	<i>Meles meles</i>	Absent, potential	No signs but reported sighting near railway line. No setts found on site and no signs of badger presence	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Least concern
pine marten	<i>Martes martes</i>	Absent	Potential but unlikely	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Least concern
Irish stoat	<i>Mustela erminea hibernica</i>	Scarce, limited potential on site.	Scarce. A species that is widespread but infrequent in the Irish countryside.	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Least concern
otter	<i>Lutra lutra</i>	Present on Grand Canal and on watercourse at south of site	Present on site, and on Grand Canal. No holts found.	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000, EU Habitats Directive [92/43/EEC] Annex II and IV. CITES Appendix 1. Near threatened.

⁴ House mouse is frequent in arable areas and close to dwellings (Fairley & Smal, 1987).

	American mink	<i>Neovison vison</i> (<i>Mustela vison</i>)	Present. Not common.	Occasional, infrequent. In association with aquatic habitats. One scat found on site.	Introduced species. Not protected
Artiodactyla					
	red deer	<i>Cervus elaphus</i>	Absent	Not known in this area.	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Open seasons. Least concern
	sika deer	<i>Cervus nippon</i>	Absent	Not known in this area.	Introduced species. Open seasons. Hybrids. Open seasons.
	red/sika hybrids	<i>Cervus elaphus/nippon</i>	Absent	Not known in this area	
	fallow deer	<i>Dama dama</i>	Absent	Not known in this area	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000. Open seasons. Least concern
	wild feral goat	<i>Capra hircus</i>	Absent	Absent in this part of Ireland	Not protected
	Chinese muntjac deer	<i>Muntiacus reevesi</i>	Absent	Not known in this area	Introduced species
Amphibians					
	common or smooth newt	<i>Lissotriton vulgaris</i> (<i>Triturus vulgaris</i>)	Absent/unlikely	No suitable ponds found on site	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000 Least concern
	frog	<i>Rana temporaria</i>	Common	Widespread nationally. A number of breeding sites on site.	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000, EU Habitats Directive [92/43/EEC] Annex V Least concern
Reptiles					
	common lizard	<i>Zootoca vivipara</i> (<i>Lacerta vivipara</i>)	Potential	Widespread nationally. Occurs in many open habitat types including lowlands. A species hard to observe.	Wildlife Act, 1976, Wildlife (Amendment) Act, 2000 Least concern

5.2 APPENDIX: PHOTOGRAPHIC RECORD

Note: Photographs taken in March 2021, unless otherwise noted.

Plate 1. The eastern portion of the site, view to north and rail station. The R113 is at right of the photograph. Principally rank grassland.



Plate 2. Rank grassland at east side of the site, view northwards. The treeline to the right has been planted along the side of the R113 (August 2020).



Plate 3. Track just at east end of the site. Scrubby hedgerow boundary on left, and waste ground/soil to right. (August 2020).



Plate 4. Rank grassland and scrub at east of the site.



Plate 5. Rabbit scrapes are extensive in some areas, accompanied by numerous rabbit burrows and warrens.



Plate 6. Rabbit warren within a bank and ditch at a hedgerow within the site at east (August 2020).



Plate 7. Typical hedgerow at east of site, with extensive bramble scrub on both sides of hedgerows and treelines.



Plate 8. Scrubby hedgerow, rough grassland and hedgerow scrub within site (August 2020).



Plate 9. Boundary adjacent to the railway line at the north-east of the site. A wet ditch is also present.



Plate 10. Grassland at the north of the site, adjacent to the railway line.



Plate 11. One of the larger pools that has formed along wet ditches and drains on site.



Plate 12. Pool along wet ditch, approximately central in the site. Frog spawn was present at this pool.



Plate 13. Frog spawn in a shallow drain.



Plate 14. A drain has been widened into a small pool next to a track at the north of the site. Frog spawn was present.



Plate 15. One of the larger pools that has formed along wet ditches and drains on site. Frog spawn was present at this pool.



Plate 16. A scrubby hedgerow and track at western side of the site (August 2020).



Plate 17. Central part of the site. Rank grassland with hawthorn scrub (August 2020).



Plate 18. Central part of site, to west. Grassland and low hedgerow.



Plate 19. Some of the scrub at the south-west of the site has been cleared.



Plate 20. Hedgerow and treeline adjacent to the Canal towpath at the south-east. Some of the scrub has been cleared.



Plate 21. Hedgerow and treeline adjacent to the Canal towpath at the south-east. Some of the scrub has been cleared.



Plate 22. View of treeline at edge of the site near the Grand Canal, view to west. Note scrub and thistle dominated grassland (August 2020).



Plate 23. Open grassland. Some scrub has been cleared.



Plate 24. Scrubby hedgerow and rushy grassland within the site (August 2020).



Plate 25. Access path to site. View towards north from Grand Canal (August 2020).



Plate 26. Run-off drain and pool from Grand Canal, at south-east of the site (August 2020).



Plate 27 Run-off drain and pool from Grand Canal, at south-east of the site (March 2021).



Plate 28. The drainage channel (overflow for the Canal) – this stream runs eastwards along the southern boundary of the site.



Plate 29. Otter spraint (faeces) at edge of the overflow channel pictured above. The amount of discoloured grass suggests this is a regular sprainting site for otters (grass is discoloured by otter urine).



Plate 30. The Grand Canal, view to east (August 2020).



Plate 31. The Grand Canal, view to west.



Plate 32. The Grand Canal, view to east, with bridge of R113 in background.



Plate 33. Outflow stream from Grand Canal; this stream runs eastwards and parallel from the Grand Canal at the south-east of the site. The R113 bridge is shown in background. (August 2020).

Appendix F5 Bat Survey – Dr. Tina Aughney/Mr. Shaun Boyle

2021

Bat Assessment: Clonburris Phase 1A, Clondalkin, Dublin 22.



Dr Tina Aughney
Bat Eco Services

Bat Eco Services, Ulex House, Drumheel, Lisduff, Virginia, Co. Cavan. A82 XW62.

Licensed Bat Specialist: Dr Tina Aughney (tina@batecoservices.com, 086 4049468)

NPWS licence C13/2020 (Licence to handle bats, expires 31st December 2022);

NPWS licence 08/2020 (Licence to photograph/film bats, expires 31st December 2022) ;

NPWS licence DER/BAT 2019-138 (Survey licence, expires 29th March 2022).

Statement of Authority: Dr Aughney has worked as a Bat Specialist since 2000 and has undertaken extensive survey work for all Irish bat species including large scale development projects, road schemes, residential developments, wind farm developments and smaller projects in relation to building renovation or habitat enhancement. She is a monitoring co-ordinator and trainer for Bat Conservation Ireland. She is a co-author of the 2014 publication *Irish Bats in the 21st Century*. This book received the 2015 CIEEM award for Information Sharing. Dr Aughney is a contributing author for the Atlas of Mammals in Ireland 2010-2015.

All analysis and reporting is completed by Dr Tina Aughney. Data collected and surveying is completed with the assistance of a trained field assistant.

Mr. Shaun Boyle (Field Assistant) NPWS licence DER/BAT 2021-19 (Survey licence, expires 15th March 2022).

Client: Cairn Homes. Cairn Homes.

Project Name & Location: Clonburriss Phase 1A

Report Revision History

Date of Issue	Draft Number	Issued To (process of issuing)
8 th November 2021	Draft 1	By email to CAIRNS
18 th November 2021	Draft 2	By email to CAIRNS
24 th November 2021	Final	By email to CAIRNS

Purpose

This document has been prepared as a Report for Cairn Homes. Only the most up to-date report should be consulted. All previous drafts/reports are deemed redundant in relation to the named site.

Bat Eco Service accepts no responsibility or liability for any use that is made of this document other than by the client for the purposes for which it was originally commissioned and prepared.

Carbon Footprint Policy

It is the policy of Bat Eco Services to provide documentation digitally in order to reduce carbon footprint. Printing of reports etc. is avoided, where possible.

Bat Record Submission Policy

It is the policy of Bat Eco Services to submit all bat records to Bat Conservation Ireland database one year post-surveying. This is to ensure that a high level bat database is available for future desktop reviews. This action will be automatically undertaken unless otherwise requested, where there is genuine justification.

Executive Summary

Project Name & Location: Clonburriss Phase 1A

Proposed work: Residential development

Bat Survey Results - Summary

Bat Species	Roosts	Foraging	Commuting
Common pipistrelle <i>Pipistrellus pipistrellus</i>		√	√
Soprano pipistrelle <i>Pipistrellus pygmaeus</i>		√	√
Nathusius' pipistrelle <i>Pipistrellus nathusii</i>			
Leisler's bat <i>Nyctalus leisleri</i>		√	√
Brown long-eared bat <i>Plecotus auritus</i>		√	
Daubenton's bat <i>Myotis daubentonii</i>		√	
Natterer's bat <i>Myotis nattereri</i>			
Whiskered bat <i>Myotis mystacinus</i>			
Lesser horseshoe bat <i>Rhinolophus hipposideros</i>			

Bat Survey Duties Completed (Indicated by red shading)

Tree PBR Survey	<input checked="" type="checkbox"/>	Daytime Building Inspection	<input checked="" type="checkbox"/>
Static Detector Survey	<input checked="" type="checkbox"/>	Daytime Bridge Inspection	<input type="checkbox"/>
Dusk Bat Survey	<input checked="" type="checkbox"/>	Dawn Bat Survey	<input type="checkbox"/>
Walking Transect	<input checked="" type="checkbox"/>	Driving Transect	<input type="checkbox"/>
Trapping / Mist Netting	<input type="checkbox"/>	IR Camcorder filming	<input type="checkbox"/>
Endoscope Inspection	<input type="checkbox"/>	Other	<input type="checkbox"/>

Citation: Bat Eco Services (2021) Bat Assessment: Clonburriss Phase 1a, Clondalkin, Dublin 22. Unpublished report prepared for Cairn Homes.

Maps produced using OpenSourceMap on QGIS.

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1. Introduction

Bat Eco Services was commissioned by Cairns Homes to undertake a bat survey of lands under Cairn Homes ownership known as Clonburriss, Clondalkin, Dublin 22.

1.1 Relevant Legislation & Bat Species Status in Ireland

A small number of these animal and plant species are protected under Irish legislation (Nelson, *et al.*, 2019). The principal Irish legislation is the Wildlife Act 1976 (as amended). Amendments to the Wildlife Act and its Statutory Instruments have enacted and amended protection of individual species, notably in order to comply with EU legislation or other international agreements. The Birds Directive (Directive 2009/147/EC) and Habitats Directive (Council Directive 92/43/EEC) are the main EU legislation resulting in the legal protection of species in Ireland. The Acts and Statutory Instruments which list species within the broad taxonomic groupings are referred to in the relevant sections.

1.1.1 Irish Legislation

The Wildlife Act 1976 (Number 39 of 1976) as amended, in particular by the Wildlife (Amendment) Act 2000 (Number 38 of 2000). The Flora (Protection) Order 2015 (S.I. no. 356 of 2015) lists the plant species protected by Section 21 of the Wildlife Acts. The regulations that give rise to the protection of animal species under the Wildlife Acts are detailed in the relevant sections. See www.npws.ie/legislation for further information.

The codes used for national legislation are as follows:

- WA = Wildlife Act, 1976, Wildlife (Amendment) Act, 2000 and other relevant amendments
- FPO = Flora (Protection) Order, 2015 (S.I. No. 356 of 2015)

1.1.2 EU Legislation

The Birds Directive (Directive 2009/147/EC) and Habitats Directive (Council Directive 92/43/EEC) are the legislation transposed into Irish law *inter alia* by the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011), as amended.

The codes used for the Habitats Directive (Council Directive 92/43/EEC) are:

- Annex II Animal and plant species listed in Annex II
- Annex IV Animal and plant species listed in Annex IV
- Annex V Animal and plant species listed in Annex V

The main aim of the Habitats Directive is the conservation of biodiversity by requiring Member States to take measures to maintain or restore natural habitats and wild species listed on the Annexes to the Directive at a favourable conservation status. These annexes list habitats (Annex I) and species (Annexes II, IV and V) which are considered threatened in the EU territory. The listed habitats and species represent a considerable proportion of biodiversity in Ireland and the Directive itself is one of the most important pieces of legislation governing the conservation of biodiversity in Europe.

Under Article 11 of the Directive, each member state is obliged to undertake surveillance of the conservation status of the natural habitats and species in the Annexes and under Article 17, to report to the European Commission every six years on their status and on the implementation of the measures taken under the Directive. In April 2019, Ireland submitted the third assessment of conservation status for 59 habitats and 60 species. There are three volumes with the third listing details of the species assessed.

1.1.3 IUCN Red Lists

The International Union for the Conservation of Nature (IUCN) coordinates the Red Listing process at the global level, defining the categories so that they are standardised across all taxa. Red Lists are also produced at regional, national and subnational levels using the same IUCN categories (IUCN 2012, 2019). Since 2009, Red Lists have been produced for the island of Ireland by the National Parks and Wildlife Service (NPWS) and the Northern Ireland Environment Agency (NIEA) using these IUCN categories. To date, 13 Red Lists have been completed. The Red Lists are an assessment of the risk of extinction of each species and not just an assessment of their rarity. Threatened species are those species categorised as Critically Endangered, Endangered or Vulnerable (IUCN, 2019) – also commonly referred to as ‘Red Listed’.

1.1.4 Irish Red List - Mammals

Red Lists in Ireland refer to the whole island, i.e. including Northern Ireland, and so follow the guidelines for regional assessments (IUCN, 2012, 2019). The abbreviations used are as follows:.

- RE Regionally Extinct
- CR Critically Endangered
- EN Endangered
- VU Vulnerable
- NT Near Threatened
- DD Data Deficient
- LC Least Concern
- NA Not Assessed
- NE Not Evaluated

There are 27 terrestrial mammals species in Ireland, which includes the nine resident bat species listed. The terrestrial mammal, according to Marnell *et al.*, 2019, list for Ireland consists of all terrestrial species native to Ireland or naturalised in Ireland before 1500. The IUCN Red List categories and criteria are used to assess that status of wildlife. This was recently completed for the terrestrial mammals of Ireland. Apart from the two following two mammal species (grey wolf *Canis lupus* (regionally extinct) and black rat *Rattus rattus* (Vulnerable)), the remaining 25 species were assessed as least concern in the most recent IUCN Red List publication by NPWS (Marnell *et al.*, 2019).

1.1.5 Irish Bat Species

All Irish bat species are protected under the Wildlife Act (1976) and Wildlife Amendment Acts (2000 and 2010). Also, the EC Directive on The Conservation of Natural habitats and of Wild Fauna and Flora (Habitats Directive 1992), seeks to protect rare species, including bats, and their habitats and requires that appropriate monitoring of populations be undertaken. All Irish bats are listed in Annex IV of the Habitats Directive and the lesser horseshoe bat *Rhinolophus hipposideros* is further listed under Annex II. Across Europe, they are further protected under the Convention on the Conservation of European Wildlife and Natural Habitats (Bern Convention 1982), which, in relation to bats, exists to conserve all species and their habitats. The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention 1979, enacted 1983) was instigated to protect migrant species across all European boundaries. The Irish government has ratified both these conventions.

Also, under existing legislation, the destruction, alteration or evacuation of a known bat roost is a notifiable action and a derogation licence has to be obtained from the *National Parks and Wildlife Service* before works can commence. Any works interfering with bats and especially their roosts, may only be carried out under a licence to derogate from Regulation 23 of the Habitats Regulations

1997 and Regulation 54 of the European Communities (Birds and Natural Habitats) Regulations 2011 (which transposed the EU Habitats Directive into Irish law). The details with regards to appropriate assessments, the strict parameters within which derogation licences may be issued and the procedures by which and the order in relation to the planning and development regulations such licences should be obtained, are set out in Circular Letter NPWS 2/07 "*Guidance on Compliance with Regulation 23 of the Habitats Regulations 1997 - strict protection of certain species/applications for derogation licences*" issued on behalf of the Minister of the Environment, Heritage and Local Government on the 16th of May 2007.

This circular states that:

“Under Regulation 23 of the Habitats Regulations 1997, any person who, in regard to the animal species listed in Annex IV of the Habitats Directive –

- a) Deliberately captures or kills any specimen of these species in the wild,
- b) Deliberately disturbs these species particularly during the period of breeding, rearing, hibernation and migration,
- c) Deliberately takes or destroys the eggs from the wild, or
- d) Damages or destroys a breeding site or resting place of such an animal.

shall be guilty of an offence.”

In summary the circular requires that an appropriate assessment is undertaken to identify where a risk of damage or disturbance to an Annex IV species may exist and where a risk is identified, alternative or modifications will be required to avoid risk. Where it is not possible to avoid risk, a derogation licence from the Minister under Regulation 23 of the Habitats Regulation should be considered. The Minister is empowered, within strict parameters, to grant a licence for derogation from complying with the requirements of the provisions of section 21 of the Wildlife Act 1976 and Regulations 23 and 24 of the Habitats Regulations as follows:

“Where there is no satisfactory alternative and the derogation is not detrimental to the maintenance of the populations of the species to which the Habitats Directive relates at a favourable conservation status in their natural range, the Minister may, in respect of those species, grant a licence to one or more persons permitting a derogation from complying with the requirements of the provision of section 21 of the Principal Act and Regulations 23 and 24”.

There are eleven recorded bat species in Ireland, nine of which are considered resident. Eight resident bat species and one of the vagrant bat species are vesper bats and all vespertilionid bats have a tragus (cartilaginous structure inside the pinna of the ear). Vesper bats are distributed throughout the island. Nathusius' pipistrelle *Pipistrellus nathusii* is a recent addition while the Brandt's bat has only been recorded once to-date (Only record confirmed by DNA testing, all other records has not been genetically confirmed). The ninth resident species is the lesser horseshoe bat *Rhinolophus hipposideros*, which belongs to the Rhinolophidae and has a complex nose leaf structure on the face, distinguishing it from the vesper bats. This species' current distribution is confined to the western seaboard counties of Mayo, Galway, Clare, Limerick, Kerry and Cork. The eleventh bat species, the greater horseshoe bat, was only recorded for the first time in February 2013 in County Wexford and is therefore considered to be a vagrant species. A total of 41 SACs have been designated for the Annex II species lesser horseshoe bat (1303), of which nine have also been selected for the Annex I habitat 'Caves not open to the public' (8310).

Irish bat species list is presented in Table 1 along with their current status.

Table 1: Status of the Irish bat fauna (Marnell *et al.*, 2019).

Species: Common Name	Irish Status	European Status	Global Status
Resident Bat Species ^			
Daubenton's bat <i>Myotis daubentonii</i>	Least Concern	Least Concern	Least Concern
Whiskered bat <i>Myotis mystacinus</i>	Least Concern	Least Concern	Least Concern
Natterer's bat <i>Myotis nattereri</i>	Least Concern	Least Concern	Least Concern
Leisler's bat <i>Nyctalus leisleri</i>	Least Concern	Least Concern	Least Concern
Nathusius' pipistrelle <i>Pipistrellus nathusii</i>	Least Concern	Least Concern	Least Concern
Common pipistrelle <i>Pipistrellus pipistrellus</i>	Least Concern	Least Concern	Least Concern
Soprano pipistrelle <i>Pipistrellus pygmaeus</i>	Least Concern	Least Concern	Least Concern
Brown long-eared bat <i>Plecotus auritus</i>	Least Concern	Least Concern	Least Concern
Lesser horseshoe bat <i>Rhinolophus hipposideros</i>	Least Concern	Least Concern	Least Concern
Possible Vagrants ^			
Brandt's bat <i>Myotis brandtii</i>	Data deficient	Least Concern	Least Concern
Greater horseshoe bat <i>Rhinolophus ferrumequinum</i>	Data deficient	Near threatened	Near threatened

^ Roche *et al.*, 2014

1.2 Relevant Guidance Documents

This report will draw on guidelines already available in Europe and will use the following documents:

- National Roads Authority (2006) Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes
- Collins, J. (Editor) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd edition). Bat Conservation Trust, London
- McAney, K. (2006) A conservation plan for Irish vesper bats, Irish Wildlife Manual No. 20 National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.
- Kelleher, C. & Marnell, F. (2006) Bat Mitigation Guidelines for Ireland. Irish Wildlife Manuals, No. 25. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.
- The status of EU protected habitats and species in Ireland: Conservation status in Ireland of habitats and species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government.
- Bat Conservation Trust (2018) Bats and artificial lighting in the UK: bats and the built environment series. Guidance Note 08/2019. BCT, London.

Collins (2016) is the principal document used to provide guidance in relation to survey effort required but the level of surveying is assessed on a case-by-case basis taking into consideration the historical bat records for the survey area, presence of built structures and trees potentially suitable for roosting bats.

Kelleher & Marnell (2006) is referred to for guidance in relation to survey guidance, derogation licences, mitigation measures.

Based on the information collected during the desktop studies and bat surveys, the bat ecologist assigns, where possible, an ecological value to each bat species recorded based on its conservation status at different geographical scales (Table 2). For example, a site may be of national ecological value for a given species if it supports a significant proportion (e.g. 5%) of the total national population of that species.

Table 2: The six-level ecological valuation scheme used in the CIEM Guidelines (2016) Ecological Value

Ecological Value	Geographical Scale of Importance
International	International or European scale
National	The Republic of Ireland or the island of Ireland scale (depending on the bat species)
Regional	Province scale: Leinster
County	County scale: County Dublin
Local	Proposed development and immediate surroundings
Negligible	None, the feature is common and widespread

Impacts on bats can arise from activities that may result in:

- Physical disturbance of bat roosts e.g. destruction or renovation of buildings
- Noise disturbance e.g. increase human presence, use of machinery etc.
- Lighting disturbance
- Loss of roosts e.g. destruction or renovation of buildings
- Modifications of commuting or foraging habitats
- Severance or fragmentation of commuting routes
- Loss of foraging habitats.

It is recognised that any development will have an impact on the receiving environment, but the significance of the impact will depend on the value of the ecological features that would be affected. Such ecological features will be those that are considered to be important and potentially affected by the proposed development.

The guidelines consulted recommend that the potential impacts of a proposed development on bats are assessed as early as possible in the design stage to determine any areas of conflicts.

1.2.1 Bats & Lighting

All European bat species, including Irish bat species, are nocturnal. Light levels as low as typical full moon levels, i.e. around 0.1 LUX, can alter the flight activity of bats (Voigt *et al.* 2018). Any level of artificial light above that of moonlight can mask the natural rhythms of lunar sky brightness and, thus, can disrupt patterns of foraging and mating and might, for instance, interfere with entrainment of the circadian system.

Artificial light pollution is an increasing global problem (Rich and Longcore, 2006) and Artificial light at night (ALAN) is considered a major threat to biodiversity, especially to nocturnal species. As urbanisation expands into the landscape, the degree of street lighting also expands. Its ecological impacts can have a profound affect the behaviour of nocturnal animals including impacts on reproductive behaviours, orientation, predator-prey interaction and competition among others, depending on the taxon and ecosystem in question (Longcore and Rich 2004). It is considered by Hölker *et al.* (2010) to be a key biodiversity threat to biodiversity conservation. In relation to bats, the potential impacts of artificial night lighting can result in habitat fragmentation (Hanski, 1998), delay in roost emergence (Downs *et al.*, 2003) and a reduction in prey items.

In the context of behavioural ecology, lights can work to attract or repel certain animals. Many groups of insects, including moths, lacewings, beetles, bugs, caddisflies, crane flies, midges, hoverflies and wasps, can be attracted to artificial light (Eisenbeis and Hassel 2000; Frank 1988; Kolligs 2000). Attraction depends on the spectrum of light. In the context of street lights, white (mercury vapour) lamps emit a white light that includes ultraviolet. High pressure sodium lights (yellow) emit some ultraviolet, while low pressure sodium lamps (orange) emit no ultraviolet light (e.g. Rydell 2006). As a result of the attractiveness of lights to aerial invertebrates, swarms of insects often occur in and around street lights and, particular bat species such as aerial insect predators, can exploit the swarming insects to their advantage. Such attraction can also take prey items away from dark zones where light sensitive species are foraging, thus reducing their likelihood of feeding effectively.

Rydell (2006) divides bats into four categories in terms of their characteristic behaviours at street lamps. The four categories are based on bat size, wing morphology and echolocation call characteristics which were highlighted by Norberg and Rayner (1987) to determine flight speed, manoeuvrability, and prey detection capabilities of bats. Rydell (2006) stated that the large, fast flying bats, which are confined to open airspace, fly high over lit areas and are rarely observed near ground level. None of these, typically large free-tailed bats (e.g. large species of the family Molossidae), are found in Ireland. The second category are the medium-sized fast flying species, including the *Nyctalus* species, which patrol the street well above the lights and can be seen occasionally as they dive for prey into the light cone. This group includes the Leisler's bat, which is found in Ireland. Rydell's third category describes the small but fast flying bats that are manoeuvrable enough to forage around light posts or under the lights, and includes the small *Pipistrellus* species of the old world, three of which are found in Ireland. The fourth category includes broad-winged slow flyers, most of which are seldom or never observed at lights. Slow flying bat species may be more vulnerable to predation by diurnal birds of prey and this may restrict their exploitation of insects around artificially illuminated areas (e.g. Speakman 1991). There are also the concerns that some bat species are more light sensitive and therefore actively avoid lit up areas. This is particularly relevant for lesser horseshoe bats. Therefore from this, we can categorise the suite of Irish bats species as follows (please note that the sensitivity category is the author's description):

Table 3: Potential light sensitivity of the Irish bat fauna using categories described by Rydell, 2006.

Species: Common Name	Rydell Category	Sensitivity
Daubenton's bat <i>Myotis daubentonii</i>	Category 4	Light sensitive
Whiskered bat <i>Myotis mystacinus</i>	Category 4	Light sensitive
Natterer's bat <i>Myotis nattereri</i>	Category 4	Light sensitive
Leisler's bat <i>Nyctalus leisleri</i>	Category 2	Light tolerant
Nathusius' pipistrelle <i>Pipistrellus nathusii</i>	Category 3	Semi-tolerant
Common pipistrelle <i>Pipistrellus pipistrellus</i>	Category 3	Semi-tolerant
Soprano pipistrelle <i>Pipistrellus pygmaeus</i>	Category 3	Semi-tolerant
Brown long-eared bat <i>Plecotus auritus</i>	Category 4	Light sensitive
Lesser horseshoe bat <i>Rhinolophus hipposideros</i>	Category 4	Light sensitive

In the context of terrestrial ecosystems, the impact of street lights may appear to be positive for some bats but over the long term impacts may be negative even for those species that seem to gain from exploiting insect swarms. As Rydell (2006) points out, there has been no research into whether or how bat predation at lights affects the size of moth populations. Moths that normally exhibit evasive responses to bats have been shown to be unable to avoid capture by bats under bright street lights (Svensson and Rydell 1998) and some bats that feed at street lights increase their consumption of moths compared with their normal catch in other habitats (Rydell 1992). By disorientating insects that would normally be feeding or engaging in reproductive behaviours, as well as increasing predation by bats, overall reproductive rates may well decrease for insects that are within range of light pollution sources. Therefore resulting in long-term overall decreased availability or diversity of prey species.

The ability of different bat species to exploit insects gathered around street lights varies greatly. Gleaning species such as *Myotis* bats rarely forage around street lights (Rydell and Racey, 1995). The ecological effects of illuminating aquatic habitats are also poorly known. Moore *et al.* (2006) found that light levels in an urban lake, subject simply to sky glow and not direct illumination from lights, reached the same order of magnitude as full moonlight.

The potential impacts of street lighting can be summarised as follows:

- Attracting Prey Items;
- Reducing Foraging Habitat;
- Fragmenting The Landscape;
- Reducing Drinking Sites.

1.2.2 Assessment Criteria

Different parameters are considered for the assessment of the potential impact(s) of a proposed development on local bat populations. Reporting may consider all or some of the criteria presented below, depending on the nature of the project being assessed.

The ecological value of the bat populations of the survey site will be completed, where possible, according to Table 2, Section 1.2 (CIEEM, 2016).

With reference to the guidelines listed in Section 1.2 and the judgement of the bat specialist, the impacts proposed project on local bat populations will be assessed, where possible, using the following criteria:

- Impact Quality using the parameters Positive, Neutral or Negative Impact (based on EPA, 2017)

Table 4a: Criteria for assessing impact quality based on EPA, 2017,

Quality of Effect	Criteria
Positive	A change which improves the quality of the environment (for example, by increasing species diversity; or the improving reproductive capacity of an ecosystem, or by removing nuisances or improving amenities).
Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Negative	A change which reduces the quality of the environment (for example, lessening species diversity or diminishing the reproductive capacity of an ecosystem; or damaging health or property or by causing nuisance).

- Impact Significance of potential impact parameters on specific bat species in relation to particular elements (e.g. roosting sites, foraging area and commuting routes) are assessed with reference to the following:
 - o Table 6.1 of Kelleher & Marnell, 2006;
 - o the known ecology and distribution of the bat species in Ireland;
 - o bat survey results including type of roosts (if any recorded), pattern of bat usage of the survey area, level of bat activity recorded etc.
 - o and bat specialist experience.

The scale of impact used in this report is divided in five categories (in increasing scale of impact):

- o Minor Impact
 - o Minor-Moderate Impact
 - o Moderate Impact
 - o Moderate to Major Impact
 - o Major Impact
- Overall Impact Significance of the proposed development on local bat populations maybe determine, where applicable, using the parameters listed in Table 4b (based on EPA, 2017).

Table 4b: Criteria for assessing significance of effects based on EPA, 2017,

Significance of Effects	Definition
Imperceptible	An effect capable of measurement but without significant consequences.
Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate	An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends.
Significant	An effect which, by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound	An effect which obliterates sensitive characteristics

The following terms will be used, where possible and applicable, when quantifying the duration of the potential effects (selected from EPA, 2017):

- Temporary – effects lasting less than a year
- Short-term – effects lasting 1 to 7 years
- Medium term – effects lasting 7 to 15 years
- Long term – effects lasting 15 to 60 years
- Permanent – effects lasting over 60 years
- Reversible – effects that can be undone, for example through remediation or restoration

Finally, how the impacts differ during the construction and operational phases will be presented, if applicable.

Specific guides utilised in the assessment process and mitigation design are:

- Table 6.1 in Kelleher & Marnell, 2006 (Page 47)
- Figure 21 in Kelleher & Marnell, 2006 (Page 49)
- P 60 - 64 in Kelleher & Marnell, 2006 in relation to roost design
- Schofield, H. (2008). *The Lesser Horseshoe Bat Conservation Handbook*. Herefordshire, England: The Vincent Wildlife Trust in relation to roost design
- Table 4.1 in Collins, 2016 (Page 35)
- Table 7.3 in Collins, 2016 (Page 52)
- Appendix 1 (Criteria for Bat Roosts of National or International Importance) in NRA (2006)

1.3 Project Description

1.3.1 Site Location

The proposed residential development is located in Clonburriss, Clondalkin, Dublin 22. It is a rectangular shaped site bounded to the north by a railway line, to the south by the Grand Canal and to the east and west by local roads. The proposed development site is agricultural land. And the following figure shows the extent of the survey area for the bat assessment (Red Rectangle).



Figure 1a: Survey area for bat assessment – Clonburriss, Clondalkin, Dublin 22.

The proposed residential development is known as Clonburriss 1A and is located in the eastern section of the survey site – Orange Rectangle is the approximate area.

1.3.2 Proposed Project

The development will consist of the construction of 569 dwellings, a creche, innovation hub and open space in the Clonburriss South West Development Area of the Clonburriss SDZ Planning Scheme 2019 as follows:

- A. 173 no. houses comprising 8 no. 2 bedroom houses, 153 no. 3 bedroom houses and 12 no. 4 bedroom houses (147 no. dwellings in CSW-S4 consisting of 8 no. 2 bedroom houses, 127 no. 3 bedroom houses & 12 no. 4 bedroom houses & 26 no. 3 bedroom dwellings in CSW-S3); all 2 no. storey comprising semi-detached, terraced, end terrace units (with parking and private open space);
- B. 148 no. duplex apartments/apartments (88 no. in CSW-S4 & 60 no. in CSW-S3) comprising 74 no. 2 bedroom units and 74 no. 3 bedroom units, in 16 no. 3 no. storey buildings. In CSW-S4 Duplex Blocks A,B,C,D,E,F,G,J,K, comprise 8 no. units (4 no. 2 bed & 4 no. 3 bed units), Duplex Block H comprises 16 no. units (8 no. 2 bed & 8 no. 3 bed units); In CSW-S3 Blocks L, N & O comprise 8 no. units (4 no. 2 bed & 4 no. 3 bed units), Block M comprises 14 no. units (7 no. 2 bed & 7 no. 3 bed units), Block P comprises 10 no. units (5 no. 2 bed & 5 no. 3 bed units), Block Q comprises 12 no. units (6 no. 2 bed & 6 no. 3 bed units), all to have terraces;

- C. 396 no. apartments as follows: within CSW-S4, Block 1 consists of 172 no. apartments (76 no. 1 bedroom, 91 no. 2 bedroom and 5 no. 3 bedroom apartments), in a 2-building arrangement both 6 no. storeys in height. Within CSW-S3, Block 2 (4 storeys) comprises 16 no. 1 bedroom apartments and 22 no. 2 bedroom apartments, Block 3 (4 storeys) comprises 16 no. 1 bedroom apartments and 22 no. 2 bedroom apartments (all apartments to have terrace or balcony).
- D. Provision of an innovation hub (626 sq. m) and creche (c. 547 sq. m) in a part 3/4 storey 'local node' building in CSW-S4;
- E. Vehicular access will be from the permitted Clonburris Southern Link Street and R113 to the east (along with provision of internal haul routes (for construction) to connect to the R136 to the west);
- F. Public Open Space/landscaping of c. 4.1 hectares (to include Local Park and MUGA in CSW-S3, Grand Canal Park, along the southern and eastern boundaries of the site to connect to existing Grand Canal towpath) as well as a series of communal open spaces to serve apartments and duplex units (c. 0.39 ha).
- G. All ancillary development works including footpaths, landscaping boundary treatments, public, private open space areas, car parking (656 no. spaces) and bicycle parking (672 no. spaces), single storey ESB substations/bike/bin stores, and all ancillary site development/construction works;
- H. Permission is also sought for revisions to attenuation permitted under SDZ20A/0021 (Surface water attenuation measures and underground attenuation systems) as well as connection to water supply, and provision of foul drainage infrastructure.

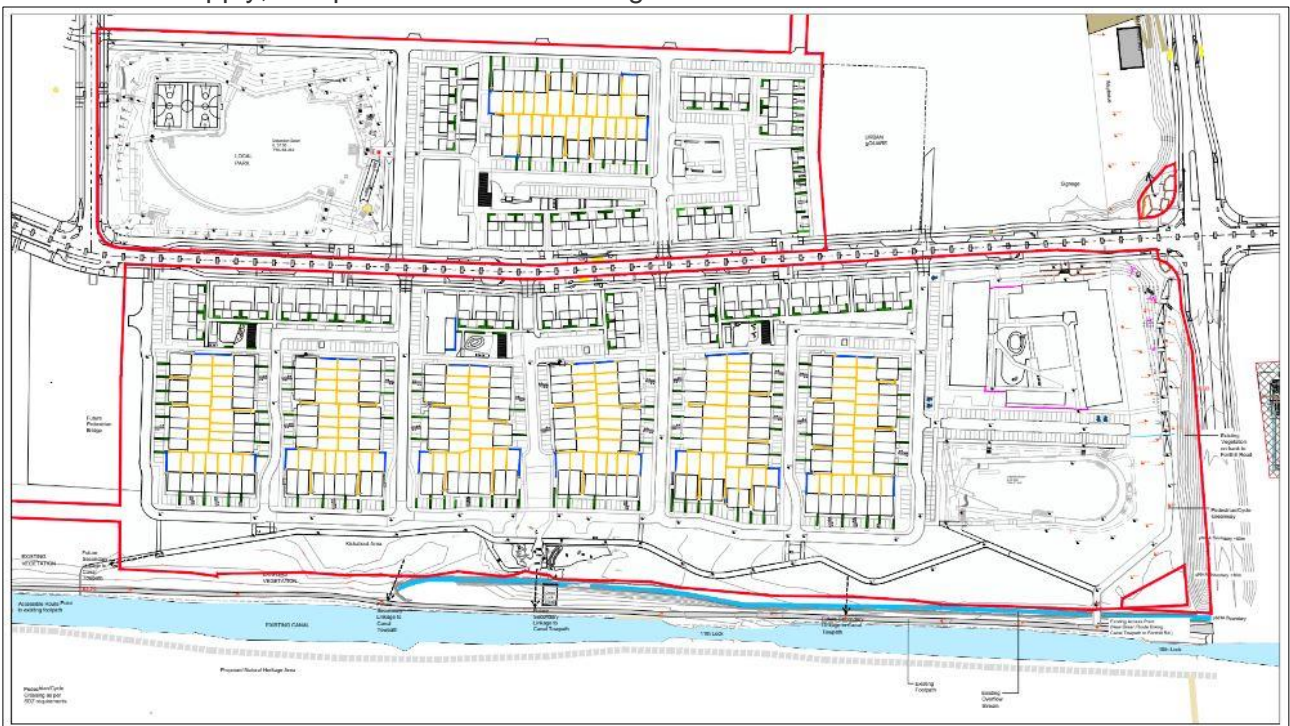


Figure 1b: Proposed layout of Clonburris Phase 1A.

1.3.3 Bat Survey Aims

The aims of the bat survey and assessment at the proposed project site are as follows:

- Collect robust data following good practice guidelines to allow an assessment of the potential impacts of the proposed project on local bat populations, both on and off-site (where possible);
- Facilitate the design of mitigation, enhancement and monitoring strategies for local bat populations recorded;
- Provide baseline information with which the results of post-construction monitoring surveys can be compared to, where appropriate;
- Provide information to enable NPWS and planning authorities to reach robust decisions with definitive required outcomes;
- Assist clients in meeting their statutory obligations;
- Facilitate the conservation of local bat populations.

Survey are comprised of many different types may differ from site to site depending on the goals of the survey. The following is a brief description of main types of surveys that can be completed. The surveys deemed suitable for a particular project is determine on a case-by-case basis.

- Emergence (dusk) surveys: surveying of buildings or structures to determine whether such building/structure is a bat roost. Undertaken from 10 minutes prior to sunset to 90 minutes after sunset.
- Walking transect: bat surveys completed on-foot where the surveyor(s) walk the survey site from 10 minutes prior to sunset to at least 110 minutes after sunset. Often this survey is completed post an emergence survey and therefore may be undertaken for a longer period of time after sunset.
- Driving transect: bat survey complete in a car and undertaken according to a strict survey protocol. Surveying is completed from 40 minutes after sunset till the end of the planned survey route. This is only undertaken for large survey area with a well-defined public road structure. Routes are planned and mapped prior to surveying.
- Dawn surveys: surveying of buildings or structures to determine whether such building/structure is a bat roost. Undertaken from 90 minutes prior to sunrise to 10 minutes after sunrise.
- Static surveys: placement of automated recording devices within the survey area. The units are set up during the daylight hours and left in place to record during the hours of darkness.
- Additional surveys required may include trapping / netting of bats. But this type of surveying is only undertaken where specific information is required (e.g. to determine if a roost is a maternity colony).

2. Bat Survey Methodology

2.1 Daytime Inspections

One purpose of daytime inspections is to determine the potential of bat roosts within the survey area. Due to the transient nature of bats and their seasonal life cycle, there are a number of different type of bat roosts. Where possible, one of the objectives of the surveys is to be able to identify the types of roosts present, if any. However, the determination of the type of roost present depends on the timing of the survey and the number of bat surveys completed. Consequently, the definition of roost types, in this report, will be based on the following:

Table 5a: Bat Roost Types (adapted from Collins 2016).

Roost Type	Definition	Time of Survey
Day Roost	A place where individual bats or small groups of males, rest or shelter in the daytime but are rarely found by night in the summer.	Anytime of the year
Night Roost	A place where bats rest or shelter in the night but are rarely found in the day. May be used by a single bat on occasion or it could be used regularly by the whole colony.	Anytime of the year
Feeding Roost	A place where individual bats or a few bats rest or feed during the night but are rarely present by day.	Anytime of the year
Transitional Roost	A place used by a few individuals or occasionally small groups for generally short periods of time on waking from hibernation or in the period prior to hibernation.	Outside the main maternity and hibernation periods.
Swarming Site	Where large numbers of males and females gather. Appear to be important mating sites.	Late summer and autumn
Mating Site	Where mating takes place.	Late summer and autumn
Maternity Site	Where female bats give birth and raise their young to independence.	Summer months
Hibernation Site	Where bats are found, either individually or in groups in the winter months. They have a constant cool temperature and humidity.	Winter months in cold weather conditions
Satellite Roost	An alternative roost found in close proximity to the main nursery colony and is used by a few individuals throughout the breeding season.	Summer months

2.1.1 Building & Structure Inspection

Structures, buildings and other likely places that may provide a roosting space for bats are inspected during the daytime for evidence of bat usage. Evidence of bat usage is in the form of actual bats (visible or audible), bat droppings, urine staining, grease marks (oily secretions from glands present on stonework) and claw marks. In addition, the presence of bat fly pupae (bat parasite) also indicated that bat usage of a crevice, for example, has occurred in the past. Inspections are undertaken visually

with the aid of a strong torch beam (LED Lenser P14.2) and endoscope (General DC5660A Wet / Dry Scope).

There is one building located along the canal within the survey area and this was assessed to determine their suitability as a bat and described using the parameters Negligible, Low, Medium or High suitability in view of Table 5.1 of Kelleher & Marnell (2006). Surveying was carried out in the preferred months of May to September (Collins, 2016). The level of suitability informed the level of surveying required.

Table 5b: Building Bat Roost Classification System & Survey Effort (Adapted from Collins, 2016 and Kelleher & Marnell, 2006).

Suitability Category	Description (examples of criteria)	Survey Effort (Timings)
Negligible	Building have no potential as a roost site Urban setting, heavily disturbed, building material unsuitable, building in poor condition etc.	No surveys required.
Low	Building has a low potential as a roost site. No evidence of bat usage (e.g. Droppings)	One dusk or dawn survey.
Medium	Building with some suitable voids / crevices for roosting bats. Some evidence of bat usage Suitable foraging and commuting habitat present.	At least one survey in May to August, minimum of two surveys (one dusk and one dawn).
High	Building with many features deemed suitable for roosting bats. Evidence of bat usage. Largely undisturbed setting, rural, suitable foraging and commuting habitat, suitable roof void and building material.	At least two surveys in May to August, with a minimum of three surveys (at least one dusk survey and one dawn survey).

2.1.2 Tree Potential Bat Roost (PBRs) Inspection

Trees that may provide a roosting space for bats were classified using the Bat Tree Habitat Key (BTHK, 2018) and the classification system adapted from Collins (2016). The Potential Roost Features (PRFs) listed in this guide were used to determine the PBR value of trees.

Trees identified as PBRs were inspected during the daytime, where possible, for evidence of bat usage. Evidence of bat usage is in the form of actual bats (visible or audible), bat droppings, urine staining, grease marks (oily secretions from glands present) and claw marks. In addition, the presence of bat fly pupae (bat parasite) also indicated that bat usage of a crevice, for example, has occurred in the past.

A series of inspections were undertaken. Phase 1 inspections aims to make a list of trees within the proposed development site that may be suitable as roosting sites for bats. Inspections were undertaken visually with the aid of a strong torch beam (LED Lenser P14.2) during the daytime searching for PRFs, if visible. To aid this Phase 1 inspection, tree reports, where available, were consulted to supplement that data collected.

Phase 2 inspections are, generally, recommended once a complete list of trees that have been identified as PBRs, and are mark for felling in order for the proposed development to be undertaken. The Phase 2 inspection will generally involve a closer examination of individual trees using a strong torch beam (LED Lenser P14.2) and endoscope (General DC5660A Wet / Dry Scope) and where required (and/or possible), height surveys are completed using a ladder. If a tree is deemed to be a roost site then further surveying involving dusk and dawn surveys of the actual trees may be recommended to determine what bat species are present etc.

Table 5c: Tree Bat Roost Category Classification System (adapted from Collins, 2016).

Tree Category	Description
1 High	Trees with multiple, highly suitable features (Potential Roosting Features = PRFs) capable of supporting larger roosts
2 Moderate	Trees with definite bat potential but supporting features (PRFs) suitable for use by individual bats;
3 Low	Trees have no obvious potential although the tree is of a size and age that elevated surveys may result in cracks or crevices being found or the tree supports some features (PRFs) which may have limited potential to support bats;
4 Negligible	Trees have no potential.

2.1.3 Bat Habitat & Commuting Routes Mapping

The survey site was assessed during daytime walkabout surveys, in relation to potential bat foraging habitat and potential bat commuting routes. Such habitats were classified according to Fossit, 2000 (Appendix 1, Table 1.B) while hedgerows were classified according to BATLAS 2020 classification (Bat Conservation Ireland, 2015) (Appendix 1, Table 1.A). Bat habitats and commuting routes identified were considered in relation to the wider landscape to determine landscape connectivity for local bat populations through the examination of aerial photographs.

2.2 Night-time Bat Detector Surveys

2.2.1 Dusk Bat Surveys

Walking transects were completed as the principal means of gathering data for the Dusk Bat Surveys and involved the surveyor(s) walking the survey area, noting the time, location and bat species encountered. Mapping of bat encounters was undertaken using QGIS and an excel file produced for mapping purposes (ITM Irish grid reference co-ordinates). Validation of bat records was completed by the principal bat surveyor prior to mapping. Surveys were completed from 10 minutes before sunset to at least 130 minutes post sunset.

The following equipment was used (between 2018 and 2021):

Surveyor 1 (Principal surveyor): Anabat Walkabout Full Spectrum Bat Detector, Pettersson D240x Time Spectrum Detector and Petersson D200 Heterodyne Bat Detector.

Surveyor 2: Bat Logger M2 Spectrum Bat Detector, Wildlife Acoustics EchoMeter Touch Pro and Petersson D200 Heterodyne Bat Detector.

2.2.2 Passive Static Bat Detector Survey

A Passive Static Bat Surveys involves leaving a static bat detector unit (with ultrasonic microphone) in a specific location and set to record for a specified period of time (i.e. a bat detector is left in the field, there is no observer present and bats which pass near enough to the monitoring unit are recorded and their calls are stored for analysis post surveying). The bat detector is effectively used as a bat activity data logger and the habitat type of where the bat detector is location is not to allow interpretation of the results (e.g. Open versus Edge versus Closed habitat types – see table below). This results in a far greater sampling effort over a shorter period of time. Bat detectors with ultrasonic microphones are used as the ultrasonic calls produced by bats cannot be heard by human hearing.

The microphone of the unit was positioned horizontally to reduce potential damage from rain. Wildlife Acoustics Song Meter SM4 Bat FS and Mini Bat FS Platform Units use Real Time recording as a technique to record bat echolocation calls and using specific software, the recorded calls are identified. It is these sonograms (2-d sound pictures) that are digitally stored on the SD card (or micro SD cards depending on the model) and downloaded for analysis. These results are depicted on a graph showing the number of bat passes per species per hour/night. Audio files are a maximum of 15 seconds long and each audio file is taken as a bat pass for each bat species recorded within the audio file. Each bat pass does not equate to the number of individuals of bats flying in vicinity of the recording device but is representative of bat activity levels. Some species such as the pipistrelles will continuously fly around a habitat and therefore it is likely that a series of bat passes within a similar time frame (i.e. separate audio files within a small time frame) is one individual bat. On the other hand, Leisler's bats tend to travel through an area quickly and therefore an individual sequence of echolocation calls or bat pass is more likely to be indicative of individual bats.

The recordings are analysed using Wildlife Acoustics Kaleidoscope Pro. Each sequence of bat pulses are noted as a bat pass to indicate level of bat activity for each species recorded. This is either expressed as the number of bat passes per hour or per survey night.

The following static units were deployed during this static bat detector survey:

Table 6a: Static Bat Detectors deployed during Static Bat Detector Surveys.

Static Unit Code	Bat Detector Type	Recording Function	Microphone
SM4 Units 1 – 8	Wildlife Acoustics SongMeter 4 Bat FS	Passive Full Spectrum	SMM-U2, 4m cable
SM Mini Bat Units 1-12	Wildlife Acoustics SongMeter Mini Bat	Passive Full Spectrum	SMM-U2
SM2 Unit 2 SM2 Unit 4 SM2 Unit 5	Wildlife Acoustics SongMeter 2 Bat+	Passive Full Spectrum	SMX-US (connected directly to unit) SMX-U1 (connected directly to unit)

Bats produce different types of echolocation calls and each bat species family have a characteristic bat echolocation call depending largely on their morphology and preferred habitat type. The different types of echolocation calls (i.e. CF or Constant Frequency call verses a FM or Frequency Modulated call) provides different types of information and therefore are used to detect prey items or for orientation in different habitat types. These can be broadly defined as in the table below.

Table 6a: Bat Habitat Types definitions for Passive Static Bat Detector Surveys.

Bat Habitat	Definition	Example
Open	Large open space require bat to produce calls that are loud and therefore will travel far in order to detect prey items in the open sky. This is typically where Leisler's bats will forage.	Grassland field
Edge	Linear habitat features where bats produce echolocation calls that allow them to detect the linear habitat and the adjacent open space of a field for example. This is typically where <i>Pipistrellus</i> species will forage.	Hedgerows and treelines
Closed	To fly within a closed habitat of a woodland (i.e. the clutter of branches and leaves), bats produce a quite calls that provides very detailed information. This is typically where brown long-eared bats will forage.	Woodland interior
Water	This is a specific Bat Habitat Type for Daubenton's bats which produced bat echolocation calls in the same manner as a bats would produce bat echolocation calls when flying within a Closed Bat Habitat Type. Daubenton's bats typically fly 30cm above water surface and as a consequence produce echolocation calls to detect the "Clutter" of the closeness of their flight to the water surface.	Rivers

2.3 Desktop Review

2.3.1 *Bat Conservation Ireland Database*

Bat Conservation Ireland acts as the central depository for bat records for the Republic of Ireland. Its' bat database is comprised of >60,000 bat records. The database primarily contains bat records from the following datasets:

- Irish Bat Monitoring Programme

The Irish Bat Monitoring Programme is comprised of four surveys (Car-based Bat Monitoring Scheme (2003-), All Ireland Daubenton's Bat Waterways Survey (2006-), Brow Long-eared Bat Roost Monitoring Scheme (2007-) and Lesser Horseshoe Bat Monitoring Scheme (1980s-). Apart from the latter survey, all monitoring data is stored on the BC Ireland database.

- BATLAS 2020 & 2010

BC Ireland has undertaken two all-Ireland species distribution surveys (2008-2009 for BATLAS 2010 and 2016-2019 for BATLAS 2020) of four target bat species (Common and soprano pipistrelle, Leisler's bats and Daubenton's bat).

- Ad Hoc Bat Records

Ad hoc bat records from national bat groups, ecological consultants and BC Ireland members are also stored on the BC Ireland database.

- Roost Records

These records are only report at a 1km level to protect the location of private dwellings and to protect such important bat records.

A 1km radius search was requested for the Irish Grid Reference O0528232384.

2.3.2 *Bat Conservation Landscape Favourability*

Bat Conservation Ireland produced a landscape conservation guide for Irish bat species using their database of species records collated during the 2000 - 2009 survey seasons. An analysis of the habitat and landscape associations of all bat species deemed resident in Ireland was undertaken and reported in Lundy *et al.*, 2011. The geographical area suitable for individual species was used to identify the core favourable areas of each species. This was produced as a GIS layer for local authorities and planners in order to provide a guide to the consideration of bat conservation. The island is divided into 5km squares and the landscape favourability of each 5km square for each species of bat was modelled. A caveat is attached to the model and it is that the model is based on records held on the BC Ireland database, while core areas have been identified, areas outside the core area should not be discounted as unimportant as bats are a landscape species and can travel many kilometres between roosts and foraging areas nightly and seasonally. This model was used as part of the desktop study for this report.

2.4 Photographic Record

A photographic record is completed for the survey and is presented throughout the report.

3. Bat Survey Results

3.1 Daytime Inspections

3.1.1 Building & Structure Inspection

The following building was inspected: derelict building (Omer Lock House). Due to anti-social behaviour, this structure is fenced off and not accessible. Therefore inspection was limited. The building is considered to be of Medium roosting value due to its location adjacent to the Grand Canal and due to the extensive ivy growth. This building is not located within the current planning application and due to its location along the canal tow path, it is not under Cairn Home ownership.

Table 7: Buildings / Structures inspection results.

Building Code	Description	Location	Roost Type / Suitability	Bat Species
Derelict building	Natural stone walls (partial roof), heavy ivy growth	Located along the Grand Canal to path	Medium	None



Plate 1: Derelict structure (Omer Lock House) located along two path of Grand Canal.

3.1.2 Tree Potential Bat Roost (PBRs) Inspection

The following trees were inspected (Using the Tree Constraints Plan, an approximate location is marked on Figure 2a). A total of 13 trees within survey area were deemed to have a PBR value, the majority of which are along the southern boundary and outside the proposed development area. Only one PBR is indicated in the Tree Impact Plan to be removed (Orange Triangle highlight in Red Circle on Figure 2). However the internal linear habitats of the proposed development site are proposed to be removed to facilitate the proposed development.

Table 8: Tree PBR inspection results.

Tree No.	Tree Species	PRFs	Bat Usage	Value	Location
1	Ash	Heavy ivy growth	None	Category 2	Hedge 1a
2 & 3	Ash	Heavy ivy growth	None	Category 2	SE of Hedge 3c
4	Willow	Heavy ivy growth	None	Category 2	Wood Thicket 2
5	Unknown tree	Heavy ivy growth	None	Category 2	Wood Thicket 1
6	Ash	Heavy ivy growth	None	Category 2	Wood Thicket 1
7	Willow	Heavy ivy growth	None	Category 2	West of Wood Thicket 1
8-13	Ash & Oak	Heavy ivy growth	None	Category 2	Treeline 1



Figure 2: Tree Constraints Plan – Draft (Source: The Tree File Ltd.). Orange Triangles (from Right to Left).

3.1.3 Bat Habitat & Commuting Routes Mapping

The habitat types, with reference to Fossit (2000) were recorded both within the survey area and adjacent to the survey area.

Table 9a: Habitat types present within survey area.

Habitat	Yes	Habitat	Yes	Habitat	Yes	Habitat	Yes
Cultivated land		Salt marshes		Exposed rock		Fens/flushes	
Built land	√	Brackish waters		Caves		Grasslands	√
Coastal structures		Springs		Freshwater marsh		Scrub	√
Shingle/gravel		Swamps		Lakes/ponds		Hedges/treelines	√
Sea cliffs/islets		Disturbed ground	√	Heath		Conifer plantation	
Sand dunes		Watercourse	√	Bog		Woodland	

Table 9b: Habitat types present adjacent to survey area.

Habitat	Yes	Habitat	Yes	Habitat	Yes	Habitat	Yes
Cultivated land		Salt marshes		Exposed rock		Fens/flushes	
Built land	√	Brackish waters		Caves		Grasslands	√
Coastal structures		Springs		Freshwater marsh		Scrub	√
Shingle/gravel		Swamps		Lakes/ponds		Hedges/treelines	√
Sea cliffs/islets		Disturbed ground	√	Heath		Conifer plantation	
Sand dunes		Watercourse	√	Bog		Woodland	

There are nine broad habitat types are present within the site boundary. Agricultural fields are predominantly dry meadows – GS2 and neutral grassland – GS1. Field boundaries are predominantly made up of hedgerows – WL1. Tree/shrub species include Grey Willow *Salix cinerea*, Blackthorn *Prunus spinosa*, Hawthorn *Crataegus monogyna*, Spindle *Euonymus europaeus*, Ash *Fraxinus excelsior*, Elm *Ulmus glabra*, Dog Rose *Rosa canina*, Elder *Sambucus nigra*, Hazel *Corylus avellana*, Guelder-rose *Viburnum opulus*. Alder *Alnus glutinosa*, Crack Willow *S. fragilis* and Sycamore *Acer pseudoplatanus*. Drainage ditches – FW4 accompany some linear woodland features. The southern boundary is mostly characterised by a treeline – WL2, with tree species including Oak *Quercus* sp., Ash and Sycamore along with Brambles *Rubus fruticosus* agg., Hazel, Blackthorn and Spindle.

Grand Canal pNHA (site codes: 2104): The Grand Canal was constructed in the 18th century and links Dublin to the River Shannon. It is a nationally valuable wildlife corridor and is home to a wide range of plants and animals, many of conservation value, including the Otter *Lutra lutra*.

3.2 Night-time Bat Detector Surveys

3.2.1 Dusk Bat Survey

Walking transects were the principal means of collecting data for this survey area. While there is one structure within the proposed development site, anti-social behaviour at this structure reduced the possibility of surveying it for the full duration of a dusk survey without drawing unwanted attention. However, the walking transects, coupled with static surveillance, ensure that this structure was surveyed adequately. Walking transects were completed along the canal and along the treeline / hedgerow network within the survey area (Please note: the survey area is greater than the actual proposed development area of Clonburris Phase1A) and these were completed in 2018, 2019, 2020 and 2021.

2018: 22nd September 2018 (Weather conditions: clear skies, dry, calm, 11oC)

2019: 31st August 2019 (Weather conditions: patchy cloud cover, dry, breezy, 17oC)

2020: 12th July 2020 (Weather conditions: full cloud cover, dry, breezy, 16oC)

2021: 2nd June 2021 (Weather conditions: partial cloud cover, dry, light wind, 18oC)

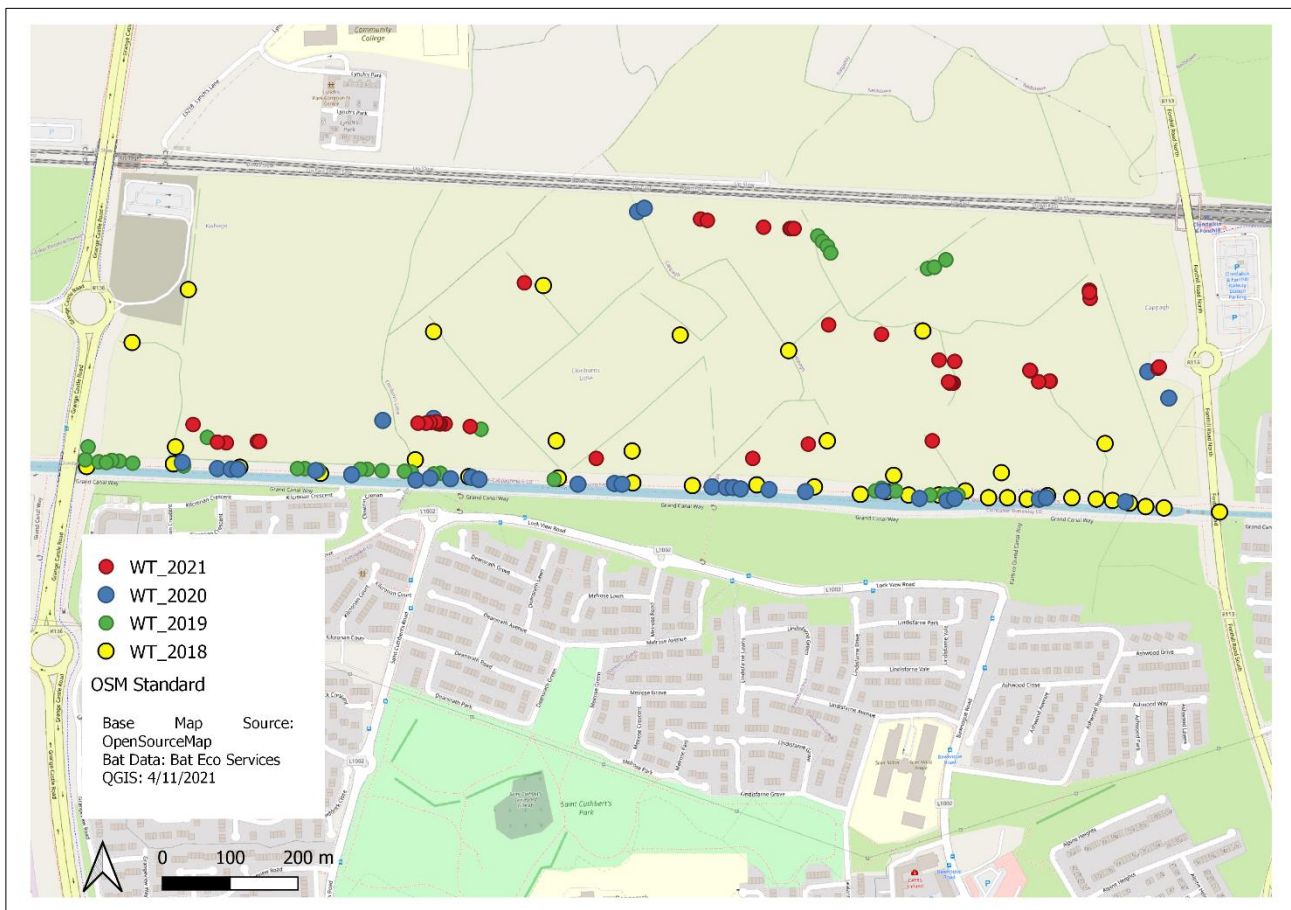


Figure 3a: All bat data recorded during the walking transects 2018-2021.

Three species of bat were recorded in all survey years: common pipistrelle, Leisler's bat and soprano pipistrelle. Daubenton's bats were recorded in 2018 along the canal only. Due to the array of surveys completed, the data for each bat species is presented later in the report.

In 2018 and 2019 one survey was located adjacent to the derelict structure along the tow path and no bats were recorded emerging. It was not possible to undertake a survey of the derelict structure in 2020 and 2021 due to anti-social behaviour.

3.2.2 Passive Static Bat Detector Survey

The following table summarises the results recorded on the static units deployed (Please see Figure 2b) over three years: 2018, 2019 and 2020. No static surveillance was completed in 2021 due to anti-social behaviour. Six different static locations were surveyed, with duplications of some of the grid referenced points during the three years of surveillance. A total of five bat species were recorded during three years of static surveillance: common pipistrelle, soprano pipistrelle, Leisler' bat, brown long-eared bat and Daubenton's bat.

Table 10a: Results of Static Bat Detectors deployed during Static Bat Detector Surveys.

Static Code	Location Description / Bat Habitat Type	Grid Reference	Survey Period	Bat Species
Static 1	Hedgerow (western section)	O0509532405	19/9/2018 to 22/9/2018	CP, SP, Leis
Static 3	Hedgerow (eastern section)	O0570732482	19/9/2018 to 22/9/2018	CP, SP, Leis, Daub
Static 4	Northern boundary	O0534832640	19/9/2018 to 22/9/2018	CP, SP, Leis
Static 2	Near canal (Adjacent to Omer Lock Hs)	O0581832233	19/9/2018 to 22/9/2018	CP, SP, Leis
Static 5	Hedgerow (western section)	O0509532405	25/8/2019 to 29/8/2019	CP, SP, Leis
Static 7	Hedgerow (eastern section)	O0570732482	25/8/2019 to 29/8/2019	CP, SP, Leis
Static 8	Northern boundary	O0534832640	25/8/2019 to 29/8/2019	CP, SP, Leis
Static 6	Near canal (Adjacent to Omer Lock Hs)	O0581832233	25/8/2019 to 29/8/2019	CP, SP, Leis
Static 9	Hedgerow (western section)	O0509532405	12/7/2020 to 17/7/2020	CP, SP, Leis, BLE
Static 10	Hedgerow (middle)	O0528232438	12/7/2020 to 17/7/2020	CP, SP, Leis
Static 11	Hedgerow (eastern section)	O0570732482	12/7/2020 to 17/7/2020	CP, SP, Leis, Daub, BLE
Static 12	Eastern boundary	O0614832304	12/7/2020 to 17/7/2020	CP, SP, Leis

Note: CP = common pipistrelle, SP = soprano pipistrelle, Leis = Leisler's bat, BLE = brown long-eared bat, Daub = Daubenton's bat.



Figure 3b: Location of static units deployed for static surveillance in 2018-2020.

In order to compare the level of bat passes from year to year, the total number of bat passes for each common bat species was divided by the total number of surveillance nights. This indicates that there was a similar level of bat passes recorded for soprano pipistrelles over the three years of static surveillance. However, a significant higher level of bat activity was recorded for both Leisler's bats and common pipistrelles in 2020 compared to 2019 and 2018. This may possibly be due to the fact that static surveillance was undertaken in July compared to September and August for the other surveillance periods, July being an important foraging month when both adult and juvenile bats are commuting and foraging and the weather is generally more favourable.

Table 10b: Results of Static Bat Detectors deployed during Static Bat Detector Surveys.

Bat Species	2018	2019	2020
	Total number of bat passes		
Common pipistrelle	613	799	1704
Soprano pipistrelle	468	482	669
Leisler's bat	86	107	536
	2018	2019	2020
	Total no. of bat passes/no. of surveillance nights		
Common pipistrelle	51	67	85
Soprano pipistrelle	39	40	33
Leisler's bat	7	9	27
	12 nights	12 nights	20 nights

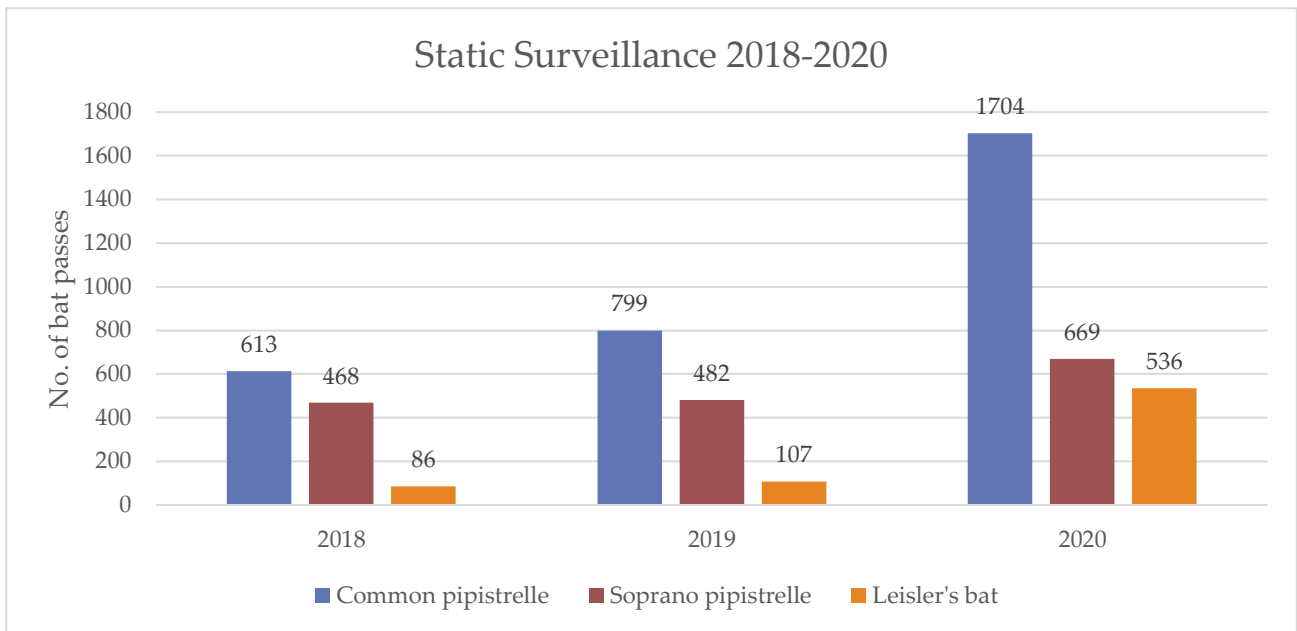


Figure 4a: Number of bat passes recorded during static surveillance for the three most frequently encountered bat species.

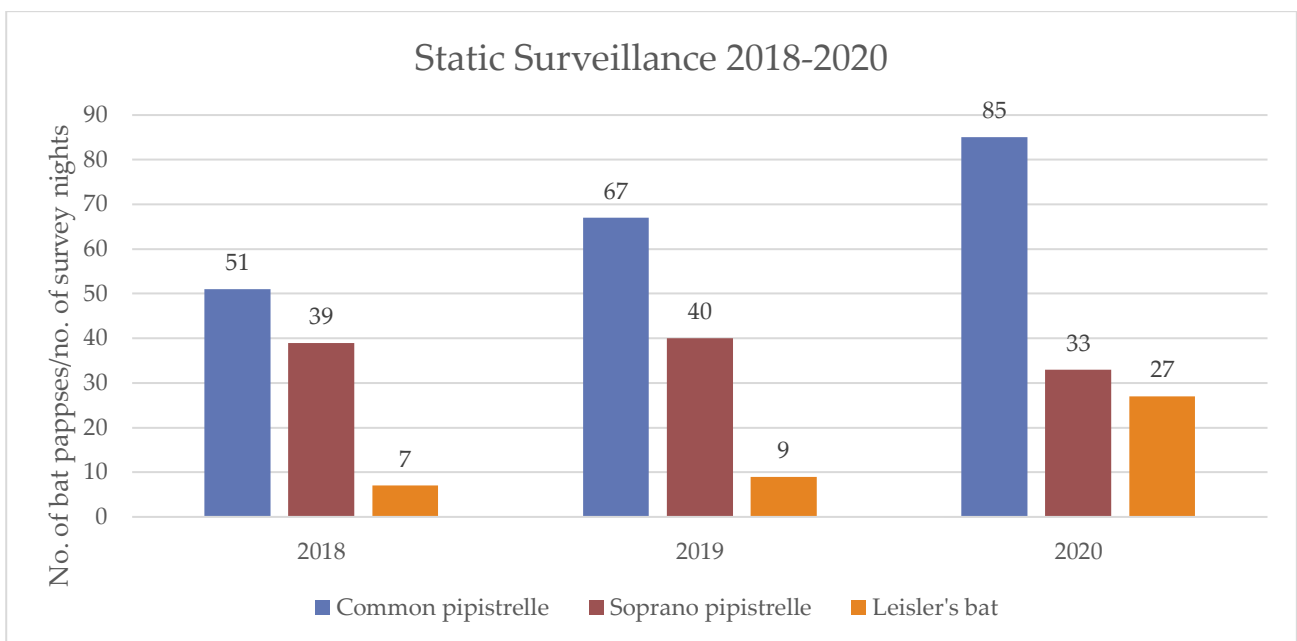


Figure 4b: Average number of bat passes recorded during static surveillance for the three most frequently encountered bat species.

However, overall the level of the level of bat activity (total number of bat passes divided by total number of hours of surveillance (2018: 108 hrs; 2019: 96 hrs and 2020: 140 hrs), apart from common pipistrelle in 2020 (1704 bat passes / 140 hrs = 12 bat passes/hr = Medium level of bat activity), there was less than 10 bat passes recorded per hour which is considered by the author as a Low level of bat activity.

As a general guide, activity level is determined as follows: Low = <10 bat passes/hr; Medium = >10 - <50 bat passes/hr; High = >50 bat passes/hr). The static units recorded for approximately 7-9 hours per night depending on the month of surveillance.

3.3 Bat Species Records

For ease of presentation of the survey results, separate maps have been prepared for each bat species recorded.

3.3.1 *Common pipistrelle*

Common pipistrelles were recorded during all walking transects and static surveillance surveys. This species was recorded foraging throughout the survey area with records distributed along the hedgerows, treelines and located along the treeline adjacent to the canal.

3.3.2 *Soprano pipistrelle*

Soprano pipistrelles were recorded during all walking transects and static surveillance surveys. This species was recorded foraging throughout the survey area with the majority of the records located along the treeline adjacent to the canal.

3.3.3 *Leisler's bat*

Leisler's bats were recorded during all walking transects and static surveillance surveys. This species was recorded foraging throughout the survey area with the majority of the records located along the mature treelines within the internal linear habitat network and along treelines adjacent to the canal.

3.3.4 *Brown long-eared bat*

Brown long-eared bats were only recorded during static surveillance during 2020 and on static units located along hedgerows within the internal linear habitat network of the survey area. A single bat pass of this bat species was recorded on the static units on the same night (16/7/2020) and therefore it is likely that it was one individual bat commuting and foraging through the survey area.

3.3.5 *Daubenton's bat*

Daubenton's bats were recorded during the 2018 walking transects and during static surveillance surveys completed in 2018 (one static unit, 3 bat passes) and 2020 (one static unit, 3 bat passes). The location of the static units was in the same grid reference point: hedgerow along the eastern section of the survey area. This species was only recorded during the 2018 walking transects and this was on the water surface of the canal.

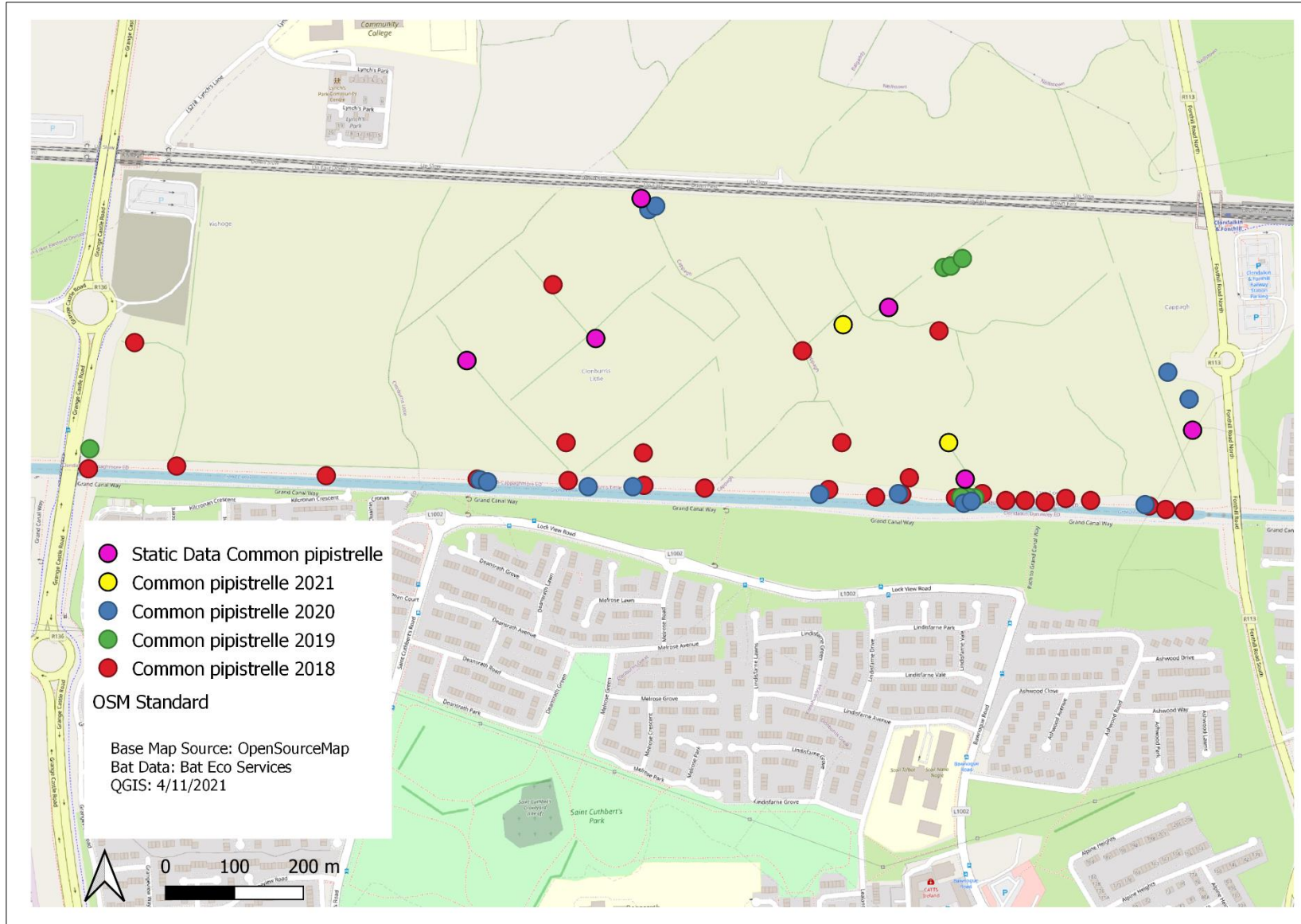


Figure 5a: Location of common pipistrelle bat encounters within the survey area.

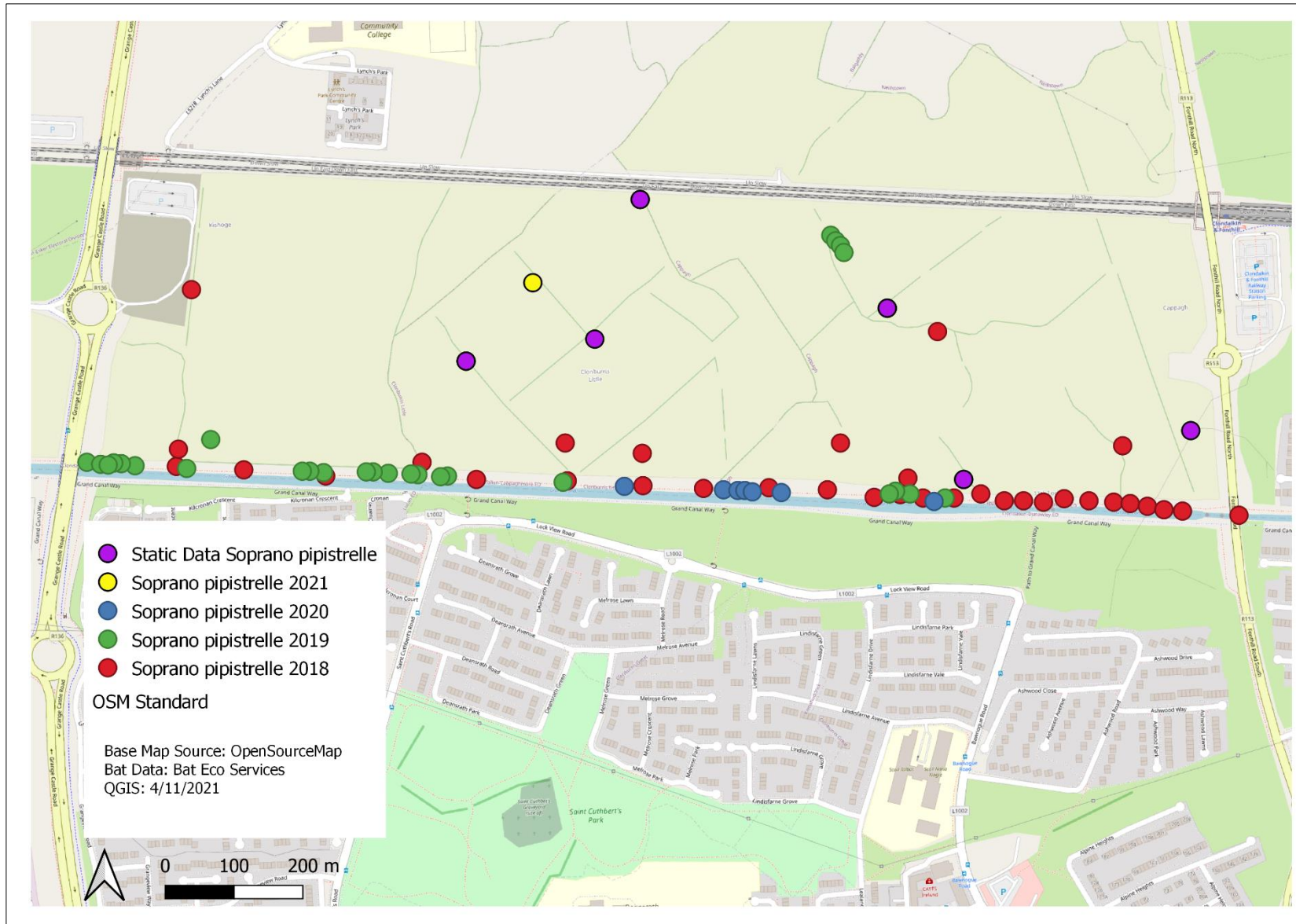


Figure 5b: Location of soprano pipistrelle bat encounters within the survey area.

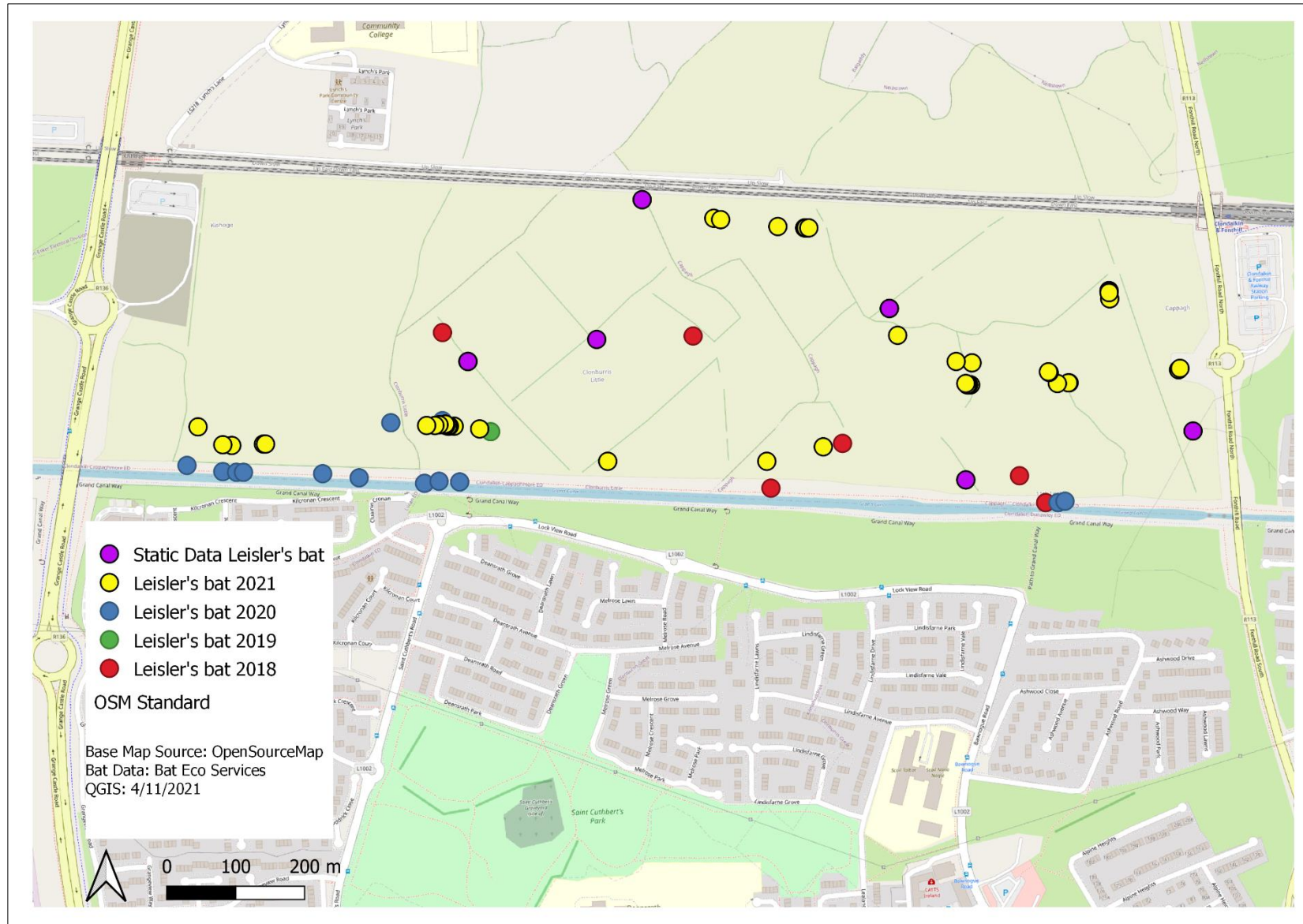


Figure 5c: Location of Leisler's bat encounters within the survey area.

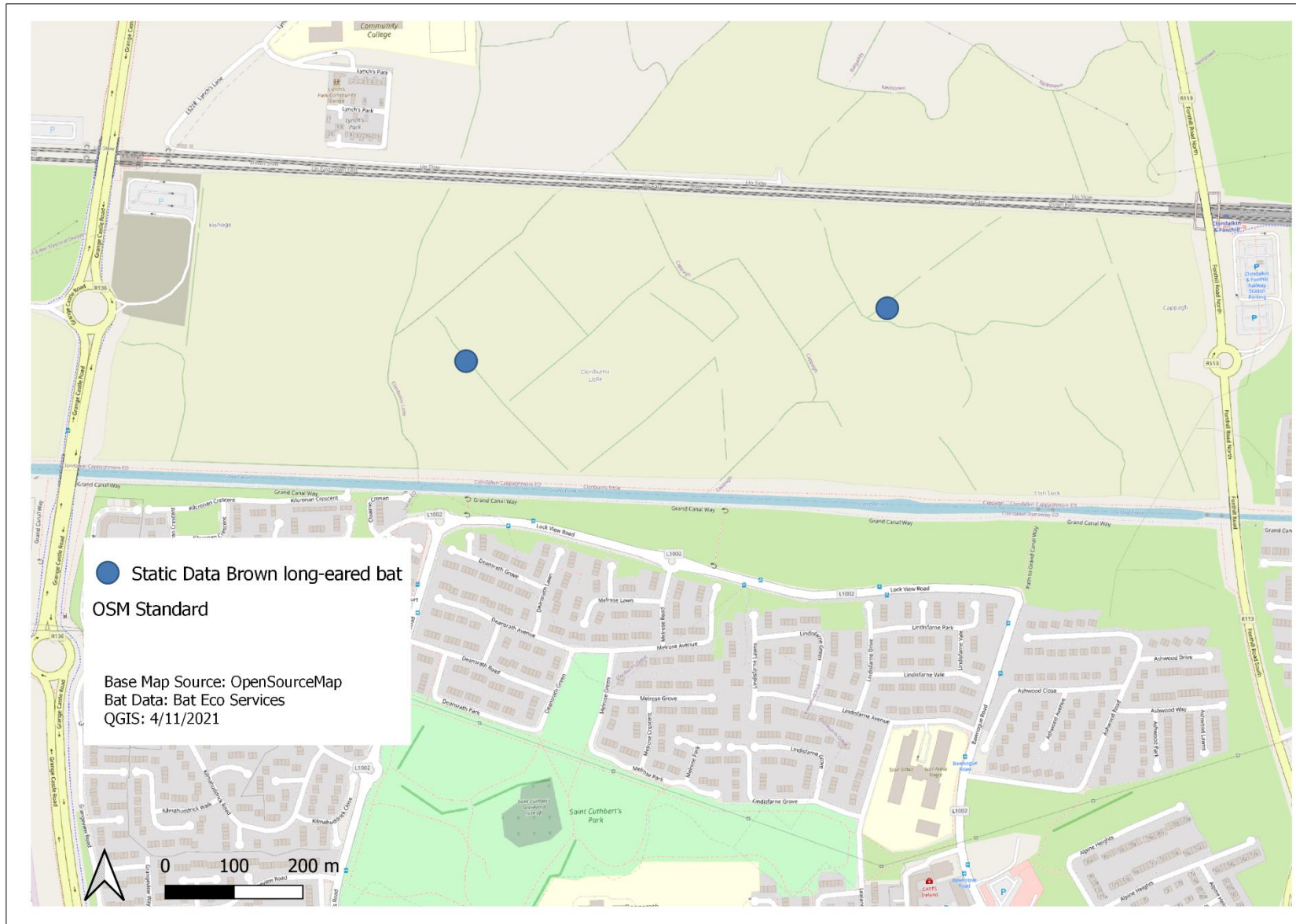


Figure 5d: Location of brown long-eared bat encounters within the survey area.

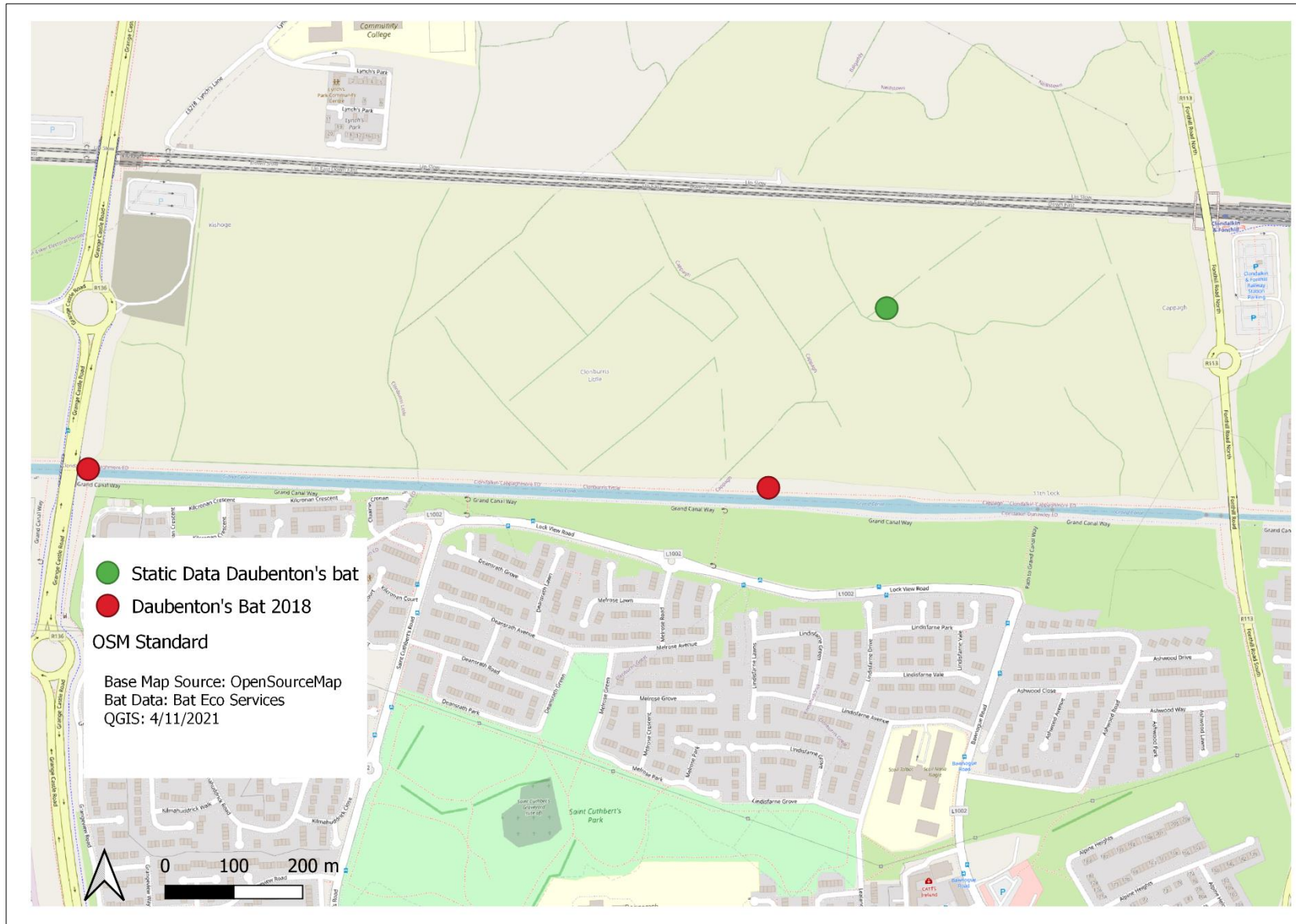


Figure 5e: Location of Daubenton's bat encounters within the survey area.

3.4 Desktop Review

3.4.1 Bat Conservation Ireland Database

The bat records within a 1km radius of the proposed development on the BC Ireland database. This dataset consists of 5 bat records. The number of records for each species is as follows:

Lesser horseshoe bat	0 records;
Common pipistrelle	5 records;
Soprano pipistrelle	5 records;
<i>Pipistrellus</i> species	0 records;
Leisler's bat	5 records;
<i>Myotis</i> species	0 records;
Daubenton's bat	2 records;
Natterer's bat	0 record;
Brown long-eared bat	1 records; and,
Nathusius' pipistrelle	0 record.

This is consistent with the bat survey results reported.

3.4.2 Bat Conservation Ireland Landscape Favourability

Figure 6 depicts the Bat Conservation Ireland Landscape Favourability Model (Lundy *et al.*, 2011). The county is divided into 5km squares and the different colouring of the square, indicates the favourability of the 5km square for bats. This GIS layer is hosted on the NBDC website www.biodiversityireland.ie. The proposed development site is approximately location in the Blue Box. This 5km square has an overall Medium favourability for bats, in general. The percentage favourability for each bat species is presented in the table below. The 5km square has Medium to High favourability for the three of the five species of bat recorded during the surveys: common pipistrelle, brown long-eared bat, and Leisler's bat and a Medium favourability for soprano pipistrelle and Low to Medium favourability for Daubenton's bat.

Table 11: 5km Square Bat Landscape Favourability value for individual bat species (Source: www.biodiversityireland.ie).

Bat species	5km Square
Common pipistrelle	41% (Medium to High)
Soprano pipistrelle	35% (Medium)
Nathusius' pipistrelle	19% (Low to Medium)
Leisler's bat	41% (Medium to High)
Brown long-eared bat	40% (Medium to High)
Daubenton's bat	19% (Low to Medium)
Natterer's bat	26% (Medium)
Whiskered bat	19% (Low to Medium)

Lesser horseshoe bat	0% (Not suitable)
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Figure 6: Bat Landscape Favourability Model (All Bats) (Source: NBDC). Blue square – approximate location of proposed development and extent of survey area.

3.5 Survey Effort, Constraints & Survey Assessment

The following table details any Survey Constraints encountered and a summary of Scientific Assessment completed.

Table 12: Survey Effort, Constraints & Survey Assessment Results.

Category	Discussion																								
Timing of surveys	Varied during the course of the four years – all in favourable weather conditions.																								
Survey Type	<p>Bat Survey Duties Completed (Indicated by red shading)</p> <table> <tr> <td>Tree PBR Survey</td> <td>■</td> <td>Daytime Building Inspection</td> <td>■</td> </tr> <tr> <td>Static Detector Survey</td> <td>■</td> <td>Daytime Bridge Inspection</td> <td>○</td> </tr> <tr> <td>Dusk Bat Survey</td> <td>■</td> <td>Dawn Bat Survey</td> <td>○</td> </tr> <tr> <td>Walking Transect</td> <td>■</td> <td>Driving Transect</td> <td>○</td> </tr> <tr> <td>Trapping/Mist Netting</td> <td>○</td> <td>IR Camcorder filming</td> <td>○</td> </tr> <tr> <td>Endoscope Inspection</td> <td>○</td> <td>Other</td> <td>○</td> </tr> </table>	Tree PBR Survey	■	Daytime Building Inspection	■	Static Detector Survey	■	Daytime Bridge Inspection	○	Dusk Bat Survey	■	Dawn Bat Survey	○	Walking Transect	■	Driving Transect	○	Trapping/Mist Netting	○	IR Camcorder filming	○	Endoscope Inspection	○	Other	○
Tree PBR Survey	■	Daytime Building Inspection	■																						
Static Detector Survey	■	Daytime Bridge Inspection	○																						
Dusk Bat Survey	■	Dawn Bat Survey	○																						
Walking Transect	■	Driving Transect	○																						
Trapping/Mist Netting	○	IR Camcorder filming	○																						
Endoscope Inspection	○	Other	○																						
Weather conditions	Favourable for bat activity.																								
Survey Constraints	Limitation to complete surveys due to anti-social behaviour. Security required in 2021.																								
Survey effort TOTAL = 365 hrs	<p>Walking Transects: x4 (1-2 surveyors) – 12 hrs</p> <p>Dusk surveys: x2 (2 surveyors) – 3 hrs</p> <p>Static surveillance: 3 years – 344 hrs</p> <p>Daytime inspection: x2 - 6 hrs</p>																								
Extent of survey area	Large area to Clonburris Phase 1a																								
Equipment	All in good working order.																								

The extent of the surveys undertaken has achieved to determine:

- Presence / absence of bat within the survey area;
- A bat species list for the survey area;
- Extent and pattern of usage by bats within the survey area.

It is therefore deemed that the Scientific Assessment completed is Appropriate in order to completed the aims of the bat survey.

4. Bat Ecological Evaluation

4.1 Bat Species Recorded & Sensitivity

Five bat species were recorded in total by the array of bat surveys completed for this survey site.

Three of the bat species recorded were common pipistrelle, Leisler's bat and soprano pipistrelle and these are the three most common bat species in Ireland.

Soprano pipistrelles were the most frequently encountered bat species and were recorded during all walking transects and static surveillance surveys. While this species was recorded foraging and commuting throughout the survey area, the majority of the bat encounters were in vicinity of the treeline along the Grand Canal. In relation to static surveillance a Low level of bat activity was recorded for this species of bat.

Common pipistrelle was the third most frequently encountered bat species. Common pipistrelles were recorded during all walking transects and static surveillance surveys. This species was recorded foraging throughout the survey area with records distributed along the hedgerows, treelines and located along the treeline adjacent to the canal. In relation to static surveillance a Low to Medium level of bat activity was recorded for this species of bat.

Leisler's bats were the second most frequently recorded bat species. Leisler's bats were recorded during all walking transects and static surveillance surveys. This species was recorded foraging throughout the survey area with the majority of the records located along the mature treelines within the internal linear habitat network and along treelines adjacent to the canal. In relation to static surveillance a Low level of bat activity was recorded for this species of bat.

The remaining three bat species are considered to be less common in Ireland.

Brown long-eared bats were only recorded during static surveillance during 2020 and on static units located along hedgerows within the internal linear habitat network of the survey area. A single bat pass of this bat species was recorded on the static units on the same night (16/7/2020) and therefore it is likely that it was one individual bat commuting and foraging through the survey area.

Daubenton's bats were recorded during the 2018 walking transects and during static surveillance surveys completed in 2018 (one static unit, 3 bat passes) and 2020 (one static unit, 3 bat passes). The location of the static units was in the same grid reference point: hedgerow along the eastern section of the survey area. This species was only recorded during the 2018 walking transects and this was on the water surface of the canal.

Leisler's bat

- Leisler's bat is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national Leisler's bat population is considered to be significantly increasing (Aughney *et al.*, 2021).
- The modelled Core Area for Leisler's bats is a relatively large area that covers much of the island of Ireland (52,820km²). The Bat Conservation Ireland Irish Landscape Model indicated that the Leisler's bat habitat preference has been difficult to define in Ireland. Habitat modelling for Ireland shows an association with riparian habitats and woodlands (Roche *et al.*, 2014). The landscape model emphasised that this is a species that cannot be defined by habitats preference at a local scale compared to other Irish bat species but that it is a landscape species and has a habitat preference at a scale of 20.5km.

Common pipistrelle

- Common pipistrelle is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national common pipistrelle population is considered to be significantly increasing (Aughney *et al.*, 2021).
- The modelled Core Area for common pipistrelle is a relatively large area that covers much of the island of Ireland (56,485km²). The Bat Conservation Ireland Irish Landscape Model indicated that the common pipistrelle selects areas with broadleaf woodland, riparian habitats and low density urbanization (<30%) (Roche *et al.*, 2014).

Soprano pipistrelle

- Soprano pipistrelle is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national soprano pipistrelle population is considered to be significantly increasing (Aughney *et al.*, 2021).
- The modelled Core Area for soprano pipistrelle is a relatively large area that covers much of the island of Ireland (62,020km²). The Bat Conservation Ireland Irish Landscape Model indicated that the soprano pipistrelle selects areas with broadleaf woodland, riparian habitats and low density urbanisation (Roche *et al.*, 2014).

Brown long-eared bat

- Brown long-eared bat is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national brown long-eared bat population is considered to be stable (Aughney *et al.*, 2021).
- The modelled Core Area for brown long-eared bat is a relatively large area that covers much of the island of Ireland (49,929 km²). The Bat Conservation Ireland Irish Landscape Model indicated that the brown long-eared bat habitat preference is for areas with broadleaf woodland and riparian habitats on a small scale of 0.5km emphasising the importance of local landscape features for this species (Roche *et al.*, 2014).

Daubenton's Bat

- Daubenton's bat is an Annex IV bat species under the EU Habitats Directive. The status of this bat species is listed as Least Concern. The national Daubenton's bat population is considered to be stable (Aughney *et al.*, 2021).
- The modelled Core Area for Daubenton's bat is (41,285 km²) reflecting the distribution of sizeable river catchments. The Irish Landscape Model indicated that the Daubenton's bat habitat preference is for areas with broadleaf woodland, riparian habitats and low density urbanisation (Roche *et al.*, 2014).

- No Annex II bat species are known to occur in County Dublin (i.e. lesser horseshoe bat) and were not recorded within the survey.

4.2 Bat Foraging Habitat & Commuting Routes

The proposed development site is comprised of treelines and hedgerows in a well-connected immediate landscape with the Grand Canal as the southern boundary of the proposed development site. However, on inspection of aerial photographs of the Clondalkin area, the Clonburris site and an area of equivalent size north of the railway line and to the west are the remaining green areas in an urban setting. There are a number of small parks north of the proposed development site: Griffeen Valley Park, Ballyowen Park and Collins Park.

The proposed development site is principally used as a commuting route and foraging area for bats. The location of the Grand Canal along the southern boundary is an important conduit for nocturnal wildlife. Currently there is outdoor lighting along the two paths on the southern bank of the Grand Canal. However there is no outdoor lighting on the northern bank of the Grand Canal within the proposed development site. Therefore it is essential that one side of the Grand Canal remains in darkness to allow nocturnal wildlife to move at night time.

4.3 Zone of Influence – Bat Landscape Connectivity

The proposed development site is comprised of treelines and hedgerows in a well-connected immediate landscape with the Grand Canal as the southern boundary of the proposed development site. However, on inspection of aerial photographs of the Clondalkin area, the Clonburris site and an area of equivalent size north of the railway line and to the west are the remaining green areas in an urban setting. There are a number of small parks north of the proposed development site: Griffeen Valley Park, Ballyowen Park and Collins Park. The River Liffey Valley is located further north of the proposed development site but due to the extent of urbanisation in between, there is little dark corridors to connect this wooded river valley to the green areas within the Clondalkin area.

The proposed development site is principally used as a commuting route and foraging area for bats. The location of the Grand Canal along the southern boundary is an important conduit for nocturnal wildlife. Currently there is outdoor lighting along the two paths on the southern bank of the Grand Canal. However there is no outdoor lighting on the northern bank of the Grand Canal within the proposed development site. Therefore it is essential that one side of the Grand Canal remains in darkness to allow nocturnal wildlife to move at night time. Therefore, the Grand Canal is the principal commuting corridor that connects the landscape in the south of Clondalkin and retaining this in darkness is essential for nocturnal wildlife.

5. Impact Assessment & Mitigation

The following bat species were recorded during this bat survey: common pipistrelle, soprano pipistrelle, Leisler's bat, Daubenton's bat and brown long-eared bat. This represents five of the nine resident bat species known to Ireland and five of the eight species known to County Dublin.

5.1 Impact Assessment - Loss of bat roosts

While one building (Omer Lock house), located on the tow path of the Grand Canal was surveyed, this is not within the proposed development area or under ownership of Cairn Homes. This building was not recorded as a bat roost but due to its proximity to the Grand Canal it has a Medium roost suitability.

Thirteen trees were identified within the Clonburris Phase 1 proposed development area as having a PBR value. With reference to the Tree Constraints Map, one tree deemed as a PBR is proposed to be felled.

Therefore, no bat roosts will not be impacted by the proposed development. However, one Potential Bat Roost (PBR) in a tree will be impacted.

5.2 Impact Assessment – Foraging & Commuting Habitats

The proposed development site is an agricultural site with extensive hedgerow and treelines. In order to facilitate the proposed development, this internal network of linear habitats will be removed. Therefore the foraging and commuting habitats for local bat populations will be impacted on.

5.3 Impact Assessment – Construction and Operation of residential development

The construction and operation of the proposed residential development will potentially increase the degree of light (both street and residential lighting) spilling onto the treeline and wooded habitats within the survey area.

There is a commitment to limit the degree of lighting adjacent to the Grand Canal. This is an important step and it should be considered that no lighting will be located along the canal tow path and within 30m of the canal's northern bank to ensure that there is a dark corridor for nocturnal wildlife.

5.4 Landscape Plan & Tree Strategy

The Tree Strategy Plan provides details of the trees to be retained. The trees identified as Potential Bat Roosts (PBRs) are proposed to be retained. The Landscape Master Plan also indicates that there is a pedestrian/cycle greenway zig zagging along the treeline of the southern section of the proposed development site adjacent to the Grand Canal. This will be part of the proposed Grand Canal Park which will provide a tall vegetation buffer zone from proposed residential buildings within the proposed development site and the Grand Canal. To ensure that this buffer is effective for nocturnal wildlife, there should be no lighting be located along the canal tow path and within 30m of the canal's northern bank. There is also plans to provide additional tree planting throughout the proposed development site.



Figure 7a: Tree Strategy Plan (Source: Murray & Associates Landscape Architects)



Figure 7b: Grand Canal Park (Source: Murray & Associates Landscape Architects)

5.5 Lighting Plan

The lighting plan took into consideration the importance of retaining an dark ecological corridor along the southern boundary of the proposed development adjacent to the Grand Canal. Apart from an access point to the greenway off the public roadway (eastern boundary) there is no lighting proposed within 30m of the Grand Canal pNHA boundary. As a consequence, there is no light spillage on to the surface of Grand Canal. This is assisted by the retention of the mature treeline between the proposed development and the Grand Canal tow path.



Figure 8a: Lighting Plan (Source: Sabre Electrical Services Ltd.).

The Horizontal illuminance (LUX) details the spread of light (Isolux contours shown are 5.0, 3.0, 1.0 & 0.5 lux). The figure below also details the lighting levels within Grid 4 which is located along the eastern boundary of the proposed development site with a pathway leading to the Grand Canal. The LUX level range from 1.19 to 11.09 LUX with an average of 5.59 LUX. This will be coupled with directional luminaires and 2700 Kelvins to meet BCT (2018) guidelines.



Figure 8b: Lighting Plan (Source: Sabre Electrical Services Ltd.).

5.6 Landscape Plan

The principal component of the Landscape Master Plan that will benefit local bat populations is the creation of two parks, the Grand Canal Park (2.85 ha) and the Local Park (1.56 ha). The Grand Canal Park will provide essential commuting and foraging areas for local bat populations but will also buffer the Grand Canal from noise and lighting during the operation of the proposed development. To increase connectivity between the two parks, it is recommended that a dense native hedgerow is planted as indicated by the Red Line on the figure below.



Figure 8c: Landscape Master Plan (Source: Murray & Associates Landscape Architecture).

In addition, there is an extensive planting regime proposed by the plan, which will be predominantly native tree species.

5.7 Impact Assessment – Overall

There is a low to medium level of bat activity within the proposed development area. Without bat mitigation measures, the proposed development will have an overall Slight to Moderate negative impact on local bat populations (Table 12). According to Tables 4a and 4b (Section 1.2.1) the following is the assessment:

- Habitat loss (potential roosting/foraging/ commuting habitat) effects on all bat species are assessed as **Permanent Slight to Moderate Negative Effects**. This is relation to the proposed removal of internal linear habitat features.
- Potential Boat Roost (PBR) loss (potential roosting/foraging/ commuting habitat) effects on all bat species are assessed as **Permanent Slight Negative Effects**.
- Disturbance and/or displacement effects on all bat species during the construction phase are assessed as **Short-term Slight to Moderate Negative Effect**. This is in relation to the outdoor lighting for the proposed development.

Table 11: Potential impact of the proposed development on the different bat species recorded during survey work.

Works	SP	CP	Leis	BLE	Daub
Lighting of development area	Minor-Moderate	Minor-Moderate	Minor	Moderate	Moderate
Removal of other linear habitats	Moderate	Moderate	Moderate	Minor-Moderate	Minor-Moderate
Removal of PBR tree	Minor	Minor	Minor	Minor	Minor
Operation of the development site	Minor-Moderate	Minor-Moderate	Minor	Moderate	Moderate
Infrastructure	Minor-Moderate	Minor-Moderate	Minor	Moderate	Moderate
Landscape Plan – Planting	Positive	Positive	Positive	Positive	Positive
Grand Canal Park	Positive	Positive	Positive	Positive	Positive

SP = soprano pipistrelle, CP = common pipistrelle, Leis = Leisler's bat, BLE = brown long-eared bat, Daub = Daubenton's bat.

However, the proposed Landscape Master Plan will have a positive impact on local bat populations, particularly the large scale planting proposed, establishment of the Grand Canal Park and Local Park and the retention of the mature treeline along the southern boundary of the proposed development site. The retraction of lighting in the Grand Canal Park will reduce the impact of the proposed development on local bat populations utilising the Grand Canal. The retention of the mature treeline along the boundary of the proposed development and the tow path of the canal will also act as a buffer zone to reduce lighting spillage.

5.8 Mitigation Measures

The following mitigation measures are recommended to reduce the potential impact of the proposed development on local bat populations, to protect local bat populations during proposed works and to conserve local bat populations post residential development.

5.8.1 Tree Felling

One PBR tree is proposed to be felled. This is a Category 2 PBR and is an Ash tree with heavy ivy growth.

- i) Erection of an alternative roosting sites are required to be erected prior to the removal of trees. These will be erected prior 6 months to tree felling to allow local bat populations to become aware of it prior to removal of the structure.
 - a. Rocket Bat Box (x3) – free-standing chamber on free standing pole (See appendices). Location of rocket box will be in dark and presented on the figure in Section 5.8.4.

Bat boxes will be erected prior to tree felling.

The PBR Tree proposed to be removed, should be felled on mild days during the autumn months of September, October or November or Spring months of February and March (felling during the spring or autumn months avoids the periods when the bats are most active).

- Category 2: Any ivy covered trees which require felling will be left to lie for 24 hours after cutting to allow any bats beneath the cover to escape.

5.8.2 Lighting Plan

It is important that any proposed lighting for the proposed residential development is wildlife friendly and that there is a provision for continued dark zones to facilitate movement of light sensitive bat species such as brown long-eared bats and Natterer's bats. This is particularly important in relation to the extension of street lighting as the town of Maynooth extends eastwards.

Nocturnal mammals are impacted by lighting. Therefore it is important that lighting installed within the proposed development site is completed with sensitivity for local wildlife while still providing the necessary lighting for human usage. It is also important that developments reduce their impact on the night sky and reduce sky glow. The "Dark Sky" principal should be followed – i.e. no upward lighting to reduce light pollution. The following principles should be followed:

- Luminaire design for any street lighting or lighting on buildings is extremely important to achieve an appropriate lighting regime. Luminaires come in a myriad of different styles, applications and specifications which a lighting professional can help to select. The following should be considered when choosing luminaires. This is taken from the most recent BCT Lighting Guidelines (BCT, 2018).
 - All luminaires used will lack UV/IR elements to reduce impact.
 - LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability.
 - A warm white spectrum (<2700 Kelvins will be used to reduce the blue light component of the LED spectrum).
 - Luminaires will feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.

- Column heights should be carefully considered to minimise light spill. The shortest column height allowed should be used where possible. Ballard lighting should be considered for pedestrian and greenway areas, if deemed necessary.
- Only luminaires with an upward light ratio of 0% and with good optical control will be used.
- Luminaires will be mounted on the horizontal, i.e. no upward tilt.
- Any external security lighting will be set on motion-sensors and short (1min) timers. The intensity of external lighting should be limited to ensure that skyglow does not occur in order to reduce light pollution.
- As a last resort, accessories such as baffles, hoods or louvres will be used to reduce light spill and direct it only to where it is needed.

In addition to above the following should also be followed:

No lighting, where possible, should be erected in the following areas:

- Grand Canal Park
- Other park areas
- Along the greenway

The lighting plan for once section of the cycle routes and pedestrian walkways to allow access to the Grand Canal tow path should strictly adhere to the guidelines listed above. It is essential that lighting is only used where required and that where used, it aims not to cause light pollution (i.e. upward sky glow).

5.8.3 *Landscape Plan*

This plan (described in Section 5.4) include the following proposals:

- Retention of tree groups, treelines and individual trees along the southern boundary.
- Development of Grand Canal Park.
- Extensive planting of native tree and shrub plant species.
- New treelines and hedgerows both within the proposed along the western boundary of the site to ensure that there is connectivity for the proposed park north of the railway line to the Grand Canal.

It is recommended that a native hedgerow with individual trees (Alder, Birch, Crab apple, Rowan etc.) is planted along the western boundary linked in with the current landscaping measures. This additional planting will act as a buffer zone to ensure that there is dark zone along the specified boundaries.

It is also recommended that gaps in the treeline along the southern boundary of the proposed development site are also planted to ensure that there is a continuous dense linear habitat. The tree mix should contain the species listed above along with native Oak tree species.

5.8.4 *Supplementary Roosts*

It is recommended that a bat box scheme should be erected within the landscaping plan for the proposed development. This is in the form of three rocket bat boxes to be erected within the boundary habitats and parks.

Bat boxes scheme be sited carefully and this will be undertaken by a bat specialist. The rocket bat boxes are to be erected on a 5m pole fixed in 1m³ of 40 newton strength concrete (Please see appendices for details). Four possible locations are presented, with 3 of these to be chosen.



Figure 9a: Tree Strategy Plan with proposed locations for rocket bat boxes (Source: Murray & Associates Landscape Architects).

5.8.5 Monitoring

Monitoring is recommended post-construction works. This monitoring should involve the following aspects:

- Inspection of bat boxes within one year of erection of bat box scheme/rocket box and alternative roosts for Natterer's bat and brown long-eared bats. Register bat box scheme, rocker bat boxes and supplementary roosts with Bat Conservation Ireland. This should be undertaken for a minimum of 2 years in relation to bat boxes/rocket bat boxes.
- Monitoring of any bat mitigation measures. All mitigation measures should be checked to determine that they were successful. A full summer bat survey is recommended post-works.

If the mitigation measures recommended in this report are strictly followed the potential impact of the proposed development on local bat populations will be reduced. In relation to the Grand Canal and associated mature treelines (southern boundary of the proposed development site), the principal area for foraging and commuting bats, the extensive landscape and lighting measures will mean that the potential negative impacts are reduced to **Not Significant**. However, overall the potential impact of the proposed development is deemed as **Permanent Slight Negative Effects**. This is primarily due to the loss of internal linear habitat network within the proposed development site as foraging and commuting habitat for local bat populations.

6. Survey Conclusions

Five bat species were recorded in total by the array of bat surveys completed for this survey site.

Three of the bat species recorded were common pipistrelle, Leisler's bat and soprano pipistrelle and these are the three most common bat species in Ireland.

- Soprano pipistrelles were the most frequently encountered bat species and were recorded during all walking transects and static surveillance surveys. While this species was recorded foraging and commuting throughout the survey area, the majority of the bat encounters were in vicinity of the treeline along the Grand Canal. In relation to static surveillance a Low level of bat activity was recorded for this species of bat.
- Common pipistrelle was the third most frequently encountered bat species. Common pipistrelles were recorded during all walking transects and static surveillance surveys. This species was recorded foraging throughout the survey area with records distributed along the hedgerows, treelines and located along the treeline adjacent to the canal. In relation to static surveillance a Low to Medium level of bat activity was recorded for this species of bat.
- Leisler's bats were the second most frequently recorded bat species. Leisler's bats were recorded during all walking transects and static surveillance surveys. This species was recorded foraging throughout the survey area with the majority of the records located along the mature treelines within the internal linear habitat network and along treelines adjacent to the canal. In relation to static surveillance a Low level of bat activity was recorded for this species of bat.

The remaining three bat species are considered to be less common in Ireland but also recorded in low levels within the proposed development area.

- Brown long-eared bats were only recorded during static surveillance during 2020 and on static units located along hedgerows within the internal linear habitat network of the survey area. A single bat pass of this bat species was recorded on the static units on the same night (16/7/2020) and therefore it is likely that it was one individual bat commuting and foraging through the survey area.
- Daubenton's bats were recorded during the 2018 walking transects and during static surveillance surveys completed in 2018 (one static unit, 3 bat passes) and 2020 (one static unit, 3 bat passes). The location of the static units was in the same grid reference point: hedgerow along the eastern section of the survey area. This species was only recorded during the 2018 walking transects and this was on the water surface of the canal.

The proposed development site is an agricultural site with extensive hedgerow and treelines. In order to facilitate the proposed development, this internal network of linear habitats will be removed. Therefore the foraging and commuting habitats for local bat populations will be impacted on. One PBR tree will be felled and this will be felled in a manner to ensure that any potential roosting bats are not harmed in the process.

The lighting plan will ensure that the guidelines recommended by BCT, 2018 will be implemented and therefore reducing the impact of the lighting plan on local bat populations.

The landscape plan aims to retain as much of the trees and treelines along the boundary of the proposed development site. It will also undertake additional planting to provide foraging and commuting habitat for local bat populations. The development of the Grand Canal Park will provide

a dark ecological corridor along the Grand Canal which will have a positive impact on local bat populations and other nocturnal wildlife. This is particularly important for commuting nocturnal wildlife.

As part of the Landscape Plan, additional bat mitigation measures have been recommended in relation to a new eastern boundary and the erection of a bat box scheme. This will increase the positive conservation of the sections of the proposed development for local bat populations.

Therefore the proposed development, if all mitigation measures including the Lighting Plan and Landscape Plan are strictly adhered to, will likely have a **Permanent Slight Negative Effects** on local bat populations, in the long-term.

However due to extensive landscape mitigation measures proposed and the proposed dark corridor within the Grand Canal Park, the proposed development will likely have a **Not Significant Negative Effects** on local bat populations along the Grand Canal. This is an important factor in protecting this linear habitat that is the primary foraging area for local bat populations within the survey area.

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8. Appendices

Appendix 1 Bat Habitat & Commuting Route Classifications

Table 1.A: Hedgerow Category (Bat Conservation Ireland, 2015)

Type of Hedgerow / Treeline	Code	Description / Bat Potential
Small Hedgerow	SH	<p>Hedgerow is less than approximately 1.5 m high, there are no, or very few, protruding bushes or trees. This type of hedgerow would provide little shelter to bats.</p> 
Medium Hedgerow	MH	<p>Hedgerow is approximately 1.5 to 3 m high. This type of hedgerow will provide foraging and commuting potential for bats.</p> 
Sparse Treeline Hedgerow	ST	<p>Hedgerow, low or medium in height, with individual trees (where tree canopies, for the most part, do not touch).</p>



		
<p>Dense Treeline Hedgerow</p>	<p>DT</p>	<p>Large uncut hedgerows or treelines, dominated by mainly large tree or very tall scrub species (e.g. tall hawthorn, blackthorn or hazel), where the canopies are mostly touching.</p> 

Table 1.B: Habitat Classification (Bat Conservation Ireland, 2015, based on Fossit, 2000)

Cultivated land		Salt marshes		Exposed rock		Fens/flushes	
Built land		Brackish waters		Caves		Grasslands	
Coastal structures		Springs		Freshwater marsh		Scrub	
Shingle/gravel		Swamps		Lakes/ponds		Hedges/treelines	
Sea cliffs/islets		Disturbed ground		Heath		Conifer plantation	
Sand dunes		Watercourse		Bog		Woodland	

Appendix 2 Light Treatments

Lighting, including street lights come in an array of different types. The Information Box provided below is taken from BCT, 2018 and provides an comprehensive summary of lighting types.

INFORMATION BOX – Type of Lights used in exterior lighting applications, (Taken directly from BCT, 2018)

Low-pressure sodium lamps (SOX) (orange lamps seen along roadsides). Light is emitted predominantly at one wavelength, contains no ultraviolet (UV) light, and has a low attraction to insects. The lamps tend to be large which makes it more difficult to focus the light from these lamps. These are in the gradual process of being removed or replaced, in part due to their poor colour rendition, and will not be available past 2019.

2. **High-pressure sodium lamps (SON)** (brighter pinkish-yellow lamps). Commonly used as road lighting. Light is emitted over a moderate band of long wavelengths giving little, if any, UV component, except for the version of the lamp used in horticulture. Insects are attracted to the brighter light. The lamp is of medium size and the light can be more easily directed than low pressure sodium. This lamp is still used for some main road lighting but this is being reduced; these lamps are expected to be phased out in the future.

3. **Mercury lamps (MBF)** (bluish-white lamps). These emit light over a moderate spectrum, including a larger component of UV light to which insects are particularly sensitive. Insects are attracted in large numbers along with high densities of certain tolerant bat species (Rydell & Racey 1993). They ceased to be available in the EU in 2015 and are rare now.

4. **White SON.** This is a reddish white light source. It is based on high pressure sodium technology and has the same UV component as SON. This source is no longer used and is not available now.

5. **Metal halide.** A small lamp and therefore more easy to focus light and make directional. Emits a small UV content. The light source is available in three forms a) quartz arc tube (HQI); b) ceramic arc tube (CDM-T) and c) CosmoPolis which is the newest of the ceramic forms. Still used by some for some exterior lighting applications.

6. **Light emitting diodes (LEDs).** This is the light source of choice for most local authorities. The light emitted is more directional and normally controlled by lenses or sometimes reflectors. The light is produced in a narrow beam. It is an instant light source. LED is available in a number of colour temperatures. Older installations tend to use 'cool white' (blueish colour) at >5700° Kelvin. More recently, 4000°K has become more commonly used. 'Warm white' (more yellow/orange colour) at around 3000°K and as low as 2700°K can now be used with little reduction in lumen output. LED typically features no UV component and research indicates that while lower UV components attract fewer invertebrates, warmer colour temperatures with peak wavelengths greater than 550nm(~3000°K) cause less impacts on bats (Stone, 2012, 2015a, 2015b).

7. **Tungsten halogen.** Is not used in new lighting schemes but may be encountered as security light on a private household.

8. **Compact fluorescent.** Mostly in use in residential street lighting. It produces a white light; variants are available with minimal UV output. It can be used at a low wattage and therefore on a low output to achieve low levels of illuminance (measured in lux).

Appendix 3 Rocket Bat Boxes

An Irish supplier of this type of bat box is:

[Shop - Eire Ecology](#) - Rocket Bat Box



9. Bat Species Profile

9.1 Leisler's bat

Ireland's population is deemed of international importance and the paucity of knowledge of roosting sites, makes this species vulnerable. However, it is considered to be widespread across the island. The modelled Core Area for Leisler's bats is a relatively large area that covers much of the island of Ireland (52,820km²). The Bat Conservation Ireland Irish Landscape Model indicated that the Leisler's bat habitat preference has been difficult to define in Ireland. Habitat modelling for Ireland shows an association with riparian habitats and woodlands (Roche *et al.*, 2014). The landscape model emphasised that this is a species that cannot be defined by habitats preference at a local scale compared to other Irish bat species but that it is a landscape species and has a habitat preference at a scale of 20.5km. In addition, of all Irish bat species, Leisler's bats have the most specific roosting requirements. It tends to select roosting habitat with areas of woodland and freshwater.

Irish Status	Near Threatened
European Status	Least Concern
Global Status	Least Concern
Irish Population Trend	2003-2013 ↑
Estimated Irish Population Size	73,000 to 130,000 (2007-2013) Ireland is considered the world stronghold for this species
Estimate Core Area (Lundy <i>et al.</i> 2011)	52,820 km ²

Taken from Roche *et al.*, 2014, Lysaght & Marnell, 2016 & Marnell *et al.*, 2019

The principal concerns for Leisler's bats are poorly known in Ireland but those that are relevant for this survey area are as follows:

- Selection of maternity sites is limited to specific habitats;
- Relative to the population estimates, the number of roost sites is poorly recorded;
- Tree felling, especially during autumn and winter months; and
- Increasing urbanisation.

9.2 Common pipistrelle

This species is generally considered to be the most common bat species in Ireland. The species is widespread and is found in all provinces. The modelled Core Area for common pipistrelles is a large area that covers much of the island of Ireland (56,485km²) which covers primarily the east and south east of the area (Roche *et al.*, 2014). The Bat Conservation Ireland Irish Landscape Model indicated that the Common pipistrelle selects areas with broadleaf woodland, riparian habitats and low density urbanization (<30%) (Roche *et al.*, 2014).

Irish Status	Least Concern
European Status	Least Concern
Global Status	Least Concern
Irish Population Trend	2003-2013 ↑
Estimated Irish Population Size	1.2 to 2.8 million (2007-2012)
Estimate Core Area (km ²) (Lundy <i>et al.</i> 2011)	56,485

Taken from Roche *et al.*, 2014, Lysaght & Marnell, 2016 & Marnell *et al.*, 2019

Principal concerns for Common pipistrelles in Ireland that are relevant for this survey area are as follows:

- Lack of knowledge of roosting requirements
- This species has complex habitat requirements in the immediate vicinity of roosts. Therefore, careful site specific planning for this species is required in order to ensure all elements are maintained.
- Renovation or demolition of derelict buildings.
- Tree felling
- Increasing urbanisation (e.g. increase in lighting)

9.3 Soprano pipistrelle

This species is generally considered to be the second most common bat species in Ireland. The species is widespread and is found in all provinces, with particular concentration along the western seaboard. The modelled Core Area for soprano pipistrelle is a large area that covers much of the island of Ireland (62,020km²). The Bat Conservation Ireland Irish Landscape Model indicated that the soprano pipistrelle selects areas with broadleaf woodland, riparian habitats and low density urbanisation (Roche *et al.*, 2014).

Irish Status	Least Concern
European Status	Least Concern
Global Status	Least Concern
Irish Population Trend	2003-2013 ↑
Estimated Irish Population Size	0.54 to 1.2 million (2007-2012)
Estimate Core Area (km ²) (Lundy <i>et al.</i> 2011)	62,020

Taken from Roche *et al.*, 2014, Lysaght & Marnell, 2016 & Marnell *et al.*, 2019

Principal concerns for Soprano pipistrelles in Ireland that are relevant for this survey area are as follows:

- Lack of knowledge of roosts;
- Renovation or demolition of structures;
- Tree felling; and
- Increasing urbanisation (e.g. increase in lighting).

9.4 Brown long-eared Bat

This species is generally considered to be widespread across the island. The modelled Core Area for Brown long-eared bats is a relatively large area that covers much of the island of Ireland (52,820km²) with preference suitable areas in the southern half of the island. The Bat Conservation Ireland Irish Landscape Model indicated that the Brown long-eared bat habitat preference is for areas with broadleaf woodland and riparian habitats on a small scale of 0.5km emphasising the importance of local landscape features for this species (Roche *et al.*, 2014).

Irish Status	Least Concern
European Status	Least Concern
Global Status	Least Concern
Irish Population Trend	2008-2013 Stable
Biographical Range	km ²
Estimate Core Area (Lundy <i>et al.</i> 2011)	49,929 km ²

Taken from Roche *et al.*, 2014, Lysaght & Marnell, 2016 & Marnell *et al.*, 2019

Principal concerns for brown long-eared bats are poorly known in Ireland, but those that are relevant for this survey area are as follows:

- Selection of maternity sites is limited to specific habitats;
- Lack of knowledge of winter roosts;
- Loss of woodland, scrub and hedgerows;
- Tree surgery and felling;
- Increasing urbanisation; and
- Light pollution.

9.5 Daubenton’s bat

The modelled Core Area for Daubenton’s bats is a relatively large area that covers much of the island of Ireland (41,285km²) reflecting the distribution of sizeable river catchments. The Irish Landscape Model indicated that the Daubenton’s bat habitat preference is for areas with broadleaf woodland, riparian habitats and low density urbanisation (Roche *et al.*, 2014).

Irish Status	Least Concern
European Status	Least Concern
Global Status	Least Concern
Irish Population Trend	2008-2013 Stable
Estimated Irish Population Size	81,000 to 103,000 (2007-2012)
Estimate Core Area (km ²) (Lundy <i>et al.</i> 2011)	41,285

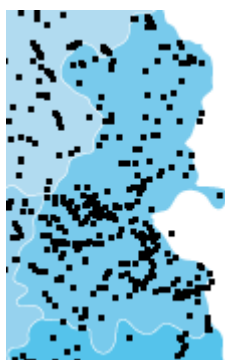
Taken from Roche *et al.*, 2014, Lysaght & Marnell, 2016 & Marnell *et al.*, 2019

Principal concerns for Daubenton’s bats are poorly known in Ireland but those that are relevant for this survey area are as follows:

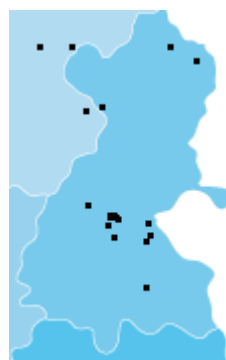
- Potential roost loss due to bridge maintenance;
- Loss of woodland and forest clearance;
- Loss of woodland, scrub and hedgerows;
- Tree surgery and felling;
- Increasing urbanisation; and
- Light pollution.

9.6 Bat Conservation Ireland Bat Species Maps

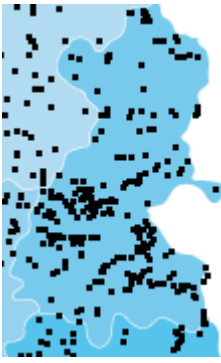
Bat records for County Dublin (Source: www.batconservationireland.org)



Common pipistrelle



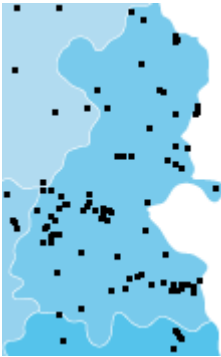
Nathusius' pipistrelle



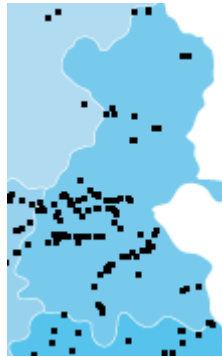
Soprano pipistrelle



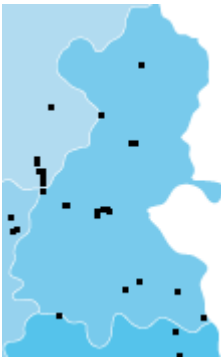
Leisler's bat



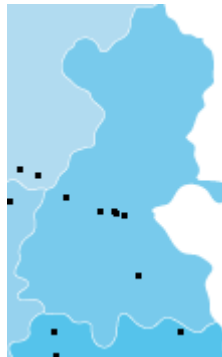
Brown long-eared bat



Daubenton's bat



Natterer's bat



Whiskered bat



Lesser horseshoe bat

