KPMG

Future Analytics

Environmental Impact Assessment Report (EIAR)

Volume 2 Main Report

for a Strategic Housing Development (SHD) at Holybanks, Swords, Co. Dublin

On behalf of

CAIRN HOMES PROPERTIES LTD.

March 2022

2-373 RPT Holybanks SHD_EIAR

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Note:

Volume 1 contains the Non-Technical Summary

Volume 3 contains the appendices

1. Introduction

1.1 Introduction

This Environmental Impact Assessment Report accompanies a planning application lodged by Cairn Homes Properties Ltd. for permission for a Strategic Housing Development (SHD) at a site with an area of c. 14.17 hectares, at Holybanks, Swords, Co. Dublin.

The subject site is situated on the northern fringe of the built-up area of Swords Town surrounded by a mix of commercial and residential use. The site has an irregular shape and is bound by Glen Ellan Road to the south, Jugback Lane/Terrace to the west, the former Celestica factory site to the east and the Broadmeadow river to the north. Currently, there are no structures or buildings existing on the lands.

1.2 Proposed Scheme

An overview of the key elements of the proposed SHD is set out below (please refer to Chapter 3 Description of Development for full details).

- The proposed development will consist of a residential scheme of 621 no. units (145 no. 1-bed units, 278 no. 2-bed units, 187 no. 3-bed units and 11 no. 4-bed units) comprising 349 no. apartments, 118 no. houses and 154 no. duplex units.
- Building heights range from 1 no. to 7 no. storeys (over basement level).
- The scheme provides for public open space, communal open space areas, a crèche, residential amenities (including concierge, multi-purpose room, meeting room and gym), a new public park to the north of the site as an extension to Broadmeadow Riverside Park and services / bin store areas.
- The development provides for a total of 705 no. car park spaces, 856 no. secure bike parking spaces and 21 no. motorbike spaces at basement, under-croft, and surface level.
- Principal vehicular access to the site is from Glen Ellan Road, with an additional new secondary site entrance provided from Jugback Lane/Terrace. Pedestrian connections are provided to the site from Jugback Lane/Terrace, Glen Ellan Road and the proposed Broadmeadow Riverside Park extension.
- The development also includes infrastructure upgrade works to local roads junctions, and existing Irish Water infrastructure including the construction of a stormwater storage tank and an overflow outfall gravity sewer to the Broadmeadow river, all associated ancillary and site development works above and below ground including hard and soft landscaping, boundary treatments, lighting, SuDs, pumping station, ESB substations and services to facilitate the development.
- As part of the proposed development, temporary permission (3 no. years) is sought for a single-storey Marketing Suite and associated signage (including hoarding) during the development construction stage.

The phasing plan for the development proposal is set out in Table 1.1

Table 1-1 Phasing Plan

Phase 1 – c. 196 units	Phase 2 – c. 76 units	Phase 3 – c. 349 units
○ 110 no. houses, 8 no. maisonette and 78 no. duplex units ○ Main link road and entrance ○ Broadmeadow riverside park and majority of central green spine ○ Public open space areas	○ c. 76 no. duplex units ○ Associated open space beside duplex units	○ c. 349 no. apartment units ○ Entrance plaza and remaining landscape elements ○ Residential amenities and Creche

○ Infrastructural upgrade works – to local roads, stormwater storage tank and outfall pipeline		

It is anticipated that Phase 1 will be fully developed and occupied by the end of 2023, phase 2 fully developed and occupied by the end of 2025 and phase 3 fully developed and occupied by 2027. However, these are aggressive targets and are subject to revision in the event of unforeseen circumstances such as further lockdowns, global supply chain issues etc.

This proposal will bring this currently undeveloped, and therefore underutilised, strategically located urban site into positive, beneficial use. The proposed scheme is cognisant of the existing urban environment and the demand for housing in Dublin. The Eastern and Midland Regional Spatial and Economic Strategy (RSES) recognises the central and strategic role that Swords plays in the context of the metropolitan Dublin area. The RSES acknowledges the role of Swords, as a "strong active urban place…with strong transport links". The designation of the town as a 'Metropolitan Consolidation Town' reinforces its capacity to cater for a large and skilled population base whilst having substantial ability to provide for international and regional economic development and growth.

The proposed development responds to and satisfies the zoning objective for the lands – **Metro-Economic Corridor (ME)** by delivering a primarily residential use with associated ancillary services and facilities featuring childcare, community, open space and utility installation uses in line with the ME zoning objectives.

The site is also located within the Estuary West Lands, as designated by the Fingal County Development Plan 2017-2023 and is the subject of the Estuary West Masterplan (May 2019), a non-statutory plan.

The subject site / gross application area (14.17ha) as shown in red outline in Figure 1.1 includes the proposed works at the Broadmeadow Riverside Park, the Irish Water upgrade works comprising stormwater storage tank and outfall pipeline, and the upgrade works to local roads the R132/R125 junction roundabout upgrade works to the south (as the insert image on top right corner of Figure 1.1 shows).

The purpose of this Environmental Impact Assessment Report (EIAR) is to assess the likely and significant direct and indirect environmental impacts of the proposed development to enable An Bord Pleánala to carry out an EIA of the proposed development. To interpret and describe in detail these impacts, and scope how they can be minimised or ameliorated. The final output of the assessment is presented in the form of this Environmental Impact Assessment Report (EIAR) which accompanies the planning application for the development to the Competent Authority. In turn, the Competent Authority will carry out an EIA in order to reach a reasoned conclusion on the significant effects of the project on the environment. A full description of the proposed development is provided in chapter 3 of this EIAR document.

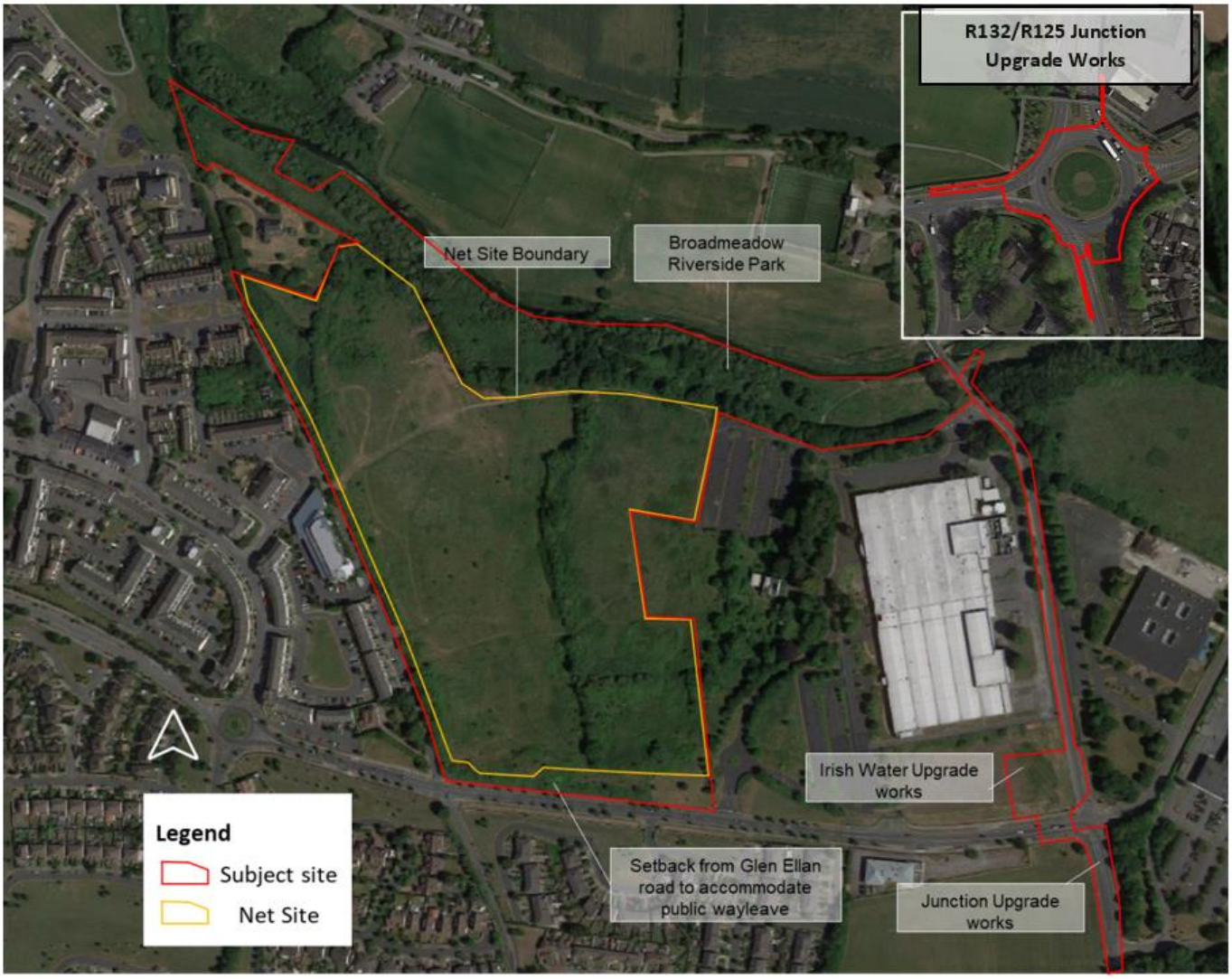

Figure 1-1: Map showing site location with road upgrade works to the south shown in insert image

1.3 Definition of EIA

The 2014 EIA Directive (2014/52/EU) defines 'Environmental Impact Assessment' as a process consisting of the preparation of an environmental impact assessment report by the developer, for the examination of the competent authority to reach a reasoned conclusion on the significant effects of the project on the environment. EIA Directives have been transposed into the Irish law by way of the *Planning and Development Acts 2000* (*As amended*) and *Planning and Development Regulations* 2001-2018.

As defined by Directive 2014/52/EU and restated within the *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* by the Department of Housing, Planning and Local Government, 2018, it is a process consisting of:

(a) the preparation of an Environmental Impact Assessment Report (EIAR) by the developer
(b) the carrying out of consultations
(c) the examination by the competent authority of the EIAR, any supplementary information provided, where necessary, by the developer and relevant information received through consultations with the public, prescribed bodies and any affected Member States
(d) the reasoned conclusion of the competent authority on the significant effects of the project on the environment, and

(e) the integration of the competent authority's reasoned conclusion into any development consent decision.

The 2017 Draft *Guidelines on the information to be contained in an EIA* by the EPA refers to the EIAR as '*a statement of the effect if any, which proposed development if carried out would have on the environment.'*

The EIAR is prepared by the developer and is submitted to a CA[1] as part of a consent process. The CA uses the information provided to assess the environmental effects of the project and, in the context of other considerations, to help determine if consent should be granted. The information in the EIAR is also used by other parties to evaluate the acceptability of the project and its effects and to inform their submissions to the CA.

This report prepared by or behalf of the developer on the environmental impact assessment is referred to as an Environmental Impact Assessment Report since the amended directive 2014/52/EU. It was previously referred to as Environmental Impact Statement (EIS).

1.4 Need for an EIAR

1.4.1 EIA Legislation context

This EIAR document has been prepared in accordance with the European Union EIA Directive 85/337/EC as amended by 97/11/EC, 2003/4/EC, 2011/92/EU and Directive 2014/52/EU. The EIAR has also been prepared in accordance with the *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environment Impact Assessments* (2018) and the Draft *Guidelines on the information to be contained in an EIA* published by the EPA (2017). The following key guidelines and guidance produced by EU and other government agencies were consulted in the preparation of this EIAR:

- EU Guidance on EIA Screening (European Commission 2001).
- EU Guidance on EIA Scoping (European Commission 2001).
- EIA Review Checklist (European Commission 2001).
- Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).
- Study on the Assessment of Indirect & Cumulative Impacts as well as Impact Interaction (DG Environment 2002)
- Environmental Impact Assessment (EIA), Guidance for Consent Authorities Regarding Sub-Threshold Development (DoEHLG 2003).
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).
- Development Management Guidelines (DoEHLG, 2007).
- Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports (EPA 2017)
- Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems - Key Issues Consultation Paper (Department of Environment, Community and Local Government, 2017).
- Circular letter PL 1/2017 - Advice on Administrative Provisions in Advance of Transposition (Department of Housing, Planning and Local Government, 2017).
- Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report (European Commission 2017)
- Environmental Impact Assessment of Projects – Guidance on Screening (European Commission 2017)
- Environmental Impact Assessment of Projects – Guidance on Scoping (European Commission 2017)

[1] Competent Authority (CA): The term 'competent authority' means the Minister or Public Authority to which an EIAR is required to be submitted, i.e. the authority charged with examining an EIAR with a view to issuing a consent to develop or operate

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government, 2018)]
- Environmental Impact Assessment Screening Practice Note 02 (Office of Planning Regulator, 2021)

1.4.2 EIA Screening

The 2017 *Environmental Impact Assessment of Projects: Guidance on Screening* published by the European Commission defines the screening as the stage that '*ascertains whether a projects effects on the environment are expected to be significant'*. Projects are required to undertake screening to determine whether an EIA is necessary. The Screening is carried out as per a case-by-case examination or by the thresholds set by the relevant Member State's Competent Authority. Mandatory legislative threshold requirements take into account the type and scale of the proposed development, and the sensitivity of the receiving environment.

Certain public and private projects that are likely to have significant effects on the environment are subject to EIA requirements derived from EIA Directive 85/337/EC (as amended by Council Directive 97/11/EC, Directive 2003/4/EC, Directive 2009/31/EC, Directive 2011/92/EU and recently Directive 2014/52/EU which amends EIA law in a number of respects by amending Directive 2011/92/EU) which are designed to ensure that projects likely to have significant effects on the environment are subject to a comprehensive assessment of environmental effects prior to development consent being given.

Article 2 of Directive 2014/52/EU provides that Member States shall bring into force the laws, regulations, and administrative provisions necessary to comply with the Directive by 16 May 2017.

The Department of Housing, Planning, Community and Local Government has brought forward amendments to the Planning and Development Act 2000, as amended, and the Planning and Development Regulations 2001- 2018 to provide for the transposition of the Directive into the Irish planning code. To this effect, the *European Union (Planning and Development) (Environmental Impact Assessment) Regulations* 2018 have now transposed the 2014 Directive into Irish law. The Department has also provided an update to the 2013 *Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment* to provide practical guidance on legal and procedural issues arising from the requirement to undertake EIA in accordance with Directive 2014/52/EU.

Annex I of the EIA Directive 85/337/EC requires as mandatory the preparation of an EIA for all development projects listed therein. Schedule 5 (Part 1) of the *Planning & Development Regulations* 2001 (as amended) transposes Annex 1 of the EIA Directive directly into Irish land use planning legislation. The Directive prescribes mandatory thresholds in respect to Annex 1 projects. Annex II of the EIA Directive provides EU Member States discretion in determining the need for an EIA on a case-by-case basis for certain classes of project having regard to the overriding consideration that projects likely to have significant effects on the environment should be subject to EIA. Schedule 5 (Part 2) of the *Planning & Development Regulations* 2001 (as amended) set mandatory thresholds for each project class.

Class 10(b) (i) and (iv) addresses 'Infrastructure Projects' and requires that the following class of project be subject to EIA:

(b) (i) Construction of more than 500 dwelling units.

Furthermore, Category 10(b)(iv) refers to:

'*Urban development which would involve an area greater than 2 hectares in the case of business district, 10hectares in the case of other parts of a built-up area and 20 hectares elsewhere.'*

The requirement for an Environmental Impact Assessment Report was subject to informal screening with Fingal County Council over the course of the pre-planning consultation. The required to carry out an Environmental Impact Assessment for the proposed development is mandatory with respect to the relevant thresholds, with particular reference to urban development exceeding '*10 hectares in the case*

of other parts of a built-up area' and the potential impacts on the receiving environment' and with respect to the '*Construction of more than 500 dwelling units'.*

1.4.3 Scoping of EIAR

Cairn Homes Properties Limited is committed to ensuring that all its developments are undertaken in a responsible and sustainable manner.

The proposed development has been subject to several pre-planning meetings including formal pre-planning meetings held on 10th January 2019, 17th June 2019 (Tripartite Meeting with Fingal County Council and An Bord Pleanála) and 12th February 2021, and various other meetings held with individual Departments of Fingal County Council. An informal scoping process was carried out to identify the issues that are likely to be most important during the Environmental Impact Assessment process. This approach is consistent with the Environmental Protection Agency's *Guidelines on the information to be contained in Environmental Impact Assessment Reports* which provides that formal scoping, as per section 173(2)(a) of the Act, is not mandatory.

The EIAR prepared for the scheme has endeavoured to be as thorough as possible and therefore the provisions included in the revised EIA Directive and all of the issues listed in Schedule 6, Sections 1, 2 and 3 of the Planning and Development Regulations 2001-2018 and in recent guidance documents have been addressed in the EIAR. In this context the following topics/issues have been reviewed and addressed in the context of the proposed development:

- Population and Human Health
- Biodiversity,
- Air Quality and Climate
- Noise and Vibration
- Land, Soils and Geology
- Water
- Landscape and Visual
- Material Assets – Traffic and Transportation
- Material Assets – Waste Management
- Material Assets – Utilities
- Interactions
- Non-Technical Summary.

In addition to the above, a *Natura Impact Statement* has been prepared by Openfield Ecological Services, along with a series of independent assessments and reports that accompany the application and inform the above chapters of the EIAR where relevant. These include:

- A Site-Specific Flood Risk Assessment for the site prepared by JBA Engineering Consultants; (as a standalone report);
- Stormwater Overflow & Receiving Stream Assessment (Broadmeadow) Assimilation Simulation Evaluation report by AWN Consulting; (provided as a standalone report)
- An Outline Construction and Environmental Management Plan prepared by Waterman Moylan Engineering Consultants; (as a standalone report);
- Traffic and Transport Assessment Report prepared by Waterman Moylan Engineering Consultants with an independent Public Transport Capacity Assessment (provided as a standalone report);
- Outline Construction Waste Management Plan and Operational Waste Management Plan by AWN Consulting (provided as an Appendix to the EIAR).
- Bat Assessment, Dr. Tina Aughney, Bat Ecoservices (provided as a standalone report)

1.4.4 Consultation

The preparation of this EIAR has been informed by several pre-planning meetings with various departments of Fingal County Council and An Bord Pleanála. The approach adopted in undertaking this EIAR was discussed and largely agreed in principle during these consultations. Issues raised in

consultations have been taken on board and addressed in the compilation of this document. Where relevant, statutory bodies were consulted by the experts assigned to each topic assessed under this EIAR, details of which are provided in the relevant Chapters.

1. Irish Water
2. Department of Culture, Heritage, Regional, Rural and Gaeltacht Affairs
3. The Heritage Council
4. An Taisce – the National Trust for Ireland
5. Transport Infrastructure Ireland
6. National Transport Authority
7. Fingal County Childcare Committee
8. Inland Fisheries Ireland

1.4.5 Risk of Major Accidents and Disasters

In accordance with Article 3(2) and Annex IV of the 2014 EIA Directive, the vulnerability of the project to risks of major accidents and/or disasters, as well as likely significant effects on the environment if it did occur, are considered.

Article 3(2) of the 2014 EIA Directive states that an EIAR should consider the following: -

> *'The effects referred to in paragraph 1 on the factors set out therein shall include the expected effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned'.*

In addition, an EIAR should also contain the following information prescribed in 5(d) of Annex IV of the 2014 EIA Directive:

- "A description of the likely significant effects of the project on the environment resulting from, inter alia: (d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);"

The 2018 Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment sets out two key considerations to address this: -

• "The potential of the project to cause accidents and/or disasters, including implications for human health, cultural heritage, and the environment;

• The vulnerability of the project to potential disasters/accidents, including the risk to the project of both natural disasters (e.g., flooding) and man-made disasters (e.g., technological disasters)."

During the construction phase, the risk of accidents and/ or disasters caused by the project, arising from the potential for construction accidents, are addressed under Health and Safety Regulations and other codes. When directly relevant to the planning and EIA process, certain mitigation measures are identified in order to prevent and/ or mitigate any significant effects.

During the operational phase, the risk of fire related accidents is addressed through the Building Regulations (Fire Safety) and is also addressed through mitigation measures, where applicable. Specifically, residual risks of fire and road traffic accidents will be managed by emergency services. The risk of flooding and vulnerability of the project is addressed in the Site-Specific Flood Risk Assessment (SSFRA) prepared by JBA Consulting Ltd and submitted as part of this SHD application. Otherwise, in terms of the project, no other major accidents or disasters are considered to give rise to effects that are 'likely' and 'significant'.

Decommissioning will not be required given the nature of this project for a strategic housing development and has therefore not been considered as part of this assessment.

1.5 Structure and Content of EIAR

The content of this EIAR has been prepared as per the guidance provided in Article 5(1) and Annex IV of the amended Directive (2014/52/EU). Environmental Protection Agency's *Guidelines on the information to be contained in Environmental Impact Assessment Reports* describes what an EIAR is to contain in accordance with Article 5(1), as follows:

a) *a description of the project comprising information on the site, design, size and other relevant features of the project;*

b) a description of the likely significant effects of the project on the environment;

c) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;

d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment.

e) a non-technical summary of the information referred to in points (a) to (d); and

f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.

The EPA '*Guidelines on the information to be contained in Environmental Impact Assessment Reports*' Draft August 2017 describe inclusion of the following as good practice in the preparation of an EIAR:

- Key alternatives considered;
- Proposed project;
- Receiving environment;
- Likely significant effects; and
- Mitigation and monitoring measures and residual effects.

A non-technical summary is also required to be provided. This is provided as a separate volume to this report. This section will provide core information of the assessments in a simpler language and condensed format to ensure that the public and local community are aware of the likely environmental impacts of the proposed development.

As per article 3(1) of Directive 2014/52/EU *the environmental impact assessment shall identify, describe, and assess in an appropriate manner, in the light of individual case, the direct and indirect significant effects of a project on the following factors:*

(a) population and human health;
(b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;
(c) land, soil, water, air and climate;
(d) material assets, cultural heritage and the landscape;
(e) the interaction between the factors referred to in points (a) to (d)

This EIAR includes all necessary technical studies to address the likely environmental impacts of the construction and operation of the proposed development. The disciplines identified for inclusion in this EIAR, along with the technical content, were determined based on a various site walkover surveys, completion of an environmental scoping exercise (to inform the content and extent of matters covered in the environmental information) and consultation with statutory bodies. The EIAR is presented in three volumes as follows:

- Volume 1 – Non-Technical Summary (NTS)

- Volume 2 – EIAR
- Volume 3 – EIAR Appendices

Within the main body of the EIAR (Volume 2), Chapter 1 sets out the introduction and methodology, Chapter 2 sets out the background to the scheme with a description of the local area and receiving environment, Chapter 3 describes the proposed development and Chapter 4 outlines the alternatives considered.

The environmental topics where there is potential for significant impacts to arise are addressed in Chapters 5 to 15 as follows:

Chapter 1	Introduction
Chapter 2	Background to the Scheme
Chapter 3	Description of the Scheme
Chapter 4	Alternatives Considered
Chapter 5	Air Quality & Climate
Chapter 6	Noise & Vibration
Chapter 7	Biodiversity
Chapter 8	Archaeological, Architectural & Cultural Heritage
Chapter 9	Landscape & Visual
Chapter 10	Land, Soils and Geology
Chapter 11	Water
Chapter 12	Population & Human Health
Chapter 13	Material Assets -Traffic & Transport
Chapter 14	Material Assets - Waste Management
Chapter 15	Material Assets - Utilities

Cumulative impacts for all relevant disciplines are addressed in each chapter with a summary table provided in Chapter 2 also. Interactions between disciplines are addressed in Chapter 16 and a summary of mitigation measures and residual impacts are set out in in Chapter 17.

Where appropriate, each of the main sections of this report are structured in the same general format, as follows:

- An introduction describing the purpose of the section and setting out the qualifications and experience of the author;
- A description of the methodology used in the section;
- A description of the aspects of the existing environment relevant to the environmental topic under consideration;
- Characteristics of the proposed development under consideration;
- An assessment of the impact of the proposed development on the environmental topic;
- Recommendations for mitigation measures to reduce or eliminate any significant negative impacts identified; and,
- An assessment of the residual impact that will remain, assuming that recommended mitigation measures are fully and successfully implemented.
- Summary of interactions, where identified;
- Monitoring measures, where relevant;
- References.

Further details of the methodology and discipline specific best practice and guidance are presented in the relevant Chapters included within this report.

Details of the project will be available online through the EIA Portal[2] and on the website of the Competent Authority. A copy of the application, including this EIAR, will also be available on the project specific website for this SHD development - www.holybanksshdplanning.com

1.6 General EIAR Methodology

1.6.1 Introduction

The methodology adopted for the preparation of this EIAR comprised a systematic analysis of the impact of the Proposed Project in relation to the existing environment. The overall methodology for preparation of the EIAR is discussed under the following headings;

- Basis for assessment;
- Impact assessment and mitigation; and
- Significance of environmental issues.

1.6.2 Basis for Assessment

The impact assessment examines the existing environmental conditions within the study area for each element of assessment and then determines the potential impacts associated with the Proposed Project during its construction and operational phases.

The study area considered within this EIAR differed for each environmental aspect and extended to incorporate all areas where there was potential for significant impact (i.e. any sensitive areas which could be affected by this development were included in the study area). Further information on the extent of the study area considered for each topic is addressed in the relevant corresponding EIAR chapter.

1.6.3 Impact Assessment and Mitigation

The preparation of the EIAR was an iterative process, linking into the design development process. The approach adopted in the impact assessment and preparation of the EIAR was based on the recommendations in the *Draft Guidelines on information to be contained in Environmental Impact Assessment Reports (EPA, 2017)*.

The proposed design was developed and the potential impacts of the proposal on the receiving environment were identified. Mitigation measures, once identified and assessed, have been incorporated into the design, where possible.

1.6.4 Residual Impacts

Residual impacts relate to environmental change(s) which will occur after the proposed mitigation measures have been put in place and taken effect. Although there may be some residual impacts which arise from any development, these impacts are usually considered to be minimal in nature.

1.6.5 Significance of Environmental Issues

The glossaries contained in the Draft Guidelines on the information to be contained in EIAR (EPA, 2017) describes an impact as '*change resulting from the implementation of project*.'

The following factors were considered when determining the significance of the impact (both positive and negative) of the Proposed Project on the receiving environment:

- The quality and sensitivity of the existing/baseline receiving environment;
- The relative importance of the environment in terms of national, regional, county, or local importance;
- The degree to which the quality of the environment is enhanced or impaired;

[2]https://housinggovie.maps.arcgis.com/apps/webappviewer/index.html?id=d7d5a3d48f104ecbb206e7e5f84b71f1

- The scale of change in terms of land area, number of people impacted, number and population of species affected, including the scale of change resulting from cumulative impacts;
- The consequence of that impact/change occurring;
- The certainty/risk of the impact/change occurring;
- Whether the impact is temporary or permanent; and
- The degree of mitigation that can be achieved.

The criteria outlined in the EPA guidelines have also been followed when quantifying the duration and magnitude of impacts. The quality of the impact is described as 'negative', 'neutral' or 'positive'. Particular consideration is also given to whether significant impacts are 'Direct' or 'Indirect'. Further information on the specific methodologies utilised for the assessment of each environmental aspect are included in the relevant EIAR chapters.

Where no impact or a positive impact was predicted to occur, the design of the Proposed Project remained unchanged. Where significant adverse impacts are predicted, mitigation measures are proposed to avoid or minimise impacts. Where feasible, these measures were then incorporated into the design of the Proposed Project.

Following on from a grant of planning permission, the proposed project will progress to construction stage. All mitigation measures set out within this EIAR and which are applicable to construction of the project and operation of the development, will be adhered to. This includes any mitigation measures contained in such planning permission, as may be granted.

The construction of the development will be undertaken in accordance with the conditions of any forthcoming planning approval received for the scheme.

Any further modification to the Proposed Project to improve/reduce environmental impacts will only occur where such modifications are minor/points of detail. The final Proposed Project design and construction will comply with all relevant statutory approvals.

1.7 EIAR and Design Team

This EIAR has been prepared by KPMG Future Analytics (KPMG FA) and various competent specialist sub-consultants on behalf of Cairn Homes Properties Ltd. The list below presents the subject matter experts[3] who contributed to the preparation of the report and their qualifications. Further details on the experience of the experts are set out in each chapter of this EIAR.

Table 1-2 Experts who contributed to the preparation of the EIAR

Environmental Aspect	Company Name	Person Responsible	Qualification
EIAR Manager	KPMG Future Analytics	Maria Rochford	BSc (Hons.) MSc MIPI
EIAR Reviewer	KPMG Future Analytics	Stephen Purcell	BSc. (Hons) MRUP MSc. MIPI FSCSI FRICS
Air Quality and Climate Factors	AWN	Niamh Nolan	BSocSci (Hons) in Social Policy and Geography
Noise and Vibration	AWN	Alistair Maclaurin	BSc PGDip MIOA
Biodiversity	Openfield	Pádraic Fogarty	BSc, MSc, IEMA
Archaeology and Cultural Heritage	IAC	Faith Bailey	MA, BA (Hons), MCIfA, MIAI
Architectural Heritage	Historic Building Consultants	Rob Goodbody	BA (MOD), DIP ENV P, DIPABRC, MUBC, MA

[3] EPA guidance requires experts preparing an EIAR to list to include: (ii) his or her competence and experience, including relevant qualifications, if any, in relation to such parts, and (iii) such additional information in relation to his or her expertise that the person or persons preparing the EIAR consider demonstrates the expert's competence in the preparation of the report and ensures its completeness and quality."

Environmental Aspect	Company Name	Person Responsible	Qualification
Landscape and Visual Impact	Cunnane Stratton Reynolds	Evelyn Sikora Declan O'Leary	BA Landscape Architecture, MA Planning and Sustainable Development (UCC), MILI B.Agr Sc. Land. Hort., Dip LA., CLI, MILI
Land, Soils and Geology	Waterman Moylan	Joe Gibbons	Dip Eng CEng MICE MIEI
Water	Waterman Moylan	Joe Gibbons	(As above)
Population and Human Health	KPMG Future Analytics	Maria Rochford Sandra Eapen Stephen M. Purcell	(As above)
Material Assets: Waste Management	AWN	Chonaill Bradley	BSc ENV AssocCIWM
Material Assets: Traffic and Transport	Waterman Moylan Independent Transport Consultant	Emma Caulwell Joe Gibbons Derry O'Leary	CEng MICE (As above) CEng
Material Assets: Utilities	Waterman Moylan	Joe Gibbons Niall Coughlan	(As above) CEng

1.8 Difficulties Encountered During the Study

Difficulties encountered in the preparation of the EIAR are outlined in each chapter as they relate to the various environmental topics.

1.9 References

- European Union (2018) The European Union (Planning and Development) (Environmental Impact Assessment) Regulations
- European Union (1999) European Communities (Environmental Impact Assessment) (Amendment) Regulations (S.I. No. 93 of 1999)
- Irish Statute (2000) The Planning and Development Act (No. 30 of 2000), as amended
- Irish Statute (2001) Planning and Development Regulations (S.I. No. 600 of 2001) as amended
- European Commission, (2001) Guidance on EIA – Scoping
- EPA (2017) Draft Guidelines on preparation of Environmental Impact Assessment Reports
- Department of the Environment, Community and Local Government (DoECLG), (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment
- EPA (2002) Guidelines on the Information to be contained in Environmental Impact Statements
- EPA (2003) Advice Notes on Current Practice in the Preparation of Environmental Impact Statements
- EPA (2015) Draft Revised Guidelines on the Information to be contained in Environmental Impact Statements
- EPA (2015) Draft Revised Advice Notes on Current Practice in the Preparation of Environmental Impact Statements
- EPA (2015) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;

- Department of Housing Planning and Local Government (2018) EIA Portal. Available from: https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal.

2. Background to the Scheme

2.1 Introduction

This section of the EIAR provides background to the proposed development and site location in accordance with the requirements set out within the EIA legislation and guidance on preparation and content of EIAR. This chapter has been prepared by Maria Rochford, MRUP MIPI, Associate Director (Planning) at KPMG Future Analytics. Maria has 10 years' experience in the planning of residential schemes including the preparation and project management of EIARs.

2.2 Subject Lands

The subject landholding consists of a disused agricultural land with an approximate gross area of c.14.17ha hectares within Estuary West Lands at Holybanks, Swords, Co. Dublin. The site is located to the north of the Glen Ellan Road, and directly west of the former Celestica site (Balheary Demesne/ Balheary Industrial Park). Jugback Lane/Terrace runs parallel with the western boundary of the site, while the Broad Meadow River runs east-west to the north of the site boundary.

The site has an irregular shape and comprises scrubland to the most part. There are no structures or buildings contained within the boundaries of the site. The site is relatively flat and slopes gently towards the Broadmeadow River. The land is dissected by a hedgerow through the centre of the site. There are currently no direct entrances to the subject landholding from Glen Ellan Road or Jugback Terrace. However, it is noted that there is an existing access way from Glen Ellan Road, close to the southeast corner of the site, which provides vehicular and pedestrian access to the former Celestica premises. A private residence is located directly adjacent to the northwest corner of the site, along Jugback Terrace.

Figure 2-1 Aerial view of subject site with location of road upgrade works to the south shown

Figure 2-2 Aerial view from south east showing subject site & location of road upgrade works

Figure 2-3 Site Location and application area outlined in red

The net site area of the site on which the SHD development is proposed is 8.92 ha (Figure 2.4). The total red line application of c.14.17ha. includes a proposed Broadmeadow Riverside Park extension to the north of the site. A portion of the Broadmeadow Riverside Park lands to the northwest are owned

by Fingal County Council – a letter of consent to include these lands in the SHD application has been provided and is available in the Planning Report accompanying this application. The remaining Broadmeadow Riverside Park lands are owned by the applicant (as shown in Figure 2.5).

The development also includes infrastructure upgrade works to local roads junctions at Glen Ellan / Balheary Road junction and R132/R125 Seatown West Roundabout to include widening of Balheary Road (South), upgrade works to cycle/pedestrian facilities and for the partial signalisation of R132/R125 junction. The requirement for these upgrade works emerged during the pre-application consultations with Fingal County Council and in response to items raised in the An Bord Pleanála Opinion. A letter of consent to include these upgrades works in the application has been provided and is available in the Planning Report accompanying this application and a map showing these areas is set out on Figure 2.5.

It also includes works to facilitate the construction of a stormwater storage tank on a corner site at the junction to Glen Ellan and Balheary Road approximately 280m east of the development and an associated outfall overflow gravity sewer to the Broadmeadow river. The proposed location for the stormwater storage tank is in the ownership of Gannon Homes Ltd. – a letter of consent for inclusion of this land within this SHD application has been provided and is available in the accompanying Planning Report (see Figure 2.5).

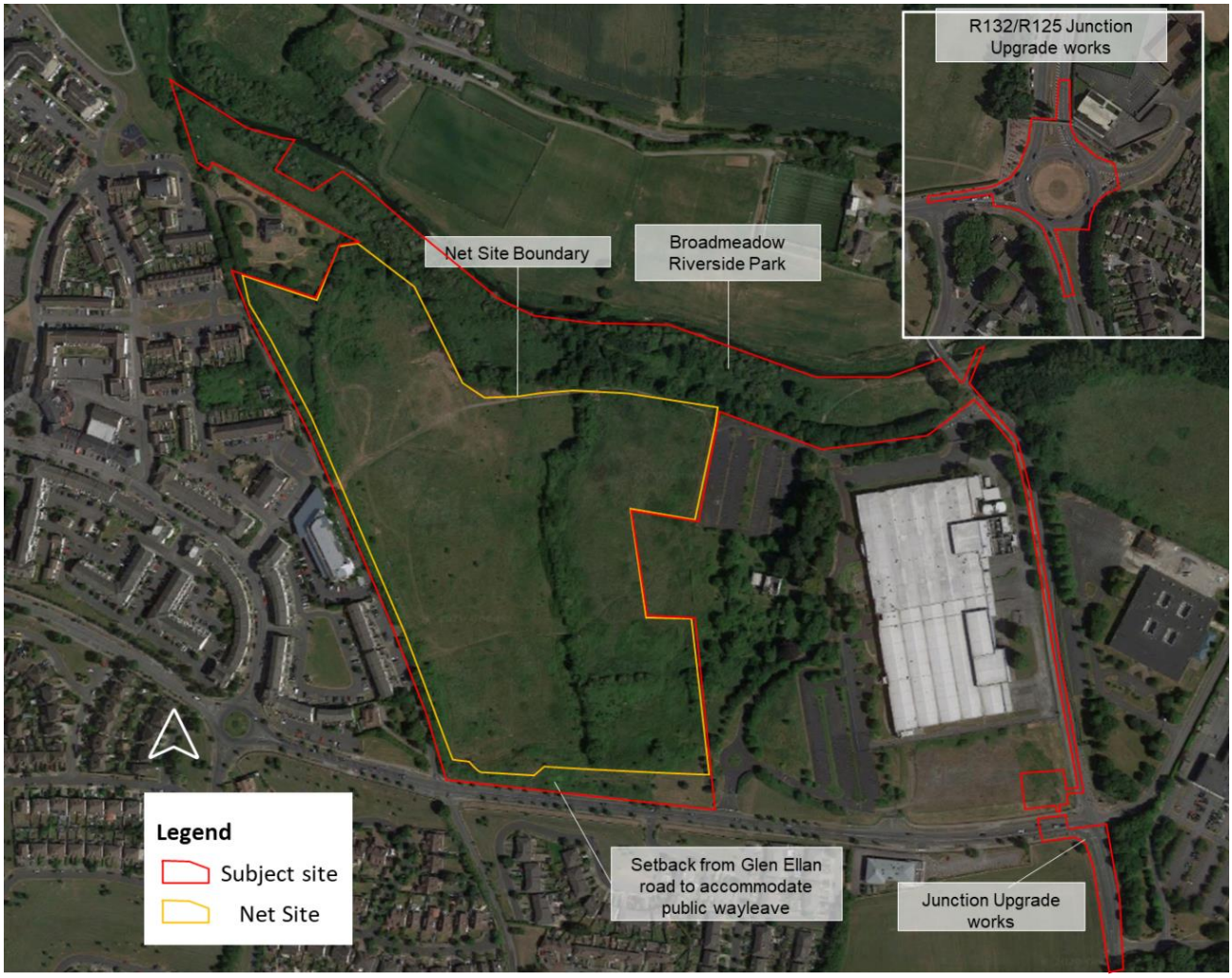

Figure 2-4 Site Boundary (Source: Google Maps, annotated by KPMG Future Analytics)

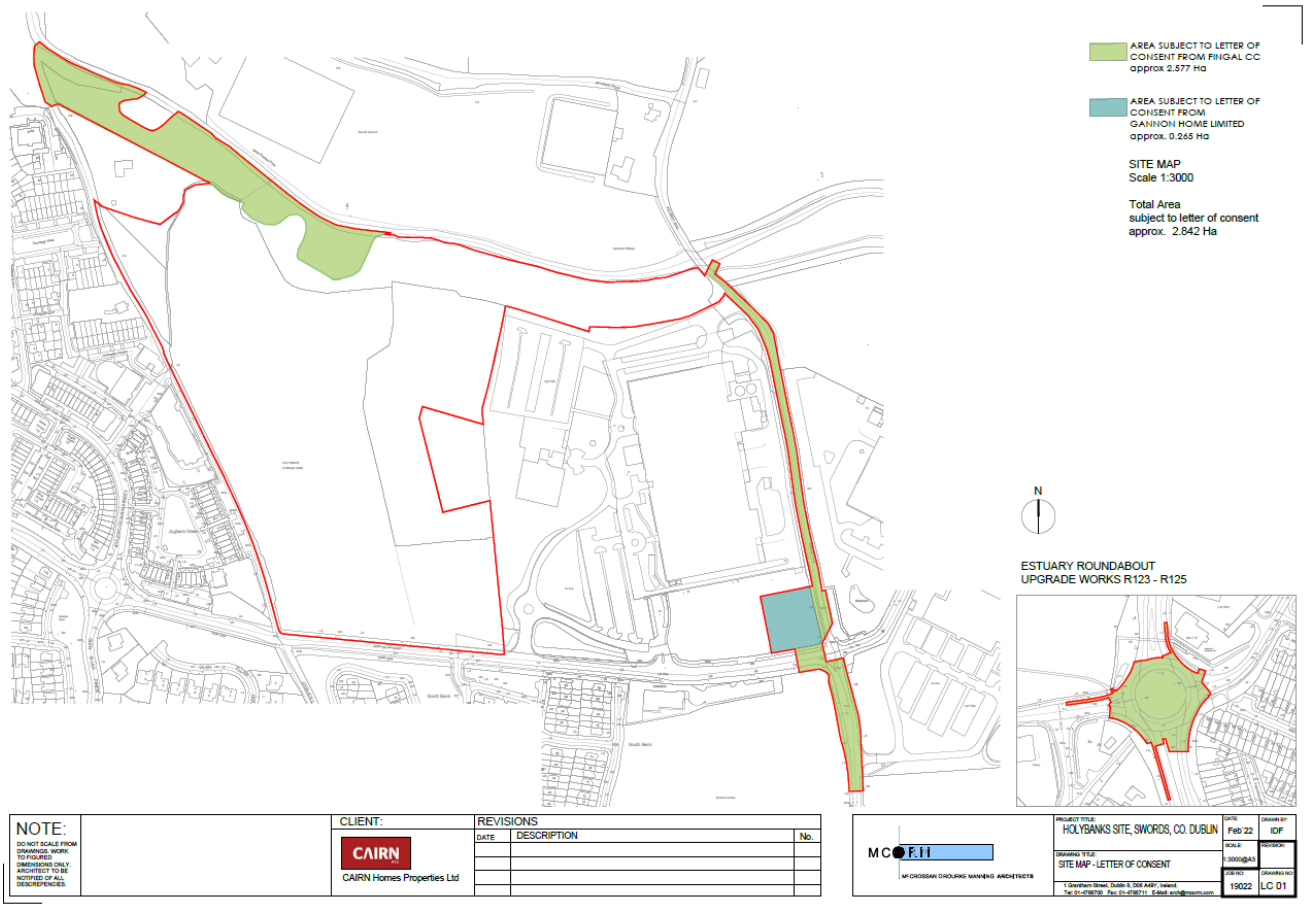

Figure 2-5 Application areas subject to letters of Consent provided by Fingal County Council and Gannon Homes Limited.

2.3 Site context

With its location on the northern edge of the built-up area of Swords, the proposed scheme is ideally positioned within convenient reach of a broad range of community facilities and services spanning healthcare, education, recreation, and amenity. The surrounding lands are predominantly residential and commercial in nature. The Balheary Industrial Park is located to the east of the subject site. The neighbouring site directly to the east of the subject landholdings contains the former Celestica factory access to which is from the Glen Ellan Road.

To the west the site is bound by Jugback Lane/Terrace, beyond which lies the Applewood residential estate. This estate comprises of a mix of housing types and apartments and is serviced by the Applewood neighbourhood centre (approx. 220m from the closest boundary to the site). The Applewood neighbourhood centre provides a range of services including a medical centre, cafes, restaurants, butchers, vet, local spar, hairdresser, and beautician. Broadmeadow Centre also provides a large gym and swimming pool and a creche directly accessible from Jugback Lane and adjacent to the site.

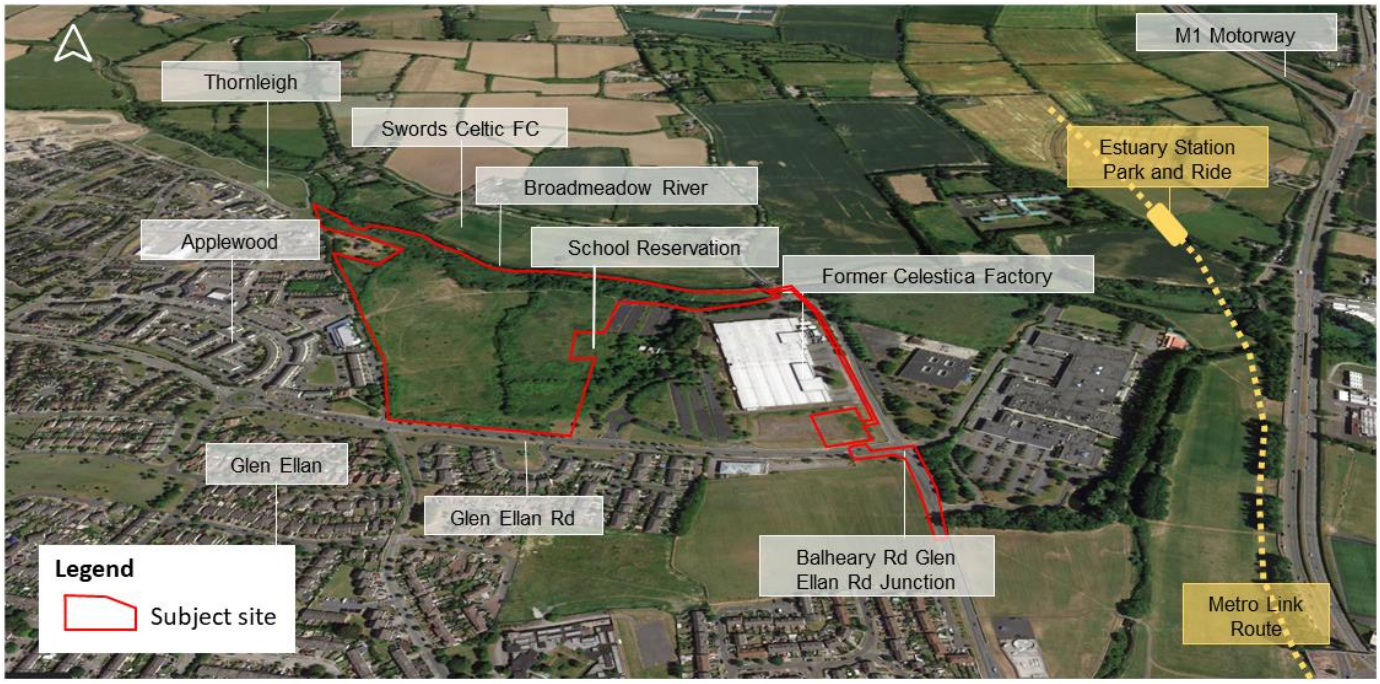

Figure 2-6 Aerial view of the main subject site (SHD lands) and environs (road upgrade works to south not shown)

A survey of social infrastructure situated within 1km of the site (undertaken in June 2020 and updated in March 2022), as set out in Table 2.1 demonstrates the variety of the local offer which includes 17 creches, 3 secondary schools and 1 primary school, all within 1km of the site. The wide provision of services and facilities in close proximity to the site of the proposed SHD demonstrates the suitability of this land for residential development purposes and the compatibility of the proposed use with the established neighbouring communities.

Figure 2-7 The Applewood Neighbourhood Centre

In line with the provisions of the Estuary West Masterplan, a portion of the Holybanks lands under the applicant's ownership, but outside the application area, have been reserved for a future school site. The 0.46 ha site is intended to facilitate a future school located to the east of the development site, as envisaged in the Estuary West Masterplan. This is a sufficient size to cater for a 16-24 room primary school. The school reservation does not form part of the development works proposed.

Table 2-1 Social Infrastructure Within 1km Buffer from the Site

Social Infrastructure Type	No.
Creche	17
Primary School	1
Secondary School	3
Pharmacy	2
Health Centre	2
Dental Practice	3
GP (Doctors Surgery)	3
Nursing Home	2
Fire Station	1
Garda Station	0
Church	1
Library	1
Bring Bank (Recycling Centre)	3
Leisure Centre	6
Total Facilities	45

Recreation facilities in close proximity to the scheme include community services, several sports clubs and playing fields, including Swords Celtic Football Club and Sports Ground which is directly adjacent the northern bank of the Broadmeadow River.

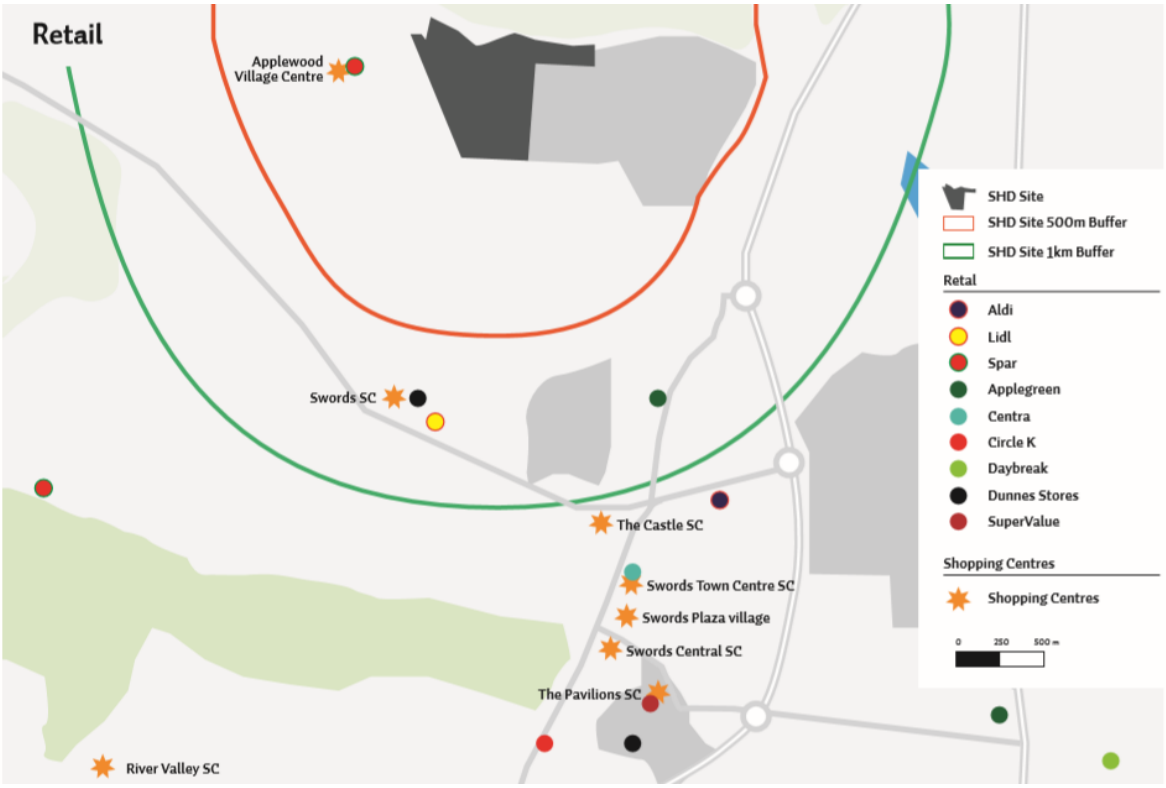

Figure 2-8: Shopping Facilities in the Study Area

Swords town centre and the Pavillion Shopping Centre will provide a broader choice to residents of the proposed scheme. Future residents of the scheme will have access to three major retailers including Dunnes, Spar and Lidl within 1km of the site. Table 2.2 provides an overview of the retail offering available in close proximity to the SHD Site. A detailed baseline study set out within chapter 16 found that the existing level of services are capable of catering to the future population generated from the proposed development.

Table 2-2: Retail Offerings near the SHD Site

Number	Name	Offering
1	Spar	Grocery/Food
2	Aria Health Care	Medical/Pharmacy
3	Pizza Max	Restaurant/Take-away
4	Look Mam No Hands!	Restaurant/Take-away
5	Primacare Medical/Dental Clinic	Medical/Pharmacy
6	Foley's Pharmacy	Medical/Pharmacy
7	Jule Beauty	Salon/Barber
8	La Boulangerie	Restaurant/Take-away
9	The Orchard Pub	Restaurant/Take-away
10	Jade Palace	Restaurant/Take-away
11	Coolers	Off License
12	Tailoring Studio	Clothing/Footwear
13	BoyleSport Bookmakers	Bookmakers
14	Jade Palace	Restaurant/Take-away
15	Applewood Veterinary Clinic	Other Medical
16	Mane Hair Design	Salon/Barber
17	Chic	Dry Cleaners
18	Dora's Takeaway	Restaurant/Take-away
19	The Tan Bar	Salon/Barber
20	Gym Plus	Gym

2.4 Accessibility of the subject site

The site is located c.14km north of Dublin City Centre, and c. 1.4 km north of Swords Town Centre. The Estuary West lands are strategically positioned in an area with high quality transport connections, within accessible distance of a variety of retail and leisure facilities, schools, childcare facilities, and employment centres.

The site is serviced by high frequency Dublin Bus routes 41A, 41C, 41X and 43 serving the Glen Ellan Estate (Business Park). Further west at the Jugback Lane – Glen Ellan Road, this point is served by both Dublin Bus (routes 41A, 41C, 41X and 43) and Swords Express routes 500, 500-X, 500-N, 501 and 503) allowing easy access to Dublin City Centre. The Swords Express Service is also available 200m from the site. During peak hours this is a high frequency service with 22 busses from Glen Ellan Road to the city centre between the hours of 6.22 and 9am which equates to a bus approximately every 7minutes. In the evening peak there is a similar service with 21 buses leaving the city centre traveling to Glen Ellan Road between the hours of 5pm and 7pm equating to a frequency one bus every 5min 45seconds. Residents may also avail of the high frequency BusConnects routes serving Applewood (X79) and Glen Ellan Road (Route 22). In addition, the proposed Spine (High Frequency) route (A4) serving Main Street, Swords will enhance the public transport offer available to residents. The bus market at this location is well developed for a strongly growing area and has a uniquely high level of commercial bus operations run by Swords Express that will respond quickly to any growth in demand to capture market share. Furthermore, the NTA's Bus Connects proposals confirm the importance of the Glen Ellen Road as a major growth axis in Swords, itself the fastest growing town in the Dublin area.

The proximity to the M1 Motorway, situated 1.6km to the east, adds further appeal allowing convenient access to the national road network.

The proposed Metrolink station, Estuary Park and Ride, is located approximately 600m from the northeast corner of the site, a short walk for residents of approximately 5-10 minutes through the Broadmeadow River Park and proposed extension of the park to the north of the site.

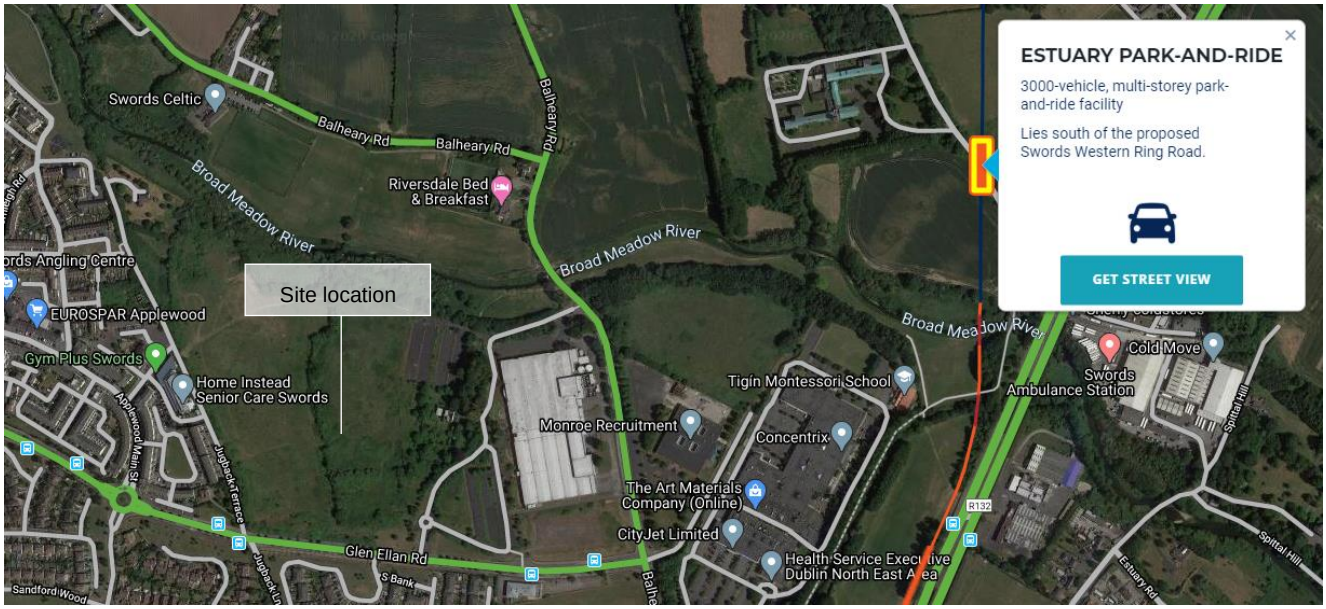

Figure 2-9 Proposed Metrolink Route – Estuary Park and Ride [4] and bus stops

As part of Phase 1 of the proposed development works, a green corridor is proposed on the north portion of the site along the southern side of the Broadmeadow River. This green corridor, which is in line with both Estuary West masterplan's essential infrastructure and the cycle network plan for the Greater Dublin Area, will facilitate connection to the proposed regional park to the west and pedestrian/cyclist progression towards R132, the proposed Estuary Metrolink Station and the Broadmeadow Estuary to the east. A shared pedestrian and cycling path also run through the proposed central spine linking the Broadmeadow Riverside Park to Glen Ellan road. The pedestrian/cycle network continues throughout the site with several connections to Jugback Terrace and facilities / services to the west and pedestrian/cycle links to the lands adjacent to the east (to allow for connections with any potential future development to the east of the subject site).

2.5 Land Use Zoning for subject lands

The Fingal Development Plan 2017-2023 has designated Objective ME – Metro Economic Corridor to the Estuary West lands on which the SHD development and ancillary works is proposed.

The Metro Economic Corridor (ME) zoning objective is intended to:

> *"Facilitate opportunities for high-density mixed-use employment generating activity and commercial development and support the provision of an appropriate quantum of residential development within the Metro Economic Corridor".*

Residential development is identified as '**permitted in principle'** within zoning Objective ME. The proposal, which will provide for an additional 621 no. residential units located in close proximity to excellent public transport infrastructure, is considered to fully accord with the overarching objective of the zoning designation. Other uses proposed ancillary to the residential use within the scheme include a childcare service, residential amenity facilities (residents' gym, concierge, meeting room and multipurpose room), open space, and essential utility installations include the proposed upgrades to Irish Water infrastructure network, namely the stormwater storage tank and pipeline. Childcare, residential amenity facilities (recreation), open space and utility installations are also listed as 'permitted in principle' uses for ME lands.

As stated, the proposed stormwater storage tank and associated pipeline falls within the ME designation, however the final section of the outfall overflow pipeline to Broadmeadow River is located

[4] MetroLink stations map. Available at: https://www.metrolink.ie/#/map

within the High Amenity (HA) land designation. The peripheral roads upgrade works proposed take place on lands running through and adjoining the ME designations.

A portion of the northern section of the site is located within lands zoned Objective HA – High Amenity. The High Amenity (HA) Zoning applies to the northern portion of the site which has an abuttal to the Broad Meadow River. The objective of HA zoning is to: "*Protect and enhance high amenity areas.*"

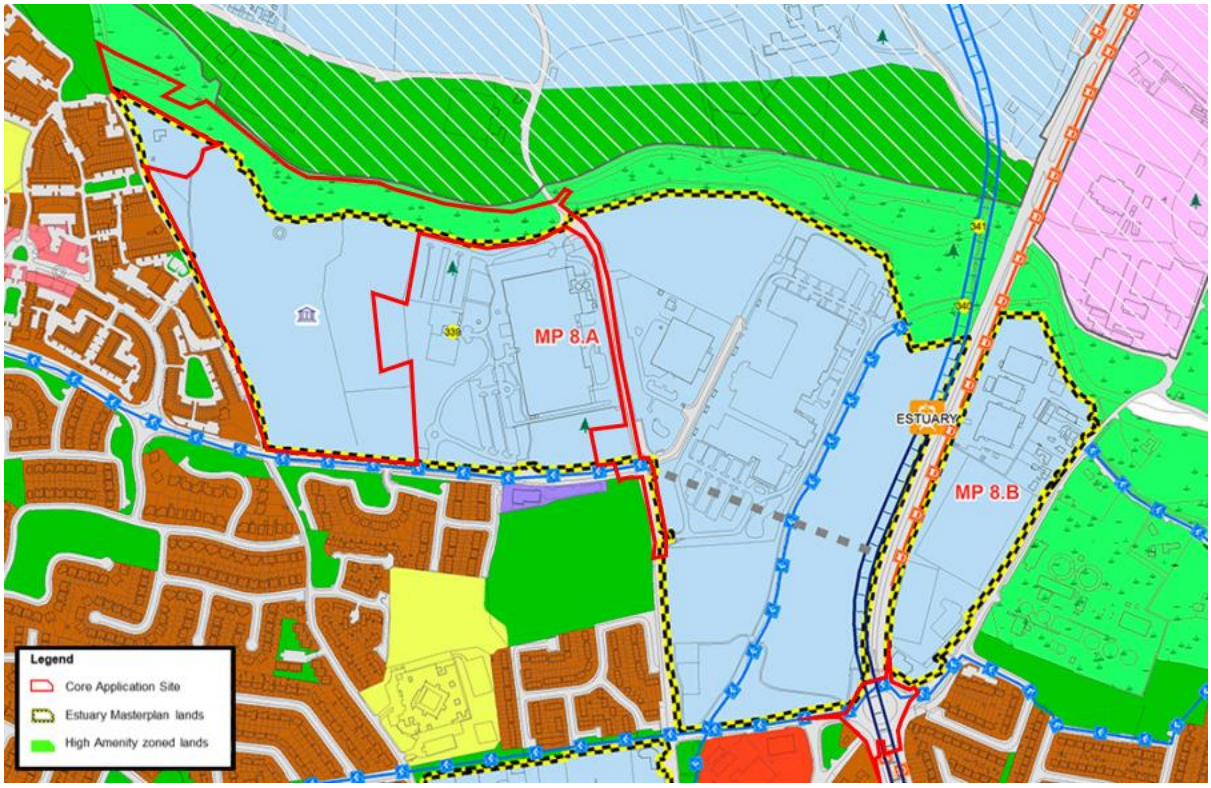

Figure 2-10 Estuary West lands as shown on the Fingal County Development Plan 2017-2023 zoning maps

Fingal Development plan identified the need for Masterplan for these landbanks arising against the backdrop of growing population, economic expansion, and opportunities from the arrival of Metro North. Estuary West: Masterplan Part D lands incorporate approximately 19.4 ha of land to the north of Swords. The vision for the Masterplan is to become a vibrant residential and mixed-use community with active and friendly streetscapes.

2.7 Cumulative Impacts

The cumulative impact assessment requires (1) assessment of the relevant interacting elements of the project as per EC guidance; and (2) the impact of the project in combination with other permitted plans and projects.

Each Chapter of the EIAR includes a cumulative impact assessment of the proposed development with other existing, permitted, and planned projects in the immediate area. The potential cumulative impacts primarily relate to traffic, dust, noise and other nuisances from the construction of the development, with other planned or existing projects, and each of the following EIAR chapters has regard to these in the assessment and mitigation measures proposed. A summary of cumulative impacts identified is provided in Table 2.3.

Table 2-3 Summary of Cumulative Impacts

No.	Chapter Title	Summary of Cumulative Impacts
5	Air Quality & Climate	Significant cumulative dust impacts are not predicted.
6	Noise & Vibration	No cumulative impacts identified.
7	Biodiversity	Cumulative impacts arising from the urbanisation of the city's hinterland as provided for by land use zoning including loss of habitats, particularly hedgerows and treelines; spread of alien invasive species, pollution from surface water run-off and pollution from wastewater generation.
8	Archaeological, Architectural & Cultural Heritage	No negative cumulative impacts identified.
9	Landscape & Visual	Cumulative landscape effects would be Significant but Neutral reflecting the landscape context and delivery of policy objectives locally.
10	Land, Soils & Geology	No cumulative impacts identified.
11	Water	No significant cumulative impacts identified.
12	Population & Human Health	Long term and positive cumulative impacts.
13	Material Assets: Traffic & Transport	Positive cumulative impacts identified.
14	Material Assets: Waste Management	Long-term, imperceptible and neutral cumulative impacts identified.
15	Material Assets: Utilities	Not anticipated or negligible impacts identified.

2.8 Related Developments

There are two development proposals of note, which are as follows:

Stormwater Storage Tank and outfall

For context, this SHD application incorporates a proposal to upgrade existing IW infrastructure to facilitate development - namely the provision of a Stormwater Storage Tank and overflow outfall gravity sewer, to alleviate constraints within the Irish Water foul water system. The proposed storage tank will provide sufficient capacity to serve the catchment of Oldtown/Mooretown/Holybanks, facilitating continued future development in the catchment. It is important to note that the capacity constraints within the network, as identified by Irish Water, affect all new development proposals for lands within the Oldtown-Mooretown and Holybanks area.

However, in the context of the consideration of related developments, it is important to note that the proposed stormwater storage tank and outfall pipe is also the subject of an extant application (F21A/0476) to Fingal County Council. If the F21A/0476 application receives planning permission, it is anticipated that the construction of stormwater off-line storage tank would be undertaken by that applicant, Gerard Gannon. Following construction and once operational, it is anticipated that the tank and outfall would be taken-in-charge by Irish Water for maintenance and monitoring. However, given that the Stormwater Storage Tank and associated outfall is critical to support future development within the Holybanks lands, a decision was taken to incorporate the stormwater storage tank and outfall pipe within this SHD application also. This, it is intended, will safeguard the proposed SHD development by ensuring it is supported by an essential ancillary utility (namely the Stormwater Storage Tank and outfall pipeline), in the event that the Gerard Gannon application, is not approved. Moreover, when consented, it is important that the SHD is capable of delivery without reliance on other parties/consents. Cairn Homes Property Ltd. has agreed this approach with Gerard Gannon, and a letter of consent has been provided by him to allow for the construction of the tank on his lands, in the event that permission is not received for the tank as part of the F21A/0476 application. Please refer to Appendix 4 of the Planning Report accompanying this application for the letter of consent from Gerard Gannon.

Road Upgrades

The applicant has liaised extensively with the transportation department of Fingal County Council on upgrade works that have been identified by the site-specific Traffic and Transport Assessment as necessary to accommodate the proposed development. In seeking to mitigate any risk on the timing of these works and the construction of the SHD scheme, it has been agreed with the Transportation Department that Cairn Homes Properties Ltd. will seek consent to undertake 'interim upgrades' to the aforementioned roads infrastructure – as follows.

> *'Junction and road improvement works are proposed to the Glen Ellan / Balheary Road junction and R132/R125 Seatown West Roundabout. This will include widening of Balheary Road (South), upgrade works to cycle/pedestrian facilities and for the partial signalisation of R132/R125 junction.'*

It is intended that these interim works will be of a sufficient scale to accommodate the uplift in traffic generated by the population of the occupied proposed development.

For context, it is important to note that the proposed road upgrade works were approved by An Bord Pleánala on 20th January 2022, as part of a wider Part 8 application- the 'R132 Connectivity Project' (JP06F.310145) made by Fingal County Council. It should be noted that the Part 8 application is for a larger project of works called the R132 Connectivity Project. The cumulative impact of the proposed road upgrades on consideration of the proposed Part 8 road upgrades has been assessed as part of Material Assets: Traffic and Transport (Chapter 13) and as part of Population and Human Health (Chapter 12).

Please refer to Appendix 4 of the Planning Report accompanying this application for the letter of consent from Fingal County Council which sets out approval for the inclusion of the aforementioned road upgrade works in this SHD application.

2.9 References

- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency, Draft August 2017)
- Advice Notes for Preparing Environmental Impact Statements, Draft September 2017
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002)
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2002)
- Department of the Environment, Community and Local Government (DoECLG), (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment

3. Description of Scheme

3.1 Introduction

This section of the EIAR provides a detailed description of the proposed development in accordance with the requirements set out within the EIA legislation and guidance on preparation and content of EIAR. This chapter has been prepared by Maria Rochford, MRUP IPI, Associate Director (Planning) at KPMG Future Analytics. Maria has 10 years' experience in the planning of residential schemes including the preparation and project management of EIARs.

This chapter describes the nature of the proposed development in accordance with the requirement of Article 5(1)(a) of the EU Directive 2014/52/EU which notes that *'a description of the project comprising information on the site, design, size and other relevant features of the project.'*

3.2 The Proposed Scheme

Overview

The proposed development is for a residential scheme on a site with an area of c. 14.17(gross) hectares at Holybanks, Swords, Co. Dublin. The proposal is for a vibrant new residential scheme that prioritises the health and wellbeing of residents by providing a high-quality public realm area for residents to enjoy, exercise and socialise in. This strategically located site on Estuary West lands and with a Metro-Economic (ME) corridor zoning designation, is prioritised for high-density mixed-use development including residential use and is an optimal location on which to deliver a quality housing scheme that can respond to the ongoing demand for homes in Dublin.

Design and buildings proposed

The proposed SHD development for 621 no. units comprises 349 no. apartments, 118 no. houses and 154 no. duplex units. Building heights range from 1 no. to 7 no. storeys (over basement level). The scheme provides for public open space, communal open space areas, a crèche, residential amenities (including concierge, multi-purpose room, meeting room and gym), a new public park to the north of the site as an extension to Broadmeadow Riverside Park, vehicular and pedestrian connections, car and bike parking facilities, services / bin store areas, landscaping and ancillary services to facilitate the development.

Landscaping plans

The landscape proposals for the scheme includes 10,008 sq.m. of public open space, 8,541 sq.m. of communal amenity space and 29,400 sq.m of new public park as an extension of the Broadmeadow Riverside Park to the north of the site. A portion of the Broadmeadow Riverside Park lands to the northwest are owned by Fingal County Council – a letter of consent to include these lands in the SHD application has been provided and is available in the Planning Report accompanying this application. The remaining Broadmeadow Riverside Park lands are owned by the applicant.

A shared pedestrian walkway and cycleway, amenity, informal play spaces and SuDs features form part of an integrated landscaping and open space solution which are distributed in an integrated way alongside the central north-south hedgerow as it passes through the site. In doing so, a connected linear spine of public open space is formed. This central spine comprises of three linked open spaces, POS-A, POS-B and POS-C. These spaces run from the entrance at Glen Ellan Road through the site to POS-C before opening up onto the Broadmeadow riverside park running from east-west along the northern portion of the lands. A Landscape Design Report, Masterplan and accompanying drawings prepared by Cunnane Stratton Reynolds set out the full details on the landscape response to the site, the planting proposed and boundary treatments.

The application is accompanied by Natura Impact Statement prepared by Openfield Ecological Services. The Urban and Architectural Design Statement and full range of drawings prepared by MCORM architects demonstrate the design rationale and advantages of the proposed layout, dwelling

types and finishing materials. The construction phase of the proposed scheme is discussed in detail within the Construction and Environment Management Plan (CEMP) prepared by Waterman Moylan Engineers.

Infrastructural Upgrades

The development also includes infrastructure upgrade works to local roads junctions at Glen Ellan / Balheary Road junction and R132/R125 Seatown West Roundabout to include widening of Balheary Road (South), upgrade works to cycle/pedestrian facilities and for the partial signalisation of R132/R125 junction. The requirement for these upgrade works emerged during the pre-application consultations with Fingal County Council and in response to items raised in the An Bord Pleanála Opinion. A letter of consent to include these upgrades works in the application has been provided and is available in the Planning Report accompanying this application.

In addition, the application includes proposals to upgrade Irish Water (IW) infrastructure to facilitate development, namely the provision of a Stormwater Storage Tank and an overflow outfall gravity sewer to the Broadmeadow River. The location of this tank is to the east of the subject site on a corner site at the junction of Balheary Road and Glen Ellan Road (this land is in the ownership of Gerard Gannon – a letter of consent for inclusion of this land within this SHD application has been provided and is available in the accompanying Planning Report). The Stormwater Storage Tank and pipeline is required to alleviate constraints within the IW foul water system. The requirement for these upgrade works emerged during the pre-application consultations with Irish Water and in response to items raised in the An Bord Pleanála Opinion as detailed in the Planning Report accompanying this application. The proposed storage tank will provide sufficient capacity to serve the catchment of Oldtown/Mooretown/Holybanks, facilitating continued future development in the catchment. It is important to note that the capacity constraints within the network, as identified by Irish Water, affect all new development proposals for lands within the Oldtown-Mooretown and Holybanks area.

An overview of key development statistics is set out on Table 3.1 below.

Table 3.1 Key Development Statistics

KEY DEVELOPMENT STATISTICS	
Site Area	Gross Site Area 14.17 ha (including infrastructure upgrade works) Net Site Area 8.92ha (Developable Site Area)
Gross Floor Area (Residential)	60,511sqm
Density	Net Site Density: 70 Unit/Ha
Plot Ratio	0.69 (Gross 0.43)
Site Coverage	28% (Gross 17%)
Height	1-7 storeys
Total No. of units	621 units
OPEN SPACE	
Public Open Space	10,008sqm
Communal Amenity Open Space	8,541sqm
Public Park	29,400 sqm Broadmeadow Riverside Park
NON-RESIDENTIAL	
Internal Communal Amenity Area	573sqm comprising concierge, gym, meeting room and multi-purpose room
Créche facility	506.5 sq.m (Capacity 100), Creche playground 90 sqm
RESIDENTIAL	
Apartments	Total 349 units 1 Bed 137 units 2 Bed 201 units 3 Bed 11 units
Duplexes	Total 154 units 2 Bed 77 units 3 Bed 77 units

Houses	Total 118 units 3 Bed 99 units 4 Bed 11 units
Maisonettes	8 no. 1 Bed units
Dual and triple aspect apartments and duplexes	64%
Part V	62 units
PARKING	
Car Parking Provision	705 no.
Bicycle Parking	856 no.
Motorbikes	21 no. (8no. in basement, 4 no. in under croft, 9 no. on surface)

3.2.1 Description of Development in the Statutory Notices

The proposed development is described in the statutory notices as follows:

Cairn Homes Properties Limited, intend to apply to An Bord Pleanála for a 7-year permission for a strategic housing development (SHD) on a c.14.17 ha (gross) site located within the Estuary West Lands at Holybanks, Swords, Co. Dublin. The main SHD site is bound by Glen Ellan Road to the south, Jugback Lane/Terrace to the west, the former Celestica factory site to the east and the Broadmeadow River to the north. A stormwater storage tank, detailed below, is proposed to be located on a corner site at the junction of Glen Ellan road and Balheary road. Junction and road improvement works are proposed to the Glen Ellan road / Balheary Road junction and the R132 Dublin Road / R125 Seatown West Roundabout.

The proposed development will consist of a residential scheme of 621 no. units (145 no. 1-bed units, 278 no. 2-bed units, 187 no. 3-bed units and 11 no. 4-bed units) along with ancillary childcare facility (506.5 sq.m) and a range of residential amenity facilities (573 sq.m) including gym, concierge, meeting room and multi-purpose room. The development will include the construction of:118 no. houses comprising: 8 no. 1-bed maisonettes contained within 4 no. 2 storey units; 99 no. 2-storey, 3-bed units (18 no. mid-terrace and 81 no. semi-detached) and 11 no. 2-storey, 4-bed units (semi-detached).

- 349 no. apartment units (137 no. 1-bed units, 201 no. 2-bed units, and 11 no. 3-bed units) provided within 2 no. blocks ranging in height from 1 no. to 7 no. storeys (over basement level) to the south side of the site along Glen Ellan Road. A single level basement has been provided for Block B and an under-croft area is provided within Block A incorporating parking areas, waste management areas, plant rooms and other ancillary services.
- 154 no. duplex units that are arranged within 14 no. 3-storey blocks comprising of 77 no. 2-bed units (ground floor) and 77 no. 3-bed units.
- Apartments and duplexes are provided with balconies/terraces along all elevations and dedicated services / bin store areas.
- The development will also provide for an ancillary childcare facility (506.5 sq.m), and residential amenity facilities (573 sq.m) including gym, concierge, meeting room and multi-purpose room within the ground floor of Block B.
- Provision of 705 no. car parking spaces, 856 no. bicycle parking spaces and 21 no. motorbike parking spaces (within basement, under-croft and at surface levels);
- The landscape proposal includes extensive public open space (10,008 sq.m.), in addition to a new public park measuring 29,400 sq.m as an extension of Broadmeadow Riverside Park to the north of the site.
- Principal vehicular access to the site is from Glen Ellan Road, with an additional new secondary site entrance provided from Jugback Lane/Terrace. New pedestrian connections are provided to the site from Jugback Lane/Terrace, Glen Ellan Road and the proposed Broadmeadow Riverside Park extension to the north of the site. Further, a segregated pedestrian/cycle path is proposed along a central green spine, connecting Glen Ellan Road in the south with Broadmeadow Riverside Park extension in the north.
- Junction and road improvement works are proposed to the Glen Ellan road / Balheary Road junction and the R132 Dublin road /R125 Seatown West Roundabout. This will include

widening of Balheary Road (South), upgrade works to cycle/pedestrian facilities and for the partial signalisation of R132/R125 junction.

- The application also contains proposals to upgrade existing Irish Water infrastructure including the construction of a stormwater storage tank proposed to be located on a corner site at the junction of Glen Ellan road and Balheary Road, and an overflow outfall gravity sewer along Balheary Road to the Broadmeadow River.
- All associated site development works above and below ground including hard and soft landscaping, roads/footpaths/cycle paths, play areas, public art, boundary treatments, lighting, SuDs, pumping station, EV charging points, green roofs, ESB substations and services to facilitate the development.
- As part of the proposed development, temporary permission (3 no. years) is sought for a single-storey Marketing Suite and associated signage (including hoarding) during the development construction stage.

Figure 3-1 Proposed Overall Site Layout Plan (McCrossan O'Rourke Manning Architects)

3.3 Planning Context

The Fingal County Development Plan 2017 – 2023 is the statutory land-use plan governing the subject site. The core strategy of the current County Development Plan outlines that there is capacity for 15,828 no. units within the zoned land bank in Swords. This includes the lands designated within the Estuary West lands in which the subject site is located.

The zoning designations pertaining to the application lands are set out on Figure 3.2 and described below.

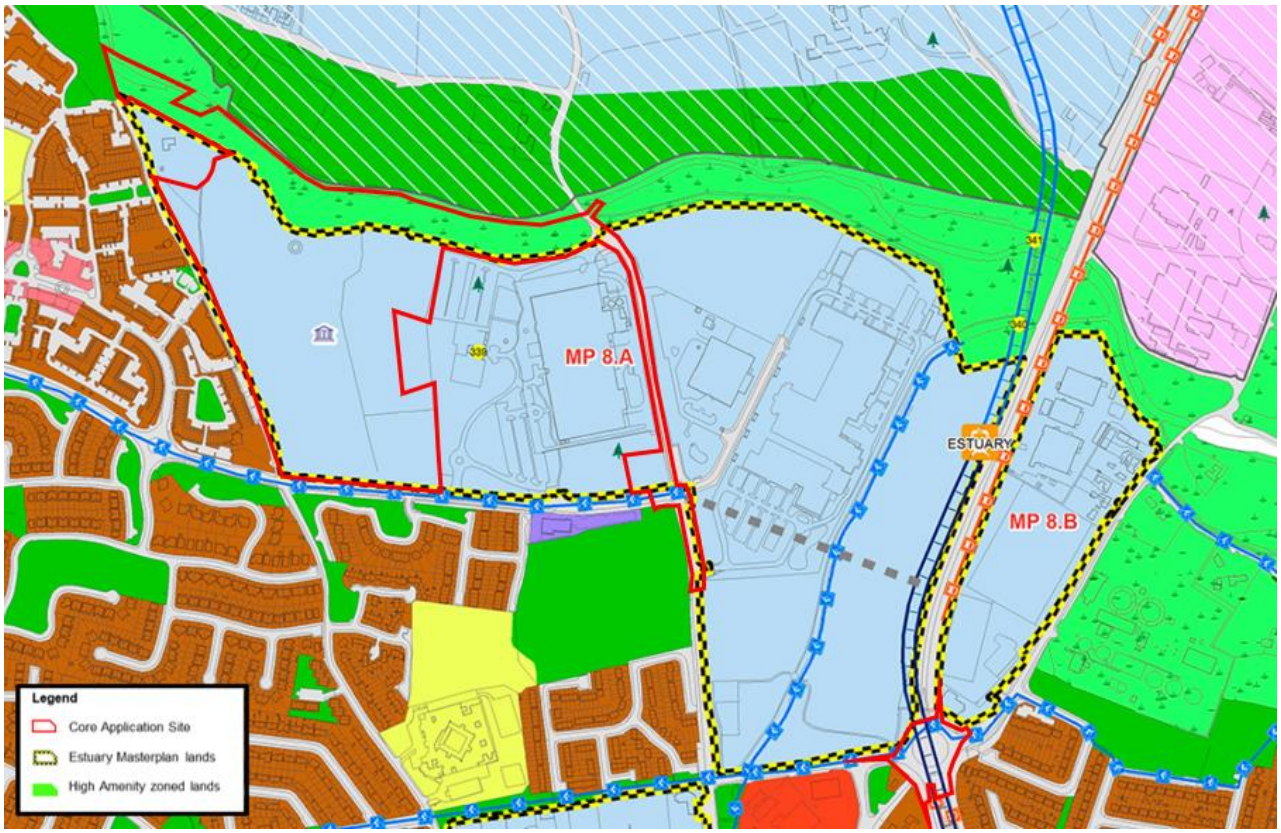

Figure 3-2 Location of Estuary West Lands within the Fingal County Development Plan 2017-2023 zoning maps

- *Metro Economic (ME) Corridor land use zoning designation*

The Fingal Development Plan 2017-2023 sets out land use zoning objectives for the Estuary West lands with the majority of the subject site zoned as Objective ME – Metro Economic Corridor, as follow:

> ***"Facilitate opportunities for high-density mixed-use employment generating activity and commercial development and support the provision of an appropriate quantum of residential development within the Metro Economic Corridor".***

Underpinning this objective is a vision to:

> ***"Provide for an area of compact, high intensity/density, employment generating activity with associated commercial and residential development which focuses on the Metro within a setting of exemplary urban design, public realm streets and places, which are permeable, secure and within a high-quality green landscape. Landmark buildings will provide strong quality architectural features, which respect and enhance the character of the area into which they sit. The designated areas will form sustainable districts which possess a high degree of connectivity and accessibility and will be developed in a phased manner subject to the necessary provision of social and physical infrastructure."***

The development plan sets out objectives for development within the designated Metro Economic Corridor as follows:

> ***Objective ED99:*** *Protect the integrity of the Metro Economic Corridors from inappropriate forms of development and optimise development potential in a sustainable and phased manner.*
>
> ***Objective ED100:*** *Ensure high quality urban design incorporating exemplary public spaces, contemporary architecture and sustainable places within a green landscape setting.*

The ME zoning provides for an area of compact, high intensity/density, employment generating activity within the Metro Economic Corridor. It is envisaged that Metrolink will provide a high capacity, high frequency and first-class public transport link between Dublin City, Dublin Airport and Swords. The Metro integrates with an expanded Dublin Airport where, along with an improved road network and improved public transport network, creates a multi-modal transport hub linking Dublin City, Dublin Airport and the strategic expansion of Swords. The proposed development on subject lands will provide for 621 no. residential units and ancillary services such as Creche, Gym, meeting rooms, and concierge.

Residential development is identified as 'permitted in principle' within zoning Objective ME. Other uses proposed ancillary to the residential use within the scheme and also within the ME zoned lands include a childcare service, residential amenity facilities (residents' gym, concierge, meeting room and multipurpose room), open space, and essential utility installations include the proposed upgrades to Irish Water infrastructure network, namely the stormwater storage tank and overflow outfall gravity sewer pipeline. Childcare, residential amenities (recreation), open space and utility installations are also listed as 'permitted in principle' uses for ME lands.

Estuary West lands are identified for uses that are "*primarily residential in nature with an element of commercial use*" within Estuary West Masterplan Part D. The proposal, which will provide for an additional 621 no. residential units located in close proximity to excellent public transport infrastructure is considered to fully accord with the overarching objective of the zoning designation.

- *High Amenity land use zoning*

A portion of the northern section of the site is a High Amenity (HA) zoned area. The objective of HA zoning is to:

> ***"Protect and enhance high amenity areas."***

The overarching vision for this zoning objective is to:

> ***"Protect these highly sensitive and scenic locations from inappropriate development and reinforce their character, distinctiveness and sense of place. In recognition of the amenity potential of these areas opportunities to increase public access will be explored."***

As outlined in the Fingal Development Plan, the vision of this zoning objective is to protect these highly sensitive and scenic locations from inappropriate development and reinforce their character, distinctiveness and sense of place. In recognition of the amenity potential of these areas, opportunities to increase public access will be explored. The Fingal Development Plan sets out the following objectives for High Amenity zoned land:

> ***Objective NH51:*** *Protect High Amenity areas from inappropriate development and reinforce their character, distinctiveness and sense of place.*
>
> ***Objective NH52:*** *Ensure that development reflects and reinforces the distinctiveness and sense of place of High Amenity Areas, including the retention of important features or characteristics, taking into account the various elements which contribute to its distinctiveness such as geology and landform, habitats, scenic quality, settlement pattern, historic heritage, local vernacular heritage, land-use and tranquillity.*

The HA area is intended to accommodate the proposed extension to the Broadmeadow Riverside Park between Jugback Lane and Balheary Road, as part of the first phase of the development of the Estuary West lands. The intended use of these High Amenity (HA) zoned lands as communal amenity space fully aligns with the intent and objectives of the HA zoning designation.

As shown in Figure 3.2, the final, northern section of the pipeline from the stormwater storage tanks is also located on HA zoned land at its outfall to the Broadmeadow River.

3.4 Need for the Scheme

This proposal will bring a strategically located undeveloped and underutilised urban site into a positive, beneficial use. The proposed scheme has been carefully planned and designed to respond appropriately and with sensitivity to the mixed urban and natural elements that comprise the surrounding environment.

The scheme is brought forward against a socio-economic context that places a high value on the availability of well designed, sustainable, accessible, and affordable homes that can help to satisfy the ongoing demand for housing in Dublin. The scheme will have significant positive impacts for the local community of Swords by providing well-designed units to facilitate and support population growth, social integration, and inclusion, bringing this strategic landbank into functional use. By opening up accessibility, the ambitions for the Broadmeadow Riverside Park set out in local planning policy, will be largely enabled through delivery of the 'HA - High Amenity' lands owned by Cairn Homes Properties Ltd, and in doing so, will bring a notable community gain to the area.

The Regional Spatial and Economic Strategy (RSES) for the Eastern and Midland Region recognises the central and strategic role that Swords plays in the context of the metropolitan Dublin area. The RSES acknowledge the role of Swords, as a "*strong active urban place…with strong transport links*". The designation of the town as a 'Metropolitan Consolidation Town' reinforces its capacity to cater for a large and skilled population base whilst having substantial ability to provide for international and regional economic development and growth.

To achieve the ambitious compact development targets set out in the National Planning Framework (NPF) for at least 50% of all new homes within or contiguous to the existing built-up area in Dublin and 30% in other settlements, the RSES, through its Dublin Metropolitan Area Strategic Plan (MASP) identifies strategic residential, employment and regeneration development opportunities on strategic development corridors, which are aligned with key public transport projects. Sites within or close to these corridors are best placed to accommodate the 113,000 residential units identified by the MASP to be fully built out to 2040.

The subject site location which is served by high frequency and high-capacity public transport, most notably Dublin Bus and an excellent private bus service, is within the strategic Metrolink-Luas Corridor and is in prime position to accommodate the sequential development of residential sites in order to cater for the population growth envisaged. At a County level, the RSES projections predict an increase of between 31,000 (low) and 43,000 (high) by 2026 with further increases of between 44,000 (low) and 53,000 (high)people by the year 2031.

The site is also located within the Estuary West Lands as designated by the Fingal County Development Plan 2017-2023 and is the subject of the Swords Masterplan: Part A and Part D: Estuary West (May 2019), a non-statutory plan. The proposed development complies with the overall objectives of the Development Plan and the principles of the Estuary West Masterplan.

The appropriate siting and distribution of housing to respond to the level of growth predicted is among the most critical functions of the local planning system over the next few years. With active land management and compact growth principles in place, and given the economic uncertainty created by the Covid-19 pandemic and other world events, there is now an even greater impetus to support the delivery of housing proposals that align with strategic planning policy and that can respond to the population growth predicted for the area, such as the current proposal brought forward by Cairn Homes Properties Ltd.

3.5 References

- Fingal County Development Plan 2017-23, www.fingal.ie/fingal-development-plan-2017-2023
- Regional Spatial and Economic Strategy, Eastern and Midland Regional Assembly, June2019, www.emra.ie/final-rses/
- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency, Draft August 2017)
- Advice Notes for Preparing Environmental Impact Statements, Draft September 2017
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002)
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2002)
- Department of the Environment, Community and Local Government (DoECLG), (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment

4. Alternatives Considered

4.1 Introduction

The 2014 EIA Directive (2014/52/EU) defines 'Environmental Impact Assessment' as a process consisting of the preparation of an environmental impact assessment report by the developer, for the

examination of the competent authority to reach a reasoned conclusion on the significant effects of the project on the environment. EIA Directives have been transposed into the Irish law by way of the *Planning and Development Acts 2000* (*As amended*) and *Planning and Development Regulations* 2001-2018.

Article 5(1)(d) of the EIA Directive 2014/52/EU requires an EIAR to contain:

> *A description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment.*

Annex IV of the EIA Directive expands further stating that an EIAR must contain *"a description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the developer, which are relevant to the proposed project and its specific characteristics and an indication of the main reasons selecting the chosen option, including a comparison of the environmental effects"* .

The Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment (2018) state the following:

> *"The Directive requires that information provided by the developer in an EIAR shall include a description of the reasonable alternatives studied by the developer. These are reasonable alternatives which are relevant to the project and its specific characteristics. The developer must also indicate the main reasons for the option chosen taking into account the effects of the project on the environment. Reasonable alternatives may relate to matters such as project design, technology, location, size and scale."*

This Chapter provides 'a *description of the reasonable alternatives (for example in terms of project design, technology, location, size and scale) studied by the person or persons who prepared the EIAR, with response to the proposed development and its specific characteristics. It sets out the main reasons for selecting the chosen option, including a comparison of the environmental effects'* as required by Schedule 6 of the Planning and Development Regulations, 2001-2021.

The 2018 Guidelines also note that it is generally sufficient for the developer to provide a broad description of each main alternative studied and the key environmental issues.

Regard has also been had to the EPA Guidance and to the European Commission Impact Assessment Guidelines, 2017. The Guidelines summarise that the Developer needs to provide:

- A description of the reasonable alternatives studied; and
- An indication of the main reasons for selecting the chosen option with regard to their environmental impacts.

The Guidelines provide that an alternative may be considered unreasonable/unfeasible if there are technological, budget, stakeholder or legal/regulatory obstacles preventing it from being carried out. The principle rationale for the development proposal is outlined in this section, to provide context for the proposed development and the selection of the proposed development site.

The section discusses the reasonable alternatives considered in terms of size and scale, and the environmental factors considered in respect of each alternative and the main reasons for selecting the option chosen. The identification of reasonable alternatives has been carried out in the context of the nature and scale of the development proposed being predominantly residential.

Accordingly, this Chapter of the EIAR provides an outline of the reasonable alternatives examined throughout the design and consultation process under the following headings:

- Alternative Locations
- Do Nothing Alternative
- Design Alternatives
- Alternative Processes

This serves to indicate the main reasons for choosing the development proposed, taking into account and providing a comparison of the environmental effects. The type of alternatives depends on the nature of the project proposed and the characteristics of the receiving environment.

Information on the site location and local context is set out in Chapter 2. A full description of the development proposal as emerged from the careful consideration of alternatives has been provided in Chapter 3.

4.2 Alternative Locations

The 2018 Guidelines note that some projects may be "site specific" so the consideration of alternative sites may not be relevant.

This point is also made in the Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2017), which states that in some instances alternative locations may not be applicable or available for a specific project which is identified for a specific location. With regard to locations, the considerations of alternatives in many cases will already have been addressed and decided at strategic planning level during the preparation of city/county/local developments plans. Furthermore, these plans will have been subject to Strategic Environmental Assessment which will have taken into account the environmental considerations associated with, for example, the cumulative impact of an area zoned for industry on a sensitive landscape.

The 2017 Draft Guidelines further state:

> *"Note also that plan-level/higher-level assessments may have set out project-level objectives or other mitigation that the project and its EIAR should be cognisant of. Thus, these prior assessments of strategic alternatives may be taken into account and referred to in the EIAR."*

Through the Dublin Metropolitan Area Strategic Plan (MASP) set out in the Regional Spatial and Economic Strategy (RSES) for the Eastern and Midlands Regional Assembly (EMRA) area strategic residential, employment and regeneration development opportunities on strategic development corridors are identified, which are aligned with key public transport projects. Sites within or close to these corridors are best placed to accommodate the 113,000 residential units identified by the MASP to be fully built out to 2040. The location of the subject site in close proximity to the proposed Metrolink-Luas Corridor places it in prime position to accommodate the sequential development of residential sites, to cater for the population growth envisaged.

The suitability of the subject site to host a new housing development is further recognised in the land use zoning objective assigned to the lands. The Fingal Development Plan 2017-2023 has designated Objective ME – Metro Economic Corridor to the Estuary West lands. The proposed créche, SHD, residential amenity facilities (gym, concierge, meeting room and multipurpose room) open space and utility installations including the proposed stormwater storage tank and pipeline, and road upgrade works are all located within the ME zoned lands. These uses are all 'permitted in principle' under the ME zoning objective assigned to the Estuary West lands.

A portion of the northern section of the site is located within lands zoned Objective HA – High Amenity. The final section of the pipeline from the stormwater storage tank is located on HA lands, at the point where it outfalls to the Broadmeadow River.

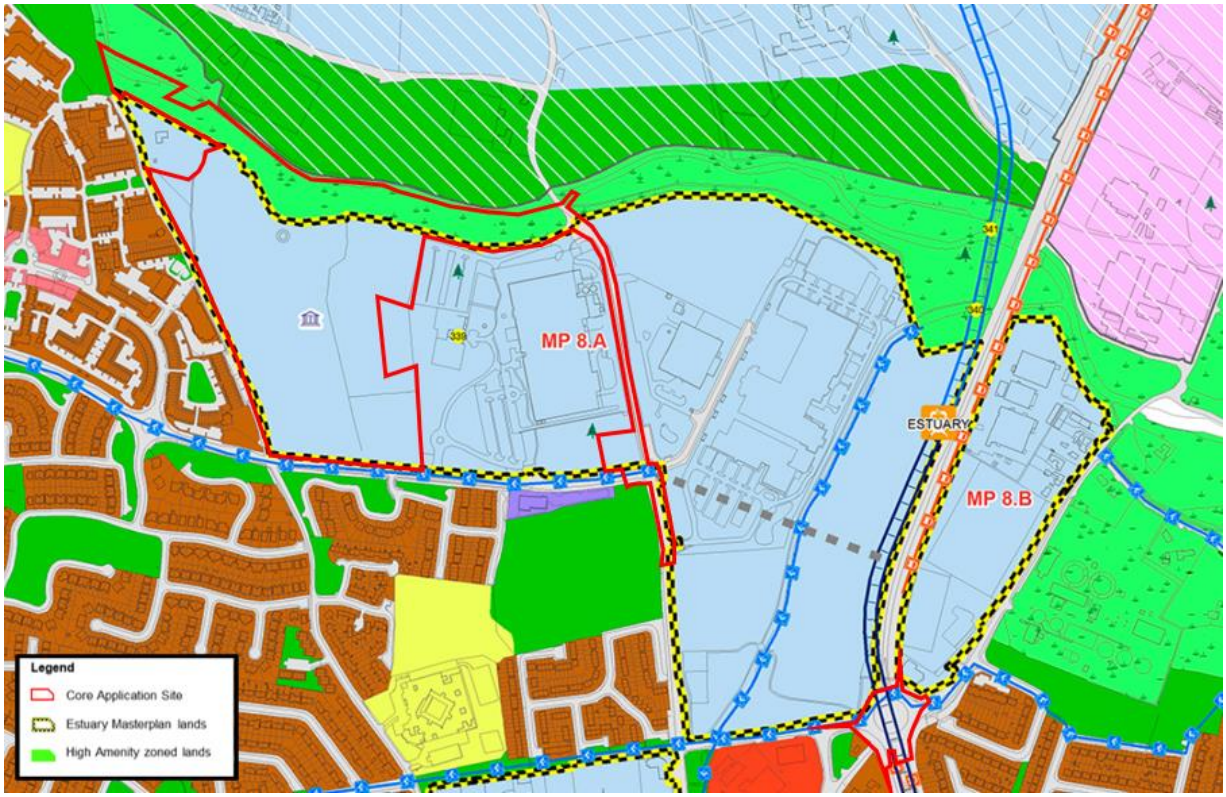

Figure 4-1 Estuary West lands as shown on the Fingal County Development Plan 2017-2023 zoning maps

As set out in the Fingal Development Plan 2017-2023, the Metro Economic Corridor (ME) zoning objective is intended to:

> *"Facilitate opportunities for high-density mixed-use employment generating activity and commercial development and support the provision of an appropriate quantum of residential development within the Metro Economic Corridor".*

Underpinning this objective is the vision for the lands to:

> *"Provide for an area of compact, high intensity/density, employment generating activity with associated commercial and residential development which focuses on the Metro within a setting of exemplary urban design, public realm streets and places, which are permeable, secure and within a high quality green landscape. Landmark buildings will provide strong quality architectural features, which respect and enhance the character of the area into which they sit. The designated areas will form sustainable districts which possess a high degree of connectivity and accessibility and will be developed in a phased manner subject to the necessary provision of social and physical infrastructure."*

Therefore, having regard to the strategic planning policy context and objectives already associated with the subject site, the location of the site was considered as suitable for residential development purposes, and so alternative locations were not considered for this SHD.

4.3 Do Nothing Alternative

This section considers the potential of the proposed development not taking place. In a 'Do Nothing' scenario, the subject site would remain as undeveloped greenfield scrubland. The natural attributes of the site would remain unchanged with existing features such as trees, hedgerows, vegetation, flora and fauna remaining in-situ and undisturbed from man-made influences. Environmental effects on aspects consider in this EIAR such as air, climate, water, population and human health, material assets

etc. arising would be caused by naturally occurring phenomena associated with seasonal variations, climatic conditions, normal life cycle processes occurring in the natural environment.

Accordingly, under the 'do nothing alternative', the subject site, which is zoned for development (Metro-Economic corridor zoning objective), would remain in its current predominantly greenfield state and as such would be underutilised, failing to fulfil the objectives of the Fingal County Development Plan as well as regional and national planning policy aspirations which require the prompt and efficient use of strategically located zoned lands.

The proposal would create significant planning gain for the local community in terms of Broadmeadow Riverside Park and substantial open space representing 11% of the net site area. The scheme also includes proposals to upgrade the existing road network and the Irish Water public wastewater network, improving existing services while also unblocking future developments to this area. In a 'Do-Nothing' scenario, the likelihood of these crucial upgrades being carried out is minimal. It is important to note at this juncture that there are currently existing constraints on both the existing road network and also existing wastewater network in the area. It can therefore be assumed that these constraints are likely to get worse in the future if critical upgrades are not carried out imminently.

In addition, if the proposed development does not proceed, the subject lands will remain in its current, underutilised state.

Therefore, if the development does not proceed it will result in the land remaining, in its current underutilised state. It would also result in substantial delays to the repair and advancement of existing public infrastructure servicing the neighbourhood and thereby would be considered as a negative impact.

In conclusion, the development would result in much needed housing development and associated residential amenities in a strategic location, with good accessibility and public transport connections.

4.4 Alternative Land Uses

The proposed SHD development aligns with the zoning objective assigned to the lands under the Fingal Development Plan 2017-2023 (Objective ME – Metro Economic Corridor to the Estuary West lands) which provides for residential development and employment generating and commercial uses. As set out in Chapter 6 'Economic Development' of the County Development Plan, the quantum of land assigned an ME zoning objective amounts to 390 hectares.

The Metro Economic (ME) zoning is a specific zoning created to respond to the provision of the Metro rail connection from Dublin City to Swords via Dublin Airport. The purpose of the zoning is to facilitate opportunities for high-density mixed-use employment, commercial and residential along and adjacent to the Metro route through the County.

The ME zoning is one of the largest economic development zonings in Fingal with lands located principally in Santry/ Ballymun and in strategic locations in the Swords area. The ME zoning objectives allows for a broad range of uses including residential which we contend is the most appropriate use for the subject lands. Given the proximity to existing and proposed public transport corridors, the established residential communities directly to the west and south, the availability of local neighbourhood services at Applegreen and in the wider Swords area, the subject site is ideally suited for development as a residential component of the ME lands.

The development strategy for Swords as set out in the Fingal Development Plan 2017-2023 identified the subject site as being most suited for residential led development. The Estuary West Masterplan (Part D) envisioned the subject lands to become a vibrant residential and mixed-use community. The proposed residential development includes ancillary community amenities and a childcare/creche facility to serve the needs of the proposed development. Employment generating activities were envisioned to be located outside the site boundary, to the east of subject site within the detailed masterplan prepared for Estuary West Lands. Moreover, the current level of density (70.22 u.p.h. net density) proposed on the subject site is in alignment with the standards set by Estuary West Masterplan.

Although the Masterplan is non-statutory in nature, cognisance is paid to it as a prudent measure in this respect.

it is relevant to note that Cairn Homes Properties Ltd. has agreed to reserve a 0.46 ha site within their ownership (but outside the application area) to accommodate a future school sufficient to cater for a 16-24 classroom school (Figure 3.2), in accordance with the provisions of the non-statutory Estuary West Masterplan (May 2019). It is also considered that commercial uses could be accommodated on wider ME lands to the east which would consolidate established employment related uses and create a more compact and higher density employment zone in this area.

Accordingly, the consideration of alternative uses on the subject site were not considered necessary or justified.

4.5 Design Alternatives

The final layout and design of the proposed scheme have been influenced at various key stages throughout the design evolution and consultation process. Numerous variations of the scheme have been assessed and audited, with amendments to the design incorporated where deemed appropriate and having regard to the key environmental issues pertaining to the lands. The environmental issues which have most informed the design process to date relate to archaeology, ecology, water, noise, and the potential impacts upon existing and future traffic and transport in the area. Specifically, the site itself is greenfield in nature and was previously in agricultural use. It is irregular in shape and is relatively flat, although it does slope gently towards the Broadmeadow River. There are no existing structures or buildings on the lands, although the landbank is dissected at the centre by a hedgerow running in a north-south direction.

Such environmental issues have served to inform the consideration of alternative layouts and scheme designs up to the finalisation of the proposal submitted by way of the planning application. The proposed layout and design have also been influenced by the site's specific topography, existing boundary conditions including the Broad Meadow River to the north of the Site.

The progression of the proposed developments layout and design has therefore been formed organically through an iterative process. The alternative layout and design options that were considered are discussed below:

4.5.1 Alternative A: Preplanning consultation with FCC

Alternative A relates to the design submitted for the S247 consultation with Fingal County Council (FCC) on 10th January 2019. The proposal was for 535 units in total, which comprised of 215 houses and 320 apartment units. This design scheme would result in a development density of approximately 55.3 units/ha. The proposal also included an independent creche unit along Glen Ellan Road. The unit mix was:

- One bedroom – 95 units (30%)
- Two bedroom – 187 units (58%)
- Three bedroom – 38 units (12%)

Apartments are distributed within 6 blocks ranging in height from 5-6 storeys, centred around a landscaped amenity area, and linked by pedestrian walkways. The apartments are located along the southern corner of the site overlooking Glen Ellan Road and Jugback Terrace. 226 no. surface carparking spaces were proposed to serve the apartments in the scheme. 100% of the parking in the scheme is provided at surface level. Main vehicular access to the site is proposed from Glen Ellan Road with a secondary access form Jugback Lane/Terrace connecting with Applewood lane.

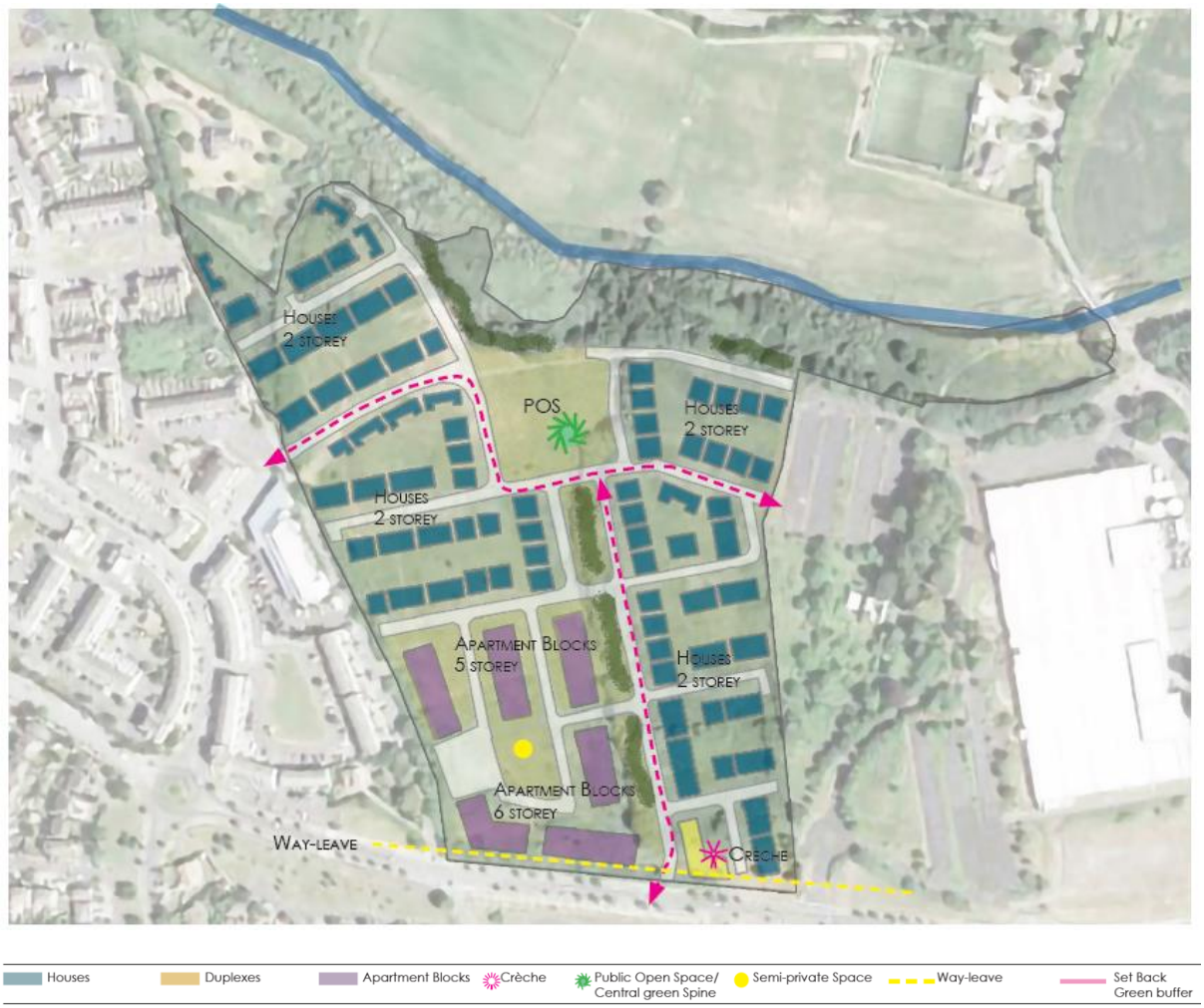

Figure 4-2 The layout submitted for pre-planning consultation with Fingal County Council

Alternative A- Comparison of Environmental effects:

The scheme proposed in Alternative A achieves a density of 55.3 units per hectare which was not considered appropriate given its location proximate to Swords and public transport also.

Estuary West Masterplan proposes a net. density of 70-75 u.p.h. which has not been achieved by this design iteration of the scheme. All the public open space within the scheme has been focussed within the northern portion of the site. Only a limited section of Broadmeadow Riverside Park was included within the scheme. This resulted in a lack of natural passive surveillance to the open spaces proposed. Due to the lack of hierarchy in open spaces proposed the functionality of these spaces are also limited.

The design does not respond well to its setting as it doesn't transition well between 2 storey houses and 5 storey apartment blocks. The apartment blocks are clustered together and does not provide a strong urban edge to Glen Ellan Road. The scheme aimed at providing an ambitious 0.42 parking ratio envisaging a majority of the trips to be made via Public Transport once Metro Link was completed. FCC notified that the scheme may preface the completion of Metro and therefore require higher parking levels. Ultimately this option would have resulted in an inefficient use of resources.

The advice received from Fingal County Council with respect to this design proposal included the following:

- Character of the lands: the vision for the ME zoned lands and the requirement for the proposals to respond to this.
- Importance of key features of the site: the existing hedgerow, addressing the river, need to protect Jugback lane, School site identified, and strong urban edge along Glen Ellan Road
- Density proposed on the site is approximately 89 per ha. Net

- Basement Parking: the timing of Metro might not correspond with the completion of units and therefore higher car parking levels may be required in the scheme.

4.5.2 Alternative B: Pre-Application Consultation with ABP

Figure 4-3 Pre application consultation layout submitted to An Bord Pleanála

Alternative B improves upon Alternative A in terms of how its responses to the opinion / comments received from Fingal County Council. Alternative B layout was submitted for a Pre-Application Consultation and round table discussion with An Bord Pleanála and Fingal County Council on 17th June 2019. The design increased the number of units to 624, of which 171 no's (27.4%) were houses, 32 no's were duplexes (5%) and 421 no units were apartments (67%). This layout also takes into consideration the Estuary West Masterplan and designates a site for future school buildings within the applicant's land ownership.

The scheme included 7 no. apartment blocks ranging in height between 5 to 6 storeys, located within a landscaped semi-private open space area that also provides for residential amenity. A total of 171 no. houses and 32 duplex units are proposed as part of the overall scheme comprising a combination of terraced, semi-detached houses with a height ranging between 2 to 3 storeys. The scheme proposes 810 no. car parking spaces on site of which 364 carparking spaces are provided within the basement. The unit mix was:

- One bedroom – 139 units (22%)
- Two bedroom – 261 units (42%)
- Three bedroom – 182 units (29%)
- Four bedroom – 42 units (7%)

Landscaping proposals for the scheme included

- 1.77ha of public open space will be provided in the form of the Broadmeadow Riverside Park to the north of the site
- 2.01ha of public open space will be provided through-out the development
- 0.63ha of semi-public open space will be provided directly adjoining the apartment buildings

Alternative B - Comparison of Environmental effects:

Alternate B has an improved density of 67.8 u.p.h. Open space has also been redistributed within the scheme with a green spine, connecting the site entrance to the Broadmeadow Riverside Park in a north south direction, hosting most of the proposed public open spaces in the scheme. The unit mix proposed has also improved with the introduction of duplex units. The road network proposed also improved to increase permeability through the site. The creche location was shifted to the centre of the site adjacent to the future school site.

The proposal had a significant quantity of car parking to compensate for any potential delay in the delivery of Metro Link. The car parking jumped from 0.42 (in Alternate A) to 1.3 with 53% of it provided at surface grade. This level of parking can be considered as an overprovision on such an accessible and well-connected site. The proposal does not respond well to the site context. The apartments are clustered together and disconnected from the rest of the scheme. The scheme does not respect the existing setting along Jugback lane/terrace with all units located away from it and no landscaped areas addressing the street.

Comments received from An Bord Pleanála concerning the design of the scheme include:

- Consideration to be given to the delivery and timing of road infrastructure upgrades in the wider areas as identified in the Masterplan to facilitate the proposed development including connectivity to existing Applewood main street, the proposed linear park and school site. Further consideration of layout, future connections and access arrangements required.
- Further consideration to be given to the provision of green infrastructure corridors and public open spaces along the Broadmeadow river, Including accessibility for pedestrians and cyclists and passive surveillance to these areas.
- Further consideration to the proposed landscaping plan and the hierarchy, function and usability of public open spaces including the use/linking of green corridors throughout the scheme.
- Further consideration on the rationale of the proposed residential layout with regard to the creation of active and aesthetically pleasing urban street frontages to ensure a qualitative design response with optimal passive surveillance of streets and public and private open spaces throughout the scheme.
- Consideration to the proposed density having regard to inter alia local planning policy context for the subject lands which outlines a net range of between 70-75 units per hectare.

4.5.3 Alternative C: Pre-Application

Alternative C is an iteration prepared by MCORM architects addressing the concerns raised by An Bord Pleanála. This proposal would have provided for a total of 655 units with a variety of dwelling types consisting of: 1

- 44 no. houses (21%)
- 58 no. duplexes (9%)
- 463 no. apartment units (70 %)

The proposed layout shows a number of apartment blocks ranging in height from 5 to 6 storeys placed along Glen Ellan road. Apartment blocks are also proposed to the north east corner of the site. The layout addresses Jugback Lane/Terrace through a landscaped setback and units fronting onto the lane.

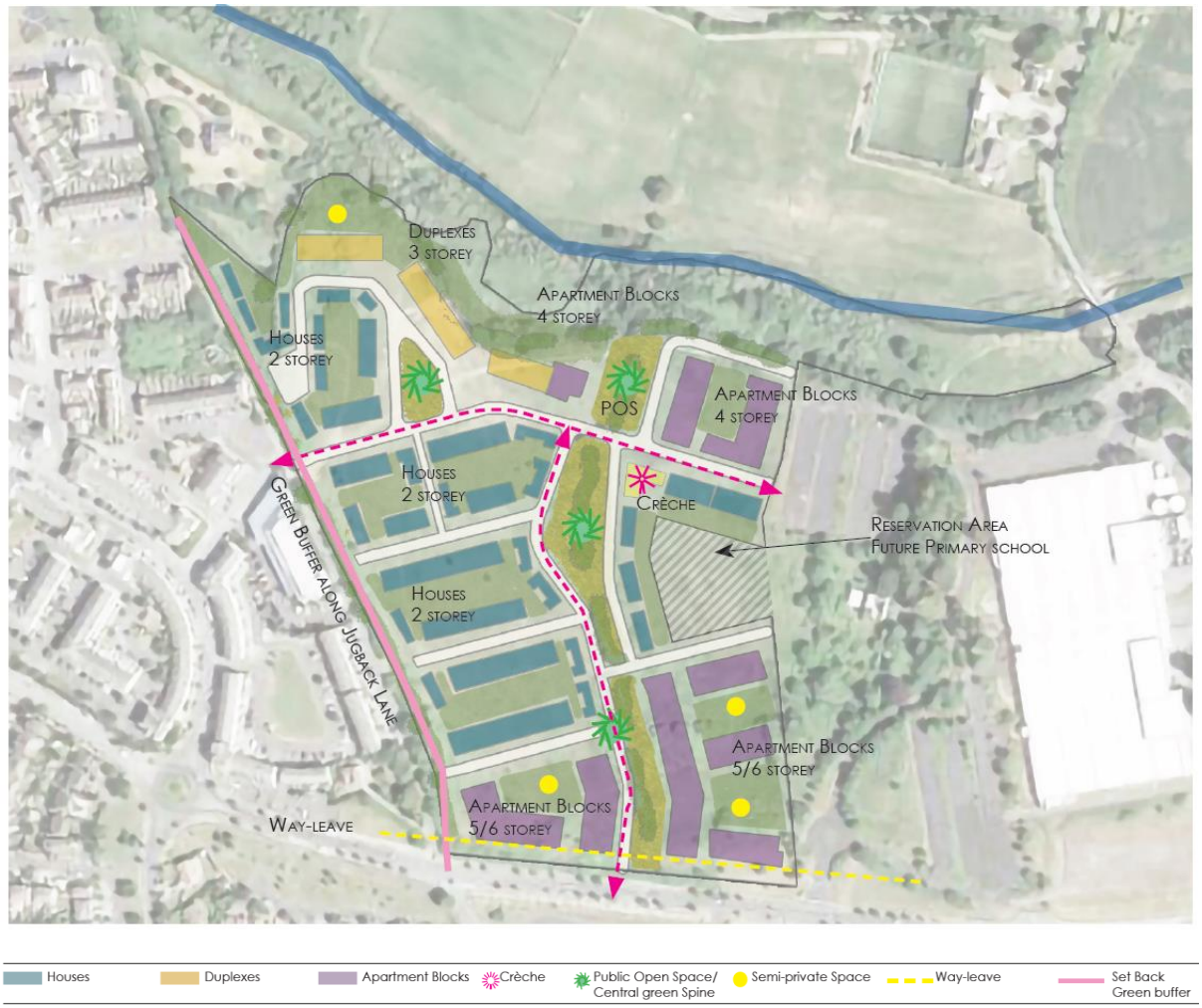

Figure 4-4 Pre application Alternate C

Alternate C - Comparison of Environmental effects:

The scheme provides for a higher density of 71.8 u.p.h. This has been attained by incorporating a substantial portion of apartment units, comprising 70% of total units. The increased level of high-density apartment units in the scheme allowed for a more open area within the scheme. However, the proposal also includes apartment units along Broadmeadow River away from the public transport corridors servicing the site. This would create a detrimental landscape impact to the river corridor and associated High Amenity zoned lands. The placement of 2 storey houses adjacent to 5/6 storey apartment does not allow for a natural transition of the development across the site.

4.5.4 Alternative D: Pre-Application

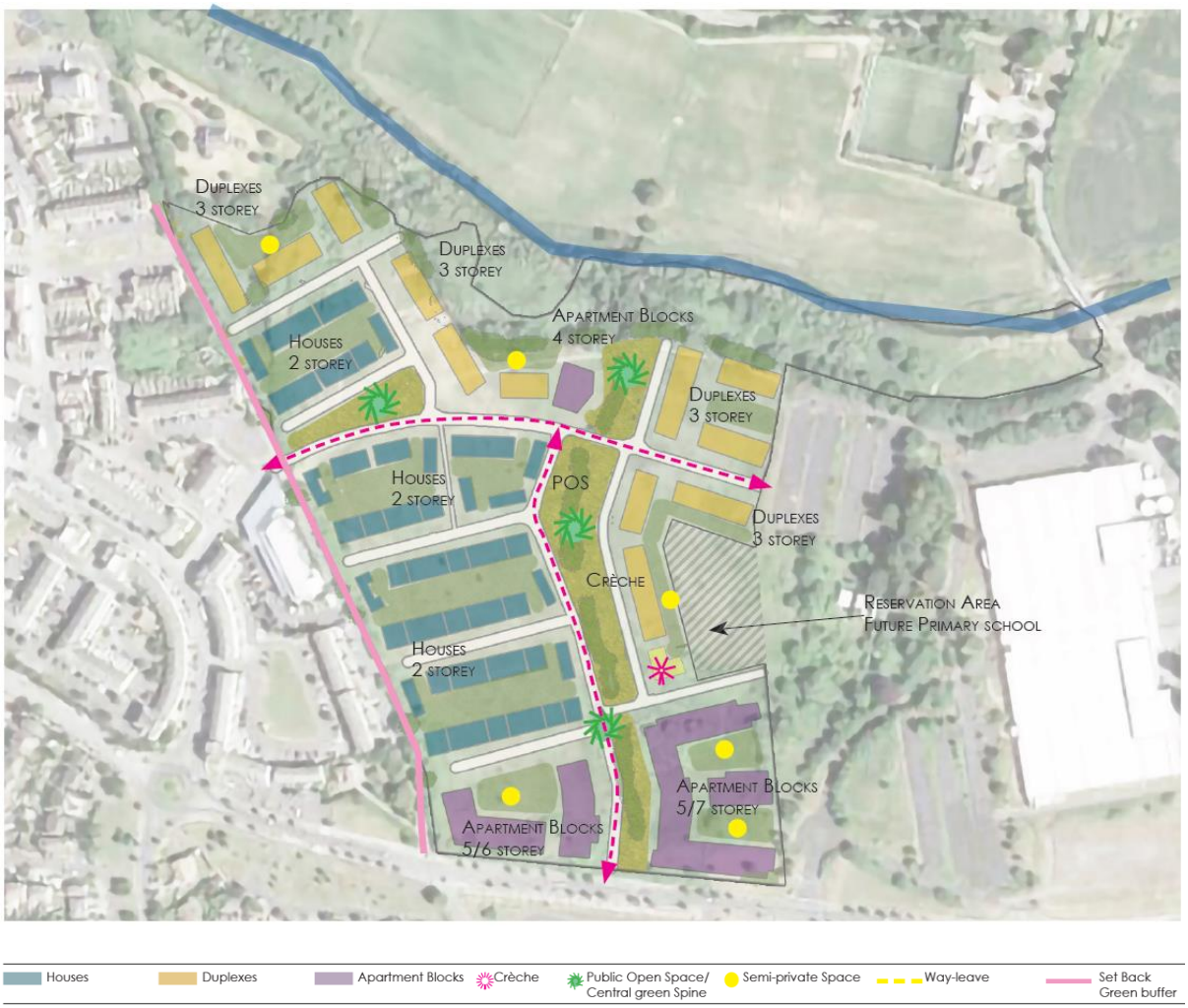

Figure 4-5 Pre-application Alternate D

Alternative D is an improved iteration prepared by MCORM architects addressing weakness identified in the previous iteration. This proposal would have provided for a total of 651 units comprising a dwelling mix of:

- 129 no. houses (20%)
- 134 no. duplexes (20.5%)
- 388 no. apartment units (59.5 %)

The proposed layout includes several apartment blocks ranging in height from 5 to 7 storeys placed along Glen Ellan road. Apartments and duplexes blocks are also proposed to the north of the site addressing the Broadmeadow Riverside Park. Houses are proposed within the west half of the site. The proposal includes a significant proportion of duplex units to the east and north of the site.

Alternate D - Comparison of Environmental effects:

The scheme provides for a density of 71.4 u.p.h. Public open spaces within the scheme are clustered within the green spine incorporating existing hedgerows and connecting Glen Ellan road in the south to the Broadmeadow Riverside park in the north. The apartments and units are provided with semi- private communal amenity spaces. The scheme features a strong urban edge created by the apartment blocks positioned at the southern boundary without any set back from Glen Ellan Road. This could impact the future delivery of the Bus Connects corridor via Glen Ellan road. The applicant would also have to

acquire legal entitlements to develop this strip of land along the road as they include infrastructure wayleave to service adjacent sites outside the applicant's ownership.

4.5.5 Submitted layout

Figure 4-6 Site layout of proposed scheme (extract image - main SHD shown only)

The revised proposal and final layout for the scheme provide for a total of 621 units with an improved unit mix, type, and density. In addition, the proposed scheme also includes the provision of road upgrades to the local network as well as public wastewater network upgrades. The dwelling mix comprises of:

- 118 no. houses (19%),
- 154 no. Build to Rent duplexes (24.8%)
- 349 no. apartment units (56.2 %)

The proposal provides for a net density of 70.22 u.p.h. The proposed layout includes a number of apartment blocks ranging in height from 1 to 7 storeys placed along Glen Ellan road. 3-storey duplexes blocks are located to the north of the site addressing the Broadmeadow Riverside Park. Houses and duplexes proposed within the western half of the site offer a gentle transition between the apartments proposed within the scheme and the existing residential estates along Jugback Terrace. The chosen layout also includes proposals for single level basement under Block B and an under-croft level in Block A. Please refer to the enclosed architectural drawing pack prepared by MCORM Architects for more details on the proposed scheme.

Chosen Layout- Comparison of Environmental effects:

The revised layout of the scheme has an improved mix of unit types and density. The design takes into consideration the Boards earlier comments. The proposal incorporates a better hierarchy of internal streets, a variety of residential character areas and a range of functional open spaces. The current scheme is a result of the progressive evolution of the design alternatives and presents a substantial higher quality proposal than earlier iterations. This proposed development is considered as an appropriate response to subject lands. In addition, and as mentioned above, the chosen layout also includes the provision of upgrades to both the local road network and public waste water network upgrades. It is considered that these upgrades will greatly facilitate future development in the area going forward.

The preservation of inherent landscape characteristics and existing features of the site has guided the landscaping proposals set out for the scheme. The focus has been to retain the primary elements of the existing ecological networks of hedgerows around the site, most notably the central north-south linear hedgerow, and the woodland amenity along the Broadmeadow River. In doing so, a connected linear spine of public open space is formed that provides for shared ecological, open space, recreation, and SuDs functions. The central spine concept proposed directly aligns with the green infrastructure vision and principles of the Fingal County Council Development Plan (2017-23) and the Estuary West Masterplan (2019).

In consultation with the Department of Education and Skills, the applicant has agreed to reserve a 0.46ha site within the applicant's ownership to accommodate a future school sufficient to cater for a 16-24 classroom school as per the requirement of Estuary West Masterplan (2019). The proposed site for the future school is located immediately to the east of the application site and will provide for significant community and social infrastructure for the locality.

The current level of density (70.22 u.p.h. net density) is proposed on the subject site. The site coverage proposed under the current scheme is 28% of the net site area. Plot ratio for the proposal stands at 0.7 for the net site area. This shows that the proposed design on this site has strived to create a balance between built and unbuilt rather than maximise the development potential of the site.

4.6 Alternative Processes

This is a residential led development on vacant land, zoned as Metro Economic Corridor, that permits residential development and associated residential ancillary uses. The EIA Guidelines state that each design solution should be considered against the different approaches, technology, location, size, and scale of the proposals thereby arriving at the most optimal solution. The evaluation must select the optimal design by comparing the environmental effects generated by each alternative scheme- through energy demand, quantity of materials used, natural resources used etc. Each design iteration has been assessed with respect to a number of key design elements within the above sections including design response to the existing site context in the location of taller buildings on site; social impact through the unit mix proposed, social infrastructure proposed within scheme; and other functional aspects of the design like car parking provision and functionality of open spaces proposed. This assessment has informed the selection of final design based on the most appropriate approach.

4.7 Summary of Alternatives Considered

Table 4-1 compares each alternative layout with respect to any direct or indirect effects to various prescribed factors. Layouts that provided better response to the existing environment, safeguarding existing residential amenities, prioritising pedestrians, and cyclists etc were considered as more positive alternatives.

Table 4.1 Summary of Alternatives Considered

Alternative	Alternative Option A	Alternative Option B	Alternative Option C	Alternative Option D	Chosen Layout
	Total **535 units** 215 no. Houses 320 no. Apartments 0.42 parking ratio Density: **55.3 u.p.**h.	Total **624 units** 171 no. Houses 32 no. Duplexes 421 no. Apartments Density: **67.8 u.p.h.**	Total **655 units** 144no. Houses 58 no. Duplexes 463 no. Apartments Density: **71.8 u.p.h.**	Total **651 units** 129 no. Houses 134 no. Duplexes 388 no. Apartments Density: **71.38 u.p.h.**	Total **621 units** 118 no. Houses 154 no. Duplexes 349 no. Apartments Density:**70.22 u.p.h.**
Population and Human Health	**Neutral**	**Positive**	**Positive**	**Positive**	**Positive**
Biodiversity	**Negative**	**Neutral**	**Neutral**	**Negative**	**Positive**
Lands Soils and Geology	**Negative**	**Neutral**	**Negative**	**Negative**	**Neutral**
Hydrology	**Negative**	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Noise and Vibration	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Air and Climate	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Landscape and Visual	**Neutral**	**Negative**	**Negative**	**Negative**	**Neutral**
Traffic and Transportation	**Negative**	**Neutral**	**Negative**	**Negative**	**Neutral**
Material Assets	**Negative**	**Neutral**	**Negative**	**Negative**	**Positive**
Waste Management	**Neutral**	**Neutral**	**Neutral**	**Neutral**	**Neutral**
Archaeology and Cultural Heritage	**Negative**	**Neutral**	**Neutral**	**Neutral**	**Neutral**

Option A

Given the location of the open space presented in Option A, as well as the lack of transition between 2 storey houses and 5 storey apartment blocks, it was considered that the development would have resulted in a negative effect on Land, Soils and Geology. In addition, the footprint and site coverage of the design was such that it negatively impacted existing hedgerows and did not adequately address or incorporate Jugback lane in terms of connectivity or accessibility. Therefore, the design also had a negative effect on Biodiversity. Separately, the parking ratio proposed was not adequate and therefore would have also had a negative impact on traffic and transportation. Lastly, the overall design of the scheme was not cognisant of site constraints or natural features of the site, and therefore the scheme would have also resulted in a negative impact on Archaeology and Cultural Heritage, as well as Hydrology.

Option B

Although Option B was a considerable improvement on Option B as it took into consideration all comments received from ABP, it was considered that the proposed landscaping plan and hierarchy, function and usability of public open space was not clearly defined and would therefore have resulted in a negative impact on Landscape and Visual.

Option C

Option C included a higher density of 71.8uph through the incorporation of a larger amount of apartment units (70%). Although the density of the scheme allowed for more open space areas, the proposals included the placement of apartment units along Broadmeadow River. Given that these apartment units would have been away from public transport corridors and would have also created a detrimental landscape impact on the river corridor, it was considered that the impacts on Land, Soils and Geology, Landscape and Visual and Material Assets would have all been negative. Separately, the impact on Traffic and Transportation would have also been negative considering the location of the apartment units from existing public transport corridors.

Option D

Option D provided a density of 71.4uph, with public open spaces clustered. Existing hedgerows were incorporated where possible and the apartment units were provided with semi-private communal amenity spaces. However, there was a strong possibility that this scheme could have impacted the future delivery of the Bus Connects corridor via Glen Ellan road. Therefore, the impact on Land Soils and Geology, Traffic and Transportation and Material Assets all would have been negative. Separately, although existing hedgerows would have been retained, the scheme itself would have resulted in a negative impact on biodiversity and Land, Soils and Geology due to the proximity of development to the western boundary.

The chosen layout was a result of the detailed design process, which included various design iterations and stages of detailed assessments. The scheme has advanced in response to the feedback received from Fingal County Council and An Bord Pleanála. The proposed layout is the optimal response to the subject lands, its surroundings and on consideration of site constraints posed by the natural features on the site as mentioned above, as well as flood risk, public wayleave along Glen Ellan road etc. The sensitive landscaping proposals successfully integrate and showcase the sites important cultural and ecological features.

The tallest built forms are located along Glen Ellan road to provide a strong urban edge to this façade. Developments here are set back by over 25m on average, at a significant distance from any sensitive receptors. The scheme also provides substantial public open space, over 28.5% of the total site area, benefitting both existing and future residents of the area. The scheme also includes proposals to upgrade the existing road network, and improve existing services, while also unblocking future developments to this area. Therefore, the proposed development represents a significant planning gain for the locality.

4.8 Alternative Infrastructure

A Pre-Connection Enquiry form to facilitate connection of the proposed scheme to the foul sewer network was submitted to Irish Water by the project engineers. In its response, Irish Water stated that to accommodate the proposed connection, a storage tank will be required in the future to manage the impacts of excessive rainfall in the sewer network downstream of the development. In this regard, as part of this application, it is proposed to provide a Stormwater Storage Tank and overflow outfall gravity sewer.

The proposed Stormwater Storage Tank is required on the Irish Water foul water network, draining to the Swords Wastewater Treatment Plant and serving then Oldtown / Mooretown and Holybanks catchment in Swords, Co. Dublin. The proposed tank will alleviate constraints within the Irish Water foul water system, that occur during times of heavy or prolonged rainfall, resulting from surface water and foul water infiltration. Irish Water have undertaken a model review of the constraints within the network and determined that a tank of 2,250m3 volume is required.

Following a review of three different locations in the area, Irish Water have suggested that the most suitable location for the tank would be at the junction of the Balheary Road and Glen Ellen Road. This area is the lowest point along the network that can be accessed by an adjacent road and facilitates an overflow to the Broadmeadow River via gravity. It is also located on a site that has the required minimum

distance from residential or other buildings. Other possible solutions to the constraints in the foul water network considered were:

— Remove the ground water and surface water infiltration from the foul water network that is the cause of the surcharging of the foul water network: This was ruled out as the catchment is very large and would require the full network to be surveyed and then all sewers and manholes to be repaired and made watertight. There are several sub-catchments of the network that are not taken in charge and are under ownership of third parties. Removal of infiltration into Foul Water network is generally only successful if the catchment is relatively small, accessible and where there are some known areas of cross connections / infiltration of surface water into the foul water network.

— Upgrading of the existing 600mm outfall sewer from Balheary Road to the Swords Wastewater Treatment Plant (WwTP): This option was ruled out as the required upgrade of the sewer crossing various land uses and ownerships, including under the Ward River and under the R132 motorway. This option would also contribute to larger flows discharging into Swords WwTP at times of heavy rainfall when the treatment plant would be under most pressure. The proposed storage tank solution will hold back surcharged volume until the heavy rainfall has passed.

4.9 References

- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency, Draft August 2017)
- Advice Notes for Preparing Environmental Impact Statements, Draft September 2017
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002)
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2002)
- Environmental Impact Assessment Projects, Guidance on the preparation of the Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU)
- Department of the Environment, Community and Local Government (DoECLG), (2018) Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment

5. Air Quality and Climatic Factors

5.1 Introduction

This chapter assesses the likely air quality and climate impacts associated with the proposed residential development at Holybanks, Swords, Co. Dublin. The proposed development is located on a site circa 14.17 Ha in size. The proposed development will involve construction of a residential development, a childcare facility and all associated ancillary and infrastructural works. A full description of the proposed development is available in Chapter 3 - Description of the Scheme.

This chapter was completed by Niamh Nolan from AWN Consulting. Niamh is an Environmental Consultant in the Air Quality section of AWN. She has one year experience in the environmental consulting sector and has experience preparing EIARs for a number of residential developments. She holds a BSocSci (Hons) in Social Policy and Geography from University College Dublin. She is an Associate Member of both the Institute of Air Quality Management and the Institution of Environmental Science. She has experience in mapping software primarily in QGIS and she specialises in the area of air quality, climate and sustainability.

This chapter was reviewed by Ciara Nolan (Senior Air Quality Consultant), she holds a BSc(Eng) in Energy Systems Engineering from University College Dublin and has also completed an MSc in Applied Environmental Science at UCD. She is an Associate Member of the Institute of Air Quality Management (AMIAQM) and the Institute of Environmental Science (AMIEnvSc). Ciara has been active in the field of air quality for 5 years with a primary focus on consultancy. She has prepared the air quality and climate EIAR chapters for a range of developments including wind energy, industrial, pharmaceutical, data centre, residential and commercial.

5.2 Methodology

5.2.2 Criteria for Rating of Impacts

5.2.2.2 Ambient Air Quality Standards

In order to reduce the risk to health from poor air quality, national and European statutory bodies have set limit values in ambient air for a range of air pollutants. These limit values or “Air Quality Standards” are health or environmental-based levels for which additional factors may be considered. For example, natural background levels, environmental conditions and socio-economic factors may all play a part in the limit value which is set (see Table 5.1).

Air quality significance criteria are assessed on the basis of compliance with the appropriate standards or limit values. The applicable standards in Ireland include the Air Quality Standards Regulations 2011 (S.I. no. 180 of 2011), which incorporate EU Directive 2008/50/EC, which has set limit values for a number of pollutants. The limit values for NO2, PM10, PM2.5, benzene and CO are relevant to this assessment (see Table 5.1). Although the EU Air Quality Limit Values are the basis of legislation, other thresholds outlined by the EU Directives are used which are triggers for particular actions.

Pollutant	Regulation Note 1	Limit Type	Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for protection of human health - not to be exceeded more than 18 times/year	200 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
		Critical level for protection of vegetation	30 µg/m^3 NO + NO_2
Particulate Matter (as PM_{10})	2008/50/EC	24-hour limit for protection of human health - not to be exceeded more than 35 times/year	50 µg/m^3
		Annual limit for protection of human health	40 µg/m^3
Particulate Matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 µg/m^3

Note 1 EU 2008/50/EC – Clean Air for Europe (CAFÉ) Directive replaces the previous Air Framework Directive (1996/30/EC) and daughter directives 1999/30/EC and 2000/69/EC.

Table 5.1: Air Quality Standards Regulations

5.2.2.3 Dust Deposition Guidelines

The concern from a health perspective is focussed on particles of dust which are less than 10 microns (PM10) and less than 2.5 microns (PM2.5) and the EU ambient air quality standards outlined in Table 5.1 have set ambient air quality limit values for PM10 and PM2.5.

With regards to larger dust particles that can give rise to nuisance dust, there are no statutory guidelines regarding the maximum dust deposition levels that may be generated during the construction phase of a development in Ireland. Furthermore, no specific criteria have been stipulated for nuisance dust in respect of this development.

With regard to dust deposition, the German TA-Luft standard for dust deposition (non-hazardous dust) (German VDI, 2002) sets a maximum permissible emission level for dust deposition of 350 mg/(m2*day) averaged over a one year period at any receptors outside the site boundary. Recommendations from the Department of the Environment, Heritage & Local Government (DEHLG, 2004) apply the Bergerhoff limit of 350 mg/(m2*day) to the site boundary of quarries. This limit value can also be implemented with regard to dust impacts from construction of the proposed development.

5.2.2.4 Climate Agreements

Ireland is party to both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol. The Paris Agreement, which entered into force in 2016, is an important milestone in terms of international climate change agreements and includes an aim of limiting global temperature increases to no more than 2°C above pre-industrial levels with efforts to limit this rise to 1.5°C. The aim is to limit global GHG emissions to 40 gigatonnes as soon as possible whilst acknowledging that peaking of GHG emissions will take longer for developing countries. Contributions to GHG emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress was also made in the Paris Agreement on elevating adaption onto the same level as action to cut and curb emissions.

In order to meet the commitments under the Paris Agreement, the EU enacted *Regulation (EU) 2018/842 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No. 525/2013* (the Regulation). The Regulation aims to deliver, collectively by the EU in the most cost-effective manner possible, reductions in GHG emissions from the Emission Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30%, respectively, by 2030 compared to 2005. Ireland's obligation under the Regulation is a 30% reduction in non-ETS greenhouse gas emissions by 2030 relative to its 2005 levels.

In 2015, the Climate Action and Low Carbon Development Act 2015 (No. 46 of 2015) was enacted (the Act). The purpose of the Act was to enable Ireland '*to pursue, and achieve, the transition to a low carbon, climate resilient and environmentally sustainable economy by the end of the year 2050*' (3.(1)

of No. 46 of 2015). This is referred to in the Act as the '*national transition objective*'. The Act made provision for a national mitigation plan, and a national adaptation framework. In addition, the Act provided for the establishment of the Climate Change Advisory Council with the function to advise and make recommendations on the preparation of the national mitigation and adaptation plans and compliance with existing climate obligations. It has since been amended by the the Climate Action and Low Carbon Development (Amendment) Act 2021 (the 2021 Climate Act) which was enacted in July 2021.

The first Climate Action Plan (CAP) was published by the Irish Government in June 2019 (Government of Ireland, 2019a). The Climate Action Plan 2019 outlined the current status across key sectors including Electricity, Transport, Built Environment, Industry and Agriculture and outlined the various broadscale measures required for each sector to achieve ambitious decarbonisation targets. The 2019 CAP also detailed the required governance arrangements for implementation including carbon-proofing of policies, establishment of carbon budgets, a strengthened Climate Change Advisory Council and greater accountability to the Oireachtas. The Government published the second Climate Action Plan in November 2021 (Government of Ireland, 2021a). The plan contains similar elements as the 2019 CAP and aims to set out how Ireland can reduce our greenhouse gas emissions by 51% by 2030 (compared to 2018 levels) which is in line with the EU ambitions, and a longer-term goal of to achieving net-zero emissions no later than 2050. The 2021 CAP outlines that emissions from the Built Environment sector must be reduced to 4 -5 $MtCO_2e$ by 2030 in order to meet our climate targets. This will require further measures in addition to those committed to in the 2019 CAP. This will include phasing out the use of fossil fuels for the space and water heating of buildings, improving the fabric and energy of our buildings, and promoting the use of lower carbon alternatives in construction.

Following on from Ireland declaring a climate and biodiversity emergency in May 2019 and the European Parliament approving a resolution declaring a climate and environment emergency in Europe in November 2019, the Government approved the publication of the General Scheme in December 2019 followed by the enactment of the 2021 Climate Act) .

The purpose of the 2021 Climate Act is to provide for the approval of plans '*for the purpose of pursuing the transition to a climate resilient, biodiversity rich and climate neutral economy by no later than the end of the year 2050*'. The 2021 Climate Act will also '*provide for carbon budgets and a decarbonisation target range for certain sectors of the economy'.* The 2021 Climate Act defines the carbon budget as '*the total amount of greenhouse gas emissions that are permitted during the budget period'.*

The 2021 Climate Act removes any reference to a national mitigation plan and instead refers to both Climate Action Plans, and a series of National Long Term Climate Action Strategies. In addition, the Minister for the Environment, Climate and Communications shall request each local authority to make a 'local authority climate action plan' which will be updated every five years and to specify the mitigation measures and the adaptation measures to be adopted by the local authority.

In July 2021, the European Climate Law came into force. This law sets a legally binding target of net zero greenhouse gas emissions by 2050. The EU Institutions and the Member States are bound to take the necessary measures at EU and national level to meet the target. A number of measures have been put in place to track progress with reviews to take place every five years.

The impact of the proposed development on climate has been assessed in relation to Ireland's commitments and obligations under the above policies and legislation.

5.2.2.5 Local Climate Action Plan

Fingal County Council Climate Change Action Plan published in 2019 (Fingal County Council and Codema, 2019) outlines a number of goals and plans to prepare for and adapt to climate change. There are five key action areas within the plan: energy and buildings, transport, flood resilience, nature-based solutions and resource management. Some of the measures promoted within the Action Plan under the 5 key areas involve building retrofits, energy master-planning, development of segregated cycle routes, the promotion of bike share schemes, development of flood resilient designs, promotion of the use of green infrastructure and water conservation initiatives. The implementation of these measures will enable Fingal to adapt to climate change and will assist in bringing Ireland closer to achieving its climate related targets in future years. New developments need to be cognisant of the Action Plan and incorporate climate friendly designs and measures where possible.

5.2.3 Construction Phase

The current assessment focuses on identifying the existing baseline levels of PM10 and PM2.5 in the region of the proposed development by an assessment of EPA monitoring data. Thereafter, the impact of the construction phase of the development on air quality was determined by a qualitative assessment of the nature and scale of dust generating construction activities associated with the proposed development. This is considered best practice and is the understood approach.

Construction phase traffic also has the potential to impact air quality and climate. The UK DMRB guidance (UK Highways Agency, 2019a), states that road links meeting one or more of the following criteria can be defined as being 'affected' by a proposed development and should be included in the local air quality assessment. The TII guidance (2011) was based on the previous version of the UK DMRB guidance (UK Highways Agency, 2007) and notes that the TII guidance should be adapted for any updates to the DMRB (see Section 1.1 of Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes, 2011) .

- Annual average daily traffic (AADT) changes by 1,000 or more;
- Heavy duty vehicle (HDV) AADT changes by 200 or more;
- A change in speed band;
- A change in carriageway alignment by 5m or greater.

The construction stage traffic does not meet the above scoping criteria and therefore, has been scoped out from any further assessment as there is no potential for significant effects.

5.2.4 Operational Phase

5.2.4.1 Air Quality Assessment

The air quality assessment has been carried out following procedures described in the publications by the EPA (2015; 2017) and using the methodology outlined in the guidance documents published by the UK Highways Agency (2019a) and UK Department of Environment Food and Rural Affairs (DEFRA) (2016; 2018). Transport Infrastructure Ireland (TII) reference the use of the UK Highways Agency and DEFRA guidance and methodology in their document Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (2011). This approach is considered best practice in the absence of Irish guidance and can be applied to any development that causes a change in traffic.

In 2019 the UK Highways Agency DMRB air quality guidance was revised with LA 105 Air Quality replacing a number of key pieces of guidance (HA 207/07, IAN 170/12, IAN 174/13, IAN 175/13, part of IAN 185/15). This revised document outlines a number of changes for air quality assessments in relation to road schemes but can be applied to any development that causes a change in traffic. Previously the DMRB air quality spreadsheet was used for the majority of assessments in Ireland with detailed modelling only required if this screening tool indicated compliance issues with the EU air quality standards. Guidance from Transport Infrastructure Ireland (TII, 2011) recommends the use of the UK Highways Agency DMRB spreadsheet tool for assessing the air quality impacts from road schemes. However, the DMRB spreadsheet tool was last revised in 2007 and accounts for modelled years up to 2025. Vehicle emission standards up to Euro V are included but since 2017, Euro 6d standards are applicable for the new fleet. In addition, the model does not account for electric or hybrid vehicle use. Therefore, this is a somewhat outdated assessment tool. The LA 105 guidance document states that the DMRB spreadsheet tool may still be used for simple air quality assessments where there is unlikely to be a breach of the air quality standards. The proposed development is unlikely to breach air quality standards and as such this tool is an appropriate assessment. Due to its use of a "dirtier" fleet, vehicle emissions would be considered to be higher than more modern models and therefore any results will be conservative in nature and will provide a worst-case assessment.

The 2019 UK Highways Agency DMRB air quality revised guidance LA 105 Air Quality states that modelling should be conducted for NO2 for the base, opening and design years for both the do minimum (do nothing) and do something scenarios. Modelling of PM10 is only required for the base year to demonstrate that the air quality limit values in relation to PM10 are not breached. Where the air quality modelling indicates exceedances of the PM10 air quality limits in the base year then PM10 should be included in the air quality model in the do minimum and do something scenarios. Modelling of PM2.5 is

not required as there are currently no issues with compliance with regard to this pollutant. The modelling of PM10 can be used to show that the project does not impact on the PM2.5 limit value as if compliance with the PM10 limit is achieved then compliance with the PM2.5 limit will also be achieved. Historically modelling of carbon monoxide (CO) and benzene (Bz) was required however, this is no longer needed as concentrations of these pollutants have been monitored to be significantly below their air quality limit values in recent years, even in urban centres (EPA, 2021).

The key pollutant reviewed in this assessment is NO2. Concentrations of PM10 have been modelled for the base year to indicate that there are no potential compliance issues. Modelling of operational NO2 concentrations has been conducted for the do nothing and do something scenarios for the opening year (2027) and design year (2042). The TII guidance (2011) states that the assessment must progress to detailed modelling if:

Concentrations exceed 90% of the air quality limit values when assessed by the screening method; or
Sensitive receptors exist within 50m of a complex road layout (e.g. grade separated junctions, hills etc).
The UK Highways Agency guidance LA 150 (2019) scoping criteria outlined in Section 5.1.2 was used to determine the road links required for inclusion in the modelling assessment.

TII guidance (2011) states that sensitive receptors within 200m of impacted road links are included within the modelling assessment. Pollutant concentrations are calculated at these sensitive receptor locations to determine the impact of the proposed development in terms of air quality. The guidance states a proportionate number of representative receptors which are located in areas which will experience the highest concentrations or greatest improvements as a result of the proposed development are to be included in the modelling (UK Highways Agency, 2019a). The TII guidance (2011) defines sensitive receptor locations as: residential housing, schools, hospitals, places of worship, sports centres and shopping areas, i.e. locations where members of the public are likely to be regularly present. A total of four high sensitivity residential receptors (R1– R4) were included in the modelling assessment and are detailed in Figure 5.1.

The following model inputs are required to complete the assessment using the DMRB spreadsheet tool: road layouts, receptor locations, annual average daily traffic movements (AADT), percentage heavy goods vehicles (%HGV), annual average traffic speeds and background concentrations. Using this input data, the model predicts the road traffic contribution to ambient ground level concentrations at the worst-case sensitive receptors using generic meteorological data. The DMRB model uses conservative emission factors, the formulae for which are outlined in the DMRB Volume 11 Section 3 Part 1 – HA 207/07 Annexes B3 and B4. These worst-case road contributions are then added to the existing background concentrations to give the worst-case predicted ambient concentrations. The worst-case ambient concentrations are then compared with the relevant ambient air quality standards to assess the compliance of the proposed development with these ambient air quality standards.

The TII document Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes (2011) details a methodology for determining air quality impact significance criteria for road schemes which can be applied to any project that causes a change in traffic. The degree of impact is determined based on both the absolute and relative impact of the proposed development. The TII significance criteria have been adopted for the proposed development and are detailed in Table A5.1.1 to Table A5.1.3. The significance criteria are based on NO2 and PM10 as these pollutants are most likely to exceed the annual mean limit values (40 µg/m3).

Conversion of NO_x to NO_2

NOX (NO + NO2) is emitted by vehicles exhausts. The majority of emissions are in the form of NO, however, with greater numbers of diesel vehicles and some regenerative particle traps on HGVs the proportion of NOX emitted as NO2, rather than NO is increasing. With the correct conditions (presence of sunlight and O3) emissions in the form of NO, have the potential to be converted to NO2.

Transport Infrastructure Ireland states the recommended method for the conversion of Nox to NO2 in “Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes” (2011). The TII guidelines recommend the use of DEFRAs Nox to NO2 calculator (2019) which was originally published in 2009 and is currently on version 8.1. This calculator (which can be downloaded in the form of an excel spreadsheet) accounts for the predicted availability of O3 and

proportion of Nox emitted as NO for each local authority across the UK. O3 is a regional pollutant and therefore concentrations do not vary in the same way as concentrations of NO2 or PM10.

The calculator includes Local Authorities in Northern Ireland and the TII guidance recommends the use of 'Armagh, Banbridge and Craigavon' as the choice for local authority when using the calculator. The choice of Craigavon provides the most suitable relationship between NO2 and NOx for Ireland. The "All Non-Urban UK Traffic" traffic mix option was used.

Update to NO_2 Projections using DMRB

In 2011 the UK DEFRA published research (Highways England, 2013) on the long term trends in NO2 and NOX for roadside monitoring sites in the UK. This study marked a decrease in NO2 concentrations between 1996 and 2002, after which the concentrations stabilised with little reduction between 2004 and 2010. The result of this is that there now exists a gap between projected NO2 concentrations which UK DEFRA previously published and monitored concentrations. The impact of this 'gap' is that the DMRB screening model can under-predict NO2 concentrations for predicted future years. Subsequently, the UK Highways Agency published an Interim advice note (IAN 170/12) in order to correct the DMRB results for future years. This methodology has been used in the current assessment to predict future concentrations of NO2 as a result of the proposed development.

Traffic Data Used in Modelling Assessment

Traffic flow information was obtained from Waterman Moylan for the purposes of this assessment. Data for the Do Nothing and Do Something scenarios for the base year 2020, opening year 2027 and design year 2042 were provided. The traffic data is detailed in Table 5.2. Only road links that met the DMRB scoping criteria outlined in Section 5.1.2 and that were within 200m of receptors were included in the modelling assessment. Background concentrations have been included as per Section 5.3.3 of this chapter based on available EPA background monitoring data (EPA, 2021).

This traffic data has also been used in the operational stage climate impact assessment.

Road Name	Speed (km/h)	% HGV	Base	Do Nothing	Do Something	Do Nothing	Do Something
			2020	2027		2042	
Glen Ellan Road	50	4%	12,603	18,239	20,382	19,461	21,604
Balheary Road North	50	4%	15,724	21,239	23,376	22,720	24,858
Castlegrange Green	50	4%	6,549	8,120	8,559	8,755	9,194
Balheary Road South	50	4%	16,803	22,196	23,889	23,826	25,519

Table 5.2: Traffic Data used in Air Quality and Climate Assessment

5.1: Approximate Locations of Residential Receptors used in Local Air Quality Assessment

5.2.4.2 Air Quality Impact on Ecological Sites

For routes that pass within 2 km of a designated area of conservation (either Irish or European designation) the TII requires consultation with an ecologist (TII, 2011). However, TII guidance (2011) states in practice the potential for impact to an ecological site is highest within 200 m of the proposed scheme and when significant changes in AADT (>5%) occur. Only sites that are sensitive to nitrogen deposition should be included in the assessment. In addition, the UK Highways Agency (2019) states that a detailed assessment does not need to be conducted for areas that have been designated for geological features or watercourses.

Transport Infrastructure Ireland's Guidelines for Assessment of Ecological Impacts of National Road Schemes (2009) and Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities (DEHLG, 2010) provide details regarding the legal protection of designated conservation areas.

If both of the following assessment criteria, taken from the TII guidance (2011), are met, an assessment of the potential for impact due to nitrogen deposition should be conducted:

- A designated area of conservation is located within 200 m of the proposed development; and
- A significant change in AADT flows (>5%) will occur.

There are no designated sites impacted within 200m of the proposed development. The closest designated site is the Malahide Estuary – which is a proposed NHA, SAC 000205, SPA however this is 500m at the closest point and therefore, a detailed NO_X assessment is not required as no significant impact is predicted.

5.2.4.3 Climate Assessment

The UK Highways Agency has published an updated DMRB guidance document in relation to climate impact assessments LA 114 Climate (UK Highways Agency 2019b). The following scoping criteria are used to determine whether a detailed climate assessment is required for a proposed project during the operational stage.

- A change of more than 10% in AADT;
- A change of more than 10% to the number of heavy duty vehicles; and
- A change in daily average speed of more than 20 km/hr.

If any of the road links impacted by the proposed development meet or exceed the above criteria, then further assessment is required. There are a small number of road links that will experience an increase of 10% or more in the AADT. These road links have been included in the detailed climate assessment (see Table 5.2).

The impact of the proposed development at a national / international level has been determined using the procedures set out by Transport Infrastructure Ireland (2011) and the methodology provided in Annex D in the UK Design Manual for Roads and Bridges (UK Highways Agency, 2007). The assessment focused on determining the resulting change in emissions of carbon dioxide (CO2). The Annex provides a method for the prediction of the regional impact of emissions of these pollutants from road schemes and can be applied to any project that causes a change in traffic. The inputs to the air dispersion model consist of information on road link lengths, AADT movements and annual average traffic speeds (see Table 5.2).

5.3 Baseline Environment

5.3.1 Meteorological Data

A key factor in assessing temporal and spatial variations in air quality is the prevailing meteorological conditions. Depending on wind speed and direction, individual receptors may experience very significant variations in pollutant levels under the same source strength (i.e. traffic levels) (WHO, 2006). Wind is of key importance in dispersing air pollutants and for ground level sources, such as traffic emissions, pollutant concentrations are generally inversely related to wind speed. Thus, concentrations of pollutants derived from traffic sources will generally be greatest under very calm conditions and low wind speeds when the movement of air is restricted. In relation to PM10, the situation is more complex due to the range of sources of this pollutant. Smaller particles (less than PM2.5) from traffic sources will be dispersed more rapidly at higher wind speeds. However, fugitive emissions of coarse particles (PM2.5 - PM10) will actually increase at higher wind speeds. Thus, measured levels of PM10 will be a non-linear function of wind speed.

The nearest representative weather station collating detailed weather records is Dublin Airport, which is located approximately 5 km south of the site. Dublin Airport met data has been examined to identify the prevailing wind direction and average wind speeds over a five-year period (see Figure 5.2). For data collated during five representative years (2017 – 2021), the predominant wind direction is westerly to south-westerly with a mean wind speed of 5.5 m/s over the period 1981 - 2010 (Met Eireann, 2022).

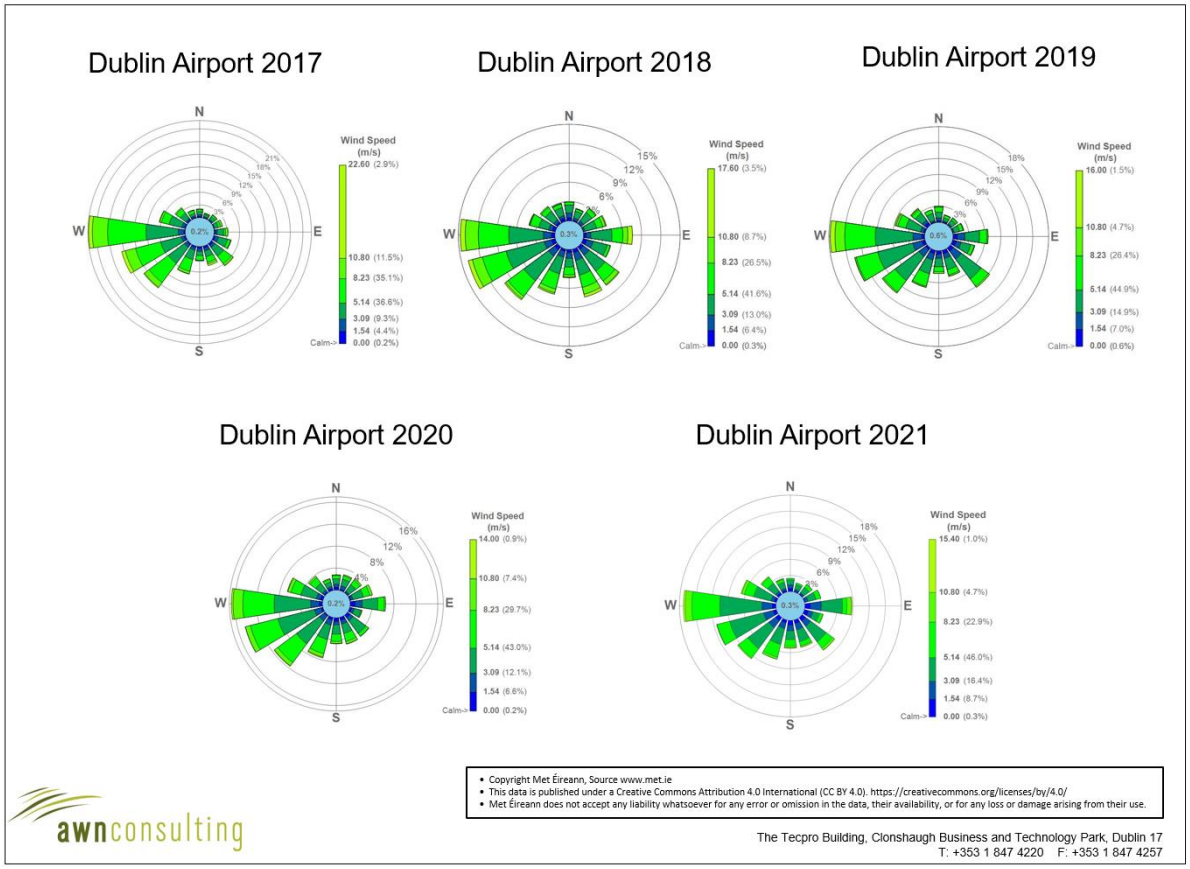

Figure 5.2: Dublin Airport Windrose 2017 – 2021

5.3.2 Trends in Air Quality

Air quality is variable and subject to both significant spatial and temporal variation. In relation to spatial variations in air quality, concentrations generally fall significantly with distance from major road sources (WHO, 2006). Thus, residential exposure is determined by the location of sensitive receptors relative to major roads sources in the area. Temporally, air quality can vary significantly by orders of magnitude due to changes in traffic volumes, meteorological conditions and wind direction.

In assessing baseline air quality, two tools are generally used: ambient air monitoring and air dispersion modelling. In order to adequately characterise the current baseline environment through monitoring, comprehensive measurements would be required at a number of key receptors for PM10, NO2 and benzene. In addition, two of the key pollutants identified in the scoping study (PM10 and NO2) have limit values which require assessment over time periods varying from one hour to one year. Thus, continuous monitoring over at least a one-year period at a number of locations would be necessary in order to fully determine compliance for these pollutants. Although this study would provide information on current air quality it would not be able to provide predictive information on baseline conditions (UK DETR, 1998), which are the conditions which prevail just prior to opening in the absence of the development. Hence the impacts of the development were fully assessed by air dispersion modelling (UK DETR, 1998) which is the most practical tool for this purpose. The baseline environment has also been assessed using modelling, since the use of the same predictive technique for both the 'do-nothing' and 'do-something' scenario will minimise errors and allow an accurate determination of the relative impact of the development.

5.3.3 Baseline Air Quality

Air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality in Ireland is "Air Quality in Ireland 2020" (EPA, 2021). The EPA website details the range and scope of monitoring undertaken throughout Ireland and provides both monitoring data and the results of previous air quality assessments (EPA, 2021).

As part of the implementation of the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), four air quality zones have been defined in Ireland for air quality management and assessment purposes (EPA, 2021). Dublin is defined as Zone A and Cork as Zone B, Zone C is composed of 23 towns with a population of greater than 15,000. The remainder of the country, which represents rural Ireland but also includes all towns with a population of less than 15,000 is defined as Zone D.

In terms of air monitoring and assessment, the proposed development site is within Zone A, but adjacent to the boundary with Zone D (EPA, 2021). The long-term monitoring data has been used to determine background concentrations for the key pollutants in the region of the proposed development. The background concentration accounts for all non-traffic derived emissions (e.g. natural sources, industry, home heating etc.).

In 2020 the EPA reported (EPA 2021) that Ireland was compliant with EU legal limits at all locations, however this was largely due to the reduction in traffic due to Covid-19 restrictions. The EPA report details the effect that the Covid-19 restrictions had on stations, which included reductions of up to 50% at some monitoring stations which have traffic as a dominant source. The report also notes that CSO figures show that while traffic volumes are still slightly below 2019 levels, they have significantly increased since 2020 levels. 2020 concentrations are therefore predicted to be an exceptional year and not consistent with long-term trends. For this reason, they have not been included in the baseline section.
With regard to NO2, continuous monitoring data from the EPA (EPA, 2020), at suburban (non-roadside) Zone A locations show that current levels of NO2 are below both the annual and 1-hour limit values, with annual average levels ranging from 15 – 22 µg/m3 in 2019 (see Table 5.3). Sufficient data is available for the stations in Rathmines, Dún Laoghaire, Swords and Ballyfermot to observe the long-term trend since 2015 (EPA, 2020) (see Table 5.3), with results ranging from 13 – 27 µg/m3. The average annual mean for Swords for the period 2015 - 2019 was 14.8 µg/m3 with an annual average of 15 µg/m3 in 2019. Based on these results, a conservative estimate of the background NO2 concentration in the region of the proposed development is 16 µg/m3.

Station	Station Classification	Averaging Period Note 1,2	Year				
			2015	2016	2017	2018	2019
Rathmines	Suburban Background	Annual Mean NO_2 (µg/m^3)	18	20	17	20	22
		99.8th%ile 1hr NO_2 (µg/m^3)	105	88	86	87	102
Ballyfermot	Suburban Background	Annual Mean NO_2 (µg/m^3)	16	17	17	17	20
		99.8th%ile 1hr NO_2 (µg/m^3)	127	90	112	101	101
Dun Laoghaire	Suburban Background	Annual Mean NO_2 (µg/m^3)	16	19	17	19	15
		99.8th%ile 1hr NO_2 (µg/m^3)	91	105	101	91	91
Swords	Suburban Background	Annual Mean NO_2 (µg/m^3)	13	16	14	16	15
		99.8th%ile 1hr NO_2 (µg/m^3)	93	96	79	85	80

Note 1 Annual average limit value of 40 µg/m^3 and hourly limit value of 200 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).
Note 2 1-hour limit value - 200 µg/m^3 as a 99.8th%ile, i.e. not to be exceeded >18 times per year (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).

Table 5.3: Trends in Zone A Air Quality – NO_2

Continuous PM10 monitoring was carried out at four Zone A locations from 2015 - 2019, Rathmines, Dún Laoghaire, Tallaght and Phoenix Park. These showed an upper average limit of no more than 15 µg/m3 (Table 5.4). Levels range from 9 - 15 µg/m3 over the five-year period with at most 9 exceedances (in Rathmines) of the 24-hour limit value of 50 µg/m3 in 2018 (35 exceedances are permitted per year) (EPA, 2020). Based on the EPA data, a conservative estimate of the current background PM10 concentration in the region of the proposed development is 15 µg/m3.

Station	Station Classification	Averaging Period Note 1, 2	Year				
			2015	2016	2017	2018	2019
Ballyfermot	Suburban Background	Annual Mean PM_{10} (µg/m^3)	12	11	12	16	14
		24-hr Mean > 50 µg/m^3 (days)	3	0	1	0	7
Dún Laoghaire	Suburban Background	Annual Mean PM_{10} (µg/m^3)	13	13	12	13	12
		24-hr Mean > 50 µg/m^3 (days)	3	0	2	0	2
Rathmines	Suburban Background	Annual Mean PM_{10} (µg/m^3)	15	15	13	15	15
		24-hr Mean > 50 µg/m^3 (days)	5	3	5	2	9
Phoenix Park	Urban Background	Annual Mean PM_{10} (µg/m^3)	12	11	9	11	11
		24-hr Mean > 50 µg/m^3 (days)	2	0	1	0	2

Note 1 Annual average limit value of 40 µg/m^3 and 24-hour limit value of 50 µg/m^3 (EU Council Directive 2008/50/EC & S.I. No. 180 of 2011).
Note 2 24-hour limit value - 50 µg/m^3 as a 90.4th%ile, i.e. not to be exceeded >35 times per year (EU Council Directive 1999/30/EC & S.I. No. 180 of 2011).

Table 5.4: Trends in Zone A Air Quality – PM_{10}

Average PM2.5 levels in Rathmines over the period 2015 – 2019 ranged from 8 - 10 µg/m3, with a PM2.5/PM10 ratio ranging from 0.60 – 0.68 (EPA, 2020). Based on this information, a conservative ratio of 0.7 was used to generate an existing PM2.5 concentration in the region of the development of 10.5 µg/m3.

Background concentrations for the opening year (2027) and design years (2042) have been calculated using the current background concentrations and the year on year reduction factors provided by TII in the Guidelines for the Treatment of Air Quality During the Planning and Construction of National Road Schemes and the UK Department for Environment, Food and Rural Affairs LAQM.TG (UK DEFRA 2018).

5.3.4 Climate Baseline

Anthropogenic emissions of greenhouse gases in Ireland included in the EU 2020 strategy are outlined in the most recent review by the EPA which details provisional emissions up to 2020 (EPA, 2021a). The data published in 2021 states that Ireland will exceed its 2020 annual limit set under the EU's Effort Sharing Decision (ESD), 406/2009/EC1 by an estimated 6.73 Mt. For 2021, total national greenhouse gas emissions are estimated to be 57.70 million tonnes carbon dioxide equivalent (Mt CO_2eq) with 44.38 MtCO_2eq of emissions associated with the ESD sectors for which compliance with the EU targets must be met. Agriculture is the largest contributor in 2021 at 37.1% of the total, with the transport sector accounting for 17.9% of emissions of CO_2.

GHG emissions for 2020 are estimated to be 3.6% lower than those recorded in 2019. Emission reductions have been recorded in 6 of the last 10 years. However, compliance with the annual EU targets has not been met for five years in a row. Emissions from 2016 – 2020 exceeded the annual EU targets by 0.29 MtCO_2eq, 2.94 MtCO_2eq, 5.57 MtCO_2eq,6.85 MtCO_2eq and 6.73 MtCO_2eq respectively. Agriculture is consistently the largest contributor to emissions with emissions from the transport and energy sectors being the second and third largest contributors respectively in recent years.

The EPA 2020 GHG Emissions Projections Report for 2020 – 2040 (EPA, 2021b) notes that there is a long-term projected decrease in greenhouse gas emissions as a result of inclusion of new climate mitigation policies and measures that formed part of the National Development Plan (NDP) which was published in 2018 and the Climate Action Plan published in 2019. Implementation of these are classed as a "*With Additional Measures scenario*" for future scenarios. A change from generating electricity using coal and peat to wind power and diesel vehicle engines to electric vehicle engines are envisaged under this scenario. While emissions are projected to decrease in these areas, emissions from agriculture are projected to grow steadily due to an increase in animal numbers. However, over the period 2013 to 2020 Ireland is projected to cumulatively exceed its compliance obligations with the EU's Effort Sharing Decision (Decision No. 406/2009/EC) 2020 targets by approximately 12.2MtCO_2eq under the "With Existing Measures" scenario and under the "With Additional Measures" scenario. The

projections indicate that Ireland can meet its non-ETS EU targets over the period 2021 – 2030 assuming full implementation of the 2019 Climate Action Plan and the use of the flexibilities available (EPA, 2021b).

5.4 Predicted Impacts

5.4.1 Proposed Development

5.4.1.1 Construction Stage

Air Quality

The greatest potential impact on air quality during the construction phase of the proposed development is from construction dust emissions and the potential for nuisance dust. The proposed development can be considered major in scale and therefore there is the potential for significant dust soiling 100 m from the source (TII, 2011) (Table 5.5). While construction dust tends to be deposited within 350 m of a construction site, the majority of the deposition occurs within the first 50 m. There are a number of high sensitivity receptors (residential properties) to the direct west of the site boundary in Applewood. Therefore, there is the potential for significant dust impacts to nearby sensitive receptors in the absence of mitigation. In order to minimise dust emissions during construction, a series of mitigation measures have been prepared in the form of a Dust Management Plan which will be incorporated into the Construction and Environmental Management Plan (CEMP) for the site. Provided the dust minimisation measures outlined in the plan (see Appendix 5.2) are adhered to, the air quality impacts during the construction phase will not be significant. These measures are summarised in Section 5.5.1.

Source		**Potential Distance for Significant Effects (Distance from source)**		
Scale	**Description**	**Soiling**	**PM_{10}**	**Vegetation Effects**
Major	Large construction sites with high use of haul routes	100m	25m	25m
Moderate	Moderate sized construction sites with moderate use of haul routes	50m	15m	15m
Minor	Minor construction sites with limited use of haul routes	25m	10m	10m

Source: Assessment of Construction Impacts taken from "Guidelines for the Treatment of Air Quality During the Planning & Construction of National Road Schemes" (TII, 2011).

Table 5. Error! Reference source not found.**5:** Assessment Criteria for the Impact of Dust Emissions f rom Construction Activities with Standard Mitigation in Place

There is also the potential for traffic emissions to impact air quality in the short-term over the construction phase. Particularly due to the increase in HGVs accessing the site. The construction stage traffic has been quantified and a detailed air quality assessment has been scoped out as none of the road links impacted by the proposed development satisfy the DMRB assessment criteria in Section 5.2.2. The contruction stage traffic will not increase by 1,000 AADT or 200 HDV AADT. It can therefore be determined that the construction stage traffic will have an imperceptible and short-term impact on air quality.

Climate

There is the potential for a number of greenhouse gas emissions to atmosphere during the construction of the development. Construction vehicles, generators etc., may give rise to CO_2 and N_2O emissions. The Institute of Air Quality Management document "*Guidance on the Assessment of Dust from Demolition and Construction"* (IAQM, 2014) states that site traffic and plant is unlikely to make a significant impact on climate. Therefore, the impact on climate is considered to be **imperceptible and short term**.

Human Health

Best practice mitigation measures are proposed for the construction phase of the proposed development which will focus on the pro-active control of dust and other air pollutants to minimise generation of emissions at source. The mitigation measures that will be put in place during construction of the proposed development will ensure that the impact of the development complies with all EU ambient air quality legislative limit values which are based on the protection of human health (see Table 5.1). Therefore, the impact of construction of the proposed development is likely to be **neutral, short-term and imperceptib**le with respect to human health.

5.4.1.2 Operational Stage

Air Quality

The impact of the proposed development has been assessed by modelling emissions from the traffic generated as a result of the development. The impact of NO_2 emissions for the opening and design years was predicted at the nearest sensitive receptors to the development. This assessment allows the significance of the development, with respect to both relative and absolute impacts, to be determined.

Transport Infrastructure Ireland's document '*Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes'* (2011) details a methodology for determining air quality impact significance criteria for road schemes and this can be applied to any development that causes a change in traffic. The degree of impact is determined based on both the absolute and relative impact of the proposed development. Results are compared against the 'Do-Nothing' scenario, which assumes that the proposed development is not in place in future years, in order to determine the degree of impact. Impacts were assessed at 4 no. worst-case sensitive residential receptors (R1 – R4), within 200m of the road links impacted by the proposed development (see Figure 5.1).

The results of the assessment of the impact of the proposed development on NO_2 in the opening year 2027 are shown in Table 5.6 and for design year 2042 are shown in Table 5.7. The annual average concentration is in compliance with the limit value at all worst-case receptors in 2027 and 2042. Concentrations of NO_2 are at most 51% of the annual limit value in 2027 and 2042. In addition, the hourly limit value for NO_2 is 200 µg/m^3 and is expressed as a 99.8th percentile (i.e. it must not be exceeded more than 18 times per year). The maximum 1-hour NO_2 concentration is not predicted to be exceeded in any modelled year (Table 5.8).

The impact of the proposed development on annual mean NO_2 concentrations can be assessed relative to "Do Nothing (DN)" levels. Relative to baseline levels, there are predicted to be some imperceptible increases in NO_2 concentrations at receptors R1 – R4. Concentrations will increase by at most 0.6% of the relevant limit value in 2027 at receptor R3. Using the assessment criteria outlined in Table A5.1.1 and Table A5.1.2 the impact of the proposed development in terms of NO_2 is considered negligible. Therefore, the overall impact of NO_2 concentrations as a result of the proposed scheme is **long-term, negative and imperceptible**.

Concentrations of PM_{10} were modelled for the baseline year of 2020. The modelling showed that concentrations were in compliance with the annual limit value of 40 µg/m^3 at all receptors assessed, therefore, further modelling for the opening and design years was not required as per UK Highways Agency Guidance LA 150 (UK Highways Agency 2019) and detailed in Section 5.2.3. The road traffic contribution from 2020 traffic contributed up to 0.9 µg/m^3 at the 4 modelled receptors. When a background concentration of 15 µg/m^3 is included the overall concentration is 40% of the annual limit value at the worst case receptor.

The impact of the proposed development on ambient air quality in the operational stage is considered **long-term, negative and imperceptible**.

Receptor	Opening Year 2027				
	DN	DS	DS-DN	Magnitude	Description
1	18.3	18.6	0.24	Imperceptible	Negligible Increase
2	16.7	16.8	0.13	Imperceptible	Negligible Increase
3	19.5	19.8	0.28	Imperceptible	Negligible Increase
4	16.2	16.3	0.12	Imperceptible	Negligible Increase

Table 5.6: Predicted Annual Mean NO_2 Concentrations – Opening Year 2027 (µg/m^3).

Receptor	Design Year 2042				
	DN	DS	DS-DN	Magnitude	Description
1	18.1	18.4	0.24	Imperceptible	Negligible Increase
2	16.4	16.6	0.14	Imperceptible	Negligible Increase
3	19.4	19.7	0.28	Imperceptible	Negligible Increase
4	16.0	16.2	0.12	Imperceptible	Negligible Increase

Table 5.7: Predicted Annual Mean NO_2 Concentrations – Design Year 2042 (µg/m^3).

Receptor	Opening Year 2027		Design Year 2042	
	DN	DS	DN	DS
1	64.2	65	63.5	64.4
2	58.4	58.8	57.5	58
3	68.3	69.3	67.9	68.9
4	56.8	57.2	56.2	56.6

Table 5.8: Predicted 99.8th percentile of Daily Maximum 1-hour NO_2 Concentrations (µg/m^3).

Climate

Climate change has the potential to alter weather patterns and increase the frequency of rainfall in future years. As a result of this there is the potential for flooding related impacts on site in future years. A detailed flood risk assessment (FRA) has been undertaken as part of this planning application (see Section 4.2.3.1 of the EIAR) and adequate attenuation and drainage have been provided for to account for climate change increased rainfall in future years.

There is the potential for a number of greenhouse gas emissions to atmosphere during the operational phase of the development. The predicted concentrations of CO_2 for the future years of 2027 and 2042 are detailed in Table 5.9. These are significantly less than the 2020 and 2030 targets set out under EU legislation. It is predicted that in 2027 the proposed development will increase CO_2 emissions by 0.00019% of the EU 2020 target. In 2042 CO_2 emissions will increase by 0.00019% of the 2030 target. Therefore, the climate impact of the proposed development is considered l**ong-term and imperceptible.**

Year	Scenario	CO_2 (tonnes/annum)
2027	Do Nothing	690
	Do Something	762
2042	Do Nothing	738
	Do Something	809
Increment in 2027		71.2 Tonnes
Increment in 2042		71.2 Tonnes
Emission Ceiling (kilo Tonnes) 2020		37,943
Emission Ceiling (kilo Tonnes) 2030		37,943
Impact in 2027 (%)		0.00019 %
Impact in 2042 (%)		0.00019 %

Note 1 Target under European Commission Decision 2017/1471 of 10th August 2017 and amending decision 2013/162/EU to revise Member States' annual emissions allocations for the period from 2017 to 2020.

Note 2 Target under Regulation (EU) 2018/842 of the European Parliament and of the Council of 30 May 2018 on binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013

Table 5.9: Climate Impact Assessment

In addition, the proposed development has been designed to reduce the impact to climate where possible, the following measures have been incorporated into the design of the development: The use of photovoltaics as a means of providing a renewable source of energy for the building is being considered. The proposed development aims to be a "Near Zero – Energy Building" meaning it will have a very high energy performance. The proposed development aims to have a BER rating of at least A3.

Human Health

Traffic related air emissions have the potential to impact air quality which can affect human health. However, air dispersion modelling of traffic emissions has shown that levels of all pollutants are below the ambient air quality standards set for the protection of human health (Table 5.1). It can be determined that the impact to human health during the operational stage is **long-term, neutral and imperceptible.**

Odour

The proposed development includes an offline 2,250m^3 stormwater storage tank which is not considered a significant odour source. However, this tank will also act as a 1 in 5 year storm overflow gravity sewer for Irish Water. Its use as a gravity sewer has the potential for odourous emissions if incorrectly managed.

The Fingal Development Plan 2017 – 2023 (Objective WT12) outlines that a buffer zone of minimum 35m is required from any odour producing stations to avoid nuisance from any odour. However, the nearest residential receptor is 120m from the site of the proposed tank, which is almost 4 times the minimum distance required by the Fingal Development Plan. The nearest sensitive receptor downwind of the prevailing wind direction is 120 m. The proposed stormwater tank and overflow sewer are not likely to be in regular use for any use other than runoff with the exception of 1/5 year flooding events. The tank will be maintained by Irish Water to ensure no odour nuisance occurs at nearby receptors.

Overall there is predicted to be a **negligible impact** from odour due to the proposed offline stormwater storage tank and high-level overflow gravity sewer over its lifecycle when maintained by Irish Water.

5.4.1.3 Do-Nothing Impact

The Do Nothing scenario includes retention of the current site without the proposed development in place. In this scenario, ambient air quality at the site will remain as per the baseline and will change in

accordance with trends within the wider area (including influences from potential new developments in the surrounding area, changes in road traffic, etc).

5.4.2 Cumulative

5.4.2.1 Construction Stage

According to the IAQM guidance (IAQM 2014) should the construction phase of the proposed development coincide with the construction phase of any other developments within 350m then there is the potential for cumulative construction dust related impacts to nearby sensitive receptors. A review of planning permissions for the area was conducted and there is the potential for the construction phase of the proposed development to coincide with the construction of other developments in the area, including the Part 8 application works to the road network. However, provided the mitigation measures outlined in Section 5.4 and Appendix 5.2 are implemented throughout the construction phase of the proposed development significant cumulative dust impacts are not predicted. Due to the short-term duration of the construction phase and the low potential for significant CO_2 and N_2O emissions cumulative impacts to climate are considered neutral.

There are no significant cumulative impacts to air quality or climate predicted for the construction phase.

5.4.2.2 Operational Stage

The traffic data used to assess the operational stage impacts to air quality and climate included the cumulative traffic associated with the development as well as other existing and permitted developments in the local area where such information was available. Therefore, the cumulative impact is included within the operational stage impact for the proposed development. The impact is predicted to be long-term and imperceptible with regards to air quality and climate.

5.4.2.3 Do-Nothing Impact

The Do-Nothing impact detailed for the proposed development is the same as that for the cumulative development.

5.5 Mitigation Measures

5.5.1 Proposed Development

5.5.1.1 Construction Stage

Air Quality

The pro-active control of fugitive dust will ensure the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released. The main contractor will be responsible for the coordination, implementation and ongoing monitoring of the Dust Management Plan. The key aspects of controlling dust are listed below. Full details of the Dust Management Plan can be found in Appendix 5.2. These measures will be incorporated into the CEMP prepared for the site.

In summary the measures which will be implemented will include:

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- Any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads.
- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates.

- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

Climate

Construction stage traffic and embodied energy of construction materials are expected to be the dominant source of greenhouse gas emissions as a result of the construction phase of the development. Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to short-term nature of these works, the impact on climate will not be significant.

Nevertheless, some site-specific mitigation measures will be implemented during the construction phase of the proposed development to ensure emissions are reduced further. In particular the prevention of on-site or delivery vehicles from leaving engines idling, even over short periods. Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.

5.5.1.2 Operational Stage

The impact of the proposed development on air quality and climate is predicted to be imperceptible with respect to the operational phase in the long term. Therefore, no additional site-specific mitigation measures are required.

In addition, the proposed development has been designed to reduce the impact to climate where possible, the following measures have been incorporated into the design of the development: The use of photovoltaics as a means of providing a renewable source of energy for the building is being considered. The proposed development aims to be a “Near Zero – Energy Building” meaning it will have a very high energy performance. The proposed development aims to have a BER rating of at least A3.

5.5.2 Cumulative

5.5.2.1 Construction Stage

There is the potential for the construction phase of the proposed development to coincide with the construction of other developments in the area. However, provided the mitigation measures outlined in Section 5.4.1 and Appendix 5.2 are implemented throughout the construction phase of the proposed development significant cumulative dust impacts are not predicted. .

5.5.2.2 Operational Stage

The traffic data used to assess the operational stage impacts to air quality and climate included the cumulative traffic associated with the development as well as other existing and permitted developments in the local area where such information was available. Therefore, the cumulative impact is included within the operational stage impact for the proposed development. The impact is predicted to be imperceptible and therefore mitigation measures are not required.

5.6 Residual Impacts

5.6.1 Proposed Development

5.6.1.1 Construction Stage

Once the dust minimisation measures outlined in Section 5.5 and Appendix 5.2 are implemented, the impact of the proposed development in terms of construction dust will be short-term and not significant at nearby receptors.

5.6.1.2 Operational Stage

The impact of the proposed development on air quality is considered long-term, negative and imperceptible. The impact to climate is considered long-term, negative and imperceptible.

5.6.1.3 Worst Case Impact

As part of the air dispersion modelling, worst-case traffic data was used in the assessment. In addition, conservative background concentrations were used in order to ensure a robust assessment. Thus, the predicted results of the operational stage assessment are worst-case and will not cause a significant impact on either air quality or climate.

5.6.2 Cumulative

The residual impact of the cumulative development is the same as that detailed above in Section 5.4.2 for the proposed development for both the construction and operational stages.

5.7 Difficulties Encountered

There were no difficulties encountered when conducting this assessment.

5.8 Interactions

Air quality does not have a significant number of interactions with other topics. The main high level interactions between air quality and climate and other environmental factors include: population and human health, traffic and land and soils . Please refer to Chapter 16 Interactions for further information on interactions.

The most significant interactions are between population and human health and air quality. An adverse impact due to air quality in either the construction or operational phase has the potential to cause health and dust nuisance issues. The mitigation measures (see Appendix 5.2) that will be put in place at the proposed development will ensure that the impact of the proposed development complies with all ambient air quality legislative limits and therefore the predicted impact is long term and imperceptible with respect to human health.

Interactions between air quality and traffic can be significant. With increased traffic movements and reduced engine efficiency, i.e. due to congestion, the emissions of vehicles increase. The impacts of the proposed development on air quality are assessed by reviewing the change in annual average daily traffic on the surrounding road network. In this assessment, the impact of the interactions between traffic and air quality are considered to be imperceptible.

Construction phase activities such as land clearing, excavations, stockpiling of materials etc. have the potential for interactions between air quality and land and soils in the form of dust emissions. With the appropriate mitigation measures, outlined in Appendix 5.2, to prevent fugitive dust emissions, it is predicted that there will be no significant interactions between air quality land and soils once mitigation measures are in place.

No other significant interactions with air quality and climate have been identified.

5.9 Monitoring

5.9.1 Construction Phase

Monitoring of construction dust deposition along the site boundary to nearby sensitive receptors during the construction phase of the proposed development is recommended to ensure mitigation measures are working satisfactorily. This can be carried out using the Bergerhoff method in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collecting vessel and a stand with a protecting gauge. The collecting vessel is secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350 mg/(m2*day) during the monitoring period between 28 - 32 days.

5.9.2 Operational Phase

There is no monitoring recommended for the operational phase of the development as impacts to air quality and climate are predicted to be imperceptible.

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6. Noise and Vibration

6.1 Introduction

This chapter assesses the likely noise and vibration impacts associated with the proposed residential development at Holybanks, Swords, Co. Dublin. The proposed development is located on a site circa 14.17 Ha area (developable area). The proposed development will involve construction of a residential development, a childcare facility and all associated ancillary and infrastructural works including storm water tank and road upgrade. A full description of the development is available in Chapter 3 - Description of the Scheme.

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6.2 Methodology

This assessment of impacts for the proposed development has been undertaken with reference to best practise guidance documents relating to environmental noise and vibration which are set out in Section 6.2.1. In addition to these specific guidance documents, the following guidelines and policy documents were taken into account when preparing this EIAR chapter:

- EPA Guidelines on the Information to be contained in Environmental Impact Statements, (EPA, 2002);
- EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), (EPA, 2003);
- EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015);
- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports Draft August 2017 (EPA, 2017);
- Guidance on the preparation of the Environmental Impact Assessment Report, (EC Directive 2011/92/EU as amended by 2014/52/EU)

The study has been undertaken using the following outline methodology:

- Review of relevant guidance in order to identify criteria for the development;
- Conduct a noise monitoring survey to quantify the existing noise environment in the vicinity of the development site and nearest noise sensitive locations;
- Predict the levels of typical noise emissions at the nearest noise sensitive locations for both the construction and operational phases;
- Predict the relative change in noise levels at the nearest noise sensitive locations due to the expected increase in road traffic for the operational phases;
- Assess the impact by comparing the calculated levels against the relevant criteria;
- Where necessary, specify ameliorative, remedial or reductive measures to control the impacts to be within the criteria;
- Present the likely significant effects of the proposed development including the ameliorative, remedial or reductive measures, and;
- Describe the significance of the residual noise and vibration effects

6.2.1 Criteria for Rating of Impacts

6.2.1.1 Construction Phase – Noise

There is no published statutory Irish guidance relating to the maximum permissible noise and vibration levels that may be generated during the construction phase of a project. It is best practice to use BS

5228: 2009+A1: 2014: *Code of Practice for Noise and Vibration Control on Construction and Open Sites* with respect to the control of noise and vibration impacts. In this instance, criteria relating to permissible construction noise levels are taken from Part One of the standard "*Noise*".

The approach adopted here calls for the designation of Noise Sensitive Locations ("NSL(s)") into a specific category (A, B or C) based on existing ambient noise levels in the absence of construction noise. This then sets a threshold noise value that, if exceeded at this location, indicates a significant noise impact is associated with the construction activities.

The closest neighbouring NSLs to the proposed development are the residential dwellings situated along Jugback Lane/Terrace, at the western boundary of the site, which are located approximately 15 m from the development site at their closest point. Other receptors are located further away from the proposed development with the next closest being dwellings on Glen Ellan Road which are located approximately 50 m from any significant works.

BS 5228-1:2009+A1:2014 sets out guidance on permissible noise levels relative to the existing noise environment. Table 6.1 sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors.

Table 6.1: Example Threshold of Potentially Significant Effect at Dwellings

Assessment category and threshold value period (L_{Aeq})	**Threshold value, in decibels (dB)**		
	Category A [A]	**Category B [B]**	**Category C [C]**
Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00)	65	70	75
Evenings and weekends	55	60	65
Night-time (23:00 to 07:00hrs)	45	50	55

Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are less than these values.

Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are the same as category A values.

Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5dB) are higher than category A values.

Working hours are scheduled to be 08:00 to 19:00 Monday to Friday and 09:00 to 14:00 on Saturdays.

There are no scheduled construction activities outside of normal working hours. For the appropriate assessment period (i.e. daytime in this instance) the ambient noise level is determined and rounded to the nearest 5dB. Baseline monitoring carried out as part of this assessment would indicate that Category A values are appropriate in terms of the nearest NSL's surrounding the proposed development.

6.2.1.2 Construction Phase – Vibration

Building Damage

In terms of vibration, British Standard BS 5228-2: 2009+A1: 2014: *Code of Practice for Noise and Vibration Control on Construction and Open Sites – Vibration* recommends that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above. The standard also notes that below 12.5mm/s PPV the risk of damage tends to

zero. It is therefore prudent, on a cautious basis, to adopt this lower value. Taking the above into consideration the vibration criteria in Table 6.2 are recommended for nearby properties.

Table 6.2: Transient vibration guidance values for avoidance of cosmetic building damage

Allowable vibration (in terms of peak particle velocity) at the closest part of sensitive property to the source of vibration, at a frequency of:-		
Less than 15Hz	15 to 40Hz	40Hz and above
12 mm/s	20 mm/s	50 mm/s

Human Perception

People are sensitive to vibration stimuli at levels that are orders of magnitude below those which have the potential to cause any cosmetic damage to buildings. BS 5228 states that *"the threshold of perception being typically in the PPV range of 0.14 mm·s^{-1} to 0.3 mm·s^{-1}. As vibrations increase above these values they can disturb, startle, cause annoyance or interfere with work activities."* However, higher levels of vibration are typically tolerated for single events or events of short-term duration, particularly during construction projects and when the origin and/or the duration of vibration is known. BS 5228 states that for vibration levels above 1 mm·s^{-1} "It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents". These values refer to the day-time periods only.

6.2.1.3 Operational Phase – Additional Traffic on Public Roads

In order to consider the potential noise impact associated with the proposed development introducing additional traffic onto the existing road networks, and given that vehicle movements on public roads are assessed using a different parameter (the ten percentile noise level; L_{A10}), it is standard practise to consider the increase in traffic noise level that arises as a result of vehicular movements associated with the development in terms of the L_{A10} parameter (Source DMRB, 2019).

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 6.3 offers guidance as to the likely impact associated with any particular change in traffic noise level (Source DMRB, 2019).

Table 6.3: Likely Impact Associated with Change in Traffic Noise Level

Long Term Magnitude	**DMRB Magnitude of Impact Long Term Noise Change (dB $L_{A10,18hr}$ or L_{night})**
Greater than or equal to 10.0	Major
5.0 to 9.9	Moderate
3.0 to 4.9	Minor
Less than 3.0	Negligible

6.2.1.4 Operational Phase – Mechanical Plant and Services

Once a development of this nature becomes fully operational, a variety of electrical and mechanical plant will be required to service the development. Most of this plant will be capable of generating noise to some degree. Some of this plant may operate 24 hours a day, and hence would be most noticeable during quiet periods (i.e. overnight). Noisy plant with a direct line-of-sight to noise sensitive properties would potentially have the greatest impact. Plant contained within plantrooms has the least potential for impact once consideration is given to appropriate design of the space.

BS 4142:2014 Methods for rating and assessing industrial and commercial sound describes methods for rating and assessing sound of an industrial and/or commercial nature. The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident.

For an appropriate BS 4142 assessment it is necessary to compare the measured external background noise level (i.e. the $L_{A90,T}$ level measured in the absence of plant items) to the rating level ($L_{Ar,T}$) of the various plant items, when operational. Where noise emissions are found to be tonal, impulsive in nature

or irregular enough to attract attention, BS 4142 also advises that a penalty be applied to the specific level to arrive at the rating level.

The subjective method for applying a penalty for tonal noise characteristics outlined in BS 4142 recommends the application of a 2 dB penalty for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.

The following definitions as discussed in BS 4142 are summarised below:

"ambient noise level, $L_{Aeq,T}$"	is the noise level produced by all sources including the sources of concern, i.e. the residual noise level plus the specific noise of mechanical plant, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T].
"residual noise level, $L_{Aeq,T}$"	is the noise level produced by all sources excluding the sources of concern, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T].
"specific noise level, $L_{Aeq,T}$"	is the sound level associated with the sources of concern, i.e. noise emissions solely from the mechanical plant, in terms of the equivalent continuous A-weighted sound pressure level over the reference time interval [T].
"rating level, $L_{Ar,T}$"	is the specific sound level plus any adjustments for the characteristic features of the sound (e.g. tonal, impulsive or irregular components);
"background noise level, $L_{A90,T}$"	is the sound pressure level of the residual noise that is exceeded for 90% of the time period T.

If the rated plant noise level is +10 dB or more above the pre-existing background noise level then this indicates that complaints are likely to occur and that there will be a significant adverse impact. A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact.

6.2.1.5 Operational Phase – Inward Noise Impact

Dublin Agglomeration Noise Action Plan 2018 – 2023 (NAP)

The *Dublin Agglomeration Noise Action Plan Volume 3 Fingal County Council* states the following with respect to assessing the noise impact on new residential development:

> *"In the scenario where new residential development or other noise sensitive development is proposed in an area with an existing climate of environmental noise, there is currently no clear national guidance on appropriate noise exposure levels. The EPA has suggested in the interim, that Action Planning Authorities should examine planning policy guidance notes, such as ProPG (2017). Such guidance notes have been produced with a view to providing practitioners with guidance on a recommended approach to the management of noise within the planning system."*

In addition, the following is provided:

> *"In advance of any national guidance relating to noise in the planning process, the following actions relating to planning and development will be considered for implementation:*

a) *To integrate Noise Action Plans into the County Development Plans.*

b) *To develop guidelines relating to Noise and Planning for FCC. These guidelines should outline the considerations to be taken into account when determining planning applications for both noise-sensitive developments and for those activities which will generate noise. They should introduce the concept of a risk based approach to assessment of noise exposure, and for Good Acoustic Design to be encouraged as part of all new residential developments in FCC.*

c) *To require developers to produce a noise impact assessment and mitigation plans, where necessary, for any new development where the Planning Authority considers that any new development will impact negatively on pre-existing environmental noise levels within their Council area.*

d) *To ensure that future developments are designed and constructed in such a way as to minimise noise disturbances in accordance with Department of the Environment, Community and Local Government planning guidelines such as the Urban Design Manual. e.g. the position, direction and height of new buildings, along with their function, their distance from roads, and the position of noise barriers and buffer zones with low sensitivity to noise,*

e) *To ensure that new housing areas and in particular brown field developments will be planned from the outset in a way that ensures that at least the central area is quiet. This could mean designating the centre of new areas as pedestrian and cycling zones with future developments to provide road design layouts to achieve low speed areas where appropriate.*

f) *To incorporate street design in new developments, which recognise that residential streets have multi-function uses (e.g. movement, recreation) for pedestrians, cyclists and vehicles, in that priority order. The noise maps will be used to identify and classify the priority areas and streets. In the design of streets, cognisance should be given to the Irish Manual for Roads and Streets 2013.*

g) *To require sound proofing for all windows, in all new residential developments, where noise maps have indicated undesirable high noise levels. This may also lead to a requirement to install ducted ventilation.*

h) *To advise during pre-planning meetings regarding site specific design, the orientation of sensitive rooms and balconies away from noise, designing the layout and internal arrangement in apartments to ensure that similar rooms in individual units are located above each other or adjoin each other and that halls are used as buffer zones between sensitive rooms and staircases."*

In accordance with this NAP policy, the following Acoustic Design Statement (ADS) has been prepared to comply with the requirements of this policy.

ProPG: Planning & Noise

The Professional Practice Guidance on Planning & Noise (ProPG) document was published in May 2017. The document was prepared by a working group comprising members of the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH). Although not a UK or Irish government document, since it's publication it has been generally considered as a best practice guidance and has been widely adopted in the absence of equivalent Irish guidance.

The ProPG outlines a systematic risk based 2 stage approach for evaluating noise exposure on prospective sites for residential development. The two primary stages of the approach can be summarised as follows:

- Stage 1 - Comprises a high-level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels; and,
- Stage 2 – Involves a full detailed appraisal of the proposed development covering four "key elements" that include:
    - Element 1 - Good Acoustic Design Process;
    - Element 2 - Noise Level Guidelines;
    - Element 3 - External Amenity Area Noise Assessment, and;
    - Element 4 - Other Relevant Issues.

A key component of the evaluation process is the preparation and delivery of an Acoustic Design Statement (ADS) which is intended for submission to the planning authority. This document is intended to clearly outline the methodology and findings of the Stage 1 and Stage 2 assessments, so as the planning authority can make an informed decision on the permission. ProPG outlines the following possible recommendations in relation to the findings of the ADS:

A. Planning consent may be granted without any need for noise conditions;

B. Planning consent may be granted subject to the inclusion of suitable noise conditions;

C. Planning consent should be refused on noise grounds in order to avoid significant adverse effects ("avoid"); or,

D. Planning consent should be refused on noise grounds in order to prevent unacceptable adverse effects ("prevent").

Section 3.0 of the ProPG provides a more detailed guide on decision making to aid local authority planners on how to interpret the findings of an accompanying Acoustic Design Statement (ADS).

A summary of the ProPG approach is illustrated in Figure 6-1.

It should be noted that a site should not be considered a negligible risk if more than 10 LAFmax events exceed 60 dB during the night period and the site should be considered a high risk if the LAFmax events exceed 80 dB more than 20 times a night.

Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233 (2014). The recommended indoor ambient noise levels are set out in Table 6.4 and are based on annual average data, that is to say they omit occasional events where higher intermittent noisy events may occur.

Table 6.4: ProPG Internal Noise Levels

Activity	Location	(07:00 to 23:00hrs)	(23:00 to 07:00hrs)
Resting	Living Room	35 dB $L_{Aeq, 16hr}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq, 16hr}$	-
Sleeping (Daytime Resting)	Bedroom	35 dB $L_{Aeq, 16hr}$	30 dB $L_{Aeq, 8hr}$ 45 dB L_{AFmax}*

*Note The document comments that the internal $L_{AFmax,T}$ noise level may be exceeded no more than 10 times per night without a significant impact occurring.

In addition to these absolute internal noise levels ProPG provides guidance on flexibility of these internal noise level targets. For instance, in cases where the development is considered necessary or desirable,

and noise levels exceed the external noise guidelines, then a relaxation of the internal L_{Aeq} values by up to 5 dB can still provide reasonable internal conditions.

ProPG provides the following advice with regards to external noise levels for amenity areas in the development:

> *"The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$."*

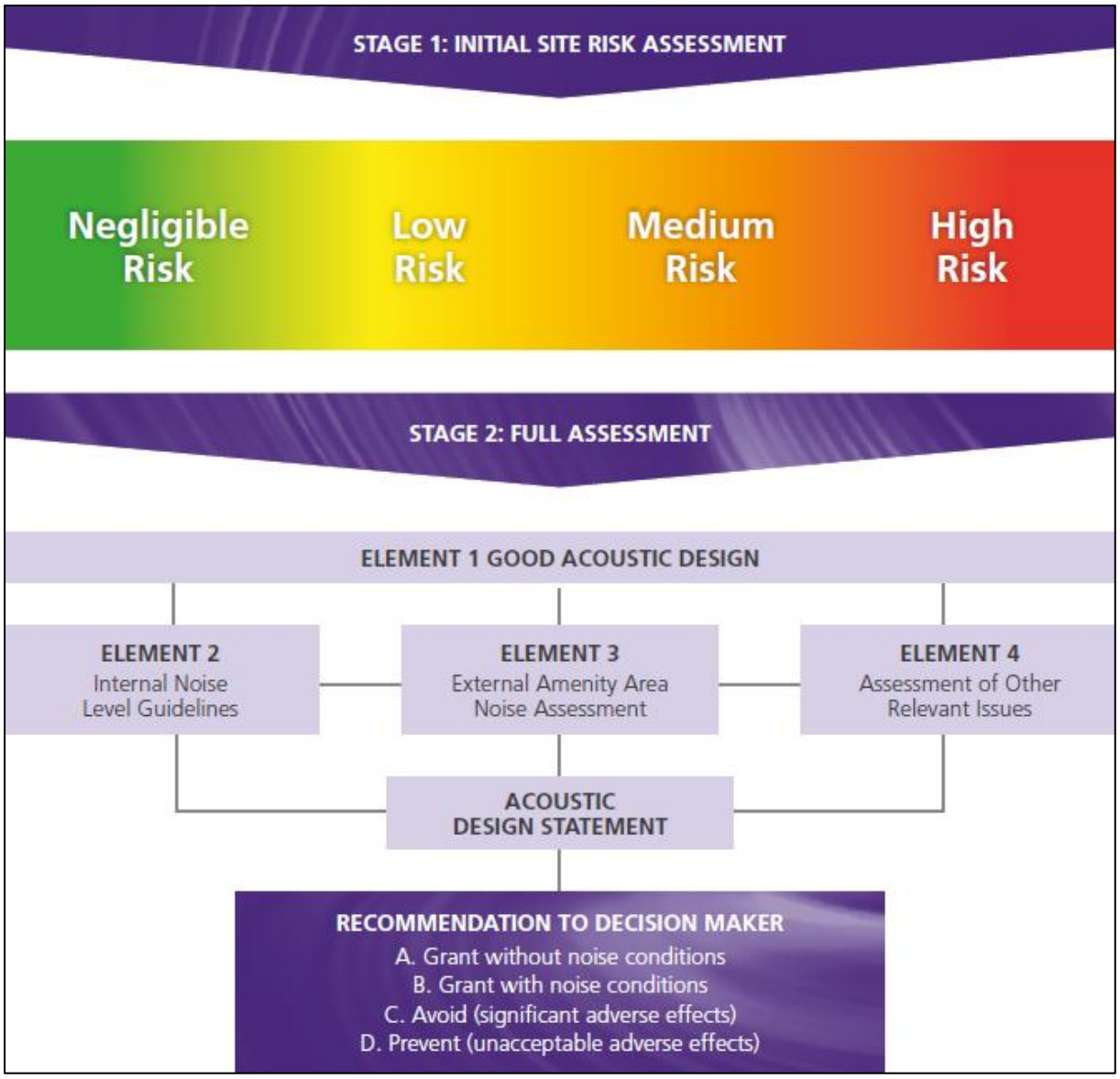

Figure 6-1: ProPG Approach (Source: ProPG)

6.3 Baseline Environment

An environmental noise survey has been conducted at the site in order to quantify the existing noise environment. The survey was conducted in accordance with ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise. Specific details are set out below.

Measurement locations were selected as shown in Figure 6-2.

Figure 6-2: Measurement Locations

The attended noise survey was conducted between 13:15 hrs on 18 December 2018 to 01:30 hrs on 19 December 2018.

The measurements cover a period that was selected in order to provide a typical snapshot of the existing noise climate, with the primary purpose being to ensure that the proposed noise criteria associated with the development are commensurate with the prevailing environment. The monitoring locations were selected to represent the baseline noise environment at the closest NSL to the proposed development.

Location 1

Table 6.5 presents the measurement results for Location 1. Noise levels at this location were dominated by traffic noise during both the day and night periods. Distant aircraft movements also contributed to the noise levels.

Table 6.5: Measured Noise Levels at Location 1

Time	Measured Noise Levels, dB		
	L_{Aeq}	L_{Amax}	L_{A90}
13:14	64	74	54
14:44	66	89	58
16:01	64	72	58
23:17	58	73	39
00:31	52	70	36

Location 2

Table 6.6 presents the measurement results for Location 2. Noise levels at this location were dominated by distant traffic and aircraft noise during the day period. During the night distant road traffic was audible, and additionally plant noise was audible from the local gym / pool.

Table 6.6: Measured Noise Levels at Location 2

Time	Measured Noise Levels, dB		
	L_{Aeq}	L_{Amax}	L_{A90}
13:38	49	57	47
15:04	53	71	48
16:21	52	71	46
22:59	48	68	42
00:13	43	50	42

Location 3

Table 6.7 presents the measurement results for Location 3. Noise levels at this location were dominated by traffic noise during both the day and night periods. Distant aircraft movements also contributed to the noise levels.

Table 6.7: Measured Noise Levels at Location 3

Time	Measured Noise Levels, dB		
	L_{Aeq}	L_{Amax}	L_{A90}
14:02	59	78	45
15:42	62	81	46
16:59	61	80	46
23:53	50	74	38
01:09	48	76	36

Location 4

Table 6.8 presents the measurement results for Location4. Noise levels at this location were dominated by traffic noise during both the day and night periods. Distant aircraft movements also contributed to the noise levels.

Table 6.8: Measured Noise Levels at Location 4

Time	Measured Noise Levels, dB		
	L_{Aeq}	L_{Amax}	L_{A90}
14:23	65	83	49
15:23	64	90	50
16:40	61	75	51
23:35	51	71	42
00:53	42	51	41

6.4 Predicted Impacts

6.4.1 Construction Phase – Noise Impact

Taking into account the baseline noise levels shown in 6.3 Baseline Environment the construction noise thresholds for surrounding receptors has been identified as Category A as assessed per the ABC criteria discussed in Section 6.2.1.1. The thresholds are used to determine whether construction noise impacts have the potential to cause a significant impact.

It is predicted that the construction programme will create typical construction activity related noise on site. During the construction phase of the proposed development, a variety of items of plant will be in use, such as piling rigs, excavators, lifting equipment, dumper trucks, compressors and generators.

The proposed general construction hours are 08:00 to 19:00hrs, Monday to Friday and 08:00 to 14:00 on Saturdays.

As the construction programme has been established in outline form only, it is difficult to calculate the actual magnitude of noise emissions to the local environment. However, it is possible to predict typical noise levels using guidance set out in BS5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise. Table 6.9 outlines typical plant items and associated noise levels that are anticipated for various phases of the construction programme at a standard reference distance of 10 metres from the various plant items.

Table 6.9: Typical Noise Levels for Construction Plant BS5228.

Phase	Item of Plant (BS 5228-1:2009+A1:2014 Ref.)	A-weighted Sound Pressure Level, $L_{Aeq,T}$, at 10 m
Site Preparation	Wheeled Loader Lorry (D3 1)	75
	Track Excavator (C2 22)	72
	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
Foundations	Tracked Excavator (C3.24)	74
	Concrete Pump (C3.25)	78
	Compressor (D7 6)	77
	Poker Vibrator (C4 33)	78
	Large Rotary Bored Piling Rig (C3.14)	82
General Construction	Hand tools	81
	Tower Crane (C4.48)	76
	Pneumatic Circular Saw (D7.79)	75
	Internal fit – out	70
Landscaping	Dozer (C2.13)	78
	Dump Truck (C4.2)	78
	Surfacing (D8.25)	68

Table 6.10 presents the predicted daytime noise levels from an indicative construction period on site at the nearest off-site receptor. Note that construction noise sources for the site are assumed to be running 66% of the time. A 2.4 m hoarding is located on the boundary of the site is included in the calculations.

The predictions have been prepared for a distance of 15 m and 50 m for the closest residential receptors. 15 m is representative of receptors located along Jugback Lane/Terrace, 50 m is representative of properties situated on Glen Ellan Road. These predictions are representative of the worst-case situation when construction work is ongoing on the site boundaries closest to the receptors.

Table 6.10: Predicted Construction Noise Levels

Phase	Item of Plant (BS 5228-1:2009+A1:2014 Ref.)	Predicted at Receiver at 15 m distance dB L_{Aeq}	Predicted at Receiver at 50 m distance dB L_{Aeq}
Site Preparation	Wheeled Loader Lorry (D3 1)	65	54
	Track Excavator (C2 22)	62	51
	Dozer (C2.13)	68	57
	Dump Truck (C4.2)	68	57
Total		**72**	**62**
Foundations	Tracked Excavator (C3.24)	64	53
	Concrete Pump (C3.25)	68	57
	Compressor (D7 6)	67	56
	Poker Vibrator (C4 33)	68	57

	Large Rotary Bored Piling Rig (C3.14)		
Total		**75**	**65**
General Construction	Hand tools	71	60
	Tower Crane (C4.48)	66	55
	Pneumatic Circular Saw (D7.79)	65	54
	Internal fit – out	60	49
Total		**73**	**62**
Landscaping	Dozer (C2.13)	68	57
	Dump Truck (C4.2)	68	57
	Surfacing (D8.25)	58	47
Total		**71**	**61**

In addition to the activities detailed in Tables 6.9 and 6.10 there will be some construction works undertaken at the east end of the site in order to construct the proposed storm water tank. Given the type of work and the appreciable distance of approximately 150 m to the nearest residential receptors the works are not found to cause significant impacts at any receptors.

It is predicted that the construction activities for the remaining development will give rise to noise emissions high enough such that a short-term, potentially significant impact will occur at the nearest noise sensitive locations on Jugback Lane/Terrace, however when works take place at 50 m or further from receptors then no significant impact is predicted to occur. It should be noted that the vast majority of construction work will take place at distances greater than 50 m from receptors. Additionally, as mentioned previously, these predictions are based on worst case scenarios where all work takes place on the boundary closest to the receptor locations, in practice this is unlikely to occur hence, noise levels have the potential to be lower than the predictions.

6.4.2 Construction Phase – Vibration Impact

Potential for vibration impacts during the demolition and construction phase programme are likely to be limited given the distances to the receptor locations and the construction plant and methodology to be used. Expected vibration levels during piling assuming augured or bored piles have been determined through reference to published empirical data. The British Standard BS 5228 – Part 2: Vibration, publishes the measured magnitude of vibration of rotary bored piling using a 600mm pile diameter for bored piling into soft ground over rock, (Table D.6, Ref. No. 106):

- 0.54mm/s at a distance of 5m, for auguring;
- 0.22mm/s at a distance of 5m, for twisting in casing;
- 0.42mm/s at a distance of 5m, for spinning off, and;
- 0.43mm/s at a distance of 5m, for boring with rock auger.

Taking into account the distance to the receptors vibration emissions from this activity will be significantly reduced. Vibration levels at the closest neighbouring buildings are expected to be orders of magnitude below the limits set out in Table 6.2 to avoid any cosmetic damage to buildings. Vibration levels have the potential to be perceptible to building occupants, however they are expected to be below a level that would cause disturbance due to the construction plant and methodology to be employed.

It's understood that archaeological sites located on the development site will be removed, hence no impact is expected to occur. Archaeological sites located outwith the development site are at such a distance that no vibration impact will occur.

None the less, vibration from construction activities to off-site residences should be limited to the values set out in Table 6.2. It should be noted that these limits are not absolute but provide guidance as to magnitudes of vibration that are very unlikely to cause cosmetic damage. Magnitudes of vibration

slightly greater than those in the table are normally unlikely to cause cosmetic damage, but construction work creating such magnitudes should proceed with caution. Consequently, the likely effects may be described as locally negative, not significant and short-term.

6.4.3 Inward Noise Impact

6.4.3.1 Stage 1 – Noise Risk Assessment

The initial noise risk assessment is intended to provide an early indication of any acoustic issues that may be encountered. It calls for the categorisation of the site as a negligible, low, medium or high risk based on the pre-existing noise environment. Figure 6-3 presents the basis of the initial noise risk assessment, it provides appropriate risk categories for a range of continuous noise levels either measured and/or predicted on site.

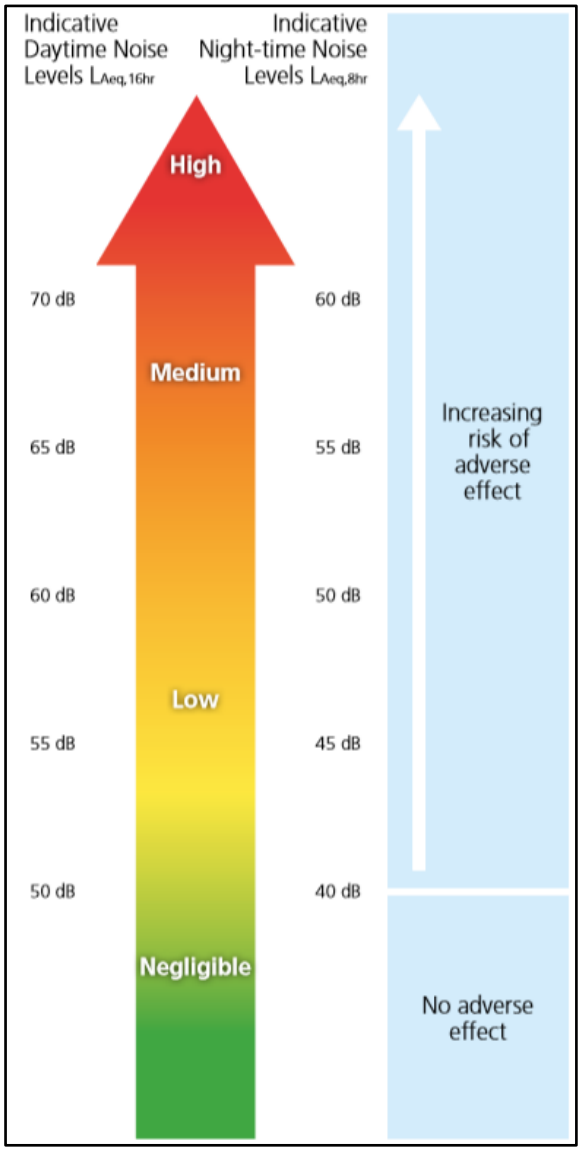

Figure 6-3: ProPG Stage 1 - Initial Noise Risk Assessment

It should be noted that a site should not be considered a negligible risk if more than 10 L_{AFmax} events exceed 60 dB during the night period and the site should be considered a high risk if the L_{AFmax} events exceed 80 dB more than 20 times a night.

Paragraph 2.9 of ProPG states that,

> *"The noise risk assessment may be based on measurements or prediction (or a combination of both) as appropriate and should aim to describe noise levels over a "typical worst case" 24 hour day either now or in the foreseeable future."*

For the proposed development a noise survey has been undertaken and is referred to in the assessment of this proposed development.

ProPG states the following with respect to the initial risk assessment,

> *"The risk assessment should not include the impact of any new or additional mitigation measures that may subsequently be included in development proposals for the site and proposed as part of a subsequent planning application. In other words, the risk assessment should include the acoustic effect of any existing site features that will remain (e.g. retained buildings, changes in ground level) and exclude the acoustic effect of any site features that will not remain (e.g. buildings to be demolished, fences and barriers to be removed) if development proceeds."*

In this instance there are no buildings to be demolished and the site topography is not expected to change significantly during construction.

Comparing the measured noise levels presented in Section 6.3 with the ProPG Initial Noise Risk Assessment guidance (Figure 6-3) the risk assessment has concluded that the level of risk across the site lies within the low to medium noise risk categories. The south site boundary that lies adjacent to Glen Ellan Road can be classified as medium risk with the remainder of the site classified as low risk.

ProPG states the following with respect to low and medium risks areas:

Low Risk	At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
Medium Risk	As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.

Given the above it can be concluded that the development site may be categorised as Low to Medium Risk and as such an Acoustic Design Strategy will be required to demonstrate that suitable care and attention has been applied in mitigating and minimising noise impact to such an extent that an adverse noise impact will be avoided in the final development, this is provided in Section 6.4.3.2. It should be noted that ProPG states the following with regard to how the initial site noise risk is to be used:

> *"2.12 It is important that the assessment of noise risk at a proposed residential development site is not the basis for the eventual recommendation to the decision maker. The recommended approach is intended to give the developer, the noise practitioner, and the decision maker an early indication of the likely initial suitability of the site for new residential development from a noise perspective and the extent of the acoustic issues that would be faced. Thus, a site considered to be high risk will be recognised as presenting more acoustic challenges than a site considered as low risk. A site considered as negligible risk is likely to be acceptable from a noise perspective and need not normally be delayed on noise grounds. A potentially problematical site will be flagged at the earliest possible stage, with an increasing risk indicating the increasing importance of good acoustic design."*

Therefore, following the guidance contained in ProPG does not preclude residential development on sites that are identified as having medium noise levels. It merely identifies the fact that a more considered approach will be required to ensure the developments on the higher risk sites are suitably

designed to mitigate the noise levels. The primary goal of the approach outlined in ProPG is to ensure that the best possible acoustic outcome is achieved for a particular site.

6.4.3.2 Stage 2 – Acoustic Design Statement

Noise levels have been measured across the development site during day and night-time periods as per the baseline survey detailed in Section 6.3. Where façade noise levels are less than 55 dB $L_{Aeq,16hr}$ during the day and 50 dB $L_{Aeq,8hr}$ at night, ProPG provides scope to achieve reasonable internal noise levels while also ventilating the dwellings with open windows. Therefore, for those facades where the noise levels are less than 55 dB $L_{Aeq,16hr}$ during the day and 50 dB $L_{Aeq,8hr}$ at night no further mitigation is required.

Where façade levels are above these levels, the sound insulation performance of the building façade becomes important and a minimum sound insulation performance specification is required for windows and vents to ensure the internal noise criteria defined in Table 6.4 are achieved.

Figure 6-4 identifies those facades where the noise levels are higher than 55 dB $L_{Aeq,16hr}$ during the day and/or 50 dB $L_{Aeq,8hr}$ at night, and where mitigation in the form of enhanced glazing and ventilation will be required. The specification of this enhanced façade is discussed in Section 6.5.3. Taking into account the specified mitigation the effects on internal living space for the highlighted facades will be neutral, not significant and permanent.

Figure 6-4: Plan Drawing Highlighting Facades that Require Upgraded Acoustic Glazing and Ventilation

External Noise Levels

Giving consideration to the measured noise levels and the attenuation due to distance from noise source to the site (e.g. approximately 100 m from measurement location 3 and 4 which will provide attenuation of at least 20 dB), as well as the shielding factor due to the location of the proposed buildings (particularly the apartment blocks to the south of the site), it can be concluded that the vast majority of external spaces across the site will meet the recommended external noise thresholds of 50 – 55 dB $L_{Aeq,16hr}$. The external areas between apartment blocks A1/A2/B and Glen Ellan Road will exceed the threshold, however noise levels in the amenity spaces directly on the opposite side of the apartment blocks will meet the recommended external noise levels. Hence it is concluded that the proposed development will meet the ProPG guidance levels for external amenity spaces.

6.4.4 Additional Traffic on Public Roads

A Traffic & Transport Assessment relating to the proposed development is presented in Chapter **Error! Reference source not found.** of this EIAR. Information from this chapter has been used to determine the predicted change in noise levels in the vicinity of a number of roads in the area surrounding the proposed development, for the opening year (2022), interim years (2023 – 2030) and design year (2040)(see Figure 6-5).

For the purposes of assessing potential noise impact, it is appropriate to consider the relative increase in noise level associated with traffic movements on existing roads and junctions with and without the development. Traffic flow data in terms of the AADT figures has been assessed for the opening year and future years. The calculated change in noise levels during these periods are summarised in Table 6.11.

The calculations indicate that the highest change in noise level will be +0.6 dB on Glen Ellan Road. Referring to the criteria presented in Table 6.3 it can be concluded that the changes in noise level for all assessed roads will be neutral, negligible and permanent.

Table 6.11: Calculated change in traffic noise levels for Do Something Scenarios

Junction / Arm	Calculated Change in Traffic Noise Levels for Each Year, dB					DMRB Impact
	2022	2023	2025	2030	2040	
1A	+ 0.1	+ 0.1	+ 0.3	+ 0.2	+ 0.2	Negligible
1B	+ 0.1	+ 0.1	+ 0.3	+ 0.3	+ 0.3	Negligible
1C	+ 0.0	+ 0.0	+ 0.0	+ 0.0	+ 0.0	Negligible
1D	+ 0.0	+ 0.0	+ 0.0	+ 0.0	+ 0.0	Negligible
2A	+ 0.1	+ 0.1	+ 0.2	+ 0.2	+ 0.2	Negligible
2B	+ 0.0	+ 0.0	+ 0.0	+ 0.0	+ 0.0	Negligible
2C	+ 0.1	+ 0.1	+ 0.3	+ 0.2	+ 0.2	Negligible
2D	+ 0.0	+ 0.0	+ 0.0	+ 0.0	+ 0.0	Negligible
3A	+ 0.0	+ 0.0	+ 0.0	+ 0.0	+ 0.0	Negligible
3B	+ 0.2	+ 0.3	+ 0.6	+ 0.5	+ 0.5	Negligible
3C	+ 0.2	+ 0.3	+ 0.6	+ 0.6	+ 0.6	Negligible
3D	+ 0.0	+ 0.0	+ 0.0	+ 0.0	+ 0.0	Negligible
4A	+ 0.1	+ 0.2	+ 0.4	+ 0.3	+ 0.3	Negligible
4B	+ 0.1	+ 0.1	+ 0.2	+ 0.2	+ 0.2	Negligible
4C	+ 0.0	+ 0.0	+ 0.0	+ 0.0	+ 0.0	Negligible
4D	+ 0.2	+ 0.3	+ 0.5	+ 0.5	+ 0.5	Negligible
5A	+ 0.0	+ 0.1	+ 0.1	+ 0.1	+ 0.1	Negligible
5B	+ 0.0	+ 0.1	+ 0.1	+ 0.1	+ 0.1	Negligible
5C	+ 0.1	+ 0.2	+ 0.3	+ 0.3	+ 0.3	Negligible
5D	+ 0.0	+ 0.1	+ 0.1	+ 0.1	+ 0.1	Negligible

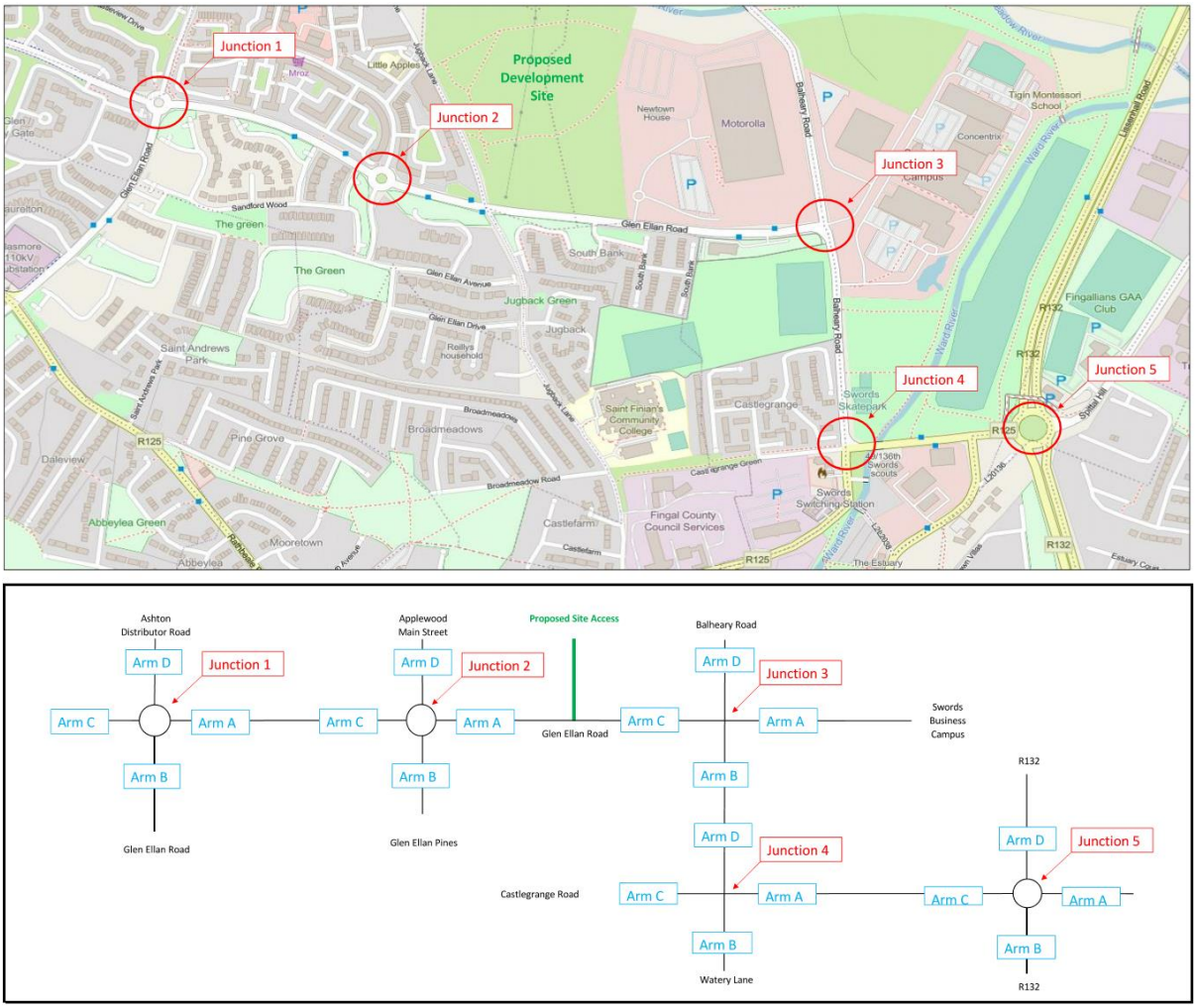

Figure 6-5: Junction References

6.4.5 Operational Noise – Mechanical Plant and Services

Once operational, there will be building services plant items required to serve the development. Details of these items of plant are not progressed to detailed procurement stage, therefore it is not possible to calculate noise levels to the surrounding environment. These items will be selected at a later stage and will be designed and located so that there is no negative impact on sensitive receivers within the development itself or on nearby sensitive receptors.

A pumping house will also be located on site. The pumping house has been located a minimum of 15m from the closest proposed dwelling to meet the Irish Water requirements for minimising odour, noise and vibration nuisance. In addition to this the pumping station will be required to be designed to meet the criteria detailed in Table 6.12 to ensure that there is no significant impact on the nearby proposed dwellings.

The cumulative operational noise level from all plant at the nearest noise sensitive locations external to the development will be designed/attenuated to meet the relevant BS 4142 noise criteria for day and night-time periods provided in Table 6.12. The residential receptor locations are indicated in Figure 6-6. The criteria has been selected so that the noise from items of plant does not exceed background noise levels, and hence, as per BS4142 *"this is an indication of the specific sound source having a low impact".* Therefore, in the case of this development the proposed plant noise threshold is the background noise level at each receptor location.

It's noted that the stormwater storage tanks are located underground and are not expected to emit any significant levels of noise.

Table 6.12: Proposed Noise Criteria for Plant Noise

Receptor	Day, dB $L_{Aeq,1hr}$	Night, dB $L_{Aeq,15min}$
A	46	42
B	54	36
C	45	36
D	49	41

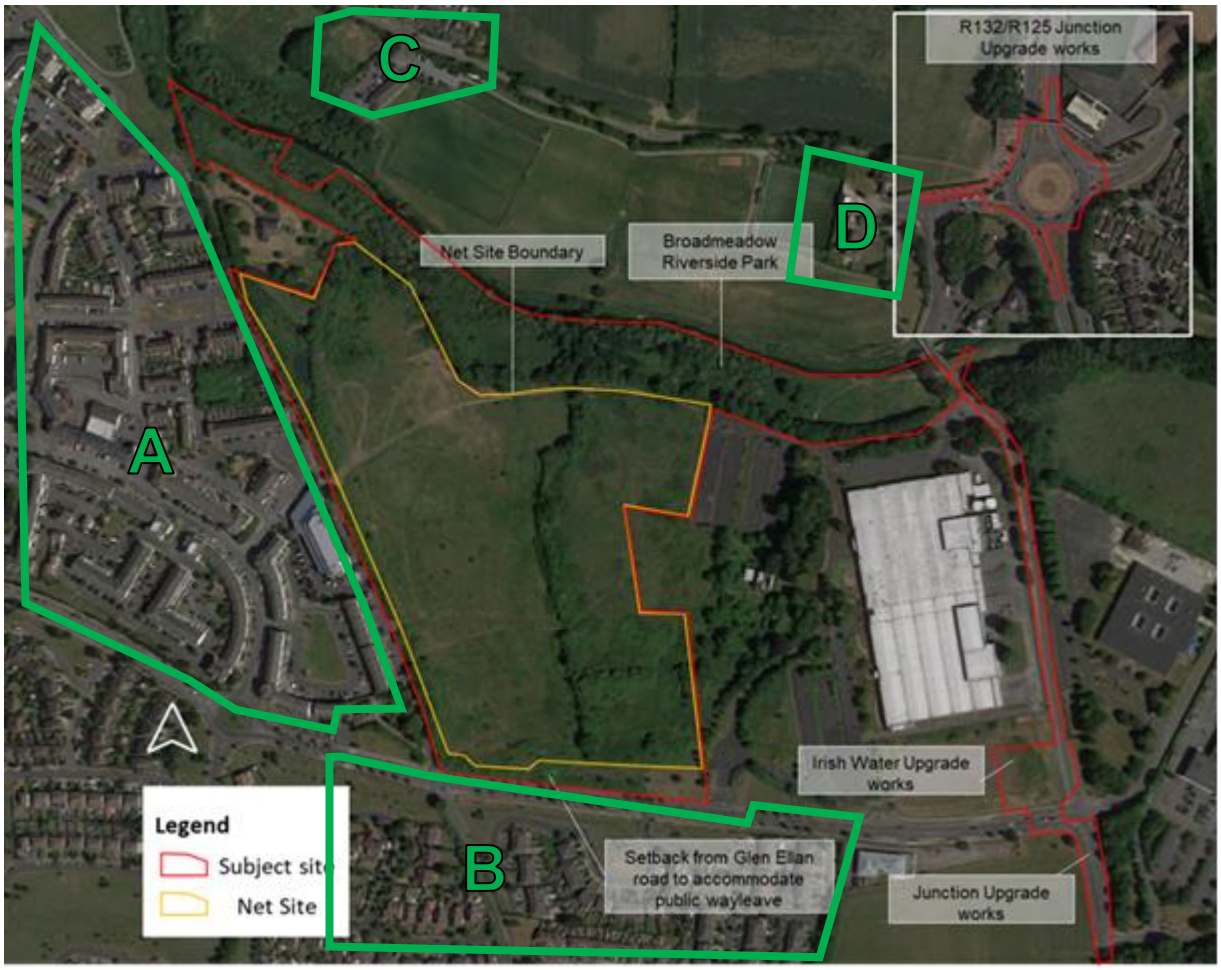

Figure 6-6: Receptor References for Plant Noise Criteria

6.5 Mitigation Measures

6.5.1 Construction Noise

With regard to construction activities, best practice control measures from construction sites within *BS 5228 (2009 +A1 2014) Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2* will be used to control noise and vibration impacts. The contractor will ensure that all best practice noise and vibration control methods will be used as necessary in order to ensure impacts to the closest residential noise sensitive locations are not significant.

Noise-related mitigation methods are described below and will be implemented for the project in accordance with best practice. These methods include:

- No plant used on site will be permitted to cause an ongoing public nuisance due to noise;
- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations;

- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract;
- Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use;
- During construction, the contractor will manage the works to comply with noise limits outlined in BS 5228-1:2009+A1 2014. Part 1 – Noise;
- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures;
- Limiting the hours during which site activities which are likely to create high levels of noise or vibration are permitted;
- Monitoring levels of noise and vibration during critical periods and at sensitive locations.

Furthermore, a variety of practicable noise control measures will be employed. These include:

- Selection of plant with low inherent potential for generation of noise and/ or vibration;
- Erection of good quality site hoarding to the site perimeters which will act as a noise barrier to general construction activity at ground level;
- Erection of barriers as necessary around items such as generators or high duty compressors, and;
- Situate any noisy plant as far away from sensitive properties as permitted by site constraints.

6.5.2 Mechanical Plant and Services

As part of the detailed design of the development, plant items and, where necessary, appropriately selected remedial measures such as attenuators or screening will be specified in order that the adopted plant noise criteria is achieved at the façades of noise sensitive properties, including those within the development itself.

6.5.3 Inward Noise Impact

As is the case in most buildings, the glazed elements and ventilation paths of the building envelope are typically the weakest element from a sound insulation perspective. In general, all wall constructions (i.e. block work or concrete and spandrel elements) offer a high degree of sound insulation, much greater than that offered by the glazing systems. Therefore, noise intrusion via the wall construction will be minimal.

In this instance the facades highlighted in Figure 6-4 will be provided with glazing and ventilation that achieves the minimum sound insulation performance as set out in Table 6.13 and Table 6.14, respectively. With the upgraded glazing and ventilation installed internal noise levels are predicted to achieve the criteria as detailed in Table 6.4. Other facades in the development have no specific requirement for sound insulation. The calculations assume that one vent is required per room.

Table 6.13: Sound Insulation Performance Requirements for Glazing, SRI (dB)

Octave Band Centre Frequency (Hz)						**dB R_w**
125	**250**	**500**	**1k**	**2k**	**4k**	
26	27	34	40	38	46	38

Table 6.14: Sound Insulation Performance Requirements for Ventilation, SRI (dB)

Octave Band Centre Frequency (Hz)						dB $D_{ne,w}$
125	250	500	1k	2k	4k	
31	33	42	43	39	44	42

The overall R_w and $D_{ne,w}$ outlined above are provided for information purposes only. The over-riding requirement is the minimum octave-band sound insulation performance values which may also be achieved using alternative glazing and ventilation configurations. Any selected system will be required to provide the same level of sound insulation performance set out in Table 6.13 and Table 6.14 or greater.

It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing and ventilation systems. In the context of the acoustic performance specification the 'glazing system' is understood to include any and all of the component parts that form part of the glazing element of the façade, i.e. glass, frames, seals, openable elements etc.

The assessment has demonstrated that the recommended internal noise criteria can be achieved through consideration of the proposed façade elements at the design stage. The calculated glazing and ventilation specifications are preliminary and are intended to form the basis for noise mitigation at the detailed design stage. Consequently, these may be subject to change as the project progresses.

Following the provision of these measures the impacts will be considered neutral, not significant and permanent.

6.6 Residual Impacts

6.6.1 Construction Noise

Properties located along Jugback Lane/Terrace will experience a potentially significant impact when construction works occur within 50 m of the properties. The impact may be described as:

Quality	*Significance*	*Duration*
Negative	Significant	Short-term

When construction works are at distances of more than 50m from the properties on Jugback Lane/Terrace, and for all other properties surrounding the proposed development the impact can be described as:

Quality	*Significance*	*Duration*
Negative	Moderate	Short-term

6.6.2 Construction Vibration

At the receptors closest to the works vibration may be perceptible but would be unlikely to cause disturbance. The impact may be described as:

Quality	*Significance*	*Duration*
Negative	Not Significant	Short-term

6.6.3 Operational Stage - Inward Noise Impact

This assessment identifies facades where mitigation in the form of enhanced glazing and ventilation will be required. The specification of this enhanced façade is discussed in Section **Error! Reference s ource not found.**. Following the provision of these measures the impacts are considered to be:

Quality	*Significance*	*Duration*
Neutral	Not Significant	Permanent

6.6.4 Operational Stage – Additional Traffic on Public Roads

The impacts are predicted to be as follows:

Quality	*Significance*	*Duration*
Neutral	Imperceptible	Permanent

6.6.5 Operational Stage – Mechanical Plant

In terms of outward noise impact a set of criteria has been established using relevant guidance. Plant items will be selected at a later stage and will be designed and located so that the criteria is met, and that there is no negative impact on sensitive receivers within the development itself or on nearby sensitive receptors. With measures in place to ensure that noise emissions meet the assigned thresholds it is expected that any impacts will be:

Quality	*Significance*	*Duration*
Neutral	Not Significant	Permanent

6.7 Cumulative Effects

6.7.1 Construction Stage

It's understood that there are no developments, either pending permission or permitted, within 350 m of the proposed site. Hence, no cumulative impacts are expected during the construction phase.

6.7.2 Operational Stage

It's understood that there are no developments, either pending permission or permitted, within 350 m of the proposed site. Hence, no cumulative impacts are expected during the operational phase.

6.7.3 Do Nothing Impact

In the absence of the proposed development being constructed, the noise environment at the nearest noise sensitive locations and across the development site itself will remain largely unchanged. The noise levels measured/noted during the baseline studies are considered representative of the Do-Nothing scenario. The Do-Nothing scenario is therefore considered neutral impact.

6.8 Difficulties Encountered

No difficulties have been encountered whilst compiling this Chapter.

6.9 References

- Dublin Agglomeration Noise Action Plan 2018 – 2023 (NAP).
- BS 8233: 2014: Guidance on sound insulation and noise reduction for buildings.
- British Standard BS 4142: 2014+A1 2019: Methods for Rating and Assessing Industrial and Commercial Sound

- Design Manual for Roads & Bridges – Volume 11 Section 3.
- British Standard BS 5228 (2009 +A1 2014): Code of Practice for Control of Noise and Vibration on Construction and Open Sites Part 1: Noise & Part 2: Vibration.
- British Standard BS 7385 (1993): Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration.
- Calculation of Road Traffic Noise, Department of Transport Welsh Office, HMSO, 1988.
- ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.
- ISO 9613 (1996): Acoustics – Attenuation of sound during propagation outdoors, Part 2: General method of calculation.
- EPA Guidelines on the Information to be contained in Environmental Impact Statements, (EPA, 2002).
- EPA Advice Notes on Current Practice (in the preparation of Environmental Impact Statements), (EPA, 2003).
- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017).
- EPA Advice Notes for Preparing Environmental Impact Statements, (Draft, September 2015).
- Professional Guidance on Planning & Noise (ProPG), (IoA, 2017).
- Guidance on the preparation of the Environmental Impact Assessment Report, (EC Directive 2011/92/EU as amended by 2014/52/EU)

7 Biodiversity

7.1 Introduction

This report has been prepared by Padraic Fogarty of OPENFIELD Ecological Services. Pádraic Fogarty has worked for 25 years in the environmental field and in 2007 was awarded an MSc from Sligo Institute of Technology for research into Ecological Impact Assessment (EcIA) in Ireland. He has an honours degree in Analytical Science from DCU, and diplomas in Environment and Geography (Open University) and Field Ecology (UCC). Pádraic is a full member of the Institute of Environmental Management and Assessment (IEMA) and is a competent expert in biodiversity survey and assessment.

This report provides for an assessment of the potential significant direct and indirect effects as well as cumulative/in-combination effects of the proposed development to biodiversity, .

7.2 Assessment Methodology

The assessment was carried out in accordance with the following best practice methodology: 'Guidelines to be contained in Environmental Impact Assessment Reports' from the Environmental Protection Agency (EPA, 2017), Guidelines from the European Commission on EIAR (2017) and 'Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland' by the Chartered Institute of Ecology and Environmental Management (IEEM, 2018). Commission notice Guidance document on the strict protection of animal species of Community interest under the Habitats Directive, published in 2021, is also considered.

Site habitat surveys were carried out on the 2nd of August 2017, the 30th of November 2018, the 29th of May 2020, the 24th of April 2021 and the 16th of March 2021. The site was surveyed in accordance with the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (Smith et al., 2010). Habitats were identified in accordance with Fossitt's Guide to Habitats in Ireland (Fossitt, 2000). Field data was complemented by a thorough literature review.

November, March and April lie within the optimal survey period for surveying large mammals and especially badgers. April, May and August are within the optimal season for general habitat surveys (Smith et al., 2010), while a breeding bird survey was carried out in May 2020 and again in April 2021. November and March are within the season for wintering birds. Data deficiencies will be highlighted further in this report within relevant sections. Dedicated bat surveys have been carried out by Dr Tina Aughney and this report is presented separately, while its findings are incorporated in this chapter.

The nomenclature for vascular plants is taken from The New Flora of the British Isles (Stace, 2010) and for mosses and liverworts A Checklist and Census Catalogue of British and Irish Bryophytes (Hill et al., 2009).

7.3 Baseline Environment

7.3.1 Zone of influence

Best practice guidance suggests that an initial zone of influence be set at a radius of 2km for non-linear projects (IEA, 1995). However, some impacts are not limited to this distance and so sensitive receptors further from the project footprint may need to be considered as this assessment progresses. This location is shown in figure 1.1.

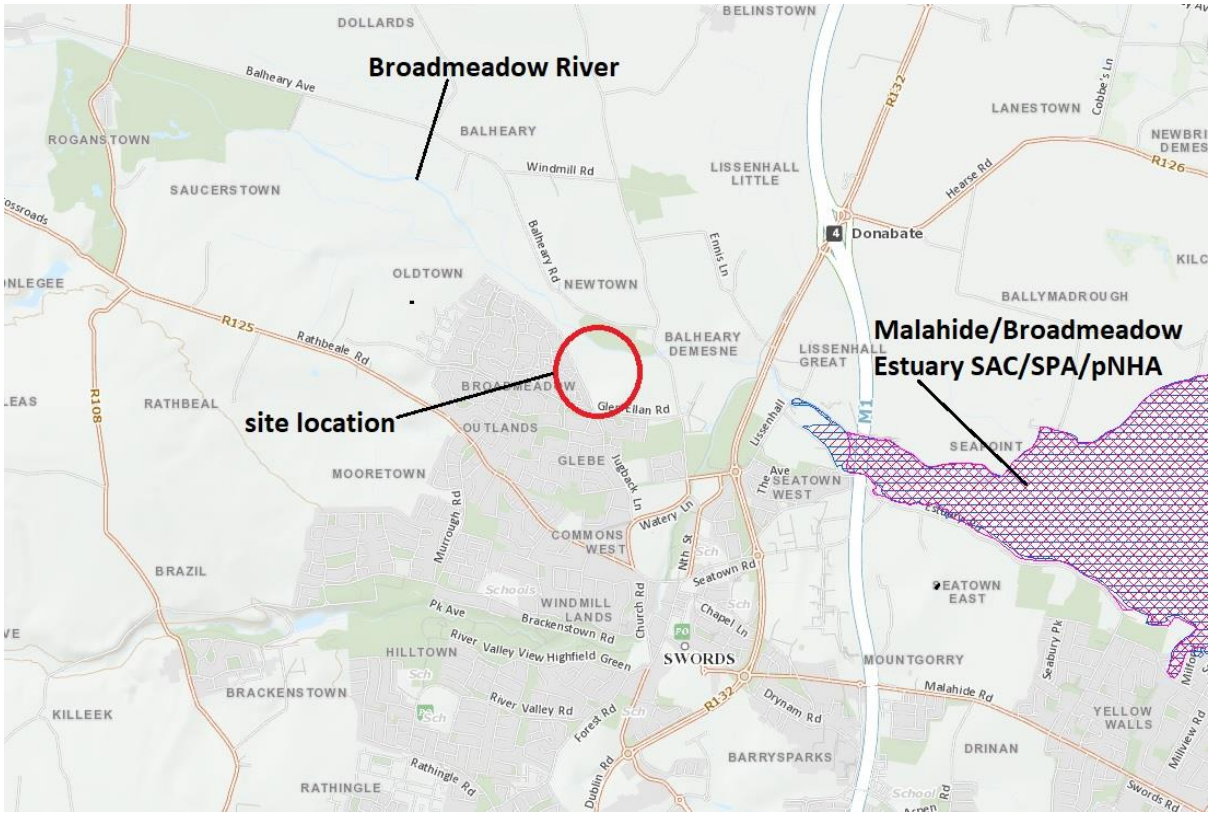

Figure 7.1: Indicative study area (in large circle) showing nearby areas designated for nature conservation and water courses (from www.epa.ie).

There are a number of designations for nature conservation in Ireland including National Park, National Nature Reserve, RAMSAR site, UNESCO Biosphere reserves, Special Protection Areas (SPA – Birds Directive), Special Areas of Conservation (SAC – Habitats Directive); and Natural Heritage Areas. The mechanism for these designations is through national or international legislation. Proposed NHAs (pNHA) are areas that have yet to gain full legislative protection. They are generally protected through the relevant County Development Plan. There is no system in Ireland for the designation of sites at a local or county level. The following areas were found to be within the zone of influence of the application site due to the presence of hydrological pathways between the two areas:

Malahide Estuary SAC (code: 0205)

The estuary is designated for its intertidal habitats and important wintering bird population.

In addition to its Natura 2000 designations, it is also a Ramsar site (Broadmeadow estuary no. 833), a proposed Natural Heritage Area (site code: 0205) and a Marine Protected Area under the OSPAR Convention (site code: O-IE-0002967).

The qualifying interests for the SAC (the reasons why the site is of European value) are detailed in table 7.1 while the Special Conservation Interests (analogous to qualifying interests for SPAs) for the SPA are given in table 7.2.

Table 7-1: Site qualifying interests for the Malahide estuary SAC

Aspect	Level of Protection	Status[5]
Fixed coastal dunes with herbaceous vegetation (grey dunes) (code: 2130)	Habitats Directive Annex I priority habitat	Bad
Shifting dunes along the shoreline with Ammophila arenaria ('white dunes') (code: 2120)	Habitats Directive Annex I	Inadequate
Salicornia and other annuals colonizing mud and sand (code: 1310)		Favourable
Mediterranean salt meadows (code: 1410)		Inadequate
Atlantic salt meadows (code: 1330)		Inadequate
Mudflats and sandflats not covered by seawater at low tide (code: 1140)		Inadequate

- Tidal mudflats (1140). This is an intertidal habitat characterised by fine silt and sediment. The overall status of the habitat is inadequate and declining due to pollution from agriculture, forestry, wastewater sources and marine aquaculture.Salicornia mudflats (1310): This is a pioneer saltmarsh community and so is associated with intertidal areas. It is dependent upon a supply of fresh, bare mud and can be promoted by damage to other salt marsh habitats. It is chiefly threatened by the advance of the alien invasive Cordgrass Spartina anglica. Erosion can be destructive but in many cases, this is a natural process.

- Atlantic and Mediterranean salt meadows (1330 & 1410): these are intertidal habitats that differ somewhat in their vegetation composition. They are dynamic habitats that depend upon processes of erosion, sedimentation and colonisation by a typical suite of salt-tolerant organisms. The main pressures are invasion by the non-native Spartina anglica and overgrazing by cattle and sheep.

- Shifting dunes along the shoreline with Ammophila arenaria (white dunes) (2120). These are the second stage in dune formation and depend upon the stabilising effects of Marram Grass. The presence of the grass traps additional sand, thus growing the dunes. They are threatened by erosion, climate change, coastal flooding and built development.

- Fixed coastal dunes with herbaceous vegetation (grey dunes) (2130 – priority habitat). These are more stable dune systems, typically located on the landward side of the mobile dunes. They have a more or less permanent, and complete covering of vegetation, the quality of which depends on local hydrology and grazing regimes. They are the most endangered of the dune habitat types and are under pressure from built developments such as golf courses and caravan parks, over-grazing, under-grazing and invasive species.

[5] 2019. The Status of EU Protected Habitats and Species in Ireland. Department of Culture, Heritage and the Gaeltacht.

Malahide Estuary SPA (code: 4025)

The boundary of the SPA is largely coincident with that of the Malahide Estuary SAC. The qualifying interests of the SPA are given in table 7-2.

Table 7-2: Qualifying Interests for Malahide Estuary SPA

Species	National Status6
Anas acuta Pintail	Amber (Wintering)
Branta bernicula Light-bellied brent goose	Amber (Wintering)
Bucephala clangula Goldeneye	Red (Wintering)
Calidris alpina Dunlin	Red (Breeding & Wintering)
Calidris canutus Knot	Red (Wintering)
Haematopus ostralegus Oystercatcher	Red (Breeding & Wintering)
Limosa lapponica Bar-tailed godwit	Red (Wintering)
Limosa limosa Black-tailed godwit	Red (Wintering)
Mergus serrator Red-breasted Merganser	Amber (Breeding & Wintering)
Pluvialis apricaria Golden Plover	Red (Breeding & Wintering)
Pluvialis squatarola Grey Plover	Red (Wintering)
Podiceps cristatus Great-crested Grebe	Amber (Breeding & Wintering)
Tadorna tadorna Shelduck	Amber (Breeding & Wintering)
Tringa totanus Redshank	Red (Breeding & Wintering)
Wetlands & Waterbirds	

- Pintail. Dabbling duck wintering on grazing marshes, river floodplains, sheltered coasts and estuaries. It is a localised species and has suffered a small decline in distribution in Ireland for unknown reasons.

- Light-bellied Brent Goose. There has been a 67% increase in the distribution of this goose which winters throughout the Irish coast. The light-bellied subspecies found in Ireland breeds predominantly in the Canadian Arctic.

- Goldeneye. This duck wintering throughout Ireland on suitable coastal areas, river valleys and wetlands. There has been an 11% contraction in its Irish wintering range since the early 1980s and a 37% decline in abundance since the 1990s.

- Dunlin. Although widespread and stable in number during the winter season, the Irish breeding population has collapsed by nearly 70% in 40 years. Breeding is now confined to just seven sites in the north and west as habitat in former nesting areas has been degraded.

- Knot. These small wading birds do not breed in Ireland but gather in coastal wetlands in winter. Their numbers have increased dramatically since the mid-1990s although the reasons for this are unclear.

- Oystercatcher. Predominantly coastal in habit Oystercatchers are resident birds whose numbers continue to expand in Ireland.

- Bar-tailed Godwit. These wetland wading birds do not breed in Ireland but are found throughout the littoral zone during winter months. They prefer estuaries where there are areas of soft mud and sediments on which to feed.

[6] Birds of Conservation Concern in Ireland. Gilbert et al., 2021

- Black-tailed Godwit. Breeding in Iceland these waders' winter in selected sites around the Irish coast, but predominantly to the east and southern halves. Their range here has increased substantially of late.

- Red-breasted Merganser. A widely distributed duck. In winter Red-breasted Mergansers also breed in Ireland at certain coastal and inland's locations to the north and west. They have suffered small declines in both their wintering and breeding ranges and possible reasons have been cited as predation by American Mink and shooting.

- Golden Plover. In winter these birds are recorded across the midlands and coastal regions. They breed only in suitable upland habitats in the north-west. Wintering abundance in Ireland has changed little in recent years although it is estimated that half of its breeding range has been lost in the last 40 years.

- Grey Plover. These birds do not breed in Ireland but winter throughout coastal estuaries and wetlands. Its population and distribution is considered to be stable.

- Great-crested Grebe. These birds breed predominantly on freshwater sites north of the River Shannon while coastal areas along the east and south are used for wintering. Numbers in Ireland have decline by over 30% since the 1990s.

- Shelduck. The largest of our ducks, Shelduck both breed and winter around the coasts with some isolated stations inland. Its population and range are considered stable.

- Redshank. Once common breeders throughout the peatlands and wet grasslands of the midlands Redshanks have undergone a 55% decline in distribution in the past 40 years. Agricultural intensification, drainage of wetlands and predation are the chief drivers of this change.

The NPWS web site (www.npws.ie) contains a mapping tool that indicates historic records of legally protected species within a selected Ordnance Survey (OS) 10km grid square. The study area is located within the square O14 and seven species of protected mammal, and flowering plants are highlighted.

These species are detailed in Table 7-3. It must be noted that this list cannot be seen as exhaustive as suitable habitat may be available for other rare, threatened or protected species.

In summary it can be seen that none of the previous records of protected plants is extant within this square. The mammals, however, are known to be present and may be of relevance to this study.

Table 7-3: Known records for protected species within the O14 10km square

Species	Habitat[7] [8]	Current status[9]
Galeopsis angustifolia Red Hemp-nettle	Calcareous gravels	Record pre-1970
Hordeum secalinum Meadow Barley	Upper parts of brackish marshes, chiefly near the sea	Record pre-1970
Hypericum hirsutum Hairy St. John's-wort	Woods and shady places	Current, record from Santry Court

[7] Parnell et al., 2012
[8] Hayden & Harrington, 2001
[9] Preston et al., 2002

Viola hirta Hairy Violet	Sand dunes, grasslands, limestone rocks	Current, record from Santry Demesne

In summary, it can be seen from table 7-3 that of the four species two records remain current..

Additional records of protected species are available from the database of the National Biodiversity Data Centre. Table 7.4 lists mammal species that are protected under the Wildlife Act 1976 and highlights those for which there are current records in this 10km square.

Table 7-4: Protected mammals in Ireland and their known status within the zone of influence10. Those cells that are greyed out indicate no records for this species in the O14 square.

Species	Level of Protection	Habitat[11]	Red List Status[12]
Otter Lutra lutra	Annex II & IV Habitats Directive; Wildlife (Amendment) Act, 2000	Rivers and wetlands	Least Concern
Lesser horseshoe bat Rhinolophus hipposideros		Disused, undisturbed old buildings, caves and mines	Least Concern
Grey seal Halichoerus grypus	Annex II & V Habitats Directive; Wildlife (Amendment) Act, 2000	Coastal habitats	-
Common seal Phocaena phocaena			-
Whiskered bat Myotis mystacinus	Annex IV Habitats Directive; Wildlife (Amendment) Act, 2000	Gardens, parks and riparian habitats	Least Concern
Natterer's bat Myotis nattereri		Woodland	Least Concern
Leisler's bat Nyctalus leisleri		Open areas roosting in attics	Least Concern
Brown long-eared bat *Plecotus auritus*		Woodland	Least Concern
Common pipistrelle Pipistrellus pipistrellus		Farmland, woodland and urban areas	Least Concern
Soprano pipistrelle Pipistrellus pygmaeus		Rivers, lakes & riparian woodland	Least Concern
Daubenton's bat Myotis daubentonii		Woodlands and bridges associated with open water	Least Concern
Nathusius' pipistrelle *Pipistrellus nathusii*		Parkland, mixed and pine forests, riparian habitats	Least Concern
Irish hare Lepus timidus hibernicus	Annex V Habitats Directive; Wildlife (Amendment) Act, 2000	Wide range of habitats	Least Concern

[10] Excludes marine mammals
[11] Harris & Yalden, 2008
[12] Marnell et al., 2019

Pine Marten Martes martes		Broad-leaved and coniferous forest	Least Concern
Hedgehog Erinaceus europaeus	Wildlife (Amendment) Act, 2000	Woodlands and hedgerows	Least Concern
Pygmy shrew Sorex minutus		Woodlands, heathland, and wetlands	Least Concern
Red squirrel Sciurus vulgaris		Woodlands	Near Threatened
Irish stoat Mustela erminea hibernica		Wide range of habitats	Least Concern
Badger Meles meles		Farmland, woodland and urban areas	Least Concern
Red deer Cervus elaphus		Woodland and open moorland	Least Concern
Fallow deer *Dama dama*		Mixed woodland but feeding in open habitat	Least Concern
Sika deer Cervus nippon		Coniferous woodland and adjacent heaths	-

As can be seen there are a number of species of bat as well as larger mammal species for which there are current records in this area.

Water quality in rivers is monitored on an on-going basis by the Environmental Protection Agency (EPA). They assess the pollution status of a stretch of water by analysing the invertebrates living in the substrate as different species show varying sensitivities to pollution. They arrive at a 'Q-Value' where Q1 = grossly polluted and Q5 = pristine quality (Toner et al., 2005). The Holybanks site is predominantly within the catchment of the Broadmeadow River, which drains a portion of north County Dublin and discharges into the Malahide Estuary. A small part of the southern section of the development site lies within the Ward catchment. The main channel of the Broadmeadow passes along the northern boundary of the subject lands and enters the Broadmeadow estuary approximately 1.5km to the east. These sub-catchments, identified as the Broadmeadow and the Ward Lower sub-catchments on the www.wfdireland.net website, are both assessed as having 'poor overall ecological status'. The nearest EPA monitoring point is along the main channel of the Broadmeadow, at the Newtown bridge at the eastern end of the development site boundary. Here Q3-4, or 'moderate' status, was most recently recorded (2020). The main channel of the Broadmeadow and its tributaries have been assessed as 'poor' for the most recent WFD monitoring period (2013-2018). These data are taken from the ENVision mapping tool on www.epa.ie.

7.3.2 Stakeholder Consultation

The Development Applications Unit of the Department of Culture, Heritage and the Gaeltacht was contacted for nature conservation observations (Gpre00203/2017). A response to this was received stating: "…*it appears that there may be a hydrological connection to Malahide Estuary which is designated as Special Area of Conservation (SAC) designated under the EC Habitats Directive (Council Directive 92/43/EEC) and Special Protection Area (SPA) designated under the EC Birds Directive (Directive 2009/147 EC). Therefore, any impacts on these sites need to be assessed, including ex-situ and cumulative impacts*."

Response:

A full assessment of potential effects to Natura 2000 sites designated under the EC Habitats Directive is presented in a stand-alone Screening Report for Appropriate Assessment and NIS which is submitted as part of this planning application.

Details were sent to Ms Gretta Hannigan, regional fisheries officer with Inland Fisheries Ireland. In an email response she stated:

"The development is within the catchment of the Broadmeadow River, an important salmonid system with Brown trout throughout and Salmon in the lower reaches. It is essential that development in the area will not have a deleterious effect on aquatic ecology in this system. Potential impacts of works on or near the system should be comprehensively assessed and recommendations and mitigation measures should be formulated. The identification of good baseline data across a range of sites, both close to the development and at a distance from the site will allow for comparison between the current situation and that which may develop over time if development proceeds. Silt fencing of discharge streams would also be recommended during construction."

Response:

The salmonid status of the Broadmeadow River is recognised throughout this report. All potential impacts to the river, or water quality, are assessed in this EIAR. Potential pollution effects are recognised and silt fencing, as well as other preventative mitigation measures, are recommended.

Details were also sent to Mr Hans Visser, biodiversity officer with Fingal County Council. In an email response he asked that the project design "ensure that the river corridor and adjacent lands remain in a semi-natural state and that any surface water runoff would ideally be collected in a pond to add another aquatic habitat".

Response

A broad band of semi-natural vegetation is being retained as part of this development application. New pond features are being created using natural topographical features and which will be used to attenuate surface water as well as provide new habitat features.

7.3.3 Site survey

Aerial photography from the Ordnance Survey Ireland (OSI) and historic mapping shows that the development site has been on the fringes of Swords town since historical times although recent decades have seen significant land use change in the immediate vicinity. Today, while the lands remain open in nature, they are surrounded on three sides by residential and other built development, and roads, with the Broadmeadow River forming the northern boundary.

Habitats/Flora

The subject site comprises a series of fields which were formerly in agricultural production, but which are no longer manged for this purpose. Open fields can be described as **dry meadows – GS2** with abundant grasses and common broad-leaved herbs including Willowherbs *Epilobium sp*., Silverweed *Potentilla anserine*, Lesser Stitchwort *Stellaria graminae*, Common Mouse-ear *Cerastium f*ontanum etc. Infrequently mown meadows such as these can have an abundance of flowers when compared with more managed systems, and so are important for common insects, such as butterflies and bees. Where meadows are never mown or grazed, a gradual process of succession takes place, which sees the replacement of open habitats with woodland. This intermediate phase is known as **scrub – WS1** and the formation of scrub can be seen in the emergence of occasional stands of Brambles *Rubus fruticosus agg*. and Blackthorn *Prunus spinosa*.

Remnants of traditional field boundaries can be found, and these are composed of **treelines – WL2** or **hedgerows – WL1.** These habitats differ in that treelines are composed of tall trees over 5m in height, however the species composition can be similar in both. Here, tall treelines have mature Ash *Fraxinus excelsior,* Hawthorn *Crataegus monogyna,* Wild Cherry *Prunus avium,* Elder *Sambucus nigra* and Elm

Ulmus sp. Hedgerows meanwhile, have abundant Brambles, with Ash, Blackthorn *Prunus spinosa,* Apple *Malus sylvestris* and Rose *Rosa sp.* The structure of the hedgerow along the western boundary is poor at its southern end, with large gaps and the presence of non-native species, such as Snowberry *Symphoricarpos albus.* To the north it is dense and composed of native species. Guidance is available from the Heritage Council to distinguish 'higher significance' field boundaries, and this is based upon their age, species composition, and structure (Foulkes et al., 2013). Boundaries to the north and east, as well as the treeline running up the centre of the site, are townland boundaries, and so are considered to be of particular antiquity. To the north-west this is associated with a **dry ditch** which is shown on maps as a tributary of the Broadmeadow. The hedgerow in the centre has stretches of **drainage ditch – FW4** which were wet in March 2022 but dry on other occasions. This ditch is not connected to the Broadmeadow via surface hydrology (i.e. there is no surface connection to the river for water in this ditch). Treelines to the east of the site appear on original OSI maps and so are at least 150 years old. These too are of higher significance due to their age, although they are outside the site boundary. Along the boundary with the Glen Ellen Road, there is a band of scrub, but no treeline or hedgerow. There is a band of **broadleaved woodland – WD1** running across the northern site boundary. Trees here include Ash, Hawthorn, Elder, Blackthorn and a specimen or two of Horse Chestnut *Aesculus hippocastanum.* Wood Dock *Rumex sanguineus,* Wood Avens *Geum urbanum,* Herb Robert *Geranium robertianum,* and Soft-shield Fern *Polystichum setiferum* can be found on the forest floor. This is a rare feature in an urban context and particularly in light of the scarcity of broadleaved woodland anywhere in Ireland. It is marked as woodland on original OSI maps and so is of some age. To the north of this lies the channel of the Broadmeadow River, a **lowland river – FW2**. Due to historic drainage, the banks are straight and steep and dominated by grassy vegetation, with Reed Canary-grass *Phalaris arundinacea* and Common Nettle *Urtica dioica.* Despite pollution issues in the river, it is a feature of county value to biodiversity due to its salmonid status.

The route of the proposed stormwater overflow outfall pipe passes an area of **amenity grassland – GA2** with a line of mid-aged Ash *Fraxinus excelsior* and Maple *Acer sp.* trees. However, the pipe itself will be installed under the existing road. The proposed location of the tank itself is dry meadow.

The route then goes through another area of amenity grassland at the riparian zone of the River Broadmeadow. The point of the proposed outfall to the River Broadmeadow is composed of an artificial bank of granite boulders. The river in this location is a **lowland river – FW2** with grassy banks and is close to a bridge/road crossing. There are no trees or natural riparian vegetation in this location. The water at the time of the survey in 2021 was shallow, and the river substrate was characterised by cobbles and stones with growths of the green algae *Cladophora sp.*

There are no habitats which are examples of those listed in Annex II of the Habitats Directive. There are no plant species which are listed as alien invasive on Schedule 3 of SI No. 477 of 2011.

Mammals

During each site visit the site was comprehensively surveyed for signs of Badger activity (tracks, trails, snuffle holes, setts, latrines, bedding etc.) including during the optimal season (November 2018, May 2020 and April 2021). There was no evidence of Badger activity on the development site during any of these surveys. No sett was recorded and there are no records of Badgers from this vicinity from the National Biodiversity Data Centre.

Otter activity is recorded from along the Broadmeadow and Ward Rivers in Swords on the database of the National Biodiversity Data Centre. Otters are strictly protected under Annex IV of the Habitats Directive. The stretch of river running along the site boundary and at the proposed outfall point from the stormwater overflow pipe was surveyed during each visit since 2017 and no evidence, in the form of spraints, tracks or holt sites, was found. This is not evidence of absence however, and it can be assumed that Otters are present along the river. The point of the proposed stormwater tank/foul overflow pipe is composed of an artificial embankment of granite boulders and this is not suitable for an Otter holt (den). The location of the proposed stormwater outfall pipe from the development was inspected and no holt sites are located in this vicinity.

There was no evidence that Irish Hare is present while the habitat is considered too isolated from other woodland areas to support Deer, Pine Marten or Red Squirrel. Small mammals such as the Irish Stoat, Hedgehog and Pygmy Shrew are considered more or less ubiquitous in the Irish countryside, including on disused land in urban areas (Lysaght & Marnell, 2016).

During surveys no direct evidence of any mammal was recorded with the exception of Rabbit *Oryctolagus cuniculus*. Fox *Vulpes vulpes* is common in Dublin along with Brown Rat *Rattus norvegicus*, House Mouse *Mus domesticus* and Field Mouse *Apodemus sylvaticus*. These species are not protected under the Wildlife Act.

A series of bat surveys was carried out by Dr Tina Aughney and this report found that:

"Surveys over five years were completed for this proposed development site [August 2017, September 2018, August 2019, June 2020, May 2021 and March 2022]. During these seven dusk, dawn and walking transect surveys, five species of bat was recorded: common pipistrelle, soprano pipistrelle, Leisler's bat, Daubenton's bat and brown long-eared bat.

Twelve static locations also recorded the same suite of bat species: common pipistrelle, soprano pipistrelle, Leisler's bat, Daubenton's bat and brown long-eared bat with additional bat encounters identified only to family level (i.e. Myotis spp.)

The primary bat areas within the proposed development site is the Broadmeadow River valley and associated treeline. In the wider landscape, the Broadmeadow River valley and associated treeline are connected to the Ward River valley. These river valleys are well connected with treelines and hedgerows. As a consequence the northern boundary of the proposed development site is important for local bat populations.

While a number of trees were recorded as Potential Bat Roosts (PBRs) through the daytime assessment process, no tree roosts were confirmed during the array of dusk and dawn surveys and walking transects."

Birds

Breeding bird surveys were carried out in May 2020, April 2021 and March 2022 which are within the optimal nesting season. The aim of the surveys was to identify all species which were nesting or displaying breeding behaviour (singing, carrying food or nesting material) across the development site. Surveys were carried out early in the morning and were complete before noon. The following species were noted:

2020: Chiffchaff Phylloscopus collybita, Blackbird *Turdus merula,* Dunnock *Prunella modularis,* Magpie *Pica pica,* Blue Tit *Parus caeruleus,* Rook *Corvus frugilegus,* Song Thrush *T. philomelos.* Barn Swallow *Hirundo rustica* were foraging on the development site but not nesting.

2021: Wood Pigeon *Columba palumbus,* Robin *Erithacus rubecula,* Wren *Troglodytes troglodytes,* Bullfinch *Pyrrhula pyrrhula*, Blackbird, Blue Tit, Dunnock, Song Thrush, Chiffchaff, Chaffinch *Fringilla coelobs*, Magpie, Starling *Sturnus vulgaris,* Collard Dove *Streptopelia decaocto*, Blackcap Sylvia atricapilla, Great Tit *P. major* and House Sparrow *Passer domesticus*.

2022: Wood Pigeon, Blackbird, Robin, Starling, Wren, Great Tit, Blue Tit.

These species are of low conservation concern/green list (Gilbert et al., 2021) with the exception of House Sparrow and Starling, which are of medium conservation concern/amber list. Suitable nesting habitat is available for these birds in treelines, woodland, scrub and hedgerows. Kingfisher *Alcedo atthis* has been recorded from this stretch of the Broadmeadow River. It is listed under Annex II of the Habitats Directive.

The habitats on the development site are not suitable for regularly occurring populations of wetland/wading/wintering birds that may be qualifying interests of the Malahide Estuary SPA, and which

are listed in table 7-2. No such species were recorded during any of the winter surveys which were carried out.

Amphibians and reptiles

The drainage ditch running along the central hedgerow provides suitable habitat for breeding Common Frog *Rana temporania* although this was dry on all survey dates exept March 2020. On this date there was no frog spawn noted. There is no suitable pond for Smooth Newt *Lissotriton vulgaris* as evidently any water in the ditch is prone to draining away. Common Lizard *Zootoca vivipara* is considered widespread.

Fish

Monitoring by Inland Fisheries Ireland, from 2011 (the most recent available), indicated that the Broadmeadow holds populations of Brown Trout *Salmo trutta*, European Eel *Anguilla anguilla*, Minnow *Phoxinus phoxinus*, Nine-spined Stickleback *Pungitius pungitius*, and Three-spined Stickleback *Gasterosteus aculaetus* (this list is an agglomeration from all three sampling points along the Broadmeadow). European Eel is assessed as being 'critically endangered', other fish are of 'least concern' (King et al., 2011). Further surveys in 2017 recorded Brown Trout, European Eel, Flounder (at the transitional waters), Minnow, Nine-spined Stickleback, Three-spined Stickleback and Stone Loach (Matson et al., 2018).

Invertebrates

Most habitats, even highly altered ones, are likely to harbour a wide diversity of invertebrates. In Ireland only one insect is protected by law, the Marsh Fritillary butterfly *Euphydryas aurinia*, and this is not to be found on in this area. Other protected invertebrates are confined to freshwater and wetland habitats and so are not present on this site. Butterflies which were recorded during the survey include Peacock *Inachis io*, Large White *Pieris brassicae* and Common Blue *Polyommatus icarus*. These are all assessed as being of 'least concern' in the Red Data Book of Butterflies in Ireland (Regan et al., 2010).

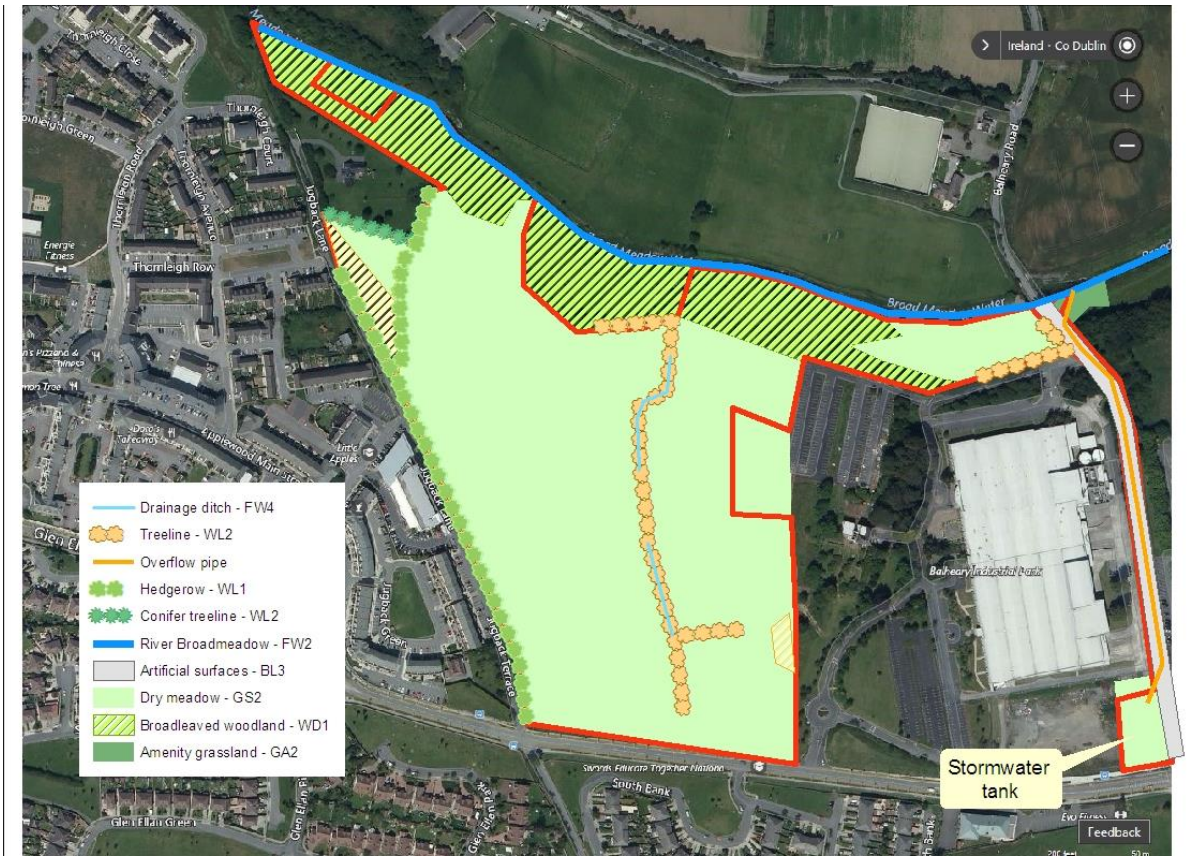

Figure 7.2 0-2 Habitat map of the subject lands

7.3.4 Overall Evaluation of the Context, Character, Significance and Sensitivity of the Proposed Development Site

In summary, it has been seen that the application site is grassland with scrub and traditional field boundaries within a built-up area. Woodland and the corridor of the Broadmeadow River are of high local significance. There are no examples of habitats listed on Annex I of the Habitats Directive or records of rare or protected plants. There are no species listed as alien invasive as per SI 477 of 2011.

Field boundaries, scrub and woodland provide habitat for common breeding birds and foraging areas for bats. The river is an important salmonid habitat as well as providing resources for high conservation value species, such as Otter and Kingfisher.

From this an evaluation of the various habitats and ecological features on the site has been made and this is shown in table 7-5.

Table 7-5: Evaluation of the importance of habitats and species on the Holybanks lands

Dry meadow – GS2 Scrub – WS1	Low local ecological value
Treeline – WL2 Hedgerow – WL1 Broadleaved woodland – WD2	High local ecological value
Broadmeadow River – FW2	County Value – river of salmonid status

7.4 Predicted Impacts

This section provides a description of the potential direct and indirect significant effects that the proposed development may have on biodiversity in the absence of mitigation.

7.4.1 Construction Phase

The following potential impacts are likely to occur during the construction phase in the absence of mitigation:

Habitat Loss

The removal of habitats including dry grassland, scrub, and sections of field boundaries. Figure 7.6 shows the tree impact drawing. The broadleaved woodland along the corridor of the River Broadmeadow is to be retained. A surface water retention basin is proposed for the woodland area to the north-east. This has been designed to avoid the removal of trees and avails of existing land contours. The construction phase of this aspect of the project will require the removal of woodland floor and shrub level vegetation, however post-construction this vegetation will return, and the presence of new wetland habitats will provide a new feature to attract biodiversity. Works to be undertaken at the Broadmeadow River are confined to the installation of a surface water outfall pipe and a separate stormwater overflow pipe. The river and its riparian zone are otherwise to remain unaltered. Following an arboricultural survey, it was calculated that 37 individual trees are to be removed due to poor condition or conflict with the scheme design.

Higher value habitat loss is estimated as follows:

Higher significance treeline: 140m

Higher significance hedgerow: 620m

Scrub: 400m2

These habitats are of value to a wide range of plant and animal species, some of which have been described in section 7.3.3, however, none of which are of special conservation significance, other than bats. Nevertheless, the predicted loss of habitat an effect which by its magnitude will alter a sensitive aspect of the environment Therefore, in the absence of mitigation, the permanent loss of these habitats is negative, significant, likely and long-term impact.

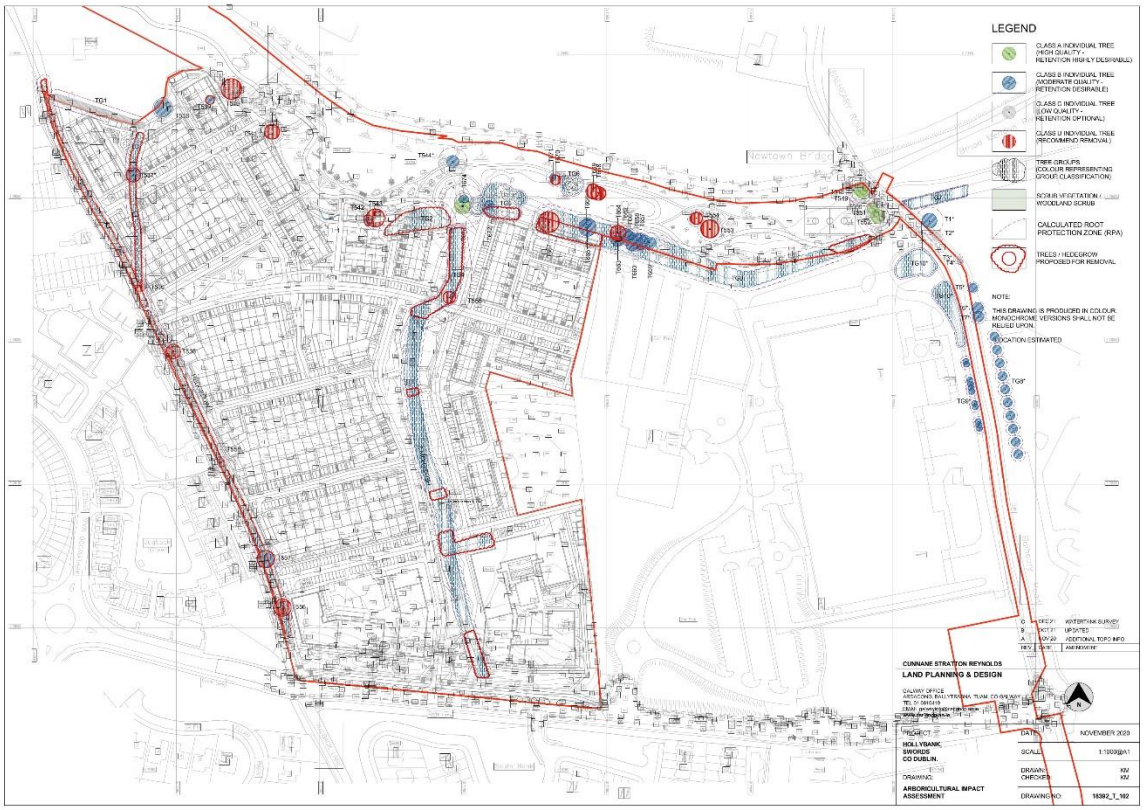

Figure 7.3: Tree removals (red) and retention (blue)

The direct mortality/disturbance of species during land clearance

The scale of this impact depends upon the timing of works as mortality principally arises when vegetation is cleared during the breeding season and when young in nests, dens, etc. are not mobile. No bat roosts were identified from the construction zone. According to the bat report:

”There are no buildings/structures within the proposed development area and therefore there will be no loss of building roosts. However, Potential Bat Roosts (PBR) in some trees were identified”.

A total of forty-five individual trees, thirteen tree groups and two hedgerows were recorded as part of the survey. According to the bat survey report “The Arboriculture Impact Assessment indicates that 10 trees which are considered to have a PBR value are to be removed. In addition, Tree groups 2 and 4, section of Tree group 5, Hedgerow 1 and sections of Hedgerow 2 is proposed to be removed. However the majority of the tall vegetation along the Broad Meadow River will remain and this is the primary area for commuting and foraging bat populations.”

All bat roosts are protected by law and can only be disturbed under licence from the National Parks and Wildlife Service. Under the Wildlife Act 1976 (as amended) all birds’ eggs and nests are protected at all times. No evidence of Otter holts was found along the River Broadmeadow and disturbance of this

riparian zone is limited to the installation of a surface water outfall pipe and an overflow pipe from the storm water storage tank.

No impacts to Otters will arise. There are no disturbance effects that might prevent them using the river, even temporarily, and there will be no loss of habitat or disturbance of holt sites.

The potential for direct mortality to species (principally birds and bats) is negative, significant, likely and long-term.

Pollution of water courses through the ingress of silt, oils and other toxic substances.

The loss of pollutants to water courses from the disturbance of soils can affect aquatic habitats by fouling fish spawning beds and directly affecting species, particularly fish. Pollutants can include oils and fuels, toxic substances such as concrete and cement, and especially sediment. Inland Fisheries Ireland has produced guidelines (IFI, 2016) to minimize the effects to fish habitats during construction works. Pollution arising from the construction phase has the potential to reach the Malahide Estuary which is a Special Area of Conservation and a Special Protection Area.

While a broad band of woodland along the river is to be retained, this temporary impact to aquatic life is nevertheless assessed as negative, significant, likely and medium-term.

Disruption to ecological corridors.

The River Broadmeadow provides an ecological corridor of county importance, and this includes vegetation along its riparian zone. This is to be retained and no physical disruption to this corridor will occur.

While sections of hedgerow and treeline are to be removed these habitats are not connected to the wider countryside as urban development is found to the east, west and south. There will be a severance of the north-south linear woodland to the east of the lands.

The effect to biodiversity from the disruption to ecological corridors is potentially negative, slight, likely and long-term.

Protected Areas

There is a direct, hydrological pathway from the development site to the Malahide (Broadmeadow) Estuary SAC and SPA. A screening report for Appropriate Assessment carried out for this development application concluded that significant effects to these Natura 2000 sites during the construction phase could not be ruled out. This was based upon the potential for pollution to arise from sediment and other construction materials. On foot of this conclusion, a separate Natura Impact Statement was prepared which details the mitigation measures which are to be undertaken. With the implementation of these measures, adverse effects to the integrity of Natura 2000 sites will not occur.

This impact in the absence of mitigation measures is therefore potentially negative, significant, likely and medium-term.

7.4.2 Operational Phase

The following potential impacts are likely to occur during the operation phase in the absence of mitigation:

Pollution of water from surface water run-off

The Greater Dublin Strategic Drainage Study (2005) identified issues of urban expansion leading to an increased risk of flooding in the city and a deterioration of water quality. This arises where soil and natural vegetation, which is permeable to rainwater and slows its flow, is replaced with impermeable hard surfaces. Surface water drainage measures comply with SUDS. This includes the installation of

an open surface water retention/attenuation area to the north-east of the development site. Other measures include permeable paving, green roofs on apartment blocks, rainwater harvesting and bioretention areas/swales.

The effect to biodiversity, particularly the salmonid status of the River Broadmeadow and the Natura 200 sites in Malahide Estuary, from this aspect of the project will be neutral, imperceptible, likely and permanent.

Pollution of water from wastewater

Wastewater will be sent to the municipal treatment plant at Swords. This plant is operated by Irish Water under licence from the EPA (D0024-01) and discharges treated effluent to the Broadmeadow Estuary. The plant has a treatment capacity of 90,000 population equivalent (P.E.) and was fully compliant with emission limit standards according to the Annual Environmental Report (AER) for 2020. The AER states that "*Based on the 2020 effluent compliance, it is not considered that the Swords WWTP and Toberburr WWTP is having an observable negative impact on the water quality downstream"* and that "*The discharges from the wastewater treatment plants do not have an observable negative impact on the Water Framework Directive status".*

The project will include the construction of a stormwater storage tank on the junction of the Glen Ellan Road and the Balheary Road and overflow pipe. The route of the pipe will follow the existing road before crossing an area of dry meadow and outfalling to the River Broadmeadow. This aspect of the development will reduce the frequency and intensity of uncontrolled storm overflows currently entering the River Ward, as well as reducing stormwater flow to the Swords wastewater treatment plant. A significant source of pollution to the catchment will therefore be removed.

As part of this development application, an Assimilation Simulation Evaluation Report has been prepared by AWN Consultants. The installation of the stormwater storage tank will remove a source of pollution from the River Ward but introduce a potential source of pollution (albeit at a much reduced level) to the River Broadmeadow. This report sought to determine the effect of the proposed development upon the WFD status of receiving waters. The report concludes that:

"Considering background concentrations associated to the current 'Poor' [Water Framework Directive] status of the Broadmeadow River (the river has not sufficient assimilative capacity considering current oxygenation and nutrient conditions), the discharge would not bring sufficient dilution to improve this condition. For a notional condition that assumes an improvement in the status of the river based on the operation of the projected development as well as the projected Irish Water works in the catchment, the project does not have the potential to cause a deterioration in the Water Framework Directive Status."

The effect to biodiversity particularly the salmonid status of the River Broadmeadow and the Natura 200 sites in Malahide Estuary from this aspect of the project will be positive, moderate, likely and permanent.

Disturbance to species from increased human activity

Limited data is available on the impact of artificial lighting to wildlife and it is believed that many species have become habituated to the level of lighting which exists near our towns and cities. Research has focussed on bats as they are nocturnal and all bat species are protected by law. Bat Conservation Ireland lists a number of species which are considered to be especially sensitive to this effect including Brown Long-eared Bat, Whiskered Bat, Natterer' Bat, Daubenton's Bat and the Lesser Horseshoe Bat. Leisler's Bat and Brown Long-eared Bat were noted from the development site. The following is taken from the bat report accompanying this application:

"The construction of the proposed residential development will potentially increase the degree of light (both street and residential lighting) spilling onto the treeline and woodland habitats within the survey area. This will potentially impact on bats species considered to be light sensitive such as brown long-eared bats and Daubenton's bat. However the lighting plan has been designed to minimise potential impact on bats and no lighting is proposed along the Broadmeadow River and adjacent linear woodland. Therefore the main commuting and bat foraging habitat will remain a dark zone post development."

The effect to bats from lighting is potentially negative, significant, likely and permanent.

Given the already built up nature of the surroundings, with roads and residential development, it is not considered that the likely increase in ambient noise or human activity can impact negatively on biodiversity in general. E.g. aquatic life in the Broadmeadow.

The effect to biodiversity other than bats from this aspect of the project will be negative, slight, likely and permanent.

Impacts to ecological corridors

The development site is bounded to the east and south by public roads and to the west by residential housing developments. The northern site boundary is characterised by the River Broadmeadow and its riparian zone. This is an important ecological corridor or aquatic and riparian species. Hedgerows and treelines running perpendicular to the river are not connected to the wider countryside and so their role as ecological corridors is limited. No works are planned to the River Broadmeadow which prevent, or otherwise impede, the movement of aquatic life. The broad, wooded corridor is to be maintained as part of this scheme. There is no artificial lighting planned for this zone and so no lighting barriers to nocturnal wildlife will be introduced.

The effect to protected areas in the Malahide Estuary during operation is neutral, imperceptible, unlikely and long-term.

Protected Areas

The potential for impacts to arise to protected areas in the Malahide Estuary during construction is negative, significant, likely and medium-term. While there is a hydrological pathway between the development and the Malahide (Broadmeadow) Estuary SAC/SPA, no negative effects to these areas are likely to arise from surface run-off or wastewater during the operational phase (these impacts have been assessed as ‘neutral’ and ‘positive’ respectively).

The effect to protected areas during operation is neutral, imperceptible, unlikely and long-term.

7.5 Mitigation Measures

7.5.1 Construction Phase

Habitat Loss

The landscaping plan provides for new areas of open space which will preserve the north-south corridor to the east of the site as well as the hedgerow to the west and the woodland along the riparian zone of the River Broadmeadow. The hedgerow along the Jugback Lane will be replaced with a broad (c.5m) green belt that will be managed for nature. Biodiversity will be boosted along these stretches through the use of soil from the hedgerow to be removed. No ‘wild flower’ seeds are to be planted along this belt. Herb vegetation will be allowed to develop while cutting will be limited in order to create seasonal meadow habitats. Trees to be planted will be predominantly native species along with biodiversity-friendly non-native species which are suited to urban settings. This corridor will be extended along Glen Ellen Road for a further 225m. In total there is an approximate area of 3,600 sqm of wildflower meadow proposed, along part of Jugback Lane and Glen Ellan Road.

Within the woodland belt along the River Broadmeadow, scrub vegetation will be allowed to develop naturally. There will be no artificial lighting in this area. The ecological value of this important corridor will be maintained.

The planting of new trees, clusters of trees and meadow areas will offset the predicted loss of habitat in the medium to long-term. The resultant, long-term impact will therefore not be significant.

The direct mortality/disturbance of species during land clearance

Woody vegetation (trees, scrub, hedgerows, woodland vegetation etc.) will not be cleared during the bird nesting season (March to August).

The following measures are taken from the bat survey report:

A Phase One survey of trees was undertaken and trees considered to have a bat roosting value were identified as PBRs. Night-time surveys were undertaken in the vicinity of such trees to determine if there were roosting bats and none were recorded. However, due to the transient nature of bats, it is recommended that a Phase Two PBR survey is required for all PBR trees proposed to be felled. This is a precautionary step and if a bat roost is recorded, then an NPWS Derogation Licence is required to be applied where the existence of any tree roost is confirmed. This Phase Two survey should be undertaken at least one month prior to tree felling in order to propose a tree felling plan in conjunction with tree contractors.

i) Erection of an alternative roosting sites are required to be erected to 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 (x2) – free-standing chamber on free standing pole (See appendices – Habibat Box). Location of rocket box will be in dark zones along the Broadmeadow River.

b. Summer Bat Boxes (1FF Schwegler woodcrete or similar design) – 8 bat boxes should also be erected on mature trees within the proposed development site (e.g. pine trees located beside Newtown Bridge).

Bat boxes will be erected prior to tree felling and will be erected under supervision by the bat specialist. Some general points that will be followed include:

• Straight limb trees (or telegraph pole) with no crowding branches or other obstructions for at least 3 metres above and below position of bat box.

• Diameter of tree should be wide and strong enough to hold the required number of boxes.

Locate bat boxes in areas where bats are known to forage or adjacent to suitable foraging areas. Locations should be sheltered from prevailing winds.

• Bat boxes should be erected at a height of 4-5 metres to reduce the potential of vandalism and predation of resident bats.

• It is recommended to erect a number of bat boxes on one tree at an array of aspects. South facing boxes will receive the warmth of the sun, which is necessary for maternity colonies. In large bat box scheme it is generally recommended to have three bat boxes arranged at the same height facing North, South-East and South-West. This ensures a range of temperatures are available all day. If the South facing boxes become warm, bats can safely remove to the cooler North facing box.

• Locations for bat boxes should be selected to ensure that the lighting plan for the proposed site does not impact on the bat boxes.

Trees 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).

An assessment of trees according to their PBR value determines the methodology of felling. The trees identified within the survey area are PBR Category 2. The procedure to fell these is as follows:

• Category 2: Trees with roosting features (dead wood, tree holes etc.) should be checked prior to felling. It is recommended that they are physically checked (using an endoscope and high power torch) or a dusk/dawn surveys are completed to determine if bats are roosting within. A tree felling plan will

be required in consultation with the tree surgeons. A bat box scheme will need to be erected prior to felling and in consultation with the bat specialist. Any trees showing crevices, hollows, etc., should be removed while a bat specialist is present to deal with any bats found. Such animals should be retained in a box until dusk and released on-site. Large mature trees will be felled carefully, essentially by gradual dismantling by tree surgeons, under supervision of a bat specialist. Care will be taken when removing branches as removal of loads may cause cracks or crevices to close, crushing any animals within.

• 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.

Pollution of water courses through the ingress of silt, oils and other toxic substances.

A preliminary Construction Environmental Management Plan has been prepared to accompany this development application and which includes full details of all pollution prevention measures. This has been prepared with regard to guidance from IFI (2016). This will include consultation with IFI at all stages of the project. Dangerous substances will be stored away from water courses and in bunded areas at all times. Measures will be taken to ensure that loss of sediment to water course is minimized to the greatest degree possible and only attenuated, silt-free water will be directed towards ditches or streams. This will be achieved through the use of silt fencing, screening berms and/or settlement ponds. The site manager will be responsible for ensuring that pollution to water courses does not occur. A record will be kept of daily inspections and any incidents which may occur, along with the action taken.

Site-specific sediment control measures are detailed in the Construction and Environmental Management Plan prepared for this application by Waterman Moylan and are given as:

Sediment Control Measures

Sediment entrapment facilities are necessary to reduce sediment discharges to downstream properties and receiving waters. All run-off leaving a disturbed area will pass through a sediment entrapment facility before it exits the site and flows downstream.

• Straw Bales

Straw bales will be placed at the base of a slope to act as a sediment barrier. These are not recommended for use within a swale or channel. Straw bales are temporary in nature and may perform for only a period of weeks or months. Proper installation and maintenance are necessary to ensure their performance.

• Silt Fencing

A silt fence is made of woven synthetic material, geotextile, and acts to filter run-off. Silt fencing will be placed as a temporary barrier along the contour at the base of a disturbed area but is not recommended for use in a channel or swale. The material is durable and will last for more than one season if properly installed and maintained. Silt fencing is not intended to be used as a perimeter fence or in an area of concentrated flow. If concentrated flow conditions exist, a more robust filter will be considered.

• Silt Barriers

Silt barriers can also be temporarily installed in any road gullies of partially constructed roads to prevent sediment movement into downstream drainage systems or SUDS components.

When the catchment area is greater than that allowed for straw bale barriers or silt fences, the runoff will be collected in diversion drains and routed through temporary sediment basins.

• Diversion Drains

Diversion drains are simple linear ditches, often with an earth bund, for channelling water to the desired location. If the drains are being eroded they will be lined with geotextile fabric or large stones or boulders.

• Silt Traps

Will be placed at the base of a slope as a sediment barrier or as a temporary filter prior to discharge into a stream. Silt traps are deemed temporary and proper installation and maintenance is needed to ensure their performance.

7.5.2 Operation Phase

The following is taken from the bat report:

Disturbance to bats from artificial lighting

The following measures are taken from the bat report:

Lighting Plan has taken into consideration recommendations and will therefore comply with BCT (2018) guidelines. A particular emphasis was made to ensure that there is no lighting planned along the Broadmeadow River and the adjoining linear woodland. This will ensure that there is a dark corridor along these habitats which will allow local bat populations to commute and avail of foraging habitats.

In addition to above, there is no lighting proposed for the cycle path and therefore lighting is avoiding the principal bat habitats along the Broadmeadow River.

All lighting within the proposed development site will meet BCT (2018) guidelines thereby minimising potential impact on local bat populations. […]

In addition to the proposals within the Landscape Master Plan, it is recommended that an additional native hedgerow is planted along the eastern boundary of the site. The proposed species mix is as follows:

o Hedgerow species: Crataegus monogyna, Corylus avellane, Prunus spinosa. Rosa canina, Ilex aquifolium, Sambucus nigra.

o Tree species: Alnus glutinosa (alder), Sorbus aucuparia (rowan), Quercus robur (pedunculate oak), Quercus petraea (sessile oak), Pinus sylvestris (Scots pine), Betula pendula (silver birch), Betula pubescens (downy birch).

It is also recommended to plant at least 2 trees for each tree proposed to be felled, using the tree species mix provided above. These should be located along the northern boundary of the proposed development site (e.g. Broadmeadow Riverside park).

During the construction phase of the proposed development, it is proposed that lighting within the construction zone is turned off outside daytime working hours.

All habitats, trees and hedgerows (particularly within the river valley) are protected during the construction phase from damage. […]

7.5.3 Cumulative impacts

A number of the identified impacts can also act cumulatively with other impacts from similar developments in the north Dublin area.

These primarily arise through the urbanisation of the city's hinterland as provided for by land use zoning and include: loss of habitats, particularly hedgerows and treelines; spread of alien invasive species, pollution from surface water run-off and pollution from wastewater generation.

Other developments in this vicinity include proposed or underway housing developments in the Oldtown and Mooretown areas to the north of Holybanks. Considering the nature of the proposed development and the adjacent residential developments, it is considered that the potential cumulative impacts are:

1. A deterioration in water quality, resulting in an impact upon aquatic biodiversity. However, given that the proposed development is not anticipated to result in a significant impact upon water quality during the operational phase, and considering the nature of the development and adjacent residential developments, it is considered that there would be no cumulative water quality impacts which would pose a significant risk to aquatic biodiversity during operation. This impact is neutral, imperceptible and unlikely.

During construction it is possible that the proposed development could act in combination with other projects underway at the same time, thereby exacerbating pollution to the Broadmeadow River. In this case, the potential for pollution during construction has already been identified as negative, significant, likely and medium-term and detailed, site-specific mitigation measures have been set out in section 7.5.3 of this chapter. These measures are designed to avoid pollution to the greatest possible extent and with their full implementation the cumulative impact to water quality will be negative, imperceptible and unlikely.

2. Alien invasive species

There are no alien invasive plant species growing on, or adjacent to, the development site.

This impact is neutral, imperceptible and unlikely.

3. Habitat loss. This development will result in the loss of habitat which is likely to contribute to cumulative losses of similar habitat (principally hedgerow and treeline). This impact was assessed as negative, significant, likely and long-term in the absence of mitigation. However, with the mitigation which has been proposed the cumulative effects will be neutral and not significant in the long-term.

7.6 Residual Impact

In the short to medium-term there will be a negative impact to biodiversity through the loss of habitat and construction phase disturbance. This will include birds, plants and invertebrates which are common and widespread. It is likely however that the range and abundance of species will be maintained while new landscaping will compensate for lost habitat in the medium to long-term. Residual impacts are assessed as slight.

There will also be a slight residual effect to water courses during the construction phase as it will not be possible to eliminate the likelihood of pollution entering the water. However, if all mitigation measures are fully implemented, this impact is unlikely.

There are interactions between the biodiversity chapter and water and landscaping.

Monitoring will be required throughout the construction phase to ensure that pollution prevention measures are implemented and that pollution is prevented. The bat report states that:

"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. Register bat box scheme, rocket bat boxes and supplementary roosts with Bat Conservation Ireland. This should be undertaken for a minimum of 2 years.

- 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."

7.7 Difficulties Encountered

A full set of ecological surveys and a desktop literature review were carried out for the project at appropriate seasons. A lack of data, or uncertainty in the results, is not a factor in assessing the impact of this development on biodiversity.

7.8 Difficulties Encountered

The main high level interactions between Biodiversity and other environmental factors include Water, Landscape & Visual, Population & Human Health. Please refer to Chapter 16 Interactions for further information on interactions.

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8. Archaeological, Architectural and Cultural Heritage

8.1 Introduction

The following report details an archaeological, architectural and cultural heritage assessment undertaken in respect of a proposed residential development in the townlands of Holybanks and Newtown, Swords, Co. Dublin (Figure 8.1). This assessment has been carried out to ascertain the potential direct and indirect significant effects of the proposed development on the archaeological, architectural and cultural heritage resources that exist within the area.

The assessment was undertaken by Faith Bailey and Rob Goodbody of IAC Archaeology. Faith Bailey holds a single honours degree in Archaeology and a MA in Cultural Landscape Management. She is a licence eligible archaeologist, a member of the Institute of Archaeologists of Ireland and a member of the Chartered Institute for Archaeologists. She has 18 years' experience in the production of assessments and EIAR in relation to the archaeological, architectural and cultural heritage resource. Rob Goodbody has a post-graduate diploma in Environmental Planning and a MA in Urban Building Conservation and an MA in Local History. He is a member of the Royal Town Planning Institute and a member of the Irish Planning Institute and has over 25 years' experience in the assessment of the built heritage resource with regards to proposed developments and large-scale infrastructure schemes.

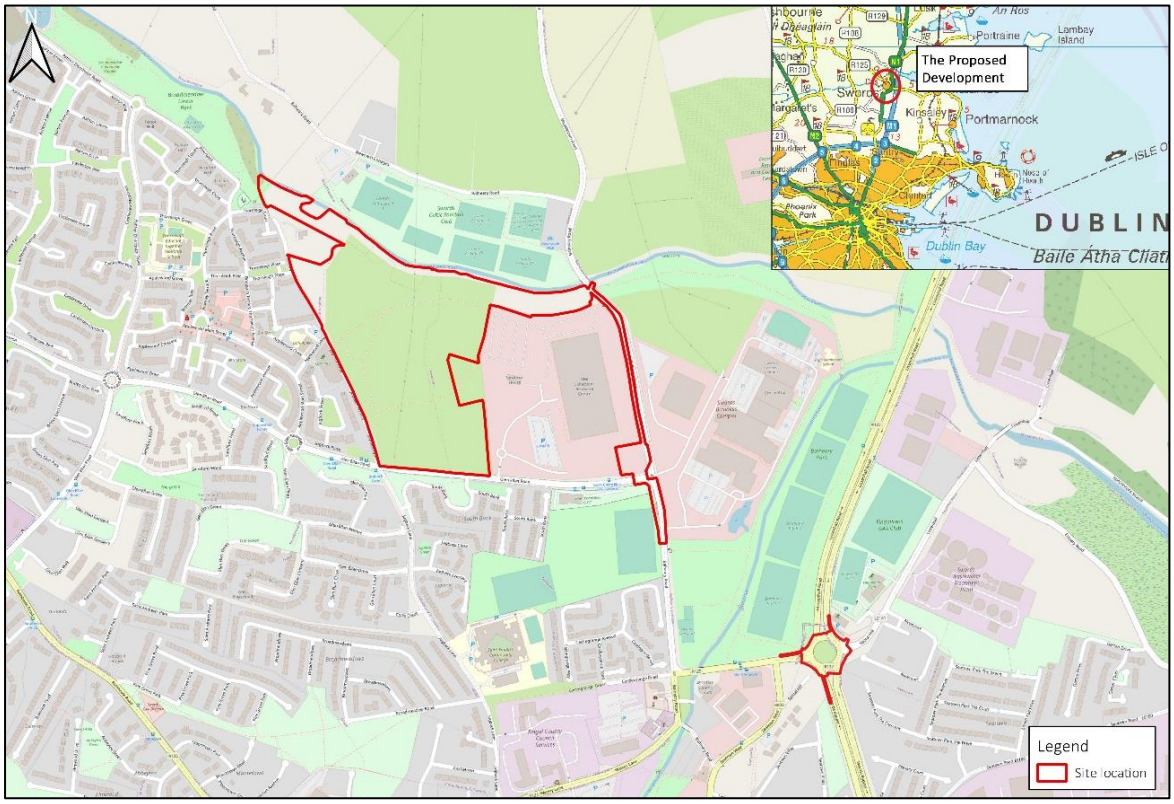

Figure 8-1 Site Location

This study determines from existing records, the nature of the archaeological, architectural and cultural heritage resource in and within the study area of the proposed development using appropriate methods of study.

Desk-based assessment is defined as a programme of study of the historic environment within a specified area or site that addresses agreed research and/or conservation objectives. It consists of an analysis of existing written, graphic, photographic and electronic information in order to identify the likely

heritage assets, their interests and significance and the character of the study area, including appropriate consideration of the settings of heritage assets (CIfA 2014). This leads to the following:

- Determining the presence of known archaeological and built heritage sites that may be affected by the proposed development;
- Assessment of the likelihood of finding previously unrecorded archaeological remains during the construction programme;
- Determining the impact upon the setting of known cultural heritage sites in the surrounding area;
- Suggested mitigation measures based upon the results of the above research.

The study involved detailed interrogation of the archaeological, historical, and architectural background of the proposed development and a study area of 500m. This was followed by a field inspection, geophysical survey and programme of archaeological testing.

An impact assessment and a mitigation strategy have been prepared. The impact assessment is undertaken to outline potential impacts that the proposed development may have on the archaeological, architectural and cultural heritage resource, while the mitigation strategy is designed to avoid, reduce or offset adverse impacts.

8.1.1 Definitions

In order to assess, distil and present the findings of this study, the following definitions apply:

'Cultural Heritage' where used generically, is an over-arching term applied to describe any combination of archaeological, architectural and cultural heritage features, where –

- the term 'archaeological heritage' is applied to objects, monuments, buildings or landscapes of an (assumed) age typically older than AD 1700 (and recorded as archaeological sites within the Record of Monuments and Places)
- the term 'architectural heritage' is applied to structures, buildings, their contents and settings of an (assumed) age typically younger than AD 1700
- the term 'cultural heritage', where used specifically, is applied to other (often less tangible) aspects of the landscape such as historical events, folklore memories and cultural associations.

8.1.2 Consultations

Following the initial research, a number of statutory and voluntary bodies were consulted to gain further insight into the cultural background of the background environment, receiving environment and study area, as follows:

- Department of Housing, Local Government and Heritage – the Heritage Service, National Monuments and Historic Properties Section: Record of Monuments and Places; Sites and Monuments Record; Monuments in State Care Database; Preservation Orders; Register of Historic Monuments and Architectural Advisory Unit.
- National Museum of Ireland, Irish Antiquities Division: topographical files of Ireland;
- National Inventory of Architectural Heritage: County Dublin; and
- Fingal County Council: Planning Section.

No specific responses were received in relation to the project from the above bodies, with the exception that the geophysical licence application and archaeological testing application were processed without query by the National Monuments Service of the DoHLGH.

8.2 Assessment Methodology

Research has been undertaken in four phases. The first phase comprised a paper survey of all available archaeological, architectural and cartographic sources. The second phase involved a field inspection of the proposed development. The third phase comprised a geophysical survey of the site that was followed by phase 4, archaeological test trenching.

8.2.1 Desktop study methodology

- Record of Monuments and Places for County Dublin;
- Sites and Monuments Record for County Dublin;
- National Monuments in State Care Database;
- Preservation Orders List;
- Topographical files of the National Museum of Ireland;
- Cartographic and written sources relating to the study area;
- Fingal County Development Plan 2017–2023;
- Aerial photographs;
- Excavations Bulletin (1970–2021);
- National Inventory of Architectural Heritage.

Record of Monuments and Places (RMP) is a list of archaeological sites known to the National Monuments Section, which are afforded legal protection under Section 12 of the 1994 National Monuments Act and are published as a record.

Sites and Monuments Record (SMR) holds documentary evidence and field inspections of all known archaeological sites and monuments. Some information is also held about archaeological sites and monuments whose precise location is not known e.g. only a site type and townland are recorded. These are known to the National Monuments Section as 'un-located sites' and cannot be afforded legal protection due to lack of locational information. As a result, these are omitted from the Record of Monuments and Places. SMR sites are also listed on a website maintained by the Department of Housing, Local Government and Heritage (DoHLGH) – www.archaeology.ie.

National Monuments in State Care Database is a list of all the National Monuments in State guardianship or ownership. Each is assigned a National Monument number whether in guardianship or ownership and has a brief description of the remains of each Monument. The Minister for the DoHLGH 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.

Preservation Orders List contains information on Preservation Orders and/or Temporary Preservation Orders, which have been assigned to a site or sites.

The topographical files of the National Museum of Ireland are the national archive of all known finds recorded by the National Museum. This archive relates primarily to artefacts but also includes references to monuments and unique records of previous excavations. The find spots of artefacts are important sources of information on the discovery of sites of archaeological significance.

Cartographic sources are important in tracing land use development within the development area as well as providing important topographical information on areas of archaeological potential and the development of buildings. Cartographic analysis of all relevant maps has been made to identify any topographical anomalies or structures that no longer remain within the landscape.

- Sir William Petty, Down Survey Map, 1654–6, *Barony of Nethercross, Parish of Swords*

- John Rocque's *Map of County Dublin*, 1760
- Ordnance Survey maps of County Dublin, 1843, 1871, 1906 and 1935–8

Documentary sources were consulted to gain background information on the archaeological, architectural and cultural heritage landscape of the proposed development.

Development Plans contain the Record of Protected Structures and a catalogue of all the archaeological sites within the county. The Fingal County Development Plan (2017–2023) was consulted to obtain information on cultural heritage sites in and within the immediate vicinity of the proposed development.

Aerial photographic coverage is an important source of information regarding the location of sites and their extent. It also provides initial information on the terrain and its likely potential for archaeology. A number of sources were consulted including aerial photographs held by the Ordnance Survey and Google Earth.

Excavations Bulletin is a summary publication that has been produced every year since 1970. This summarises every archaeological excavation that has taken place in Ireland during that year up until 2010 and since 1987 has been edited by Isabel Bennett. This information is vital when examining the archaeological content of any area, which may not have been recorded under the SMR and RMP files. This information is also available online (www.excavations.ie) from 1970–2021.

The National Inventory of Architectural Heritage (NIAH) is a state initiative established under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999 tasked with making a nationwide record of significant local, regional, national and international structures, which in turn provides county councils with a guide as to what structures to list within the Record of Protected Structures.

8.2.2 Geophysical Survey

Geophysical survey is used to create 'maps' of subsurface archaeological features. Features are the non-portable part of the archaeological record, whether standing structures or traces of human activities left in the soil. Geophysical instruments can detect buried features when their electrical or magnetic properties contrast measurably with their surroundings. In some cases, individual artefacts, especially metal, may be detected as well. Readings, which are taken in a systematic pattern, become a dataset that can be rendered as image maps. Survey results can be used to guide excavation and to give archaeologists insight into the pattern of non-excavated parts of the site. Unlike other archaeological methods, the geophysical survey is not invasive or destructive.

A geophysical survey was undertaken within the proposed development in 2018 to inform this assessment (Leigh 2018, licence 18R0256). A summary of the geophysical report is presented in Section 10.3.8 and the full report included in Appendix 8.1.

8.2.3 Archaeological Testing

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 or underwater. If such archaeological remains are present test trenching defines their character and extent and relative quality' (CIfA 2014a, 4). A programme of archaeological testing based on the results of the geophysical survey was carried out within the proposed development in February 2019. This was undertaken by Liza Kavanagh of IAC under licence 19E0053 (Kavanagh and Tobin 2019). Detailed results of the archaeological testing are included in Section 10.3.9 and Appendix 8.2 of this report.

8.2.4 Guidance and Legislation

The following relevant policies and guidance have been taken into account and this chapter has been prepared in accordance with it.

- National Monuments Acts, 1930-2014;
- Planning and Development Acts, 2000-2021;
- Environmental Protection Agency (EPA) 2015 Advice Notes on Current Practice (in the preparation of Environmental Impact Statements) (Draft Sept. 2015). Dublin, Government Publications Office;
- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EIAR) (EPA 2017). Dublin: Government Publications Office;
- Guidelines on the Information to be Contained in Environmental Impact Statements, (EPA, 2002);
- Advice notes on Current Practice in the Preparation of Environmental Impact Statements, (EPA, 2003);
- Frameworks and Principles for the Protection of the Archaeological Heritage, 1999, (formerly) Department of Arts, Heritage, Gaeltacht and Islands; and
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act, 2000.

8.3 Baseline Environment

8.3.1 Archaeological and Architectural Background

The core of the proposed development is located within the townlands of Holybanks and Newtown in the Parish of Swords and Barony of Nethercross. The site comprises large overgrown open fields on the southern banks of the Broadmeadow River; to the east of Jugback Terrace, north of Glen Ellan Road and west of the NMI Collection Resource Centre. The course of the river has been straightened and rerouted to the north of site during the 20th century. The footprint of the former winding watercourse forms the northern boundary of the townland and of the current development area. The Irish name for Holybanks is *An Bruach Naofa* meaning the ‘Sacred Bank’. It should be noted however that the name Holybanks may also have derived from ‘Holly banks’ – merely denoting a predominant vegetation in the area.

A single recorded monument is known within the proposed development, a ring-ditch (DU011-080) (Figure 8.2). This was identified as a circular cropmark on an aerial photograph taken in 1992 on the bank of the river. Within the study area there are three further recorded monuments located within 500m of the proposed development. These include enclosure (DU011-079), 180m to the west and ringfort (DU011-079) and field system (DU011-107), c. 230m to the north. Newtown Bridge (RPS 907, NIAH 11335017), crossing the Broadmeadow River, to the immediate northeast of the proposed development is both a protected structure and is listed in the NIAH. Newtown House (NIAH 11335009), a site listed in the NIAH only, is located outside and to the east of the proposed development.

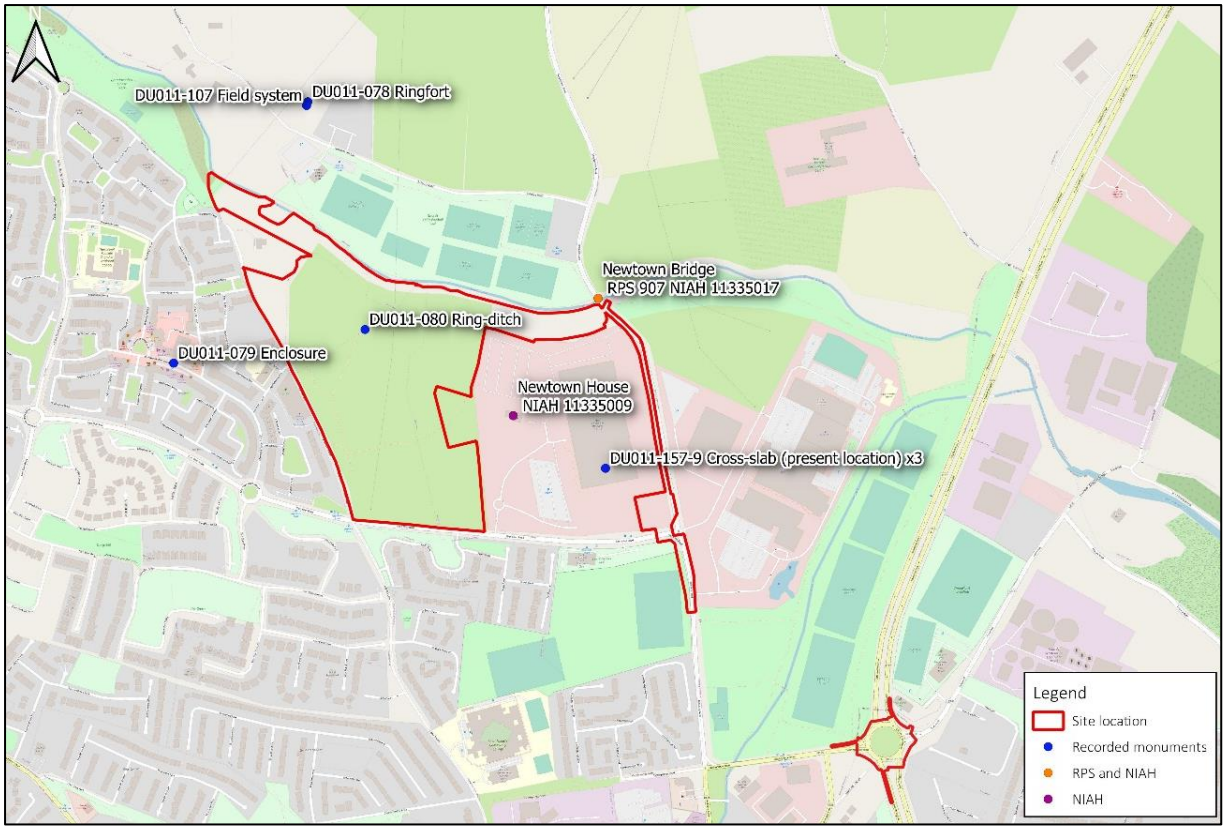

Figure 8-2 Archaeological and architectural sites within the study area

Mesolithic Period (c. 7000–4000 BC)

Although recent discoveries may push back the date of human activity by a number of millennia (Dowd and Carden 2016), the Mesolithic period is the earliest time for which there is clear evidence of prehistoric activity in Ireland. During this period people hunted, foraged and gathered food and appear to have had a mobile lifestyle. The most common evidence for Mesolithic activity comprises of scatters of worked flint material; a by-product from the production of flint implements or rubbish middens consisting largely of shells (Stout and Stout 1997). The latter are commonly discovered in coastal regions or at the edge of lakes and a number of shell middens and flint scatters are located along the coast from Sutton and Malahide to Balbriggan; however, no Mesolithic material is known from the study area of the proposed development.

Neolithic Period (c. 4000–2500 BC)

During the Neolithic period communities became less mobile and their economy became based on the rearing of stock and cereal cultivation. This transition was accompanied by major social change. Agriculture demanded an altering of the physical landscape; forests were rapidly cleared and field boundaries constructed. There was a greater concern for territory, which contributed to the tradition of construction of large communal ritual monuments called megalithic tombs, which are characteristic of the period.

Neolithic houses, which are large rectangular timber-built monuments are also associated with this period (Smyth 2015). Significant evidence for Neolithic settlement in the wider landscape of the proposed development has been uncovered during excavations at Lissenhall, c. 1.3km to the northeast. Two Neolithic post-built structures (DU012-079001–2) were excavated during the construction of the M1 motorway. Both structures measured c. 9m by 5–6m. The structures were represented by postholes, hearths and fire pits and one them was associated with a possible platform area and fragments of Western Neolithic pottery.

Bronze Age (c. 2500–500 BC)

The Bronze Age was characterised by the introduction of metalworking technology to Ireland and coincides with many changes in the archaeological record, both in terms of material culture as well as the nature of the sites and monuments themselves. Though this activity has markedly different characteristics to that of the preceding Neolithic period including new structural forms and new artefacts (such as Beaker pottery), it also reflects a degree of continuity.

The megalithic tomb tradition went into decline and ended after the early bronze age and the burial of the individual became more typical. Cremated or inhumed bodies were often placed in a cist, a small stone box set into the ground, or a stone lined grave. Burials were often made within cemeteries which were either unenclosed or else marked in the landscape with the construction of an earthen barrow. Barrows of this period often vary in form and can include the ring-ditch, the embanked ring-ditch, the ring barrow, the bowl barrow and the bowl barrow lacking an external bank. In general, ring-ditches date to the Bronze Age, with the earlier examples being simpler in form and later examples incorporating entrances and a wider range of burial practices. Ring-ditches appear to have continued to be built and earlier monuments re-used, during the Iron Age and early medieval period.

A ring-ditch (DU011-080) was noted on a 1992 aerial photo within the northern half of the proposed development. The circular ditch appeared to have an entrance in the northwest quadrant. Situated on the southern banks of the Broadmeadow River, this monument was located on a natural boundary and may have functioned as a territorial marker in addition to a memorial. No surface trace survives for these remains and geophysical survey and archaeological testing failed to identify any archaeological remains at the recorded location. The remains of a ring-ditch were identified in the eastern portion of the proposed development during geophysical survey and archaeological test (Archaeological Area 1). It is possible that this site is the site that was apparent within the 1992 aerial photograph and was plotted by the National Monuments Service at the incorrect location.

Iron Age (c. 500 BC – AD 400)

Compared to the rest of Irish prehistory, there is relatively little evidence in Ireland, as a whole, representing the Iron Age. Despite the relative paucity of evidence for the period in Ireland, the Fingal coastline presents one of the most interesting areas in Ireland in terms of Iron Age material. The Discovery Programme's Late Iron Age and Roman Ireland (LIARI) project has identified a concentration of possible Iron Age monuments along the coastline at Rush, c. 10km northeast of the proposed development. In his comprehensive study of the political and ecclesiastical history of Swords, Ailbhe MacShamhráin (2016) provides potential evidence for the installation of P-Celtic groups originating in Britain in the wider hinterland of Swords in the first century AD.

With the expanding population, there was an increased need for defence at this time. Coastal promontory forts were constructed around Ireland as defensive settlements, of which four are located in Fingal. The largest of these four is located at Drumanagh (DU008-006001) located c. 12km to the northeast of the proposed development. At Drumanagh, the promontory is defended by a series of deep ditches and high banks at the neck while also providing extensive views of the coastline. Roman artefacts, such as 2nd century AD Roman coins, Romano-British fibulae and copper ingots, were found at Drumanagh which are thought to represent a possible trading centre (Baker 2010a).

Early Medieval Period (AD 400–1169)

Swords was an important centre of the ancient Gaelic kingdom of *Brega*, which, from the late Iron Age to the Norman intervention of 1169, approximately covered the same area of modern Fingal bounded by the Rivers Tolka to the south and Delvin to the north. During this period, *Brega*, was ruled by the *Ui Chernaig* branch of the dynasty known as *Sil nAedo Slaine*, a southern branch of the *Ui Neill* who gained control of the territory in the early 8th century (Bradley 1998). MacShamráin (2016) concludes that Swords formed part of the sub kingdom of Gailenga Becca until the expansion of the Hiberno-Norse kingdom of Dublin in the late 9th and 10th centuries.

During this period, Ireland is depicted in the surviving sources as entirely rural. The Kingdom of *Brega* would have been sub-divided into smaller territorial units, known as *túath* (Stout 1997). Secular habitation sites in the early medieval period include *crannógs, cashels* and ringforts in addition to unenclosed settlements which are more difficult to identify in the archaeological record. The ringfort or *rath* is considered to be the most common indicator of settlement during the early medieval period. Ringforts are strongly associated with agricultural land and are rarely situated at higher altitudes. A double-ditched circular enclosure, recorded as a bivallate ringfort (DU011-078) was identified in an aerial photo from 1992, associated with a radiating field system (DU011-107), c. 230m north of the proposed development at Newtown. A further enclosure, which may have represented a ringfort (DU011-079) is now located under a residential estate in Broadmeadow townland, c. 180m to the west of the proposed development.

This period is characterised by the foundation of a large number of ecclesiastical sites throughout Ireland during the centuries following the introduction of Christianity in the 5th century AD. These early churches tended to be constructed of wood or post-and-wattle, replaced by the late 8th and 10th centuries with mortared stone churches. Many of the sites, some of which were monastic foundations, were probably originally defined by an enclosing wall or bank similar to that found at the coeval secular sites. This enclosing feature was probably built more to define the sacred character of the area of the church than as a defence against aggression.

A monastic settlement, dedicated to St Colmcille, was likely founded in the 6th century on high ground to the west of the River Ward, c. 1.2km south of the proposed development (Gwynn and Hadcock 1988, 44). The name 'Swords' derives from the Irish *Sord Colmcille* or St. Colmcille's Well; *sord* meaning 'pure' (Joyce 1995, 566). Edmund O'Donovan suggests possible missionary activity in the area in the 6th century with the coming of Palladius and Secundus (O'Donovan 2016), while according to MacShamráin (2016) there is a strong possibility of Gaulish and British ecclesiastical links at Swords and the wider Fingal area. Evidence for substantial burial grounds originating in the early medieval period have also been identified, such as that at Mount Gamble (DU011-101) 1.3km south of the proposed development (O'Donovan 2016). Geophysical survey and test trenching have also indicated the presence of a large enclosed burial ground at Oldtown (DU011-144001–4), c. 980m to the west of the proposed development. The survey results indicated a multiple enclosure site with the burials located within the inner enclosure. The scale and layout of the Oldtown site is indicative of an idealised ecclesiastical enclosure probably laid out after the 7th century (Baker 2010b). The radial divisions at Oldtown suggest different functions for the separate spaces and osteological analysis of a sample of the bone indicated the presence of men, women and children (ibid.).

The ecclesiastic settlement at Swords suffered a series of attacks during the 10th and 11th centuries although it held prominence as one of the resting places of Brian Boru's funeral procession following the Battle of Clontarf in 1014. The pattern of attack and counter attack continued as Swords found itself on the border of warring kingdoms. The value of Swords to the Hiberno-Norse of Dublin made it a prime target for the Kings of Meath, who repeatedly attacked Swords throughout the 11th and 12th centuries.

Medieval Period (AD 1169–1600)

In the mid-12th century, the monastic site at Swords and its possessions were transferred to the Archbishop of Dublin. Swords subsequently became one of the principal archiepiscopal manors of Dublin. The piecemeal conquest by the Anglo-Normans of Ireland, which commenced in 1169, had a fundamental impact on the Irish landscape. Following this, the property of the monastery of Swords formed part of the lands of the See of Dublin, confirmed to Archbishop Laurence O'Toole in 1179 (McNeill 1950). In 1197, King Richard granted a charter to Swords, by which each burgess was to pay 12 pence annually for his burgage. In a later charter, he confirmed the burgesses of Swords in their burgages and gave them the liberties and free customs of Dublin, and established an annual rent of one shilling per burgage (Bradley 1988; Ball 1906).

During the 13th century, the archbishops of Dublin occasionally resided at Swords Castle (DU011-034001), c. 1km south of the proposed development. Expenditure on the upkeep of the castle was recorded and in the 1270s, a sum of £100 was accounted for the 'repairs of houses, mills, and other

expenses in the manor of Swords' implying that mills along the River Ward were in existence at least as early as the late 13th century (Stalley 2006).

The Broadmeadow River functioned as a natural boundary marker for centuries; however, it was also exploited to power milling activities during the medieval period. Several water mills are recorded along the course of the river in Counties Meath and Dublin. No medieval mills are recorded in the vicinity of the proposed development along the Broadmeadow River, although examples are known on the River Ward to the south, as noted above.

Post-Medieval Period (AD1600–1900)

Swords was granted a charter and borough status during the reign of Elizabeth and it appears that the castle was retained by the archbishop well into the 17th century, if not beyond. During the Wars of the Catholic Confederation in 1641, Swords Castle was used as a rendezvous for Confederate forces and attacked and routed by the forces led by Sir Charles Coote. Following the execution of Charles I, the aristocracy of Fingal remained loyal to the Royalist cause. A rebel force was defeated by Charles Coote at Swords in 1642. By the 18th century Swords expanded into a market and post-town and the 1831 census enumerated the population of Swords parish as comprising 3722 inhabitants, 2537 of whom were in the town.

The 17th century saw dramatic rise in the establishment of large residential houses around the country. The large country house was only a small part of the overall estate of a large landowner and provided a base to manage often large areas of land that could be located nationwide. Lands associated with the large houses were generally turned over to formal gardens, which were much the style of continental Europe. By the mid-18th century more natural parkland landscapes were in favour, although the creation of these required considerable effort, including moving earth, removal of field boundaries, culverting streams to form lakes and quite often roads were completely diverted to avoid travelling anywhere near the main house or across the estate. A substantial number of large demesnes are shown on the first edition OS mapping within the study area of the proposed development. Newtown House (NIAH 11335009), c. 50m to the east of the site and its former parkland is shown on the first edition OS map of 1843 extending within the current site. Newtown Bridge (RPS 907, NIAH 11335017), crossing the Broadmeadow River to the immediate north of the proposed development, was built in the mid-19th century and later extended around 1930 with the addition of a new beam bridge on either side of the original rifle-vaulted masonry arch bridge.

The Broadmeadow River provided power for many mills along its course and one example is shown on Rocque's Map of 1760, c. 330m to the northwest of the proposed development. Several buildings are shown on the earlier mapping, which are labelled as a corn mill and flour mill on the 1843 OS map. A windmill is also illustrated on the 1760 mapping, further testifying to the agricultural industry of the area.

8.3.2 Summary of Previous Archaeological Fieldwork

A review of the Excavations Bulletin (1970–2021) has shown that, with the exception of investigations conducted as part of this assessment, no previous archaeological investigations have been carried out within the proposed development. Several programmes of geophysical survey, test trenching, excavation and monitoring have been carried out in the wider landscape, outside of the study area, in advance of proposed infrastructural and residential development. These are summarised below in order to provide full archaeological context to the surrounding landscape.

Test-trenching and geophysical survey were undertaken in the footprint of the then proposed Metro North project in Lissenhall Little and Balheary Demesne townlands, c. 570m to the east of the proposed development (Channing and Hession 2009, licence 09E0464; Channing 2009, licence 09E0463). The remains of a former bridge arch and wall was noted extending between Lissenhall Bridge and Balheary Bridge. Further to the northeast, a ring-ditch, linear ditch and cremation pit were also recorded in Lissenhall Little townland.

Monitoring carried out c. 550m north of the proposed development, as part of the Lissenhall Water Scheme, did not reveal any archaeology (Byrne 2003, licence 03E0104). Similarly, programmes of

testing and monitoring carried out off Seatown West, c. 700m to the southeast of the proposed development, did not reveal any archaeological remains (O'Carroll 2005, licence 05E0525; O'Connor 2003, licence 03E0053; and Meenan 2002, licence 02E0898).

Significant archaeological discoveries have been made further to the west in Mooretown and Oldtown. A large ecclesiastical enclosure, burials and an extensive medieval field system (DU011-144001-4) were identified at 900m to the west of the proposed development at Mooretown by geophysical survey (licence 03R0095, 04E0023 and 05R0170) and confirmed by test trenching (licence 03E1080, 04E0543). These features are mostly preserved in-situ. A large ditched enclosure (DU011-150) was identified through testing, c. 1.2km northwest at Oldtown (McLoughlin 2013a, licence 13E0283) and was preserved in-situ. Subsequent monitoring of topsoil removal at this site revealed an Iron Age cereal drying kiln, a metalled roadway shown on Rocque's map of 1760 and some linear ditches (McLoughlin 2013b and 2016, licence 13E0283).

8.3.3 Cartographic Analysis

Down Survey Maps: Nethercross Barony and Swords Parish, 1655–56 (Figure 8.3)

The barony map shows 'Newtonne' townland traversed on an east-west axis by the Broadmeadow River. A parcel of land, annotated as plot 64, is outlined bordering the western extent of Newtown to the south of the river. This plot represents Holybanks; however, it is not named as such. There are no buildings or features of archaeological potential indicated. The parish map provides some further detail, noting that 'Newtowne' was the property of 'Russell of Seatowne'. The unnamed plot representing the current Holybanks is listed as 11 acres of fertile land. To the south 'Fitzsymons' land extends towards 'Sword Towne'.

Rocque's Map of the County of Dublin, 1760 (Figure 8.4)

This map shows the proposed development within a rural and undeveloped landscape to the north of a well-developed Swords Town. Newtown House is shown and annotated to the east as an L-shaped main building with a possible stables and gate lodges shown to the east and southeast respectively. A probable square walled garden is shown adjacent to the proposed development near the banks of the Broadmeadow River. Four roads radiate north from Swords are marked, one of which bounds the proposed development to the west, forming the current Jugback Terrace. There are no buildings or features of archaeological potential shown within the proposed development. The study area is characterised by open fields and large houses, such as Mooretown and Oldtown to the west, 'Ballyhare' (Ballyheary) to the north and 'Little Lisshen Hall' and 'Lissen Hall' to the northeast. Several large mill buildings are shown on the northern banks of the river, fed by a mill race, 360m north and a windmill is present in 'Ballyhare'.

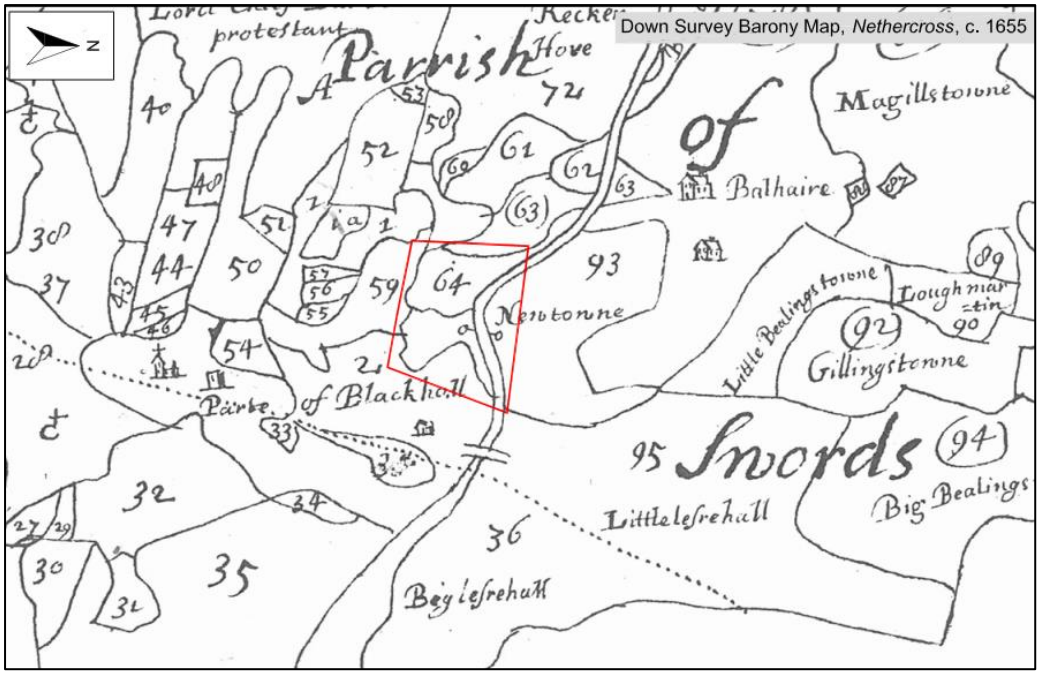

Figure 8-3 Down Survey Map of the Barony of Nethercross C. 1655 showing the approximate location of the proposed development

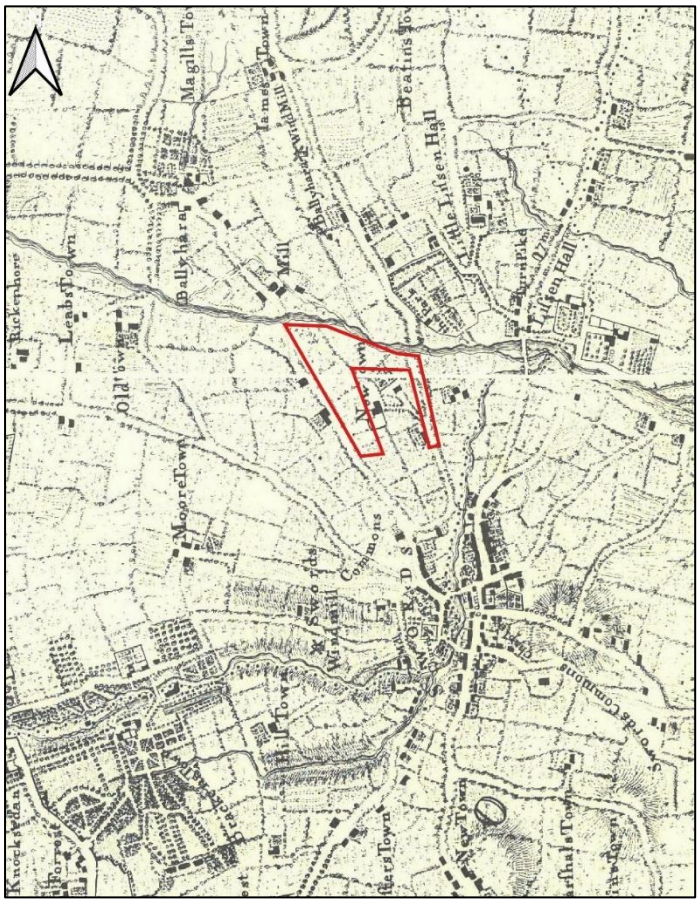

Figure 8-4 Extract from Rocque's Map of 1760 showing the approximate location of the proposed development

First Edition Ordnance Survey Map, 1843, scale 1:10,560 (Figure 8.5)

This is the first accurate historic mapping coverage of the area containing the proposed development. Although there are no major changes in the layout of the lands since the 1760 map, the site is shown at a scale of the individual field. The western half of site comprises almost the entirety of Holybanks townland. The parcel of land is shown as comprising three large tree-lined sub-rectangular fields bordered to the north by a short section of the Broadmeadow River. As such the western and north limits of the proposed development comprise the townland boundaries with the adjacent lands at Broadmeadow and Newtown. The townland boundary dividing Holybanks from Newtown divides the proposed development. The eastern portion of the proposed development is located in Newtown townland and is shown within the shaded demesne parkland associated with Newtown House (located east of the proposed development). The area mostly comprises open fields although part of an orchard is also shown. A path extends from the house towards the road by Newtown Bridge in the north. No buildings or features of archaeological potential are illustrated within the proposed development.

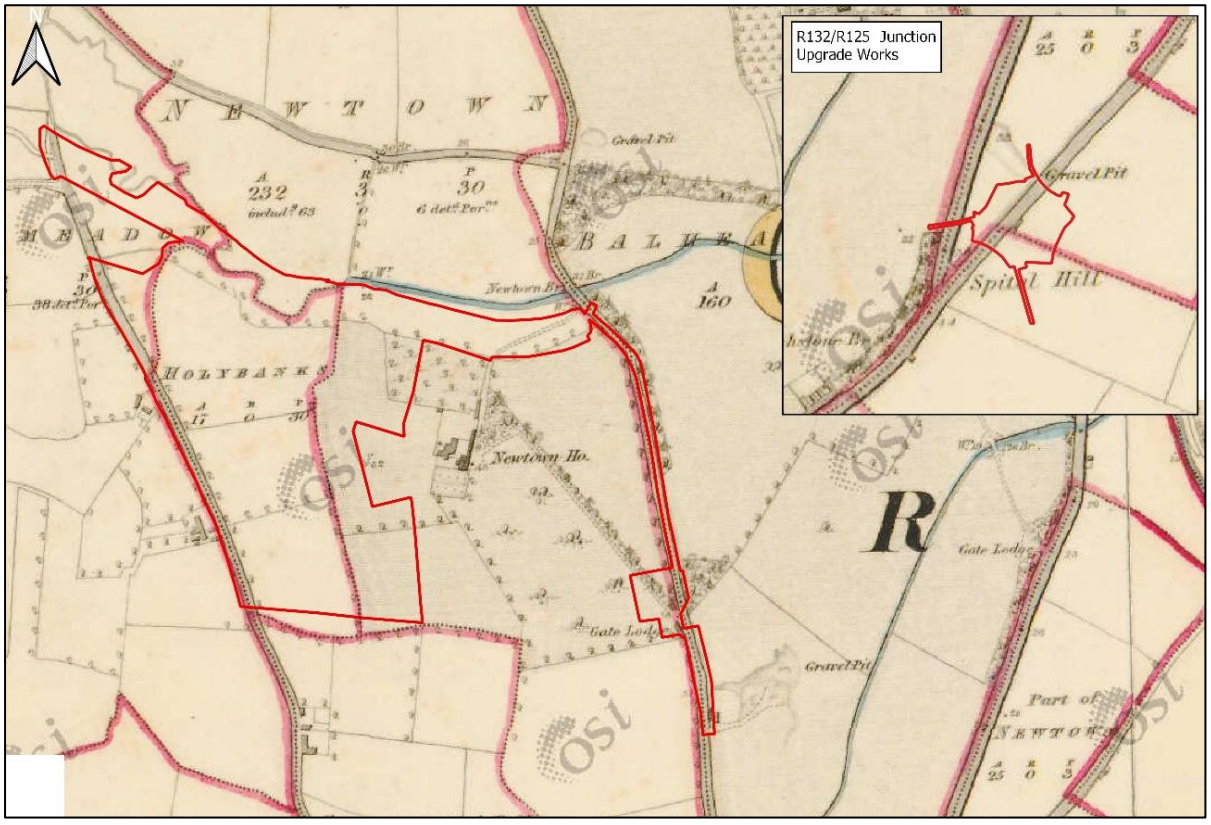

Figure 8-5 Extract from the first edition OS map of 1843 showing the proposed development

Second Edition Ordnance Survey Map, 1871, scale 1:10,560

There are no major changes to note within the cartography of this map that relate to the proposed development.

Ordnance Survey Map, 1906, scale 1:2,500 (Figure 8.6)

There are no changes of note within the proposed development although this map shows the site in greater detail than before. Several weirs are annotated on the river in Newtown townland.

Third Edition Ordnance Survey Map, 1935–8, scale 1:10,560

The Broadmeadow River has been rerouted into a wider straight channel to the north of site by the time of this map. Some of the internal field boundaries have been removed. Notably, Newtown Bridge is

shown as having three spans, resulting from the enlargement of the bridge five years previously. This work was carried out to alleviate flooding in the area and the straightening of the river channel would have been part of the deepening of the river bed.

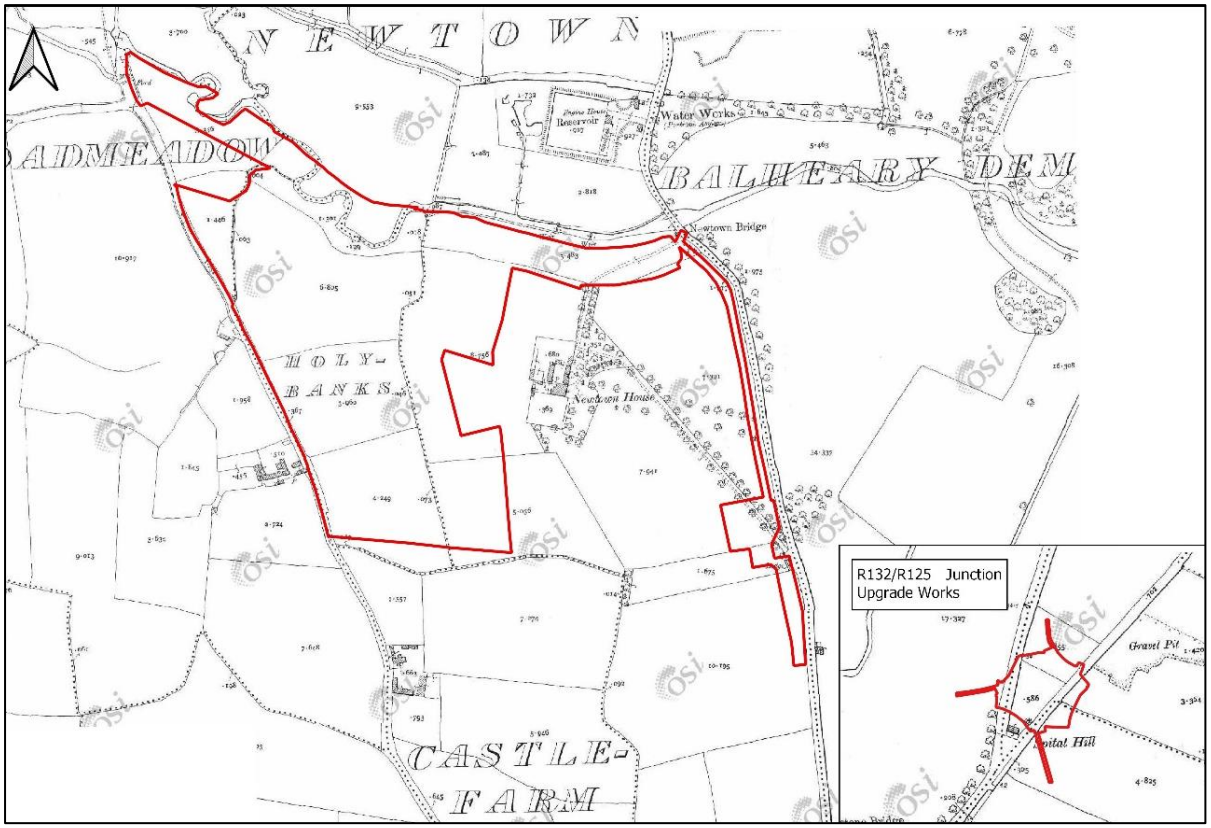

Figure 8-6 Extract from OS map of 1906 showing the proposed development

8.3.4 Aerial Photography

Inspection of the aerial photographic coverage of the proposed development held by the Ordnance Survey (1995–2013), Google Earth (2002–2021) and Bing Maps was carried out as part of this assessment. The ring-ditch (DU011-080) is not evident in any of these images. A circular patch of waterlogged ground was noted in the middle of the large field to the west of site in imagery from 2005. It is possible that this represents a former pond or water source.

The dense and scrubby nature of the vegetation cover on site in recent years has hindered identification of any potential subsurface archaeological remains. The 2002 image shows a compound contained within the southern boundary of the site; which may be associated with the adjacent housing construction to the west. The images indicate that the area was traversed by machinery at the time of this construction activity and some deposition of imported material occurred along the southern boundary of site.

8.3.5 Topographical Files of the National Museum of Ireland

Information on artefact finds from the study area in County Dublin has been recorded by the National Museum of Ireland since the late 18th century. Location information relating to these finds is important in establishing prehistoric and historic activity in the study area. There were no stray finds recorded from within the proposed development or its study area.

8.3.6 County Development Plan

Recorded Monuments

Fingal County Development Plan (2017–2023) aims to manage, enhance and protect the archaeological heritage of Fingal by safeguarding archaeological sites, monuments, objects and their settings listed in the Record of Monuments and Places (RMP) along with any additional newly discovered archaeological remains, and by identifying archaeologically sensitive historic landscapes. It recognises the statutory protection afforded to all RMP sites and contains a number of aims and objectives in relation to archaeological heritage.

A single recorded monument is known within the area of proposed development, ring-ditch (DU011-080). This was identified as a circular cropmark on an aerial photograph taken in 1992 on the former bank of the river. The site has been subject to geophysical survey and archaeological testing as part of this assessment, but failed to identify archaeological remains at the recorded location. A small ring-ditch was identified in the eastern portion of the proposed development during these investigations (AA1).

Within the study area there are four groups or individual monuments located within 500m of the proposed development, the closest of which is an enclosure (DU011-079), c. 180m to the west.

Table 8-1 Recorded monuments within 500m of the proposed development

RMP No.	Townland	Classification	Distance To Development
DU011-080	Holybanks	Ring-ditch	Within site
DU011-079	Broadmeadow	Enclosure	180m west
DU011-157, 158, 159	Newtown	Cross Slab (present location)	200m east
DU011-078	Newtown	Ringfort	230m north
DU011-107	Newtown	Field system	230m north

Protected Structures

The development plan notes protected structures in the study area of the proposed development. One structure is recorded in the Record of Protected Structures, Newtown Bridge (RPS 907), crossing the Broadmeadow River to the immediate northeast of the proposed development. Newtown Bridge is also listed in the National Inventory of Architectural Heritage (NIAH 11335017). Newtown House (NIAH 11335009) was listed as a protected structure in the Fingal Development Plan 2011-2017, but was subsequently removed in the current Fingal Development Plan 2017–2023.

Architectural Conservation Areas

There are no Architectural Conservation Areas within the study area of the proposed development.

8.3.7 National Inventory of Architectural Heritage

A review of both the architectural survey and garden survey was undertaken as part of this assessment. An area up to 500m that surrounds the proposed development was examined in order to identify any buildings or designed landscapes.

Building Survey

Two structures are listed within the NIAH Building survey for the study area of the proposed development. Newtown Bridge (RPS 907, NIAH 11335017) is located to the immediate northeast of the proposed development and Newtown House (NIAH 11335009), is listed c. 50m to the east of the site.

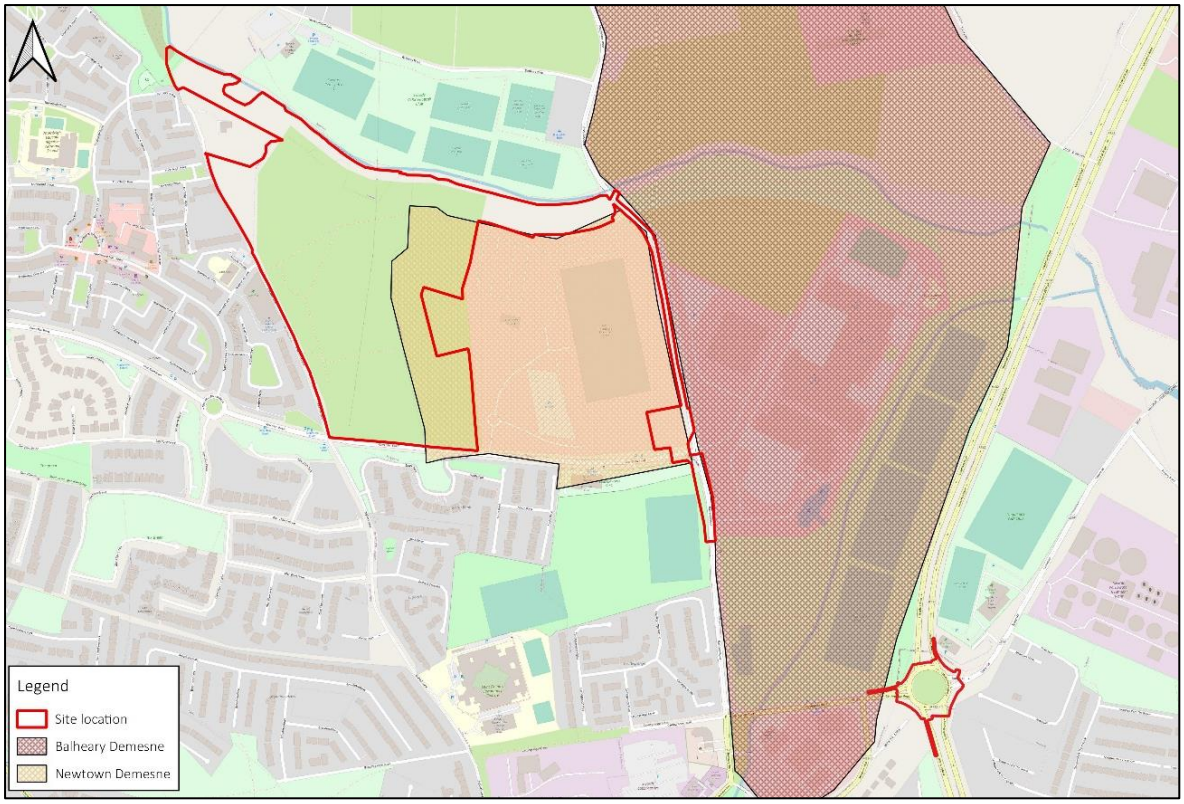

Figure 8-7 Former demesne landscapes in the vicinity of the proposed development

Garden Survey

There are two former demesne landscapes within the study area of the proposed development (Figure 8.7). The demesne of Newtown House is included within the NIAH Garden Survey (Site ID 2420) and once occupied the eastern portion of the proposed development. Initially marked on the first edition OS map of 1843 as a shaded area, and complete with gate lodge and formal garden. The eastern half of the demesne has seen extensive development in the form of industrial warehouses. The principal structure survives (NIAH 11335009), although is now in ruins (due to fire damage), but the gate lodge and outbuildings are no longer extant. With the exception of some mature demesne planting around Newtown House, the demesne has lost the majority of its designed characteristics. The western boundary of the demesne is formed by townland boundary between Newtown and Holybanks.

Balheary Demesne (Site ID 2426) is located to the immediate east of the proposed development, incorporating a large section of the Broadmeadow River as a landscape feature. To the south of the river, the demesne has largely been eroded by modern industrial development. While north of the river, parts of the demesne planting remain, although Balheary House itself was demolished in 2004.

8.3.8 Summary of Geophysical Survey

A geophysical survey was carried out by Joanna Leigh within all available areas of the proposed development in December 2018 under licence 18R0256. This involved a detailed gradiometry survey that covered c. 6ha. The data was dominated by modern responses resulting from debris and litter throughout the site. Rough ground conditions and overgrown vegetation restricted the area available for survey. Despite the constraints on site, some geophysical responses of interest were recorded. In the east of the proposed development a circular response measuring c.11.5m in diameter was identified (Figure 8.8) that was considered to be of archaeological potential. The ring-ditch feature was located 170m to the east of the recorded ring-ditch (DU011-080). Survey was conducted over the recorded ring-ditch (DU011-080) but no clear responses were recorded. Leigh noted that it was possible that the modern magnetic interference in this area was masking any such feature.

The full technical report for the survey is included in Appendix 8.1.

8.3.9 Summary of Archaeological Testing Results

Archaeological testing was carried out in February 2019 under licence 19E0053 (Kavanagh and Tobin 2019). The trenches targeted the zone of notification for recorded monument DU011-080, along with the geophysical anomalies and remaining open green space, in order to fully investigate the archaeological potential of the site (Figure 8.9).

Testing revealed three areas of archaeological significance, which have been designated as Archaeological Areas 1–3 (Figures 10.10). These comprise: AA 1 - a previously unrecorded ring-ditch containing burnt and unburnt bone, AA 2 - two sub-circular pits and AA 3 - a linear feature containing at least two deposits. The archaeological features noted in AA 2 and AA 3 are in close proximity to the ring-ditch in AA 1, and as such there is potential that they are related to this activity.

No archaeology was indicated by the geophysical survey or the programme of testing within the zone of notification for ring-ditch RMP DU011-080. It is possible that the monument shown on the aerial photographs has been removed through agricultural activity or was associated with natural banding of river gravels that were recorded in this part of the site. It is further possible that the ring-ditch identified during testing (AA 1) is the ring-ditch visible within the aerial photographs, but has been incorrectly plotted by the National Monuments Service.

While the results of the geophysical survey have been confirmed to show that the proposed development appears to be clear of large-scale archaeological remains, there remains the potential for smaller more ephemeral archaeological features (such as those features identified in AA 2) to survive beneath the current ground surface, outside of the footprint of the excavated test trenches.

Figure 8-8 Geophysical Survey Results (after Leigh 2018)

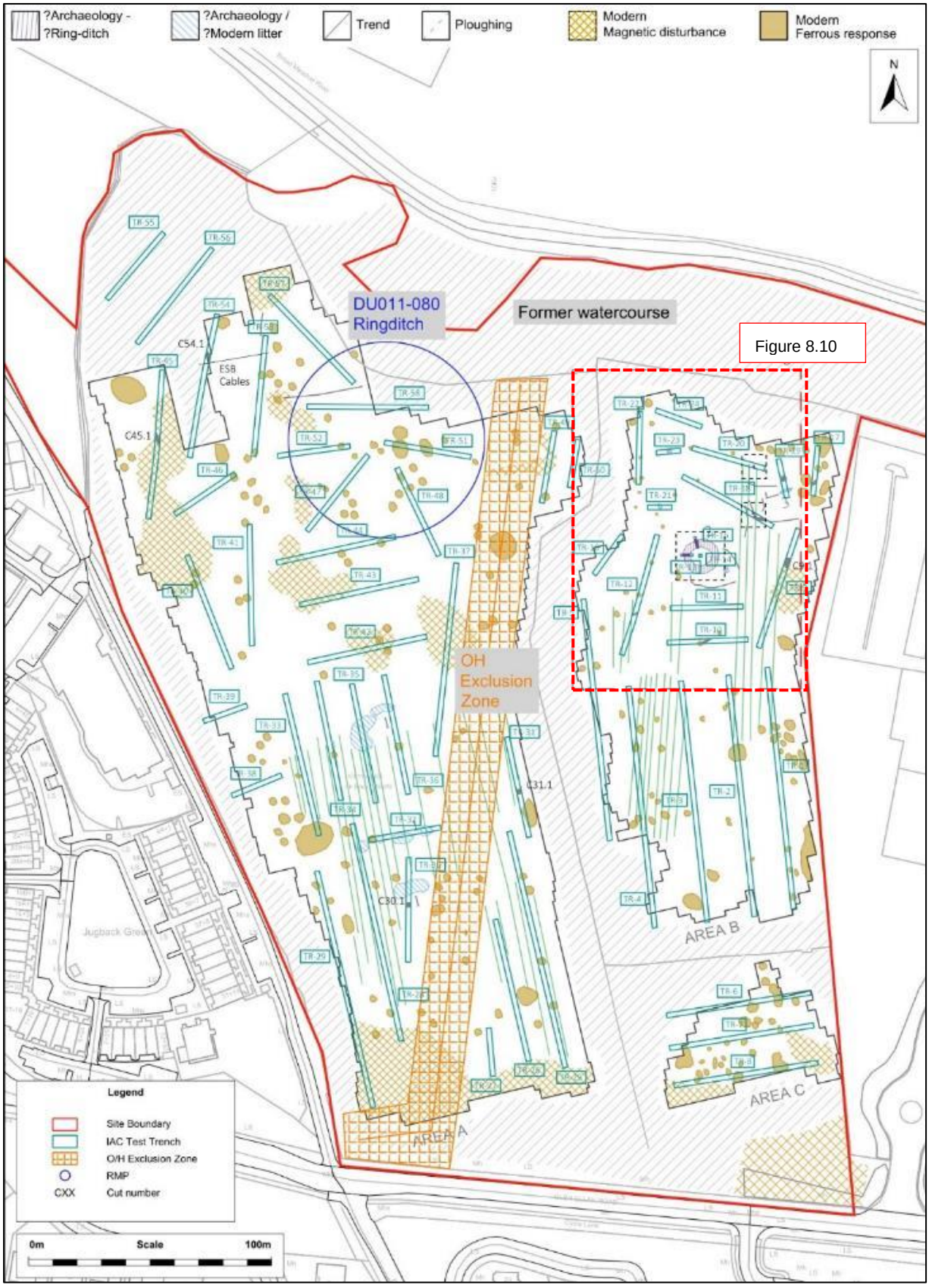

Figure 8-9 Plan of IAC trenches (2019)

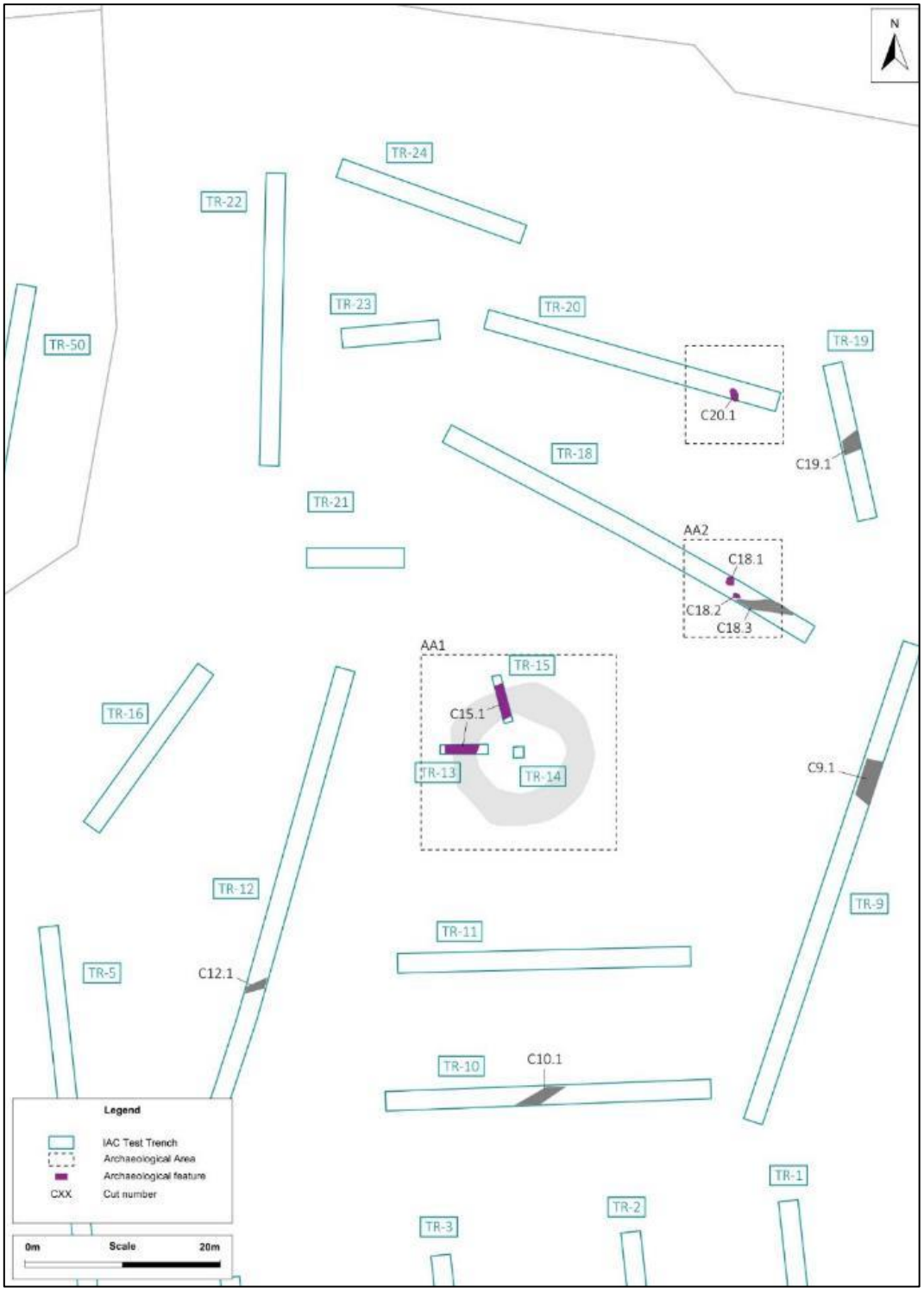

Figure 8-10 Detail of Archaeological Areas 1-3 identified during testing

8.3.10 Cultural Heritage

Toponomy of townlands

Townland and topographic names are an invaluable source of information on topography, land ownership and land use within the landscape. They can also provide information on history; archaeological monuments and folklore of an area. A place name may refer to a long-forgotten site, and may indicate the possibility that the remains of certain sites may still survive below the ground surface. The Ordnance Survey surveyors wrote down townland names in the 1830's and 1840's, when the entire country was mapped for the first time. Some of the townland names in the study area are of Irish origin and through time have been anglicised. A description and possible explanation of each townland name in the environs of the proposed development are provided in the below table.

Table 8-2 Toponomy of local townlands

Placename	Derivation	Possible Meaning
Holybanks	*An Bruach Naofa* or Holly Bank	Sacred Bank or Holly Bank
Newtown	-	New town – a newly established settlement.
Broadmeadow	-	Broad meadow – Possible Anglo origin.
Balheary Demesne	*Baile Uí Eaghra*	Heary's town
Swords	*Sord Coluim Cille*	St. Colmcille's Well

Townland Boundaries

The townland is an Irish land unit of considerable longevity as many of the units are likely to represent much earlier land divisions. However, the term townland was not used to denote a unit of land until the Civil Survey of 1654. It bears no relation to the modern word 'town' but like the Irish word *baile* refers to a place. It is possible that the word is derived from the Old English *tun land* and meant 'the land forming an estate or manor' (Culleton 1999, 174).

Gaelic land ownership required a clear definition of the territories held by each sept and a need for strong, permanent fences around their territories. It is possible that boundaries following ridge tops, streams or bog are more likely to be older in date than those composed of straight lines (ibid. 179).

The vast majority of townlands are referred to in the 17th century, when land documentation records begin. Many of the townlands are mapped within the Down Survey of the 1650s, so called as all measurements were carefully 'laid downe' on paper at a scale of forty perches to one inch. Therefore, most are in the context of pre-17th century landscape organisation (McErlean 1983, 315).

In the 19th century, some demesnes, deer parks or large farms were given townland status during the Ordnance Survey and some imprecise townland boundaries in areas such as bogs or lakes, were given more precise definition (ibid.). Larger tracks of land were divided into a number of townlands, and named Upper, Middle or Lower, as well as Beg and More (small and large) and north, east, south and west (Culleton 1999, 179). By the time the first Ordnance Survey had been completed a total of 62,000 townlands were recorded in Ireland.

The townland boundary between Holybanks and Newtown traverses the proposed development in the north-south direction (Figure 8.11). This boundary was visible on the first edition OS map of 1843 where it was also utilized as the western boundary of Newtown Demesne. The former route of the Broadmeadow River, prior to straightening of the early 20th century, also forms part of this boundary and forms the northern border in the west of the proposed development. The townland boundary is largely intact as visible in the recent aerial photography. Jugback Lane to the immediate west of the proposed development is shown as forming the townland boundary between Holybanks and Broadmeadow. Both boundaries are marked by a low earthen embankment, with the southern section of the latter boundary also flanked by shallow ditches.

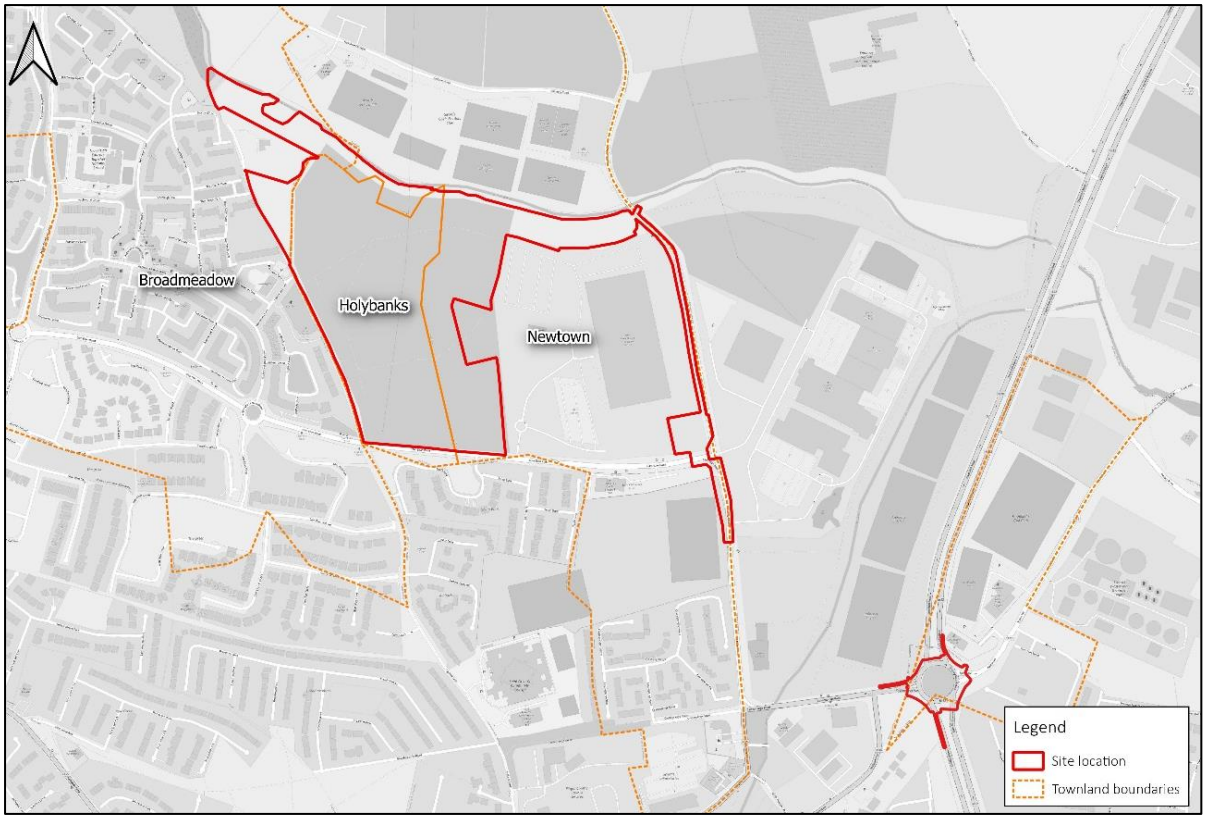

Figure 8-11 Townland boundaries within the proposed development

Cultural Heritage Sites

The term 'cultural heritage' can be used as an over-arching term that can be applied to both archaeology and architectural. However, it also refers to more ephemeral aspects of the environment, which are often recorded in folk law or tradition or possibly date to a more recent period.

No specific cultural heritage sites, with the exception of those sites described above, were identified during the course of this assessment.

8.3.11 Field Inspections

Newtown Bridge (RPS 907, NIAH 11335017), crosses the Broadmeadow River to the immediate north of the proposed development. The structure was built in the mid-19th century and later extended around 1930 with the addition of a new beam bridge on either side of the original rifle-vaulted masonry arch bridge (Plate 8.1). The Broadmeadow River flows west-east along the northern boundary of the proposed development. This section of the river was canalized and rerouted in the 20th century, although the former undulating course is fossilized by the property boundary for Holybanks townland. The south bank of the river contains tall grasses in the east, becoming more densely overgrown with mature trees and hedgerow to the west (Plate 8.2).

Newtown House (NIAH 1133509) is present in a partially overgrown and derelict state, c. 50m to the east of the proposed development (Plate 8.3). The house is surrounded by the remnants of mature demesne trees, but the demesne as a whole has been disturbed to the east by the construction of a large industrial unit, with associated access road and car park, whilst the western section of the demesne that extends into the proposed development, has lost its original designed characteristics. No outbuildings or garden enclosures survive and the original entrance drive and gate lodge is no longer present. Newtown House (NIAH 1133509), which dates to the mid-18th century, was gutted by fire in 2011 and no longer possesses its roof. The house has been removed from the record of protected structures.

Plate 8.1 Newtown Bridge (RPS 907, NIAH 11335017), facing northeast

Plate 8.2 Banks of Broad Meadow River in Newtown, facing west

The eastern portion of the proposed development is characterized by a ground surface that is uneven in places with the land rising gradually to the south, away from the river. The field is overgrown with waist-high grasses and brambles, getting progressively denser towards the southern boundary. The townland boundary between Newtown and Holybanks is extant, dividing the proposed development on a north–south axis. The boundary comprises a heavily overgrown earthen embankment (c. 1m high x 1m wide), which is traversed by several pathways (Plate 8.4).

Plate 8.3 Newtown House (NIAH 11335009), facing west

Plate 8.4 Holybanks/Newtown townland boundary, facing east

The western portion of the site forms the entirety of Holybanks townland. Shown on the historic maps as comprising three fields, the area is now one open field. The ground is largely level with a very gradual slope towards the watercourse in the north. The southern half of the field is heavily overgrown with brambles and tall grasses, while the northern part is more open, comprising rough pasture. There is no above-ground evidence for ring-ditch DU011-080, which was also confirmed during geophysical survey and archaeological testing. An existing hard-core trackway leads from the east of site along the northern limit of the proposed development. Some minor patches of former ground disturbance and modern burning were noted. The northwest quadrant of the proposed development is formed by level ground with pedestrian access through to the adjacent housing estates. The river bank to the north is heavily overgrown and was largely inaccessible for inspection.

No previously unrecorded features or deposits of archaeological or cultural heritage potential were noted in the field inspection, with the exception of the townland boundaries. Newtown Bridge and Newtown House are present within the landscape, although the house is now derelict and located within

a demesne landscape that has lost a large portion of its original character. No other sites of architectural heritage merit were identified in or within the study area of the proposed development.

8.3.12 Conclusions

The proposed development is located within Holybanks townland and part of Newtown townland, in the Parish of Swords and Barony of Nethercross. The core of the site comprises two large rectangular fields mostly covered in dense overgrowth on the southern banks of the Broadmeadow River. The ground level gradually slopes towards the north on the river banks. The site is bordered by the Balheary Road to the northeast, Glen Ellan Road to the south, Jugback Terrace to the west and by industrial buildings to east.

A recorded monument, ring-ditch DU011-080, was identified on a 1992 aerial photo in the northern half of the proposed development in Holybanks townland. No above-ground evidence was noted for this site during field inspection. A geophysical survey was carried out within all available areas of the proposed development in December 2018 under licence 18R0256 (Leigh 2018). In the east of the application area, a circular response measuring c. 11.5m in diameter was identified and interpreted as a possible ring-ditch. The survey included the recorded ring-ditch (DU011-080) but no archaeological responses were recorded.

Archaeological testing was then carried out in February 2019 under licence 19E0053 (Kavanagh and Tobin 2019). The trenches targeted the zone of notification for recorded monument DU011-080, geophysical anomalies and open green space, in order to fully investigate the archaeological potential of the proposed development. Testing revealed three areas of archaeological significance, which have been designated as Archaeological Areas 1–3. These comprise: AA 1 - a previously unrecorded ring-ditch containing burnt and unburnt bone, AA 2 - two sub-circular pits, and AA 3 - a linear feature. No archaeology was identified at ring-ditch DU011-080. It is possible that the original ring-ditch noted in the RMP was mis-identified as an archaeological site in 1992, or the site found in testing (AA 1) represents the actual location of the site, which may have been incorrectly plotted by the National Monuments Service.

One structure is recorded in the Record of Protected Structures and the NIAH Survey, Newtown Bridge (RPS 907, NIAH 11335017), crossing the Broadmeadow River to the immediate northeast of the proposed development. In addition, one further structure is listed in the NIAH only, Newtown House (NIAH 11335009), c. 50m to the east of the site. The house dates to the mid-18th century and was gutted by fire in 2011. No other structures of built heritage merit are located within the proposed development or study area.

The proposed development is divided by the extant townland boundary between Holybanks and Newtown and bordered to the west by the extant townland boundary between Holybanks and Broadmeadow. Both boundaries are marked by a low earthen embankment, with the southern section of the latter boundary also flanked by shallow ditches.

During the 18th and 19th centuries the proposed development was located in a rural landscape. The first edition OS map of 1843, illustrates that the eastern portion of the proposed development once formed part of Newtown House Demesne (NIAH Garden Survey Site ID 2420), while the Balheary House Demesne (NIAH Garden Survey Site ID 2426) was located to the east. Today the Newtown House demesne has been heavily affected by industrial development. A number of mature demesne trees surround the derelict house, but no other elements of the designed demesne landscape survive today.

8.4 Predicted Impacts

8.4.1 Methodology

Each archaeological, architectural and cultural heritage receptor within the study area has been assessed in terms of its sensitivity, the type of potential impact, magnitude of same and the potential significance of the effect/impact.

The quality and type of an impact can be classed as one of the following (as per the Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2017)):

- Negative Impact: A change which reduces the quality of the environment, for example a change that will detract from or permanently remove an archaeological/architectural or cultural heritage site from the landscape;
- Neutral Impact: A change which does not affect the quality of the environment; or
- Positive Impact: A change which improves the quality of the environment, for example a change that improves or enhances the setting of archaeological, architectural or cultural heritage site.

The below terms are used in relation to the archaeological, architectural and cultural heritage and relate to whether a site will be physically impacted upon or not:

- Direct Impact: Where an archaeological/cultural heritage feature or site is physically located within the footprint of the proposed development and entails the removal of part, or all, of the monument or feature; and
- Indirect Impact: Where a feature or site of archaeological or cultural heritage merit or its setting is located in close proximity to the footprint of a development.

8.4.2 Significance of Effects

(as defined by the EPA (draft) 2017 Guidelines):

Imperceptible: An effect capable of measurement but without noticeable consequences.

Not significant: An effect which causes noticeable changes in the character of the environment but without noticeable consequences

Slight Effects: An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.

Moderate Effects: An effect that alters the character of the environment in a manner that is consistent with existing and emerging trends.

Significant Effects: 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 the majority of a sensitive aspect of the environment.

Profound Effects: An effect which obliterates sensitive characteristics.

8.4.3 Archaeology

- The site of the recorded ring-ditch DU011-080 was targeted by geophysical survey and six trenches. These investigations did not identify any trace of a monument at this location, which may have originally been mis-identified as an archaeological site, or incorrectly plotted in the RMP following the identification of the site in 1992. Based on the results of this assessment, no significant impacts are predicted on this monument as it does not exist at this location.
- No direct or indirect impacts are predicted upon the remaining recorded archaeological sites located within the study area of the proposed development. This is due to the fact that the closest site (DU014-079) has been fully developed and DU014-157-9 represent ex-situ

artefacts currently stored at the National Museum storage facility to the east. Ringfort and field system (DU014-107 and 078), located c. 230m to the north, will not be affected due to the distance from the development area to these sites, which possess not upstanding remains.

- Archaeological testing with the proposed development has identified three areas of archaeological potential within the proposed development, designated AA 1–3. There will be a **significant direct negative (permanent)** impact on these features (prior to the application of mitigation), which will be caused by groundworks associated with the proposed development.

- There is potential for disturbance to occur to the riverbed and river bank at the location of the proposed outfall from the stormwater storage tank into the River Broadmeadow, which will be caused by groundworks associated with the outfall installation. Direct impacts (prior to the application of mitigation) have the potential to range from **moderate to very significant negative (permanent),** dependent on the nature, extent and significance of any archaeological remains that are identified.

- Ground disturbances associated with the proposed development may have a direct, negative (permanent) impact on isolated or small-scale archaeological features that may survive within the proposed development, outside the footprint of the excavated trenches. Impacts (prior to the application of mitigation) have the potential to range from **moderate to significant negative (permanent)** dependent on the nature, extent and significance of any archaeological remains that are identified.

8.4.4 Architecture

- The derelict remains of the mid-18th century Newtown House are within 50m of the proposed development. It is noted that there are no windows in the rear of the house as it now stands. Given the derelict condition of the house and its much-denuded demesne setting; its removal from the Record of Protected Structures and the separation between the house and the proposed development, **no negative direct or indirect impacts** are predicted on the character or setting of the house.

- Newtown Bridge lies close to the north-eastern boundary of the proposed development and is a protected structure. The part of the site in the vicinity of the bridge is to be laid out as open space and no buildings are proposed in the vicinity of the bridge. The outfall pipe from the proposed stormwater storage tank associated with the proposed development will go through the existing wall that leads up to Newtown Bridge, but this wall is not part of the protected structure. There may be an **indirect slight negative impact (permanent)** upon the bridge, due to the alteration of the existing adjacent wall to facilitate the pipeline.

- The former demesne of Newtown House has been partially developed for warehousing, with access roads and extensive car parking. The part of the demesne that lies within the application site is overgrown and has lost any designed characteristics. **No negative direct or indirect impacts** on the former demesne is predicted as a result of the proposed development.

- The former demesne of Balheary House that lies to the south of the Broadmeadow River has been developed for commercial purposes, leaving a small field in the north-eastern part close to Newtown Bridge and on the opposite side of Balheary Road from the development area. The only part of the development area within view of the former demesne will be laid out as open space. **No negative direct or indirect impacts** on the former demesne are predicted as a result of the proposed development.

8.4.5 Cultural Heritage

- Two extant townland boundaries are present, dividing the site on a north-south axis (Holybanks/Newtown) and forming the western development limit (Holybanks/ Broadmeadow). It is proposed to remove these boundaries to enable construction of the residential development, which represents a **direct, moderate negative (permanent)** impact upon the cultural heritage resource.

8.5 Do Nothing Impact

If the proposed development were not to proceed, there would be no negative impact on the archaeological architectural or cultural heritage resource.

8.6 Worst Case Impact

Under a worst-case scenario, ground disturbances associated with the proposed development would disturb previously unidentified and unrecorded deposits and artefacts without appropriate excavation and recording being undertaken. This would lead to direct, negative impacts upon the archaeological resource that may be profound in significance.

8.7 Mitigation Measures

8.7.1 Archaeology

- No evidence of an archaeological site was identified within RMP DU011-080. As such, no further specific archaeological mitigation is required for this particular site.
- It is acknowledged that preservation in-situ of archaeological remains is the preferred option for the conservation of the archaeological resource. Due consideration was given by the Design Team to the preservation in-situ of ring-ditch identified in AA 1 and associated remains. The design on this site has strived to create a balance between built and unbuilt, rather than maximise the development potential of the site; only 26% of the net site area will be taken up by residential development and an area is being protected for a future Bus Connects corridor. For these reasons preservation by record is ultimately being proposed. We have set out further information below, in this regard.
    - The preservation of key landscape characteristics and existing features of the site has guided the landscaping proposals set out for the scheme. The focus has been to retain the primary elements of the existing ecological networks of hedgerows around the site, most notably the central north-south linear hedgerow, and the woodland amenity along the Broadmeadow River. In doing so, a connected linear spine of public open space is formed that provides for shared ecological, open space, recreation and SuDs functions. The central spine concept proposed directly aligns with the green infrastructure vision and principles of the Fingal County Council Development Plan (2017-23) and the Estuary West Masterplan (2019). The implications of designing a landscaping strategy around the original north-south hedgerow and the historical townland boundary it represents have resulted in the need for more efficient use of lands within the adjoining cells across the site.
    - In consultation with the Department of Education and Skills, the applicant has agreed to reserve a 0.46ha site within the applicants ownership to accommodate a future school sufficient to cater for a 16-24 classroom school as per the requirement of Estuary West Masterplan (2019). The future school will provide for significant community and social infrastructure for the locality. This together with the obligation to set back the development site from Glen Ellan Road to protect a corridor for future Bus Connects and existing wayleave for local infrastructure services, has rendered a substantial portion of the site undevelopable.
    - The current level of density (70 uph net density) proposed on the subject site is in alignment with the standards set by Estuary West Masterplan. The site coverage proposed under the current scheme is 26% of the net site area. Plot ratio for the proposal stands at 0.7 for the net site area. This shows that the proposed design on this site has strived to create a balance between built and unbuilt, rather than maximise the development potential of the site.
    - The site of recorded monument was targeted by geophysical surveys and trenches but did not reveal any trace of the monument. Broader archaeological testing carried out revealed a previously unrecorded circular response measuring c.11.5m diameter which has been interpreted as a possible ring-ditch. The design team looked at protecting this previously

unrecorded ring-ditch by incorporating it into the open space proposals but this would lead to a lack of coordination between open spaces proposed and an overconcentration of green spaces to the north of the site. The current proposal at this location provides for a high-quality urban environment, that includes duplex units, private gardens and semi-private amenity areas including an informal play area. The residential developments at this location also perform an important function of providing passive surveillance to Broadmeadow Riverside Park.

- Given the design and planning rationale as detailed above, coupled with the truncated nature of the identified archaeological remains on site, preservation by record of the features in AA 1–3 will be carried out prior to the commencement of construction. This will be undertaken by a license eligible archaeologist in consultation with the National Monuments Service of the DoHLGH.

- An archaeological wade survey, including metal detection, will be carried out at the location of the outfall into the River Broadmeadow. This will be undertaken by a license eligible archaeologist in consultation with the National Monuments Service of the DoHLGH.

- All topsoil stripping associated with the proposed development will be monitored by a suitably qualified archaeologist. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the DoHLGH.

8.7.2 Architecture

- The intervention to the wall leading to the protected structure of Newtown Bridge will be reconstructed using materials recovered from the original wall.

- As there are no further predicted impacts on the architectural resource, no further mitigation is deemed necessary.

8.7.3 Cultural Heritage

- During the course of topsoil stripping a written and photographic record describing the form of the townland boundaries to be impacted upon will be included in the monitoring report.

8.8 Residual Impacts

As it is proposed to monitor construction activity and preserve any identified archaeological features by record, no residual impacts are predicted upon the archaeological, architectural or cultural heritage resource.

8.9 Cumulative Impacts

With regards to proposed and permitted developments as detailed in Chapter 16, no negative cumulative impacts are predicted upon the archaeological, architectural or cultural heritage resource. This is due to the fact that all potential negative impacts as part of this development will be fully mitigated.

8.10 Interactions

The main high-level interactions between Archaeological, Architectural and Cultural Heritage and other environmental factors includes Chapter 9 Landscape and Visual. Please refer to Chapter 16 Interactions for further information on interactions.

8.11 Monitoring

The mitigation measures recommended above would also function as a monitoring system during construction to allow the further assessment of the scale of the predicted impacts and the effectiveness of the recommended mitigation measures.

8.12 Difficulties Encountered

No difficulties were encountered during the compilation of this chapter.

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8.13.1 Cartographic Sources

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8.13.2 Electronic Sources

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www.heritagemaps.ie – The Heritage Council web-based spatial data viewer which focuses on the archaeological heritage of County Dublin.

http://map.geohive.ie/mapviewer.html - Historic maps and aerial photographs

https://www.irishnewsarchive.com/ - Newspapers

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9. Landscape and Visual

9.1 Introduction

The Landscape and Visual Impact Assessment (LVIA) prepared by CSR was informed by a desktop study and a survey of the site and receiving environment in April and October 2018, July 2019 and January 2022.

This Landscape and Visual Assessment was carried out by Evelyn Sikora, BA MA, MILI. She has eight years' experience in Landscape and Visual Assessment (LVIA) and has worked on the Landscape and Visual assessment for a range of developments through Ireland, She has experience in a range of LVIA projects including wind and solar energy, infrastructure, flood relief, residential, commercial and recreation projects. This chapter was overseen by Landscape Director, Declan O'Leary, B.Agr Sc. Land. Hort., Dip LA., CLI, MILI, of Cunnane Stratton Reynolds Ltd. Declan has over 30 years experience in the design and analysis of landscape and the impacts of change, and the preparation of assessments for inclusion EIAR.

The report identifies and discusses the landscape and visual constraints and effects in relation to the proposed development on Glen Ellen Road, Swords, Co. Dublin.

9.2 Methodology

Ireland is a signatory to the European Landscape Convention (ELC). The ELC defines landscape as '*an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors'*. This definition is important in that it expands beyond the idea that landscape is only a matter of aesthetics and visual amenity. It encourages a focus on landscape as a resource in its own right - a shared resource providing a complex range of cultural, environmental and economic benefits to individuals and society.

As a cultural resource, the landscape functions as the setting for our day-to-day lives, also providing opportunities for recreation and aesthetic enjoyment and inspiration. It contributes to the sense of place experienced by individuals and communities and provides a link to the past as a record of historic socio-economic and environmental conditions. As an environmental resource, the landscape provides habitat for fauna and flora. It receives, stores, conveys and cleans water, and vegetation in the landscape stores carbon and produces oxygen. As an economic resource, the landscape provides the raw materials and space for the production of food, materials (e.g. timber, aggregates) and energy (e.g. carbon-based fuels, wind, solar), living space and for recreation and tourism activities.

Landscape is not unchanging. Many different pressures have progressively altered familiar landscapes over time and will continue to do so in the future, creating new landscapes. For example, within the receiving environment, the environs of the proposed development have altered over the last thousand years, from wilderness to agriculture and settlement.

Many of the drivers for change arise from the requirement for development to meet the needs of a growing population and economy. The concept of sustainable development recognises that change must and will occur to meet the needs of the present, but that it should not compromise the ability of future generations to meet their needs. This involves finding an appropriate balance between economic, social and environmental forces and values.

The reversibility of change is an important consideration. If change must occur to meet a current need, can it be reversed to return the resource (in this case, the landscape) to its previous state to allow for development or management for future needs.

Climate change is one of the major factors likely to bring about future change in the landscape, and it is accepted to be the most serious long-term threat to the natural environment, as well as economic activity (particularly primary production) and society. The need for climate change mitigation and adaptation, which includes the management of water and more extreme weather and rainfall patterns, is part of this.

Landscape and Visual Impact Assessment (LVIA) is a tool used to identify and assess the significance of and the effects of change resulting from development on both the landscape as an environmental resource in its own right and on people's views and visual amenity.

The methodology for assessment of the landscape and visual effects is in accordance with the following key guidance documents, namely:

- Guidelines for Landscape and Visual Impact Assessment, 3rd Edition 2013, published by the UK Landscape Institute and the Institute of Environmental Management and Assessment (hereafter referred to as the GLVIA).
- Guidelines on the information to be contained in Environmental Impact Assessment Reports (Draft August 2017, EPA).
- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report' (2017), published by the European Commission 2017

References are also made to the *'Landscape and Landscape Assessment – Consultation Draft of Guidelines for Planning Authorities'* document, published in 2000 by the Department of Environment, Heritage and Local Government.

9.2.1 Use of the Term 'Effect' vs 'Impact'

The GLVIA advises that the terms 'impact' and effect' should be clearly distinguished and consistently used in the preparation of an LVIA.

'Impact' is defined as the action being taken. In the case of the proposed works, the impact would include the construction of the proposed development.

'Effect' is defined as the change or changes resulting from those actions, e.g. a change in landscape character, or changes to the composition, character and quality of views in the receiving environment. This report focuses on these effects.

Assessment of Both 'Landscape' and 'Visual' Effects

Another key distinction to make in a LVIA is that between landscape effects and the visual effects of development.

'Landscape' results from the interplay between the physical, natural and cultural components of our surroundings. Different combinations of these elements and their spatial distribution create distinctive character of landscape in different places. 'Landscape character assessment' is the method used in LVIA to describe landscape, and by which to understand the potential effects of a development on the landscape as 'a resource'. Character is not just about the physical elements and features that make up a landscape, but also embraces the aesthetic, perceptual and experiential aspects of landscape that make a place distinctive.

Views and '*visual amenity'* refer to the interrelationship between people and the landscape. The GLVIA prescribes that effects on views and visual amenity should be assessed separately from landscape, although the two topics are inherently linked. Visual assessment is concerned with changes that arise in the composition of available views, the response of people to these changes and the overall effects on the area's visual amenity.

The assessment of landscape and visual effects included a desktop study, review of the proposed development drawings and visualisations, and site visits which were carried out in April and October 2018, July 2019 and January 2022.

9.2.2 Methodology for Landscape Assessment

In Section 9.4 of this chapter the landscape effects of the development are assessed. Landscape impact assessment considers the likely nature and scale of changes to the main landscape elements and characteristics, and the consequential effect on landscape character and value. Existing trends of change in the landscape are taken into account. The potential effect is assessed based on

measurement of the landscape sensitivity against the magnitude of change which would result from the development.

Sensitivity of the Landscape Resource

Landscape Sensitivity: Landscape sensitivity includes consideration of landscape values as well as the susceptibility of the landscape to change. This is related to its land use, landscape patterns and scale, visual enclosure and distribution of visual receptors, scope for mitigation, and the value placed on the landscape. It also relates to the nature and scale of development proposed.

Landscape values can be identified by the presence of landscape designations or policies which indicate particular values, either on a national or local level. In addition, a number of criteria are used to assess the value of a landscape. These are described further in Section 9.6 below.

Landscape susceptibility is defined in the GLVIA as *the ability of the landscape receptor to accommodate the proposed development without undue consequences for the maintenance of the baseline scenario and/or the achievement of landscape planning policies and strategies*. Susceptibility also relates to the type of development – a landscape may be highly susceptible to certain types of development but have a low susceptibility to other types of development.

For the purpose of assessment, five categories are used to classify the landscape sensitivity of the receiving environment. These tables (9.1 to 9.5) were prepared by CSR based on the approach outlined in the GLVIA (3rd Edition).

Table 9-1: Categories of Landscape Sensitivity

Sensitivity	Description
Very High	Areas where the landscape exhibits a very strong, positive character with valued elements, features and characteristics that combine to give an experience of unity, richness and harmony. The character of the landscape is such that its capacity for accommodating change in the form of development is very low. These attributes are recognised in landscape policy or designations as being of national or international value and the principle management objective for the area is protection of the existing character from change.
High	Areas where the landscape exhibits strong, positive character with valued elements, features and characteristics. The character of the landscape is such that it has limited/low capacity for accommodating change in the form of development. These attributes are recognised in landscape policy or designations as being of national, regional or county value and the principal management objective for the area is conservation of the existing character.
Medium	Areas where the landscape has certain valued elements, features or characteristics but where the character is mixed or not particularly strong. The character of the landscape is such that there is some capacity for change in the form of development. These areas may be recognised in landscape policy at local or county level and the principle management objective may be to consolidate landscape character or facilitate appropriate, necessary change.
Low	Areas where the landscape has few valued elements, features or characteristics and the character is weak. The character of the landscape is such that it has capacity for change; where development would make no significant change or would make a positive change. Such landscapes are generally unrecognised in policy and where the principal management objective is to facilitate change through development, repair, restoration or enhancement.
Negligible	Areas where the landscape exhibits negative character, with no valued elements, features or characteristics. The character of the landscape is such that its capacity for accommodating change is high; where development would make no significant change or would make a positive

	change. Such landscapes include derelict industrial lands or extraction sites, as well as sites or areas that are designated for a particular type of development. The principal management objective for the area is to facilitate change in the landscape through development, repair or restoration.

Magnitude of Landscape Change: The magnitude of change is a factor of the scale, extent and degree of change imposed on the landscape with reference to its key elements, features and characteristics (also known as 'landscape receptors'). Five categories are used to classify magnitude of landscape change.

Table 9-2: Table Magnitude of Landscape Change

Sensitivity	**Description**
Very High	Change that is large in extent, resulting in the loss of or major alteration to key elements, features or characteristics of the landscape (i.e. landscape receptors), and/or introduction of large elements considered totally uncharacteristic in the context. Such development results in fundamental change in the character of the landscape.
High	Change that is moderate to large in extent, resulting in major alteration of key elements, features or characteristics of the landscape, and/or introduction of large elements considered uncharacteristic in the context. Such development results in change to the character of the landscape.
Medium	Change that is moderate in extent, resulting in partial loss or alteration of key elements, features or characteristics of the landscape, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape.
Low	Change that is moderate or limited in scale, resulting in minor alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that are not uncharacteristic in the context. Such development results in minor change to the character of the landscape.
Negligible	Change that is limited in scale, resulting in no alteration to key elements, features or characteristics of the landscape, and/or introduction of elements that are characteristic of the context. Such development results in no change to the landscape character.

Significance of Effects

The terminology used to describe the significance or importance of effects is that which is set out in the EPA's Guidelines (Draft 2017) which include seven categories.

In order to classify the significance of effects (both landscape and visual), the predicted magnitude of change is measured against the sensitivity of the landscape/viewpoint, using the following guide. There are seven classifications of significance, namely: (1) imperceptible, (2) not significant, (3) slight, (4) moderate, (5) significant, (6) very significant, (7) profound.

Table 9-3: Significance of Effects Matrix

		Sensitivity of the Landscape/Visual Resource				
		Very High	**High**	**Medium**	**Low**	**Negligible**
Magnitude of Change	**Very High**	Profound	Profound-Very Significant	Very Significant-Significant	Moderate	Slight
	High	Profound-Very Significant	Very Significant	Significant	Moderate-Slight	Slight-Not Significant
	Medium	Very Significant-Significant	Significant	Moderate	Slight	Not Significant
	Low	Moderate	Moderate-Slight	Slight	Not significant	Imperceptible
	Negligible	Slight	Slight-Not Significant	Not significant	Imperceptible	Imperceptible

Table 9-3 above indicates how sensitivity of the resource/receptor, and the magnitude of the change, are combined to assess the significance of the effect. It should however be noted that this *is a guide only* and a degree of professional judgement is also applied.

Landscape effects are also classified as positive, neutral or negative/adverse. Development has the potential to improve the environment as well as damage it. In certain situations, there might be policy encouraging a type of change in the landscape, and if a development achieves the objective of the policy the resulting effect might be positive, even if the landscape character is profoundly changed.

9.2.3 Methodology for Visual Assessment

In Section 9.4 of this report the visual effects of the development are assessed. Visual assessment considers the changes to the composition of views, the character of the views, and the visual amenity experienced by visual receptors. Visual receptor sensitivity is a function of two main considerations:

- *Susceptibility of the visual receptor to change.* This depends on the occupation or activity of the people experiencing the view, and the extent to which their attention or interest is focussed on the views or visual amenity they experience at that location.

Visual receptors most susceptible to change include residents at home, people engaged in outdoor recreation focused on the landscape (e.g. trail users), and visitors to heritage or other attractions and places of community congregation where the setting contributes to the experience.

Visual receptors less susceptible to change include travellers on road, rail and other transport routes (unless on recognised scenic routes which would be more susceptible), people engaged in outdoor recreation or sports where the surrounding landscape does not influence the experience, and people in their place of work or shopping where the setting does not influence their experience.

- *Value attached to the view.* This depends to a large extent on the subjective opinion of the visual receptor but also on factors such as policy and designations (e.g. scenic routes, protected views), or the view or setting being associated with a heritage asset, visitor attraction or having some other cultural status (e.g. by appearing in arts).

The significance of the visual effects experienced at these locations is assessed by measuring the visual receptor sensitivity against the magnitude of change to the view resulting from the development. Five categories are used to classify a viewpoint's sensitivity:

Table 9-4: Categories of Visual Receptor Sensitivity

Sensitivity	Description
Very High	Viewers at iconic viewpoints - towards or from a landscape feature or area - that are recognised in policy or otherwise designated as being of high value or national value. This may also include residential viewers who are focused to a large extent on the view.
High	Viewers at viewpoints that are recognised in policy or otherwise designated as being of value, or viewpoints that are highly valued by people that experience them regularly (such as views from houses or outdoor recreation features) and views which are valued by the local community. This would include tourist attractions, and heritage features of regional or county value, and viewers travelling on scenic routes
Medium	Viewers at viewpoints representing people travelling at slow or moderate speed through or past the affected landscape in cars or on public transport, where they are partly but not entirely focused on the landscape, or where the landscape has some valued views. The views are generally not designated, but which include panoramic views or views judged to be of some scenic quality, which demonstrate some sense of naturalness, tranquility or some rare element in the view
Low	Viewers at viewpoints reflecting people involved in activities not focused on the landscape e.g. people at their place of work or engaged in similar activities such as shopping, etc. The view may present an attractive backdrop to these activities but there is no evidence of that the view is valued, and not regarded as an important element of these activities. Viewers travelling at high speeds (e.g., motorways) may also be considered of low susceptibility
Negligible	Viewpoints reflecting people involved in activities not focused on the landscape e.g., people at their place of work or engaged in similar activities such as shopping where the view has no relevance or is of poor quality and not valued

Magnitude of Change to the View

Classification of the magnitude of change takes into account the size or scale of the intrusion of development into the view (relative to the other elements and features in the composition, i.e. its relative visual dominance), the degree to which it contrasts or integrates with the other elements and the general character of the view, and the way in which the change will be experienced (e.g. in full view, partial or peripheral, or glimpses). It also considers the geographical extent of the change, the duration and the reversibility of the visual effects.

Five categories are used to classify magnitude of change to a view.

Table 9-5: Visual Magnitude of Change

Magnitude of Change	Description
Very High	Full or extensive intrusion of the development in the view, or partial intrusion that obstructs valued features or characteristics, or introduction of elements that are completely out of character in the context, to the extent that the development becomes the dominant the composition and defines the character of the view and the visual amenity.
High	Extensive intrusion of the development in the view, or partial intrusion that obstructs valued features, or introduction of elements that may be

	considered uncharacteristic in the context, to the extent that the development becomes co-dominant with other elements in the composition and affects the character of the view and the visual amenity.
Medium	Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.
Low	Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context, resulting in minor alteration to the composition and character of the view but no change to visual amenity.
Negligible	Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.

Significance of Visual Effects

As for landscape effects, in order to classify the importance of visual effects, the magnitude of change to the view is measured against the sensitivity of the viewpoint. This is set out in Table 9.3 above, though as noted this table is a guide only.

9.2.4 Quality and Timescale

The predicted effects are also classified as beneficial, neutral or adverse. This is not an absolute exercise; in particular, visual receptors' attitudes to development, and thus their response to the impact of a development, will vary. However, the methodology applied is designed to provide robust justification for the conclusions drawn. These qualitative impacts/effects are defined as:

- Adverse – Scheme at variance with landform, scale, pattern. Would degrade, diminish or destroy the integrity of valued features, elements or their setting or cause the quality of the landscape(townscape)/view to be diminished;
- Neutral - Scheme complements the scale, landform and pattern of the landscape(townscape)/view and maintains landscape quality;
- Beneficial – improves landscape(townscape)/view quality and character, fits with the scale, landform and pattern and enables the restoration of valued characteristic features or repairs / removes damage caused by existing land uses.

Effects are also categorised according to their longevity or timescale:

- Temporary – Lasting for one year or less;
- Short Term – Lasting one to seven years;
- Medium Term – Lasting seven to fifteen years;
- Long Term – Lasting fifteen years to sixty years;
- Permanent – Lasting over sixty years.

A statement is made as to the appropriateness of the proposed development based on the combined assessment of the predicted landscape and visual effects. This methodology, in accordance with the various guidelines for LVIA, results in a conclusion as to the appropriateness of the proposed development based on objective assessment of its likely landscape and visual impacts

9.3 Baseline Environment

The site is bounded by the Glen Ellen Road to the south and the Broadmeadow river to the north. It is approximately 1 kilometre north of Swords village and approximately 0.13 kilometres east of Applewood main street.

The proposed development consists of a residential development of 621 units on the northern periphery of Swords, Co. Dublin. This includes:

- 349 no apartments, 118 no houses and 154 duplex units.
- Building heights range from 1 no. to 7 no. storeys (over basement level).
- The scheme provides for public open space, communal open space areas, a crèche, residential amenities (including concierge, multi-purpose room, meeting room and gym), a new public park to the north of the site as an extension to Broadmeadow Riverside Park and services / bin store areas.
- The development provides for a total of 705 no. car park spaces (including houses), 856 no. secure bike parking spaces and 21 no. motorbike spaces at basement, under-croft, and surface level.
- Principal vehicular access to the site is from Glen Ellan Road, with an additional new secondary site entrance provided from Jugback Lane/Terrace. Pedestrian connections are provided to the site from Jugback Lane/Terrace, Glen Ellan Road and the proposed Broadmeadow Riverside Park extension to the north of the site. The development also includes infrastructure upgrade works to local roads junctions, and to existing Irish Water infrastructure including the construction of a stormwater storage tank and overflow outfall pipeline.

All associated site development works above and below ground including hard and soft landscaping, boundary treatments, lighting, SuDs, pumping station, ESB substations and services to facilitate the development. Key issues in relation to landscape and visual impact include:

- The change from semi-rural, partly overgrown and undeveloped field to new urban neighbourhood adjacent the Broadmeadow Valley and Glen Ellan Road.
- The height and mass of some blocks, up to 7 stories, and their impact locally and in particular the corridor of Glen Ellan Road.
    - part of the proposed development, temporary permission (3 no. years) is sought for a single-storey Marketing Suite and associated signage (including hoarding) during the development construction stage.

For further detail refer to Chapter 3 Description of Development'

Figure 9-1 below shows the proposed layout with the Landscape masterplan, which took into account the sensitive features on site and was designed to avoid and mitigate adverse effects,

Figure 9-1: Proposed layout showing Landscape Proposals

9.3.1 Receiving Environment – Policy Context- Fingal County Development Plan 2017-2023

The following section includes policies and objectives from the Fingal County Development Plan 2017-2023, hereafter referred to as the Plan.

Swords is designated as a Metropolitan Consolidation town in the Core Strategy, which are described as *'strong active urban places within metropolitan areas with strong transport links'*. Swords is described as the administrative capital of the County, with direct links to the national road network, and located on the Dublin-Belfast economic corridor.

Land Use Zoning Objectives

Chapter 4, Urban Fingal, contains a number of policies and objectives relating to the development of Swords as a whole, including specific objectives relating to the site of the proposed development. These are illustrated in Figure 9.2 below. The site is outlined in red.

The site is subject to the following zoning objective ME, which is described as:

- ***Metro Economic Corridor*** *– Facilitate Opportunities for high density mixed use employment generating activity and commercial development, and support the provision of an appropriate quantum of residential development within the Metro Economic Corridor.*

The site of the proposed development is subject to a non-statutory Masterplan in the current Development Plan (indicated on the map in Figure 1 below as MP8A) known as Estuary West Masterplan. It should be noted that the site only consists of part of the area for the Masterplan, so some objectives relate to the lands within the proposed masterplan but outside the application site. A number of other masterplans are also proposed for lands in the vicinity.

The land on the northern part of the site is zoned High Amenity, along the Broadmeadow River. The following Vision is stated in terms of this zoning objective:

- *Protect these highly sensitive and scenic locations from inappropriate development and reinforce their character, distinctiveness and sense of place. In recognition of the amenity potential of these areas opportunities to increase public access will be explored.*

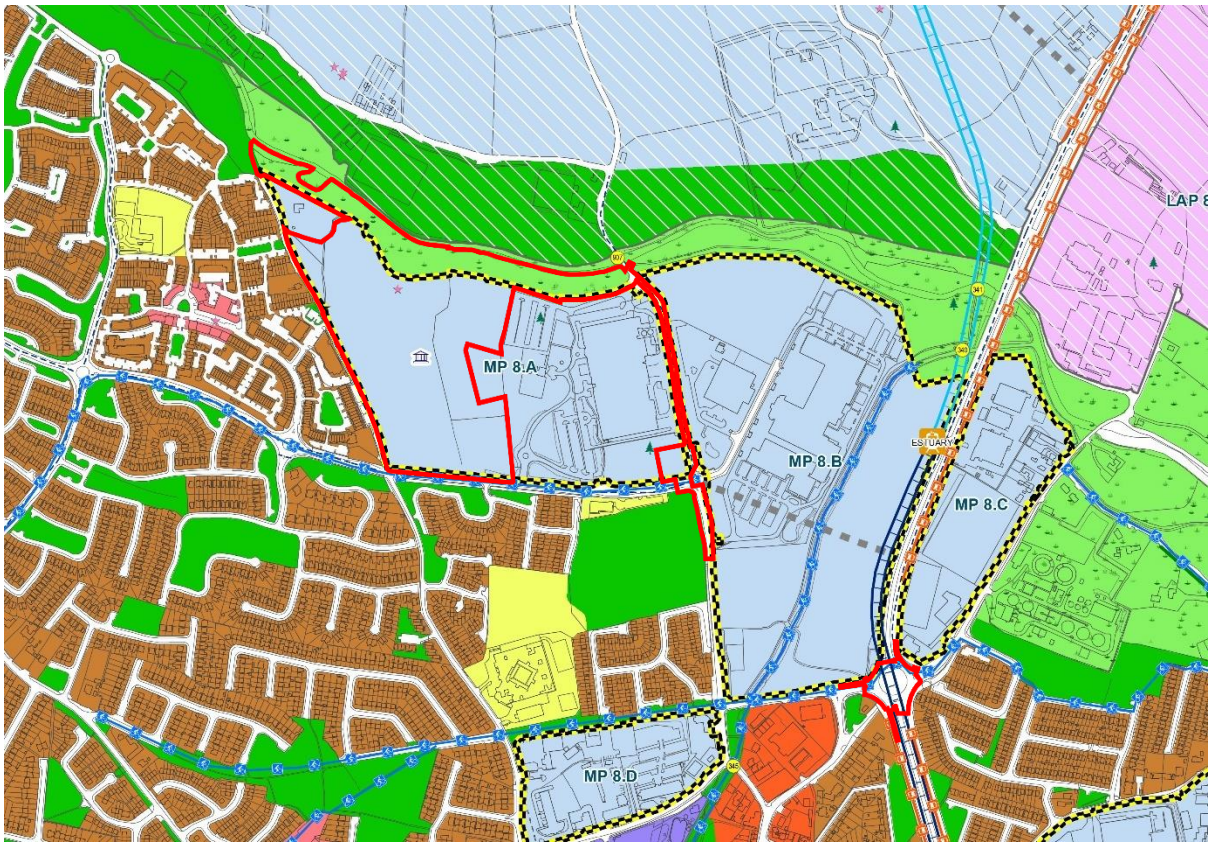
Two zoning objectives are also stated for High Amenity areas*:*

- ***Objective NH 51:*** *Protect High Amenity areas from inappropriate development and reinforce their character, distinctiveness and sense of place.*

- ***Objective NH 52:*** *Ensure that development reflects and reinforces the distinctiveness and sense of place of High Amenity areas, including the retention of important features or characteristics, taking into account the various elements which contribute to its distinctiveness such as geology and landform, habitats, scenic quality, settlement pattern, historic heritage, local vernacular heritage, land-use and tranquillity.*

Land use zoning in the vicinity

The zoning map shows that to the north of the site, the land is zoned for open space (coloured dark green. Several other areas in the vicinity are also zoned ME and subject to masterplans related to the proximity to the proposed Metro North line. Figure 9-2 below illustrates the zoning in the vicinity of the site. Note that at this scale the site boundary in this Figure is indicative only.



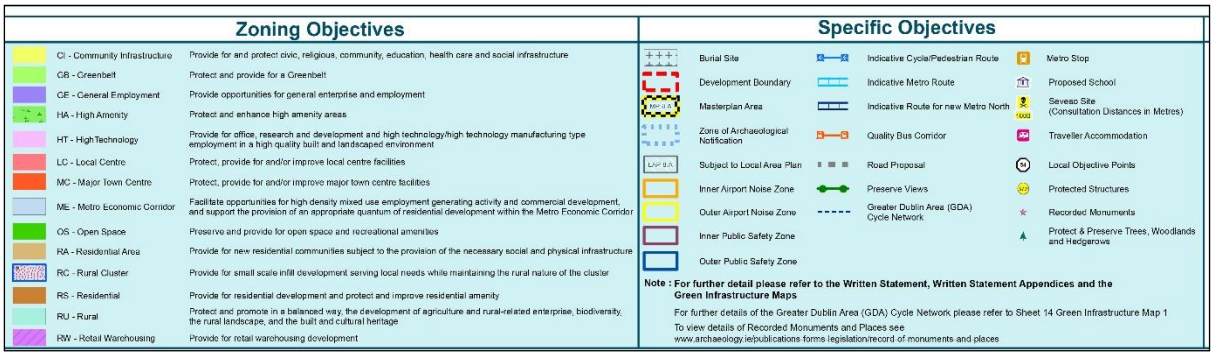


Figure 9-2: Land Use Zoning Objectives for Site

The development plan provides an outline of the main elements in the Estuary West Masterplan, (MP8A on the above Figure).

Objectives which are also indicated in the masterplan, but not necessarily within the site include a proposed school, and an objective to protect and preserve trees, woodlands and hedgerows.

Estuary West Masterplan

The Estuary West Masterplan contains an overall vision and strategy for the development of the area, which is 19.4ha which includes the development of the site which has a gross area of 14.17 ha.

The Masterplan sets out in some detail the vision and principles for the area.

> *Estuary West will become a vibrant residential and mixed-use community, with active and friendly streetscapes. The aim is to produce an exemplary environment; a place that is desirable to live and one which balances usable private space within an overall structure of high quality public spaces. The community will be prioritised, with parks, open space and public plazas filtered throughout.*

The most relevant aspects of the Masterplan which are relevant to the site are listed as follows:

- *The Masterplan lands are primarily residential in nature with an element of commercial use*
- *This Masterplan envisions a community that can adapt and grow with the changing needs of its residents, and incorporates a mixture of houses and apartments, and a mixture of bedroom sizes. Lower density houses have been incorporated along Jugback Lane, while higher density apartments are located through the centre and south of the lands.*
- *Overall heights on the land will range from 2- to 5-storeys. Along Jugback Lane, heights will be 2-3-storeys, with higher buildings at more appropriate locations, such as along Glen Ellan Road and the Broadmeadow River, where landmark buildings can act to give a sense of place/identity to this new community.*
- *Roughan & O'Donovan (ROD) Consulting Engineers have prepared SFRA and SuDS assessments for each of the Masterplan areas, which are published alongside these Masterplans. The proposed layout of each Masterplan area has been fully informed by these assessments.*

Green Infrastructure and Open Space Objectives:

Green corridors and open space is proposed along the Broadmeadow River, in the north of the Masterplan lands, as well as north-south green corridors, linking Broadmeadow River Park with Glen Ellan Road, providing pedestrian and cycling routes, as shown below in Figure 9-3.

Figure 9-3: Green Infrastructure *Source: Estuary West Masterplan*

A number of key objectives relating to Green Infrastructure are as follows:

- *Provide active open space facilities in the form of playing pitches adjacent to the school site and available for use by local residents outside of school requirements.*
- *Ensure that the proposed link streets and local access streets as shown on the road hierarchy are lined with trees planted in constructed tree pits.*
- *Provide an open space area that encompasses any required SuDS or flood mitigation measures adjacent to the Balheary Road/ Broadmeadow River, to coincide with the 1:1000 year flood risk area as identified in the accompanying Strategic Flood Risk Assessment. Any possible form of development in this area shall be subject to further site specific flood risk assessment.*
- *Ensure that new or extended open space networks are designed to facilitate people with a broad range of ability*.

Other CDP Objectives

The County Development Plan includes other relevant objectives for Swords. Many of which are already contained in the Masterplan document, but some are included here for the wider vicinity:

Objective SWORDS 6: *Prioritise the early construction of the following critical infrastructure:*

- *Develop a Regional Park (of circa 65 ha) immediately west of Oldtown, and adjoining and ultimately extending into the Broadmeadow River Valley Linear Park, to serve Swords and its hinterland, and to comprise active recreational and passive activities, commensurate with the Council's vision for the emerging city of Swords, subjecting the proposal to Screening for Appropriate Assessment, in particular the cumulative impacts of increased access to European Sites:*

Objective SWORDS 11: *Prioritise the early construction of the following critical infrastructure:*

- *Provide for a comprehensive network of pedestrian and cycle ways, linking housing to commercial areas, to the town centre and to Metro stops and linking the three water bodies (the Ward River Valley, the Broadmeadow River Valley and the Estuary) to each other subject to Screening for Appropriate Assessment if required.*

Objective SWORDS 12:

- *Develop a 'green necklace' of open spaces which are linked to each other and to the existing town centre of Swords, as well as to new development areas, thus promoting enhanced physical and visual connections to the Ward River Valley Park and the Broadmeadow River Valley Park from within the development boundary of Swords.*

Objective SWORDS 14:

- *Prepare a Landscape and Recreation Strategy for the Broadmeadow River Valley Park. The Strategy shall facilitate planned extension of the Park into the proposed Regional Park and provide for managed connectivity to the Broadmeadow Estuary. The Strategy will be required to address issues to improve passive supervision, accessibility and permeability of the park and to develop additional passive and limited active recreational facilities and amenities within the Broadmeadow River Park.*

Objective SWORDS 21:

- *Preserve existing good quality views of the Castle, Church and Round Tower from within Swords; and where feasible to open up new views.*

Chapter 3 Placemaking, also includes some relevant policies and objectives relating to sustainable communities, placemaking, residential developments: and open spaces:

- ***Objective PM51:*** *Provide a wide variety of accessible public open spaces, including allotments, community gardens, permaculture parklands and sporting facilities, on a hierarchical basis throughout the County in order to achieve a choice of open space facilities. Best practice Green Infrastructure Guidelines should be used to determine the location and type of open spaces to be provided.*

- ***Objective PM60:*** *Ensure public open space is accessible, and designed so that passive surveillance is provided.*

- ***Objective PM61:*** *Ensure permeability and connections between public open spaces including connections between new and existing spaces, in consultation to include residents.*

- ***Objective PM63****: Facilitate the provision of appropriately scaled children's playground facilities within new and existing residential development.*

- ***Objective PM64****: Protect, preserve and ensure the effective management of trees and groups of trees.*

Chapter 8 includes policies and objectives relative to Green Infrastructure while Chapter 9 includes policies and objectives relating to Natural Heritage. Relevant policies are as follows:

The Plan states that Natural capital is contained in networks of land and water including farmland, the coast, parks, open space, rivers, floodplains, wetlands, woodlands, and nature conservation areas. This resource can also be considered to be a form of infrastructure - which we call green infrastructure - which performs key functions for our communities.

The Plan aims to

- *Ensure that areas and networks of green infrastructure are identified, protected, enhanced, managed and created to provide a wide range of environmental, social and economic benefits to communities.*

  The Council have identified a number of key Green Infrastructure themes, the most relevant of which include Parks, Open Space and Recreation, and Landscape. These include lands zoned as Open Space, and designated landscapes including Special Amenity Areas, High Amenity Areas, Highly Sensitive Landscapes,

- ***Objective GI02**: Create an integrated and coherent green infrastructure for the County by requiring the retention of substantial networks of green space in urban, urban fringe and adjacent countryside areas to serve the needs of communities now and in the future including the need to adapt to climate change.*

- ***Objective GI03:** Create an integrated and coherent green infrastructure for the County by requiring the retention of substantial networks of green space in urban, urban fringe and adjacent countryside areas to serve the needs of communities now and in the future including the need to adapt to climate change.*

- ***Objective GI04**: Seek a net gain in green infrastructure through the protection and enhancement of existing assets, through the provision of new green infrastructure as an integral part of the planning process, and by taking forward priority projects including those indicated on the Development Plan green infrastructure maps during the lifetime of the Development Plan.*

- ***Objective GI22:** Require all proposals for large scale development such as road or drainage schemes, windfarms, housing estates, industrial parks or shopping centres to submit a Green Infrastructure Plan as an integral part of a planning application.*

GIM 8: *Provide new Regional Parks at the following locations: Balealy Lane, Moore town/Old town (Swords), Baldoyle, and Dunsink subject to Appropriate Assessment screening.*

Landscape Character

The Landscape Character Assessment (LCA) for Fingal divides the County into six Landscape Character Types representing generic areas of distinctive character. The Assessment also assigns a value and sensitivity to each Landscape Character Type. Values range from Low to Exceptional. Sensitivity is defined as the ability to sustain its character in the face of change, and sensitivity ranges from High to Low.

It should be noted that the GLVIA 3rd edition guidelines emphasises that landscape sensitivity is related directly to the type of development proposed.

The proposed development lies in the Rolling Hills Character Type, which includes the settlement of Swords. This landscape type is characterised by rolling agricultural landscape, with views across the Ward and Broadmeadow river valleys, with tree belts which add to a varied and rich landscape. There are protected views along the R108 St Margaret's to Naul Road, and the R125 Swords to Ashbourne Road. The architectural heritage of Swords adds to the quality of the area. The landscape value is considered Modest.

The Landscape Sensitivity of the LCT is considered Medium sensitivity. The Plan states that where a wide range of developments would sit comfortably in a particular landscape, and would not interfere with a character or eliminate a value, such a landscape is deemed to be of low to medium sensitivity. The Plan notes that these landscapes can absorb a certain amount of development, providing the scale and form of development are kept simple, with adequate screening of boundaries and appropriate landscaping to reduce impact on the surrounding rural character of the roads. The protection of views and riparian corridors is considered of high importance. The principles for development, as set out by the Plan, are as follows:

- *The skyline should be protected.*
- *Existing tree belts should be retained, and managed and older stands of trees restocked. Roadside hedging should be retained and managed. Proposals necessitating the removal of extensive hedging should not be permitted. Strong planting schemes using native species, to integrate development into these open landscapes, will be required.*
- *Establish riparian corridors free from new development along all significant watercourses in the County. Ensure a 10 to 15 metres wide riparian buffer strip from top of bank either side of all watercourses, except in respect of the Liffey, Tolka, Pinkeen, Mayne, Sluice, Ward, Broadmeadow, Corduff, Matt and Delvin where a 30 m wide riparian buffer strip from top of bank to either side of all watercourses outside urban centres is required.*
- *Sites with natural boundaries should be chosen, rather than open parts of larger fields*.
- *Clustering with existing farmhouse and/or farm buildings is generally preferable to stand-alone* locations.

The Plan also includes several objectives relating to Landscape Character Assessment as follows:

- ***Objective NH34:*** *Ensure development reflects and, where possible, reinforces the distinctiveness and sense of place of the landscape character types, including the retention of important features or characteristics, taking into account the various elements which contribute to their distinctiveness such as geology and landform, habitats, scenic quality, settlement pattern, historic heritage, local vernacular heritage, land-use and tranquillity.*
- ***Objective NH36:*** *Ensure that new development does not impinge in any significant way on the character, integrity and distinctiveness of highly sensitive areas and does not detract from the scenic value of the area. New development in highly sensitive areas shall not be permitted if it:*
    - *Causes unacceptable visual harm*
    - *Introduces incongruous landscape elements*
    - *Causes the disturbance or loss of (i) landscape elements that contribute to local distinctiveness, (ii) historic elements that contribute significantly to landscape character and quality such as field or road patterns, (iii) vegetation which is a characteristic of that landscape type and (iv) the visual condition of landscape elements.*
- ***Objective NH38:*** *Protect skylines and ridgelines from development*

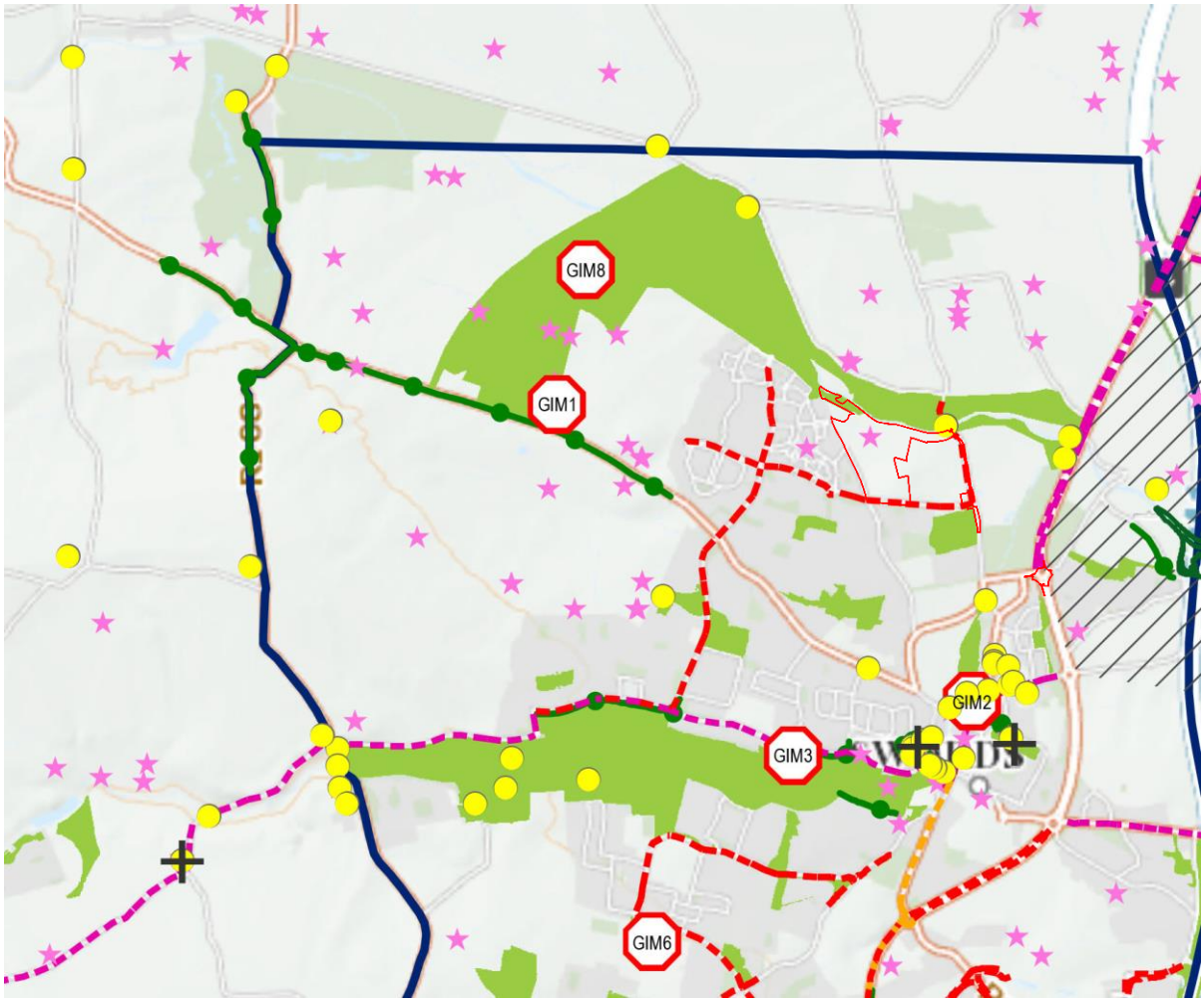
However the Plan also states that

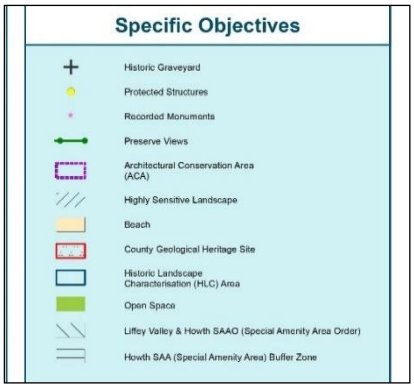
"It is important to note that it does not necessarily follow that an exceptional value landscape will be highly sensitive to change or similarly a low value landscape will have a low sensitivity to change."

For example the LCA description relate to descriptions of rural or agricultural landscapes which are sensitive to change, however the site sits within / adjacent to the existing built up area of Swords, along a main road and is zoned for development, therefore locally its sensitivity would be influenced by these urban factors rather than the rural landscape beyond the development boundary.

Protected Views and Prospects

Views and prospects are identified in the Plan for areas of high landscape quality occur along the coast, river valleys and upland areas along the Co. Meath border. Map 14 of the Plan, included in Figure 9-4 below, indicates that there are a number of protected views to the west of the proposed development, along the R125, as shown on the Green Infrastructure map below. The site is illustrated in a black dashed line and the boundary is indicative only.





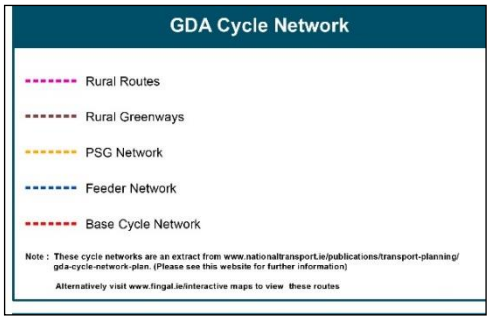


Figure 9-4: Green Infrastructure Objectives Source: Fingal County Development Plan

These views are along the R125 Rathbeale Road, T108 St Margaret's road (north and south of the junction with Rathbeale Road). The closest protected view is 1.1 kilometres west of the site. The following objective applies:

- ***Objective NH40****: Protect views and prospects that contribute to the character of the landscape, particularly those identified in the Development Plan, from inappropriate development.*

A protected structure (Newtown Bridge) is located approximately 135m to the east of the site, while a Recorded monument is also noted on site.

Tree Policy

Chapter 12 of the Plan sets out Objectives in relation to Trees and Hedgerows:

- ***Objective DMS77:*** *Protect, preserve and ensure the effective management of trees and groups of trees*
- ***Protect, preserve and ensure the effective management of trees and groups of trees.***
- ***Objective DMS78:*** *Ensure during the course of development, trees and hedgerows that are conditioned for retention are fully protected in accordance with 'BS5837 (2012) Trees in relation to the Design, Demolition and Construction – Recommendations' or as may be updated.****Objective DMS79:*** *Require the use of native planting where appropriate in new developments in consultation with the Council.*
- ***Objective DMS80:*** *Ensure trees, hedgerows and other features which demarcate townland boundaries are preserved and incorporated where appropriate into the design of developments.*
- ***Objective DMS81:*** *Consider in tree selection the available rooting area and proximity to dwellings or business premises particularly regarding shading of buildings and gardens.*
- ***Objective DMS82:*** *Promote the planting of large canopy trees on public open space and where necessary provide for constructed tree pits as part of the landscape specification.*
- ***Objective DMS83:*** *Ensure roadside verges have a minimum width of 2.4 metres at locations where large trees are proposed and where necessary provide for constructed tree pits as part of the landscape specification. Road verges shall be a minimum of 1.2 metres wide at locations where small canopy trees are proposed.*

The site description below sets out the character of existing fields and hedgerow boundaries. Two of these hedgerows are Townland Boundaries – centrally in the site and along Jugback Lane.

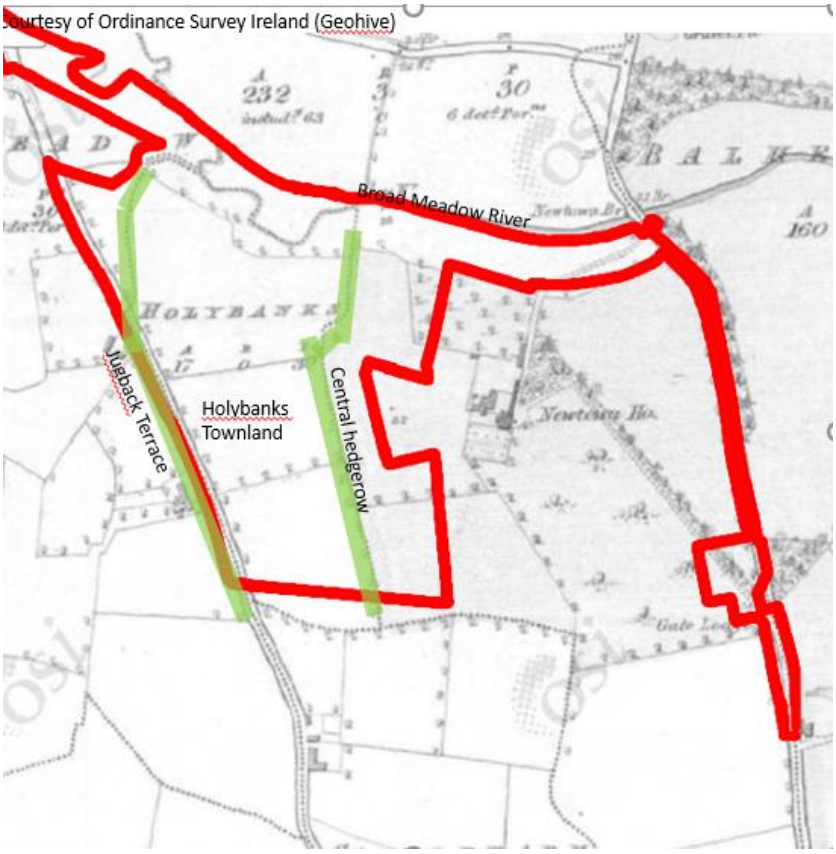


Figure 9-5: 1830 (6" map): analysis of Townland boundaries

Implications of Development Plan Policy

The Plan policy identifies a number of policies and objectives which should be considered as part of this Assessment. These include:

- The site is within the Swords town boundary, and is zoned ME, Metro Economic Corridor.
- The non-statutory Masterplan includes guidance on building density and height, and also proposes to extend and connect the Broadmeadow River Park with Glen Ellan Road via two north-south green corridors, with pedestrian and cycle connectivity to be provided in these north-south links and in the Broadmeadow River Park. Existing trees and hedgerows are to be retained, protected and enhanced. Tree planting is proposed along streets. Thus, the Masterplan sets out a prescriptive approach to areas of open space, connections, surface water management, and areas of built form.
- The County Development Plan contains a number of objectives relating to the Broadmeadow Valley Park, including extending the park and connecting to the new Oldtown Regional Park, and providing pedestrian and cycle connectivity to Swords village and to Ward River Valley Park. A Landscape and Recreation Strategy for the Broadmeadow River Valley Park is also proposed.
- Ensure the retention of Townland Boundaries and associated trees, features.
- The Landscape Character Assessment for the Rolling Hills Character Type notes the rolling hills, river valleys and tree belts are features of the area's character.
- The nearest protected view in the County Development Plan is located approximately 1.1 kilometres west of the proposed development in the direction of the town. Views and prospects in the County Development Plan are unlikely to be affected.

9.3.2 Receiving Environment –Site Character

General Overview of Study Area

For the purposes of the Landscape and Visual assessment, a study area was defined. The study area includes the site itself, and the lands immediately to the east and west while extending out to the R132 to the east and as far as the Rathbeale Road (R125) to the west.

This study area was determined following site visits and review of the proposed works as well as the likely extents of landscape and visual effects. In effect the study area consists primarily of the site itself, housing areas immediately to the south and west, adjacent commercial areas and roads immediately to the east, and nearby open / recreational spaces as well as undeveloped rural lands to the north. The main receptors of landscape and visual change would be in immediately adjacent built-up areas. The characteristics of the wider setting of the site are discussed below, followed by a description of the site itself.

The study area includes the Balheary Road to the north, and the lands south of the Glen Ellan Road to the south. The site location and indicative site boundary as well as surrounding character areas are shown in Figure 9- below.

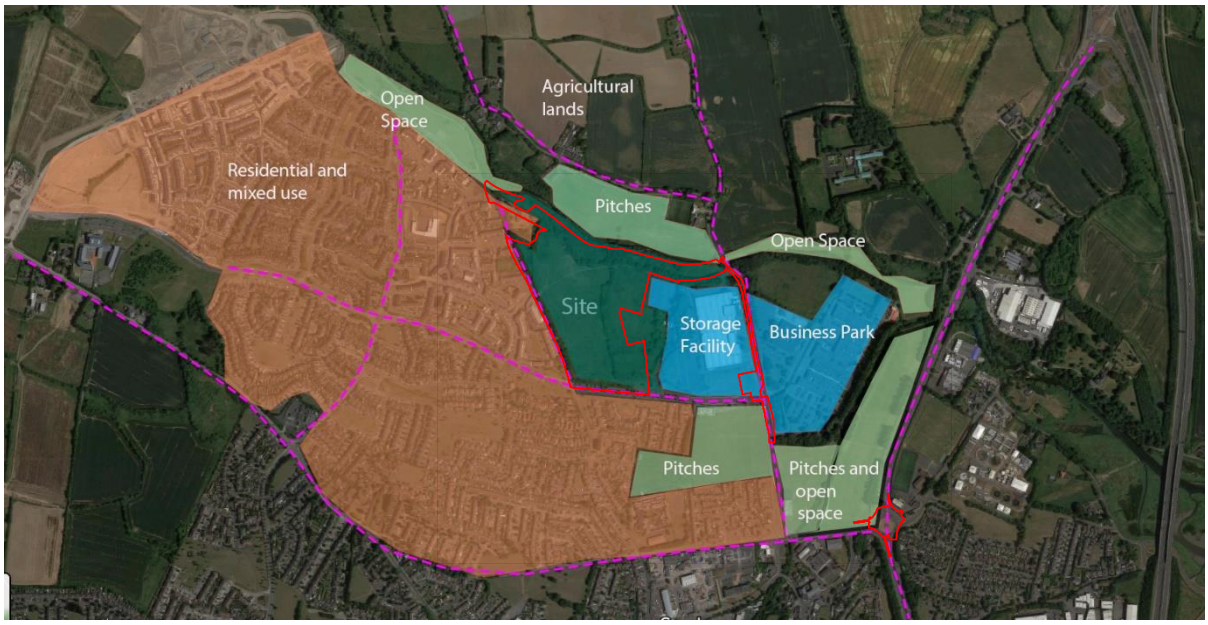


Figure 9-6: Site and surrounding areas (*Source : Google Maps*)

To the east, the study area includes a large scale storage facility and car park, (coloured in blue) bordering Balheary Road. East of this is another business park.

To the west of the site, Figure 9-5 above shows the primarily residential area of Applewood (which has some commercial facilities) is located adjacent to the site, separated by Jugback Lane. A large area of primarily residential use also lies to the south of the site, along Glen Ellan Road.

There are several open spaces, with formal access, surrounding the site, including playing pitches and an open space to the northwest of the site between Thornleigh Road and the river. There are also several areas where there appears to be informal access, including the site itself.

To the north, the study area extends to include the Broadmeadow River and Balheary Road , while to the south the study area includes the Glen Ellan Road and residential estates and St. Colmcille's playing pitches.

Landscape Character of the Site and Surrounds

The wider landscape and townscape are described below in terms of its location and access, as well as its character in terms of landform, landcover, built and cultural heritage, land use, all of which contribute to the description of the overall character. The 'site' and immediate surroundings are then described under the same headings.

Swords lies southwest of the Broadmeadow River estuary. The centre of Swords lies approximately 1 kilometre southeast of the proposed development, which can be described as the outskirts of Swords. These are not visible from the proposed development. Balheary Road connects the site with the town centre, and residential estates, business parks, and large green spaces are evident as one travels from the site to the town centre. There are parts of the town centre which have a strong sense of history, such as Church St. and the vicinity of Swords castle.

Access

Although the lands are private pedestrians can access the site from Jugback Lane, as well as from the car park and riverbank area to the west of the site. Several informal paths traverse the site however this is uncontrolled use of private land

Landform - Topography and Drainage - Site and immediate surroundings

The topography of the proposed development generally falls from the south of the site, which borders Glen Ellan Road towards the Broadmeadow River to the north of the site. There is a berm along the southern boundary and the height at the top is approximately 15 metres OD, with levels along the Broadmeadow River to the north of the site at approximately 3 metres OD. Plate 9-1 below shows low lying lands along the Broadmeadow River in the northeast of the site:

Plate 9-1: Low lying topography along the Broadmeadow River north of the site

Plate 9-2:Topography rises in the south of the site, restricting views towards Glen Ellan Road

Wider vicinity

The topography in the vicinity is low-lying and typically ranges from between 10 and 20 metres, with levels of less than 10 metres found in proximity to the Broadmeadow River. Plate 9-3 below shows the relatively flat and low-lying lands north of the site stretching to Balheary Road, which include Swords Celtic soccer club pitches.

Plate 9-3: Topography: low-lying lands north of Broadmeadow River

South of Glen Ellan Road, the topography rises slightly, with several housing estates and Jugback Lane having a slightly elevated view of the site.

Plate 9-4: Topography rises south of Glen Ellan Road

Landcover – Vegetation and natural heritage - Site and immediate surroundings

The landcover in the site is currently grassland, which was formerly in agricultural production, composed of two large fields, divided by a hedgerow, with a smaller field to the south, and an area of grass and scrub/tree clumps extending to the northeast along the Broadmeadow River. Ecologically these are described as dry meadows with grasses and common herb species.

There is a mature hedgerow along the boundary with Jugback lane, to the west of the site, as shown in Plate 9.5 below. This is relatively dense and provides a visual barrier to the site, especially when trees are in full leaf. As one travels north along the lane, it becomes narrower and more vegetated in character as shown in Plate 9.6. Occasional gaps allow views into the site as shown in Plate 9.7 below.

Plate 9-5: Tree and hedgerow separate the site from Jugback Lane

Plate 9-6 and **Plate 9-7**: Jugback lane shows rural character in parts, with some gaps allowing views to and from site

The eastern boundary is defined by a fence and areas of vegetation. Plate 9-8 below shows this boundary, with the adjacent car park, and Plate 9.9 shows the view to the eastern boundary, towards Newtown House which is partly visible through the trees.

Plate 9-8: Open section of site boundary with lands east of the site

Plate 9-9: Looking over site to eastern boundary – tree clumps partly hide Newtown House

Plates 9-10 and 9-11 below show the grassland in the western part of the site, adjacent to Jugback Lane, and the north-south hedgerow and tree line in the centre of the site, dividing the two large fields.

Plate 9-10: Western part of site with grassland adjacent to Jugback Lane

Plate 9-11: Informal track in grassland and the north-south hedgerow in the centre of the site

The Broadmeadow River defines the northern boundary of the site. The areas lying along the Broadmeadow river, vary from relatively open grassland with an informal path leading from Newtown bridge, to more enclosed spaces with vegetation and tree clumps, to the northwest of the site as shown below in Plates 9-12 and 9-13.

Plate 9-12: Informal track and grassland adjacent to river near Newtown Bridge

Plate 9-13: Vegetated areas along the Broadmeadow River to the northwest of the site

There are also areas of more formal open space along the river outside the site both to the east and west.

Landcover – Vegetation and natural heritage - Wider Vicinity

Landcover in the immediate vicinity includes large areas of built form – the 'Applewood' area, a residential development with some commercial uses to the west, mainly residential areas and some formal green space to the south, and a large-scale storage facility with a car park and Newtown House to the east. To the north lies the Broadmeadow River with some areas of informal and other areas of formal open space. These areas are illustrated in Figure 9.5 above. In the wider landscape to the north, the landcover is a mixture of scattered houses and farmland, with agricultural lands under crops are evident to the north of the site.

Built Form and Cultural Heritage - Site and immediate environs

A ring-ditch is marked in the north of the larger field in the west of the site, on the National Inventory of Architectural Heritage (NIAH) map viewer. The NIAH (on maps.archaeology.ie) notes that this was observed as a crop-mark but not visible at ground level.

There are no buildings on the site. However, the adjacent (ruined) Newtown House lies to the east. This is not a protected structure but is listed as a house of Regional importance on the NIAH. The house is shown as surrounded by a designed landscape on the historic (6 inch) maps on www.myplan.ie, and the large field to the west of the site appears to have been originally associated with Newtown House. A plantation to the north of the house is now replaced by a car park northwest of the house. The maps also show a path from Newtown Bridge through the grounds, which appears to be similar to the path which exists today.

Wider Landscape

In terms of built form, the environs of the site (west and south) are of relatively recent construction. Newtown Bridge, northeast of the site, is an element of cultural heritage, and the historic 6 inch map also shows the land to the east of Newtown House as all part of Balheary Demesne, another designed landscape. The wider landscape has a mix of business parks, residential estates, commercial areas and open space.

Land use - Site and immediate vicinity

Thesite is currently grassland, with no evidence of grazing or agricultural practices. There are signs that the site is used informally as a number of paths are evident (rubbish was also observed on site). The proposed stormwater storage tank is proposed on grassland adjacent to a car park at the junction of Balheary and Glen Ellan Roads.

Land use - Wider Landscape

As noted in Section 9.3, the wider landscape contains a mix of largely residential uses, with some commercial uses. Business parks and a storage facility lie to the east, and areas of open space are found to the north, south, and northeast of the site as shown in Figure 9.5. To the north the landscape is mainly rural with scattered dwellings, farms and agricultural fields, including areas under crops.

9.3.3 Views and Visual Amenity

Views on the site are mainly of grassland, trees and hedgerows, with glimpses of the surrounding buildings to the west, and to the south. The extent of the buildings visible from the site in some cases depends on the time of year, with greater visibility in the winter months, and greater screening in the summer months by intervening vegetation. The river is seen only at close proximity, due to trees and undergrowth and there are no long distance views from the site. Views to the surrounds – towards Glen Ellen Road and the estates to the south, are available, but partly restricted from parts of the site, by the sloping topography and by vegetation. Plate 9.14 below shows a view south through a gap in vegetation (taken without leaf cover):

Plate 9-14: Views to the south over open fields

Views from the western part of the site to Jugback Lane are restricted by vegetation, particularly in the summer months, but good visibility of the buildings along the lane as well as to the north of Jugback Lane are available in the winter as shown in Plate 9.14 below.

Plate 9-15: Open views to buildings from the west of the site

The north-south hedgerow restricts views east-west across the site, though this will also be less in winter months. Views to the Broadmeadow River are restricted to areas in close proximity, due to vegetation.

Visual amenity on the site varies but overall is not considered to be high. A large part of the site would have views over open grassland, with views to mature trees, the hedgerow in the centre of the site, and surrounding buildings to the west. Some areas have evidence of antisocial behaviour or littering, as shown below:

Plate 9-16: Evidence of littering on the site

Other areas of more dense vegetation have a different character and are more enclosed by the vegetation which can have a sense of tranquillity but also of isolation.

Parts of the site such as near the Broadmeadow River, particularly to the northeast of the site where there is a stronger sense of visual amenity, offer good views of the river, mature trees, and areas of open grassland.

In recent months the landowner has carried out some clearance of litter and overgrown vegetation leading to a “tidier” presentation of the site.

Plates 9-17 & 18: Recent overgrowth clearance (January 2022)

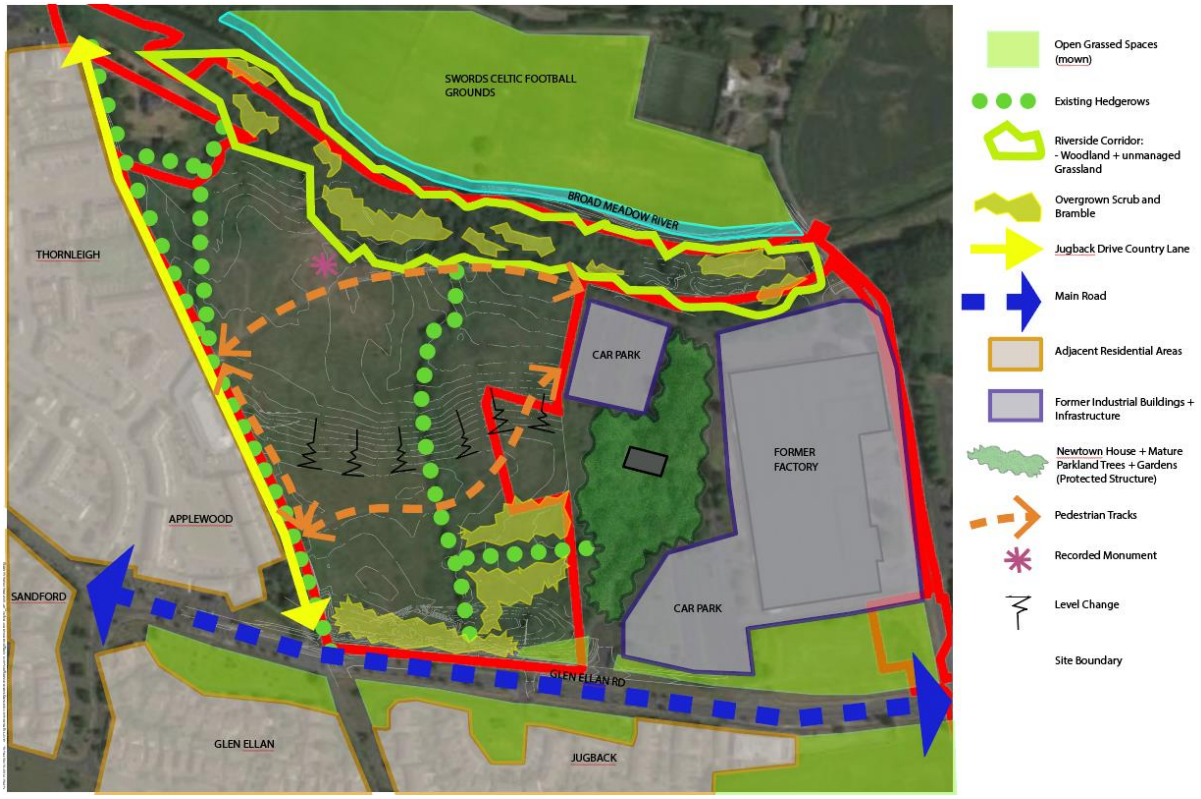


Figure 9-7: Landscape Analysis of site – Ref: Landscape Design Statement

9.3.4 Summary of Landscape Characteristics and Values

In summary, the site is characterised by several features. The site is a large area of open fields and areas of vegetation, which are surrounded by some form of built development on two sides- the Applewood/ Thornleigh area to the west and Glen Ellan Road and the South Bank residential area to the south.

One of the site's main features is the Broadmeadow River running along the site's northern boundary, and the character of this area ranges from somewhat overgrown areas which are difficult to access, to more open areas in the northeast of the site near Newtown Bridge.

The two large fields of the site are relatively open in character, and slope towards the river. The north-south treeline and hedgerow which divides these fields is a feature of the site, as is the hedgerow which divides the site from Jugback Lane, and the trees clumps close to the eastern boundary. These mature

trees frame the views, and provide a contrast to the large open fields, built form, and give some sense of enclosure. The built form west of the site and some to the south is evident but views to the east and north of the site are restricted by vegetation.

Landscape Values

The landscape values of a site can be identified through formal designations which infer landscape valu**e**, as well as values which are not enshrined in policy but are evident on the site. These values are listed below, and can be further categorised in two ways – values which should be conserved, and those that provide opportunity for enhancement.

There are no landscape designations on the site of the proposed development.

However, in addition to formal designations at international, national and local level, the GLVIA 3rd edition (2013) recommend the use of a number of criteria which can help to describe landscape values. These are listed below.

- *Landscape Quality/Condition: A measure of the physical state of the landscape.* The site is considered to be in relatively good condition. Some evidence of antisocial behaviour and littering is evident on site.

- *Heritage/Conservation interests:* A ring-ditch is mapped but not visible on the site. The eastern part of the site appears to have been once part of Newtown House grounds, but no features are evident today. Further detail is included in Chapter 10 Archaeology and Archaeological Heritage.

- *Scenic Quality*: *The landscape may appeal primarily to the senses (primarily but not wholly visual senses):* The site has hedgerows and mature tree lines which give a pleasant visual quality to parts of the site. The Broadmeadow River also adds to the scenic quality for the northern part of the site. However, the majority of the site consists of open fields. Overall, the site is considered to have a moderate quality of visual amenity.

- *Perceptual aspects: A landscape may be valued for its perceptual qualities, such as wildness or tranquillity.* The site is an area of pastureland adjacent to a built up area with the majority of the site having no particular perceptual aspects, and without a sense of wildness or tranquillity. Littering on site reduces the perception of a valued space and negatively affects the perceptual qualities. The area along the Broadmeadow river is a pleasant and tranquil area, albeit somewhat overgrown.

- *Recreation Value:* While the site does not have formal public access, there are paths throughout the site that are evidence of informal but uncontrolled use of private land. An entrance from adjacent to Newtown Bridge appears to be used, as do several access points from Jugback Lane. There is a walkway along the Broadmeadow River to the east of Newtown Bridge.

Conservation values

The conservation values indicate those aspects of the receiving environment which are sensitive and could be negatively impacted on by the proposed development. These values form the potential landscape and visual constraints to the proposed development. These include:

- Views towards the Broadmeadow River, and the character of the area around it

- Mature tree lines and hedgerows – particularly to the north along the river, and the north-south townland tree line/hedgerows - enhance the sense of place, denote field boundaries and are part of the landscape setting of the site and should be retained where possible.

- Existing access points and paths are evidence of informal use of the site, and formal access and connectivity to the surrounding areas and to the Broadmeadow River should be retained and enhanced.

Enhancement Values

The enhancement values reflect change that is occurring in the landscape and its inherent robustness, and also considers elements which could be enhanced.

- Accessibility and connectivity: Though there is informal access through the site, there are large areas which do not have any passive surveillance from the surrounding residential areas. Enhanced access and connectivity, as advocated in the Masterplan, to Glen Ellen Road and Jugback Lane would benefit the site.

- Broadmeadow River: Informal access to the river should be improved and enhanced, without losing the character of the vegetated areas along the river. Connectivity to the riverside open space and paths to the east and west would further enhance the landscape and recreation value of the site.

Zone of Visual Influence and Potential Visual Receptors

A thorough assessment of potential views of the proposed development was carried out during the site visits. The surrounding vicinity was walked and driven, from Glen Ellan Road to the south to Balheary Road to the east and north. Jugback lane (both sides of Glen Ellan Road and the Applewood area) was also visited to assess visual receptor sensitivity.

Following this process, a number of locations for photomontage were selected where views of the proposed development are likely to occur. Sensitive visual receptors were identified in order to arrive at a list of representative viewpoints.

In general, the most open views will be from the south and west. Viewpoint locations considered include:

Views from the south – Glen Ellan Road and vicinity

- Views along the southern boundary of site from Balheary Road junction to the roundabout on the western end
- Views from elevated lands south of this road, from Jugback Lane (south) and from Residential estates

Views from the west–

- Views from the west include views from Jugback lane, as well as from Applewood Close, Thornleigh Place, and the other streets leading to Jugback Lane.
- Views potentially from the open space adjacent to Thornleigh
- Residential receptors on east of Jugback Lane
- Views from buildings facing east along Jugback lane, including gym and residents

Views from the east

- Newtown Bridge (protected structure)
- Limited views due to storage facility building
- Parking area to the rear of storage Facility/Newtown house – not considered to be location of sensitive receptors

Views from the north

- Very limited views from road
- Potential views from Soccer Club (but not sensitive receptors)
- Potential views from residences (but reduced by tree planting along Broadmeadow River.)

Following a site visit, the following viewpoints were identified:

Table 9-6: Viewpoints contained in Photomontage Booklet

Viewpoint	Description
1	View from Applewood Close
2	View from Thornleigh Terrace
3	View from Thornleigh Place
4	View from Jugback Lane
5	View from Glen Ellan Rod roundabout
6	View from Glen Ellan Road/Jugback Lane junction
7	View form South Bank residential development
8	View from Glen Ellan Road east
9	View from Glen Ellan Rd/Balheary Rd junction
10	View from Swords Celtic FC car park
11	View from Newtown Bridge
12	View from Jugback Lane (south)
13	View from amenity areas east of Newtown Bridge

These viewpoints are represented in the Photomontage Booklet prepared by Modelworks, submitted as a sperate enclosure, and the existing and proposed view is described in Section 9.4. The location map of the viewpoints is reproduced below and also included in the photomontage booklet.

Figure 9-5: Viewpoint Locations contained in Photomontage Booklet

9.4 Predicted Impacts

9.4.1 Landscape Effects

Landscape Sensitivity

Given the urban context on the fringes of Swords and its zoning, landscape sensitivity is considered to be Low on the majority of the site, with certain area of high sensitivity. These are described in Table 9.1 as:

High: *Areas where the landscape exhibits strong, positive character with valued elements, features and characteristics. The character of the landscape is such that it has limited/low capacity for accommodating change in the form of development. These attributes are recognised in landscape policy or designations as being of national, regional or county value and the principle management objective for the area is conservation of the existing character.*

Areas of Low sensitivity include the main fields of the site which are influenced by the peri-urban context.

Low: *Areas where the landscape has few valued elements, features or characteristics and the character is weak. The character of the landscape is such that it has capacity for change; where development would make no significant change or would make a positive change. Such landscapes are generally unrecognised in policy and where the principle management objective is to facilitate change through development, repair, restoration or enhancement.*

The more sensitive areas on the site which were identified in Section 9.3 are along the Broadmeadow river to the north of the site, which is also a High Amenity area. Other parts of the site which would be sensitive to this type of development would be the tree line and hedgerow in the centre of the site which is a feature also identified as an element to be retained. Jugback Lane also has some pleasant qualities.

In the wider area, the landscape sensitivity also varies. The residential areas to the south and west and the rural lands to the north (excluding the Broadmeadow River) are considered of Low-Medium sensitivity. The Glen Ellan Road and the area to the east, including the warehousing/storage facility and the business park further to the east are considered Low sensitivity. The area along the Broadmeadow river would be an element of High sensitivity.

Construction Phase Landscape Effects

The construction phase is expected to last several years with the development carried out over 3 phases. The construction phase will involve the conversion of open fields to a residential development. Earthworks, vegetation removal and the construction of the development will be ongoing on site. Machinery will be entering and exiting the site and the construction phase will give rise to increased noise and dust and will temporarily affect the landscape character of the site and surrounding *areas.*

It is anticipated that Phase 1 will be fully developed and occupied by the end of 2023, phase 2 fully developed and occupied by the end of 2025 and phase 3 fully developed and occupied by 2027. For further details of phasing please see Table 5.2

Magnitude of Change

The magnitude of change is considered Medium.

Significance of Effect

The landscape effect will be a temporary to short term effect, as the site will be the focus of construction activities. The effect on the landscape character is considered Temporary, Moderate adverse effect.

Operational Phase Landscape Effects

Operational Phase effects include the effects on the landscape as a result of the constructed development.

Magnitude of Change

The magnitude of change of the landscape fabric is Low to Medium, as the key elements of the site are to be retained and enhanced (see paragraphs following). The landscape character, however, will undergo a Medium to High magnitude of change, on the site and immediate surrounds.

The site will change from fields on an urban periphery, to a suburban or even urban character area of mixed uses, with some clearly defined open spaces.

The effects on the landscape fabric of the site are considered to be Medium, defined as:

> *Change that is moderate in extent, resulting in partial loss or alteration of landscape receptors, and/or introduction of elements that may be prominent but not necessarily substantially uncharacteristic in the context. Such development results in change to the character of the landscape but not necessarily reduction in landscape quality and perceived value.*

The extent of the change varies throughout the site depending on the sensitivity of the elements. The main landscape element identified as of higher sensitivity – the area with mature vegetation around the Broadmeadow River – is to be retained and enhanced and will function as an open space for the development, and a green link to the surrounds to the east and west. Some minor tree/vegetation clearance will take place, but the majority are retained. This is consistent with policy for the area, and will complement the existing riverside path just east of Newtown Bridge.

The other landscape element identified for enhancement is the north-south hedgerow which will be incorporated into an open space and also serve as a north-south connection.

The landscape elements affected will be the vegetation and townland boundary along Jugback Lane which in some areas will be retained and cut back but the majority will be removed, and the streetscape enhanced with street trees. Site levels will change, and sections of the existing hedgerow are to be removed. This is to be replaced with street trees and low hedging, which will serve to visually and

physically link the proposed development to the Applewood area, while introducing planting to create a street-like feel to the lane, and provide some natural screening referencing the townland boundary.

The landscape fabric (physical landscape elements) will undergo change, but the main change will be the character of the landscape.

Significance of Effect

The significance of the effect is considered **Slight** on the landscape fabric, while a **Moderate** effect on the landscape character.

This reflects the relatively few sensitive landscape receptors on site, and the retention and enhancement of these elements. The effect on the physical landscape features on site is considered beneficial, as these spaces are enhanced, and opened up with greater permeability between the site and its surrounds, and an increase in passive surveillance.

The more pronounced effects (Moderate) are on the overall character of the site as it changes from rural to urban, and the effect of the higher buildings on the immediate surrounds of the site. The change is consistent with policies for the site. The lower buildings adjacent to Jugback Lane result in a low level of change in character to their surroundings. The larger buildings along Glen Ellan Road introduce a new element to the character of the road and the immediate vicinity to the south. This area will experience a change in character which is considered Moderate, and localised. The quality of the effect ranges from neutral to the west of the site, to adverse to the south of the site. It is considered that effects on the area north of the site along the Broadmeadow are beneficial.

9.4.2 Visual Effects

Construction Phase Visual Effects

Construction phase visual effects will involve the movement of machinery to and from the site and the carrying out of earthworks on the site, vegetation removal and the construction of temporary structures and facilities. This is temporary in duration to be carried out on a phased basis.

The construction phase visual effects are considered to impart a High magnitude of change on the site and immediate vicinity, but not to the wider area. This will result in a Temporary, Moderate, to Significant adverse visual effect on the more sensitive viewers (residents to the east and in elevated locations south of the site) and a Slight adverse visual effect on viewers along the Glen Ellan Road. Visual effects during construction will not result in pronounced visual effects to the north or east of the site.

Operational Phase Visual Effects

Based on the desk study, review of the proposed development, site characteristics and sensitivity, as well as the visibility of the site, twelve representative viewpoints (listed in Table 9.6) were selected to assess visual effects. These are included and described below, and existing photographs and proposed photomontages are provided in a separate booklet – please refer to Appendix 9-1.

These were chosen to represent a variety of viewers, including viewers in the residential areas to the west and south of the site, those viewing the proposed development from the north including recreational viewers and those attending sports facilities, and viewers along Glen Ellan Road.

Photography and presentation of viewpoints

Each Viewpoint is illustrated by a photograph showing the existing view followed by the photomontage, or technical visualisation, showing the proposed development. Photographs and photomontages have been produced by Modelworks, and are presented in a separate booklet with a map of their locations. Verified photographs and photomontages have been taken with a wide-angle focal length (FL) and prime lens to allow representation of the development within its context. In all visualisations, the extent of the 50mm FL view has been indicated by a white rectangle for reference, in the centre of the view , which is broadly equivalent to the c.39 degree Horizontal Field of View (HFoV) and is representative of what the human eye perceives and reflects the requirements of the Landscape Institute Technical Guidance Note on Visual Representation 2019.

Each viewpoint is described below in two parts, firstly its existing (baseline) condition, and secondly to describe the magnitude of change and the predicted visual effects brought about by the proposed development. The descriptions focus primarily on the extent of the 50mm view but refers also to the wider context provided by the visualisation, as appropriate, to inform analysis.

To correctly view the photomontage at the appropriate scale the extents of the 50mm FL lens or 39-degree HFoV should be extended to A3 in size and viewed at arm's length. This can be done by printing a hard copy or, more easily, digitally on screen, allowing reference back to the wider angle visualisation to help understand the context.

The viewpoints depict the landscape proposals at approximately 5-7 years maturity, though it should be noted that growing conditions do vary, and this is an estimate. The viewpoints are described below:

Viewpoint 1 - View from Applewood Close

Existing View

The existing view shows a view along Applewood Close, which is a suburban area separated by Jugback Lane from the site. The view shows a relatively wide street with buildings on both sides of the street, comprising two storey buildings to the left and a mixture of two and three storey buildings, some with balconies, to the right. A larger footprint gym building is also visible on the right. In the centre of the view, vegetation along Jugback lane is visible and is the main natural landscape feature in the view. Street signage and lighting is also visible in the view.

Visual Receptor Sensitivity

Visual receptors would be motorists and pedestrians using the road and footpaths, and people entering or exiting the residential and commercial buildings. These are considered of Low to Medium sensitivity.

Viewpoint 1 - Proposed View

The proposed view shows the Holybanks development visible in the centre of the view, behind some vegetation along Jugback Lane. The existing vegetation has been removed, while proposed tree and shrub planting partly screens the buildings and softens the overall effect. The building heights are relatively low. It should be noted that more of the buildings are likely to be visible in the winter months when the trees are without leaves.

Magnitude of Change

The magnitude of change is considered Low. The development occupies a limited extent of the view of a low-rise development and is not a prominent feature in the view. Furthermore, this type of residential development is not uncharacteristic in the context. Low is described as:

Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context

Significance of Effect

The significance of the effect is considered to be **Not Significant to Slight**. This is a combination of a Low to Medium visual receptor sensitivity and a Low magnitude of change. The quality of the effect is considered neutral.

This effect will be Permanent.

Viewpoint 2 –View from Thornleigh Terrace

Existing View

This viewpoint is taken from Thornleigh terrace, looking from the terrace across the carpark towards Jugback lane. The view captures the front of the residential terrace, with carparking and a small,

grassed area. To the right of the image, a tall boundary wall separates it from the adjacent development comprising buildings and some trees which are visible behind the wall.

In the centre of the view, the vegetation along the eastern boundary of Jugback lane is visible, which consists of a dense hedgerow and some trees. Several mature trees are visible behind the hedgerow in the distance.

Visual Receptor Sensitivity

Visual receptors include residents looking out from the vicinity of the parking area, as well as those accessing the residences, and using the car park. Visual receptors are considered of Medium sensitivity.

Viewpoint 2 – Proposed View

The proposed view shows the upper storeys visible, primarily at the gable ends, with the roofscape of the proposed development appearing behind the partly vegetated Jugback Lane. The vegetation has been cut back and some trees removed, but proposed street trees are shown, allowing views of mainly the upper storeys and roofs to be visible in the centre of the view. It should be noted that more of the buildings are likely to be visible in the winter months when the trees are without leaves.

Magnitude of Change

The magnitude of change is considered Low. There are several blocks visible which are of medium extent in the centre of the view, however these are partly screened by intervening vegetation. These are lower in height than the buildings in the foreground and while visible, they do not disrupt or change the character of the view and are considered characteristic of a suburban area. Low is defined as:

Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context

Significance of Effect

The significance of effect, resulting from a Medium visual receptor sensitivity and a Low magnitude of change results in a **Slight visual** effect. The quality of the effect is considered **neutral**.

This effect will be Permanent.

Viewpoint 3 –View from Thornleigh Place

Existing View

The existing view looks across an area of green space at Thornleigh Place, with dwellings to both the left and right of the image. The dwellings range from 2 to 3 storeys in height. In the centre of the view, an area of grassed space divides the two rows of houses and parking areas. The densely vegetated hedgerow along Jugback Lane is visible in the centre of the view and is the only area of shrubs and trees in the view.

Visual Receptor Sensitivity

Visual receptors are those walking and driving in the vicinity of the houses and are considered of Medium sensitivity.

Viewpoint 3 – Proposed View

The proposed view shows the proposed development in the centre of the view as a single row of dwellings in the background. Part of the hedgerow vegetation has been removed and replaced with shrubs and street trees, allowing views to the majority of the terrace of houses. However, further to the left of the view, the retained vegetation serves to screen the rest of the buildings. Over time the new vegetation will further soften the terrace frontages.

Magnitude of Change

The magnitude of change is considered Low. The dwellings are partly screened and occupy a relatively limited extent of the view. They are visible but not dominant and are seen as characteristic in a suburban area. Low is defined as:

Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context

Significance of Effect

The significance of effect is considered **Slight**, as combination of a Medium visual receptor sensitivity and a Low magnitude of change. The effect is considered **neutral.**

This effect will be Permanent.

Viewpoint 4 – View from Jugback Lane

Existing View

This view is taken from the pavement along Jugback Lane, looking north. On the left of the image are a number of duplex residences with entrances both at ground floor and first floor, bordered by a footpath and parking bays. A large (gym) building is visible at the end of the row of buildings. To the right of the image, the hedgerow which divides Jugback land from the site of the proposed development is an element of the view, with a section of dense vegetation and some gaps in the hedgerow. Streetlights are visible but the character of the view is that of a semi urban area with the vegetated lane giving a partly rural character to the view.

Visual Receptor Sensitivity

Visual receptor sensitivity is considered Medium as it represents the view from the front of several residences and also the views of those walking or driving along Jugback Lane, or the footpath.

Viewpoint 4 – Proposed View

The proposed view shows a row of dwellings. The existing hedgerow vegetation along Jugback lane has been removed and replaced with street trees and low shrub planting. The trees are shown as relatively mature, and they will soften / partly screen the new buildings. The roofline is in keeping with the height of the existing buildings to the left of the view.

Magnitude of Change

The magnitude of change is considered Medium. The proposed development is clearly visible in the view, but softened and framed by the new street trees. The scale is in keeping with the buildings along Jugback Lane to the left, visible in the wider view, and is not uncharacteristic in the context of the area. The vegetation helps to break up the visibility and partly screens some buildings, while allowing views and creating more of a ‘streetscape’ which is consistent with the suburban context. Medium is defined as:

Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context

Significance of Effect

The visual effect is considered **Moderate, neutral effect.** A combination of a Low-Medium sensitivity and a Medium magnitude of change results in a Moderate effect as per Table 9.3. The quality of the effect is considered **neutral**.

This effect will be Permanent.

Viewpoint 5 – View from Glen Ellan Road roundabout

This view is taken from the roundabout on the western end of the wide Glen Ellan road, looking to the north east. This view shows the roundabout in the foreground of the view, with several dwellings along the left of the view which range from three to four storeys in height. These overlook the roundabout and Glen Ellan Road. Beyond this on the left, street trees screen some smaller buildings in the distance. To the right of the view, the road is bordered by a large open grassed space with some trees.

Visual Receptor Sensitivity

The visual receptor sensitivity is considered Low, as it represents viewers driving on the roundabout.

Viewpoint 5 – Proposed View

The photomontage view shows the proposed development visible in the background, in the centre of the view. An apartment building is partly visible, but mostly hidden by intervening street trees. It appears behind some smaller buildings. There are no changes to the remainder of the view.

Magnitude of Change

The magnitude of change is considered Low. The development is visible as one building, of limited extent, and mostly screened by intervening vegetation. The scale of the buildings is not out of character with the foreground buildings, and the character of the wide suburban road. The overall view undergoes a minor change. Low is defined as:

> *Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context*

Significance of Effect

The effect is considered **Not Significant**, as a result of the Low visual receptor sensitivity and Low magnitude of change. The quality of the effect is considered **neutral.**

This effect will be Permanent.

Viewpoint 6 – View from Glen Ellan Road/Jugback Lane junction

Existing View

This view is taken from Glen Ellan Road, near the junction with Jugback Lane. The view shows a wide road, with a grassed embankment and street trees on the left, and a sloping fenced grassed open space to the right, which is part of a residential development. In the distance, low rise dwellings are visible on the right hand side of the view. There is a sense of openness to the road, and no elements of distinctive character or streetscape are evident. The sloping ground on both sides, and distant tree planting restricts views to the wider landscape and townscape.

Visual Receptor Sensitivity

Visual receptors sensitivity is considered Low as it consists of mainly motorists and pedestrians travelling along the road.

Viewpoint 6 – Proposed View

The photomontage shows the proposed development, consisting of several large 5-7 storey buildings which are visible to the left and centre of the image, along the northern side of Glen Ellan Road. The existing street trees along the northern side of the road have been replaced with new trees.

Magnitude of Change

The magnitude of change is considered High. The unbuilt lands bordering the left of the view along the road have been re-graded, and large apartment blocks now line the road, creating a more urban feel to

the area. The apartment blocks are of considerably larger scale than the surrounding development, which is seen along the opposite side of road in the distance, visible just at the edge of the 50mm view. However, the width of the road and green area on the southern side creates a relatively large 'buffer' between the proposed taller and lower existing buildings. Street trees and grass on either side of the pavement help to break up the façade of the buildings and create a more human scale.

High is described in Table 9.5 as:

Extensive intrusion of the development in the view…, or introduction of elements that may be considered uncharacteristic in the context.

Significance of Effect

The visual effect is considered Moderate- this is a combination of Low visual receptor sensitivity, and High magnitude of change. Table 9.3 indicates this would be considered Slight-Moderate but this is judged be to **Moderate** effect.

The effect is considered **Adverse** in quality in the Short and Medium term due to the change of scale or character to the surroundings. However, over time, as the new landscape establishes and a new sense of place and strong urban edge is created by the presence of the buildings and trees, this quality of change in the Long Term becomes Neutral

This Long Term effect will become Permanent

Viewpoint 7 - Existing View

This shows a view from the South Bank residential development, with two storey residences to the left of the view, and a pavement and road visible in the centre of the view. In the distance, some higher ground is visible. Beyond the road, a hedgerow is visible with views of fields and some hedgerows to the right and centre of the view. The character of the view is a combination of a suburban character in the foreground, with views over a rural landscape of fields and hedgerows.

Visual Receptor Sensitivity

The visual receptors are considered to be of Medium to High sensitivity, as the viewers will likely be residents driving or walking around their residences. The view is pleasant but not highly scenic.

Viewpoint 7 – Proposed View

The photomontage shows the proposed development is visible across the entire view, from left to right. In the wider view, the proposed development consists of a number of high-rise blocks ranging from 6-7 storeys in height. In the centre of the view, considerably lower buildings are visible in the distance, to the rear of the entrance road, partly screened by intervening trees. Though the blocks are on the opposite side of Glen Ellan road, the road is at a lower level than the viewer and the blocks appear closer.

Magnitude of Change

The magnitude of change is considered High. The proposed development is visible across a large extent of both the wider view, and also across the extent of the 50mm view. The height and scale of the development is in contrast to the existing residences in the foreground. The views of fields, hedgerows and to the distant hill are restricted and replaced by high rise apartment buildings, though the entrance to the proposed development offers a contrast to the restricted views and allows some longer distance views. The elements of rural character to the view have changed entirely.

High is described in Table 1.5 as:

Extensive intrusion of the development in the view, or introduction of elements that may be considered uncharacteristic in the context

Significance of Effect:

The visual effect is considered **Significant**. The effect is considered **Adverse** in quality in the Short & Medium term due to the change of scale or character to the surroundings and the loss of the distant rural view. However, overtime, as the new landscape establishes and a new sense of place and strong urban edge is created by the presence of the buildings and trees, this quality of change in the Long Term becomes Neutral

This Long Term effect will become Permanent

Viewpoint 8 – View from Glen Ellan Road east

Existing View

This view is taken looking along Glen Ellan Road from the east. This is a wide and straight road, at this point a three-lane road with a bus bay. The road is bordered by metal fencing and low buildings on the left, with some street trees and a grass strip dividing the road from the pavement. On the opposite side of the road, a parking lot is visible with some metal fencing, and beyond this a grass embankment lines the road. In the background mature trees are visible to the centre and left of the image. The character is that of a road on the urban edge with no elements of high scenic quality.

Visual Receptor Sensitivity:

Visual receptors would be road users and those walking along the pavement or at the bus stop and the sensitivity is considered Low.

Viewpoint 8 –Proposed View

The proposed view shows a number of apartment blocks visible in the centre of the view. The buildings range from 1-7 storeys in height. The existing trees in the foreground partly screen the lower floors, and the trees to the right of the view and the grass embankments in the foreground, remain.

Magnitude of Change:

The magnitude of change is considered Medium. The development occupies a medium proportion of the view, set back at some distance from the viewer. The apartment blocks are a new element in the view, in contrast to lower buildings to the left of the view and are clearly visible. The existing trees to the right of the view and in the foreground help to partly screen the lower floors and assimilate the building into the landscape.

Medium magnitude of change is defined as:

Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.

Significance of Visual Effect:

The visual effect is considered **Moderate.** Table 9.3 indicates that a Low visual receptor sensitivity combined with a Medium magnitude of change would result in a Slight effect, however an element of professional judgement results in a Moderate effect. The quality of the effect which will further soften over time as the new landscape establishes is considered **Neutral.**

This effect will be Permanent

Viewpoint 9– View from Glen Ellan Rd/Balheary Rd junction

Existing View

The existing view shows the junction of Glen Ellan and Balheary Road, which are two wide roads on the urban periphery. Streetlight posts and traffic lights are visible in the foreground of the image. Metal

security fencing borders the land along both roads, beyond which areas of car parking are visible. On the right of the view, a large industrial building is visible. In the centre of the view, some two storey dwellings and street trees are visible while mature trees are visible in the background to the centre and right of the image. Overall, the view has an industrial character with no elements which are considered scenic.

Visual Receptor Sensitivity

Visual Receptor Sensitivity is considered Low, as it represents those driving or walking along a road in an area of industrial character.

Viewpoint 9 –Proposed View

The proposed view shows a number of apartment blocks visible in the centre of the view. These appear to the rear of a line of mature trees, which serve to screen the lower storeys from view. The buildings are set back at some distance from the viewer, and no elements are removed from the view.

Magnitude of Change

The magnitude of change is considered to be Low to Medium. The development occupies a limited extent of the centre of the view, and though no developments of a similar scale are identified, the development is seen in the context of a wide road on the urban periphery and with extensive car parking and fencing in the foreground. To the left in the foreground, tree planting screens the proposed water storage tank area.

Low is defined as:

> *Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context*

Significance of Visual Effect:

The visual effect is considered **Slight,** as a result of the Low and Low-Medium judgements on visual receptors and magnitude of change, combined with professional judgement. The quality of the effect is considered **Neutral**. Though there are no buildings of similar form and scale, the buildings are clearly set back from any surrounding development of smaller scale. The wider view has an industrial character, emphasised by the existing warehousing to the right of the image and security fencing lining the road in the foreground. The tree planting to the right of the image is a beneficial effect on the view and softens the industrial aspect of the view.

This effect will be Permanent.

Viewpoint 10– View from Swords Celtic FC car park

Existing View

The existing view shows a hard surfaced car park in the foreground, with floodlighting poles evident in the foreground. Some small trees are visible in the foreground. A fence delineates the grass pitch area in the middleground of the view. In the background, mature trees extend along the whole extent of the view and restrict further views.

Visual Receptor Sensitivity

Visual receptors would primarily be those entering and leaving the carpark, and on accessing the pitch for training and matches, and are considered as Low sensitivity.

Viewpoint 10 – Proposed View

The photomontage shows the proposed development is visible in the background of the image, to the rear of the existing trees. The roofs of the nearer buildings are just visible behind the trees, while the upper storeys of the apartment blocks are partly visible in the background.

Magnitude of Change

The magnitude of change is considered to be Low. The buildings are only partly visible above the trees, in the centre of the view, and occupy a limited proportion of the overall view. The buildings are not prominent elements in the view. Low is described as:

> *Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context*

Significance of Visual Effect:

The visual effect is **Not Significant,** resulting from a combination of Low visual receptor sensitivity and Low magnitude of change. The visual effect is considered **Neutral.**

This effect will be Permanent

Viewpoint 11– View from Newtown Bridge

Existing View

The existing view is taken looking along the Broadmeadow River, from Newtown bridge, which is a protected structure. The view is that of an open, grassy meadow bordering the river, which runs to the right of the image. The key elements in the view are the river, but also the extensive areas of grass, and the mature trees which provide a backdrop to the view. Just a small part of a building is visible to the extreme right of the view, otherwise the view is without built form. The character of the view is a tranquil, riverside view, with a very different character to the other viewpoints. The scenic qualities are considered to be high and the view has a naturalistic character.

Visual Receptor Sensitivity

Visual receptors would include viewers walking along the riverside path and therefore would be highly focussed on their surroundings, which are of scenic quality. The sensitivity is considered to be High.

Viewpoint 11 –Proposed View

The photomontage shows the proposed development is largely hidden in this view. The mature trees to the right of the view screen the majority of the buildings but some of the roofline of the proposed development is visible.

Magnitude of Change

The majority of the proposed buildings are not visible in this view, but some tree planting and an informal grassed open space is visible. Some of the proposed buildings are visible as a result of tree removal to the right of the view. This results in a Low magnitude of change:

> *Minor intrusion of the development into the view, or introduction of elements that are not uncharacteristic in the context*

Significance of Visual Effect:

The visual effect is considered **Not Significant, and neutral- beneficial** in quality. While the naturalistic, grassed space has been slightly formalised, proposed tree planting adds to the view. Some tree removal to the right of the view is considered an adverse effect however proposed trees help to screen the views and allow glimpses of some proposed buildings.

This effect will be Permanent

Viewpoint 12– View from Jugback Lane (south).

Existing View

The existing view looks along Jugback Lane where it crosses Glen Ellan Road.

A grass verge and hedgerow are visible in the foreground, with some mature trees. Metal railings denote the green space adjacent to the South Bank housing estate in the foreground to the right of the view.

In the middleground, across Glen Ellan Road, Jugback Lane with its trees and hedgerow, are visible. Towards the centre and right of the view, street trees are visible, with some distant views to the fields and trees in the background behind the grass embankment. A glimpse of an area of higher ground is just perceptible.

The view has no built form and has a suburban character with a rural quality, partly as a result of the narrow lane and expanse of vegetation visible.

Visual Receptor Sensitivity

Visual receptor sensitivity is considered Medium. Those walking along or driving on Jugback Lane (south) would be the main users.

Viewpoint 12 – Proposed View

The proposed view shows several apartment blocks to the centre and right of the image. The building at the corner is lower, a 5-storey building, with a gradual increase in building height apparent as the viewer moves away from the junction. There are some lower and smaller scale buildings along Jugback Lane, and these are partly screened by trees. Vegetation along the boundary between the site and Jugback Lane has been replaced with street trees, and some trees have been planted along Glen Ellan Road on the grass verge.

Magnitude of Change

The magnitude of change is considered to be Medium. The proposed development occupies a considerable proportion of the view and is substantial in size. However, the height varies, with the apartment block buildings reaching 5 to 7 storeys and graduated in height away from the corner. Some lower buildings are barely visible due to intervening vegetation. Medium is described as:

Partial intrusion of the development in the view, or introduction of elements that may be prominent but not necessarily uncharacteristic in the context, resulting in change to the composition but not necessarily the character of the view or the visual amenity.

Significance of Visual Effect:

The visual effect is considered **Moderate**, as a result of the Medium visual receptor sensitivity and Medium magnitude of change. The visual effect is considered **Neutral**. From this view, there are no other existing buildings and so the development is not set within the context of other buildings or built form. The large trees to the left of the view provide a sense of scale and the tree planting to the front and left of the apartment blocks will, over time, soften the building edges and help to assimilate them to the suburban landscape. The façade has been designed so that parts of it appear to recede in order to break up the massing. Overtime, as the new landscape establishes and a new sense of place and strong urban edge is created by the presence of the buildings and trees, the landscape will soften and the sense of an urban new place be enhanced. The development will complement its setting and the quality of change continue to be Neutral

This effect will be Permanent

Viewpoint 13– View from amenity area east of Newtown Bridge

Existing View

The existing view shows the riverside path and grassed area adjacent to Newtown Bridge. In the foreground the path and grassed area is visible. A stone wall joins on to a section of concrete wall, adjacent to the single arch stone bridge in the foreground of the view. This wall restricts the view beyond, with a gap in the wall providing access to the road. A single large pine tree is seen behind the wall. In the background, mature trees are seen in the distance, with some buildings in the background to the right of the view.

Visual Receptor Sensitivity

This view will be experienced by those walking the path and using the adjoining the amenity area which is pleasant. The sensitivity is considered High.

Viewpoint 13 – Proposed View

The proposed view shows a low concrete plinth surrounded by a timber fence, located in the grassed area to the right of the view. A fence/handrail is also visible.

Magnitude of Change

The magnitude of change is considered to be Negligible. Though the fence/handrail is visible, it occupies a small proportion of the view and the outfall itself is not evident from this view. The overall character of the view is unchanged. Negligible is defined as:

> *Barely discernible intrusion of the development into the view, or introduction of elements that are characteristic in the context, resulting in slight change to the composition of the view and no change in visual amenity.*

Significance of Visual Effect:

The visual effect is considered **Not Significant,** and Neutral in nature. While the proposed railing is visible, and adds a minor element of visual clutter, to a short section of the path, and the pleasant character of the view remains. A view taken form slightly left or right of this location would allow a clear view towards the bridge.

This effect will be Permanent

Summary of Visual Effects

Table 9.7 above summarises the visual effects for the 13 viewpoints with key points highlighted below.

Table 9-7: Viewpoints – summary of visual effects

View	Location	Sensitivity	Degree of Change	Significance and Quality over Time			
				Short Term	Medium Term	Long Term	Permanent
1	View from Applewood Close	Low-Medium	Low	Not Significant to Slight & Neutral	Not Significant to Slight & Neutral	Not Significant to Slight & Neutral	Not Significant to Slight & Neutral
2	View from Thornleigh Terrace	Medium	Low	Slight & Neutral	Slight & Neutral	Slight & Neutral	Slight & Neutral
3	View from Thornleigh Place	Medium	Low	Slight & Neutral	Slight & Neutral	Slight & Neutral	Slight & Neutral
4	View from Jugback Lane	Medium	Low-Medium	Moderate & Neutral	Moderate & Neutral	Moderate & Neutral	Moderate & Neutral
5	View from Glen Ellan Rod roundabout	Low	Low	Not Significant & Neutral	Not Significant & Neutral	Not Significant & Neutral	Not Significant & Neutral
6	View from Glen Ellan Road/Jugback Lane junction	Low-Medium	High	Moderate & Adverse	Moderate & Adverse	Moderate & Neutral	Moderate & Neutral
7	View from South Bank residential development	Medium	High	Significant & Adverse	Significant & Adverse	Significant & Neutral	Significant & Neutral
8	View from Glen Ellan Road east	Low	Medium	Moderate & Neutral	Moderate & Neutral	Moderate & Neutral	Moderate & Neutral
9	View from Glen Ellan Rd/Balheary Rd junction	Low	Low-Medium	Slight & Neutral	Slight & Neutral	Slight & Neutral	Slight & Neutral
10	View from Swords Celtic FC car park	Low	Low	Not Significant & Neutral	Not Significant & Neutral	Not Significant & Neutral	Not Significant & Neutral
11	View from Newtown Bridge	High	Low	Not Significant & Neutral - Beneficial	Not Significant & Neutral - Beneficial	Not Significant & Neutral - Beneficial	Not Significant & Neutral - Beneficial
12	View from Jugback Lane (south)	Medium	Medium	Moderate & Neutral	Moderate & Neutral	Moderate & Neutral	Moderate & Neutral
13	View from amenity area east of Newtown Bridge	High	Negligible	Not Significant & Neutral	Not Significant & Neutral	Not Significant & Neutral	Not Significant & Neutral

Views from residential areas to the east and south

Viewpoints 1-4 represent viewers in the Applewood area to the west of the site, which contains a mixture of low-rise residential and commercial uses. Views along Jugback lane are also represented by Viewpoint 1-5.

Views 1-4 show that the effect on viewers to the west range from Not Significant-Slight to Slight. These viewers experience partial views of the lower (1-2 storey) residences along Jugback Lane, but views of the taller buildings are not available from these viewpoints. The views of the residences are partly screened by intervening vegetation along Jugback lane, and though this will be cut back in sections, low shrubs, and additional street trees are to be planted which will increase the screening effect as they mature. These views are all suburban in character and the presence of a similar and low rise development in the views does not change the overall character of the views.

Views from the south include a view from the Southbank housing estate (Viewpoint 7) and a view from Jugback Lane south (Viewpoint 12). These views show the taller (5-7) storey buildings are clearly visible from this area. Viewpoint 7is initially Significant and adverse () from the South bank housing estate directly opposite the site, however, over time this moderates to neutral as new trees and soft landscape matures and a new urban place becomes established. Viewpoint 12 slightly further west at the junction of Glen Ellan road and Jugback Lane. is similar but judged as Moderate and Neutral () Over time this would also soften.

Views from the Southbank estate and neighbouring area are also elevated, and the separation by the Glen Ellan Road is difficult to distinguish in these views view.

Viewpoint 7 is representative of one of the most direct views towards the development, with open views from an elevated location across the Glen Ellan road. The difference in scale and height between the 5-7 storey buildings and the lower (primarily 2 storey) buildings in the vicinity of Viewpoint 7 is a clear contrast and this viewpoint will undergo considerable change, (Significant, adverse visual effect moderating to neutral in the Long Term).

A less pronounced change (Moderate, neutral) occurs in Viewpoint 12, as the development 'steps down' toward the junction with Jugback lane, and the extent of the development is less in this view. Therefore, it is likely that viewers from the western part of the South Bank estate will have a less pronounced view of the proposed development, with Moderate visual effects more likely.

The proposed tree planting and landscape treatment will establish over time, helping to create a softer setting for the buildings and assist in assimilating them into the surroundings. The trees are a key part of the overall urban composition but are not immediate in effect. Over time they create their own aestanetic improvement but more importantly create capacity in the landscape to absorb the new development.

Viewers in the parts of these estates without direct or open view across the Glen Ellan Road will experience lesser visual effects.

Views from Glen Ellan Road

Several views (5,6,8,9) represent viewers travelling along the Glen Ellan Road. These views show that visual effects will vary, from Not Significant near the roundabout at the western end, to Moderate nearer to the development. Views from the east range from Slight to Moderate. Visual effects from the Glen Ellan Road in the vicinity of the proposed development are more pronounced, and views of the taller buildings are frequent. However, it should be noted that receptors will be mainly people traveling in cars along the road, as well as walking along the wide suburban road, and are considered as being of Low sensitivity. The character of this area on the urban edge is mixed, with no active frontage on the northern side and many areas defined by industrial type fencing. It should be noted that the approach to these areas which are viewed from the west and south is consistent with the Estuary West Masterplan, (outlined in Section 9.3.1) with 2-3 storey buildings along Jugback Lane and higher buildings envisaged at more appropriate locations including the Glen Ellan Road and the Broadmeadow River.

Views from the north – Balheary Road

A number of views (Viewpoints 10 and 11) represent this area, though in general there are few open views from this road due to dense vegetation. Viewpoint 10 represents the view from the Swords Celtic FC grounds where the development gives rise to a Not significant visual effect and is barely visible due to intervening vegetation. A view from Newtown bridge looking along the riverside path and meadow, which is one of the views with higher receptor sensitivity, will not change as a result of the proposed development.

Views from the Balheary Road directly to the east of the site are not available, due to screening by the large industrial building to the east of the proposed development and of the existing Newtown House. A view from the junction of Balheary Road and Glen Ellan Road represents viewers in this area and is considered of Slight visual effect.

A proposed stormwater storage tank at the junction of Balheary Road and Glen Ellan Road is well screened by vegetation as seen in Viewpoint 9. Viewpoint 13 shows the view of the proposed outfall east of Newtown Bridge, a protected structure, which is located on the riverbank and the visual effect is considered Not Significant and adverse. This view is extremely localised to the immediate vicinity of the proposed outfall and the character of the view is not affected.

Quality of the visual effects

The visual effects are, in the main, considered to be neutral in effect, where the development is considered to fit in with the scale and character of the existing surrounds. This is particularly evident in Viewpoints 1-4, where the scale of the proposed development complements the existing development. The proposed treatment of Jugback Lane, with new street trees and low shrubs proposed, creates partial screening along the lane and reduces visual effects.

Viewpoints 5, 8,9 and 12 along the Glen Ellan Road are all considered neutral in quality. In these views, the development is seen in the context of an expansive road on the urban edge, without a strong sense of character and with much of the northern side of the road bordered by fencing, or by a vegetated embankment. The eastern end of the road near the Balheary Road junction has a more industrial character. The proposed development, while large in scale, provides street frontage, enclosure, new street trees and anmimation to the street corridor and an important place -making function in this edge of town location.

Out of 12 viewpoints, only 2 (Viewpoints 6,7,) were considered to result in an adverse visual effect. The views which are considered adverse in quality are localised to these locations (6 and 7) in close proximity to the site, from the Glen Ellan Road. However in the longer term new establishing landscape will moderate these effects to neutral.

9.4.3 Cumulative Effects

The County Development Plan allows for a development of this nature on this site and extending across adjacent lands to the East. The Estuary West Masterplan provides guidance to this development. Cumulative landscape effects would be Significant but Neutral reflecting the landscape context and delivery of policy objectives locally.

9.5 Mitigation Measures

Avoidance and mitigation by design were incorporated into the design. A Landscape Masterplan was prepared in order to maximise retention of the most important landscape elements, to create a design with a strong sense of place, and to avoid and reduce landscape and visual effects.

The Design Strategy incorporates the Development Plan policies and objectives contained in the Estuary Masterplan outlined in Section 9.3. These are incorporated into the Landscape Masterplan (illustrated in Figure 9.1). A balance between built form and open space is proposed, which enhances the legibility and the permeability of the site and contributes to place-making in a newly evolving neighbourhood. The Landscape Masterplan includes the following elements which reduce the landscape and visual effects.

- Retention of the hedgerow (and townland boundary) in the centre of the site (running north-south), as set out in the Estuary Masterplan. The hedgerow acts as an element of public open space, as well as green infrastructure connecting the Broadmeadow River and Glen Ellan Road.

- Creation of a riverside Park along Broadmeadow River which enhances the areas' natural character and includes retained mature trees and provides a link to the areas to the east and west, as well as linking to the north-south green link. This is a large area of open space and will have a strong naturalistic feel due to the river and retained trees. It will also have smaller areas of varying character including play areas, as well as a network of walking trails.

- Lower (2-3-storey) buildings along Jugback Lane are proposed,this reflects the strategies of the Estuary Masterplan and reduces visual effects on the primarily residential areas to the west of the site. The proposal introduces an entrance to the site along Jugback Lane, which increases permeability between the site and the area.

- Jugback lane itself will remain as a lane but with a more open and urban character. Proposed tree planting will enhance the lane.

- The taller buildings proposed line Glen Ellan Road, this reflects objectives set out in the Estuary West Masterplan. However, this is a wide road of a large scale and is the most suitable location for these taller buildings. A 'green corridor' comprised of large street trees and grass is proposed as a buffer between the buildings and Glen Ellan Road. The building elevations in association with the new maturing landscape will be important placemaking additions to the road corridor and transformational in character.

- The inclusion of a private open space to the front of Block A along Glen Ellan Road will provide a communal open space enclosed by a low stone wall and railing with a hedge, and improve the street frontage along Glen Ellan Rd

- The proposed stormwater storage tank is screened from view by the proposed landscape measures, as seen in Viewpoint 9, and is therefore not visible in this view.

In summary, the retention of trees is proposed where possible. Key areas include the area along the Broadmeadow river, and the retention of the majority of trees here will assist in creating a pleasant public open space and important green link, as well as screening the development from the north, as seen in Viewpoints 10 and 11. The north-south link which includes the retained hedgerow is smaller in scale, but will assist in breaking up the space internally, as well as being viewed as a green space as shown in Viewpoint 7.

9.5.1 Construction phase mitigation measures – landscape and visual

Construction Stage will be programmed over a number of years resulting in ongoing infrastructure, building and related works for some period of time. These are generally destructive and visually adverse in nature, but temporary and short term. Best practice site management will be employed including appropriately scaled and located hoarding to screen the site from viewers along Glen Ellan Road and the residential areas to the south, as well as areas to the west at Applewood.

9.6 Residual Impacts

The landscape and built form design incorporate avoidance and mitigation measures to reduce adverse impacts, and where possible, to enhance the natural elements of the existing landscape, contribute to new placemaking and reflecting local policy objectives. Therefore, the assessment of effects in Section 9.4 included these measures, and the residual effects.

Section 9.4 outlines the landscape and visual effects of the proposed development. The Estuary West Masterplan provides guidance to the development layout and, whilst not a statutory plan, reflects an appropriate analysis of site opportunities and best practice and has informed the proposed development

Landscape Effects

The changes to the physical landscape of the site will result in a **Slight** landscape effect. This reflects the relatively few sensitive landscape receptors on site, and the retention and enhancement of these elements which include existing trees and vegetation along the north-south spine of the site, and along the banks of the Broadmeadow river.

The quality of the effect on the physical landscape features of site is, in the main, considered beneficial, as these spaces are enhanced, and opened up with greater permeability between the site and its surrounds, and an increase in passive surveillance. Parts of the site which are currently open grassland and which are subject to anti-social behaviour, are considered to undergo a change which is beneficial. The removal of trees and hedgerow along Jugback lane can be seen as an initially adverse effect, however, this is mitigated by the proposed tree and shrub planting as this establishes over time..

The proposed development will result in a **Moderate** effect on the landscape character. The more pronounced effects are on the overall character of the site as it changes from semi-rural to urban, and the effect of the higher buildings on the immediate surrounds of the site.

As noted above, this change is consistent with policies for the site in the County Development Plan and as developed in the Estuary West Masterplan. The lower buildings adjacent to Jugback Lane result in a low level of change in character to their surroundings. The larger buildings along Glen Ellan Road, are not considered characteristic of the area in its current form. They introduce a new element to the character of the road and the immediate vicinity to the south of Glen Ellan Road. This area will experience a change in character which is considered Moderate, and localised. The quality of the effect ranges from neutral to the west of the site, to adverse to the south of the site. It is considered that effects on the area north of the site along the Broadmeadow are beneficial.

The landscape elements of the scheme which help mitigate impacts, would take time to establish and the landscape receptors would, in places, take time to appreciate their presence, Whilst effects may remain of Moderate Significance across the scheme in the long term, post-maturing of the landscape vegetation the Residual Impacts would revert to Neutral as the new “place” softens and integrates in its setting.

Visual Effects

Visual Effects as illustrated by the Photomontages 1-4 show no significant visual effects (Not Significant to Slight and neutral) in the Applewood area to the west of the site.

The viewpoints along Glen Ellan Road range from Not Significant to Moderate and neutral in quality. One view from the Southbank residential area was considered Significant. The visual effects are expected to be more pronounced in close proximity to the taller apartment buildings along the Glen Ellan Road, however these effects are relatively localized and over time would improve.

Viewpoints to the north show little change in the views and effects range from None to Not Significant

As with the residual landscape effects whilst effects may remain of Significant in places in the long term, post-maturing of the landscape vegetation the Residual Impacts would revert to Neutral as the new “place” softens and integrates in its setting.

9.7 Difficulties Encountered

No difficulties were encountered.

9.8 Interactions

The main high level interactions between Landscape and Visual Effects and other environmental factors include:

Population and Human Health – in terms of changes to landscape and visual amenity

Biodiversity – in terms of enhanced and managed areas of habitat – Broadmeadow River, retained and enhanced hedgerows and new planting, as we'll as site clearance and reduction in existing vegetation.

Planning Policy – the development as proposed will deliver significant parts of development policy and objectives of the Fingal CDP and supporting documents whilst playing a significant role in place making in this urban fringe location.

Archaeological, Architectural and Cultural Heritage – in terms of the retention/removal and changed setting of features of heritage interest.

Please refer to Chapter 16 Interactions for further information on interactions.

9.9 References

Department of Environment, Heritage and Local Government, 2000. *'Landscape and Landscape Assessment – Consultation Draft of Guidelines for Planning Authorities'.*

EPA, 2017. *Draft Guidelines on the information to be contained in Environmental Impact Assessment Reports.*

Fingal County Council, 2017. Fingal County Development Plan.

Landscape Institute/Institute of Environmental Management and Assessment, 2013. *Guidelines for Landscape and Visual Impact Assessment, 3rd Edition.*

10. Land, Soils and Geology

10.1 Introduction

This chapter has been prepared by Waterman Moylan Consulting Engineers for Cairn Homes Properties Ltd. by Emma Caulwell CEng MICE, a civil engineer with 10 years' experience in preparing planning submissions for housing developments and checked by Joe Gibbons CEng MICE and Director of Waterman Moylan, with over 30 years' civil engineering experience in the industry.

This section of the Environmental Impact Assessment Report describes the natural characteristics of the land at the proposed development site at Holybanks, Swords, Co. Dublin in terms of land and soil. The proposed development consists of 621 no. units (145 no. 1-bed units, 278 no. 2-bed units, 187 no. 3-bed units and 11 no. 4-bed units) comprising 349 no. apartments, 118 no. houses and 154 no. duplex units. Building heights range from 1 no. to 7 no. storeys (over basement level). The scheme provides for public open space, communal open space areas, a crèche, residential amenities (including concierge, multi-purpose room, meeting room and gym), a new public park to the north of the site as an extension to Broadmeadow Riverside Park and services/bin store areas. The development provides for a total of 705 no. car park spaces (including houses), 856 no. secure bike parking spaces and 21 no. motorbike spaces at basement, under-croft, and surface level.

The proposed development, the extent of which is defined by the red line boundary on the submitted planning drawings, also includes a Stormwater storage tank, located on the Celestica site to the east of Holybanks together with an outfall to the Broadmeadow River which will be laid along the Balheary Road. Upgrades to both the Glen Ellan Road, Balheary Road Junction and The Estuary Roundabout are also proposed as part of the development proposals.

The direct and indirect significant effects of the proposed development on the land, soils and geology of the subject site , i.e. the lands within the red line planning boundary, is assessed during the construction and operational phases, and mitigation measures, where necessary, are proposed and assessed to reduce the impact of the proposed development.

10.2 Assessment Methodology

In accordance with best practice, to determine the impact of the proposed development on the prevailing geological conditions, the following sources of information were consulted; the Map of the Bedrock Geology of Ireland, produced by the Geological Survey of Ireland available on www.gsi.ie. Guidance on relevant assessment methods is obtained from "Guidelines for the Preparation of Soils, Geology and Hydrogeology Chapters of Environmental Impact Statements". April 2013, published by the Institute of Geologists of Ireland.

An extensive site investigation (SI) was carried out within the proposed development site. The purpose of the site investigation was to investigate subsurface conditions utilising different methodologies. The results of the site investigation have been compiled in a report prepared by Site Investigations Ltd (SIL) in October 2017, (Report Number: 5415). Please refer to appendix 10.1.

An additional site investigation was carried out in April 2019 by (SIL), (Report Number: 5588) to further investigate the drainage of the site through shallow soakaway tests. Refer to appendix 10.2.

In addition to the above-mentioned site investigations, an additional Site Investigation was carried out in October 2020 by SIL (Report Number: 5769) to get more dynamic probing and additional boreholes. Please refer to appendix 10.3.

10.3 Baseline Environment

This section describes the land, soils and geology in the subject site and its surroundings. It also states the historic land use of the subject site.

10.3.1 Site Development

The site is in Swords, Co. Dublin. The site is bound by Glen Ellan Road to the south, Jugback Lane/Terrace to the west, the former Celestica factory site to the east and the Broadmeadow River to the north. In addition, as part of this application, a Stormwater Storage Tank is being proposed in the Celestica/Motorola site which is directly adjacent east to the main subject site. The Celestica site is located on the junction of the Glen Ellan Road and the Balheary Road, Swords, Co. Dublin. The proposed road upgrades are located on The Glen Ellan Road, Balheary Road junction and at the Estuary roundabout to the southeast of the site.

The total site area is circa 14.17 hectares and was previously in agricultural use. The lands have been vacant for the past 10 years. A topographical survey was carried out on the site and determined that the site falls from the south to north ranging in level from 14 m in the southwest to 5.6m in the northeast. The Broadmeadow River runs immediately adjacent and along the northern boundary of the site. Refer to Chapter 3 for a detailed description of the proposed development.

10.3.2 Historic Land use

Historic maps and aerial photographs from the Ordnance Survey of Ireland (OSI) have been reviewed. There is no evidence of development on the subject site and all available OSI records indicated the land has only ever been in agricultural use. The land surrounding the site has been developed for both residential and commercial use.

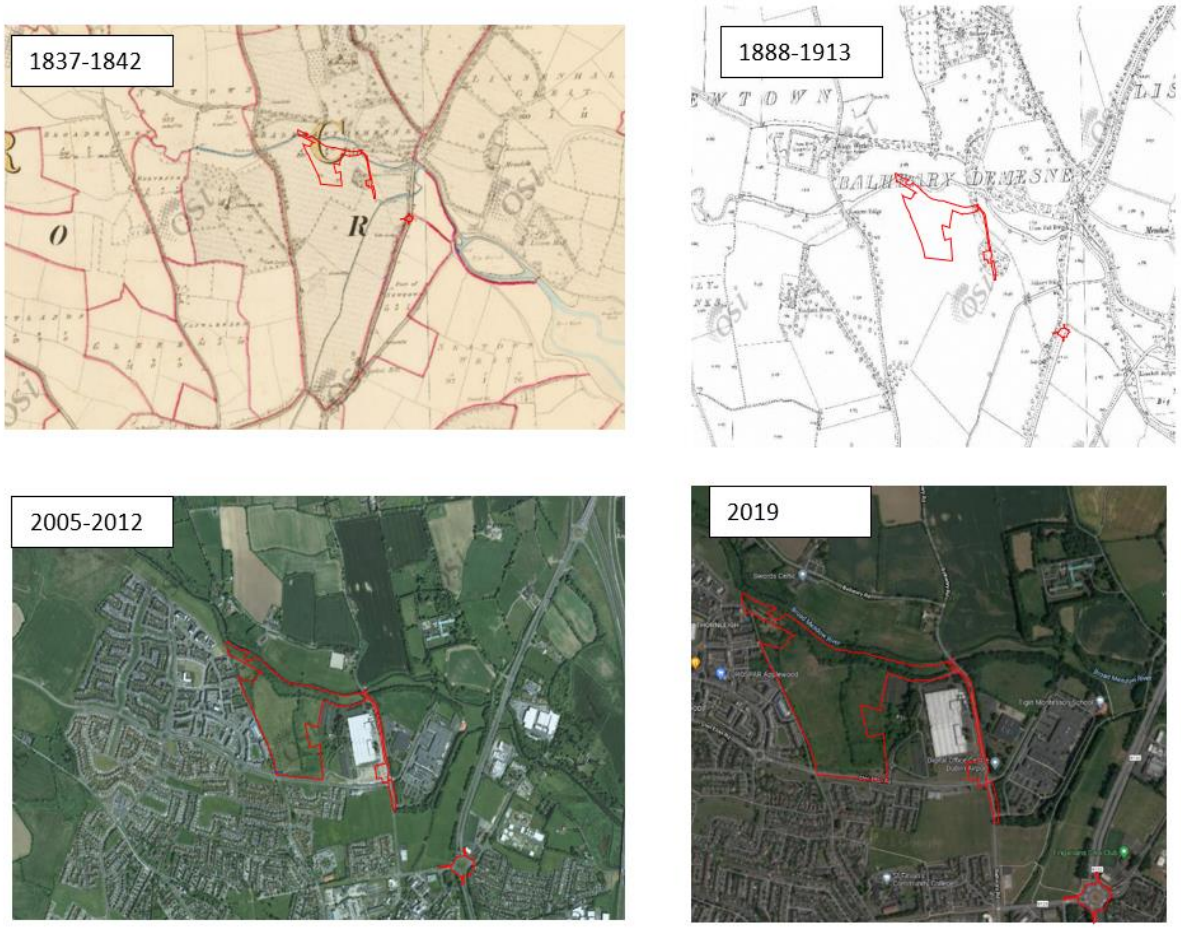


Figure 10.1 Historic Maps and Aerial Photos of the site

10.3.3 Ground Investigation

A site investigation (SI) was carried out within the proposed development site in October 2017 and a second detailed SI was carried out in 2020 In addition to this, soakaway tests were carried out on-site in December 2018 which indicated that the site is not suitable for the use of infiltration techniques. In April 2019, an intrusive SI was carried out to further ascertain the ground conditions. The site investigations comprised the following works:

A total of 14 No. cable percussive boreholes to a maximum depth of 8 m BGL;

- A total of 25 No. Trial Pits to a maximum depth of 3 m BGL;
- A total of 160 No. dynamic probes;
- 8 No. California Bearing Ratio tests;
- 11 No. Soakaways tests to a maximum depth of 0.8 m BGL; and
- Geotechnical & Environmental Laboratory testing.

Figure 10.3 Location of Trial Pits and Boreholes (October 2017)

Figure 10.2 Location of Soakaway tests (April 2019)

The ground conditions encountered during the investigation are summarised below:

1. The first layer is formed by topsoil and is present over most of the site varying from 300 to 500mm in thickness.

2. The layer of deposits, described as firm to stiff grey, brown sandy slightly gravelly silty clay with low cobble content is present beneath the topsoil to a maximum depth of 4.5m

3. A stratum of very stiff to black sandy slightly gravelly clay with low cobble content to a depth ranging from 2.5 to 5 metres.

Groundwater was found in 8 of the 14 boreholes ranging in depth from 2.40m bgl to 5.80m bgl. Water was also recorded in 3 of the 25 trial pits ranging in depth from 2.3 m bgl to 2.9m bgl.

Trial pits were excavated in seventeen locations to a depth of between 1 and 2 mbgl. Laboratory testing was undertaken on selected soil samples collected during the investigation. Testing consisted of classification, grading analysis, sulphate, chloride and pH determination and California Bearing Ratio. Chemical tests indicate low sulphate concentrations and neutral pH.

The California Bearing Ratio (CBR) is the standard measurement of the strength of the subgrade of a road or other paved areas. The CBR values on the subject site range from 6.2 to 7.7 % which would equate to a firm subgrade.

Soakaway tests were carried out at 11 number locations. These tests were performed at shallow depths to investigate the infiltration properties of the upper soil layer. Results of these tests show that drainage of the soil on site is very poor, and tests failed to pass the BRE specification therefore surface water drainage which discharges water directly back into the ground is not feasible for this site.

In October 2020, upon some changes of the proposed layout, a further Site Investigation was carried out within the site. This SI comprised the following scope of work:

- 6 No. cable percussive boreholes to a maximum depth of 8 m BGL;
- 8 No. Trial Pits to a maximum depth of 3 m BGL;
- 143 No. dynamic probes; and
- Geotechnical & Environmental Laboratory testing.

The second extensive ground investigation confirmed that the ground conditions are dominated by brown and brown grey slightly sandy slightly gravelly silty clay with cobbles and boulders overlying black slightly sandy slightly gravelly silty clay with cobbles and boulders. The laboratory tests of the cohesive soils confirm that CLAY soils dominate the site with low to intermediate plasticity indexes of 12 to 15% recorded.

Two groundwater ingresses were recorded during the fieldworks period in BH101 at 3.80mbgl and TP103 at 2.90mbgl with a slow ingress rate. The remaining investigation locations remained dry during the fieldwork.

Figure 10.4 Location of Boreholes, Trial Pits and Dynamic probes Map 1 (October 2020)

Figure 10.5 Location of Boreholes, Trial Pits and Dynamic probes Map 2 (October 2020)

10.3.4 Geology

The Bedrock Geology Map of Ireland produced by the Geological Survey of Ireland (GSI), describes the prevalent geology of the area. The proposed development spans an area underlain by one geological formation:

- Argillaceous bioclastic limestone, shale.

An extract from the GSI map showing the area of the proposed development is shown in Figure 10.6 below.

10.3.5 Soils

According to the Teagasc Soils website, datasets (www.gis.teagasc.ie) indicates the site is underlain by fine loamy drift with siliceous stones. See Figure 10.7.

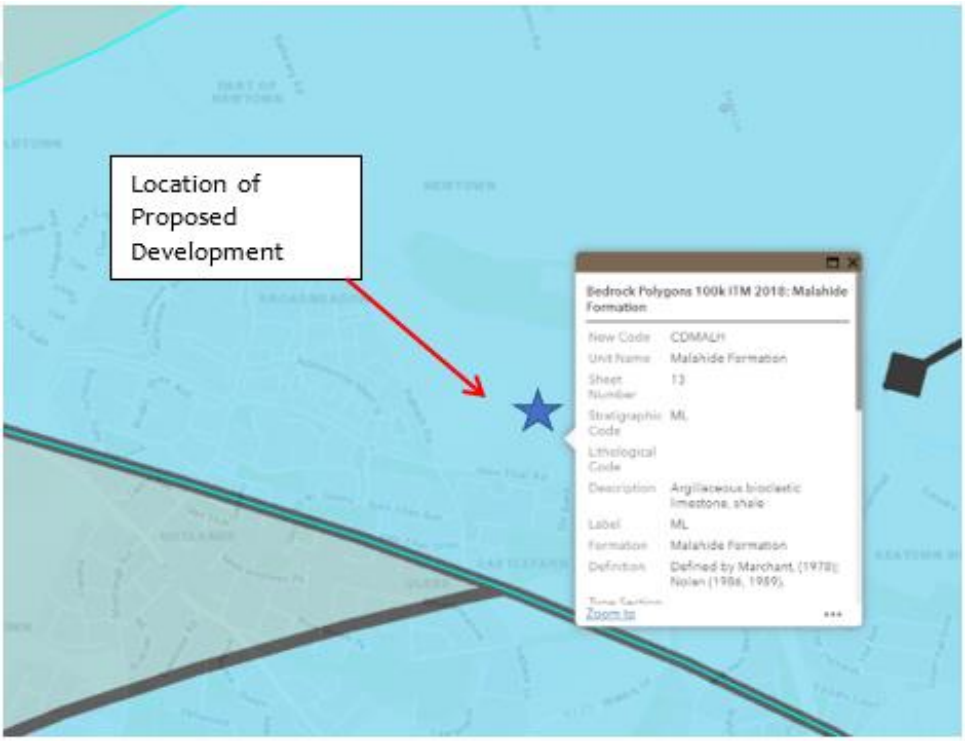


Figure 10.6 Extract from GSI Bedrock Map

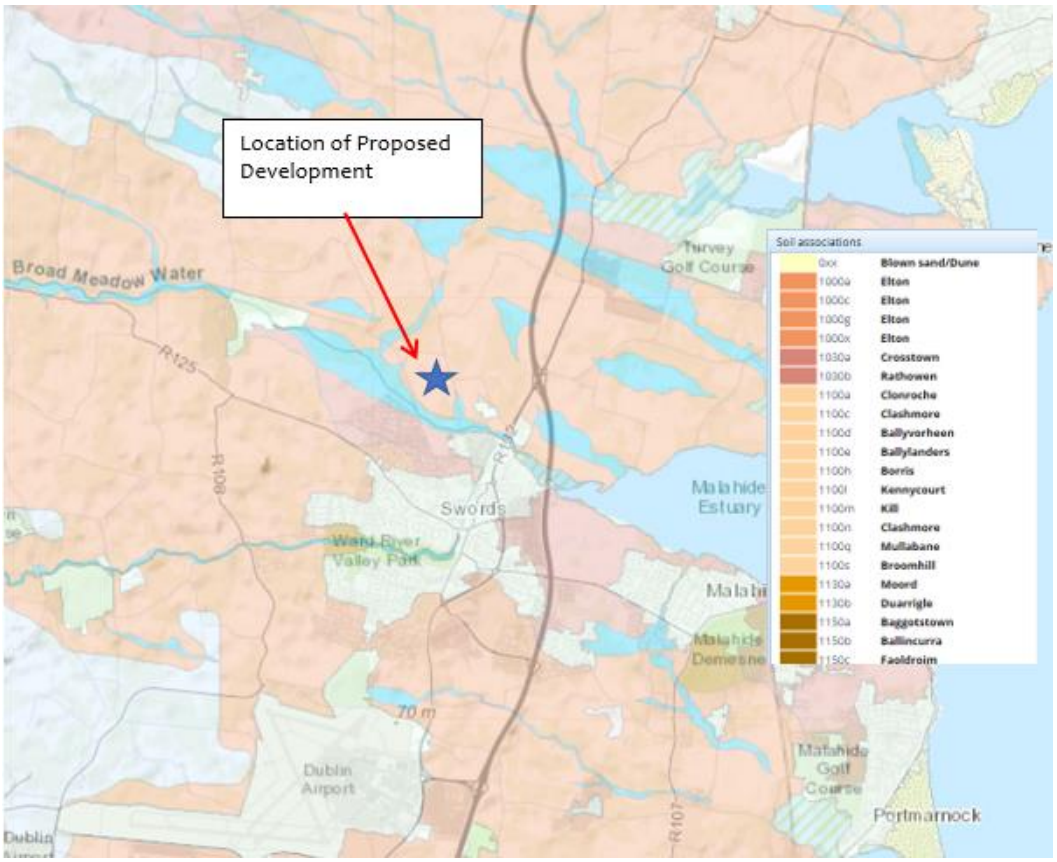


Figure 10.7 Teagasc Soil Mapping

10.3.6 Characteristics of the Proposed Development

The proposed scheme will consist of the development of the existing circa 14.17 Ha vacant site to provide a total of 621 No. residential units comprising a mix of housing typologies, duplexes and apartments. The proposal also includes the provision of public open space, vehicular access, surface level car parking, basement carparking including bicycle parking, plant and storage, all associated ancillary works including site development works, and hard and soft landscaping.

It is proposed to supply a Stormwater storage tank and outfall utilising lands on the Celestica site to alleviate known constraints in the foul water network that services the Oldtown / Mooretown / Holybanks lands catchments.

The associated site development and infrastructural works will include new vehicular and cycle entrances, foul and surface water drainage, hard and soft landscaping and improvements to the public realm. Upgrades to the existing Glen Ellan Road, Balheary Road junction and at the Estuary roundabout to the southeast of the site are also proposed.

There is a site reserved on the eastern side of the subject site for the construction of a future school and as such the sitewide infrastructure has been designed to accommodate this future school where appropriate.

Cut and Fill Analysis

Cutting and filling of subsoil will be required to form the basement, finished floor levels and development roads. A preliminary cut and fill analysis has been carried out for the total site area, the basement in apartment block B. A total cut volume of 72,661 m^3 and fill volume of 23,300 m^3 is estimated for the

total site area. The basement in Block B itself will require a cut volume of 27,900 m^3 approximately. The proposed stormwater storage tank on the Celestica site will require an approximate cut volume of 3,200 m^3. In summary, it is estimated that approximately 75,800 m^3 of material will be excavated. It is envisaged that 23,300 m^3 will be reutilised on site whilst the remaining volume will be disposed of offsite to appropriate authorised facilities. Please refer to Chapter 16 Material Assets – Waste Management for further details on how this material will be handled on-site and transported offsite.

As mentioned in Section 10.3.3 above, there is a layer of topsoil to a depth of between 300 and 500mm across the majority of the site. This topsoil will be removed before the start of any construction works and stored on-site in stockpiles for reuse in the on-site landscaping.

Additionally, the following works have the potential to impact on the land and soils:

- Excavations for utilities and services;
- Importation of suitable construction material;
- Backfilling of excavations;
- Topsoil reinstatement; and
- Removal off-site of unsuitable and surplus material.

It is intended that any surplus of materials generated on the site will be minimised.

10.4 Predicted Impacts

10.4.1 Construction Stage

Prior to the commencement of any construction works, the topsoil on the site will be stripped and removed to stockpiles. Stockpiles will be located in designated areas within the site boundary, located outside the Riparian Corridor/buffer zones of the Broadmeadow River as defined by the project ecologist for later re-spreading on completion of the works where possible.

The removal of topsoil and the earthworks will expose subsoil to weathering and may result in some minor erosion of the soils during the construction period, in particular, following extreme dry and sunny or prolonged wet weather conditions. The lack of topsoil is likely to give rise to dust from the subsurface during dry periods.

Construction traffic movements involved in the construction of the proposed development and access roads may result in local compaction of the subsoil along haulage routes.

During the construction phase, there is a risk that construction traffic will damage the structure of the adjoining road network and increase the amount of mud and dust on the roads providing access to the site.

There will also be a temporary increase in traffic volumes due to deliveries of stone fill materials and removal of surplus unsuitable cut materials which are addressed in the Traffic and Transportation Chapter of this EIAR.

During adverse weather conditions surface water runoff across the exposed sub-soil could result in increased levels of silt being deposited in the Broadmeadow River to the North of the site.

Some minor local contamination of the watercourse and/or subsoils may occur should chemicals or fuels used during the construction phase spill derived from human error.

Excavation for structural piling could give rise to increased noise levels, as outlined in the accompanying noise chapter, noise will be monitored on site and the mitigation measures adopted where necessary.

The construction of the proposed development has the potential to cause **a slight, adverse, temporary, impacts** on receiving lands and soils.

10.4.2 Operational Stage

On completion of the construction phase and following replacement of topsoil and a planting program, no further impacts on the soil environment are envisaged. Should the landscaping not be maintained, and replanting carried out where necessary there is a risk of the topsoil becoming exposed and damaged over time.

10.4.3 Do nothing Scenario

The Ground conditions will remain as they currently are, and the valuable opportunity to develop housing on this site will be missed.

10.5 Mitigation Measures

10.5.1 Construction Stage

The provision of wheel wash facilities at the construction entrance to the development will minimise the amount of soil deposited on the surrounding road network. The adjoining road network will be cleaned regularly, if required, to prevent the build-up of soils from the development site on the existing blacktop roads.

Measures will be implemented throughout the construction stage to prevent contamination of the soil and adjacent watercourses from oil and petrol leakages and siltation. Suitable bunded areas will be installed for oil and petrol storage tanks. Designated fuel filling points will be put in place with appropriate oil and petrol interceptors to protect the ground from accidental spills. Spill kits will be provided by the Contractor to cater for any other spills.

Cut off trenches along the northern boundary of the development will be constructed before stripping topsoil. These cut off trenches will have a settlement pond/silt trap at the end of each trench with an overflow. Straw bales will be placed within the cut off trenches at strategic locations and at the outfall of the settlement ponds to the overflow. These measures will be implemented and maintained during the construction phase to prevent silt runoff into the existing ditches/watercourses during the drainage works.

Dampening down measures with water sprays will be implemented during periods of dry weather to reduce dust levels arising from the development works.

The contractor will be obliged to ensure that any sub-contractors engaged on the site are made fully aware of the required mitigation measures and that they are properly implemented as part of any works that they undertake.

After implementation of the above measures which are also outlined in the Construction and Environmental Management Plan, which forms part of the application provided under a separate cover, the proposed development will not give rise to any significant long-term adverse impact. Negative impacts during the construction phase will not be significant and will be short term only in duration.

10.5.2 Operational Stage

Within the development, landscape areas will be topsoiled and planted in accordance with the proposed landscaping plan. Following completion of these reinstatement works and once an appropriate landscape maintenance and replanting programme is adopted during the operational stage, no significant adverse impacts on the lands, soils and geology of the subject lands are envisaged.

A comprehensive drainage network will be constructed comprising Detention Basins, Grass Swales, Filter Drains and Permeable Paving to ensure that the lands drain effectively following their reshaping / re-profiling. The drainage system incorporates sustainable urban drainage methods to clean flows

before discharge to the Broadmeadow River. Please refer to the enclosed drainage drawings which provide full details of the drainage network to be constructed withing the development.

10.6 Residual Impacts

10.6.1 Construction Stage

After the implementation of the mitigation measures outlined above, the proposed development will not give rise to any significant long-term adverse impact. Negative impacts during the construction phase will not be significant once the appropriate mitigation measures are adopted and will be only short term in duration.

10.6.2 Operational Stage

No significant adverse impacts on soil and geology, resulting from the proposed development are predicted.

10.7 Cumulative Effects

It is not anticipated that potential cumulative impacts will be generated on the land and soils during the construction or operation phases or in the event of future developments adjacent to the site should they implement the appropriate mitigation measures.

10.7.1 Future SHD Development

The applicant does not control the entirety of the Estuary West Masterplan lands. This current application, therefore, relates to the lands controlled by the applicant and aims to deliver critically required residential units. The design approach has been carefully considered to deliverer the proposed development without compromising the future potential school and commercial development of the Estuary West Masterplan.

There are no additional impacts anticipated on Land and Soil as a result of any future development.

10.8 Monitoring

10.8.1 Construction Stage

Monitoring as outlined below, during the construction phase will be undertaken. These measures form part of the Construction Environmental Management Plan, submitted under a separate cover.

- Adequate protection of the topsoil stockpiled for reuse,
- Monitoring of surface water discharged to existing sewers and stream,
- Monitoring cleanliness of the adjoining road network,
- Monitoring measures for prevention of oil and petrol spillages, and
- Dampening down measures close to the boundaries of the site in dry weather.

10.8.2 Operational Stage

No operational stage / post-development monitoring will be required.

10.9 Difficulties Encountered

There were no difficulties encountered.

10.10 Interactions

The main high-level interactions between Land, Soils and Geology and other environmental factors include: Biodiversity, Air & Climate, Traffic and Transport and Water. Please refer to Chapter 16 Interactions for further information on interactions.

10.11 References

Geological Survey of Ireland 1:100,000 scale bedrock maps

Google maps, 2019

Site Investigations Ltd, Report Number: 5415

Site Investigations Ltd, Report Number: 5588

Site Investigations Ltd, Report Number: 5769

Ordinance Survey of Ireland historical map. www.osi.ie

Subsoils datasets Teagasc (www.gis.teagasc.ie)

Site walkover visits

11. Water

11.1 Introduction

This chapter has been prepared by Waterman Moylan Consulting Engineers for Cairn Homes Properties Ltd. by Emma Caulwell CEng MICE, a civil engineer with 10 years' experience in preparing planning submissions for housing developments, and checked by Joe Gibbons CEng MICE and Director of Waterman Moylan, with over 30 years' civil engineering experience in the industry.

This section of the Environmental Impact Assessment Report describes the impact of the proposed development on the surrounding hydrological (surface water) and hydrogeological (groundwater) environment both during the construction and operation phases. The impact of the surface water drainage proposed as part of the development will also be assessed in this chapter.

The proposed development is located at Holybanks, Swords, Co. Dublin.

11.2 Assessment Methodology

The methodology followed for this section is in accordance with the EPA "Environmental Impact Assessment Reports, Draft Guidelines 2017".

The following information sources were used in the assessment of the local hydrology and hydrogeological aspects of the proposed development site.

- Geological Survey of Ireland (GSI) Website;
- Environmental Protection Agency;
- Office of Public Works (OPW) National Flood Hazard Mapping;
- OPW Catchment Flood Risk and Management Studies;
- Ordinance Survey Mapping;
- Topographical Survey; and
- Site investigation reports and soakaway testing.

The following methodology has been adopted for this assessment:

- Review of relevant information including, where available, Development Plans, existing drainage information and other relevant studies as outlined above including the site investigation for the site;
- Consultations with Fingal County Council to agree on the drainage strategy, and
- Review of the Estuary West Masterplan.

11.3 Baseline Environment

11.3.1 Site Development

The site is in Swords, Co. Dublin. The site is bound by Glen Ellan Road to the south, Jugback Lane/Terrace to the west, the former Celestica factory site to the east and the Broadmeadow River to the north.

In addition, as part of this application, a Stormwater Storage Tank is being proposed in the Celestica/Motorola site which is directly adjacent east to the main subject site. The Celestica site is located on the junction of the Glen Ellan Road and the Balheary Road, Swords, Co. Dublin. The proposed road upgrades are located on The Glen Ellan Road, Balheary Road junction and at the Estuary roundabout to the southeast of the site.

Swords Celtic Football Club and its associated sports grounds are located to the north, on the opposite side of the Broadmeadow River. The Swords Business Campus is also located to the east of the site on the opposite side of Balheary Road.

11.3.2 Hydrology (Surface Water)

The main subject site falls from the south to north ranging in level from 14 m in the southwest to 5.6m in the northeast.

The Broadmeadow River is a watercourse that traverses the northern boundary of the subject site. The EPA Maps show this part of the Broadmeadow River as being at risk of not achieving it's Water Framework Directive (WFD) objectives which is to return all our waters to Good Status.

The existing ground topography of the proposed Stormwater Storage tank location ranges from 6.30m-6.90m, with gentle gradients falling from west to east and from north to south.

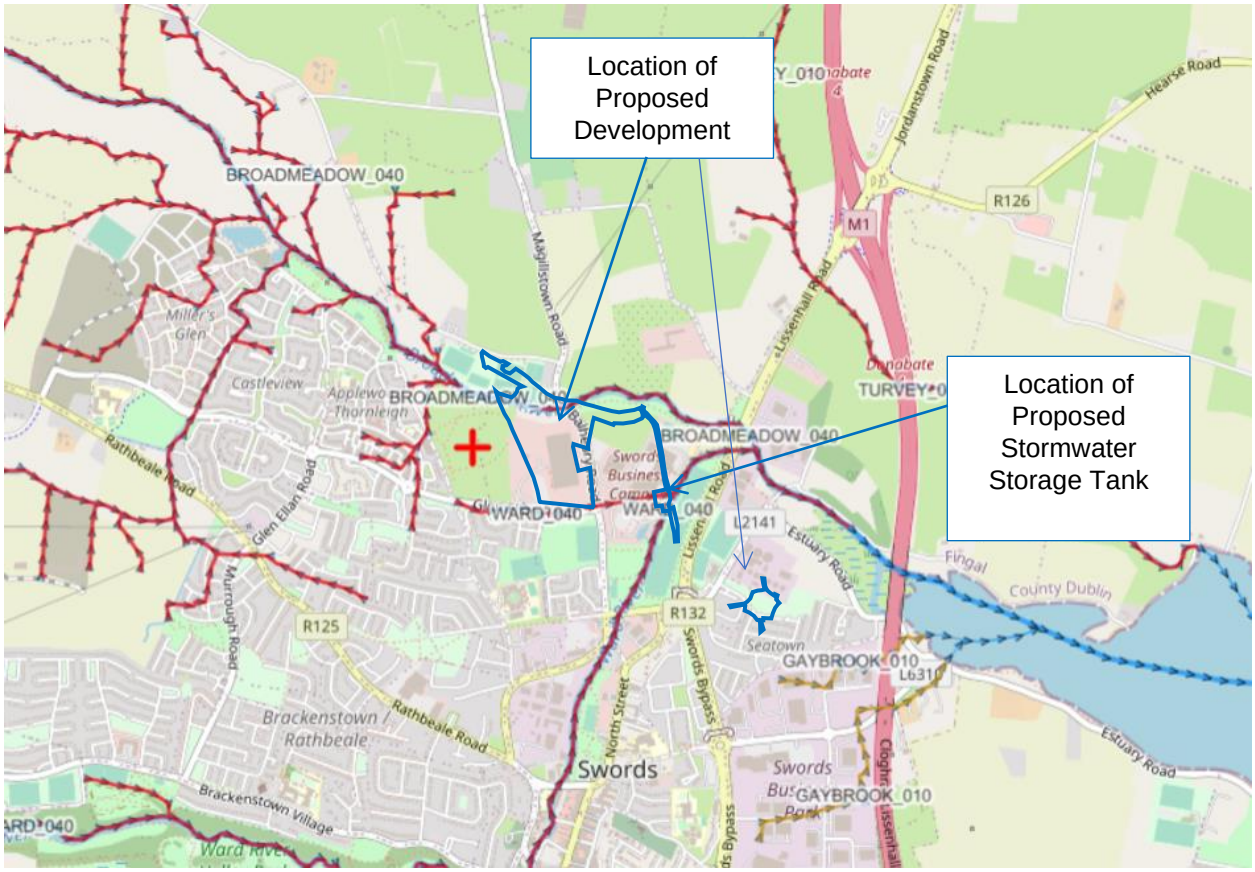


Figure 11.1: River network status in the surroundings of the subject site

11.3.3 Hydrology (Groundwater)

A review of the Environmental Protection Agency website database at https://gis.epa.ie/EPAMaps/ classifies the groundwater risk on the subject lands as 'Not at Risk', which is indicated by the green shading in Figure 11.2 below. The groundwater risk looks at the current water quality and trends and is used to highlight waterbodies that are at risk of deteriorating or being at less than good status in the future.

Figure 11.2 Groundwater Waterbodies Risk Map

GSI's aquifer classes are divided into three main groups based on their resource potential, and further sub-divided based on the type of openings through which groundwater flows. A review of the GSI database revealed that the aquifer below the subject lands is classified as LI, locally important aquifer i.e. the Bedrock is moderately productive only in local zones.

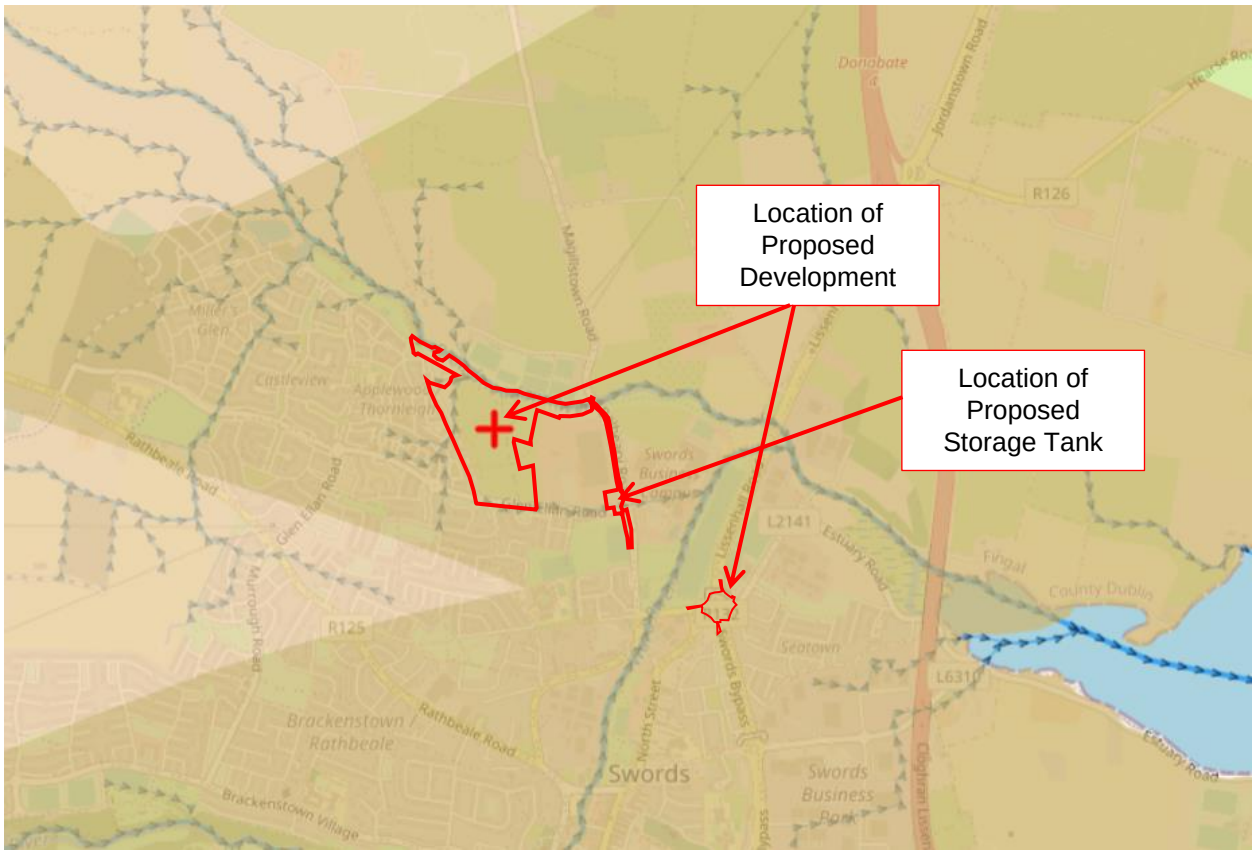


Figure 11.3: GSI Aquifer

11.3.4 Flood Risk Assessment

A Flood Risk Assessment has been prepared by JBA Consulting Engineers. A review of the available historic information confirms that areas to the north and west of the site have experienced historic flooding. A site-specific hydraulic model has been developed to investigate further the flood risk to the site and includes the assessment of climate change and residual risks. This is considered in further detail below.

11.3.5 Characteristics of the Proposed Development

The proposed scheme will consist of the development of the existing circa 14.17 Ha vacant site to provide a total of 621 no. residential units. It is proposed to supply a Stormwater storage tank and outfall utilising lands on the Celestica site to alleviate known constraints in the foul water network that services the Oldtown / Mooretown / Holybanks lands catchments. The outfall will be provided via a c. 350m long, 300m diameter pipe & headwall outfalling to the Broadmeadow River. The outfall headwall to the Broadmeadow shall be fitted with a tide-flex (or similar approved) non-return valve to ensure surcharge from the Broadmeadow will not back up into the proposed pipe and tank during extreme events.

The stormwater storage tank, the tank will store stormwater that would otherwise be discharged unimpeded to the Broadmeadow River. The function of the stormwater storage tank activates when the current IW foul water system overflows during heavy rainfall events and surface/storm water infiltration into the foul water drainage network occurs. The tank therefore will capture the surface/storm water and foul waters that are generated during heavy rainfall events, stopping these mixed, deleterious waters from discharging directly to the river, and thereby reducing the potential for contaminants present in the mixed storm/foul water to enter the stream.

The proposed tank will alleviate constraints within the Irish Water foul water system, that occur during times of heavy or prolonged rainfall. Waterman Moylan has prepared a report to address the proposed Stormwater Storage tank which is included as part of the planning submission under a separate cover.

The total gross area of this application is circa 14.17 Ha. The catchment area for surface water is 10.83ha and does not include the green corridor along the Broadmeadow River or the wayleave to the south of the site. The Estuary West Masterplan stipulates that the post-development run-off rates are limited to 2l/s/ha for the site. Therefore, the proposed design is based on an outflow of 21.6 l/s. It will be necessary to treat and then store excess stormwater within the site. This will be achieved by using a Sustainable drainage network of green roofs, swales, an attenuation pit, detention basins and permeable paving. Further detail on the calculation for surface water attenuation and the final run off from site are included in the Engineering Assessment Report included as part of this application under a separate cover.

The subject site will be split into 3 No. catchments for surface water attenuation. These catchments are indicated on Surface Water catchment drawing No. 17-088-P122 and in figure 11.4 below. It is proposed to discharge surface water from the site via an onsite SUDS system to this Broadmeadow River which subsequently discharges to the Broadmeadow Estuary. The proposed drainage on-site will protect and improve the quality of the surface water discharging into the Broadmeadow River.

The summary for all the surface water catchments is as follows:

- Catchment A: This catchment comprises the southern area of the access road to the site off Glen Ellen Road. Surface water from the road will discharge into a swale located along the edge of the road. During high intensity rain events, surface water from the swale will discharge into an attenuation pit located to the southeast of the road before discharging via a hydrobreak into the existing public sewer located on Glen Ellen Road. The max outflow from this catchment is 2l/s.
- Catchment B: this catchment is comprised of the southern area of the subject site including the apartment buildings to the south. Apartment buildings will have green roofs which will reduce surface water runoff before discharging to the local network. The rest of the catchment will drain

to the local network where storage will be provided in a series of swales along the main access road and a central detention basin. A hydrobreak located at the end of the basin will allow some of the water to store in the detention basin before discharging into Catchment C. The max outflow of this catchment is 30 l/s.

- Catchment C: the northern area of the site comprises this catchment. This catchment receives surface water from catchment B. Storage will be provided in a series of swales along the length of the residential road and a detention basin in the green space to the north of the site for final storage and treatment before discharging into the Broadmeadow River. The max outflow from this catchment is 19.6 l/s.
- The total runoff from site is the runoff from Catchment A and the runoff from Catchment C which equates to 21.6l/s and is in line with the peak run-off set out in the Estuary West Masterplan.

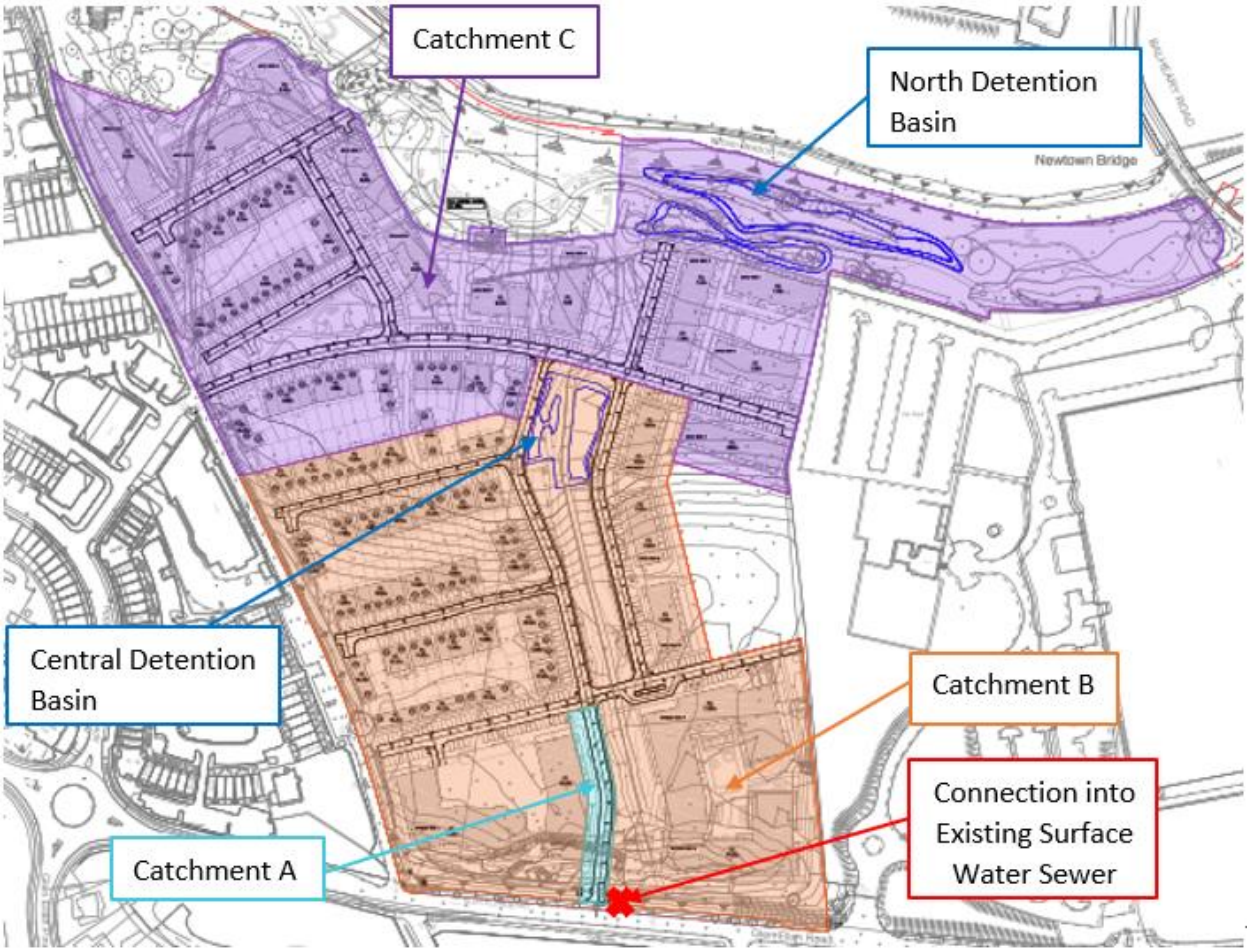


Figure 11.4 **Surface Water Catchment Areas**

Additionally, permeable paving will be installed throughout the site providing initial treatment for the surface water. The stormwater system will be designed to cater for the 1 in 100-year storm plus a 20% allowance for climate change In line with design requirements and best practice.

Construction activities with a possible impact on surface water and groundwater features will include the following:

- Excavation of soil, sub-soil and vegetation;
- Infilling and landscaping will be undertaken;
- Excavation of basement.; and

- Temporary storage/use of fuel/oils on-site will be required for construction machinery.

Operational Activities will include the following:

- The total hardstanding area will be increased. It is expected that the surface water will be discharged to the existing watercourse following attenuation to greenfield run-off rate and discharged through a petrol / hydrocarbon interceptor. A hydrobrake system, which restricts the flow of water through the use of an orifice plate, will be employed to manage the outflow.

11.4 Predicted Impacts

The potential impacts of the proposed development from both a hydrology (surface water) and hydrogeology (groundwater) perspective at construction and operational stages are outlined in the following sections.

11.4.1 Construction Stage

Significant amounts of site stripping and excavation will be required to construct the development. When the site has been stripped layers of sub-soil will be exposed to weathering and there will be potential for erosion due to rainfall and subsequent runoff. The erosion of soil can lead to sediments being washed into the receiving watercourses /sewers at higher rates of runoff.

There is also potential during the development's construction stage that contaminants from cement/concrete be washed into the receiving watercourses/sewers.

There is a risk of pollution of groundwater/watercourses/soils by accidental spillage of oils/diesel from temporary storage areas or where maintaining construction equipment.

Foul water could be connected to the surface water drainage network resulting in the contamination of the receiving watercourses. Furthermore, if there is damage to any foul pipes, there is potential for contaminants to seep into the groundwater.

Contamination from faecal coliforms can arise if there is inadequate containment and treatment of onsite toilets and washing facilities.

Groundwater was not encountered in any of the three boreholes where the basement is to be located, therefore the chance of impacting on the existing ground water during construction is minimal.

Should groundwater be encountered during construction, the water table will need to be locally lowered, for the duration of the basement construction or the Surface Water Storage Tank construction. As there are no buildings in close proximity to the proposed basement, there are no negative effects associated with temporarily lowering the watertable.

The construction of the proposed development has the potential to cause **a slight, adverse, temporary, residual impact** on receiving watercourses/groundwater.

11.4.2 Operational Stage

The proposed development will result in increased impermeable areas and there is potential for an increase in the risk of higher rates of surface water runoff leading to increased downstream flooding.

There is a potential impact for the discharge of contaminants from the proposed development and road surfaces to the surrounding drainage network. These would include particulates, oil, soluble extracts from the bitumen binder etc. The quality of runoff from the site would be dependent on the time of year, weather, particulate deposition from the atmosphere and any gritting or salting carried out by the Local Authority. The time of year has a major bearing on the quality of stormwater run-off - in particular, the

first rains after a prolonged dry period where accumulated deposits of rubber, particulates, oils, etc. are, washed away.

There is potential for leaks in the foul network to result in contamination of the groundwater.

Accidental spills of fuels/hydrocarbons and washing down into the drainage pipe network has the potential to impact the receiving hydrogeology.

The flood risk assessment carried out by JBA has been based on a model based on an up-to-date site survey and LIDAR data. A conservative approach has been undertaken for the site-specific FRA and a 95 percentile FSE (1.85) has been applied to the peak flow (1%/0.1% AEP) hydrology values. The resulting flood maps from the modelling study confirm that all the proposed residential dwellings are located in Flood Zone C. Flood Zone C is an area where minor inundation occurs during the 1% and 0.1% AEP event along the boundary with the Broadmeadow River, however, this area of the site will be utilised as greenspace only and therefore will not pose a risk to development.

Residual risks and climate change (High End Future Scenario scenario) have also been assessed for the site. The residual risk has included the potential blockage of the Balheary Road bridge downstream of the site. The freeboard available to the site from the residual risk (blockage) and climate change (HEFS) are 0.78m and 0.75m respectively. A review of the hydraulic model results shows there is no increased flood risk to the site in any of the fluvial residual risk events assessed.

Pluvial flood risk has also been reviewed for the site. A detailed stormwater system has been designed for the site to minimise increased pluvial flood risk generated by the increase in hardstanding area, refer to the supporting stormwater section of the Engineering Assessment Report included as part of the submission. In the event of the stormwater system failing the minimum FFL on site of 7.40mOD provides over 150mm freeboard above the external hardstanding areas.

In summary, the key areas of the proposed site are located within Flood Zone C and therefore suitable for the development of residential and commercial buildings.

The proposed stormwater tank provides a storage facility to capture overflow in the IW network and reduce outfall to the Broadmeadow River. As such, it will improve the infrastructure capacity available to reduce the outflow to protected sites and rivers.

As a stormwater storage tank, the tank will store stormwater that would otherwise be discharged unimpeded to the Broadmeadow River. The function of the stormwater storage tank activates when the current IW foul water system overflows during heavy rainfall events and surface/storm water and foul water infiltration occurs. The tank therefore will capture the surface/storm water and foul waters that are generated during heavy rainfall events, stopping these mixed, deleterious waters from discharging directly to the river, and thereby reducing the potential for contaminants present in the mixed storm/foul water to enter the stream. In this way, the tank will improve the capacity of the network to prevent the discharge of pollutant material to the Broadmeadow River, and by extension, the Malahide Estuary SAC and SPA.

Any artificial lowering of the groundwater table during construction will be immitted to the construction of the basement/Stormwater Storage Tank and the groundwater would return to its natural level post construction. Therefore, there are no residual impacts of the proposed development on groundwater.

The operation of the proposed development has the potential to cause a **slight, adverse, temporary, residual** impact on receiving watercourses/groundwater.

11.5 Mitigation Measures

This section of the report will discuss mitigation measures to reduce the impact of the proposed development on the surrounding water environments during the construction and operation phase.

11.5.1 Construction Stage

A Construction and Environmental Management Plan (CEMP) has been prepared for this application and is included under a separate cover as part of the proposed application that outlines the mitigation measures. The CEMP will be updated by the appointed contractor. To minimise the potential impact of the construction phase of the proposed development on the surrounding surface water and groundwater environs, the following construction stage mitigation measures are to be included in the plan and will be implemented in full.

- The contractor will appoint a suitably qualified person to oversee the implementation of measures for the prevention of pollution to the receiving surface water environment.
- To minimise the adverse effects, the prevailing weather conditions and time of year is to be taken into account when the site development manager is planning the stripping back of the site.
- Site stripping will be minimised as far as practicable.
- Cut off trenches together with settlement ponds/silt traps will be provided to prevent silt runoff into the existing sewers/watercourses during the drainage works.
- Regular testing of surface water discharges will be undertaken at the outfall from the subject lands. The location for testing and trigger levels for halting works will be agreed upon between the project ecologist and the site foreman at the commencement of works.
- Where silt control measures are noted to be failing or not working adequately, works will cease in the relevant area. The project ecologist will review and agree on alternative pollution control measures, such as deepening or redirecting trenches as appropriate, before works may recommence.
- All fuels and chemicals will be bunded, and where applicable, stored within double skinned tanks/containers with the capacity to hold 110% of the volume of chemicals and fuels contents. Bunds will be located on flat ground a suitable distance from any watercourse or other water-conducting features, including the cut off trenches.
- Foul and surface water pipes will be carefully laid to minimise the potential for cross-connections which results in contamination of receiving watercourses.
- Site personnel inductions are to be conducted such that all site personnel are made aware of the procedures the best practice in relation to the management of surface water runoff and groundwater protection.
- Where possible, precast concrete units are to be used to avoid on-site “wet” mix concrete usage. In situ concrete pours are to be managed in accordance with best practice to avoid overspills
- Concrete truck and wheel wash down facilities are to be provided in designated areas. Discharge from these areas is to be directed into the settlement ponds/silt traps.
- Topsoil for landscaping will be located in such a manner as to reduce the risk of washing away into local drainage or watercourses.

11.5.2 Operational Stage

The implementation of the following operation stage mitigation measures will minimise the impact on the hydrology and hydrogeology aspects of the development lands.

- The surface water drainage network has been designed in accordance with the CIRIA SUDS Manual and the Greater Dublin Strategic Drainage Scheme. The appropriate interception mechanisms and treatment train process has been incorporated into the design.
- Surface water outflow will be restricted to the equivalent greenfield runoff rate.
- Flow restrictors with attenuation storage will be used to slowdown and store surface water runoff before discharging at green field rates to the river.
- Attenuation systems will be constructed on-line to intercept the first flush during rainfall events after periods of dry weather.

- Sustainable urban drainage measures, including green roofs, permeable paving and filter strips/ swales will be provided to improve water quality.
- A petrol interceptor will be installed to prevent hydrocarbons from entering the local drainage system.
- The attenuation storage systems will be constructed at a fall to maintain the movement of water and thus prevent stagnation. Silt will be collected at a sump and removed periodically.
- Regular inspection and maintenance of the drainage network, including petrol interceptor.

11.6 Residual Impacts

11.6.1 Construction Stage

Due to the proposed mitigation measures outlined above, and the implementation of a Construction and Environmental Management Plan, the impact during the construction stage on the hydrology and hydrogeological aspects of the lands are not significant.

11.6.2 Operational Stage

As outlined, in the AWN Stormwater Overflow & receiving stream assessment (Broadmeadow) assimilation simulation evaluation report and the Waterman Moylan (WM) Stormwater Storage Tank Report, the stormwater storage tank will store water that would otherwise had been discharged unimpeded to the Ward River. Details of the reduction in overflow to the Ward/Broadmeadow River are outlined in both the AWN and WM reports. Therefore, the proposal will provide a significant improvement on the existing situation, where uncontrolled flooding of the foul network occurs frequently. It should be noted that the discharge of the intermittent overflow from the tank is not significant in providing dilution improvement within the Broadmeadow based on volume. The flow in the Broadmeadow is c. 500-600 times greater than the outfall flow. The overflow is not expected to bring dilution to the river due to this disproportion and the duration of the discharge.

As concluded in the AWN report, the proposed development including the stormwater storage tank does not have the potential to cause a deterioration in the Water Framework Status.

Due to the proposed mitigation measures outlined above many of the potential impacts will not arise during the operational phase of the proposed development on surface water and groundwater quality.

Surface water discharge from the site will be restricted using attenuation, therefore, no adverse impact in respect of flooding downstream will arise from the proposed development.

The installation of a Sustainable Urban Drainage System, in line with the SUDS Manual will ensure surface water runoff will be of high quality before discharge to the receiving river to the north of the site and will not have an impact on the receiving watercourse. Further details on the treatment provided to surface water run off is outlined in the accompanying Engineering Assessment Report provided as part of this application.

11.7 . Cumulative Impacts

11.7.1 Committed Housing Development

Evidently, the applicant does not control the entirety of remaining lands to provide consolidated development to the remaining Estuary West Masterplan. This current application, therefore, relates to the west of the Estuary West Masterplan Development area, on lands that can deliver critically required residential units. There has been a carefully considered design approach to development to ensure that the subject application can be delivered without compromising the future potential for the development of the East phase of the West Estuary Masterplan.

The Masterplan successfully integrates this new phase of development with the existing stream to the north of the subject site. The approach has been to set the blocks around different public open spaces, which complements the existing scheme and delivers significant enhancements to the public realm.

As with the proposed development, development of the eastern side of the Estuary West masterplan will increase the impermeable areas and there is potential for an increase in the risk of higher rates of surface water runoff leading to increased downstream flooding. Both phases will discharge surface water to the Broadmeadow River. Both phases are independent of each other with separate outfalls to the Broadmeadow River which will restrict the surface water discharge at a peak rate of 2l/s/ha in line with the Estuary West Masterplan. Therefore, no significant additional impacts are anticipated to arise as a result of any future development.

11.7.2 Construction Stage

Any permitted adjacent developments will have no impact on the existing water on or immediately adjacent to this site. Due to the proposed mitigation measures outlined above, and the implementation of a Construction and Environmental Management Plan, the impact during the construction stage on the hydrology and hydrogeological aspects of the lands, even when considered alongside other developments in the area are not significant.

11.7.3 Operational Stage

There are no additional operational stage impacts that have not already been addressed above when the development of other local sites is considered. Therefore, there are no additional operational stage cumulative impacts as a result of the development.

The cumulative impact following the operational phase mitigation measures outlined above are negligible.

11.8 Do Nothing Scenario

In this scenario, surface water runoff would continue to be discharged to the receiving river at existing un-restricted discharge rates. The receiving watercourses and groundwater aquifers would remain in their current state and there would be no change.

11.9 Risks to Human Health

There is a risk to Human Health should the groundwater or the existing water supply become contaminated during the construction or operational stages, and the untreated water is consumed. To mitigate these risks the measures outlined above will be adopted.

11.10 Worst Case Scenario

The worst-case scenario in relation to hydrology and hydrogeology during the construction phase would be the failure to implement the mitigation measures outlined above. This may result in the contamination of the receiving surface water network and/or groundwater.

In relation to the operation stage, the worst case would be the flooding of the surface water drainage network. In this regard, the network has been designed to accommodate a 20% increase in flows due to climate change in line with national standards and best practice. Finished floor levels have also been set with appropriate freeboard and an overland flood route through the site has been provided.

Implementation of the mitigation measures outlined in this document will reduce the risk of the worst-case scenario occurring, making this unlikely.

11.11 Monitoring

11.11.1 Construction Stage

Implementation of the Construction Environmental Management Plan is required to protect the hydrology and groundwater elements of the subject lands during the construction stage. Maintenance of the mitigation measures and monitoring of the management processed is required to ensure best practice. The monitoring measures to be implemented include:

- Monitoring of the management and storage of dangerous chemicals and fuel;
- Monitoring and maintenance of the wheel wash facilities;
- Regular maintenance and monitoring of the sediment control measures; and
- Monitoring and maintenance of the SUDS features, road gullies and, detention basins during the construction phase of the development.

11.11.2 Operational Stage

Monitoring and maintenance of the SUDS features, road gullies, attenuation and flow control devices are imperative during the operation phase of the development.

11.12 Difficulties Encountered

There were no difficulties encountered compiling the Water chapter of the EIAR. Due to the proposed mitigation measures in both construction and operational phase, the impact on the surface and groundwater is considered not significant and not likely, alone or in combination with any other plans or projects, to have a significant effect on the environment.

11.13 Interactions

The main high level interactions between Water and other environmental factors include: Utilities, Land, Soils & Geology and Biodiversity. Please refer to Chapter 16 Interactions for further information on interactions.

11.14 References

- Environmental Impact Assessment Reports – Draft Guidelines, (2017), Environmental Protection Agency
- Environmental Protection Agency available at http://gis.epa.ie/EPAMaps/
- Geological datasets available at www.gsi.ie
- Greater Dublin Strategic Drainage Study (GDSDS), (2015), Dublin Drainage
- OPW Eastern CFRAM study
- OPW Flood Hazard Mapping

12. Population and Human Health

12.1 Introduction

This section of the EIAR assess any potential impacts the proposed development may have on Population and Human Health in accordance with the requirements set out within the EIA legislation and guidance on preparation (detailed in Section 12.2 below) and content of EIAR. This chapter has been prepared by Maria Rochford, MRUP IPI, Associate Director (Planning) at KPMG Future Analytics. Maria has 10 years' experience in the planning of residential schemes including the preparation and project management of EIARs and the preparation of Population and Human Health assessments.

Population and Human Health is a broad ranging topic and addresses the potential likely significant direct and indirect effects of the proposed development on population and human health. The assessment considers the existence, activities, and wellbeing of people. It comprises an important aspect of the environment to be considered. This chapter describes the demographic and socio-economic profile of the receiving environment and potential impact of the proposed development on population, i.e. human beings, and human health. Any likely negative impacts would be addressed through mitigating factors and actions to be applied to minimise these effects.

As per the description of development set out in Chapter 3, the proposed development will consist of a residential scheme of 621 no. units (145 no. 1-bed units, 278 no. 2-bed units, 187 no. 3-bed units and 11 no. 4-bed units) comprising 349 no. apartments, 118 no. houses and 154 no. duplex units. Building heights range from 1 no. to 7 no. storeys (over basement level). The scheme provides for public open space, communal open space areas, a crèche, residential amenities (including concierge, multi-purpose room, meeting room and gym), a new public park to the north of the site as an extension to Broadmeadow Riverside Park and services / bin store areas. The development provides for a total of 705 no. car park spaces, 856 no. secure bike parking spaces and 21 no. motorbike spaces at basement, under-croft, and surface level. As part of the proposed development, temporary permission (3 no. years) is sought for a single-storey Marketing Suite and associated signage (including hoarding) during the development construction stage. Principal vehicular access to the site is from Glen Ellan Road, with an additional new secondary site entrance provided from Jugback Lane/Terrace. Pedestrian connections are provided to the site from Jugback Lane/Terrace, Glen Ellan Road and the proposed Broadmeadow Riverside Park extension. The development also includes infrastructure upgrade works to local roads junctions, and existing Irish Water infrastructure including the construction of a stormwater storage tank and an overflow outfall gravity sewer to the Broadmeadow river, all associated ancillary and site development works above and below ground including hard and soft landscaping, boundary treatments, lighting, SuDs, pumping station, ESB substations and services to facilitate the development.

12.2 Assessment Methodology

This section has been prepared in accordance with the European Union EIA Directive 85/337/EC (as amended by 97/11/EC, 2003/4/EC, 2011/92/EU), Directive 2014/52/EU, and in accordance with the Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (published in August 2018) and the 2017 Draft EIA Guidelines published by the EPA. The 2014 Directive's title change to assess the impact on 'Population and Human Health' and the 2017 Draft EIA Guidelines published by the EPA have been adhered to, to ensure that the EIAR includes *'the assessment of impacts on population & human health should refer to the assessments of those factors under which human health effects might occur, as addressed elsewhere in the EIAR e.g. under the environmental factors of air, water, soil etc'.*

The assessment of potential impacts of the proposed development on the Population and Human Health of residents in the Study Area are based on local population information sourced from the Central Statistics Office (CSO) Census data captured in the previous Censuses of 2011 and 2016. Datasets analysed in this assessment include:

- Population Data
- Household Data
- Economic Activity and Employment Data

- General Human Health Data

Population data reflects on the growth, age and gender distribution, and nationalities of people in the Study Area. Household data reflects on the household composition and predominant family cycles of households in the Study Area. The economic and employment context draws on principle economic status data of persons in the Study Area aged 15 years and older. Census data was also used to reflect on the (self-evaluated) general health status of residents in the Study Area.The data used analyses the socio-economic and demographic attributes of the Study Area as recorded by the Census at ED level. Data from the 2011 and 2016 Censuses were used to identify and highlight change in the social fabric of the Study Area over time. Data on social infrastructure was obtained from the following sources:

- Department of Education and Skills
- TUSLA – information on childcare facilities
- POBAL Geoprofiling reports

To provide further context to the social and demographic assessment, a similar data analysis exercise, but at broader scale, was performed on the Fingal County Council (FCC) administrative area, Dublin City and the State. Furthermore, an assessment of the current provision of social infrastructure was conducted through spatial analysis.

12.3 The Study Area

The Study Area comprises of the subject site and the Swords-Lissenhall Electoral Division (ED) in which the site is located. The site is located to the northern edge of the Swords settlement area (as defined by the CSO settlement boundary). **Error! Reference source not found.** shows the subject Site location in r elation to the Swords settlement area boundary.

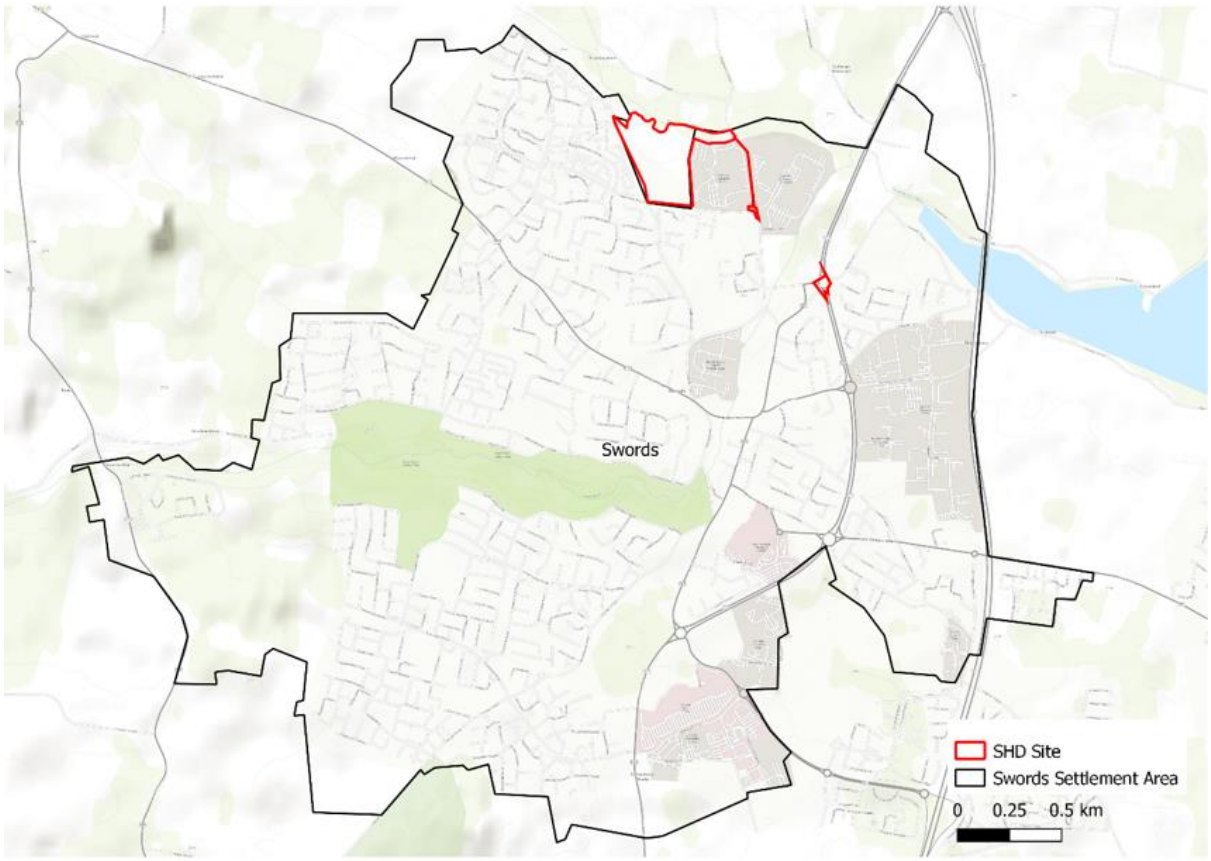


Figure 12-1 Core Application Site and Swords Settlement Area

To analyse the effects of the proposed development on Population and Human Health within the area surrounding the site, the Study Area was delineated as the Swords-Lissenhall ED that the site is located in. This Study Area provides a good representation of the socio-economic and demographic characteristics of the immediate populated area potentially impacted by the proposed development. The Study Area also captures an area of the Swords settlement approximately 1km from the site and the remaining part of the ED that extends north toward Ballyboghill and the R129.

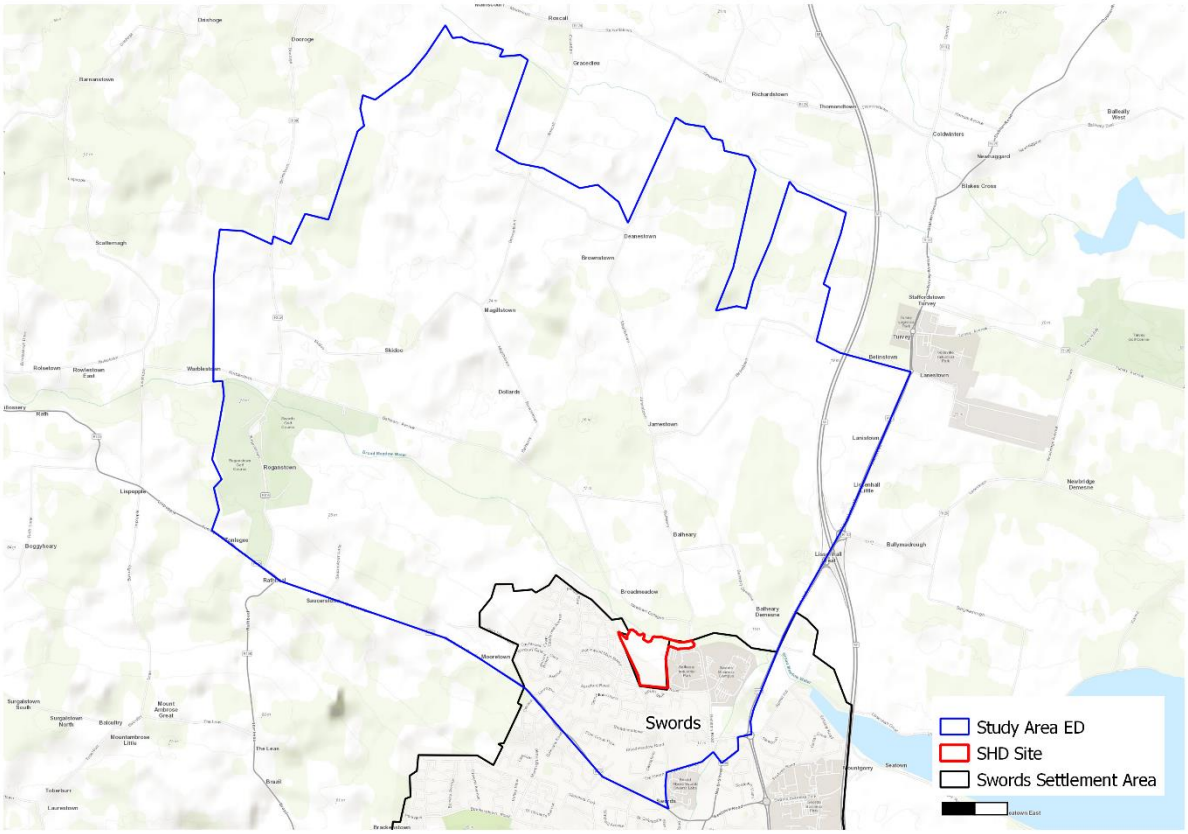


Figure 12-2 Study Area Electoral Division

The subject landholding has an area of approximately 14.17 hectares and is located on the northern side of the Glen Ellan Road, directly west of the former Celestica site (Balheary Demesne/ Balheary Industrial Park). It is situated on the northern boundary of the built-up area of Swords surrounded by a mix of mixed use residential (to the west and south), educational use reservation and vacant commercial industry (to the east) and by the Broadmeadow River estuary and recreational lands to the north.

Jugback Lane/Terrace runs parallel with the western boundary of the site, while the Broad Meadow River runs east-west along the north of the site. The site has an irregular shape and comprises scrubland to the most part. There are no structures or buildings contained within the boundaries of the site. The site is relatively flat and slopes gently towards the Broadmeadow River. The land is dissected by a hedgerow through the centre of the site.

There is no existing direct entrance to the subject landholding from Glen Ellan Road or Jugback Terrace. However, it is noted that there is an existing access way from the Glen Ellan Road at the southeast corner of the site, which provides vehicular and pedestrian access to the former Celestica premises. A private residence is located directly adjacent to the northwest corner of the site, along Jugback Terrace.

12.4 Baseline Environment

This section presents the findings of the baseline analysis of datasets relevant to population and human health. This analysis informs the professional conclusions reached as to duration and significant of impacts.

12.4.1 Population Characteristics

The closest neighbours to the subject site are the residential units situated along Jugback Lane/Terrace, at the western boundary of the site, which are located approximately 15m from the development site at their closest point. The Applewood residential settlement and village centre is situated to the rear of the houses on Jugback Lane/Terrace. The next closest dwellings are situated on Glen Ellan Road directly south of the proposed scheme and at a distance approximately 50 m from the site.

Figure 12-3 Closest residential receptors to the site

Data analysis on the Study Area and FCC administrative area show similar trends in the distribution of the population across various age cohorts, although the Study Area has a notably larger percentage population in the 35-44 age bracket.

Population growth in the Study Area matches that of FCC at an 8% increase from 2011 to 2016. Although the largest portion of the population of the Study Area is between the ages of 35 and 44, there was considerable growth in both younger and older age groups. As seen in Table 12.1, the Study Area recorded significant growth of 16% in the 0-14 age group (amounting to 402 people). Although the percentage growth in the 65+ age group is high at 50%, the numerical value of the increase is only 176 people in the intercensal period.

Table 12.1 Study Area, Dublin, and State Population by Age Group (Summary)

Age	Study Area				*Fingal County*	*Dublin*	*State*
	2011 No.	**2016 No.**	**% Change**	**% 2016**	***% 2016***	***% 2016***	***% 2016***
0-4	1,115	978	-12%	9%	8%	7%	7%
5-18	1,747	2,346	34%	23%	21%	17%	18%
19-34	3,021	2,384	-21%	23%	21%	26%	21%
35-64	3,434	4,213	23%	40%	40%	38%	40%
65+	350	526	50%	5%	*9%*	*12%*	*13%*
Total	**9,667**	**10,447**	**8%**		*296,020*	*1,347,359*	*4,761,865*

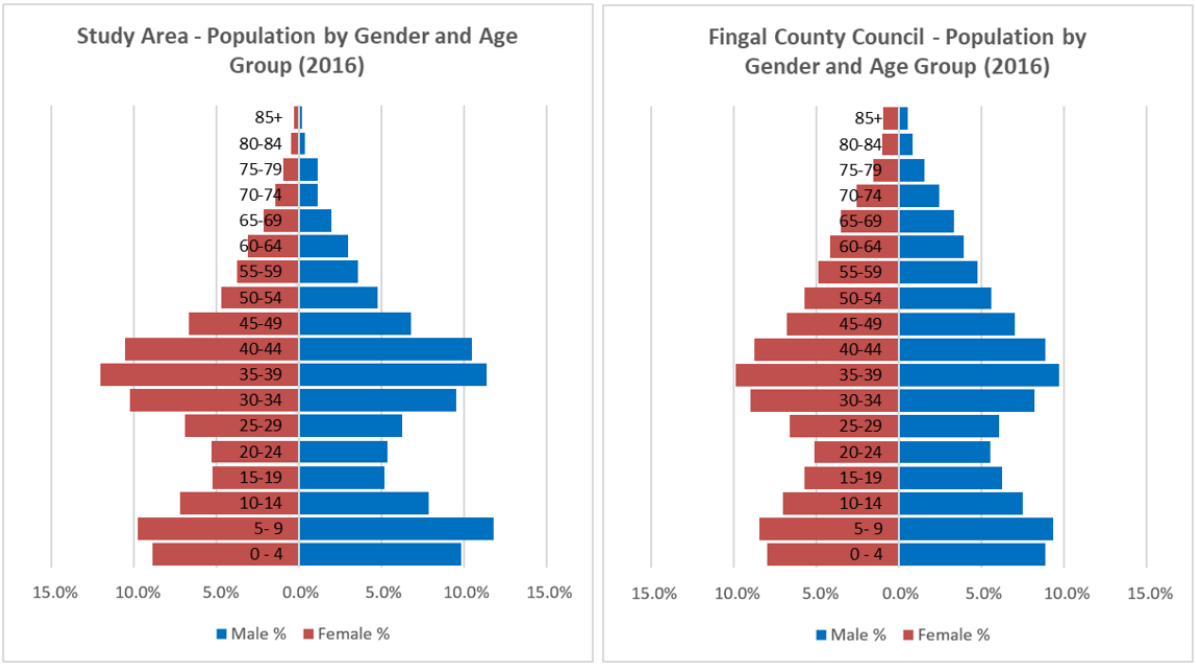


Figure 12-4 Study Area and Fingal County Council Population Pyramids

Though the growth rate of Swords is relatively steady (as a whole), the identification of Swords in the EMRA Regional Spatial and Economic Strategy (RSES) as a Key Metropolitan Town and Fingal County Council's growth strategy aiming to accommodate 100,000 persons in Swords by 2035, indicate that these steady growth patterns will most likely change significantly over the coming years.

While the resident population of both FCC administrative area and the Study Area is comprised in the majority by Irish nationals (82% and 77% respectively), there is a notable presence of other nationalities with polish and 'Other EU' nationals comprising 14% of the total population (majority share of 'Other EU' nationals). In addition, 3% identify as being from the 'Rest of the World', with the sum of all recorded foreign nationals contributing 21% (2,186) to overall population in the Study Area. The number of foreign nationals in the Study Area, however, decreased from 2011 to 2016 by 4%, with the largest decreases in foreign nationals from the UK (-6%) and the 'Rest of the World' (-36%). Foreign nationals in the Dublin region make up 15% of the population, compared to 11% foreign nationals in the State.

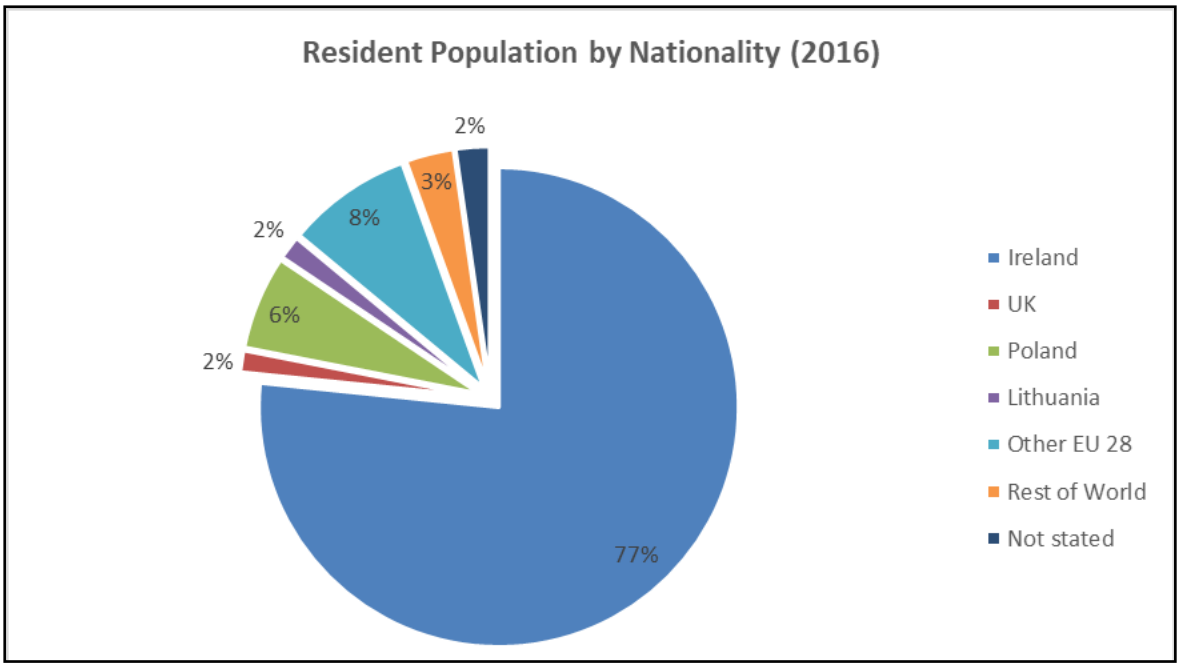


Figure 12-5 Usually Resident Population by Nationality in the Study Area

12.4.2 Household Characteristics

Trends in household data from the intercensal period for the Study Area are summarised in the table below.

Table 12.2 Study Area Household Composition

Composition of Households	Study Area				*Fingal County*	*Dublin*	*State*
	2011	**2016**	**Change**	**% 2016**	*% 2016*	*% 2016*	*% 2016*
One person	549	495	-10%	15%	*16%*	*23%*	*23%*
Married couple	354	337	-5%	10%	*14%*	*13%*	*15%*
Cohabiting couple	212	167	-21%	5%	*4%*	*5%*	*4%*
Married couple and children	1121	1256	12%	37%	*37%*	*27%*	*31%*
Cohabiting couple and children	173	194	12%	6%	*5%*	*4%*	*4%*
Father and children	42	49	17%	1%	*1%*	*1%*	*1%*
Mother and children	362	357	-1%	10%	*9%*	*9%*	*9%*
Couple and others	70	54	-22.9%	2%	*2%*	*2%*	*1%*
Couple children and others	84	130	55%	4%	*3%*	*2%*	*2%*
Father children and others	5	13	160%	0.4%	*0.3%*	*0.2%*	*0.2%*
Mother children and others	38	44	16%	1%	*1%*	*1%*	*1%*
Two or more family units	58	58	0%	2%	*2%*	*2%*	*1%*
Non-family households and relations	93	81	-13%	2%	*2%*	*3%*	*2%*
Two or more non-related persons	170	166	-2%	5%	*4%*	*7%*	*4%*
Total	**3331**	**3401**	**2%**				

The majority of households are composed of 'married couple and children' (FCC 37%; Study Area 37%) – up by 12% on 2011 levels, and 'one person' (FCC 16%; Study Area 15%) households – down by 10%

on 2011 levels. The third most notable household composition in the Study Area is 'mother and children' at 10% of the total households. Distribution is relatively evenly split across other compositions. The composition with the largest numerical change from 2011-2016 was 'married couple and children' (135; an increase of 12%). The State and Dublin, in comparison, have a higher percentage of 'one person' households and a lower percentage of households with 'married couple and children'. Coinciding with the increase in population aged 0-14, an increase in households with children is also evident.

As depicted by the changes in age distribution and household composition, family cycles in the study area show sharp increases in 'early school', 'pre-adolescent' and 'adolescent' families, with decreases in 'pre-school' and 'pre-family' families.

The changes reflected in the population, household composition, and family cycle data, and again in the increase in average household size from 2.91 (in 2011) to 3.09 (in 2016), suggest a shift in the Study Area as a preferable settlement area for larger households and families with children.

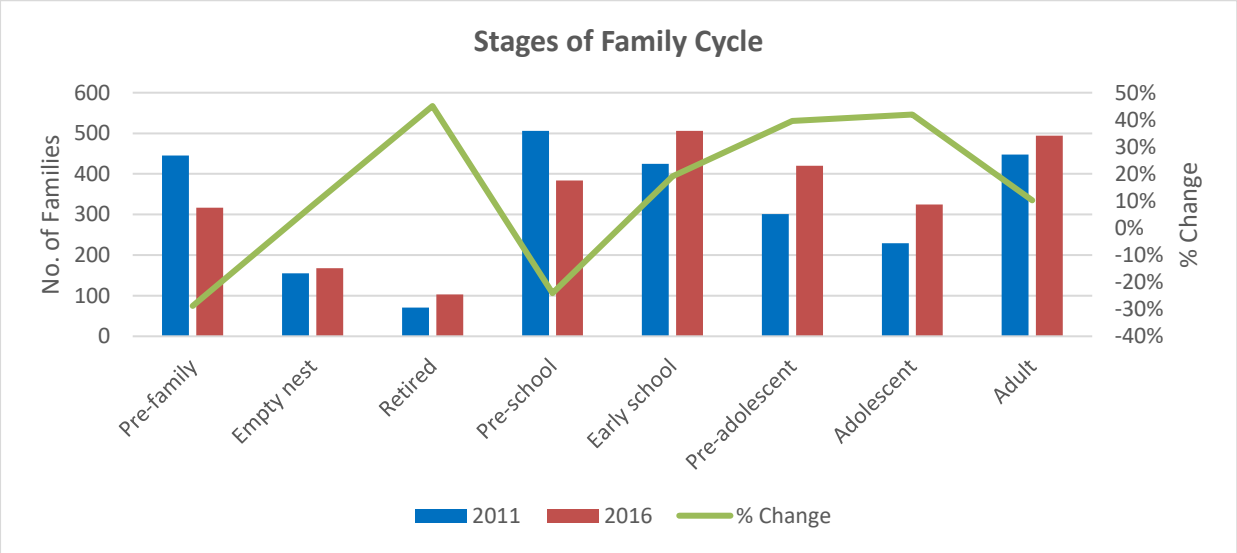


Figure 12-6 Stages of Family Cycles in the Study Area

12.4.3 Human Health

The Census records the self-evaluated general health status of respondents (as opposed to the health status confirmed by medical practitioners). In terms of general health and wellbeing, disparate changes were recorded throughout the spectrum as seen in Table 12.3.

Table 12.3 Study Area Population by General Health and Gender

General Health	Male			Female			Total			
	2011	2016	% Change	2011	2016	% Change	2011	2016	% Change	2016%
Very good	3027	3255	8%	3025	3272	8%	6052	6527	8%	62%
Good	1352	1372	1%	1334	1447	8%	2686	2819	5%	27%
Fair	230	255	11%	245	320	31%	475	575	21%	6%
Bad	35	53	51%	32	46	44%	67	99	48%	1%
Very bad	13	8	-38%	12	9	-25%	25	17	-32%	0%
Not stated	185	231	25%	177	179	1%	362	410	13%	4%
Total	4842	5174	7%	4825	5273	9%	9667	10447	8%	

A 31% increase (75) in females with 'fair' health is noted, and a 51% increase (18) in males with 'bad' health. When considering numerical values, however, there were significant increases in the number of people with 'very good' (475) and 'good' (133) health. Nearly 90% of the Study Area population classified themselves as not having serious medical issues and generally healthy people.

12.4.4 Economic Activity and Employment

The principal economic status as captured by the CSO, provides a breakdown of the number of people aged 15 years and older in the labour force at work as well as those looking for their first job or unemployed. Persons or groups over 15 years of age not participating in the labour force are typically students, home makers, retirees, and persons unable to work due to illness or disability and they are considered not economically active.

Table 12.4 Population Aged 15 years and Over by Principal Economic Status

Principal Economic Status	Study Area				Fingal County	Dublin	State
	2011	2016	Change	% 2016	*% 2016*	*% 2016*	*% 2016*
At work	4,658	5,046	8.33%	67%	60%	57%	53%
Looking for first regular job	75	65	-13.33%	1%	1%	1%	1%
Unemployed having lost or given up previous job	725	456	-37.10%	6%	6%	7%	7%
Student	622	659	5.95%	9%	11%	12%	11%
Looking after home/family	541	587	8.50%	8%	8%	7%	8%
Retired	345	502	45.51%	7%	11%	13%	15%
Unable to work due to permanent sickness or disability	201	230	14.43%	3%	3%	4%	4%
Other	16	16	0.00%	0.2%	0.2%	0.4%	0.4%
Total	7,183	7,561					

With a steady decline in unemployment (37%), employment in the Study Area increased by 8% from 2011 to 2016, which equates to 67% of the 15 years and older population that are at work. The increase in the number of students coincided with the increase in the population aged 0-9 (+9%) and 10-19 (+29%). The increase in people 'looking after family/home' also coincides with the increase in families in the 'early school', 'pre-adolescent' and 'adolescent' family cycles. Despite the large decrease in unemployment, the not economically active population in the study area increased by 16%.

By comparison, employment in FCC increased by 12%, while unemployment decreased by 34%. However, the number of persons looking for their first regular job also decreased by 17% in the local authority administrative area. With a substantial increase in retirees (33%), the proportion of the population not economically active increased by 13% as specifically, students increased by 11.5%. Overall, the Study Area and the County have higher rates of employment compared to the State and Dublin region.

12.4.5 Social Infrastructure and Amenities

Overview

Social infrastructure is defined by the European Association of Long-Term Investors[13] as a subcategory of infrastructure that are seen as physical assets in the social sector that provide personal (individual/household) benefits and community benefits to increase social cohesion. An overview of the social infrastructure available within close proximity of the site is presented in the series of tables and maps (figures) set out below. As seen in the three social infrastructure maps, a variety of different social

[13] Fransen, L., del Bufalo, G., Reviglio, E. (2018). Boosting Investment in Social Infrastructure in Europe, Report of the High-Level Task Force on Investing in Social Infrastructure in Europe 2018. [PDF File]. Retrieved from: https://ec.europa.eu/info/sites/info/files/economy-finance/dp074_en.pdf

infrastructure facilities are situated within easy reach of the Site. The number of facilities within one kilometre from the site are listed in the table below. A variety of healthcare facilities are available locally, in addition to 6 leisure facilities (sports clubs and fields, community hall) and 3 recycling centres.

Table 12.5 Social Infrastructure Within 1km Buffer from the Site

Creche	**16**
Primary School	**1**
Secondary School	**3**
Pharmacy	**2**
Health Centre	**1**
Dental Practice	**3**
GP	**3**
Nursing Home	**1**
Fire Station	**1**
Garda Station	**0**
Church	**1**
Library	**1**
Bring Bank (Recycling Centre)	**3**
Leisure Centre	**6**
Total Facilities	**42**

Childcare and Education

The baseline assessment undertaken for the 1km catchment area of the site indicated a total of 20 educational facilities. Of these, 16 creches are available to provide childcare for parents with small children. There are three secondary schools located in close proximity. One primary school is located within the 1km buffer zone, while an additional 7 primary schools are located within 2km of the Site. There are 3 Secondary schools available within 1km buffer of site and an additional 2 schools available within 2km buffer. The location of these assets is shown on Figure 12.7 and listed in Table 12-6.

The development includes proposals for a Childcare facility within Block B of the Apartment blocks that will cater for 100 children once operational. In addition, the applicant has set aside a portion of subject lands(0.46ha) under the ownership of the applicant for the future development of a school. This was agreed in consultation with the Department of Education and Skills. The area reserved is envisaged to cater for a 16-24 classroom school, in accordance with the requirements set within Estuary West (Part D) Masterplan. This school reservation site is not included within the application lands.

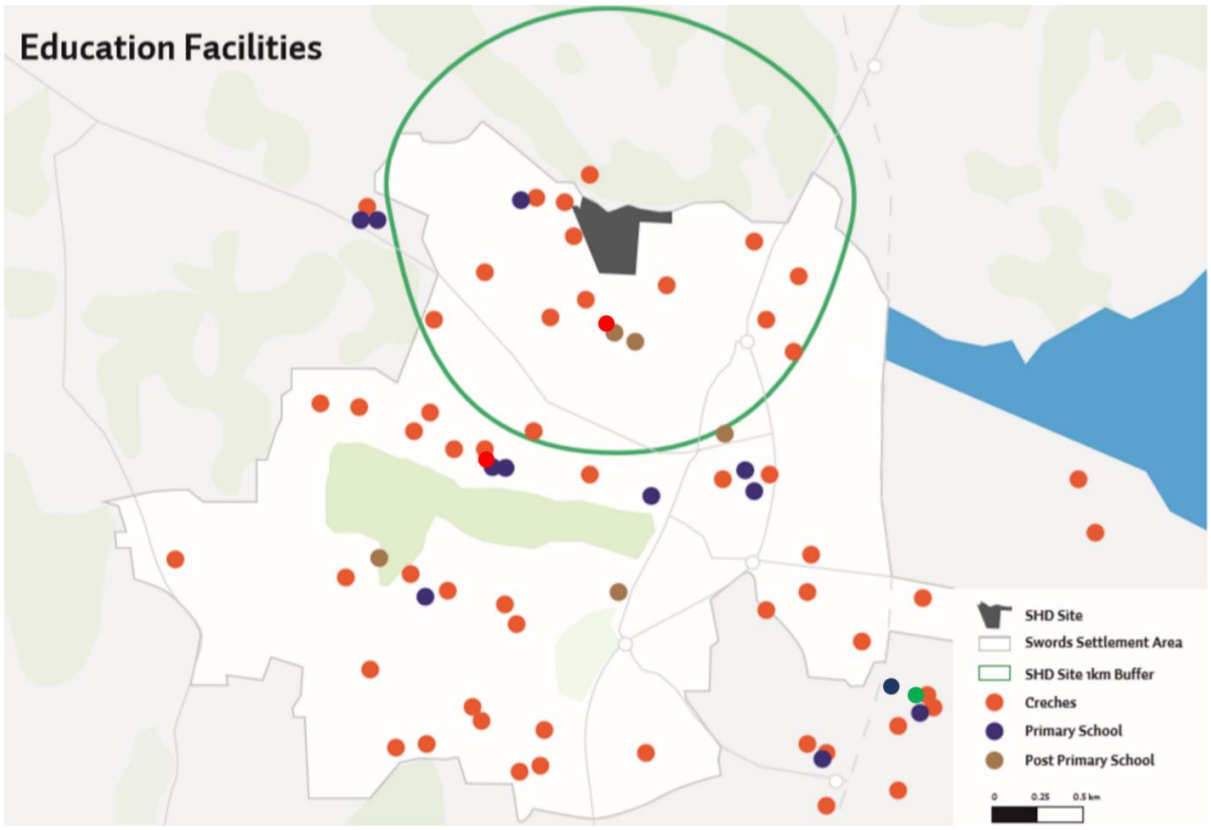


Figure 12-7 Education Facilities

Table 12.6 List of Education Facilities

Primary School	Address	Roll_No
1 km buffer		
Thornleigh Educate Together National School	Applewood Village	20302E
2 km buffer		
Swords Borough N S	Swords Borough N S	12358M
S N Cholmcille B	Swords	18976W
S N Cholmcille C	Swords	18977B
St Cronan	Brackenstown	19456B
Brackenstown Senior N S	Brackenstown	19535U
Gaelscoil Bhrian Bóroimhe	Coill Na Núll	20095C
Swords Educate Together Ns	Applewood	20145O
Secondary School	**Address**	**Roll_No**
1 km buffer		
St Finians Community College	Swords	70120F
Swords Community College	Swords	76475D
Fingal Community College	Seatown Road	70121H
2 km buffer		
Colaiste Choilm	Dublin Road	60383I
Loreto College	Swords	60810B

Retail Services

A wide retail offering is available in the Study Area. As seen in Figure 12.8, there are two main locations (Applewood Village Centre, and Swords Shopping Centre (SC) area) within the 1km buffer zone of the SHD where retail facilities are available with different tenant mixes.

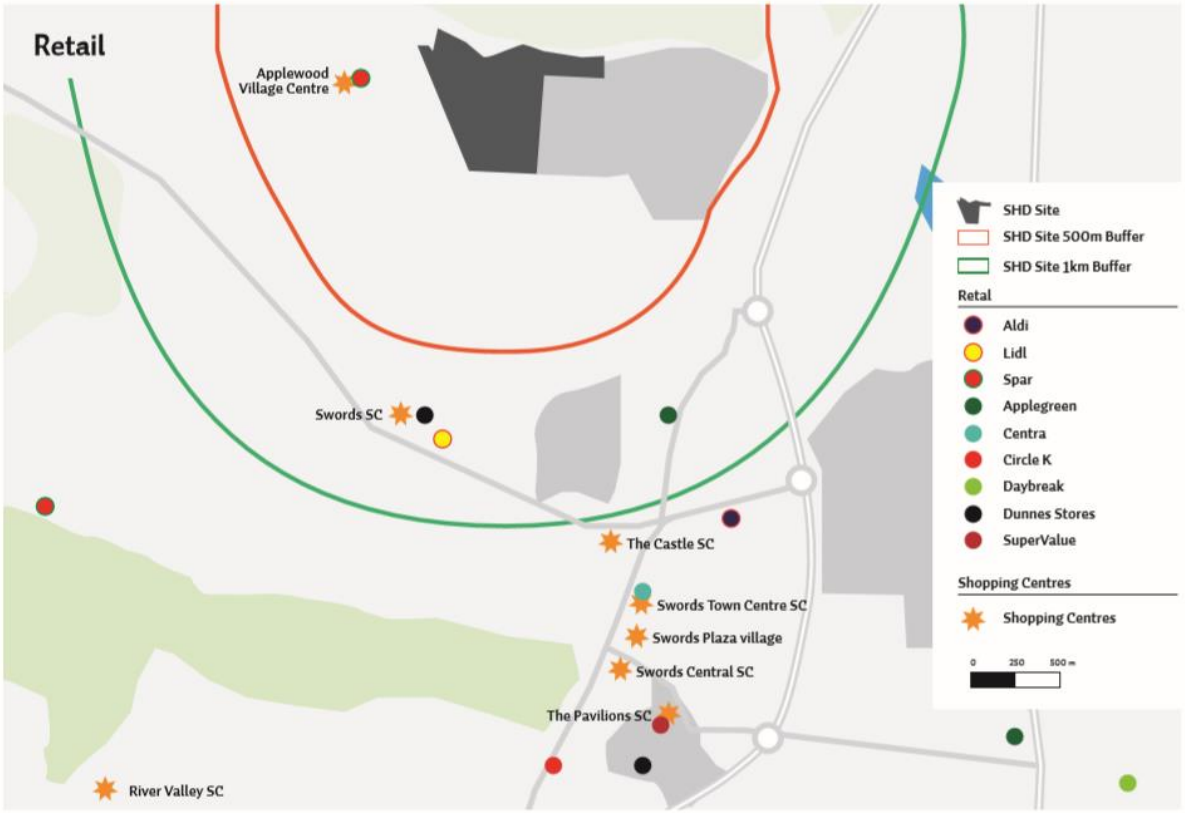


Figure 12-8 Shopping Facilities in the Study Area

Within the 1km buffer zone, residents from the proposed SHD have access to three major retailers (Dunnes, Spar and Lidl) and one smaller convenience retailer (Applegreen). Figure 12.9 shows the diversity of the local offering across the retail category, within 500m of the subject site. The Applewood village centre includes food, beverage, medical and personal services. To the south, and within 15min walking time, residents can access Swords Shopping Centre (shown on the map as Swords SC) where there is a Dunnes Stores and Lidl (large grocery/convenience stores), a pharmacy and barber shop. The proposed scheme has been designed to allow easy access to the Applewood Village Centre via a secondary access along Jugback Lane/Terrace. The design promotes pedestrian permeability throughout, with a variety of pathways and segregated routes proposed, connecting the site east to west and north to south. Residents will also benefit from the larger formal retail offering within Swords, such as The Castle SC, Swords Town SC, and The Pavilion SC, which are 1km-2km from the subject Site and provide a wider range of shops in a central location.

Figure 12-9 Retail Offering near the subject Site

Table 12.7 Retail Offering near the subject Site

Number	Name	Offering
-	Spar	Grocery/Food
1	Aria Health Care	Medical/Pharmacy
2	Pizza Max	Restaurant/Take-away
3	Look Mam No Hands!	Restaurant/Take-away
4	Primacare Medical/Dental Clinic	Medical/Pharmacy
5	Foley's Pharmacy	Medical/Pharmacy
6	Jule Beauty	Salon/Barber
7	La Boulangerie	Restaurant/Take-away
8	The Orchard Pub	Restaurant/Take-away
9	Jade Palace	Restaurant/Take-away
10	Coolers	Off License
11	Ann's Sewing Studio	Clothing/Footwear
12	BoyleSport Bookmakers	Bookmakers
13	Jade Palace	Restaurant/Take-away
14	Applewood Veterinary Clinic	Other Medical
15	Mane Hair Design	Salon/Barber
16	Chic	Dry Cleaners
17	Dora's Takeaway	Restaurant/Take-away
18	The Tan Bar	Salon/Barber
19	Gym Plus	Gym

Access and Transport

The site is well served by Dublin Bus with the bus service routes 41A, 41C, 41X and 43 serving the Glen Ellan Estate (Business Park). Further west at the Jugback Lane – Glen Ellan Road, this point is served by both Dublin Bus (routes 41A, 41C, 41X and 43) and Swords Express routes 500, 500-X, 500-N, 501 and 503) allowing easy access to Dublin City Centre. The Swords Express Service is also available 200m from the site. During peak hours this is a high frequency service with 22 busses from Glen Ellan Road to the city centre between the hours of 6.22 and 9am which equates to a bus approximately every 7minutes. In the evening peak there is a similar service with 21 buses leaving the city centre traveling to Glen Ellan Road between the hours of 5pm and 7pm equating to a frequency one bus every 5min 45seconds.

Residents may also avail of the high frequency BusConnects routes serving Applewood (Route 382) and Glen Ellan Road (Route 82). In addition, the Swords Express Bus Service to the City Centre, and the proposed BusConnects Core Bus Corridor (CBC), will enhance the public transport offer available to residents.

The bus market at this location is well developed for a strongly growing area and has a uniquely high level of commercial bus operations run by Swords Express that will respond quickly to any growth in demand to capture market share. Furthermore, the NTA's Bus Connects proposals confirm the importance of the Glen Ellen Road as a major growth axis in Swords, itself the fastest growing town in the Dublin area.

The proposed Metrolink station, Estuary Park and Ride, is located approximately 600m from the northeast corner of the site, a short walk for residents of approximately 5-10 minutes through the proposed Broadmeadow Riverside Park.

A comprehensive cycle network is proposed for Swords town within the GDA Cycle Network Plan. Proposed primary/secondary cycle route SW7 runs along Glen Ellan road which defines the southern boundary of the site and from which the main access to the site is proposed. The pedestrian/cyclist infrastructure proposed for the subject development consists of a north-south spine running along the centre of the site leading to the proposed main vehicular access on Glen Ellan Road, and a west-east spine running from the proposed western vehicular access point on Jugback Lane/Terrace up until Balheary Road further east. The eastern section of the west-east spine will form part of the green corridor along the south side of Broadmeadow River. These proposed spines will be connected internally within the site and will facilitate safe and secure pedestrian/cyclist progressions towards the bus stops on Glen Ellan Road, the existing services/amenities at Applewood Village and the future Estuary Metrolink Station. The pedestrian/cycle network provides for connections to Jugback Terrace and facilities / services to the west and pedestrian/cycle links to the lands adjacent to the east (to allow for connections with any potential future development to the east of the subject site).

The proximity to the M1 Motorway, situated 1.6km to the east provides convenient access to the national road network.

Figure 12-10 Bus Connects revised routes

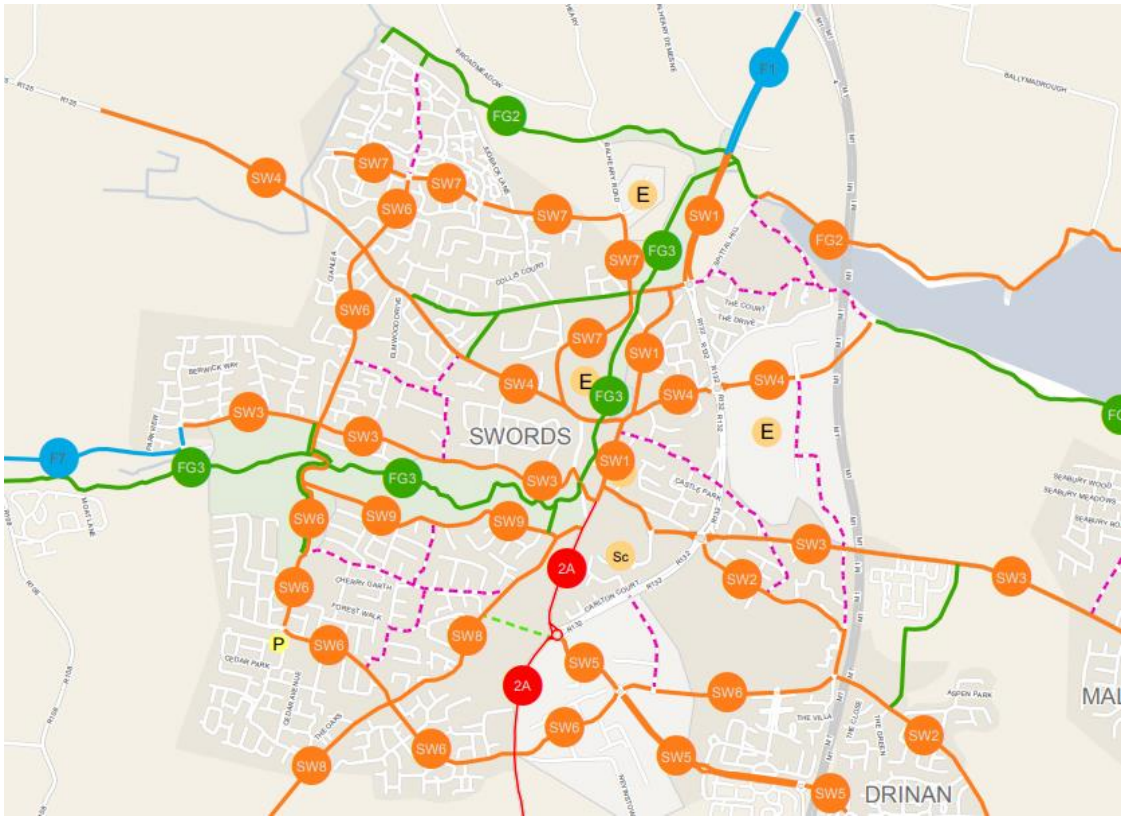


Figure 12-11 Extract from the Proposed Cycle Network Swords & Malahide (Sheet N9), Cycle Network Plan for the GDA

Healthcare

The baseline survey conducted for the study area identified 32 Healthcare services and facilities in total within 2 km buffer, 10 of which are available within the 1km buffer of the site. This includes 10 Pharmacies, 1 Health Centre, 7 Dental Practices, 2 Nursing Home and 12 General Practitioners. The location and details of the services are shown on Figure 12.12 and Table 12.8 below.

Table 12.8 Healthcare facilities

#	Type	Name	Address	Distance (m)
	1 km buffer			
1	Pharmacy	Foley's Pharmacy	Applewood Village, Swords, Co. Dublin	260
2	Pharmacy	McCabes Pharmacy	Swords Shopping Centre, Rathbeale Road, Swords	700
3	Health Centre	Swords Health Centre		930
4	Dental Practice	Applewood Dental Centre	6 Applewood Village Green, Applewood, Swords, Co. Dublin	260
5	Dental Practice	Dental Practice	Seatown West, Swords, Co. Dublin	740
6	Dental Practice	Dublin Orthodontics	29/31 North Street, Swords, Co. Dublin	940
7	Nursing Home	Fingal House Nursing home		660
8	GP	6 Applewood Village Green, Applewood, Swords, Co. Dublin, K67v2y0	Primacare Applewood - Nahed Arnous, Barbara Byrne, Conor McGrane (GMS), Raquel Morales Mora, Ajaz Ahmed, Anthony Reilly, Tomasz Janusz Zabiello, James Lee, Adrienne Balogh, Fadzilah Abdul-Aziz	340
9	GP	29/31 North Street, Swords, Co. Dublin	netDRnow Swords - Juliah Tbarani, Sarah Monawar, Christopher Owens, Tarig Suliman, Razia Sultana, Zekria Bakhshi, Thobeka Msani, David Mitchell, Lewis Regan, Intan Besri	890
10	GP	Seatown West, Swords, Co. Dublin, K67ve44	Fingal House Nursing Home, - Aogan Rooney, Carol Mooney (GMS)	660
	2km buffer			
1	Pharmacy	Gilsenan's Pharmacy	1-2 Town Centre Mall, Main Street, Swords, Co. Dublin	1200
2	Pharmacy	McNally Pharmacy	Unit 1, Manor Mall Shopping Centre, Brackenstown, Swords, Co. Dublin	1475
3	Pharmacy	MacNamara's Pharmacy	30 Main Street, Swords, Co. Dublin	1150
4	Pharmacy	MacNamara's Pharmacy	Unit 4, Swords Retail Centre, Dublin Road, Swords, Co. Dublin	1550
5	Pharmacy	Boots	Unit G06, The Pavillions Shopping Centre, Swords, Co. Dublin	1650
6	Pharmacy	McCabes Pharmacy	The Pavilions, Malahide Road, Swords	1650
7	Pharmacy	Plaza Pharmacy	The Plaza, Main Street, Swords	1300
8	Pharmacy	Swords Castle Pharmacy	Bridge Street, Castle Shopping Centre, Swords, Co. Dublin	1050
9	Dental Practice	Dental Practice	42 Main Street, Swords, Co. Dublin	1200
10	Dental Practice	Dental Practice	66 Main Street, Swords, Co. Dublin	1300

11	Dental Practice	Dental Surgery	58 Main Street, Swords, Co. Dublin	1260
12	Dental Practice	Swords Orthodontic Practice	17 Main Street, Swords, Co. Dublin	1140
13	Nursing Home	Carechoice Nursing Home	Bridge Street, Swords	1070
14	GP	17 Main Street, Swords, Co. Dublin, K67h3k4	The Plaza Clinic - Susan Wall, Paul Lannon (GMS), Anne Devitt (GMS), Feargal Costello, Rebecca O'Rourke	1100
15	GP	Castle Shopping Centre, Swords, Co. Dublin	Castle Surgery - David Anthony Reilly (GMS)	1062
16	GP	9 Malahide Road, Swords, Co. Dublin, K67v8n3	Rath Mhuire Health Centre, - Sharon Dillon, Seamus Greenan (GMS), Margaret McGrory, Fiona McKenna	1370
17	GP	91 Main Street, Swords, Co. Dublin, K67f6p8	Family Planning Clinic, - Muhammad Idris K. Muhammad Kunni, Fadzilah Abdul-Aziz, Barsardie Moodley (GMS)	1470
18	GP	Manor Mall Shopping Centre, Ormond Avenue, Swords, Co. Dublin, K67k6w7	Manor Hall Medical Centre, - Ellen Jones	1500
19	GP	Albany House, Main Street, Swords, Co. Dublin	Salus Medical Clinic, - Stanley Natin (GMS)	1520
20	GP	108 Forest Fields Road, Rivervalley, Swords, Co Dublin	George Morris - George Morris (GMS), Padraig Coughlan	1820
21	GP	28 Brackenstown Village, Swords, Co. Dublin, K67f6e4	Dr. Rosaleen O'kelly, - Declan O'Malley, Rosaleen Marie O'Kelly (GMS)	1320
22	GP	59 Main Street, Swords, Co. Dublin, K67t802	Dr. A. Lehane Family Planning Clinic, - Mary Antonia Geraldine Lehane (GMS)	1300

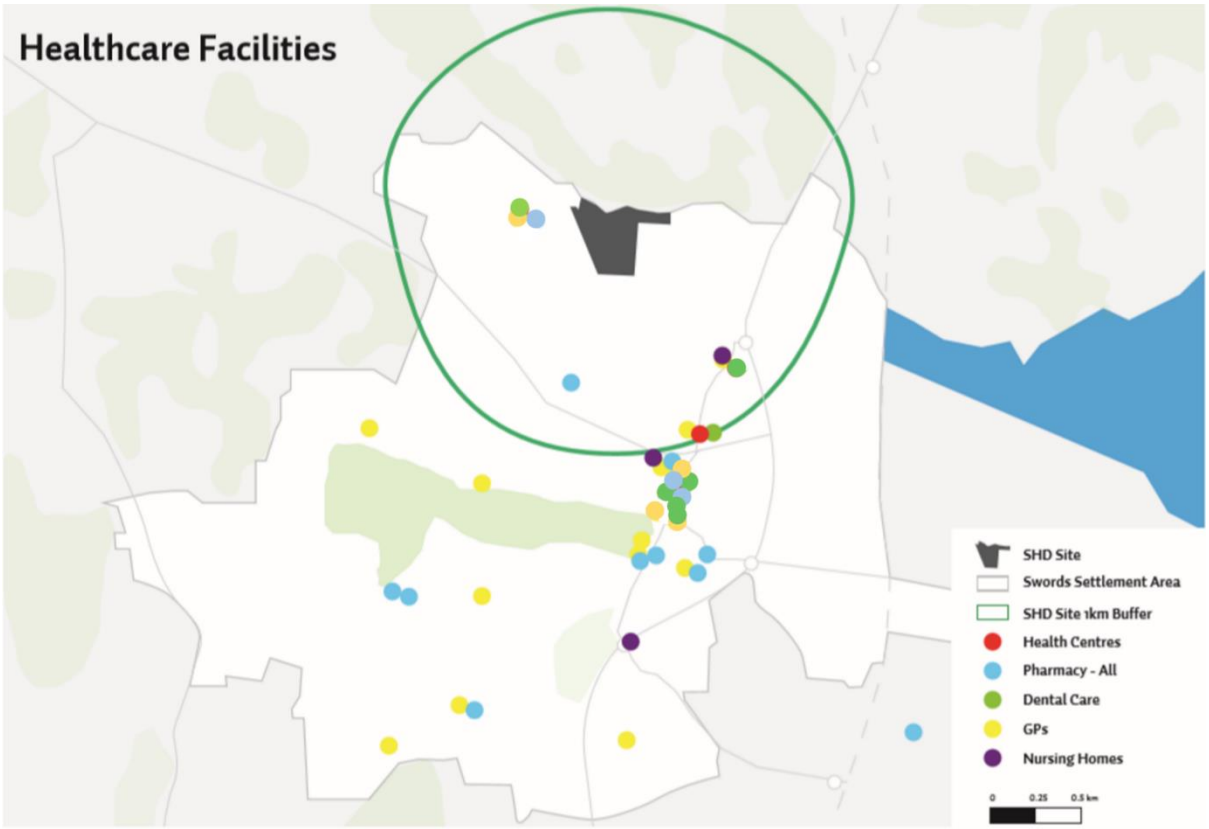


Figure 12-12 Healthcare Facilities

Community Infrastructure

A total of 27 community facilities and services are available within Swords Settlement Area of which a total of 12 amenities falls within 1km catchment of the site. This comprise of 6 Leisure and Sports facilities, 3 Recycle centres, 1 Library, 1 Church, 1 Fire station and 1 public gathering venue. The location of these assets is identified on Figure 12.13.

Table 12.9 Other Social Infrastructure facilities

#	**Leisure Facilities**		**170**
	1 km buffer		
1	Leisure Facilities	Intelligent fitness	930
2	Leisure Facilities	Gym Plus	150
3	Leisure Facilities	Paddy Power	700
4	Leisure Facilities	Alan Dunne Fitness	760
5	Leisure Facilities	Balheary Skate park	700
6	Reycling Centre	Celestica / St Colmcilles GAA Bring_Banks	200
7	Reycling Centre	Environment Depot Watery Lane Bring_Banks/Bring_Banks	600
8	Reycling Centre	Fingallians GAA Bring_Banks/Bring_Banks	790
9	Church	Church	170
10	Fire Station	Swords Fire Station	580
11	Venues	Swords Castle Public Venues	960
12	Library	Swords Library	700

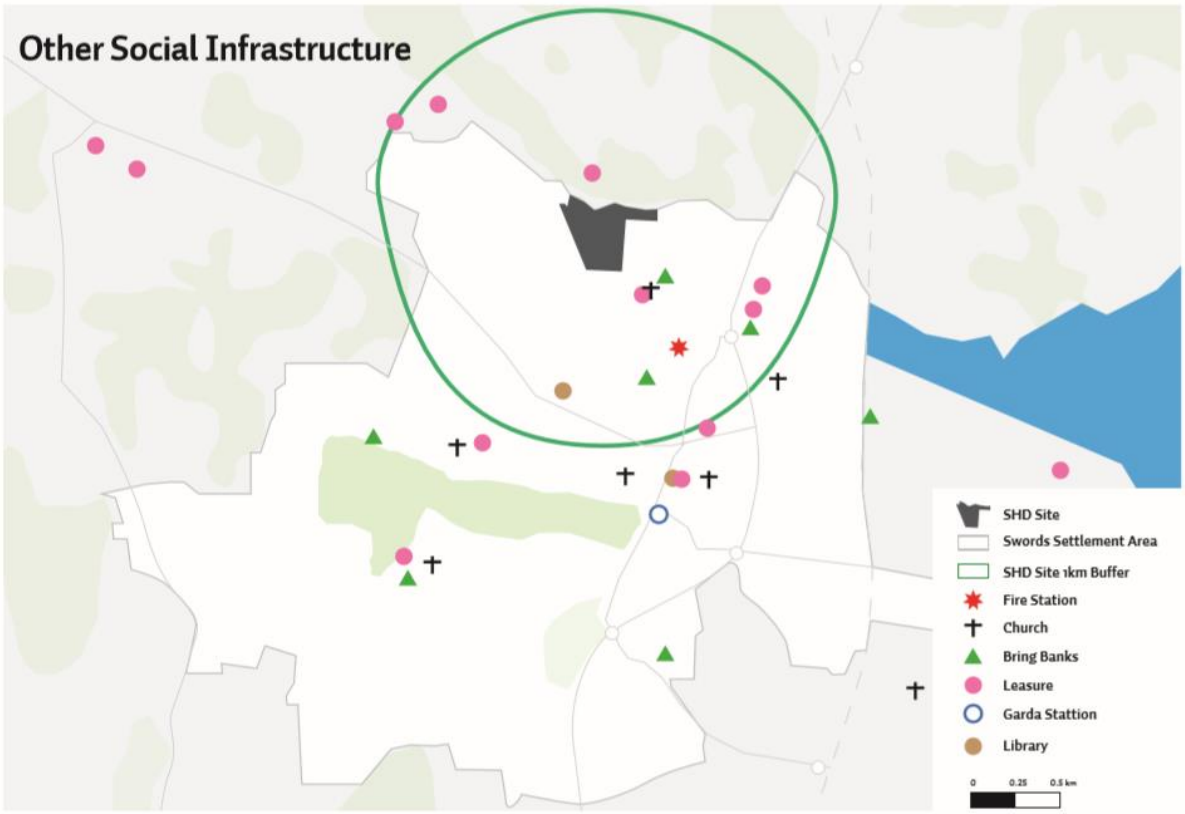


Figure 12-13 Other Social Infrastructure

12.5 Impact Assessment

This section provides a description of the specific, direct, indirect positive and negative impacts that the proposed development may have on population and human health during both the construction and operational phases of the proposed development. Potential impacts are assessed under the following headings: Population and Human Health; Economic Activity and Employment and Social Infrastructure - Childcare/Creche facilities; Primary and Post Primary Schools; Transport and Access, Health, Community Infrastructure Mitigation measures required to alleviate any such effects are discussed further in Section 12.8.

For a more detailed assessment of potential impacts associated with other environmental factors, please refer to the specific chapters of the EIAR.

The analysis comprises a study of the key assessment themes as well as consideration of the construction phase, with a conclusion reached in relation to the proposed development on the environment. The baseline characteristics, as described above. The characteristics of this impact assessment are defined below, as per the EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA 2017).

Information to be Contained in Environmental Impact Assessment Reports (EPA 2017)

Type	Description
Probability of Effects	Likely Effects: The effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented. Unlikely Effects: The effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented.
Quality of Effects	Positive Effects: 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 Effects: No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error. Negative/adverse Effects: 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).
Significance of Effects	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 Effects: An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. Moderate Effects: An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends. Significant Effects: 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 Effects: An effect which obliterates sensitive characteristics
Duration and Frequency of Effects	Momentary Effects: Effects lasting from seconds to minutes Brief Effects: Effects lasting less than a day Temporary Effects: Effects lasting less than a year Short-term Effects: Effects lasting one to seven years. Medium-term Effects: Effects lasting seven to fifteen years. Long-term Effects: Effects lasting fifteen to sixty years. Permanent Effects: Effects lasting over sixty years Reversible Effects: Effects that can be undone, for example through remediation or restoration Frequency of Effects: Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)

12.5.1 Population and Human Health

Construction Phase

Population and Human Health
The construction of the proposed development may give rise to short term impacts to the locality, such as construction traffic and surface contaminants, dusts, exhaust emissions and noise. Residents of homes situated on Jugback Lane/Terrace are most likely to experience effects arising from the development. Where relevant, these impacts have been considered in the relevant chapters of the EIAR and will be minimised or mitigated where appropriate. In this regard, please refer to Chapter 5 Air and Climate, Chapter 6 Noise and Vibration, Chapter 9 Landscape and Visual and Chapter 13 Material Assets – Traffic and Transport.

It is unlikely that these impacts will be of a scale to either encourage people to move from the area or discourage people from moving to the area.

Probability	Quality	Significance	Duration
Likely	Negative	Moderate	Short Term

Operational Phase

Population
The operational phase of the proposed development will result in the provision of 621 no. residential units, a creche facility and significant public open space. This will provide accommodation for approximately 1,708 persons, based upon an estimated occupancy rate of 2.75 persons per unit. The uplift in local population generated by the proposed development will contribute to the compact development targets set out in the National Planning Framework i.e. at least 50% of all new homes within or contiguous to the existing built-up area in Dublin and 30% in other settlements.

Furthermore, the RSES, through its Dublin Metropolitan Area Strategic Plan (MASP) identifies strategic residential, employment and regeneration development opportunities on strategic development corridors, which are aligned with key public transport projects. Sites within or close to these corridors are best placed to accommodate the 113,000 residential units identified by the MASP to be fully built out to 2040. The location of the subject site in close proximity to the proposed Metrolink-Luas Corridor places it in prime position to accommodate the sequential development of residential sites, to cater for the population growth envisaged.

At a County level, the RSES projections predict an increase of between 31,000 (low) and 43,000 (high) by 2026 with further increases of between 44,000 (low) and 53,000 (high) people by the year 2031. The appropriate siting and distribution of housing to respond to this level of growth is among the most critical functions of the local planning system over the next few years.

With the proposed upgrades to Irish Water infrastructure, namely the Stormwater Storage Tank and overflow outfall gravity sewer and the upgrades to the local road network, the proposed development will have a positive, indirect and significant benefit in terms of addressing and overcoming infrastructural constraints that future development in the area will benefit from.

On consideration of the above, the propose development will have a **significant permanent positive** impact on the population and households in the area.

Probability	Quality	Significance	Duration
Likely	Positive	Significant	Long Term

Human Health
The operational stage of the development is unlikely to cause any adverse impacts on the existing and future residents of the locality in terms of human health. The design of the development has been formulated to provide for a safe environment for the future residents and visitors alike. The paths, roadways and public realm have been designed in accordance with the best practice and applicable guidelines. All open areas have been designed to be inviting, safe and conveniently located. A **neutral, not significant** impact has been determined.

Probability	Quality	Significance	Duration
Likely	Neutral	Not Significant	Permanent

12.5.2 Economic Activity and Employment

Construction Phase

Population
The development in the short term will provide for increased construction related employment. During the construction phase, businesses directly involved in the sector and those indirectly involved in the supply chain will generate economic benefits that will provide a positive net impact on the economy. The construction phase will also provide for indirect positive impacts on ancillary support services in the area of the site, such as retail services (including those at the Applewood Village Centre), together with wider benefits in the construction sector, building materials supply services and professional and technical professions. These beneficial impacts on economic activity will be largely temporary but will contribute to the overall future viability of the construction sector and related services and professions over the phased construction period. The construction of the proposed development is likely to have a **slight, positive effect** on the local economy.

Probability	Quality	Significance	Duration
Likely	Positive	Slight	Temporary

Human Health
Economic benefits and any uplift in local employment opportunities will contribute positively to the local area. The availability of local job opportunities is positively correlated with health in terms of improvements made to quality of life, reduced commuter time, and an uplift in the local economy which contributes to the overall vitality and viability of the area.

Probability	Quality	Significance	Duration
Likely	Positive	Slight	Temporary

Operational Phase

Population

The operational phase of the proposed development will provide accommodation for approximately 1,708 persons, based upon an estimated occupancy rate of 2.75 persons per unit. Considering the number of people in employment in the area (60%), it can be expected that circa 1,044 of the population generated will be working. This increase in occupancy in the area will enhance local spending power and will contribute to a critical mass of population to support a wide range of employment generating opportunities. In particular, the new residential community created by the proposed development will bring positive benefits in supporting the local retail environment at Applewood, while also supporting

other commercial developments in the locality. Collectively, it is considered that the development will have a **moderate, positive impact** on economic activity and employment.

Probability	Quality	Significance	Duration
Likely	Positive	Moderate	Permanent

Human Health
It is reasonable to consider that positive impacts generated by the proposed development on the local economy will, in turn, give rise to improvements in the vibrancy and vitality of the area contributing to a stronger sense of place which is positively related to health.

Probability	Quality	Significance	Duration
Likely	Positive	Slight	Permanent

12.5.3 Social Infrastructure

Construction Phase

Population and Human Health

Childcare and Education
The potential for temporary impacts arising from the construction stage on childcare and educational facilities within 1km of the site, relate to noise, dust, and traffic. The quality and significance of effects is determined in the relevant chapters of this EIAR, alongside mitigation measures proposed to ameliorate any adverse impacts. The closest educational receptor to the site is Thornleigh Educate Together National School which is situated c. 200m to the west of the site. This is considered to be sufficient distance to ensure potential effects arising as a result of construction works to be reduced to a negligible level – so **imperceptible, neutral impacts** are predicted.

Access and Transport, Healthcare, Community Infrastructure

The construction phase is not anticipated to give rise to perceptible impacts on the local retail environment or on other local social infrastructure such as healthcare and community facilities. The Applewood Village Centre is situated at sufficient distance to ensure **imperceptible, neutral impacts.**

The cycling and pedestrian environment surrounding the site will not be impacted on by the proposed works. There is some potential for cyclist/pedestrians along Glen Ellan and/or Balheary road to be impacted by construction traffic. No road closures are anticipated to be required as a result of the construction works. During the construction phase, workers may have a tendency to park in surrounding residential roads even though parking facility is provided within the site. This can lead to some potential for traffic congestion during the construction phase, however the duration for this impact is considered to be **temporary to short term and of a neutral and not significant impact.**

Probability	Quality	Significance	Duration
Unlikely	Neutral	Not significant	Temporary – Short term

Operational Phase

Population and Human Health

Childcare and Education

The proposed development includes a **creche facility** that can accommodate up to 100 child places. 621 no. residential units are proposed as part of the development. The Planning Report accompanying this application establishes that this is an appropriate capacity for the proposed créche facility.

Based on the 621 units proposed and discounting for 145 no. of one-bedroom units (comprising 137 no. one bed apartments and 8 no. maisonettes) in accordance with the Apartment Guidelines, there are 476 dwellings for which childcare provision is a consideration. Applying the Childcare Facilities Guideline standard of 20 places per 75 no. dwellings (and discounting one-bedroom units), the total requirement arising from the scheme has been determined as 127 places. However, a deduction of 27 places has been made to bring the total capacity to 100 spaces. The reasons and justifications for this deduction set out in the Planning Report relate to discounting of 2-bedromm dwellings, the findings on childcare arrangements of the CSO's Quarterly National Household Survey, current childcare service provision and commercial viability reasons. In any event, the proposed scheme's inclusion of a créche facility is considered to be of sufficient scale to satisfy the childcare requirements of the future occupied development. As such, existing childcare services will not be impacted on. Conversely, the provision of a new créche facility, while predominately catering for the new residential base generated by the proposed development, may also offer capacity to satisfy wider demand from the local community. In this regard, the proposed development will give rise to a **positive, moderate** impact on population and human health.

Probability	Quality	Significance	Duration
Likely	Positive	Moderate	Long Term

In terms of **schools**, the Census 2016 data for the study area sets out the share of population attending primary and post primary school years, as per Table 12.10 below. This percentage share was used to estimate the number of primary and post-primary school children the proposed development would generate.

Table 12.10 Projected population for the development at full occupancy (not including the 1-bed unit population equivalent)

	Local Catchment Area Population in 2016		Estimated school going population for the Development
	Numbers	% Share	
Primary School (5-12)	1,639	15.7%	205
Post Primary School (13-18)	707	6.8%	89

Based on an average household size of 2.75, the estimated population of the development will be 1,708. In order to estimate the primary and post primary school child yield generated from the development, the population generated by 1-bedroom apartment units(145 no.) has been discounted given their improbability of generating a child yield and in accordance with the Apartment Guidelines previously noted. Therefore, based on the 2016 Census figures for the area, the population estimate for the 5-12 age cohort (primary school) (15.7%) is estimated to be 205 children. The population estimate for the 13-18 age cohort (Post primary school) (6.8%) is estimated to be 89. However, the proposed development will not generate this level of demand within the short term given that the development will be constructed in a phased manner.

Moreover, an objective contained within the Estuary West Masterplan requires that the subject site (and adjoining landholding to the east) provides for a 16-24 classroom school. In consultation with the Department of Education and Skills, the applicant has agreed to reserve a 0.46ha site within their

ownership (but outside the application area) to accommodate a future school sufficient to cater for the provisions of the Masterplan. In response to a request by the Department of Education and Skills, an access route to the school via the proposed development site has been established as part of this application.

Accordingly, the proposed development will have a **positive, indirect, significant impact** on population and human health with regard to primary and post primary school provision.

Probability	Quality	Significance	Duration
Likely	Positive	Significant	Long Term

Healthcare

The provision of healthcare within the study area is considered to be of a sufficient scale, with 32 healthcare services and facilities in total, 10 of which are available within the 1km of the site, to serve the occupied development. The quality-of-life benefits for residents, and neighbouring communities arising from the improved access to the Broadmeadow Riverside park and the public amenities it contains, may have a positive knock on effect in terms of public health. As such, the proposed scheme is anticipated to have a **positive, slight effect** on social infrastructure and its impact on population and human health.

Probability	Quality	Significance	Duration
Likely	Positive	Slight	Long Term

Access and Transport

New pedestrian connections are provided to the site from Jugback Lane/Terrace, Glen Ellan Road and the proposed Broadmeadow Riverside Park extension to the north of the site – all of which will allow for convenient access to the Broadmeadow Riverside Park from surrounding communities. Furthermore, a segregated pedestrian/cycle path is proposed along the central green spine, connecting Glen Ellan Road in the south with Broadmeadow Riverside Park extension in the north. The Broadmeadow River Park will also offer recreational features including play areas. There will be a direct access from the existing Thornleigh Playground to the park facilitating continuity of the wider park lands along the Broadmeadow River. This new connection will also allow convenient accessibility from the Thornleigh and Applewood communities through the pleasant surroundings of the riverside park onto the east, and to the proposed Metrolink Park and Ride Station at Estuary West. The pedestrian and cyclist infrastructure proposed will greatly enhance connectivity of surrounding neighbourhoods to the Broadmeadow Riverside Park which will result in a **positive, significant impact.**

Positive impacts on population and human health will include health benefits associated with the provision of a significant quantity of open space, as well as the provision of walking and cycling facilities.

Probability	Quality	Significance	Duration
Likely	Positive	Significant	Long Term

Community Infrastructure

The proposed scheme will bring positive benefits in terms of recreational amenity and provision. By opening up accessibility through the site for pedestrians and cyclists, the ambitions for the

Broadmeadow riverside park set out in local planning policy, will be enabled by extending the Fingal County Council owned park lands (to the northwest) for which a letter of consent has been provided (as set out in the Planning Report), and opening up the remainder of the park lands, which are owned by Cairn Homes Properties Ltd, for use by future residents of the proposed SHD and for wider community/ public use. In doing so, a notable local amenity gain is provided to the established community. By enhancing the amenity value of the green corridor along the Broadmeadow and opening up access for the wider community, the proposed scheme is delivering on a key ambition set out in the Estuary West Masterplan, May 2019 - to bring this underutilised asset into functional use and contribute to public open space provision available to the people of north Swords. Accordingly, **positive, significant impacts** on recreational amenity and provision are identified.

Probability	Quality	Significance	Duration
Likely	Positive	Significant	Long Term

12.5.4 Risk of Major Accidents or Disasters

Construction Phase

It is considered that the proposed development will not give rise to any impacts related to a major accident or disasters during the construction phase. Throughout the construction phase standard and regulated construction practices will be employed. The accompanying Construction and Environment Management Plan prepared by Waterman Moylan Consulting Engineers outlines measures that will ensure construction practices will limit the risk of accidents during the construction phase. It will also detail the storage measures for hazardous materials used during construction ensuring they do not give rise to a risk of pollution.

The subject site is located outside of the zones of notification with regard to Seveso and COMAH designated sites. The works proposed in proximity to public roadways and footpaths will be governed by best practice and appropriate safety procedures, thus reducing any risk of a major accidents in public areas.

Operational Phase

The proposed development is not considered to be vulnerable to major accidents or disasters, and therefore the anticipated impacts are considered to be negligible. The site access, surrounding highway and pedestrian network of the proposed development has been designed to ensure risk of a major accident is avoided.

12.6 Cumulative Impacts

The surrounding context of the site consists of a mix of some commercial, residential, amenity and related land uses. The Balheary Industrial Park is located to the east of the subject site. This neighbouring site directly to the east of the subject landholdings contains the former Celestica factory and is accessed via Glen Ellan Road. The Applewood development is located directly to the west of the site and on the opposite side of Jugback Lane. The development comprises a mix of housing types and apartments and is serviced by the Applewood neighbourhood/village centre. Existing developments in the area are not considered to give rise to significant cumulative impacts in combination with the proposed development.

The proposed area of public open space to the north of the subject site (Broadmeadow Riverside Park), and pedestrian and cycle linkages from surrounding neighbourhoods, will add to overall vibrancy and permeability in the local area. In this regard, the cumulative impact of the proposed development will be long term and positive particularly with respect to the benefits that improved recreation and amenity infrastructure will bring to human health. New and existing residents will benefit from increased opportunities for recreation arising from the delivery of the high quality public open spaces and the amenity provision to be delivered as part of the proposed development.

The potential cumulative impacts of the proposed development on population and human health have also been considered in conjunction with the planned changes to the surrounding area. In May 2021 Fingal County Council lodged a Part 8 application to An Board Pleanála under reference number ABP-310145-21. This application included the junction upgrade works required to the R132/R125 Estuary Roundabout, referred to as Junction A in this application. On 20th January 2022, ABP approved this application with conditions under case number JP06F.310145 and the submission can be reviewed on Fingal County Councils Website under the title R132 Connectivity Project. These Part 8 Road works will improve the existing traffic and pedestrian permeability in the surrounding area which have a positive impact on population and human health.

There are no other significant developments, or extant or approved planning permissions submitted of note on any of the immediate adjoining sites that would give rise to cumulative impacts. However, the proposed development forms part of the wider Estuary West Masterplan and Metro Economic Corridor. The cumulative impact of the development of adjacent lands within the Estuary West Masterplan will be the resulting rise in population, in line with national, regional, and local planning policy for Swords and the Masterplan lands. This impact will be long term and positive in the context of the development zoning objectives for the subject site, and wider local, regional, and national planning policy, and also given the strategic location of the Estuary West lands and their proximity to high-quality public transport network, social and community services. The cumulative impact of the full development of the Estuary West lands will enhance the economic viability of the area, increasing spending and support for existing and planned businesses.

12.7 'Do Nothing' Impact

This section considers the potential impacts should the proposed development not take place. In a 'Do Nothing' scenario, the subject site would remain as undeveloped greenfield scrubland. The environmental receptors discussed throughout this EIAR would in all likelihood remain unchanged while the potential for any likely significant adverse environmental impacts arising from the proposed development would not arise.

Consequently, in a 'Do Nothing' scenario, the potential for any significant positive impacts from the construction and operation of the proposed development would also not arise.

Moreover, a 'do nothing' scenario would involve the subject site, which is zoned for development (Metro-Economic corridor zoning objective), remaining in its current predominantly green-field state, and remaining underutilised and not fulfilling local, regional and national planning policy objectives.

12.8 Mitigation Measures

Construction Phase

A range of construction related remedial and mitigation measures are proposed throughout this EIAR with reference to the various environmental topics examined, and the inter-relationships between each topic. Through the provision of these remedial and mitigation measures, any negative impacts on population and human health during the construction phase shall be appropriately mitigated. Readers are directed to Chapter 19 of this EIAR for a summary of mitigation measures proposed as a result of this EIAR.

Operational Phase

The proposed development has been designed to avoid negative impacts on population and human health through the design and provision of physical and social infrastructure as described in Chapter 5 'Description of the Scheme' of this EIAR. Compliance with the proposed design and layout will be a condition of any permitted development. Monitoring will be undertaken by the Building Regulations certification process and by the requirements of specific conditions of a planning permission. Furthermore, measures outlined in the chapters of this EIAR which address other environmental matters such as water, air quality and climatic factors, landscape and visual impact and noise sufficiently address monitoring requirements. Readers are directed to Chapter 19 of this EIAR for a summary of mitigation measures proposed as a result of this EIA.

12.9 Residual Impacts of the Proposed Development

Residual impacts are those which remain following the implementation of the proposed mitigation measures; however, no significant adverse residual impacts have been identified. The character and condition of the land will change from disused, green field site to a residential land use. This change is in alignment with the specific zoning of the site for and the impact is considered acceptable when balanced with the other positive impacts in terms of building a critical mass of population, compact urban development, provision of housing on a strategic, edge of centre site, provision of new local services and amenities (créche facility, public open space enhancements) and the indirect benefits arising for employment.

12.10 Interactions

There are numerous inter-related environmental topics described in detail throughout this EIAR which are of relevance to population and human health. The main high-level interactions between Population and Human Health and other environmental factors include Traffic and Transportation, Air and Climatic Factors, Landscape and Visual Impact and Noise and Vibration. Please refer to the specific chapters of this EIAR where detailed assessments relating to these environmental topics are provided. Please also refer to Chapter 16 Interactions for more information.

12.11 Difficulties Encountered

There were no significant difficulties encountered in compiling the information contained in the Population and Human Health Chapter; however, census data (2016) is now six years old. Census 2016 remains the best available data source for socio-economic information at localised level as per the study area defined in this assessment. It is not anticipated that any future revision of figures/data would result in a significant impact upon the findings of this assessment, or the conclusions reached.

12.12 References

- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency, Draft August 2017)
- Advice Notes for Preparing Environmental Impact Statements, Draft September 2017
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002)
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2002)
- CSO Labour Force Surveys - www.cso.ie
- Census 2016- www.cso.ie.
- Department of Education https://www.gov.ie/en/organisation/department-of-education/
- TUSLA - https://www.tusla.ie/
- POBAL Geoprofiling reports - https://maps.pobal.ie/

13. Material Assets - Traffic and Transport

13.1 Introduction

This chapter has been prepared by Waterman Moylan Consulting Engineers on behalf of Cairn Homes Properties Ltd. Emma Caulwell CEng MICE, a civil engineer with 10 years' experience in preparing planning submissions for housing developments and reviewed by Joe Gibbons CEng MICE and Director of Waterman Moylan, with over 30 years' civil engineering experience in the industry.

In addition, the section relating to capacity of the public transport network has been compiled by Derry O'Leary, Transport Consultant who is a Civil Engineer, qualified as a Traffic Engineer and has over 40 years' experience in both the public and private sector. He has spent nearly 30 years in both planning and operations in Dublin Bus

The Chapter has been prepared in accordance with the "Traffic & Transportation Assessment Guidelines", published by Transport Infrastructure Ireland (TII) dated May 2014.

The proposed development consists of 621 no. units (145 no. 1-bed units, 278 no. 2-bed units, 187 no. 3-bed units and 11 no. 4-bed units) comprising 349 no. apartments, 118 no. houses and 154 no. duplex units. Building heights range from 1 no. to 7 no. storeys (over basement level). The scheme provides for public open space, communal open space areas, a crèche, residential amenities (including concierge, multi-purpose room, meeting room and gym), a new public park to the north of the site as an extension to Broadmeadow Riverside Park and services/bin store areas. The development provides for a total of 705 no. car park spaces (including houses), 856 no. secure bike parking spaces and 21 no. motorbike spaces at basement, under-croft, and surface level.

The proposed development, the extent of which is defined by the red line boundary on the submitted planning drawings, also includes a Stormwater storage tank, located on the Celestica site to the east of Holybanks together with an outfall to the Broadmeadow River which will be laid along the Balheary Road. Upgrades to both the Glen Ellan Road, Balheary Road Junction and The Estuary Roundabout are also proposed as part of the development proposals.

The chapter assesses the likely significant effects of the proposed residential development at Holybanks, Swords in terms of vehicular, pedestrian and cycle access during the construction and operational phases of the proposed development.

The chapter describes the methodology; the receiving environment at the application site and surroundings; the characteristics of the proposal in terms of physical infrastructure; the potential impact that proposals of this kind would be likely to produce; the predicted impact of the proposal examining the effects of the proposed development on the local road network; and the mitigation measures required to prevent, reduce or offset any significant adverse effects.

13.2 Methodology

The study area for the Traffic and Transport Assessment EIAR chapter is the transport network and junctions immediately surrounding the site which could be impacted as part of the proposed development. The junctions chosen for assessment are outlined in figure 13.3 below and were chosen based on both experience and consultation with the Roads department of Fingal County Council.

In line with best practice, the following methodology has been adopted for this assessment:

- Review of relevant available information, a list of which is included in section 13.13 including Fingal Development Plan 2017-2023 and Estuary West Masterplan (2019), existing traffic information and other relevant studies;
- Site visit to gain an understanding of the site access and observe the existing traffic situation;

- Consultations with Fingal County Council through the initial pre-application meetings and Stage 2 of the SHD process including the tri-partite meeting, to agree on the site access arrangements and determine the scope of the traffic analysis required to accompany a planning application;

- Review of the "Traffic Transport Assessment" (TTA) carried out by Waterman Moylan where survey data is presented for the existing traffic conditions and there is a detailed estimation of the transport demand that will be generated by the development. The TTA also addresses the existing capacity on the public transport network. The traffic generated during both the morning and evening peak times is assessed as well as an estimation of the construction stage traffic; and

- Assessment of the percentage impact of traffic on local junctions, and accessibility of the site by sustainable modes including walking, cycling and public transport.

13.3 Receiving Environment

This section considers the receiving environment, providing background information for the site to determine the significance of any traffic implications. This section also considers the existing accessibility of the site by sustainable modes of transport.

13.3.1 Site Location and Zoning

The subject site is located in Holybanks, Swords, to the north of Glen Ellan Road and west of the Balheary Road as per Figure 13. 1– extracted from Fingal Development Plan 2017 – 2023.

The subject site is bounded to the south by the Glen Ellan Road, to the west by residential estates (Applewood and Thornleigh), to the east by a disused industrial building and associated carpark which forms part of the Estuary West Masterplan and to the north by the Broadmeadow River and green field lands.

According to the Swords Masterplans - Part D: Estuary West, published by Fingal County Council in May 2019 in response to objectives in the Fingal Development Plan 2017 - 2023, the subject site is situated in the 'Estuary West - a Future Residential Area' which is zoned within the Fingal Development Plan 2017 – 2023 (FDP) as a '*ME - Metro Economic Corridor*'.

The Fingal Development Plan 2017 – 2023 describes the zoning objective of a ME – Metro Economic Corridor as follows:

"*Facilitate opportunities for high density mixed-use employment generating activity and commercial development, and support provision of an appropriate quantum of residential development within the Metro Economic Corridor*."

The proposed road upgrades are located on The Glen Ellan Road, Balheary Road junction and at the Estuary roundabout to the southeast of the site.

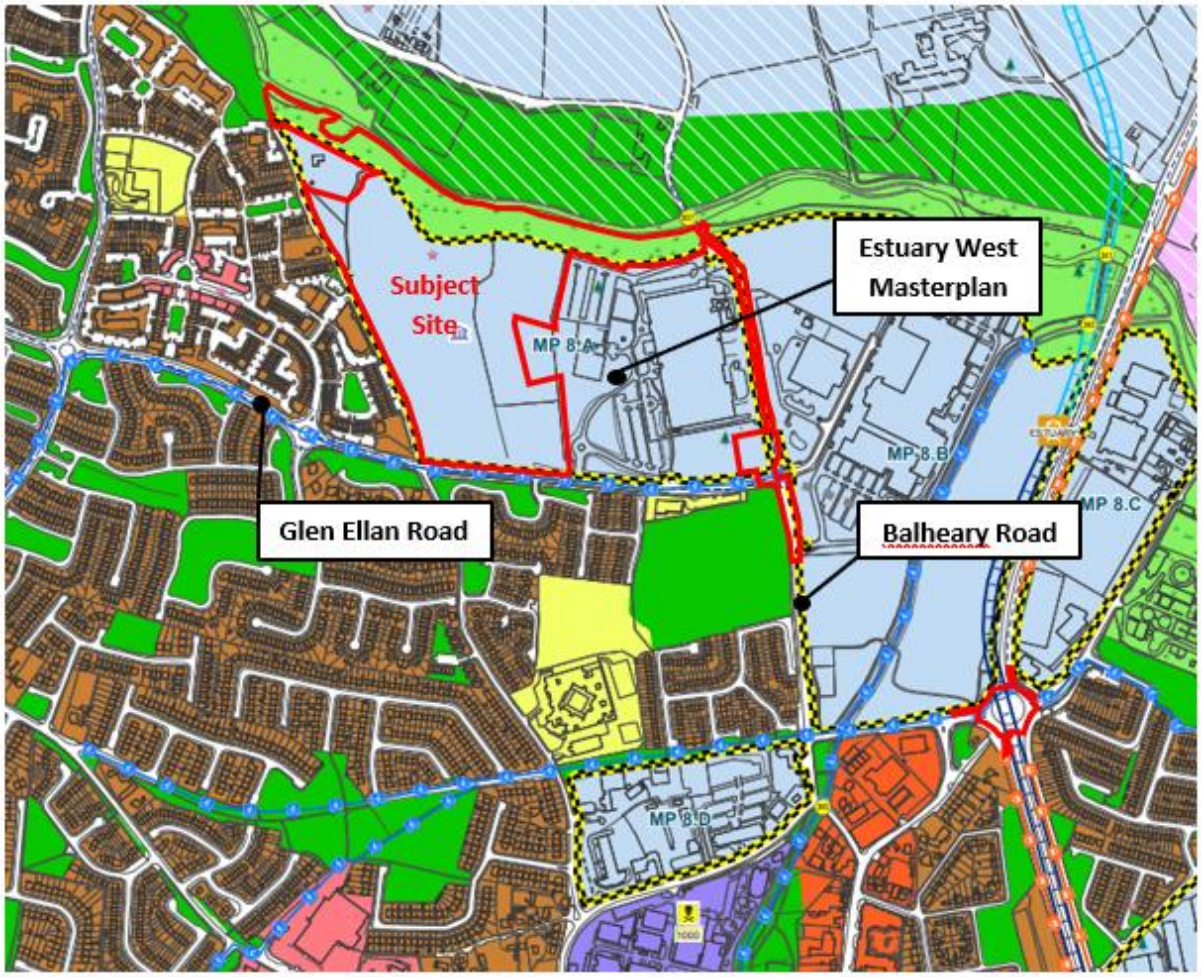


Figure 13. 1: Site Location and Zoning (Zoning Map – Fingal Development Plan 2017 - 2023).

13.3.2 Local Road Network

The proposed site is located circa 1.4 km north of Swords Town Centre and is in close proximity to the M1 motorway, regional routes, primarily the R132 Dublin Road and local roads. The key roads within this network are shown in Figure 15.2 and described below.

The **M1 Motorway** is an important dual carriageway road that is subject to a speed limit of 120kph linking Dublin to Belfast and provide direct access to the M50, Dublin Airport and Dublin Port. It is a central media with 2-3 lanes and grade separated junctions

The **R132 Dublin Road** is a dual carriageway road subject to a speed limit of 80kph with two normal traffic lanes and a hard shoulder on each side of the carriageway. Each traffic lane is approximately 10m wide. Travelling north from the R132/R125 roundabout (Junction A – See Figure 15.2), the R132 links to the M1 Motorway at Junction 4. Footpaths or cycle lanes are not provided on this section of the road. To the south, the R132 extends towards Dublin, facilitating access to Dublin Airport, as far as Collins Avenue before joining the N1 National Road. It is a central media on approaches to M1 with grade junctions with 2x2 lanes on approaches to M1 and around Swords Village

The **R125** is a single 8m wide carriageway road subject to a speed limit of 50kph. Travelling eastwards from the signalised junction with Balheary Road (Junction B as per Figure 15.2), the R125 terminates at a four-armed roundabout with R132 Dublin Road (Junction A – Figure 15.2). Along this section, there are footpaths provided on both sides of the carriageway. To the west, the R125 connects Swords with Ashbourne.

Balherary Road is a single carriageway road subject to a speed limit of 50kph and with a cross section of 13m. Approximately 380m to the south of the signalised junction with Glen Ellan Road (Junction C as per Figure 15.2), Balheary Road terminates at a four-armed signalised junction with R125 (Junction B – Figure 15.2). Along this section of the road, a footpath is provided on the eastern side of the carriageway.

Glen Ellan Road will comprise the primary access to the subject site. It is a single carriageway road subject to a speed limit of 50kph with a cross section of 11m with footpaths and cycle lanes provided along both sides. Travelling in an easterly direction from the subject site, approximately 400m, the Glen Ellan Road terminates at a four-armed signalised junction with Balheary Road (Junction C – Figure 15.2).

Jugback Lane will comprise the secondary access to the subject site. In the section of road adjacent to the proposed development site, Jugback Lane is a single carriageway road subject to a speed limit of 30kph with a cross section of 5m with some metres of footpaths provided on the western side of the carriageway and no cycle lanes provided. Jugback Lane intersects Glen Ellan Road at the southwestern edge of the subject site and continues south towards R125.

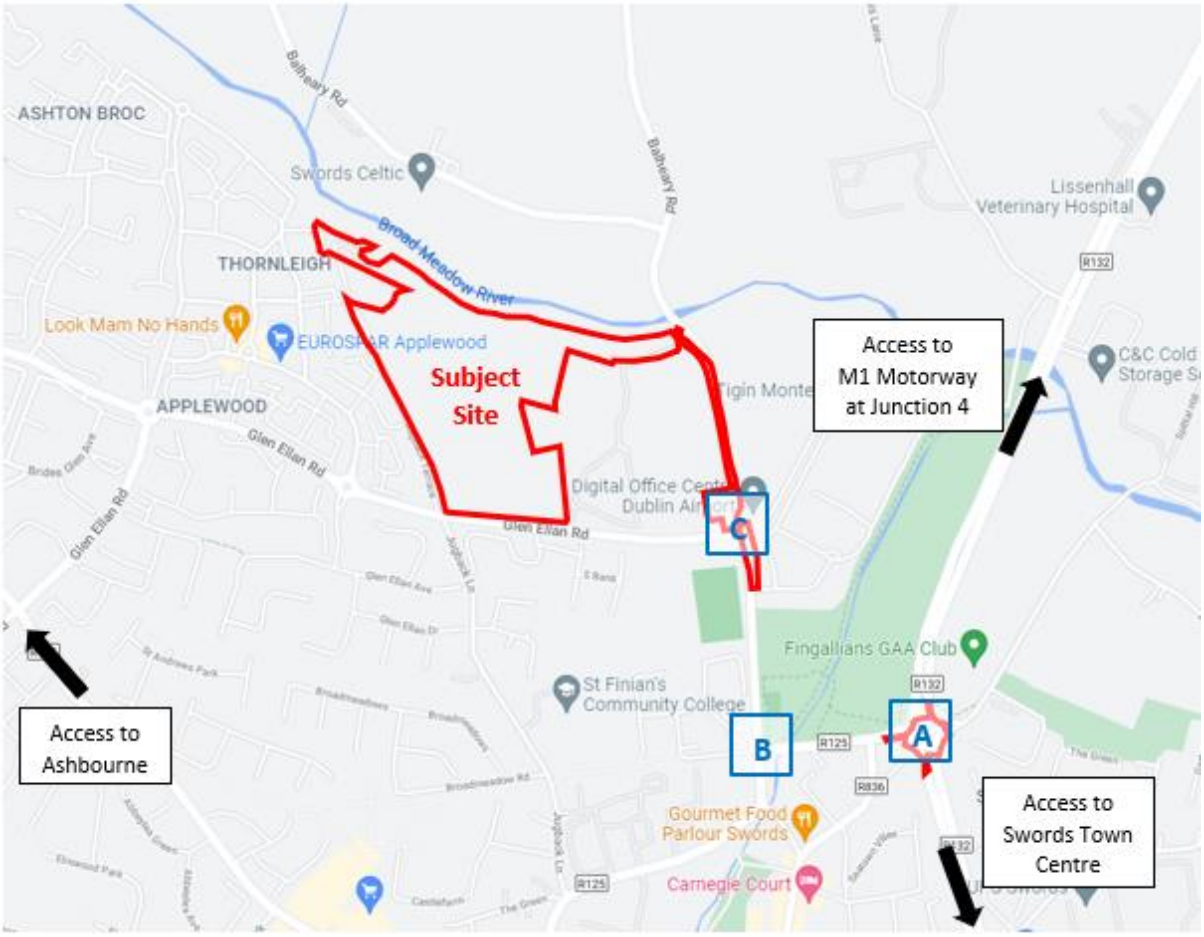


Figure 13. 2: Existing Road Network and Primary Junctions.

13.3.3 Existing Traffic Conditions

As part of the Traffic and Transport Assessment the scope of the assessment was discussed and agreed with Fingal County Council In this regard, five junctions in the vicinity of the site were identified to be included in the assessment and have been surveyed to understand the existing volume of traffic and to estimate the impact that the additional traffic arising from the proposed development will have on the operation capacity of the junctions. The junctions, which were chosen in consultation with the Roads Department of Fingal County Council and which have been surveyed are as follows:

- Junction 1: Ashton Distributor Road/Glen Ellan Road (Roundabout);
- Junction 2: Applewood Main Street/Glen Ellan Road (Roundabout);
- Junction 3: Balheary Road/Glen Ellan Road/Swords Business Campus (Signalised);
- Junction 4: Balheary Road/R125/Castlegrange Green (Signalised);
- Junction 5: R132 Dublin Road /R125 (Roundabout).

The location of the surveyed junctions in relation to the subject development site is illustrated in Figure 13. 3 below.

Figure 13. 3: Location of Surveyed Junctions.

The results of the survey indicated that the peak traffic levels through the junctions occurred between the hours of 08:00 – 09:00 in the AM and 17:00 to 18:00 in the PM.

To ascertain the existing operational capacity of each surveyed junction during the AM and PM peak hours, they have been modelled based on their current layout and their surveyed traffic levels. The surveyed traffic levels are presented in Section 3.2 of the Traffic and Transport Assessment prepared for the subject application accompanying the documentation package. A summary of the modelling results for each junction is presented below.

When assessing the capacity of priority junctions (junctions 1, 2 & 5), the Ratio of Flow to Capacity (RFC) is determined through modelling using Industry Standard Software (in this instance PICADY traffic modelling software was used) An RFC value of less than 1 indicates that there is capacity within the junction and over 1 indicates the junction is at or over capacity,

For signal controlled junctions (junctions 3 and 4) the Degree of Saturation (DOS) is determined through modelling using Industry Standard Software (in this instance TRANSYT traffic modelling software was used). A DOS of 90% to 100% indicates that a junction is operating at capacity. A DOS of less than 90% indicates that the junction has capacity for additional traffic.

Junction 1 is currently operating well within capacity during both peak hours, with the highest RFC at 0.50 and a corresponding queue of 1.0 vehicles recorded on Glen Ellan Road Extension (W) in the AM, and with the highest RFC at 0.44 and a corresponding queue of 0.8 vehicles recorded on Glen Ellan Road (E) in the PM.

Junction 2 is currently operating well within capacity during both peak hours, with the highest RFC at 0.47 and a corresponding queue of 0.9 vehicles recorded on Glen Ellan Road (W) in the AM, and with the highest RFC at 0.47 and a corresponding queue of 0.9 vehicles recorded on Glen Ellan Road (E) in the PM.

Junction 3 is currently operating at capacity during the AM peak hour, with the highest DOS at 92% and a corresponding queue of 15.71 vehicles occurring on Balheary Road (N), and within capacity during the PM peak hour, with the highest DOS at 75% and a corresponding queue of 13.82 vehicles occurring on Glen Ellan Road (W).

Junction 4 is currently operating within capacity during both peak hours, with the highest DOS at 67% and a corresponding queue of 14.83 vehicles recorded on R125 (S) in the AM, and with the highest DOS at 69% and a corresponding queue of 16.61 vehicles recorded also on Balheary Road (N).

Junction 5 is currently operating above capacity during the AM peak hour, with the highest RFC at 1.01 and a corresponding queue of 53.8 vehicles occurring on R132 (M), and within capacity during the PM peak hour, with the highest RFC at 0.85 and a corresponding queue of 5.7 vehicles occurring on R132 (S).

13.3.4 Existing Bus Service

Existing bus services which currently serve the proposed development site area include:

- Swords Express and
- Dublin Bus
- Go Ahead Ireland
- Transport for Ireland

Swords Express

The Swords Express provides an existing, high-quality and express bus service from Swords to Dublin City Centre which is routed along Glen Ellan Road. The Swords Express has a travel time of approximately 35 minutes to The Point Village.

The Swords Express links Swords to Dublin City Centre via the Port Tunnel. There are two coach stops located along Glen Ellan Road within approximately 150m of the proposed site entrance, being the Jugback Lane and St. Colmcille GAA Club. The routes that serve these coach stops are 500, 500X, 503, 507 (all daily) and 500N (Thursday and Friday night).

During peak hours this is a high-frequency service with 22 buses from Glen Ellan Road to the city centre between the hours of 06:22 and 09:00 in the morning, which equates to one bus approximately every 7 minutes. In the evening peak, there is a similar service with 21 buses leaving the city centre travelling to Glen Ellan Road between the hours of 17:00 and 19:00 equating to a frequency of one bus every 5min 45sec.

On 01 March 2022, Waterman Moylan undertook a survey of the capacity in the Bus Network which would directly serve the subject site. This capacity study was undertaken adjacent to the development site and also at the stop in Swords before the buses join the M1 motorway. The survey was undertaken during the peak morning hours and it was found that all busses were operating at approximately 50% capacity or less.

Outside of peak hours, the Swords Express runs at least every 30 minutes from Monday to Saturday and once per hour on Sundays.

Go-Ahead Ireland

In addition to the Swords Express service, the following Go-Ahead Ireland routes also serve the subject site area:

- **Go Ahead Route 197**: Swords – Ashbourne
- **Go Ahead Route 33a**: Balbriggan – Dublin Airport
- **Go Ahead Route 33b**: Portane – Swords

The weekday and weekends frequencies which these routes operate are presented in **Error! R eference source not found.** below.

Figure 13-1 Go Ahead Routes – Weekdays and Weekends Frequencies

Go Ahead Route	Weekdays Frequencies	Saturday Frequencies	Sunday Frequencies
33a	30-60min (All day)	90min (All day)	90min (All day)
33b	30-45min (All day)	30-60min (All day)	30-60min (All day)
197	60min (All day)	60min (All day)	60min (All day)

Transport for Ireland

In addition to the Swords Express service, the following Transport for Ireland routes also serve the subject site area:

- **Transport for Ireland Route 196**: St. Margaret`s – Swords Nursing Home

The weekday and weekends frequencies which these routes operate are presented in **Error! R eference source not found.** below.

Figure 13-2 Transport for Ireland Route– Weekdays and Weekends Frequencies.

Transport for Ireland Route	Weekdays Frequencies	Saturday Frequencies	Sunday Frequencies
196	40-60min (All day)	40-60min (All day)	Not work

Dublin Bus

In addition to the Swords Express service, the following Dublin Bus routes also serve the subject site area:

- **Dublin Bus Route 41c**: Lower Abbey Street – Swords Manor
- **Dublin Bus Route 43**: Talbot Street – Swords Business Park
- **Dublin Bus Route 41**: Lower Abbey Street – Swords Manor
- **Dublin Bus Route 41b**: Lower Abbey Street – Rolestown
- **Dublin Bus Route 41x**: UCD Belfield – Knocksedan
- **Dublin Bus Route 33**: Lower Abbey Street – Balbriggan
- **Dublin Bus Route 33a**: Dublin Airport – Balbriggan
- **Dublin Bus Route 33b**: Swords – Portrane
- **Dublin Bus Route 33e**: Lower Abbey Street – Mourne view
- **Dublin Bus Route 33n**: Westmoreland Street – Balbriggan

The weekday and weekends frequencies which these routes operate are presented in **Error! R eference source not found.** below.

Figure 13-3 Dublin Bus Routes – Weekdays and Weekends Frequencies

Dublin Bus Route	Weekdays Frequencies	Saturday Frequencies	Sunday Frequencies
41c	20-30min (All day)	20-30min (All day)	20-30min (All day)
43	30min (Peak Hours) 60min (Off Peak)	60min (All day)	60min (All day)
41	20-30min (All day)	20-30min (All day)	30min (All day)
41b	5h (All day)	5h (All day)	8h (All day)
41x	1 Time per day	Not work	Not work
33	40min (Peak Hours) 60min (Off Peak)	60min (All day)	60min (All day)
33a	30-60min (All day)	90min (All day)	90min (All day)
33b	30-45min (All day)	30-60min (All day)	30-60min (All day)
33e	1 Time per day	Not work	Not work
33n	4 Times per night (Thursday and Friday)	4 Times per night	Not work

The closest bus stops which are served by Dublin Bus Route 43 are located on R836 approximately 1.1km (13-minute walk as per Figure 13. 4) of the main site access, being Bus Stop No. 4924, No. 44958, No. 3712, No. 3679 and No. 5075 see Figure 13. 7.

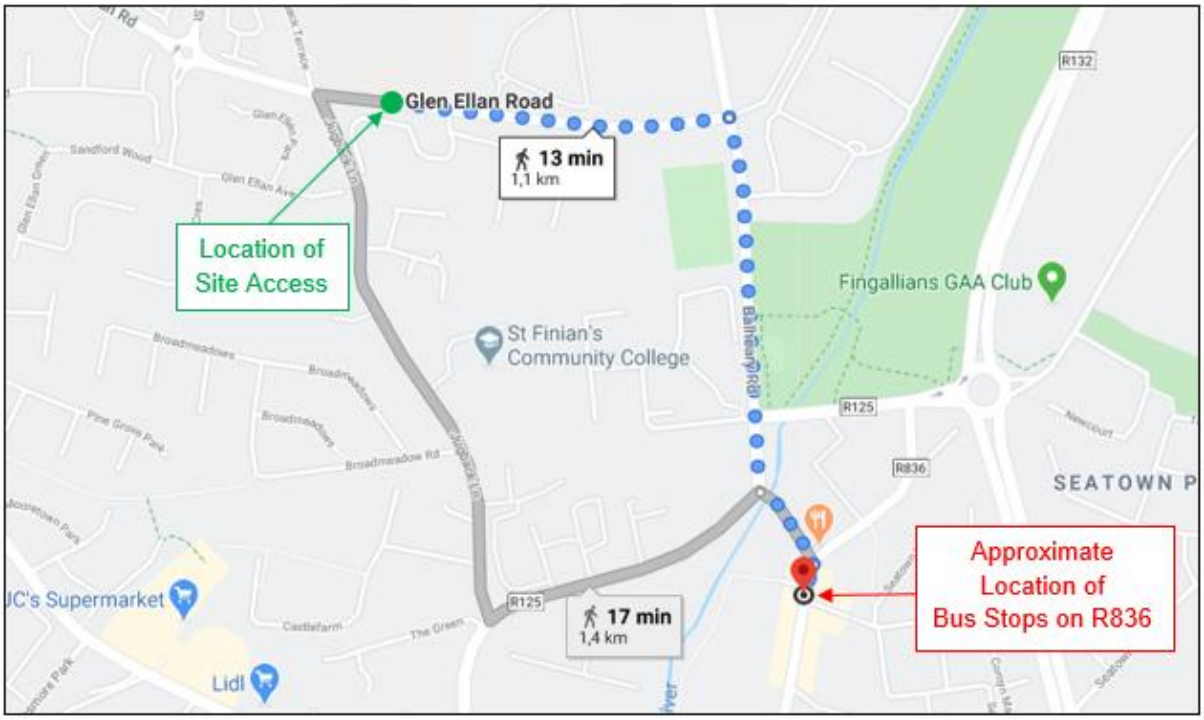


Figure 13. 4: Walking Route from Subject Site to Bus Stops on R836 (Source: Google Maps).

In reference to Figure 13. 4, a network of footpaths is provided on Glen Ellan Road, Balheary Road and R125 with dedicated pedestrian crossing facilities at each road crossing point along the route to the bus stops. All these pedestrian crossings include dropped kerbs.

Travel time on Go-Ahead Route 33a from Bus Stop No. 3712 on Glen Ellan Road to Dublin Airport is approximately 40 minutes.

Travel time on Go-Ahead Route 33b from Bus Stop No. 3712 on Glen Ellan Road to Marsh Lane is approximately 60 minutes.

Travel time on Dublin Bus Route 33 from Bus Stop No. 3712 on Glen Ellan Road to Lower Abbey Street in Dublin City Centre is approximately 70 minutes.

Travel time on Dublin Bus Route 33e from Bus Stop No. 3712 on Glen Ellan Road to Lower Abbey Street in Dublin City Centre is approximately 70 minutes.

Travel time on Dublin Bus Route 41c from Bus Stop No. 3712 on Glen Ellan Road to Lower Abbey Street in Dublin City Centre is approximately 70 minutes.

Travel time on Dublin Bus Route 43 from Bus Stop No. 3679 on Glen Ellan Road to Talbot Street in Dublin City Centre is approximately 70 minutes.

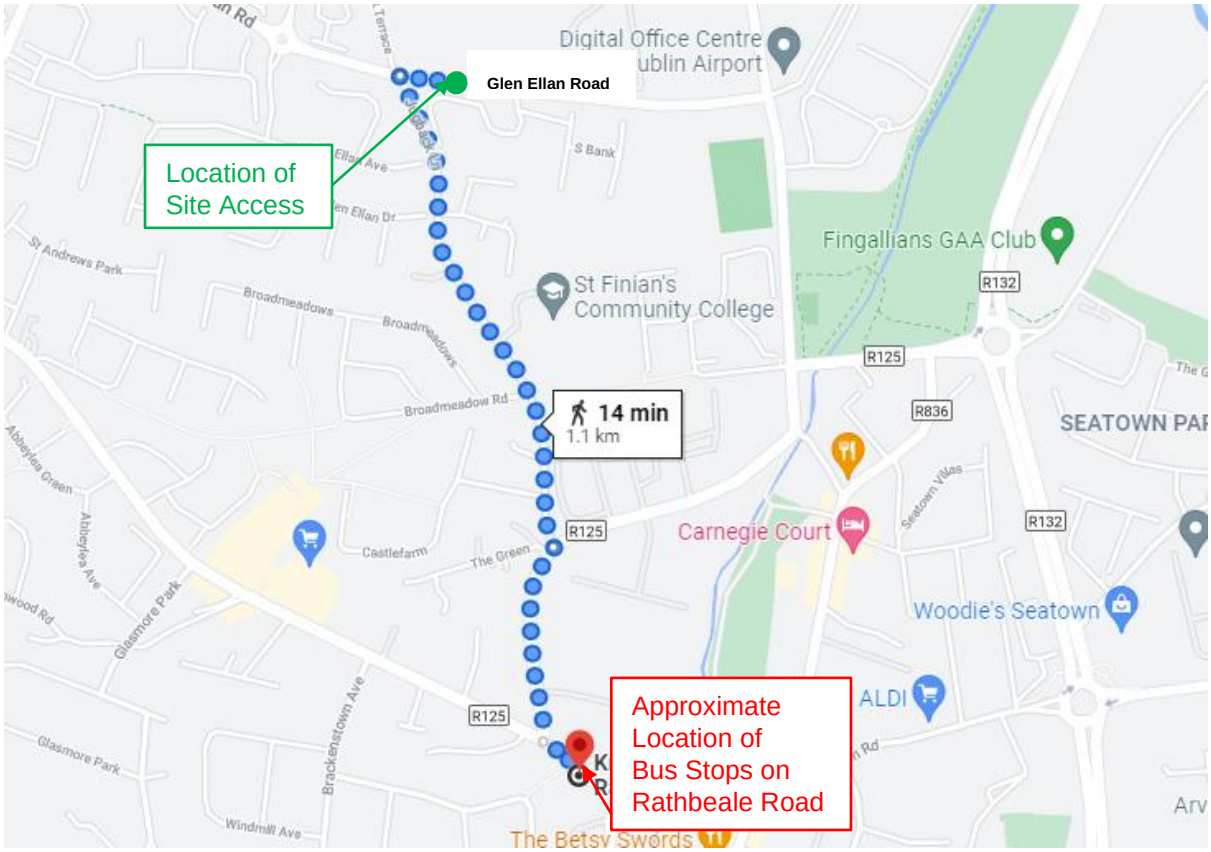


Figure 13. 5: Walking Route from Subject Site to Bus Stops on Rathbeale Road (Source: Google Maps).

In reference to Figure 13. 5, a network of footpaths is provided on Glen Ellan Road, Rathbeale Road with dedicated pedestrian crossing facilities at each road crossing point along the route to the bus stops. All these pedestrian crossings include dropped kerbs.

Travel time on Dublin Bus Route 41 from Bus Stop No. 5075 on Glen Ellan Road to Lower Abbey Street in Dublin City Centre is approximately 70 minutes.

Travel time on Dublin Bus Route 41b from Bus Stop No. 5075 on Glen Ellan Road to Lower Abbey Street in Dublin City Centre is approximately 70 minutes.

Travel time on Dublin Bus Route 41x from Bus Stop No. 5075 on Glen Ellan Road to Tara Street is approximately 60 minutes.

Travel time on Go-Ahead Route 197 from Bus Stop No. 5075 on Glen Ellan Road to Ashbourne is approximately 60 minutes.

Travel time on Transport for Ireland 196 from Bus Stop No. 5075 on Glen Ellan Road to Swords Nursing Home is approximately 60 minutes.

Figure 13. 6: Walking Route from Subject Site to Bus Stops on R836 (Source: Google Maps).

In reference to Figure 13. 6, a network of footpaths is provided on Glen Ellan Road, Main Street with dedicated pedestrian crossing facilities at each road crossing point along the route to the bus stops. All these pedestrian crossings include dropped kerbs.

Travel time on Go-Ahead Route 33a from Bus Stop No. 3679 on Glen Ellan Road to Dublin Airport is approximately 40 minutes.

Travel time on Go-Ahead Route 33b from Bus Stop No. 3679 on Glen Ellan Road to Marsh Lane is approximately 60 minutes.

Travel time on Go-Ahead Route 197 from Bus Stop No. 3679 on Glen Ellan Road to Ashbourne is approximately 60 minutes.

Travel time on Dublin Bus Route 33 from Bus Stop No. 3679 on Glen Ellan Road to Lower Abbey Street in Dublin City Centre is approximately 70 minutes.

Travel time on Dublin Bus Route 33e from Bus Stop No. 3679 on Glen Ellan Road to Lower Abbey Street in Dublin City Centre is approximately 70 minutes.

Travel time on Dublin Bus Route 41 from Bus Stop No. 3679 on Glen Ellan Road to Lower Abbey Street in Dublin City Centre is approximately 70 minutes.

Travel time on Dublin Bus Route 41c from Bus Stop No. 3679 on Glen Ellan Road to Lower Abbey Street in Dublin City Centre is approximately 70 minutes.

Travel time on Dublin Bus Route 41b from Bus Stop No. 3679 on Glen Ellan Road to Lower Abbey Street in Dublin City Centre is approximately 70 minutes.

Travel time on Dublin Bus Route 41x from Bus Stop No. 3679 on Glen Ellan Road to Tara Street is approximately 60 minutes.

Travel time on Dublin Bus Route 43 from Bus Stop No. 3679 on Glen Ellan Road to Talbot Street in Dublin City Centre is approximately 70 minutes.

Travel time on Dublin Bus Route 33n from Bus Stop No. 3679 on Westmoreland Street to Glen Ellan Road is approximately 60 minutes.

Travel time on Transport for Ireland 196 from Bus Stop No. 3679 on Glen Ellan Road to Swords Nursing Home is approximately 60 minutes.

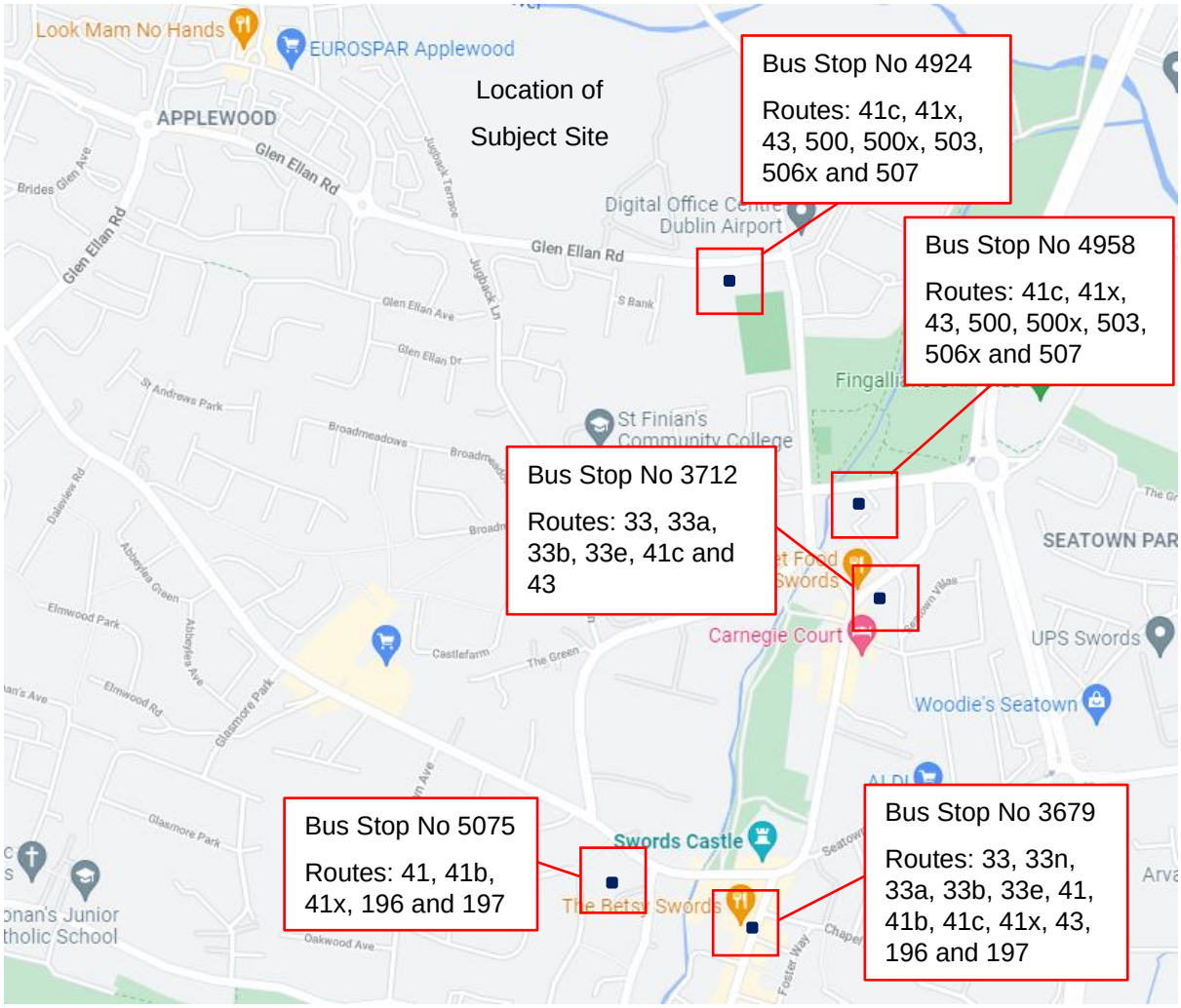


Figure 13. 7: Location of Closest Bus Stops Served by Dublin Bus Routes, Go-Ahead and Transport for Ireland.

13.3.5 Existing Car-Sharing Service

The closest GoCar stations, which are served by two vehicles, is located in the car park at Braeburn Terrace, Applewood, approximately 650m (8-minute walk) northwest of the main vehicular access on Glen Ellan Road, and approximately 350m west (4-minute walk) west of the secondary access on Jugback Lane.

The location of the closest GoCar station in relation to the proposed development site is illustrated in Figure 13. 8 below.

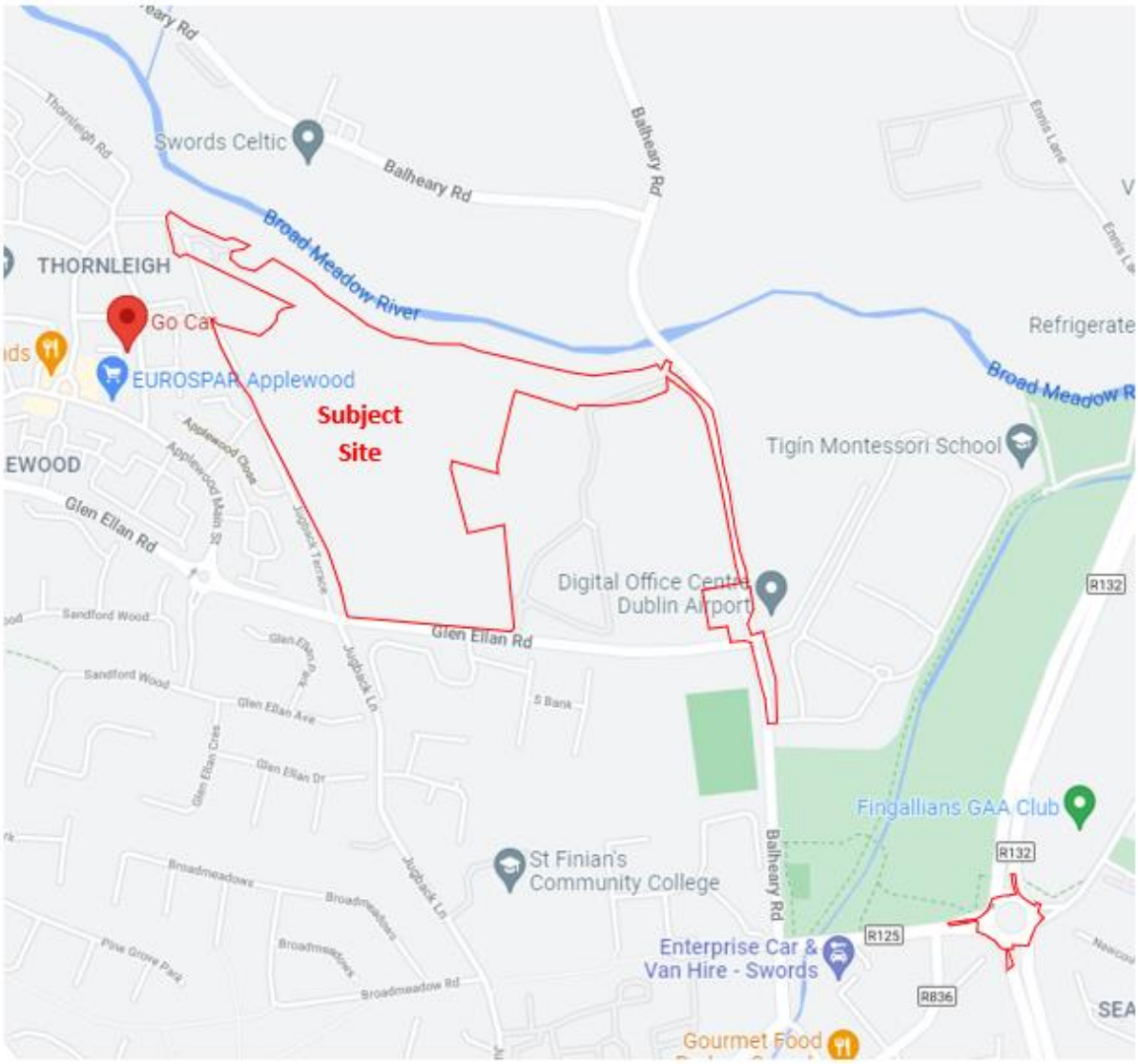


Figure 13. 8: Location of Closest GoCar Station (Source: www.gocar.ie).

13.3.6 Existing Cycle Facilities

Along the site frontage, cyclists can benefit from the provision of a dedicated cycle lane along the south side of the carriageway on Glen Ellan Road. This cycle lane is separated from the road by a footpath and a grass verge. Figure 13. 9 is an extract of the Cycle Network Plan for the Greater Dublin Area which illustrates the existing cycling infrastructure within the area surrounding the proposed development site.

Figure 13. 9: Existing Cycle Infrastructure – Extracted from Sheet E9 in GDA Cycle Network Plan.

13.3.7 Existing Pedestrian Facilities

The existing pedestrian facilities in the surrounding area comprise an interconnected network of footpaths linking the various neighbourhoods to each other, to the existing schools, to the existing parks, to Swords Main Street and associated services/amenities and the surrounding public network.

13.3.8 Other Services

Rail Services – Swords is not currently served by rail transportation. The site is located approximately 7.4km drive (c. 12 minutes off-peak but would be significantly longer during peak periods depending upon the time of year/weather conditions etc) from Malahide Rail Station which includes both on-site car parking (77 no. spaces) and cycle facilities (70 no. sheltered spaces and 13 rentable bike lockers) making it an option for commuters, however due to the very good bus services in proximity of the subject site it is unlikely to be an attractive commuting option for residents who wish to travel to the City Centre. This station provides access to the Dublin Connolly / Drogheda / Dundalk services as well as the DART. This forms part of the wider rail network throughout the Greater Dublin Area and links the site directly to Dublin City Centre.

13.4 Planned Future Receiving Environment

13.4.1 BusConnects

The BusConnects project currently being promoted by the National Transport Authority aims to deliver a much-enhanced bus service to the Greater Dublin Area. The bus routes proposed to directly serve the proposed development site are the **Radial Route 22, Local Routes L21, L82, L83, L85, L89, L197** and **Peak-time Route X79, X84** as per Figure 15.10 below – extracted from BusConnects Local Area Map. A summary of the proposed route of these bus services is presented in **Error! Reference source not found.**. The weekday and weekend frequencies of each route are presented in **Error! Reference source not found.**.

Figure 13-4 BusConnects Routes.

Route No.	From	Via	To
22	**Glen Ellan Rd.**	River Valley	**City Centre**
X79	**Glen Ellan Rd.**	River Valley – City Centre	**UCD**
X84	**Portrane**	Donabate – City Centre	**UCD**
L21	**Dalkey**	-	**Dun Laoghire**
L82	**Swords**	Clonshaugh	**Beaumont Hospital**
L83	**Portrane**	Donabate – Swords	**Airport**
L85	**Balbriggan**	Skerries – Rush/Lusk - Swords	**Airport**
L89	**Airside**	Swords-Knocksedan-Toberburr	**Finglas**
L197	**Ashbourne**	Rolestown	**Swords**
A4	**Swords**	City Centre	**Dundrum**

Figure 13. 10: BusConnects Routes Map.

Figure 13-5 BusConnects Routes Frequencies.

Weekday Frequency					
Route No.	Before 07:00	07:00 to 08:00	08:00 to 17:00	17:00 to 18:00	After 18:00
22	15 to 30 min	15 min	15 min	15 min	15 to 30 min
X79	-	3 services	-	3 services	-
X84	-	3 services	-	3 services	-

L21	60 min	60 min	60 min	60 min	60 min
L82	-	60 min	60 min	60 min	-
L83	30 min	30 min	30 min	30 min	30 to 60 min
L85	30 min	30 min	30 min	30 min	30 to 60 min
L89	-	60 min	6 services	60 min	2 services
L197	1 service	60 min	60 min	60 min	60 min
A4	15 to 30 min	12 min	12 min	12 min	15 to 30 min
Saturday Frequency					
Route No.	Before 07:00	07:00 to 08:00	08:00 to 17:00	17:00 to 18:00	After 18:00
22	20 min	20 min	15 to 20 min	20 min	20 to 30 min
X79	-	-	-	-	-
X84	-	-	-	-	-
L21	60 min	60 min	60 min	60 min	60 min
L82	-	60 min	60 min	60 min	1 service
L83	-	60 min	60 min	60 min	30 to 60 min
L85	60 min	60 min	30 to 60 min	30 min	30 to 60 min
L89	-	1 service	5 services	1 service	services
L197	1 service	60 min	60 min	60 min	60 min
A4	20 min	15 to 20 min	15 min	15 min	20 to 30 min
Sunday Frequency					
Route No.	Before 07:00	07:00 to 08:00	08:00 to 17:00	17:00 to 18:00	After 18:00
22	-	-	20 to 30 min	30 min	30 min
X79	-	-	-	-	-
X84	-	-	-	-	-
L21	-	-	60 min	60 min	60 min
L82	-	-	-	-	-
L83	-	1 service	30 to 60 min	30 min	30 to 60 min
L85	-	1 service	30 to 60 min	30 min	30 to 60 min
L89	-	1 service	4 services	1 service	1 service
L197	-	-	60 min	60 min	60 min
A4	-	-	20 to 30 min	20 min	20 to 30 min

It is estimated that the BusConnects will improve current journey times to the city centre by 40-50% and mitigate against any future increase in journey times. The improved journey time to the city centre will encourage a greater modal shift towards bus service and away from the private car.

The proposed BusConnects together with the existing Swords Express service will offer another alternative for sustainable travel in advance of the completion of the MetroLink.

13.4.2 MetroLink

MetroLink is a proposed high-capacity, high-frequency rail line running from Swords through Dublin Airport and Dublin City Centre to Charlemont. MetroLink will carry up to 50 million passengers annually, cutting journey times from Swords to the city centre to 25 minutes. The preferred route for MetroLink is currently undergoing consultation and an application for planning approval for the MetroLink Scheme is expected to be made to An Bord Pleanala in Q2 2022. It is anticipated that the construction period would be about six to eight years post planning grant and that the MetroLink service would be operational in early 2030's.

The Estuary Park and Ride station, which is also the terminus of MetroLink is located approximately 1.5km northeast of the proposed site. It will comprise a multi-storey park-and-ride facility with a total of 3,000 car parking spaces. It is envisaged that the introduction of the MetroLink will see a significant modal shift towards public transport resulting in a lower dependence on the private car. The location of the Estuary Park and Ride station in relation to the proposed development site is illustrated in Figure 19 – extracted from MetroLink website.

Figure 13. 11: Location Map for Proposed Development Site and Estuary Park and Ride Station

The proposed development is planned to be developed in three distinct phases. Phase 1 is programmed to be fully constructed by 2023, Phase 2 by 2025 and Phase 3 by 2027. These milestones have been defined to fully comply with the Estuary West masterplan Phasing and Implementation programme and to coordinate with the operation of the MetroLink. Should the opening of the MetroLink project extend beyond 2027, which based on current timeframes is likely and suggest an early 2030's opening year, then the delivery of some or all of Phase 3 of the housing development may be delayed. The delayed delivery of MetroLink may be mitigated against through the provision of increased frequency bus services in the interim. This increased bus provision may permit increased development in the Masterplan area in advance of MetroLink, including some or all of the Phase 3 housing project.

13.4.3 Car Sharing

5 No. car sharing spaces have been reserved within the development. It is therefore expected that 5 No. shared car club vehicles will be provided in the proposed development when fully developed and occupied.

13.4.4 Pedestrian and Cycling Facilities

As part of Phase 1 of the proposed development works, a green corridor is proposed on the north portion of the site along the southern side of the Broadmeadow River. This green corridor, which is in line with both Estuary West masterplan's essential infrastructure and the cycle network plan for the Greater Dublin Area (See Figure 13. 12 below), will facilitate connection to the proposed regional park to the west and pedestrian/cyclist progression towards R132, the proposed Estuary Metrolink Station and the Broadmeadow Estuary to the east. A shared pedestrian and cycling path also runs through the proposed central spine linking the Broadmeadow Riverside Park to Glen Ellan road. The pedestrian/cycle network continues throughout the site with several connections to Jugback Terrace and facilities / services to the west and pedestrian/cycle links to the lands adjacent to the east (to allow for connections with any potential future development to the east of the subject site).

Proposals for the Greater Dublin Area Cycle Network Plan were published by the National Transport Authority in December 2013. The plan sets out a vision and a strategy for the construction and/or designation of a comprehensive network of cycling routes throughout the Greater Dublin Area (Counties Dublin, Meath, Kildare and Wicklow).

An extract from Sheet N9 (Proposed Cycle Network Swords & Malahide) is reproduced in Figure 13. 12 below.

Figure 13. 12: Proposed Cycle Network Upgrades.

13.4.5 Junctions Improvements

Oldtown-Mooretown Local Area Plan - FCC

The Oldtown / Mooretown Local Area Plan, published by the Planning Department of Fingal County Council in 2010 sets out the development strategy to develop the Oldtown-Mooretown lands in a phased, coordinated and sustainable manner from 2010 to 2016. On 28th July 2015, an extension of the duration of the LAP's life has been approved for an additional period of 5 years, from the 13th July 2015 up to the 12th July 2020.

A phasing programme is set out as part of the Oldtown – Mooretown Local Area Plan to ensure that the physical and social infrastructure required for the area is provided. This phasing programme is divided into 4 phases. Each phase indicates junctions in the vicinity of the proposed development site that need an upgrade in conjunction with the development of the plan lands. These junctions are:

- Junction A: R132 Dublin Road /R125 (Roundabout).
- Junction B: Balheary Road/R125/Castlegrange Green (Signalised);
- Junction C: Balheary Road/Glen Ellan Road/Swords Business Campus (Signalised);

The junction upgrades proposed under the Oldtown-Mooretown LAP are detailed described in Section 4.1 of the Traffic and Transport Assessment prepared for the subject site which is accompanying the documentation package under a separate cover.

In May 2021 Fingal County Council lodged a Part 8 application to An Board Pleanala under reference number ABP-310145-21. This application included the junction upgrade works required to the R132/R125 Estuary Roundabout, referred to as Junction A in this application.

On 20th January 2022, ABP approved this application with conditions under case number JP06F.310145.

Part D: Estuary West Masterplan - FCC

The '*Phasing and Implementation'* section of Part D: Estuary West Masterplan, published by Fingal County Council in May 2019, does not consider that the road and junction upgrades proposed as part of the Oldtown / Mooretown LAP are essential for the development of the Estuary Masterplan lands. Therefore, it is understood that the proposed development can be delivered in advance of these aforementioned upgrades.

However, to increase the operational capacity of the local road network to accommodate the proposed development traffic in advance of the major improvements planned under the Oldtown – Mooretown LAP, , improvements to Glen Ellan Road / Balheary Road (signalised crossroads) and R132 Dublin Road / R125 (roundabout) are proposed as part of this planning application. These improvements are presented below.

Glen Ellan Road / Balheary Road - Proposed Junction Upgrade

As part of subject development works, minor alterations to the existing Glen Ellan Road / Balheary Road signalised junction layout are proposed. These alterations consist of:

- Traffic travelling from Glen Ellan Road (W) will have a right turning lane and a lane allowing forward left and right turning movements.
- Traffic travelling from Balheary Road (S) will have one lane for left-turning movement and one lane for straight and right turning movement. Balheary Road (S) will also comprise two exit lanes.
- Provision of advanced stop lines for cyclists on Glen Ellan Road (W) and Balheary Road (S).

These proposed improvements will only require a small portion of the green site to the west of the Balheary Road (S). The lands required to carry out the junction upgrade works are within the ownership of the council. Details of the proposed layout are set out on Waterman Moylan Drg. No. 17-088-P014 accompanying the documentation package.

R132 Dublin Road / R125 – Proposed Junction Upgrade

Should the programme for the approved Part 8 works to this roundabout be such that the upgrade works are not complete prior to occupation of the development, minor alteration works will be required to the Estuary Road roundabout to accommodate this development. This alteration consists of:

- The signalisation of this roundabout with only the eastern approach remaining as priority controlled.
- Provision of dedicated cycle lanes on the northern, western and southern approaches to the junction, with advanced stop lines for cyclists.
- Provision of a network of footpaths with dedicated pedestrian crossings and safety barriers on the western, southern and eastern approaches to the junction.

To undertake this junction upgrade, no additional lanes are required. Details of the proposed layout are set out on Waterman Moylan Drg. No. 17-088-P013 accompanying the documentation package.

13.5 Characteristics of Proposed Development

13.5.1 General

The proposed scheme will consist of the development of the existing 8.92 Ha (net site area/developable area) vacant site to provide a total of 621 No. residential units comprising a mix of housing typologies, duplexes and apartments together with a Creche facility (506.5 sqm). The detailed breakdown of the proposed residential scheme is as follows:

Figure 13-6 Breakdown of Proposed Schedule of Accommodation.

Typology	1Bed	2Bed	3Bed	4Bed	Total
Houses/Maisonettes	8	-	99	11	118
Duplexes	-	77	77	-	154
Apartments	137	201	11	-	349
Total	145	278	187	11	621

13.5.2 Phasing Programme

It is proposed that the subject development will be delivered in three distinct phases.

- **Phase 1**: programmed to be fully developed and occupied by the end of 2023, will consist of the development of 118 no. houses/maisonettes and 78 no. duplexes in the centre-north-west portion of the site. The green corridor along Broadmeadow River and the majority of the internal road network will also be delivered as part of Phase 1 development works.
- **Phase 2**: programmed to be fully developed and occupied by the end of 2025, will consist of the development of 76 no. duplexes in the northeast portion of the site.
- **Phase 3**: programmed to be fully developed and occupied by the end of 2027, will consist of the development of 349 no. apartments in the south portion of the site. The creche facility will also be delivered as part of Phase 3 development. The opening year of 2027 has been used in the calculations for the opening year of Phase 3 of the development. It is noted that this is an aggressive target.The proposed phasing plan is illustrated in Figure 13. 13.

13.5.3 Vehicular Access Points

Main vehicular access to the subject development is proposed from the south via a new priority-controlled T-junction on Glen Ellan Road. The visibility splay requirements for this vehicular access are based on the 50kph design speed limit. The sightline requirements for a new priority junction on a 50kph road are identified within DMURS which recommends a visibility splay of 49m x 2.4m on roads with bus routes. The proposed development entrance complies with these requirements.

Secondary vehicular access will be provided from the west via Jugback Lane/Terrace. This additional access will be constructed to primarily provide connectivity to the adjacent Applewood Village and all its associated services/amenities. Visibility splay for this junction has also been designed in accordance with DMURS requirements for the junction of 30kph without bus routes, which is 23m x 2.4m.

An allowance for future traffic and pedestrian/cycle links has also been proposed to facilitate a connection between the site and any potential future development to the east of the subject site.

Figure 13. 13 below illustrates the location of the access points proposed to serve the subject development. Details of the designed sightlines for the proposed site access junctions are shown on Waterman Moylan Drg. No. 17-088-P010 accompanying the documentation package.

Regarding the access to the stormwater attenuation tank in the Celestica site, access to the site will be from a newly proposed entrance to the east of the site.

Figure 13. 13: Proposed Development Phasing Plan and Access Points to the Site

13.5.4 Internal Layout

All internal roads in the proposed development are designed for a speed limit of 30kph with 5.0m wide carriageways and footpaths along both sides. All intersections within the development itself will be priority junctions with raised tables where appropriate. The low design speeds and traffic calming measures will ensure the safe operation of these junctions and a safe/secure environment for pedestrians and cyclists.

The design and layout of the proposal have been prepared to fully comply with the current relevant design standards and specifications applicable to this form of development, which are outlines in section 13-13..

13.5.5 Pedestrian and Cyclist Infrastructure

All footpaths proposed for the subject development will be provided in accordance with Section 4.3.1 of the DMURS which suggests that a minimum 1.8m footpath should be provided. All the proposed cycle tracks are designed in accordance with the National Cycle Manual. These proposed pedestrian/cycle facilities will connect to the existing facilities in the vicinity of the site and will provide good quality and safe/secure network for pedestrians and cyclists.

The pedestrian/cyclist infrastructure proposed for the subject development consists of a north-south spine running along the centre of the site leading to the proposed main vehicular access on Glen Ellan Road, and a west-east spine running from the proposed western vehicular access point on Jugback Lane/Terrace up until Balheary Road further east. The eastern section of the west-east spine will form part of the green corridor along the south side of Broadmeadow River.

These proposed spines will be connected internally within the site and will facilitate safe and secure pedestrian/cyclist progressions towards the bus stops on Glen Ellan Road, the existing services/amenities at Applewood Village and the future Estuary Metrolink Station.

13.6 Predicted Impacts

13.6.1 Construction Stage

There is a potential for construction traffic to impact from a noise and dust perspective in relation to the surrounding road network. Construction deliveries to and from the site by heavy good vehicles will impact on noise levels, whilst dust may result from vehicles travelling along site roads and from general earthwork activities. There is also potential for traffic congestion, particularly during the construction of the upgraded signalised junction and also due to increased construction traffic on the road network which may also perform turning movements in areas that impact traffic. There is potential for inappropriate parking, particularly along Glen Ellan Road whilst vehicles are waiting to access the site. There is also potential for workers to park on the surrounding residential roads.

A number of the construction traffic movements will be undertaken by heavy goods vehicles, though there will also be vehicle movements associated with the appointed contractors and their staff.

Whilst it is not possible at this stage to accurately identify the day to day traffic movements associated with the construction activities, based on the experience of similar sites it is considered that the number of construction-related heavy goods vehicle movements to and from the application site will be approximately 30 arrivals and departures per day.

Similarly, the general workforce is unlikely to exceed approximately 120 in number, which with an allowance for shared journeys could equate to a maximum of around 80 arrivals and departures per day

There is a potential for conflict between construction traffic and pedestrians/cyclists using the existing facilities on Glen Ellan Road and/or Balheary Road. There is potential for construction traffic to have a moderate effect on the surrounding environment. However, the duration of this impact will be short to medium-term (i.e. one to seven years).

13.6.2 Operational Stage

The proposed scheme consists of the development of 621 No. residential units comprising of 118 no. houses/maisonettes, 154 No. duplexes and 349 No. apartments together with a Creche facility. It is proposed that the subject development will be delivered in the following three phases.

Phase 1 will consist of the development of 118 No. houses/maisonettes and 78 No. duplexes.

Phase 2 will consist of the development of 76 No. duplexes.

Phases 1 and 2 will comprise a total of 272 No. residential units and, as per Table 8 above, can therefore be delivered as part of the Phase 1 of Estuary West masterplan (prior to Metrolink operation).

Phases 1 and 2 of the subject development are proposed to be opened in 2023 and 2025, respectively.

Phase 3 will consist of the development of 349 No. apartments and the creche.

Due to the number of residential units proposed in this phase, as per Table 8 above and to coordinate with the operation of Metrolink, this phase is programmed to be delivered during of the second phase

of the Estuary West masterplan (not before MetroLink). Metrolink is projected to be operational by early 2031's and, Phase 3 of the subject development is proposed to be completed by early 2031's, to coincide with the opening of the MetroLink.. Should the delivery of MetroLink be delayed, the provision of increased frequency bus services may mitigate against the delay in the interim or indeed by Bus Connects should this be fully operational at the time of occupation of Phase 3. This increased bus provision may permit increased development in the Masterplan area in advance of MetroLink, including some or all of the Phase 3 housing project.

Trip Generation

The proposed development will generate a number of trips by various modes of travel including vehicular, pedestrian, cycle and public transport. These trips may have an impact on the surrounding road network. Specific impacts are identified below.

Error! Reference source not found. below shows a summary of the car trips expected to be generated d uring each phase of the proposed development. For further detail on trip generation, including the assessment methodology, please refer to the Traffic and Transport Assessment accompanying the documentation package.

Figure 13-7 Peak Hour Car Trip Generation.

Proposed Development	Year	AM Peak Hour		PM Peak Hour	
		Car Trips IN	Car Trips OUT	Car Trips IN	Car Trips OUT
Phase 1 (196 no. units)	2023	28	59	54	35
Phases 1 + 2 (272 no. units)	2025	39	82	75	48
Phases 1 + 2 + 3 (621 no. units)	2027	80	169	155	98

Trip Distribution

For the subject assessment, it is conservatively assumed that all traffic to/from the proposed development will access the site from Glen Ellan Road via the priority-controlled T-junction proposed as part of the subject development works.

Based on our experience of similar developments, the location of the subject site together with the likely destinations that the residents will need travel to from the proposed development, it was considered that 75% of the overall trips generated by the proposed development will travel eastwards along Glen Ellan Road and turn right onto Balheary Road, towards Dublin Airport or the M1,whilst the remaining 25% will make their way to west along Glen Ellan Road and turn left on Glen Ellan Road / Ashton Distributor Road roundabout towards R125 Rathbeale Road, where they can continue their journey into Swords or towards Ashbourne.

Trip distribution percentages for the Balheary Road / R125 / Castlegrange Green – Signalised crossroads, and the R132 Dublin Road / R125 – Four-armed roundabout, were calculated using the base surveyed flows and associated turning movements. The trip distribution for the AM and PM peak

hours generated traffic can be seen in Appendix F of the Traffic and Transport Assessment accompanying the subject application.

Traffic Growth

Based upon consultation with the developer and in line with their anticipated construction programme, the following opening years have been assumed for each phase of the proposed development:

Phase 1: Opening Year 2023 **Phase 2**: Opening Year 2025 **Phase 3**: Opening Year 2027

As per methodology adopted in the NRA Transport Assessment Guidelines (2014), which the TTA is based on, the assessed junctions were also modelled for the future design years of 2032 (Opening Year of Phase 3 + 5 years) and 2042 (Opening Year of Phase 3 + 15 years).

A traffic survey was carried out in 2019 which provides traffic data pre-covid. Therefore, the 2019 surveys are considered the most appropriate for use and are increased to include for traffic growth over the period 2019to 2022

The traffic growth rates used to factor up the 2019 base year traffic are in accordance with '*Table 6.2: Link-Based Growth Rates: County Annual Growth Rates (excluding Metropolitan Area)'* within the TII Publication – Project Appraisal Guidelines for National Roads Unit 5.3 – Travel Demand Projections (May 2019). These growth rates are as follows:

- 1.066 (Central growth) growth factor to 2023.
- 1.101 (Central growth) growth factor to 2025.
- 1.123 (Low Sensitivity growth) growth factor to 2027.
- 1.181 (Low Sensitivity growth) growth factor to 2032.
- 1.220 (Low Sensitivity growth) growth factor to 2042.

Assessed Junctions

The junctions that have been assessed as part of the TTA accompanying the documentation package are the following:

- **Junction 1 (Roundabout)**: Ashton Distributor Road / Glen Ellan Road.
- **Junction 2 (Roundabout)**: Applewood Main Street / Glen Ellan Road.
- **Junction 3 (Signalised)**: Balheary Road / Glen Ellan Road / Access Road to Swords Business Campus.
- **Junction 4 (Signalised)**: Balheary Road / R125 / Castlegrange Green.
- **Junction 5 (Roundabout)**: R132 Dublin Road / R125.

Road Impact – Traffic Increase

The extent of the impact of traffic from the proposed development has been determined by initially checking where generated traffic would exceed 10% of the traffic flow on the adjoining road or 5% on the road where congestion exists or the location is sensitive. This is in line with the NRA Transport Assessment Guidelines (2014). A summary of the existing two-way flows traffic and the expected traffic increase arising from the proposed development and based on the assumed trip distribution, expressed as a percentage, at each assessed junction is presented in **Error! Reference source not found.** below.

Figure 13-8 Existing and Additional Two-way Flows.

Junction	Junction Existing Flow - AM Peak Hour	Junction Existing Flow - PM Peak Hour	Additional Traffic Two-way Flow (AM)	Additional Traffic Two-way Flow (PM)	% Expected Increase (AM)	% Expected Increase (PM)
Junction 1	1,672	1,539	62	63	3.70%	4.09%
Junction 2	1,373	1,355	62	63	4.59%	4.65%
Junction 3	1,484	1,384	187	190	12.60%	13.73%
Junction 4	1,908	1,872	187	190	9.80%	10.15%
Junction 5	3,836	3,865	149	150	3.88%	3.88%

As can be seen from above, Junctions 1, 2 and 5 do not exceed a 5% increase in traffic and therefore no further assessment is warranted. However, as Junction 5 is known to currently operate at/without capacity in the peak hours, and improvement works are proposed on this junction, it has been modelled. Junctions 3 and 4 are expected to receive a two-way traffic increase higher than 10% and therefore have also been modelled.

Assessment Scenarios

The performance of the junctions has been analysed for the critical AM and PM Peak Hours (08:00 – 09:00 and 17:00 – 18:00) for the following scenarios:

- **BASE YEAR 2019**: with 2019 surveyed flows
- **DO NOTHING 2023 (DN-23)**: with 2019 baseline traffic flows factored up
- **DO NOTHING 2025 (DN-25)**: with 2019 baseline traffic flows factored up
- **DO NOTHING 2027 (DN-27)**: with 2019 baseline traffic flows factored up + traffic to/from the committed office development
- **DO NOTHING 2032 (DN-32)**: with 2019 baseline traffic flows factored up + traffic to/from the committed office development
- **DO NOTHING 2042 (DN-42)**: with 2019 baseline traffic flows factored up + traffic to/from the committed office development
- **DO SOMETHING 2023 (DS-23)**: DN-23 + traffic to/from Phase 1 of proposed development
- **DO SOMETHING 2025 (DS-25)**: DN-25 + traffic to/from Phases 1 and 2 of the proposed development
- **DO SOMETHING 2027 (DS-27)**: DN-27 + traffic to/from Phases 1, 2 and 3 of the proposed development
- **DO SOMETHING 2032 (DS-32)**: DN-32 + traffic to/from Phases 1, 2 and 3 of the proposed development

- **DO SOMETHING 2042 (DS-42)**: DN-42 + traffic to/from Phases 1, 2 and 3 of the proposed development

Junction Assessment Results

Junction 3 – Balheary Road / Glen Ellan Road / Swords Business Campus

Junction 3 is an existing signalised crossroads located to the east of the proposed development site. In order to simulate the capacity of the existing junction to accommodate the demand traffic arising from the proposed development, it has been initially modelled on the basis of its current layout.

The arms of the junction were labelled as follows within the TRANSYT model:

- Arm A: Swords Business Campus access road (E);
- Arm B: Balheary Road (S);
- Arm C: Glen Ellan Road (W);
- Arm D: Balheary Road (N).

As per the analysis results below, for the 2023 DO NOTHING scenario, with the baseline flows factored up and without the inclusion of any trips generated by the proposed development, Junction 3 will operate within capacity in the PM peak hour with the highest DOS at 80% and a corresponding queue of 15.34 vehicles recorded on Glen Ellan Road (W), and at capacity in the AM peak hour with the highest DOS at 98% and a corresponding queue of 20.13 vehicles recorded on Balheary Road (N).

With the inclusion of the trips generated by Phase 1 of the proposed development, for the 2023 DO SOMETHING scenario, Junction 3 will continue to operate within capacity in the PM peak hour with the highest DOS at 85% and a corresponding queue of 17.23 vehicles recorded on Glen Ellan Road (W), and at capacity during the AM peak hour with the highest DOS at 98% and a corresponding queue of 20.13 vehicles recorded on Balheary Road (N). Glen Ellan Road (W) is also recorded to operate at capacity during the AM peak hour with a DOS value of 96% and a corresponding queue of 33.32 vehicles.

Figure 13-9 Junction 3 – Current Layout – TRANSYT Analysis Results.

Arm	Mov.	AM		PM	
		Queue (Veh)	DOS (%)	Queue (Veh)	DOS (%)
2023 DO NOTHING					
A	S/L/R	0.13	4	0.13	4
B	L	6.71	38	13.58	62
	S/R	1.90	54	3.49	26
C	S/L	0.56	4	1.52	11
	R	27.14	91	15.34	80
D	S/L/R	20.13	98	4.22	58
2023 DO SOMETHING					
A	S/L/R	0.13	4	0.13	4
B	L	7.22	40	14.89	66
	S/R	1.90	54	3.49	26
C	S/L	0.56	4	1.52	11
	R	33.32	96	17.23	85
D	S/L/R	20.13	98	4.22	58
2025 DO NOTHING					
A	S/L/R	0.13	4	0.13	4
B	L	6.94	39	14.28	64
	S/R	1.96	56	3.64	26
C	S/L	0.58	4	1.57	12
	R	30.17	94	16.39	83
D	S/L/R	23.68	101	4.35	60
2025 DO SOMETHING					
A	S/L/R	0.13	4	0.13	4
B	L	7.73	42	16.42	69
	S/R	1.96	56	3.64	26
C	S/L	0.58	4	1.57	12
	R	43.98	101	19.23	89
D	S/L/R	23.68	101	4.35	60

For the future assessment scenario of 2025 DO NOTHING, with the baseline flows factored up and without the inclusion of any trips generated by the proposed development, the analysis results indicate that Junction 3 will operate within capacity in the PM peak hour with the highest DOS at 83% and a corresponding queue of 16.39 vehicles recorded on Glen Ellan Road (W), and above capacity in the AM peak hour with the highest DOS at 101% and a corresponding queue of 23.68 vehicles recorded on Balheary Road (N). Glen Ellan Road (W) is recorded to operate at capacity during the AM peak hour with a DOS value of 94% and a corresponding queue of 30.17 vehicles.

With the inclusion of the trips generated by Phases 1 and 2 of the proposed development, for the 2025 DO SOMETHING scenario, Junction 3 will continue to operate within capacity during the PM peak hour with the highest DOS at 89% and a corresponding queue of 19.23 vehicles recorded on Glen Ellan Road (W), however, in the AM peak hour the DOS value is recorded above capacity – at 101% on Glen Ellan Road (W) and Balheary Road (N).

It is acknowledged that as part of Phase 3 of the Oldtown – Mooretown Local Area Plan a major improvement is planned for this junction to provide additional capacity to accommodate the future traffic demand produced by the Oldtown – Mooretown lands. This layout will require a significant area of the green site to the west of the Balheary Road (S).

To increase the operational capacity of the existing junction to accommodate the proposed development trips before the major improvements planned under the Oldtown – Mooretown LAP are undertaken,, a minor alteration on the subject junction's layout is proposed. Details of the proposed layout are set out on our enclosed Waterman Moylan Drg. No. 17-088-P014.

For this proposed layout, the TRANSYT analysis was undertaken to apply a 5-phase signal cycle (4 traffic phases and 1 pedestrian phase) with the cycle time also set at 120 seconds and intergreen periods set at 5 seconds. The full TRANSYT output report is provided in Appendix G of the accompanying Traffic and Transport Assessment and is summarised below. The arms of the junction were labelled as follows within the TRANSYT model:

- Arm A: Swords Business Campus access road (E);
- Arm B: Balheary Road (S);
- Arm C: Glen Ellan Road (W);
- Arm D: Balheary Road (N).

Figure 13-10: Junction 3 – Proposed Layout – TRANSYT Analysis Results.

Arm	Mov.	AM		PM	
		Queue (Veh)	DOS (%)	Queue (Veh)	DOS (%)
2042 DO NOTHING					
A	S/L/R	0.16	5	0.16	6
B	L	9.36	50	17.16	71
	S/R	2.10	53	4.07	29
C	S/L/R	13.49	67	9.69	59
	R	12.12	62	7.08	46
D	S/L/R	14.69	79	5.03	66
2042 DO SOMETHING					
A	S/L/R	0.16	5	0.16	6
B	L	11.42	58	22.47	82
	S/R	2.10	53	4.07	29
C	S/L/R	16.51	76	11.21	65
	R	14.92	71	8.40	52
D	S/L/R	14.69	79	5.03	66

For the future assessment year of 2042 DO SOMETHING (worst-case scenario), the analysis results indicate that Junction 3 with its proposed layout would operate within capacity during both peak hours with the highest DOS at 79% and a corresponding queue of 14.69 vehicles recorded on Balheary Road (N) in the AM, and with the highest DOS at 82% and a corresponding queue of 22.47 vehicles recorded on Balheary Road (S) in the PM.

For additional results of the junction modelling carried out for Junction 3, including assessment years of 2023, 2025, 2027 and 2032, please refer to the Traffic and Transport Assessment accompanying the documentation package.

It is expected that by the future assessment year of 2042, the major improvements proposed under Oldtown – Mooretown LAP for Junction 3 will be in place. At that stage, the operational capacity of Junction 3 is likely to be significantly higher.

Junction 4 – Balheary Road / R125 / Castlegrange Green

Junction 4 is an existing four-armed signalised junction located southeast of the proposed development site. Pedestrian crossings incorporated into the traffic signals are provided on all approaches to this junction.

To simulate the capacity of the existing junction to accommodate the future traffic demand arising from the proposed development, it has been initially modelled based on its current layout. The TRANSYT analysis was undertaken to apply a 5-phase signal cycle (4 traffic phases and 1 pedestrian phase) with the cycle time set at 130 seconds and intergreen periods set at 5 seconds. The full TRANSYT output report is provided in Appendix G of the Traffic and Transport Assessment accompanying the documentation package. A summary of the analysis is presented below. The arms of the junction were labelled as follows within the TRANSYT model:

- Arm A: R125 (E).
- Arm B: R125 (S).
- Arm C: Castlegrange Green (W).
- Arm D: Balheary Road (N) – Straight/Right Turning Lane.
- Arm D-1: Balheary Road (N) – Left Turning Slip Lane (Flashing Amber).

Figure 13-11 Junction 4 – Current Layout – TRANSYT Analysis Results.

Arm	Mov.	AM		PM	
		Queue (Veh)	DOS (%)	Queue (Veh)	DOS (%)
2042 DO NOTHING					
A	S/L	3.95	23	3.14	18
	R	21.03	83	23.13	83
B	S/L	3.69	30	9.49	70
	R	12.04	78	10.28	74
C	S/L/R	2.23	66	2.58	78
D	S/R	9.04	81	6.25	76
D-1	L	0.24	49	0.14	41
2042 DO SOMETHING					
A	S/L	3.91	23	3.06	17
	R	24.18	88	29.01	90
B	S/L	4.20	36	12.04	84
	R	12.90	84	10.90	80
C	S/L/R	2.23	66	2.58	78
D	S/R	10.69	86	7.16	82
D-1	L	0.33	55	0.18	44

As can be seen from the above, with the baseline flows factored up to 2042, for the future assessment year of 2042 DO NOTHING, Junction 4 will operate within capacity during both peak hours with the highest DOS at 83% and a corresponding queue of 21.03 vehicles recorded on R125 (E) in the AM and with the highest DOS at 83% and a corresponding queue of 23.13 vehicles also recorded on R125 (E) in the PM.

With the inclusion of the trips generated by the overall proposed development (Phases 1 to 3), the results in Table 26 above indicate that for the future assessment year of 2042 DO SOMETHING (worst-case scenario), Junction 4 would continue to operate within capacity during both peak hours with the highest DOS at 88% and a corresponding queue o of 24.18 vehicles recorded on R125 (E) in the AM, and with the highest DOS at 90% and a corresponding queue of 29.01 vehicles also recorded on R125 (E) in the PM.

For additional results of the junction modelling carried out for Junction 4, including assessment years of 2023, 2025, 2027 and 2032, please refer to the Traffic and Transport Assessment accompanying the documentation package.

It is acknowledged that a junction with a DOS of 90% is likely to operate with some level of congestion and restrained movements, however, it is expected that by the future assessment year of 2042, the

major improvements proposed under Oldtown – Mooretown LAP for Junction 4 will be in place. At that stage, the operational capacity of Junction 4 is likely to be significantly higher.

Junction 5 – R132 Dublin Road / R125

Junction 5 is an existing priority-controlled roundabout located southeast of the proposed development site. An overpass link and an unsignaled pedestrian crossing are provided over the R132 (N) and on Estuary Road (E), respectively.

As previously briefed, this roundabout is currently operating within capacity in the PM peak hour, but overcapacity during the AM peak. Fingal County Council also recognises that this roundabout is operating over capacity and there are plans to upgrade it to a signalised crossroads. The works on this junction are currently identified to be carried out as part of Phase 2 of Oldtown – Mooretown LAP or the MetroLink works, whichever occurs first. However, to increase the operational capacity of this existing roundabout in advance of the major works related to the above-mentioned plans, , this roundabout is proposed to be partially signalised, as part of this application. In carrying out this modelling, it was assumed that the three busiest arms of the roundabout (R125 (W), R132 (S) and R132 (N)) were signalised and the Estuary Road (E) was kept as a priority-controlled arm. No additional lane was introduced into the model. Details of the proposed layout are set out on Waterman Moylan Drg. No. 17-088-P013 accompanying the documentation package.

The TRANSYT analysis was undertaken, introducing three synchronised controller streams, with cycle and phase times optimised by the software.

The analysis results for the proposed partially signalised roundabout are contained in Appendix G of the Traffic and Transport Assessment accompanying the subject application and are summarised below. The arms of the roundabout were labelled as follows within the TRANSYT model:

- Arm A: Estuary Road (E);
- Arm B: R132 (S);
- Arm Bc: Circulating Arm (S);
- Arm C: R125 (W);
- Arm Cc: Circulating Arm (W);
- Arm D: R132 (N);
- Arm Dc: Circulating Arm (N).

For the future year of 2042, with the baseline flows factored up, the analysis results below indicate that for the assessment scenario of 2042 DO NOTHING, Junction 5 with its proposed partially signalised configuration would operate within capacity during both peak hours with the highest DOS at 93% and a corresponding queue of 20.47 vehicles recorded on R132 (N) in the AM and with the highest DOS at 90% and a corresponding queue of 58.11 vehicles recorded on R132 (S) in the PM.

With the inclusion of the trips generated by the overall proposed development (Phases 1 to 3), the results indicate that for 2042 DO SOMETHING (worst-case scenario), the subject junction would continue to operate within capacity with the highest DOS at 96% and a corresponding queue of 24.53 vehicles recorded on R132 (N) in the AM and with the highest DOS at 93% and a corresponding queue of 62.10 vehicles recorded on R132 (S) in the PM. Note that, the impact of the overall proposed development is minimal on this junction when compared to 2042 DO NOTHING.

It is acknowledged that a junction with a DOS higher than 90% is likely to operate with some level of congestion and restrained movements, however, it is expected that by the future assessment year of 2042, the major improvements proposed under Oldtown – Mooretown LAP for Junction 5 will be in place. At that stage, the operational capacity of Junction 5 is likely to be significantly higher.

Figure 13-12 Junction 5 – Proposed Layout – TRANSYT Analysis Results

Arm	AM		PM	
	Queue (Veh)	DOS (%)	Queue (Veh)	DOS (%)
2042 DO NOTHING				
A	0.00	3	0.00	6
B	31.05	63	58.11	90
Bc	4.81	66	5.80	80
C	23.81	60	38.59	86
Cc	3.12	55	4.08	77
D	20.47	93	15.24	69
Dc	5.93	81	4.93	69
2042 DO SOMETHING				
A	0.00	3	0.00	6
B	31.65	63	62.10	93
Bc	4.80	66	6.26	83
C	26.27	67	40.75	87
Cc	3.16	57	4.33	79
D	24.53	96	15.42	72
Dc	6.39	84	4.98	70

13.7 Do nothing Scenario

Should the proposed development not take place, the access roads and infrastructure will remain in their current state and there will be no change. Background traffic would be expected to grow over time. Given the location and zoning of the subject site, it is reasonable to assume that a similar development, with a potentially more intensive requirement for vehicular trips, would be established on this site at some stage in the future.

The benefits from the proposed scheme including junction upgrade works, pedestrian routes, cycle paths, etc. would improve the current setting. Do Nothing scenario would result in no improvement measures being taken aside from the permitted part 8 road upgrade works.

13.8 Potential Cumulative Impacts

Committed Housing Developments

The growth factors applied to the 2019 traffic survey figures in section 13.6.2 above are derived by the TII and make an allowance for traffic growth due to future developments as it is future developments that will increase traffic flows, This is in line with industry standards and best practice, the traffic modelling undertaken includes the growth factors and therefore the potential cumulative impacts have been considered as part of this proposal.

Part 8 Road Works by Fingal County Council

In May 2021 Fingal County Council lodged a Part 8 application to An Board Pleanala under reference number ABP-310145-21. This application included the junction upgrade works required to the R132/R125 Estuary Roundabout, referred to as Junction A in this application.

On 20th January 2022, ABP approved this application with conditions under case number JP06F.310145 and the submission can be reviewed on Fingal County Councils Website under the title R132 Connectivity Project.

These Part 8 Road works will improve the existing traffic and pedestrian permeability in the surrounding area.

Future Development

Any future development will increase the traffic volumes on the surrounding road and therefore a full Traffic and Transport assessment will be prepared and appropriate mitigation measures implemented for any future developments.

13.9 Mitigation Measures

13.9.1 Construction Stage

- Adequate signposting will be located on-site to ensure the safety of all road users and construction workers.
- Due to the proximity of the proposed site along well-serviced bus routes and being well served by cycle lanes, it is intended to limit construction staff parking and to encourage the use of public transport. A limited number of car parking spaces may be provided for senior construction managers within the development site. Suitable locations in the surrounding area may be identified where staff can park and link to public transportation.
- The main contractor as part of their site set up arrangements, shall appoint a Coordinator responsible for the implementation of a Construction Stage Mobility Management Plan and shall carry out the following tasks as part of their role:
    - Provide an extensive information service for public transport options and routes at a public location(s) within the development for construction workers;
    - Update the public transport information adjacent to the development on an ongoing basis; and
    - Advise company staff of tax incentives for public transport and bicycles.
- For those wishing to cycle to and from the development, dedicated cycle parking will be provided for the duration of the works within the site. Shower facilities and lockers will also be provided.
- A dedicated “construction site”’ access/egress system will be implemented during the construction phases.
- Hoarding will be set up around the perimeter to prevent pedestrian access.
- Dedicated construction haul routes will be identified and agreed upon with the local authority before the commencement of construction activities on site.
- A material storage zone will also be provided in the Construction Compound area. This storage zone will include material recycling areas and facilities.
- A detailed Construction and Traffic Management Plan will be prepared by the contractor and agreed with the Local Authority before commencing works on site.
- The contractor will be obliged to ensure that any sub-contractors engaged on the site are made fully aware of the required mitigation measures and that they are properly implemented as part of any works that they undertake.

13.9.2 Operational Stage

- To reduce traffic impact and to promote more sustainable modes of transport a Mobility Management Plan will be prepared for the development on an ongoing basis.
- A management company will be appointed by the developer to manage the development. A senior member of staff from the management company who supports the philosophy of the Plan will be appointed as the Coordinator. The Coordinator will be responsible for:
    - Implementation and maintenance of the Plan;
    - Monitoring progress of the Plan
    - Liaison with public transport operators and officers of the Planning and Roads Authorities;
    - Production of information reports for the Developer, the occupier(s) and the Planning and Highway Authorities; and
    - Ongoing assessment of the objectives of the Plan.

- Up to date, local bus timetables will be maintained within the tenant amenity area and other fixed points within the buildings on the site. Residents will be advised of their location. In addition, internet access to travel information will be provided. The developer will provide all new residents with a travel pack showing alternative modes of travel to the development. Where possible, the developer will advise visitors to the site of alternative modes of travel to that of the car.
- Secure bicycle parking facilities will be provided within the basement level for residents and at surface level for visitors and Creche users. The cycle parking has been provided in line with local guidelines and is outlined in detail in the accompanying TTA. Local cycle route information will be provided in the tenant amenity area and at other fixed points within the development and residents will be advised of their location. Details of cycle parking provided are included in the Traffic and Transport assessment accompanying this planning submission.
- The Mobility Management Plan Co-ordinator will be responsible for the management of inappropriate parking within the development. This parking management will ensure that spaces are reserved for those who have rented the space and will be accessible only to those users.

13.10 Residual Impacts

13.10.1 Construction Stage

In line with their experience working on projects of this scale in similar locations, the developer will build a construction car park at the start of works by laying a temporary surface for vehicles. Staff are likely to arrive to site before 8am, before the morning peak hour of 8am -9am however staff are likely to leave during the peak PM hour of 5-6pm. Asthe number of construction staff on site will be less than the number of people on site post development the number of additional vehicles can be accommodated.

Care will be taken to ensure existing pedestrian and cycling routes are suitably maintained or appropriately diverted as necessary during the construction period, which will be addressed by the Contractor as part of the Construction Traffic Management Plan and which will be approved by Fingal County Council. On this basis construction will likely have a negligible impact on pedestrian and cyclists. Due to the proposed mitigation measures outlined above, the impact of the proposed development will be temporary and minimised during the construction stage.

13.10.2 Operation Stage

There will be an increase in the use of the road network by private vehicles. However, a Mobility Management Plan will promote more sustainable forms of transport to help reduce the use of private vehicles by the residents of the proposed development.

There is likely to be an increase in the number of pedestrians and cyclists in the surroundings of the development. However, footpaths and cycling paths, both internally and externally (along the site frontage) are provided as part of the development, thus, the impact should be minimal.

The traffic modelling undertaken includes growth in background traffic flows which accounts for other developments in the area.

The increase in traffic volumes as a result of the proposed development will impact the adjacent existing developments as the traffic flows through access and egress from the site will increase. The transport assessment carried out indicates that all assessed junctions, operating with improved layouts as proposed as part of the subject application, would operate within the capacity and the impact arising from the proposed development would be considered negligible.

13.11 Monitoring

13.11.1 Construction Stage

Traffic management and deliveries will be carefully monitored during the construction stage as part of the Construction Management Plan. The appointed contractor will monitor their mobility management plan to ensure that is operating effectively.

13.11.2 Operational Stage

During the operational stage, the Mobility Management Plan will be monitored by the Co-ordinator. The travel survey will establish the initial modal split of travel by residents.

The Co-ordinator, in consultation with the Developer, the Occupiers, and the Local Authority or its agents, will agree on annual targets, following completion and analysis of the travel survey, for increasing the percentage of residents travelling by non-car modes.

The Co-ordinator will:

- Meet with officers of the Local Authorities or its agents within 6 months following the occupation of the building(s) and thereafter every 12 months to assess and review the progress of the Plan and agree on objectives for the next 12 months, and
- Prepare and submit to senior management of the Developer, the Occupier(s) and the Local Authorities or its agents, an Annual Monitoring Report.

13.12 Difficulties Encountered

There were no difficulties encountered.

13.13 Interactions

The main high level interactions between Material Assets – Traffic & Transport and other environmental factors include: Noise & Vibration, Air & Climate and Population & Human Health. Please refer to Chapter 16 Interactions for further information on interactions.

13.14 References

In preparing this report, Waterman Moylan Consulting Engineers have referred to:

- Traffic and Transport Assessment by Waterman Moylan submitted under a separate cover,
- The Traffic and Transport Assessment Guidelines – TII (May 2014),
- Design Manual for Urban Roads and Streets (DMURS – 2019),
- Fingal County Development Plan 2017 - 2023,
- FCC - Part D: Estuary West Masterplan (2019),
- Project Appraisal Guidelines for National Roads – Unit 5.3 Travel Demand Projections Link-Based Growth Rate; Annual Growth Factors (2019),
- Greater Dublin Area Cycle Network Plan – National Transport Authority (NTA), and
- Sustainable Urban Housing: Design Standards for New Apartments – Guidelines for New Apartments – Department of Housing, Planning and Local Government – December 2020

14. Material Assets - Waste Management

14.1 Introduction

This chapter of the EIAR comprises an assessment of the likely significant direct and indirect effects of the proposed development arising from the consumption of resources and the generation of waste materials as well as identifying proposed mitigation measures to minimise any associated impacts.

This Chapter was prepared by Chonaill Bradley (Bsc ENV AssocCIWM) of AWN Consulting. Chonaill Bradley is a Principal Environmental Consultant in the Environment Team at AWN. He holds a BSc in Environmental Science from Griffith University, Australia. He is an Associate Member of the Institute of Waste Management (CIWM). Chonaill has over seven years' experience in the environmental consultancy sector and specialises in waste management.

A site-specific Construction & Demolition Resource and Waste Management Plan (C&D RWMP) has been prepared by AWN Consulting Ltd to deal with waste generation during the excavation and construction phase of the project and has been included as Appendix 14.1. The C&D RWMP was prepared in accordance with the 'Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects' document produced by the National Construction and Demolition Waste Council (NCDWC) in conjunction with the Department of the Environment, Heritage and Local Government (DoEHLG) in July 2006 and the Environmental Protection Agency's (EPA) document 'Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021)..

A separate Operational Waste Management Plan (OWMP) has also been prepared for the operational phase of the development and is included as Appendix 14.2 of this chapter.

The Chapter has been prepared in accordance with European Commissions Guidelines, *Guidance on the preparation of the Environmental Impact Assessment Report* (2017) and the EPA Guidelines on the Information to be contained in EIAR (2017, Draft)

These documents will ensure the sustainable management of wastes arising at the development in accordance with legislative requirements and best practice standards.

14.2 Assessment Methodology

The assessment of the impacts of the proposed development arising from the consumption of resources and the generation of waste materials, was carried out taking into account the methodology specified in relevant guidance documents, along with an extensive document review to assist in identifying current and future requirements for waste management including the Waste Framework Directives, the Waste Management Acts 2006-2021 and other appropriate waste legislation and policies, waste strategies, management plans, legislative requirements and relevant reports.

This Chapter is based on the proposed development, as described in Chapter 3.0 and considers the following aspects:

- Legislative context;
- Construction phase (including site preparation and excavation); and,
- Operational phase.

A desk study was carried out which included the following:

- Review of applicable policy and legislation which creates the legal framework for resource and waste management in Ireland;
- Description of the waste materials that will be generated during the construction and operational phases; and

- Identification of measures to prevent waste generation and promote management of waste in accordance with the waste hierarchy and circular economy policies.

Estimates of waste generation during the construction and operational phases of the proposed development have been calculated. The waste types and estimated quantities are based on published data by the EPA in the *National Waste Reports* and *National Waste Statistics*, data recorded from similar previous developments, the two phases of this development, Irish and US EPA waste generation research.

Mitigation measures are proposed to minimise the effect of the proposed development on the environment during the construction and operational phases, to promote efficient waste segregation and to reduce the quantity of waste requiring disposal. This information is presented in Section 14.6.

A detailed review of the existing ground conditions on a regional, local and site-specific scale are presented in Chapter 7 Land and Soils. Chapter 7 of the EIAR also discusses the environmental quality of any soils which will have to be excavated to facilitate construction of the proposed development.

14.2.1 Legislation and Guidance

Waste management in Ireland is subject to EU and national waste legislation and control, which defines how waste materials must be managed, transported and treated. The overarching EU legislation is the Waste Framework Directive (2008/98/EC) which is transposed into national legislation in Ireland. The cornerstone of Irish waste legislation is the Waste Management Acts 1996-2021. European and national waste management policy is based on the concept of the 'waste hierarchy', which sets out an order of preference for managing waste (prevention > preparing for reuse > recycling > recovery > disposal) (Figure 14.1).

Figure 14.1: Waste Hierarchy (Source: European Commission)

EU and Irish National waste policy also aims to contribute to the circular economy by extracting high-quality resources from waste as much as possible. Circular Economy (CE) is a sustainable alternative

to the traditional linear (take-make-dispose) economic model, reducing waste to a minimum by reusing, repairing, refurbishing and recycling existing materials and products. (Figure 14.2).

Figure 14.1: Circular Economy (Source: Repak)

The Irish government issues policy documents which outline measures to improve waste management practices in Ireland and help the country to achieve EU targets in respect of recycling and disposal of waste. The most recent policy document, *Waste Action Plan for a Circular Economy – Waste Management Policy in Ireland*, was published in 2020 and shifts focus away from waste disposal to higher levels of the waste hierarchy. The need to embed climate action in all strands of public policy aligns with the goals of the European Green Deal.

The strategy for the management of waste from the construction phase is in line with the requirements of the EPA *Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects* (2021) and the EPA's *Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2006)*. The guidance document, *Construction and Demolition Waste Management: A Handbook for Contractors and Site Managers* (FÁS & Construction Industry Federation, 2002), was also consulted in the preparation of this assessment.

There are currently no Irish guidelines on the assessment of operational waste generation, and guidance is taken from industry guidelines, plans and reports including the *Eastern-Midlands Region (EMR) Waste Management Plan 2015 – 2021*, *BS 5906:2005 Waste Management in Buildings – Code of Practice*, the Fingal County Council (FCC) Fingal County Council Segregation, Storage and Presentation of Household and Commercial Waste bye-Laws 2020, the EPA National Waste Database Reports 1998 – 2018 and the EPA National Waste Statistics Web Resource.

14.2.2 Terminology

Note that the terminology used herein is generally consistent with the definitions set out in Article 3 of the Waste Framework Directive. Key terms are defined as follows:

Waste - Any substance or object which the holder discards or intends or is required to discard.

Prevention - Measures taken before a substance, material or product has become waste, that reduce:

a) the quantity of waste, including through the re-use of products or the extension of the life span of products;
b) the adverse impacts of the generated waste on the environment and human health; or
c) the content of harmful substances in materials and products.

Reuse - Any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.

Preparing for Reuse - Checking, cleaning or repairing recovery operations, by which products or components of products that have become waste are prepared so that they can be re-used without any other pre-processing.

Treatment - Recovery or disposal operations, including preparation prior to recovery or disposal.

Recovery - Any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy. Annex II of the Waste Framework Directive sets out a non-exhaustive list of recovery operations.

Recycling - Any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations.

Disposal - Any operation which is not recovery even where the operation has as a secondary consequence the reclamation of substances or energy. Annex I sets out a non-exhaustive list of disposal operations

14.3 Baseline Environment

The proposed development will consist of a residential scheme comprising apartments, houses and duplex units. The scheme provides for public open space, communal open space areas, a crèche, residential amenities (including concierge, multi-purpose room, meeting room and gym), a new public park to the north of the site as an extension to Broadmeadow Riverside Park and services / bin store areas.

In terms of waste management, the receiving environment is largely defined by Fingal County Council (FCC) as the local authority responsible for setting and administering waste management activities in the area. This is governed by the requirements set out in the Eastern-Midlands Region (EMR) Waste Management Plan 2015-2021 (the “EMR Plan”).

The waste management plan sets out the following targets for waste management in the region:

- A 1% reduction per annum in the quantity of household waste generated per capita over the period of the plan;
- Achieve a recycling rate of 50% of managed municipal waste by 2020; and
- Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices.

The EMR Plan sets out the strategic targets for waste management in the region and sets a specific target for C&D waste of “70% preparing for reuse, recycling and other recovery of construction and demolition waste” (excluding natural soils and stones and hazardous wastes) to be achieved by 2020. Ireland achieved 84 per cent material recovery of such waste in 2019, and therefore surpassed the 2020 target and is currently surpassing the 2025 target. The National Waste Statistics update published by the EPA in November 2021 identifies that Ireland’s current target of “Preparing for reuse and recycling of 50% by weight of household derived paper, metal, plastic & glass (includes metal and plastic estimates from household WEEE)” was met for 2020 at 51% however they are currently not in line with the 2025 target.

The Fingal County Council Development Plan 2017 – 2023 also sets policies and objectives for the FCC area which reflect those set out in the EMR Plan.

In terms of physical waste infrastructure, FCC no longer operates any municipal waste landfill in the area. There are a number of waste permitted and licensed facilities located in the Eastern-Midlands Waste Region for management of waste from the construction industry as well as municipal sources. These include soil recovery facilities, inert C&D waste facilities, hazardous waste treatment facilities, municipal waste landfills, material recovery facilities, waste transfer stations and two waste-to-energy facilities.

14.4 Characteristics of the proposed development

A full description of the development can be found in Chapter 5. The characteristics of the development that are relevant in terms of waste management are summarised below.

14.4.1 Demolition Phase

There will be no demolition associated with this proposed development.

14.4.2 Construction Phase

During the construction phase, waste will be produced from surplus materials such as broken or off-cuts of timber, plasterboard, concrete, tiles, bricks, etc. Waste from packaging (cardboard, plastic, timber) and oversupply of materials may also be generated. The construction contractor will be contractually required to ensure that oversupply of materials is kept to a minimum and opportunities for reuse of suitable materials is maximised.

In addition, soil & stone will require excavation to facilitate the basement and construction of foundations, along with the installation of underground services. The project engineers have estimated that c. 75,800m^3 of material will require excavation. It is envisaged that the majority of this material will be removed offsite site, with c. 23,300m^3 (approximately 30 per cent) of material expected to be kept for onsite reuse. These estimates will be refined prior to commencement of construction. If the material that requires removal from site is deemed to be a waste, removal and reuse/recycling/recovery/disposal of the material will be carried out in accordance with the Waste Management Act 1996 (as amended), the Waste Management (Collection Permit) Regulations 2007 (as amended) and the Waste Management (Facility Permit & Registration) Regulations 2007 (as amended). The volume and type of waste requiring recovery/disposal will dictate to which type of receiving facilities it will be sent. Alternatively, the material may be classed as by-product under Article 27 classification (European Communities (Waste Directive) Regulations 2011 as amended, S.I. No. 126 of 2011).

In order to establish the appropriate reuse, recovery and/or disposal route for the soils and stones to be removed off-site, it will first need to be classified. Waste material will initially need to be classified as hazardous or non-hazardous in accordance with the EPA publication Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous. Environmental soil analysis will be carried out prior to removal of the material on a number of the soil samples in accordance with the requirements for acceptance of waste at landfills (Council Decision 2003/33/EC Waste Acceptance Criteria) and EPA guidelines, *Guidance on waste acceptance criteria at authorised soil recovery facilities* (2020). This legislation sets limit values on landfills for acceptance of waste material based on properties of the waste including potential pollutant concentrations and leachability. It is anticipated that the surplus material will be suitable for acceptance at either inert or non-hazardous soil recovery facilities/landfills in Ireland or, in the unlikely event of hazardous material being encountered, be transported for treatment/recovery or exported abroad for disposal in suitable facilities.

Waste will also be generated from construction workers e.g. organic/food waste, dry mixed recyclables (waste paper, newspaper, plastic bottles, packaging, aluminium cans, tins and Tetra Pak cartons), mixed non-recyclables and potentially sewage sludge from temporary welfare facilities provided onsite during the construction phase. Waste printer/toner cartridges, waste electrical and electronic equipment (WEEE) and waste batteries may also be generated infrequently from site offices.

. The C&D RWMP provides an estimate of the main waste types likely to be generated during the C&D phase of the proposed development and these are provided in Table 14.1.

Table 14-1

Waste Type	Tonnes	Reuse		Recycle/Recovery		Disposal	
		%	Tonnes	%	Tonnes	%	Tonnes
Mixed C&D	1207.2	10	120.7	80	965.8	10	120.7
Timber	1024.3	40	409.7	55	563.4	5	51.2
Plasterboard	365.8	30	109.7	60	219.5	10	36.6
Metals	292.7	5	14.6	90	263.4	5	14.6
Concrete	219.5	30	65.8	65	142.7	5	11.0
Other	548.7	20	109.7	60	329.2	20	109.7
Total	**3658.3**		**830.4**		**2484.0**		**343.9**

14.4.3 Operational Phase

As noted in Section 14.1, an OWMP has been prepared for the development and is included as Appendix 14.2. The OWMP provides a strategy for segregation (at source), storage and collection of all wastes generated within the building during the operational phase including dry mixed recyclables, organic waste and mixed non-recyclable waste as well as providing a strategy for management of waste glass, batteries, WEEE, printer/toner cartridges, chemicals, textiles, waste cooking oil and furniture.

The total estimated waste generation for the development for the main waste types based on the AWN Waste Generation Model (WGM) is presented in Tables 14.2, 14.3 & 14.4 below, and is based on the uses and areas as advised by the project architects (MCORM) December 2021.

Table 14-2 *Estimated waste generation for the proposed development for the main waste types*

Waste type	Waste Volume (m^3/week)			
	Residential Block A1/A2 (Combined)	Residential Block B (Combined)	Residential House 3 - Bed (Individual)	Residential House 4 - Bed (Individual)
Organic Waste	2.11	3.09	0.02	0.02
DMR	14.94	21.93	0.13	0.18
Glass	0.41	0.60	0.01	0.01
MNR	7.86	11.53	0.08	0.09
Total	**25.32**	**37.15**	**0.24**	**0.30**

Table 14-3 *Estimated waste generation for the proposed development for the main waste types*

Waste type	Waste Volume (m^3/week)			
	Duplex Type 1 (Combined) 4 no. 2 bed 4 no. 3 bed	Duplex Type 2 (Combined) 5 no. 2 bed 5 no. 3 bed	Duplex Type 3 (Combined) 6 no. 2 bed 6 no. 3 bed	Duplex Type 4 (Combined) 8 no. 2 bed 8 no. 3 bed
Organic Waste	0.14	0.18	0.22	0.29
DMR	0.98	1.27	1.47	2.03
Glass	0.03	0.03	0.04	0.06
MNR	0.57	0.67	0.85	1.07
Total	**1.72**	**2.15**	**2.58**	**3.44**

Table 14-4 *Estimated waste generation for the proposed development for the main waste types*

Waste type	Waste Volume (m^3/week)	
	Creche Unit	Maisonette

	(Individual)	1 – bed (Individual)
Organic Waste	0.04	0.01
DMR	1.47	0.08
Glass	0.01	0.01
MNR	0.80	0.04
Total	**2.32**	**0.14**

The residents and tenants will be required to provide and maintain appropriate waste receptacles within their units to facilitate segregation at source of these waste types. Residential amenity waste is quantified within the residential waste figures and tobe managed by facilities management and stored within residential waste stores. The location of the bins within the units will be at the discretion of the residents.All Waste Storage Areas (WSA's) can be viewed on the plans submitted with the application.

The OWMP seeks to ensure the development contributes to the targets outlined in the EMR Waste Management Plan 2015 – 2021 and the FCC waste Bye-laws.

Mitigation measures proposed to manage impacts arising from wastes generated during the operation of the proposed development are summarised below.

14.5 Predicted Impacts

If the proposed Development was not to go ahead (i.e. in the Do-Nothing scenario) there would be no excavation or construction or operational waste generated at this Site. There would, therefore, be a neutral effect on the environment in terms of waste.

This section details the potential waste associated with the proposed Development.

14.5.1 Construction Phase

The proposed Development will generate a range of non-hazardous and hazardous waste materials during site excavation and construction. General housekeeping and packaging will also generate waste materials, as well as typical municipal wastes generated by construction employees, including food waste. Waste materials will be required to be temporarily stored on-site pending collection by a waste contractor. If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the Development Site and in adjacent areas. The indirect effect of litter issues is the presence of vermin in areas affected, possible odours and visual pollution. In the absence of compliance with relevant waste legislation and mitigation, the effect on the local and regional environment is likely to be ***short-term, significant*** and ***negative***.

The use of non-permitted waste contractors or unauthorised waste facilities could give rise to inappropriate management of waste, resulting in indirect negative environmental impacts, including pollution. It is essential that all waste materials are dealt with in accordance with local, regional and national legislation, bye-laws and guidance, as outlined previously, and that time and resources are dedicated to ensuring efficient waste management practices. In the absence of compliance with relevant waste legislation and mitigation, the effect on the local and regional environment is likely to be ***long-term, significant*** and ***negative***.

Wastes arising must be taken to suitably authorised waste facilities for processing and segregation, reuse, recycling, recovery, and / or disposal, as appropriate. There are numerous authorised waste facilities in the EMR which can accept hazardous and non-hazardous waste materials, and acceptance of waste from the Development Site would be in line with daily activities at these facilities. The majority of construction materials are either recyclable or recoverable. However, in the absence of compliance with relevant waste legislation and mitigation, the effect on the local and regional environment is likely to be ***short-term, significant*** and ***negative***.

There is a quantity of material which will need to be excavated to facilitate the proposed development. A detailed review of the existing ground conditions on a regional, local site-specific scale are presented in Chapter 12 Land and Soils. It is anticipated that c. 52,500m^3 of excavated material will need to be

removed offsite, however c. 23,300m^3 of excavated material will be reused onsite. Uncontaminated soil and stone moved offsite will be notified to the EPA as a byproduct and/or sent to appropriately authorised facilities that have capacity at the time of the construction phase. Correct classification and segregation of the excavated material will be carried out to ensure that any contaminated materials are identified and handled in a way that will not harm workers as well as on the environment , both on and off-site. However, in the absence of compliance with relevant waste legislation and mitigation, the effect on the local and regional environment is likely to be **short term, significant** and **negative.**

14.5.2 Operational Phase

The potential impacts on the environment of improper, or a lack of, waste management during the operational phase would be a diversion from the priorities of the waste hierarchy which would lead to pollution and/or small volumes of waste being sent unnecessarily to landfill. In the absence of compliance with relevant waste legislation and mitigation, the effect on the local and regional environment is likely to be ***Long-term, significant*** and ***negative****.*

The nature of the development means the generation of household waste materials during the operational phase is unavoidable. Networks of waste collection, treatment, recovery and disposal infrastructure are in place in the region to manage waste efficiently from this type of development. Municipal Waste which is not suitable for recycling is typically sent for energy recovery. There are also facilities in the region for segregation of municipal recyclables which is typically exported for conversion in recycled products (e.g. paper mills and glass recycling).

If waste material is not managed and stored correctly, it is likely to lead to litter or pollution issues at the Development Site and in adjacent areas. The knock-on effect of litter issues is the presence of pollution and vermin in affected areas. However, in the absence of mitigation and compliance with relevant waste legislation and, the effect on the local and regional environment is likely to be ***short-term, significant*** and ***negative****.*

Waste contractors will service the proposed Development on a regular basis to remove waste. Legislation requires the proper management of waste and its removal to appropriate facilities. The use of non-permitted waste contractors or unauthorised facilities could give rise to inappropriate management of waste and result in negative environmental impacts or pollution. All waste materials will be dealt with in accordance with regional and national legislation, as outlined previously, and time and resources are dedicated to ensuring efficient waste management practices. However, in the absence of compliance with relevant waste legislation and mitigation, the effect on the local and regional environment is likely to be ***Long-term, significant*** and ***negative****.*

14.6 Mitigation Measures

This section outlines the measures that will be employed in order to reduce the amount of waste produced, manage the wastes generated responsibly and handle the waste in such a manner as to minimise the effects on the environment.

14.6.1 Construction Phase

The following mitigation measures are those which the contractor will be required by way of contract to implement during the construction phase of the proposed Development:

As previously stated, a project specific C&D RWMP has been prepared in line with the requirements of the requirements of the EPA, Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021) and the Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects (DoEHLG, 2006). and is included as Appendix 14.1. Adherence to the high-level strategy presented in this C&D RWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the excavation and construction phases of the proposed Development.

- Prior to commencement, the appointed Contractor(s) will be required to refine / update the C&D RWMP (Appendix 14.1) in agreement with FCC, or submit an addendum to the C&D RWMP to

DCC, detailing specific measures to minimise waste generation and resource consumption, and provide details of the proposed waste contractors and destinations of each waste stream.

- The Contractor will be contractually required to fully implement the C&D RWMP throughout the duration of the proposed construction phase.

A quantity of soil, stone and made ground which will need to be excavated to facilitate the proposed development. Project Engineers have estimated that c. 52,500m^3 of excavated material will need to be removed offsite, however it is envisaged that c. 23,300m^3 excavated material will be reused onsite. Correct classification and segregation of the excavated material is required to ensure that any contaminated materials are identified and handled in a way that will not harm workers orthe environments, both on and off-site.

In addition, the following mitigation measures will be implemented:

- Building materials will be chosen with an aim to 'design out waste';
- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery – it is anticipated that the following waste types, at a minimum, will be segregated:
  - Concrete rubble (including ceramics, tiles and bricks);
  - Plasterboard;
  - Metals;
  - Glass; and
  - Timber.
- Left over materials (e.g. timber off-cuts, broken concrete blocks/bricks) and any suitable construction materials swill be re-used on-site, where possible;
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);
- A waste manager will be appointed by the main contractor(s) to ensure proper management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered where possible to avoid material being designated for disposal;
- All waste leaving the site will be transported by suitable permitted contractors and taken to appropriate authorised facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.
- Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Article 27 of the EC (Waste Directive) Regulations (2011) as amended). The potential to reuse material as a by-product will be confirmed during the course of the excavation works, with the objective of eliminating any unnecessary disposal of material.

These mitigation measures will ensure that the waste arising from the construction phase of the development is dealt with in compliance with the provisions of the Waste Management Act s1996-21, as amended, associated Regulations and the Litter Pollution Acts 1997 as amended, the EMR Waste

Management Plan (2015-2021). It will also ensure optimum levels of waste prevention, reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources.

14.6.2 Operational Phase

As previously stated, a project specific OWMP has been prepared and is included as Appendix 14.2.

- The Operator / Buildings Manager of the Site during the operational phase will be responsible for ensuring – allocating personnel and resources, as needed – the ongoing implementation of this OWMP, ensuring a high level of recycling, reuse and recovery at the Site of the proposed Development.

In addition, the following mitigation measures will be implemented:

- Facilities will be provided for the on-site segregation of all waste materials into appropriate categories including (but not limited to):
    - Organic waste;
    - Dry Mixed Recyclables;
    - Mixed Non-Recyclable Waste;
    - Glass;
    - Waste electrical and electronic equipment (WEEE);
    - Batteries (non-hazardous and hazardous);
    - Cooking oil;
    - Light bulbs;
    - Cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.);
    - Furniture (and from time to time other bulky waste); and
    - Abandoned bicycles.
- The Operator / Buildings Manager for the shared WSAs will be required to ensure that all waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials;
- The Operator / Buildings Manager will ensure that all waste collected from the Site of the proposed Development will be reused, recycled or recovered, where possible, with the exception of those waste streams where appropriate facilities are currently not available; and
- The Operator / Buildings Manager will ensure that all waste leaving the Site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.

These mitigation measures will ensure the waste arising from the development is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations, the *Litter Pollution Act 1997 as amended* , the *EMR Waste Management Plan (2015 - 2021)* and the FCC waste bye-laws. It will also ensure optimum levels of waste prevention, reduction, reuse, recycling and recovery are achieved.

14.7 Residual Impacts

The implementation of the mitigation measures outlined in Section 16.6 will ensure that a high rate of waste reuse, recovery and recycling is achieved at the development during the excavation and construction phases as well as during the operational phase. It will also ensure so far as is possible that European, National legislative and bye-law waste requirements with regard to waste are met and that associated targets for the management of waste are achieved.

14.7.1 Construction Phase

A carefully planned approach to waste management as set out in Section 16.6 and adherence to the C&D RWMP during the excavation construction phase will ensure that the effects on the environment and human health will be **short-term, imperceptible** and **neutral**.

14.7.2 Operational Phase

During the operational phase, a structured approach to waste management as set out in Section 16.6 will promote resource efficiency and waste minimisation. Provided the mitigation measures are implemented and a high rate of prevention, reuse, recycling and recovery is achieved, the predicted effect of the operational phase on the environment will be **long-term**, **imperceptible** and **neutral**.

14.8 Monitoring

The Contractor will be contractually required to manage and monitor compliance with the OWMP AND above waste controls. The management of waste during the construction phase will be monitored by the Contactor's appointed Waste Manager to ensure compliance with the above-listed mitigation measures, and relevant waste management legislation and local authority requirements, including maintenance of waste documentation.

The management of waste from shared WSAs during the operational phase will be monitored by the Operator / Buildings Manager to ensure effective implementation of the OWMP internally and by the nominated waste contractor(s). Residents with individual WSAs will be required to segregate in line with the local waste bye-laws.

14.8.1 Construction Phase

The objective of setting targets for waste management is only achieved if the actual waste generation volumes are calculated and compared. This is particularly important during the excavation and construction works, where there is a potential for waste management objectives to become secondary to other objectives, i.e. progress and meeting construction schedule targets. The C&D RWMP specifies the need for a Waste Manager to be appointed, who will have responsibility for monitoring the actual waste volumes being generated and ensuring that contractors and sub-contractors are segregating waste as required. Where targets are not being met, the Waste Manager will identify the reasons for this and resolve any issues. Recording of waste generation during the construction phase of the proposed Development will enable better management of waste contractor requirements and identify trends. The data will be maintained to advise on future Developments.

14.8.2 Operational Phase

During the operational phase, waste generation volumes the Operator / Buildings Manager will be required to monitor against the predicted waste volumes outlined in the OWMP. Experience may enable the reduction in the number of bins and equipment required in the WSAs, where estimates have been too conservative. Reductions in bin and equipment requirements will improve efficiency and reduce waste contactor costs.

14.9 Reinstatement

14.9.1 Construction Phase

There are existing residential and commercial developments close by, along with the multiple permissions remaining in place in the area. In a worst-case scenario, multiple developments in the area could be developed concurrently or overlap in the construction phase.

Due to the high number of waste contractors in the Dublin region there would be sufficient contractors available to handle waste generated from a large number of these sites simultaneously, if required. Similar waste materials would be generated by all the developments.

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which **will mitigate against any potential cumulative effects** associated with waste generation and waste management. As such the effect will be **short-term, not significant** and **neutral.**

14.9.2 Operational Phase

There are existing residential and commercial developments close by, along with the multiple permissions remaining in place. All of the current and potential developments will generate similar waste types during their operational phases. Authorised waste contractors will be required to collect waste materials segregated, at a minimum, into recyclables, organic waste and non-recyclables. An increased density of development in the area is likely improve the efficiencies of waste collections in the area.

Other developments in the area will be required to manage waste in compliance with national and local legislation, policies and plans which **will minimise/mitigate any potential cumulative impacts** associated with waste generation and waste management. As such the effect will be a **long-term**, **imperceptible** and **neutral.**

14.10 Reinstatement

In the event that the proposed development is discontinued, there is not likely to be any significant impacts on waste management at the site.

14.11 Difficulties Encountered

Until final materials and until planning compliance conditions are issued, it is difficult to predict with a higher level of accuracy the construction waste that will be generated from the proposed works as the exact materials and quantities may be subject to some degree of change and variation during the construction process.

There is a number of authorised waste facilities in Dublin, in the surrounding counties and across Ireland to which waste will be consigned. However, these sites may not be available for use when required or may be limited by the waste contractor selected to service the development in the appropriate phase. There is potential for more suitably placed waste facilities or recovery facilities to become operational in the future which may be more beneficial from an environmental perspective.

The ultimate selection of waste contractors and waste facilities will be subject to appropriate selection criteria including proximity, competency, capacity, serviceability, and cost.

14.12 References

- Waste Management Act 1996 as amended.
- Protection of the Environment Act 2003, (No. 27 of 2003) as amended.
- Litter Pollution Act 1997 (S.I. No. 12 of 1997) as amended
- Eastern-Midlands Region Waste Management Plan 2015 – 2021 (2015).
- Forum for the Construction Industry – Recycling of Construction and Demolition Waste.
- Environmental Protection Agency (EPA) ‘Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects’ (November 2021)
- Department of Environment, Heritage and Local Government, Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects (2006).
- FÁS and the Construction Industry Federation (CIF), Construction and Demolition Waste Management – a handbook for Contractors and Site Managers (2002).
- Fingal County Council (FCC), Fingal County Council Development Plan 2017-2023
- Planning and Development Act 2000 as amended

- EPA, Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous (2015)
- Council Decision 2003/33/EC, establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC.
- Environmental Protection Agency (EPA), National Waste Database Reports 1998 – 2012.
- EPA and Galway-Mayo Institute of Technology (GMIT), EPA Research Report 146 – A Review of Design and Construction Waste Management Practices in Selected Case Studies – Lessons Learned (2015).
- BS 5906:2005 Waste Management in Buildings – Code of Practice.
- DoEHLG, Sustainable Urban Housing: Design Standards for New Apartments, Guidelines for Planning Authorities (2018).
- FCC, County Council (Storage, Presentation and Segregation of Household and Commercial Waste) Bye-Laws (2020).
- Department of Housing, Planning & Local Government, Guidelines for Planning
- Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (2018)
- European Commission, Environmental Impact Assessment of Projects:
- Guidance on the preparation of the Environmental Impact Assessment Report (2017)
- EPA, Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – Draft (2017).
- Department of Communications, Climate Action and Environment (DCCAE), *Waste Action Plan for the Circular Economy - Ireland's National Waste Policy 2020-2025* (Sept 2020)

15. Material Assets - Utilities

15.1 Introduction

This chapter has been prepared by Joe Gibbons CEng MICE Civil Director with over 30 years' experience in civil engineering and in preparing planning submissions for residential developments and Niall Coughlan CEng M&E Director in Waterman Moylan Consulting Engineers who has worked in Building Services Consultancy for over 15 years, for Cairn Homes Properties Ltd. as part of a planning submission to An Bord Pleanála for a Strategic Housing Development (SHD) at Holybanks, Swords, Co. Dublin.

This section of Chapter 15 Material Assets – Utilities of the Environmental Impact Assessment Report examines the material assets serving the subject lands relating to water supply, foul sewerage, electricity, gas and telecommunications.

15.2 Assessment Methodology

The methodology followed for this section is in accordance with the EPA "Environmental Impact Assessment Reports, Draft Guidelines 2017". Information on built assets in the vicinity of the development lands was assembled from the following sources:

- A desktop review of Irish Water Utility Plans, ESB Networks Utility Plans, Gas Networks Ireland Service Plans, Eir E-Maps and Virgin Media Maps,
- Consultation with Irish Water and Fingal County Council,
- Submission of a Pre-Connection Enquiry Application to Irish Water,
- Review of ESB Network Utility Plans & Site meetings with ESB Network,
- Review of Gas Networks Ireland exiting network maps,
- Review of EIR Telecommunications exiting network maps,
- Review of Virgin Media Telecommunications exiting network maps, and
- Site Inspection / Walkover.

As part of assessing the likely impact of the proposed development, foul drainage discharge and water usage calculations were carried out in accordance with the following guidelines, in line with best practice:

- Greater Dublin Strategic Drainage Study (GDSDS),
- IS EN752, "Drain and Sewer Systems Outside Buildings", and
- Irish Water's Code of Practice (water demand and foul water loading).

15.3 Baseline Environment

15.3.1 Water Supply

There is an existing 150mm along Balheary road that connects into a 300mm diameter watermain to the northeast of the subject site. In addition, there is a 250mm diameter watermain on Glen Ellan Road to the south of the subject site.

A pre-Connection Enquiry form was submitted to Irish Water which outlined our proposals for the provision of water supply and the response stated that Irish Water

can facilitate a main connection to serve the proposed development by providing a 20m of new 200 mm ID pipe main to be laid to connect the site development to the existing 300mm DI main to the northeast

of the site. A secondary connection can be made providing 20 m of new 200mm ID pipe main to be laid to connect the proposed development to the existing 250mm uPVC watermain to the south of the site along Glen Ellan Road.

An estimate of water demand from the public water supply system for the proposed site has been based on the development of a total of 621 No. residential units and a crèche using Irish Waters expected demand for the respective residential and commercial uses. Allowance for a future school on the lands of the Masterplan has also been considered to ensure the utility infrastructure installed at this stage has adequate capacity to cater for the future school development.

Table 15-1: Total Water Demand

Description	No. of Units/People	Flow l/h/day	Population per Unit	Total Discharge (l/d)
Residential Units	621	150	2.7	251,505
Crèche	1	50	143	7,865
Future School	1	50	795	43,725
Totals				***303,095 l/d***

The total water requirement from the public supply, for the development, is estimated at 303m^3/day. The proposed watermain network can be seen on Waterman Moylan drawing 17-088 P040/P041/P042.

There is an existing 150mmØ PVC watermain located adjacent to the proposed stormwater storage tank location along Glen Ellan Road, and a 200mmØ PVC watermain located adjacent to the proposed tank location along the Balheary Road.

A 25mm connection to the public watermain is proposed to be provided to service washdown facilities, in line with the Irish Water Code of Practice section 5.31, as indicated on drawing 17-088-P042. The supply will be fitted with a usage meter and non-return valve to prevent backflow contamination of the public water supply.

15.3.2 Foul Sewerage

There is an existing 600mm diameter foul sewer along Glen Ellen Road to the south of the subject site. This sewer is approximately 9m deep at the site boundary and drains eastwards ultimately outfalling to the Swords Waste Water Treatment Plant (WWTP). See Figure 15.1 showing Irish Water Record Maps.

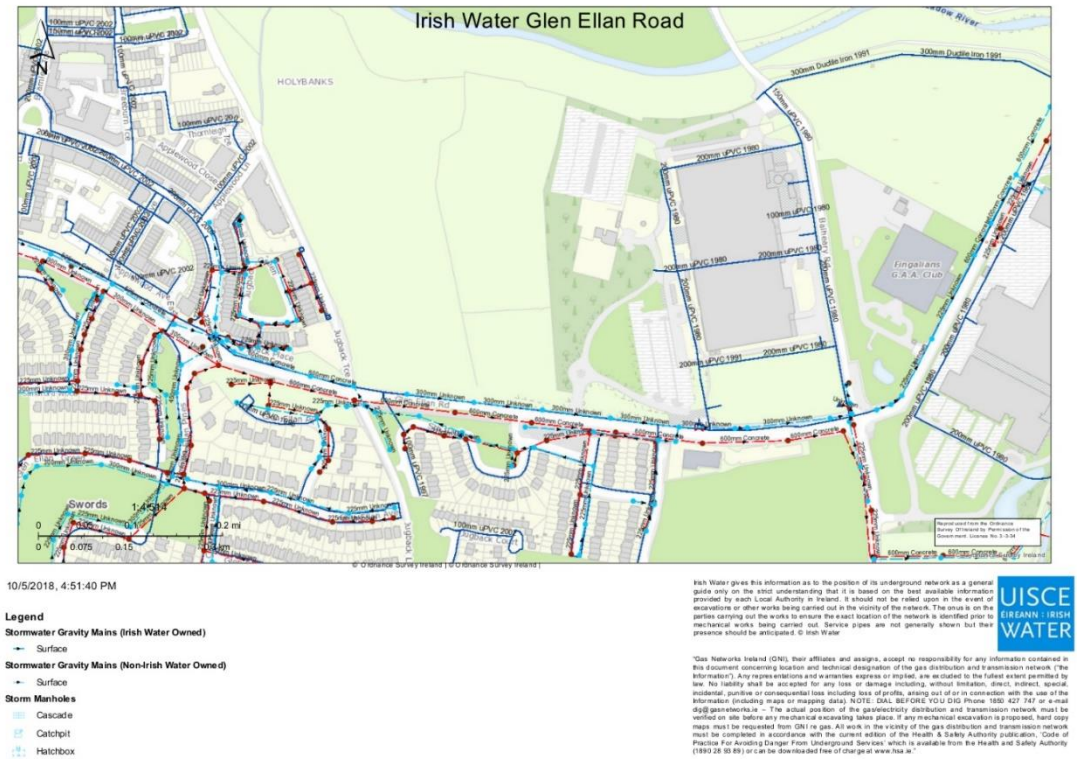


Figure 15.1 Irish Water Records

A Pre-Connection Enquiry form was submitted to Irish Water and a response has been received. In summary, Irish Water stated that to accommodate the proposed connection to the Irish Water network at the premises, a storage tank will be required in the future to manage the impacts of excessive rainfall in the sewer network downstream of the development. In this regard, as part of this application, it is proposed to provide a Stormwater Storage Tank. The proposed tank will be located on the junction of the Glen Ellan Road and Balheary Road, Swords, Co. Dublin, approximately 280m east of the development. The outfall will be provided via a c. 350m long, 300m diameter pipe & headwall outfalling to the Broadmeadow River. The outfall headwall to the Broadmeadow shall be fitted with a tide-flex (or similar approved) non-return valve to ensure surcharge from the Broadmeadow will not back up into the proposed pipe and tank during extreme events. The proposed Stormwater Storage Tank will alleviate constraints within the Irish Water foul water system, that occur during times of heavy or prolonged rainfall, resulting from surface water and foul water infiltration. Waterman Moylan has prepared a report to address the proposed Stormwater Storage tank which is included as part of the planning submission under a separate cover. Refer to Figure 15.2 below showing the location of the proposed Stormwater Storage Tank.

In addition, a Statement of Design Acceptance for the proposed drainage design has been received from Irish Water.

Despite the depth of the existing foul sewer on Glen Ellan Road it is not possible to drain the entire site by gravity. In this regard, a portion of the site will have to be pumped to facilitate an outfall to the existing foul sewer network. It is proposed to construct a new pumping station to comply with Irish Water Code

of Practice on the open space to the north of the site and to pump to the onsite drainage network before falling by gravity via the onsite drainage network to the 600mm diameter public sewer on Glen Ellan Road. See Figure 15.3 below.

Figure 15.2 Site Location

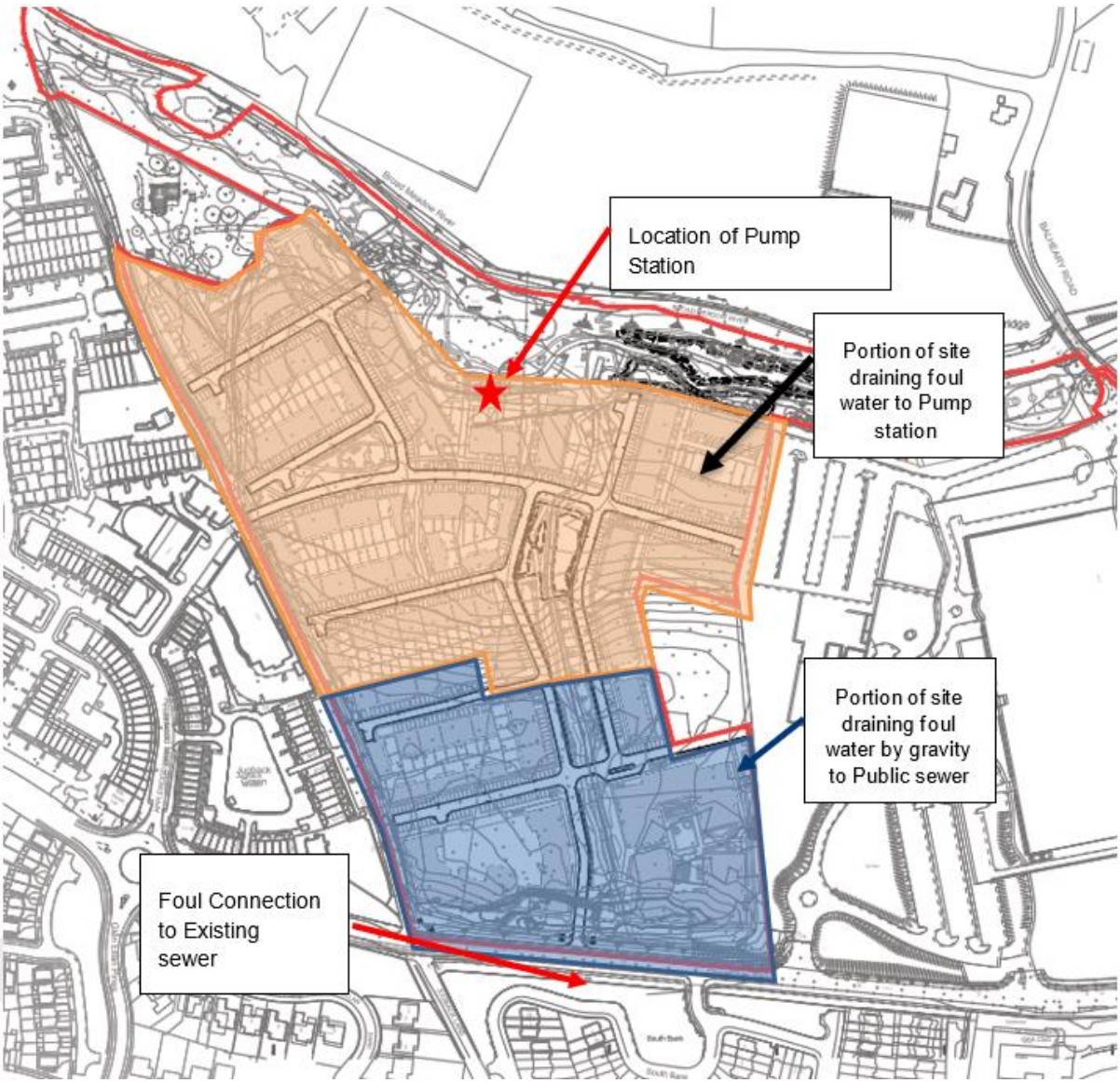


Figure 15.3 Foul Water Scheme

The proposed development will consist of 621 residential units and a Créche. A future School is planned in the lands of the Masterplan and therefore the Foul Water networks has been designed to accommodate this future school where appropriate. Based on the Irish Waters Code of Practice, the peak foul flow from the proposed development will be as follows:

Table 15-2 Calculation of proposed Foul Water Flow

Description	No. of Units	Flow l/h/day	Population per Unit	Infiltration Factor	Total Discharge (l/d)
Residential Units	621	150	2.7	1.1	276,655.5
Crèche	1	50	143	1.1	7,865
Future School	1	50	795	1.1	43,725
				Total	***328,245.5 l/d***

Calculation of Proposed Peak Foul Flow		
Total Daily Discharge *(from Table 15.2)*	328,245.5	l/d
Residential Dry Weather Flow (RDWF)	3.202	l/s
Commercial Dry Weather Flow (CDWF)	0.597	l/s
Residential Peak Foul Flow (=3 x RDWF)	***9.606***	***l/s***
Commercial Peak Foul Flow (=4.5 x CDWF)	***2.687***	***l/s***
Total Peak Foul Flow	***12.293***	***l/s***

The proposed foul water outfall from the site to the existing foul sewer on Glen Ellan Road is a 225 mm-diameter pipe laid at a minimum gradient of 1:200, giving a minimum capacity of 30l/s. Therefore, the proposed outfall has adequate capacity to cater for the flows from the development.

As mentioned above, Irish Water have undertaken a model review of the constraints within the network and determined that a Stormwater Storage Tank of 2,250m³ volume is required for up to a 1 in 5-year storm event. For storms in excess on 1 in 5 years it is proposed to provide a new high-level overflow gravity sewer along the Balheary Road to the Broadmeadow River, so that excess stormwater within the foul network can be discharged from the network during the more extreme rainfall events. The design together with the proposals for this Stormwater Storage tank are outlined in the Stormwater Storage Tank report prepared by Waterman Moylan, submitted as part of the application.

The proposed offline 2,250m³ stormwater storage tank, and high-level overflow gravity sewer to the Broadmeadow River is detailed on accompanying planning drawings 17-088-P001, 17-088-P200, 17-088-P201 & 17-088-P202. The proposed high-level overflow gravity sewer will be laid from the proposed tank and discharges northwards to the Broadmeadow River, just east of the Balheary Road.

The storage tank is designed to simply surcharge by gravity at times of extreme heavy rainfall events, and discharge back to the foul water sewer by gravity once the rainfall passes and the levels of surface water in the foul network drops.

The overflow outfall pipe to the Broadmeadow River will only function when the storage tank surcharges beyond the proposed 2,250m³ capacity of the tank. Flood mapping undertaken by the OPW indicate that during a 1 in 10-year event at a node point circa 200m upstream of the proposed outfall location there will be a flow rate of in excess of 36m³/second ensuring that any overflow outfall from the tank

beyond a 1 in 5-year event will be discharging to a fast moving heavily diluted/surcharged river. The outfall waters (largely surface water) from the tank will result in a vast betterment when compared with the existing arrangement of uncontrolled discharge to the Ward and in turn Broadmeadow Rivers. In this regard, we refer you to the Stormwater Overflow and Receiving Stream Assimilation Report by AWN submitted with this application under separate cover.

The outfall will be supplied via a c. 350m long, 300m diameter pipe & headwall outfalling to the Broadmeadow River. The outfall headwall to the Broadmeadow River shall be fitted with a tide-flex (or similar approved) non-return valve to ensure surcharge from the Broadmeadow River will not backfill into the proposed pipe and tank during extreme events. For construction methods at the outfall, please refer to the accompanying Construction and Environmental Management Plan (CEMP) Report.

15.3.3 Electricity

ESB Networks have been contacted and an existing ESB network map for the area surrounding the proposed development has been obtained. There are existing ESB Networks (ESBN) infrastructure within the site in the form of Medium Voltage and Low Voltage (MV/LV) below ground ducted services and overhead power lines. The below-ground ducted services run east/west across the site adjacent to the Broad meadow River while the overhead services run the north site through the centre of the site, before transitioning to an underground ducted service passing under/through the Broad meadow River.

The existing overhead services on the site will be undergrounded and the existing below ground services will be diverted as required. A new Medium Voltage below ground network will be provided in the proposed development which will connect to the existing ESB Networks infrastructure in the area. Up to 3 new “unit sub-stations” will be provided throughout the site to meet the electrical demands associated with the new houses and duplex units while a further 3 “in-building” substations will be provided to serve the apartments.

The exact extent and location of the connections will be agreed upon with ESB Networks during the design stage of the project.

15.3.4 Gas

Gas Networks Ireland (GNI) has been contacted and an existing gas network map for the area surrounding the proposed development has been obtained There are existing gas pipe networks in the vicinity of the site in the form of Medium Pressure (4bar) mains pipework. The services include a 4-bar network to the west within the Applewood residential development, a 125 diameter 4 bar main in the Balheary Road to the East and a 125 diameter 4 bar main on Jugback Lane, south of the junction with Glen Ellan Road.

There are no existing services within the footprint of the proposed site.

If gas is adopted as the fuel source of choice for the heating systems in the scheme, a new gas connection may be made to the existing network with the most likely connection point being the 125 diameter 4 bar main in Jugback Lane. The exact extent and location of these connections will be agreed with Gas Networks Ireland during the design stage of the project.

All works on the gas supply infrastructure will be carried out in accordance with Gas Networks Ireland relevant guidelines. All gas infrastructure will be below ground except for a gas pressure reduction station if required by Gas Networks Ireland.

15.3.5 Telecommunications

Eir and Virgin Media have been contacted and the existing network maps for the area surrounding the proposed development have been obtained

There is an extensive Eir Network in the roads surrounding the site, the most significant of which is a ducted service with multiple access chambers running along both the northern and southern sides of the Glen Ellan Road.

There are also existing Virgin Media services in the residential schemes to the west and south of the proposed site.

There are no existing services with the footprint of the proposed site.

New connections will be made to the existing Eir and Virgin Media networks at the boundary of the site and services will be distributed throughout the site as required. The exact extent and location of these connections will be agreed upon with Eir and Virgin Media during the design stage of the project

15.4 Predicted Impacts

15.4.1 Water Supply

Construction Phase

- There is a risk of contamination of the existing water supply during construction of the development when the connection of the trunk watermain to the public water supply is being made.
- There is a risk of damage to watermain fittings due to high pressure in the existing watermain.
- There will be a minor water demand for site offices.
- There is a possibility of a temporary increase in traffic due to deliveries of materials and other construction-related traffic.
- There is a risk of damage to existing buried utilities during excavations works resulting in temporary loss of supply to existing properties.
- The proposed development will not give rise to any significant long-term adverse impact. Negative impacts during the construction phase will be short term only.

The construction of the proposed development has the potential to cause **a slight, adverse, temporary, residual impact** on the receiving water supply network.

Operational Phase

- There will be an increased demand for water once the development is occupied.

The construction of the proposed development has the potential to cause a slight, adverse, temporary, residual impact on the receiving water supply network.

15.4.2 Foul Sewerage

Construction Phase

- There is a risk of the ingress of ground/surface water to the foul water network.
- There is a risk of damage to existing buried utilities during excavations works resulting in temporary loss of supply to existing properties.
- There is a possibility of a temporary increase in traffic due to deliveries of materials and other construction-related traffic.
- There will be some disruption to traffic during construction works on the public road.
- Cross-connection between foul and surface water pipes on-site.

The construction of the proposed development has the potential to cause **a slight, adverse, temporary, residual impact** on the receiving foul network.

Operational Phase

- Blockages may occur within the pipe network and the wastewater could become septic.
- Foul water could be connected to the surface water drainage network on-site.
- Increased flows to the wastewater network and the Ringsend treatment plant.
- Overflow from foul sewer network to Broadmeadow River during storm events.
- The stormwater overflow tank/pipe will improve capacity in the foul sewer network.

The construction of the proposed development has the potential to cause **a slight, adverse, temporary, residual impact** on the receiving foul network.

15.4.3 Electricity, Gas & Telecommunications

Construction Phase

The installation of the utilities for the development will be conducted in parallel with the other services. This will mainly involve excavation of trenches to lay ducting, construction/installation of access chambers and backfilling of trenching. The trenching and backfilling works will be carried out in conjunction with the construction of the roads and footpaths throughout the scheme.

The relocation or diversions of the existing overhead ESB lines may lead to loss of connectivity to and/or interruption of the supply from the electrical grid to the surrounding areas. Any loss of supply will be managed by ESB Networks to minimise the impact on neighbouring properties.

The new connections to the gas network could cause temporary loss of supply to neighbouring sites/properties while works are carried out. Any interruptions to supply will be managed by Gas Networks Ireland.

There is also a potential loss of connection to the Telecommunications infrastructure while carrying out works to provide service connections. Any loss of supply will be managed by Eir / Virgin Media to minimise the impact on neighbouring properties.

The construction of the proposed development has the potential to cause **a slight, adverse, temporary, residual impact** on receiving the electricity, gas and telecommunication networks.

Operational Phase

The impact of the operational phase of the proposed development on the power supply network would be the requirement for an Electrical Diversified Load of 3.0 MW which will be split over up to 6no ESB sub-stations located throughout the scheme.

The impact of the operational phase of the proposed development on the gas supply would be the requirement for a Gas diversified load of 6.0 MW to accommodate the development of the lands.

The impact of the operational phase of the proposed development on the telecommunications network would be to increase the demand on the existing network.

The construction of the proposed development has the potential to cause a **slight, adverse, temporary, residual impact** on receiving the electricity, gas and telecommunication networks.

15.5 Mitigation Measures

15.5.1 Water Supply

Construction Phase

- Additional survey works will be carried out to confirm the location of existing services using service records, GPR surveys and slit trenches to ensure that their position is accurately identified before excavation works commence.
- All water mains will be cleaned, sterilised and tested to the satisfaction of the Irish Water/Local Authority before connection to the public water main.

- All connections to the public water main will be carried out under the supervision of the Irish Water/Local Authority.

Operational Phase

- It is not envisaged that any other remedial or reductive measures will be necessary upon the completion of the development.

15.5.2 Foul Sewerage

Construction Phase

- Additional survey works will be carried out to confirm the location of existing services using service records, GPR surveys and slit trenches to ensure that their position is accurately identified before excavation works commence.
- Foul water pipes to be laid with sufficient falls to ensure self-cleansing velocity
- Foul pipes will be carefully laid to minimise the potential for cross-connections.
- The provision of a stormwater tank of 2,250m³ to minimize the risk of foul flows to the Broadmeadow River.
- Air vent to control odour on stormwater overflow tank

Operational Phase

- Irish Water through the pre connection enquiry process have assessed the impact of this development together with other committed or known proposed developments in the area and have concluded that, the provision of the Stormwater Storage Tank to be constructed as part of the foul water drainage infrastructure, will ensure that the existing foul water drainage infrastructure, including the Waste Water Treatment Plant at Ringsend will have capacity to accommodate the developments.
- The foul network, including the Stormwater Storage Tank will be inspected annually and maintained.

15.5.3 Electricity

Construction Phase

- Additional survey works will be carried out to confirm the location of existing services using service records, GPR surveys and slit trenches to ensure that their position is accurately identified before excavation works commence.
- All works will be carried out in accordance with ESB Networks methods and standards
- Live connections to the existing electricity network will only be made by ESB Networks

Operational Phase

- It is not envisaged that any other remedial or reductive measures will be necessary upon the completion of the development.

15.5.4 Gas

Construction Phase

- Additional survey works will be carried out to confirm the location of existing using service records, GPR surveys and slit trenches to ensure that their position is accurately identified before excavation works commence.
- Gas Networks Ireland will take full responsibility for the installation of the gas pipework required to serve the site.
- All work will be carried by specialist sub-contractors with specific training for working on gas main networks.

Operational Phase

- It is not envisaged that any other remedial or reductive measures will be necessary upon the completion of the development.

15.5.5 Telecommunications

Construction Phase

- Additional survey works will be carried out to confirm the location of existing services using service records, GPR surveys and slit trenches to ensure that their position is accurately identified before excavation works commence.
- All works will be carried out in accordance with Eir & Virgin Media methods and standards
- Live connections to the existing electricity network will only be made by Eir & Virgin Media

Operational Phase

- It is not envisaged that any other remedial or reductive measures will be necessary upon the completion of the development.

15.6 Residual Impacts

15.6.1 Water Supply

Construction Phase

Due to the proposed mitigation measures outlined above, the impact on the water supply infrastructure during the construction phase of the proposed development is slight.

There will be disruption to local traffic during the connection of the watermains from the proposed development to the existing watermain on Glen Ellan Road.

Operational Phase

There will be an increased demand for water supply due to the development resulting in a moderate impact in terms of demand on the water supply infrastructure. This impact will be managed through consultation with Irish Water to ensure necessary upgrades are provided and that connections are carried out in accordance with the Code of Practice.

15.6.2 Foul Sewerage

Construction Phase

Due to the proposed mitigation measures outlined above, the impact on the foul network construction will be not significant.

There may be short term disruption to local traffic on the connection of the foul sewers from the proposed development to the existing foul sewers.

Operational Phase

There will be increased flows in the existing foul water drainage network, resulting in a moderate impact in terms of demand on the receiving foul water network. This impact will be managed through the provision of a 2,250m³ stormwater tank on the foul sewer network to reduce the risk of foul water surcharging overflow to the surface water network. This impact will be further managed through consultation with Irish Water to ensure any additional necessary upgrades measures are provided and further connections are carried out in accordance with the Code of Practice. In addition, the Ringsend Waste Water Treatment Plant currently has the capacity to cater for 1.64million people and is currently undergoing upgrade works to increase the capacity to 2.4million people by 2025 therefore the impact of the proposed development on the Ringsend WWTP is considered negligible.

15.6.3 Electricity

Construction Phase

Due to the proposed mitigation measures outlined above, the impact of the proposed work on the ESB Network will not be significant.

There may be short term disruption to local traffic or temporary interruptions to supply while the tie-ins to the existing networks are being made.

Operational Phase

The impact of the operational phase of the proposed development on the power supply network would be the requirement for an Electrical Diversified Load of 3.0 MW which will be split over up to 6no ESB sub-stations located throughout the scheme.

15.6.4 Gas

Construction Phase

Due to the proposed mitigation measures outlined above, the impact of the proposed work on the Gas Network will not be significant.

There may be short term disruption to local traffic or temporary interruptions to supply while the tie-ins to the existing networks are being made.

Operational Phase

The impact of the operational phase of the proposed development on the gas supply would be the requirement for a Gas diversified load of 6.0 MW to accommodate the development of the lands.

15.6.5 Telecommunications

Construction Phase

Due to the proposed mitigation measures outlined above, the impact of the proposed work on the Telecommunication Network will not be significant.

There may be short term disruption to local traffic or temporary interruptions to supply while the tie-ins to the existing networks are being made.

Operational Phase

The impact of the operational phase of the proposed development on the telecommunications network would be to increase the demand on the existing network.

15.7 Cumulative Impacts

15.7.1 Water Supply

The connection agreement from Irish Water, given at construction stage, considers the cumulative impact of all other developments on the water supply and will only be awarded if there is capacity within the network, Cumulatively, there will be an increased demand on the network however, due to the capacity assessment carried out by Irish Water the demand will not exceed the available supply. Therefore, the cumulative impact on the water supply is negligible.

15.7.2 Foul Sewerage

Construction Phase

The onsite works will not have any effect on the cumulative impacts on the foul network. It will be the responsibility of the contractor and Irish Water to ensure any off-site works, i.e. the final connection to the public sewer, is programmed with consideration for connections from other sites in the area so as not to negatively impact on the functionality of the public sewer.

Operational Phase

The Stormwater Storage tank has been designed to accommodate all of the known development which would connect to the foul catchment area. Therefore, the cumulative impact on the foul network has been considered and upon completion of the Stormwater Storage tank will be no negative impact on the foul sewage network.

15.7.3 Electricity

Should any other developments be under construction or planned in the vicinity of the site they are likely to have similar impacts during the construction phase in relation to Material Assets. Should the construction phase of any developments coincide with the development of this proposed site, potential cumulative impacts are not anticipated once similar mitigation measures are implemented.

15.7.4 Gas

Should any other developments be under construction or planned in the vicinity of the site they are likely to have similar impacts during the construction phase in relation to Material Assets. Should the construction phase of any developments coincide with the development of this proposed site, potential cumulative impacts are not anticipated once similar mitigation measures are implemented.

15.7.5 Telecommunications

Should any other developments be under construction or planned in the vicinity of the site they are likely to have similar impacts during the construction phase in relation to Material Assets. Should the construction phase of any developments coincide with the development of this proposed site, potential cumulative impacts are not anticipated once similar mitigation measures are implemented.

15.8 Monitoring

The proposed monitoring of the various built services during the operation stage will include:

- The water usage within the proposed development will be monitored via the bulk water meters. Records will be maintained by Irish Water to ensure any excess usage is identified and investigated as necessary.
- Irish Water will monitor the operation of the foul drainage network including the receiving environment.
- The construction and waste management plans will be adhered to.
- The provision of utility services including electricity, gas and broadband will be monitored by the relevant utility providers.

15.9 Difficulties Encountered

There were no difficulties encountered.

15.10 Interactions

The main high level interactions between Material Assets - Utilities and other environmental factors include: Water, Population & Human Health and Traffic & Transport. Please refer to Chapter 16 Interactions for further information on interactions.

15.11 References

- Code of Practice for Water Infrastructure – Connections and Developer Services, (2020), Irish Water
- Code of Practice for Wastewater Infrastructure – Connections and Developer Services, (2020), Irish Water
- Openeir Emaps

- Environmental Impact Assessment Reports – Draft Guidelines, (2017), Environmental Protection Agency
- ESB Networks
- Virgin Media Emaps
- Gas Networks Ireland – Cork Design Department
- Greater Dublin Strategic Drainage Study (GDSDS), (2015), Dublin Drainage
- Irish Building Regulations – Part H 2010 – Drainage and Waste Water Disposal

16. Interactions

16.1 Introduction

This chapter deals with likely interactions between effects predicted as a result of the proposed development. The chapter has been prepared by Maria Rochford, MRUP MIPI, Associate Director (Planning) at KPMG Future Analytics. Maria has 10 years' experience in the planning of residential schemes including the preparation and project management of EIARs. It has been prepared in accordance with the requirements set out within the Planning and Development Regulations 2001 to 2020 and the EPA's Draft Guidelines on Information to Be Contained in Environmental Impact Assessment Reports (2017) to summarise the interactions and interrelationships between key factors identified and assessed.

16.2 Definitions

Article 3(1) of the amended EIA Directive requires environmental impact assessments to include interactions of key effects assessed. The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

a) population and human health;

b) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;

c) land, soil, water, air and climate;

d) material assets, cultural heritage and the landscape;

e) the interaction between the factors referred to in points (a) to (d).

Accordingly, this EIAR seeks to identify all potential impacts of the subject scheme, and this chapter has been compiled to list in one location all of the interactions identified in the assessment of impacts set out in Chapters 5 to 15.

Impact interactions and inter-relationships have been considered throughout in the preparation of the individual, topic specific chapters so that it can take into account the broader picture of how the proposed scheme may affect the various environmental media. All environmental topics are interlinked to a degree such that interrelationships exist on numerous level. It is general practice, to evaluate interaction of effects as a matrix between effects and key factors assessed, accompanied by brief text describing the interactions identified. The matrix incorporated in Table 16.1 inter-relates the various Chapters of the EIAR to the various impact headings referred to in Schedule 6 Item 2(d) of the Planning and Development Regulations, 2001, as amended.

16.3 Interaction of Effects

Table 16.1 Table showing interaction between key factors assessed

Some interaction ✔ No interaction x	Air Quality &		Noise & Vibration		Biodiversity		Archaeology& Cultural Heritage		Landscape & Visual		Land & Soils		Water		Population & Human Health		Traffic & Transport		Waste Mngt		Utilities	
	Con.	Ope.	Con.	Ope.	Con.	Ope.	Con.	Ope.	Con.	Ope.	Con.	Ope.	Con.	Ope.	Con.	Ope.	Con.	Ope.	Con.	Ope.	Con.	Ope.
Air Quality & Climate			x	x	x	x	x	x	x	x	✔	x	x	x	✔	✔	✔	✔	x	x	x	x
Noise & Vibration	x	x			x	x	x	x	x	x	x	x	x	x	✔	x	✔	✔	x	x	x	x
Biodiversity	x	x	x	x			x	x	✔	x	✔	x	✔	✔	✔	✔	x	x	x	x	x	x
Architectural & Cultural	x	x	x	x	x	x			✔	x	x	x	x	x	x	x	x	x	x	x	x	x
Landscape & Visual	x	x	x	x	✔	x	✔	x			x	x	x	x	✔	✔	x	x	x	x	x	x
Land & Soils	✔	x	x	x	x	x	x	x	x	x			✔	x	x	x	x	x	✔	x	x	x
Water	x	x	x	x	✔	✔	x	x	x	x	✔	x			x	x	x	x	x	x	✔	✔
Population & Human Health	✔	x	✔	x	✔	x	x	x	✔	✔	x	x	x	x			✔	✔	x	✔	x	✔
Traffic & Transport	✔	✔	✔	✔	x	x	x	x	x	x	✔	x	x	x	✔	✔			✔	x	✔	x
Waste Management	x	x	x	x	x	x	x	x	x	x	x	x	x	x	✔	✔	x	x			x	x
Utilities	x	x	x	x	x	x	x	x	x	x	x	x	✔	✔	✔	✔	x	x	x	x		

Interactions identified in Table 16.1 are discussed below within individual factors identified.

16.3.1 Air Quality and Climatic Factors

The main interactions with air quality and climate and other topics / media are set out below.

Land & Soils

Potential for dust emissions, nuisance and soiling arising as a result of construction activities. Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated.

Population & Human Health

Potential for dust emissions and nuisance arising as a result of construction activities. Subject to the adherence to the recommended mitigation measures set out in the Dust Management Plan included as part of the Construction and Environmental Management Plan (CEMP), no significant adverse impacts are anticipated.

Traffic related air emissions have the potential to impact air quality which can affect human health. However, air dispersion modelling of traffic emissions has shown that levels of all pollutants are below the ambient air quality standards set for the protection of human health.

The proposed storm water storage tank is not considered a significant odour source. But its use as a gravity sewer has the potential for odourous emissions if incorrectly managed. However, the nearest sensitive receptor downwind of the prevailing wind direction is 120 m away, almost 4 times the minimum distance required by the Fingal Development Plan. Overall there is predicted to be a **negligible impact** from odour due to the proposed stormwater storage tank and high-level overflow gravity sewer over its lifecycle when maintained by Irish Water.

With the mitigation measures outlined in Chapter 7, there are no significant cumulative impacts to air quality or climate predicted for the construction phase.

Traffic

There is potential for traffic emissions to impact air quality in the short-term over the construction phase particularly due to the increase in HGVs accessing the site. Subject to the adherence to the recommended mitigation measures, no significant adverse impacts are anticipated. The impact of traffic generated by the proposed development on air quality has been assessed by modelling emissions as set out in Chapter 7 and was found to be long-term, negative and imperceptible.

There is potential for greenhouse gas emissions to atmosphere during the construction of the development. Construction vehicles, generators etc., may give rise to CO_2 and N_2O emissions. However, the air and climate assessment (Chapter 7) states that site traffic and plant is unlikely to make a significant impact on climate.

There is potential for greenhouse gas emissions to atmosphere during the operational phase of the development. However, the assessment on air and climate found these to be long term and imperceptible.

Due to the short-term duration of the construction phase and the low potential for significant CO_2 and N_2O emissions cumulative impacts to climate are considered neutral. The traffic data used to assess the operational stage impacts to air quality and climate included the cumulative traffic associated with the development as well as other existing and permitted developments in the local area where such information was available. The impact is predicted to be long-term and imperceptible with regards to air quality and climate.

16.3.2 Noise & Vibration

The main interactions with noise and vibration and other topics / media are set out below

Traffic & Transportation

Increased traffic volumes during the construction and operational phases have the potential to increase background noise levels. Traffic flow data in terms of the AADT figures has been assessed for the opening year and future years. The calculations indicate that the highest change in noise level will be +0.6 dB on Glen Ellan Road. Subject to mitigation measures set out in Chapter 8, the noise assessment concluded that the changes in noise level for all assessed roads will be neutral, negligible and permanent.

However, the assessment of effects has found no significant adverse impacts.

Population and Human Health

The assessment of impacts arising from noise and vibration, as set out in Chapter 16, found that construction activities will give rise to noise emissions with a potentially significant impact at the nearest noise sensitive locations on Jugback Lane/Terrace, however when works take place at 40 m or further from receptors then no significant impact is predicted to occur. Subject to the adherence to recommended mitigation measures, no significant adverse impacts are anticipated.

Vibration levels have the potential to be perceptible to building occupants, however they are expected to be below a level that would cause disturbance due to the construction plant and methodology to be employed.Once operational, there will be building services plant items required to serve the development. These items will be selected at a later stage and will be designed and located so that there is no negative impact on sensitive receivers within the development itself or on nearby sensitive receptors. The cumulative operational noise level from building services plant at the nearest noise sensitive locations external to the development will be designed/attenuated to meet the relevant BS 4142 noise criteria for day and night-time periods. Therefore, in the case of this development the proposed plant noise threshold is the background noise level at each receptor location. It is noted that the stormwater tanks are located underground and are not expected to emit any significant levels of noise.

16.3.3 Biodiversity

The main interactions with biodiversity and other topics / media are set out below

Water

The loss of pollutants to water courses from the disturbance of soils can affect aquatic habitats by fouling fish spawning beds and directly affecting species, particularly fish. Pollutants can include oils and fuels, toxic substances such as concrete and cement, and especially sediment. While a broad band of woodland along the river is to be retained, this temporary impact to aquatic life is assessed in Chapter 7 as negative, significant, likely and medium-term.

The project will include the construction of a stormwater storage tank on the junction of the Glen Ellan Road and the Balheary Road and overflow pipe. This aspect of the development will reduce the frequency and intensity of uncontrolled storm overflows currently entering the River Ward, as well as reducing stormwater flow to the Swords wastewater treatment plant. A significant source of pollution to the catchment will therefore be removed. As part of this development application, an Assimilation Simulation Evaluation Report has been prepared by AWN Consultants. The installation of the stormwater storage tank will remove a source of pollution from the River Ward but introduce a potential source of pollution (albeit at a much reduced level) to the River Broadmeadow. This report sought to determine the effect of the proposed development upon the WFD status of receiving waters. The report concludes that:

"Considering background concentrations associated to the current 'Poor' [Water Framework Directive] status of the Broadmeadow River (the river has not sufficient assimilative capacity considering current oxygenation and nutrient conditions), the discharge would not bring sufficient dilution to improve this condition. For a notional condition that assumes an improvement in the status of the river based on the operation of the projected development as well as the projected Irish Water works in the catchment, the project does not have the potential to cause a deterioration in the Water Framework Directive Status."

The proposed stormwater storage tank has therefore been determined to have a positive, moderate, likely and permanent impact on biodiversity including the salmonid status of the River Broadmeadow and the Natura 200 sites in Malahide Estuary.

Considering the nature of the proposed development and the adjacent residential developments, it is considered that the potential cumulative impacts include a deterioration in water quality, resulting in an impact upon aquatic biodiversity. However, given that the proposed development is not anticipated to result in a significant impact upon water quality during the operational phase, and considering the nature of the development and adjacent residential developments, it is considered that there would be no cumulative water quality impacts which would pose a significant risk to aquatic biodiversity during operation. This impact is neutral, imperceptible and unlikely.

During construction it is possible that the proposed development could act in combination with other projects underway at the same time, thereby exacerbating pollution to the Broadmeadow River. In this case, the potential for pollution during construction has already been identified as negative, significant, likely and medium-term and detailed, with site-specific mitigation measures set out in Chapter 7. These measures are designed to avoid pollution to the greatest possible extent and with their full implementation the cumulative impact to water quality will be negative, imperceptible and unlikely.

Landscape and Visual

There is a loss of habitat arising from landscape works proposed including the removal of dry grassland, scrub, and sections of field boundaries. The surface water retention basin will require the removal of woodland floor and shrub level vegetation during the construction stage, however post-construction this vegetation will return, and the presence of new wetland habitats will provide a new feature to attract biodiversity. Works to be undertaken at the Broadmeadow River are confined to the installation of a surface water outfall pipe and a separate stormwater overflow pipe. The river and its riparian zone are otherwise to remain unaltered. Following an arboricultural survey, it was calculated that 37 individual trees are to be removed due to poor condition or conflict with the scheme design. . These habitats are of value to a wide range of plant and animal species, however, the Biodiversity assessment set out in Chapter 7 states that none of these are of special conservation significance other than bats. Nevertheless, the predicted loss of habitat it is an effect which by its magnitude will alter a sensitive aspect of the environment. Therefore, in the absence of mitigation, the permanent loss of these habitats is negative, significant, likely and long-term impact.

The loss of habitat is likely to contribute to cumulative losses of similar habitat (principally hedgerow and treeline). In Chapter 7, this impact was assessed as negative, significant, likely and long-term in the absence of mitigation. However, with the mitigation which has been proposed the cumulative effects will be neutral and not significant in the long-term.

Population and Human Health

Disturbance to species, including bats, from increased human activity and activity associated with the operation of the development, lighting, may arise. The following is taken from the bat report accompanying this application:

"*The construction of the proposed residential development will potentially increase the degree of light (both street and residential lighting) spilling onto the treeline and woodland habitats within the survey area. This will potentially impact on bats species considered to be light sensitive such as brown long-eared bats and Daubenton's bat."*

The effect to bats from lighting is potentially negative, significant, likely and permanent. Given the already built up nature of the surroundings, with roads and residential development, it is not considered that the likely increase in ambient noise or human activity can impact negatively on biodiversity in general. E.g. aquatic life in the Broadmeadow. The effect to biodiversity other than bats from this aspect of the project will be negative, slight, likely and permanent.

16.3.4 Archaeological, Architectural & Cultural Heritage

The main interactions with archaeology, architecture and cultural heritage and other topics / media are set out below

Landscape & Visual

There is potential for disturbance to occur to the riverbed and riverbank at the location of the proposed outfall from the stormwater storage tank into the River Broadmeadow, which will be caused by groundworks associated with the outfall installation. Direct impacts (prior to the application of mitigation) have the potential to range from **moderate to very significant negative (permanent),** dependent on the nature, extent and significance of any archaeological remains that are identified.

Ground disturbances associated with the proposed development may also have a direct, negative (permanent) impact on isolated or small-scale archaeological features that may survive within the proposed development, outside the footprint of the excavated trenches. Impacts (prior to the application of mitigation) have the potential to range from **moderate to significant negative (permanent)** dependent on the nature, extent and significance of any archaeological remains that are identified.

Two extant townland boundaries are present, dividing the site on a north-south axis (Holybanks/Newtown) and forming the western development limit (Holybanks/ Broadmeadow). It is proposed to remove these boundaries to enable construction of the residential development, which represents a direct, moderate negative impact upon the cultural heritage resource.

However, as it is proposed to monitor construction activity and preserve any identified archaeological features by record, no residual impacts are predicted upon the archaeological, architectural or cultural heritage resource.

16.3.5 Landscape & Visual

The main interactions with landscape and visual and other topics / media are set out below

Population and Human Health

The principal interaction between landscape and visual and other EIAR topics is with population and human health. The construction phase visual effects are considered to impart a high magnitude of change on the site and immediate vicinity, but not to the wider area. This will result in a Temporary, Moderate, to Significant adverse visual effect on the more sensitive viewers (residents to the east and in elevated locations south of the site) and a Slight adverse visual effect on viewers along the Glen Ellan Road. Visual effects during construction will not result in pronounced visual effects to the north or east of the site.

In terms of the operational stage (the visual impact of the proposed development), the significance of effects for thirteen selected viewpoints are set out in Chapter 9. The visual effects are, in the main, considered to be neutral in effect, where the development is considered to fit in with the scale and character of the existing surrounds. This is particularly evident in Viewpoints 1-4 (represents viewers in the Applewood area to the west of site), where the scale of the proposed development complements the existing development. The proposed treatment of Jugback Lane, with new street trees and low shrubs proposed, creates partial screening along the lane and reduces visual effects.

Viewpoints 5, 8,9 and 12 along the Glen Ellan Road are all considered neutral in quality. In these views, the development is seen in the context of an expansive road on the urban edge, without a strong sense of character and with much of the northern side of the road bordered by fencing, or by a vegetated embankment. The eastern end of the road near the Balheary Road junction has a more industrial character. The proposed development, while large in scale, provides some active street frontage.

Out of 13 viewpoints, only 3 (Viewpoints 6,7, 13) were considered to result in an adverse visual effect. The views which are considered adverse in quality are localised to these locations (6 and 7) in close proximity to the site, from the Glen Ellan Road.

The Estuary West Masterplan allows for a development of this nature on this site and extending across adjacent lands to the East. Cumulative landscape effects would be Significant but Neutral reflecting the landscape context and delivery of policy objectives locally.

Planning Policy – the development as proposed will deliver significant parts of development policy and objectives of the Fingal CDP and supporting documents whilst playing a significant role in place making in this urban fringe location.

Biodiversity

In terms of enhanced and managed areas of habitat – Broadmeadow River, retained and enhanced hedgerows and new planting, as well as site clearance and reduction in existing vegetation.

Archaeological, Architectural and Cultural Heritage

In terms of the retention/removal and changed setting of features of heritage interest.

16.3.6 Lands & Soil

The main interactions with lands and soils and other topics / media are set out below

Biodiversity

Potential impacts on the underlying soils and geology could also impact on biodiversity conditions present. However, the mitigation measure described in the Land and Soils Chapter and those relevant in the Biodiversity chapter will ensure that this will not occur.

Air Quality and Climate

The removal of topsoil and the earthworks will expose subsoil to weathering and may result in some minor erosion of the soils during the construction period, in particular following extreme dry and sunny or prolonged wet weather conditions. The lack of topsoil is likely to give rise to dust from the subsurface during dry periods.

Traffic and Transport

Construction traffic movements involved in the construction of the proposed development and access roads may result in local compaction of the subsoil along haulage routes. During the construction phase, there is a risk that construction traffic will damage the structure of the adjoining road network and increase the amount of mud and dust on the roads providing access to the site. There will also be a temporary increase in traffic volumes due to deliveries of stone fill materials and removal of surplus unsuitable cut materials which are addressed in the Traffic and Transportation Chapter 13.

Water

During adverse weather conditions surface water runoff across the exposed sub-soil could result in increased levels of silt being deposited in the Broadmeadow River to the North of the site. Some minor local contamination of the watercourse and/or subsoils may occur should chemicals or fuels used during the construction phase spill derived from human error. Mitigation measures outlined in *the EIAR Water chapter* for the construction and operational phase of the proposed development are equally applicable to the protection of soils and bedrock.

However, as stated in the Lands and Soils chapter, after the implementation of the mitigation measures outlined above, the proposed development will not give rise to any significant long-term adverse impact. Negative impacts during the construction phase will not be significant once the appropriate mitigation measures are adopted and will be only short term in duration. It is not anticipated that potential cumulative impacts will be generated on the land and soils during the construction or operation phases or in the event of future developments adjacent to the site should they implement the appropriate mitigation measures.

16.3.7 Water

The main interactions with water and other topics / media are set out below

Utilities

During the construction stage, the connection of wastewater services has the potential to impact groundwater if wastewater were to leak from the network during the construction process. There are potential implications for the local populations if there is a disruption to utility services during the connection of the new services to the proposed development. The construction of the various services will also interact with construction traffic as outlined in the Traffic and Transport Chapter 13.

During the operation stage, the water supply and foul drainage services have a potential interaction with the available water supply and with potential pollution to natural water bodies.

Lands & Soil

The construction of the proposed development has the potential to cause **a slight, adverse, temporary, residual impact** on receiving watercourses/groundwater.

Significant amounts of site stripping and excavation will be required to construct the development. When the site has been stripped layers of sub-soil will be exposed to weathering and there will be potential for erosion due to rainfall and subsequent runoff. The erosion of soil can lead to sediments being washed into the receiving watercourses /sewers at higher rates of runoff.

There is also potential during the development's construction stage that contaminants from cement/concrete be washed into the receiving watercourses/sewers.

There is a risk of pollution of groundwater/watercourses/soils by accidental spillage of oils/diesel from temporary storage areas or where maintaining construction equipment.

Foul water could be connected to the surface water drainage network resulting in the contamination of the receiving watercourses. Furthermore, if there is damage to any foul pipes, there is potential for contaminants to seep into the groundwater.

Contamination from faecal coliforms can arise if there is inadequate containment and treatment of onsite toilets and washing facilities.

However, with the range of proposed mitigation measures set out in Chapter 11 in place, and the implementation of a Construction and Environmental Management Plan, the impact during the construction stage on the hydrology and hydrogeological aspects of the lands are not significant.

The proposed development, once operational, will result in increased impermeable areas and there is potential for an increase in the risk of higher rates of surface water runoff leading to increased downstream flooding. There is a potential impact for the discharge of contaminants from the proposed development and road surfaces to the surrounding drainage network. There is potential for leaks in the foul network to result in contamination of the groundwater. Accidental spills of fuels/hydrocarbons and washing down into the drainage pipe network has the potential to impact the receiving hydrogeology.

Biodiversity

In respect of Biodiversity, there is an interaction between hydrology and the downstream habitats present along the Broadmeadow river.

The proposed stormwater tank provides a storage facility to capture overflow in the IW network and reduce outfall to the Broadmeadow river. As a stormwater storage tank, the tank will store stormwater that would otherwise be discharged unimpeded to the Broadmeadow River. The function of the storage tank activates when the current IW foul water system overflows during heavy rainfall events and surface/storm water and foul water infiltration occurs. The tank therefore will capture the surface/storm water and foul waters that are generated during heavy rainfall events, stopping these mixed, deleterious waters from discharging directly to the river, and thereby reducing the potential for contaminants present in the mixed storm/foul water to enter the stream. In this way, the tank will improve the capacity of the network to prevent the discharge of pollutant material to the Broadmeadow River, and by extension, the Broadmeadow Estuary SAC. As such, it will improve the infrastructure capacity available to reduce the outflow to protected sites and rivers.

16.3.8 Population & Human Health

There are numerous inter-related environmental topics described in detail throughout this EIAR which are of relevance to population and human health. The main high-level interactions between Population and Human Health and other environmental factors including Air and Climatic factors and Noise and Vibration are described in the relevant sections above. Further interactions in terms of and Traffic and Transportation and Landscape and Visual are set out below,

The operational phase of the proposed development will result in the provision of 621 no. residential units, a creche facility and significant public open space. **T**he uplift in local population generated by the proposed development will contribute to the compact development targets set out in the National Planning Framework i.e. at least 50% of all new homes within or contiguous to the existing built up area in Dublin and 30% in other settlements.

No significant adverse residual impacts have been identified. The character and condition of the land will change from disused, green field site to a residential land use. This change is in alignment with the specific zoning of the site for and the impact is considered acceptable when balanced with the other positive impacts in terms of building a critical mass of population, compact urban development, provision of housing on a strategic, edge of centre site, provision of new local services and amenities (créche facility, public open space enhancements) and the indirect benefits arising for employment.

Traffic and Transport

The pedestrian and cyclist infrastructure proposed will greatly enhance connectivity of surrounding neighbourhoods to the Broadmeadow Riverside Park which will result in a **positive, significant impact.** Positive impacts on population and human health will include health benefits associated with the provision of a significant quantity of open space, as well as the provision of walking and cycling facilities.

Landscape and Visual

The landscaping proposals set out in this scheme will bring positive benefits in terms of recreational amenity and provision including the amenity value of the green corridor along the Broadmeadow and the opening up of access to the Broadmeadow riverside park which will contribute to public open space provision available to the people of north Swords. As the Population and Human Health chapter sets out, this will bring **positive, significant impacts** in terms of local recreation amenity and provision.

16.3.9 Material Assets – Traffic & Transportation

The main interactions identified in the Material Assets – Traffic and Transport chapter and other topics / media are set out below.

Noise

There is a potential for construction traffic to impact from a noise perspective in relation to the surrounding road network. Construction deliveries to and from the site by heavy good vehicles will impact on noise levels.

Construction and operational impacts of the development arising from traffic generated are described in Section 6.3.2 above (Noise Interactions) and the Noise chapter of this EIAR.

Air and Climate

There is a potential for construction traffic to impact on air quality from a dust perspective in relation to the surrounding road network and the potential for dust to arise from vehicles travelling along site roads and from general earthwork activities.

The impacts of the proposed development on air quality arising from traffic generated at construction and operational phases are described in Section 6.3.1 above (air Interactions) and the Air and Climate chapter of this EIAR.

Population and Human Health

There will be an increase in the use of the road network by private vehicles. However, a Mobility Management Plan will promote more sustainable forms of transport to help reduce the use of private vehicles by the residents of the proposed development. There is likely to be an increase in the number of pedestrians and cyclists in the surroundings of the development. However, footpaths and cycling paths, both internally and externally (along the site frontage) are provided as part of the development, thus, the impact should be minimal.

The traffic modelling undertaken includes growth in background traffic flows which accounts for other developments in the area.

The increase in traffic volumes as a result of the proposed development will impact the adjacent existing developments as the traffic flows through access and egress from the site will increase. The transport assessment set out in Chapter 13 indicates that all assessed junctions, operating with improved layouts as proposed as part of the subject application, would operate within the capacity and the impact arising from the proposed development would be considered negligible.

16.3.10 Material Assets – Waste Management

Adherence to the mitigation measures outlined will ensure that there are no significant impacts on resource or waste management from the proposed development. The management of waste during the construction phase in accordance with the C&D WMP and during the operational phase in accordance with the OWMP will meet the requirements of regional and national waste legislation and promote the management of waste in line with the priorities of the waste hierarchy.

Land & Soils

During the construction phase excavated soil and stone will be generated from the excavations required to facilitate site levelling and construction of new foundations. Some excavated material will need to be removed offsite, but a significant portion will be reused onsite. Where material has to be taken off site it will be taken for reuse or recovery, where practical, with disposal as last resort. Adherence to the mitigation measures in Chapter 14 and the accompanying C&D WMP will ensure the effect is long-term, imperceptible and neutral.

Traffic

Local traffic and transportation will be impacted by the additional vehicle movements generated by removal of waste from the site during the construction and operational phases of the development. Provided the mitigation measures detailed in Chapter 14 and the requirements of the OWMP are adhered to, the effects should be short to long-term, imperceptible and neutral.

Population & Human Health

The potential impacts on human beings in relation to the generation of waste during the demolition, construction and operational phases are that incorrect management of waste could result in littering which could cause a nuisance to the public and attract vermin. A carefully planned approach to waste management and adherence to the project specific C&DWMP and OWMP, will ensure appropriate management of waste and avoid any negative impacts on the local population. long-term, imperceptible and neutral.

16.3.11 Material Assets – Utilities

The main interactions relating to this EIAR Chapter are Water , Population and Human Health and Traffic and Transport.

Water

The water supply and foul drainage services have a potential interaction with the available water supply and with potential pollution to natural water bodies, as set out in Chapter 15.

Water Supply: With a range of mitigation measures set out in Chapter 15 in place, the impact on the water supply infrastructure during the construction phase of the proposed development is slight.

Once operational, there will be an increased demand for water supply due to the development resulting in a moderate impact in terms of demand on the water supply infrastructure. This impact will be managed through consultation with Irish Water to ensure necessary upgrades are provided and that connections are carried out in accordance with the Code of Practice.

Foul Sewerage: Due to the proposed mitigation measures outlined above, the impact on the foul network construction will be slight.

Once operational, the increased flows in the existing foul water drainage network will result in a residual impact in terms of demand on the receiving foul water network. This impact will be managed through the proposed stormwater tank on the foul sewer network to reduce the risk of foul water surcharging overflow to the surface water network. This impact will be further managed through consultation with Irish Water to ensure any additional necessary upgrades measures are provided and further connections are carried out in accordance with the Code of Practice. In addition, the Ringsend Wastewater Treatment Plant currently has the capacity to cater for 1.64million people and is currently undergoing upgrade works to increase the capacity to 2.4million people by 2025 therefore the impact of the proposed development on the Ringsend WWTP is considered negligible.

Population and Human Health

There are potential implications for the local populations if there is a disruption to utility services (electricity, gas and telecommunications) during the connection of the new services to the proposed development. However, as described in Chapter 15, with mitigation measures in place, the impact of the proposed works on utility service networks during the construction phase will not be significant. Once operational, the proposed development will increase demand on existing networks.

Traffic and Transport

There will be disruption to local traffic during the connection of the watermains from the proposed development to the existing watermain on Glen Ellan Road. There may also be short term disruption to local traffic on the connection of the foul sewers from the proposed development to the existing foul sewers.

16.4 Other effects

Schedule 6 Item 2(e) of the Planning and Development Regulations, 2001 as Amended requires that an EIAR contains a description of the likely significant effects (including direct, indirect, secondary, cumulative, transboundary, short, medium and long-term, permanent and temporary, positive and negative) of the project on the environment resulting from the following:-

• *the Use of Natural Resources*

As the proposed development will not require the use of natural resources that are in short supply no likely significant effects on the environment are expected to arise from the use of natural resources in the construction / operation of the project

• *the emission of pollutants, the creation of nuisances and the disposal and recovery of waste*.

No likely significant effects on the environment are expected to arise from the emission of pollutants, the creation of nuisances or the elimination of waste associated with this project, as the relevant assessments included in this EIAR set out.

• *the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)*

The likely significant effects of risks due to major accidents or disasters are described in Section 1.4.5 of this EIAR and in the Assessment Chapters, where relevant.

• *The technologies and the substances used.*

This is an urban residential development and there are no technologies or substances associated with the project which would significantly or adversely affect the environment.

16.5 References

- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (Environmental Protection Agency, Draft August 2017)
- Advice Notes for Preparing Environmental Impact Statements, Draft September 2017
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002)
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2002)

17. Summary of Mitigation Measures and Residual Impacts

17.1 Introduction

This chapter provides a complete summary of mitigation measures proposed in Chapters 5-15. The appointed contractor is required to adhere to the mitigation measures provided here to avoid or reduce significant effects and ensure sustainable development.

17.2 Mitigation Measures

The EPA Guidelines on information to be contained in EIARs (2017) established four main strategies for mitigation of effects avoidance, prevention, reduction, and offsetting.

17.2.1 Air Quality and Climatic Factors

Construction stage

The pro-active control of fugitive dust will ensure the prevention of significant emissions, rather than an inefficient attempt to control them once they have been released. The main contractor will be responsible for the coordination, implementation and ongoing monitoring of the Dust Management Plan. The key aspects of controlling dust are listed below. Full details of the Dust Management Plan can be found in Appendix 7.3. These measures will be incorporated into the CEMP prepared for the site.

- Hard surface roads will be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic.
- Any road that has the potential to give rise to fugitive dust must be regularly watered, as appropriate, during dry and/or windy conditions.
- Vehicles exiting the site shall make use of a wheel wash facility where appropriate, prior to entering onto public roads.
- Vehicles using site roads will have their speed restricted, and this speed restriction must be enforced rigidly. On any un-surfaced site road, this will be 20 kph, and on hard surfaced roads as site management dictates.
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods.
- During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin at all times. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.

At all times, these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust would be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.

Construction stage traffic and embodied energy of construction materials are expected to be the dominant source of greenhouse gas emissions as a result of the construction phase of the development. Construction vehicles, generators etc., may give rise to some CO_2 and N_2O emissions. However, due to short-term nature of these works, the impact on climate will not be significant.

Nevertheless, some site-specific mitigation measures will be implemented during the construction phase of the proposed development to ensure emissions are reduced further. In particular the prevention of on-site or delivery vehicles from leaving engines idling, even over short periods. Minimising waste of materials due to poor timing or over ordering on site will aid to minimise the embodied carbon footprint of the site.

Operational Stage

The impact of the proposed development on air quality and climate is predicted to be imperceptible with respect to the operational phase in the long term. Therefore, no additional site-specific mitigation measures are required.

In addition, the proposed development has been designed to reduce the impact to climate where possible, the following measures have been incorporated into the design of the development: The use of photovoltaics as a means of providing a renewable source of energy for the building is being considered. The proposed development aims to be a "Near Zero – Energy Building" meaning it will have a very high energy performance. The proposed development aims to have a BER rating of at least A3.

17.2.2 Noise & Vibration

With regard to construction activities, best practice control measures from construction sites within *BS 5228 (2009 +A1 2014) Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2* will be used to control noise and vibration impacts. The contractor will ensure that all best practice noise and vibration control methods will be used as necessary in order to ensure impacts to the closest residential noise sensitive locations are not significant.

Noise-related mitigation methods are described below and will be implemented for the project in accordance with best practice. These methods include:

- No plant used on site will be permitted to cause an ongoing public nuisance due to noise;
- The best means practicable, including proper maintenance of plant, will be employed to minimise the noise produced by on site operations;
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the contract;
- Compressors will be attenuated models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
- Machinery that is used intermittently will be shut down or throttled back to a minimum during periods when not in use;
- During construction, the contractor will manage the works to comply with noise limits outlined in BS 5228-1:2009+A1 2014. Part 1 – Noise;
- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures;
- Limiting the hours during which site activities which are likely to create high levels of noise or vibration are permitted;
- Monitoring levels of noise and vibration during critical periods and at sensitive locations.

Furthermore, a variety of practicable noise control measures will be employed. These include:

- Selection of plant with low inherent potential for generation of noise and/ or vibration;

- Erection of good quality site hoarding to the site perimeters which will act as a noise barrier to general construction activity at ground level;
- Erection of barriers as necessary around items such as generators or high duty compressors, and;
- Situate any noisy plant as far away from sensitive properties as permitted by site constraints.

Mechanical Plant and Services

As part of the detailed design of the development, plant items and, where necessary, appropriately selected remedial measures such as attenuators or screening will be specified in order that the adopted plant noise criteria is achieved at the façades of noise sensitive properties, including those within the development itself.

17.2.3 Inward Noise Impact

As is the case in most buildings, the glazed elements and ventilation paths of the building envelope are typically the weakest element from a sound insulation perspective. In general, all wall constructions (i.e. block work or concrete and spandrel elements) offer a high degree of sound insulation, much greater than that offered by the glazing systems. Therefore, noise intrusion via the wall construction will be minimal.

The overall R_w and $D_{ne,w}$ outlined above are provided for information purposes only. The over-riding requirement is the minimum octave-band sound insulation performance values which may also be achieved using alternative glazing and ventilation configurations. Any selected system will be required to provide the same level of sound insulation performance set out in Table 6.13 and Table 6.14 or greater.

It is important to note that the acoustic performance specifications detailed herein are minimum requirements which apply to the overall glazing and ventilation systems. In the context of the acoustic performance specification the 'glazing system' is understood to include any and all of the component parts that form part of the glazing element of the façade, i.e. glass, frames, seals, openable elements etc.

The assessment has demonstrated that the recommended internal noise criteria can be achieved through consideration of the proposed façade elements at the design stage. The calculated glazing and ventilation specifications are preliminary and are intended to form the basis for noise mitigation at the detailed design stage. Consequently, these may be subject to change as the project progresses.

Following the provision of these measures the impacts will be considered neutral, not significant and permanent.

17.2.4 Biodiversity

Construction Phase

Habitat Loss

The landscaping plan provides for new areas of open space which will preserve the north-south corridor to the east of the site as well as the hedgerow to the west and the woodland along the riparian zone of the River Broadmeadow. The hedgerow along the Jugback Lane will be replaced with a broad (c.5m) green belt that will be managed for nature. Biodiversity will be boosted along these stretches through the use of soil from the hedgerow to be removed. No 'wild flower' seeds are to be planted along this belt. Herb vegetation will be allowed to develop while cutting will be limited in order to create seasonal meadow habitats. Trees to be planted will be predominantly native species along with biodiversity-friendly non-native species which are suited to urban settings. This corridor will be extended along Glen Ellen Road for a further 225m. In total there is an approximate area of 3,600 sqm of wildflower meadow proposed, along Jugback Lane and Glen Ellan Road.

Within the woodland belt along the River Broadmeadow, scrub vegetation will be allowed to develop naturally. There will be no artificial lighting in this area. The ecological value of this important corridor will be maintained.

The planting of new trees, clusters of trees and meadow areas will offset the predicted loss of habitat in the medium to long-term. The resultant, long-term impact will therefore not be significant.

The direct mortality/disturbance of species during land clearance

Woody vegetation (trees, scrub, hedgerows, woodland vegetation etc.) will not be cleared during the bird nesting season (March to August).

The following measures are taken from the bat survey report:

A Phase Two PBR survey is required for all trees proposed to be felled. This should be undertaken at least one month prior to tree felling in order to propose a tree felling plan in conjunction with tree contractors.

i) Erection of an alternative roosting sites are required to be erected to 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 (x2) – free-standing chamber on free standing pole (See appendices – Habibat Box). Location of rocket box will be in dark zones along the Broadmeadow River.

b. Summer Bat Boxes (1FF Schwegler woodcrete or similar design) – 8 bat boxes should also be erected on mature trees within the proposed development site (e.g. pine trees located beside Newtown Bridge).

Bat boxes will be erected prior to tree felling and will be erected under supervision by the bat specialist. Some general points that will be followed include:

• Straight limb trees (or telegraph pole) with no crowding branches or other obstructions for at least 3 metres above and below position of bat box.

• Diameter of tree should be wide and strong enough to hold the required number of boxes.

Locate bat boxes in areas where bats are known to forage or adjacent to suitable foraging areas. Locations should be sheltered from prevailing winds.

• Bat boxes should be erected at a height of 4-5 metres to reduce the potential of vandalism and predation of resident bats.

• It is recommended to erect a number of bat boxes on one tree at an array of aspects. South facing boxes will receive the warmth of the sun, which is necessary for maternity colonies. In large bat box scheme it is generally recommended to have three bat boxes arranged at the same height facing North, South-East and South-West. This ensures a range of temperatures are available all day. If the South facing boxes become warm, bats can safely remove to the cooler North facing box.

• Locations for bat boxes should be selected to ensure that the lighting plan for the proposed site does not impact on the bat boxes.

Trees 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).

An assessment of trees according to their PBR value determines the methodology of felling. The trees identified within the survey area are PBR Category 2. The procedure to fell these is as follows:

• Category 2: Trees with roosting features (dead wood, tree holes etc.) should be checked prior to felling. It is recommended that they are physically checked (using an endoscope and high power torch) or a dusk/dawn surveys are completed to determine if bats are roosting within. A tree felling plan will be required in consultation with the tree surgeons. A bat box scheme will need to be erected prior to felling and in consultation with the bat specialist. Any trees showing crevices, hollows, etc., should be removed while a bat specialist is present to deal with any bats found. Such animals should be retained in a box until dusk and released on-site. Large mature trees will be felled carefully, essentially by gradual dismantling by tree surgeons, under supervision of a bat specialist. Care will be taken when removing branches as removal of loads may cause cracks or crevices to close, crushing any animals within.

• 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.

Pollution of water courses through the ingress of silt, oils and other toxic substances.

A preliminary Construction Environmental Management Plan has been prepared to accompany this development application and which includes full details of all pollution prevention measures. This has been prepared with regard to guidance from IFI (2016). This will include consultation with IFI at all stages of the project. Dangerous substances will be stored away from water courses and in bunded areas at all times. Measures will be taken to ensure that loss of sediment to water course is minimized to the greatest degree possible and only attenuated, silt-free water will be directed towards ditches or streams. This will be achieved through the use of silt fencing, screening berms and/or settlement ponds. The site manager will be responsible for ensuring that pollution to water courses does not occur. A record will be kept of daily inspections and any incidents which may occur, along with the action taken.

Site-specific sediment control measures are detailed in the Construction and Environmental Management Plan prepared for this application by Waterman Moylan and are given as:

Sediment Control Measures

Sediment entrapment facilities are necessary to reduce sediment discharges to downstream properties and receiving waters. All run-off leaving a disturbed area will pass through a sediment entrapment facility before it exits the site and flows downstream.

• Straw Bales

Straw bales will be placed at the base of a slope to act as a sediment barrier. These are not recommended for use within a swale or channel. Straw bales are temporary in nature and may perform for only a period of weeks or months. Proper installation and maintenance are necessary to ensure their performance.

• Silt Fencing

A silt fence is made of woven synthetic material, geotextile, and acts to filter run-off. Silt fencing will be placed as a temporary barrier along the contour at the base of a disturbed area but is not recommended for use in a channel or swale. The material is durable and will last for more than one season if properly installed and maintained. Silt fencing is not intended to be used as a perimeter fence or in an area of concentrated flow. If concentrated flow conditions exist, a more robust filter will be considered.

• Silt Barriers

Silt barriers can also be temporarily installed in any road gullies of partially constructed roads to prevent sediment movement into downstream drainage systems or SUDS components.

When the catchment area is greater than that allowed for straw bale barriers or silt fences, the runoff will be collected in diversion drains and routed through temporary sediment basins.

• Diversion Drains

Diversion drains are simple linear ditches, often with an earth bund, for channelling water to the desired location. If the drains are being eroded they will be lined with geotextile fabric or large stones or boulders.

• Silt Traps

Will be placed at the base of a slope as a sediment barrier or as a temporary filter prior to discharge into a stream. Silt traps are deemed temporary and proper installation and maintenance is needed to ensure their performance.

Operation Phase

The following is taken from the bat report:

Disturbance to bats from artificial lighting

The following measures are taken from the bat report:

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 Daubenton's bats. This is particularly important along the northern boundary of the proposed development site (i.e. adjacent to the Broadmeadow River).

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).

o All luminaires used will lack UV/IR elements to reduce impact.

o LED luminaires will be used due to the fact that they are highly directional, lower intensity, good colour rendition and dimming capability.

o A warm white spectrum (<2700 Kelvins will be used to reduce the blue light component of the LED spectrum).

o Luminaires will feature peak wavelengths higher than 550nm to avoid the component of light most disturbing to bats.

o 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.

o Only luminaires with an upward light ratio of 0% and with good optical control will be used.

o Luminaires will be mounted on the horizontal, i.e. no upward tilt.

o 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.

o 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 should be erected in the following areas:

- Broadmeadow River Valley (e.g. Broadmeadow Riverside Park).

The lighting plan for greenway, cycle routes and pedestrian walkways should strictly adhere to the guidelines listed above. It is recommended that the horizontal illuminance is 0 LUX on the Broad Meadow River and therefore that there is no light spillage on this habitat. If the horizontal illuminance maps indicated that there is lighting spillage on the river, then landscaping is required to buffer this light spillage to ensure that there is no lighting shining on the river surface.

The proposed lighting plan was examined (SES 12920Holybank, Swords – Public Lighting Calculation Report.pdf (dated 16/9/2020). Five luminaires are proposed as part of the lighting plan, all of which are 3000 Kelvins with a maximum of 15.48 LUX in Grid 1 and 14.03 in Grid 2 (please SES document listed above). The contour map (SES 12920 Holybank, Swords – Public Lighting Layout.pdf – please note, this is a detailed map and it is advise to consult this. This map is not reproduced in this report as the appropriate detail would not be visible) depicts four contour lines in relation to the horizontal luminescence (LUX levels, 0.25, 0.5, 1.0 and 3.5 LUX contours). The lighting is principally confined to the residential areas. No lighting is proposed for the cycle path and lighting is avoiding the principal bat habitats along the Broadmeadow River.

17.2.5 Archaeological, Architectural & Cultural Heritage

Archaeology

- No evidence of an archaeological site was identified within RMP DU011-080. As such, no further specific archaeological mitigation is required for this particular site.
- It is acknowledged that preservation in-situ of archaeological remains is the preferred option for the conservation of the archaeological resource. Due consideration was given by the Design Team to the preservation in-situ of ring-ditch identified in AA 1 and associated remains. The design on this site has strived to create a balance between built and unbuilt, rather than maximise the development potential of the site; only 26% of the net site area will be taken up by residential development; an area of the site is being preserved for a school and an area is being protected for a future Bus Connects corridor. For these reasons preservation by record is ultimately being proposed. We have set out further information below, in this regard.
    - The preservation of key landscape characteristics and existing features of the site has guided the landscaping proposals set out for the scheme. The focus has been to retain the primary elements of the existing ecological networks of hedgerows around the site, most notably the central north-south linear hedgerow, and the woodland amenity along the Broadmeadow River. In doing so, a connected linear spine of public open space is formed that provides for shared ecological, open space, recreation and SuDs functions. The central spine concept proposed directly aligns with the green infrastructure vision and principles of the Fingal County Council Development Plan (2017-23) and the Estuary West Masterplan (2019). The implications of designing a landscaping strategy around the original north-south hedgerow and the historical townland boundary it represents have resulted in the need for more efficient use of lands within the adjoining cells across the site.
    - In consultation with the Department of Education and Skills, the applicant has agreed to reserve a 0.46ha site within the applicants ownership to accommodate a future school sufficient to cater for a 16-24 classroom school as per the requirement of Estuary West Masterplan (2019). The future school will provide for significant community and social infrastructure for the locality. This together with the obligation to set back the development site from Glen Ellan Road to protect a corridor for future Bus Connects and existing wayleave for local infrastructure services, has rendered a substantial portion of the site undevelopable.

- The current level of density (70 uph net density) proposed on the subject site is in alignment with the standards set by Estuary West Masterplan. The site coverage proposed under the current scheme is 26% of the net site area. Plot ratio for the proposal stands at 0.7 for the net site area. This shows that the proposed design on this site has strived to create a balance between built and unbuilt, rather than maximise the development potential of the site.
- The site of recorded monument was targeted by geophysical surveys and trenches but did not reveal any trace of the monument. Broader archaeological testing carried out revealed a previously unrecorded circular response measuring c.11.5m diameter which has been interpreted as a possible ring-ditch. The design team looked at protecting this previously unrecorded ring-ditch by incorporating it into the open space proposals but this would lead to a lack of coordination between open spaces proposed and an overconcentration of green spaces to the north of the site. The current proposal at this location provides for a high-quality urban environment, that includes duplex units, private gardens and semi- private amenity areas including an informal play area. The residential developments at this location also perform an important function of providing passive surveillance to Broadmeadow Riverside Park.

- Given the design and planning rationale as detailed above, coupled with the truncated nature of the identified archaeological remains on site, preservation by record of the features in AA 1–3 will be carried out prior to the commencement of construction. This will be undertaken by a license eligible archaeologist in consultation with the National Monuments Service of the DoHLGH.
  - An archaeological wade survey, including metal detection, will be carried out at the location of the outfall into the River Broadmeadow. This will be undertaken by a license eligible archaeologist in consultation with the National Monuments Service of the DoHLGH.
- All topsoil stripping associated with the proposed development will be monitored by a suitably qualified archaeologist. If any features of archaeological potential are discovered during the course of the works further archaeological mitigation may be required, such as preservation in-situ or by record. Any further mitigation will require approval from the National Monuments Service of the DoHLGH.

Architecture

- The intervention to the wall leading to the protected structure of Newtown Bridge will be reconstructed using materials recovered from the original wall.
- As there are no further predicted impacts on the architectural resource, no further mitigation is deemed necessary.

Cultural Heritage

- During the course of topsoil stripping a written and photographic record describing the form of the townland boundaries to be impacted upon will be included in the monitoring report.

17.2.6 Landscape & Visual

Avoidance and mitigation by design were incorporated into the design. A Landscape Masterplan was prepared in order to maximise retention of the most important landscape elements, to create a design with a strong sense of place, and to avoid and reduce landscape and visual effects.

The Design Strategy incorporates the Development Plan policies and objectives contained in the Estuary Masterplan outlined in Section 11.3. These are incorporated into the Landscape Masterplan (illustrated in Figure 11.1). A balance between built form and open space is proposed, which enhances the legibility and the permeability of the site and contributes to place-making in a newly evolving neighbourhood. The Landscape Masterplan includes the following elements which reduce the landscape and visual effects.

- Retention of the hedgerow (and townland boundary) in the centre of the site (running north-south), as set out in the Estuary Masterplan. The hedgerow acts as an element of public open

space, as well as green infrastructure connecting the Broadmeadow River and Glen Ellan Road.

- Creation of a riverside Park along Broadmeadow River which enhances the areas' natural character and includes retained mature trees and provides a link to the areas to the east and west, as well as linking to the north-south green link. This is a large area of open space and will have a strong naturalistic feel due to the river and retained trees. It will also have smaller areas of varying character including play areas, as well as a network of walking trails.

- Lower (2-3-storey) buildings along Jugback Lane are proposed,this reflects the strategies of the Estuary Masterplan and reduces visual effects on the primarily residential areas to the west of the site. The proposal introduces an entrance to the site along Jugback Lane, which increases permeability between the site and the area.

- Jugback lane itself will remain as a lane but with a more open and urban character. Proposed tree planting will enhance the lane.

- The taller buildings proposed line Glen Ellan Road, this reflects objectives set out in the Estuary West Masterplan. However, this is a wide road of a large scale and is the most suitable location for these taller buildings. A 'green corridor' comprised of large street trees and grass is proposed as a buffer between the buildings and Glen Ellan Road. The building elevations in association with the new maturing landscape will be important placemaking additions to the road corridor and transformational in character.

- The inclusion of a private open space to the front of Block A along Glen Ellan Road will provide a communal open space enclosed by a low stone wall and railing with a hedge, and improve the street frontage along Glen Ellan Rd

- The proposed stormwater storage tank is screened from view by the proposed landscape measures, as seen in Viewpoint 9, and is therefore not visible in this view.

In summary, the retention of trees is proposed where possible. Key areas include the area along the Broadmeadow river, and the retention of the majority of trees here will assist in creating a pleasant public open space and important green link, as well as screening the development from the north, as seen in Viewpoints 10 and 11. The north-south link which includes the retained hedgerow is smaller in scale, but will assist in breaking up the space internally, as well as being viewed as a green space as shown in Viewpoint 7.

Construction phase mitigation measures – landscape and visual

Construction Stage will be programmed over a number of years resulting in ongoing infrastructure, building and related works for some period of time. These are generally destructive and visually adverse in nature, but temporary and short term. Best practice site management will be employedincluding appropriately scaled and located hoarding to screen the site from viewers along Glen Ellan Road and the residential areas to the south, as well as areas to the west at Applewood.

17.2.7 Lands & Soil

Construction Stage

The provision of wheel wash facilities at the construction entrance to the development will minimise the amount of soil deposited on the surrounding road network. The adjoining road network will be cleaned regularly, if required, to prevent the build-up of soils from the development site on the existing blacktop roads.

Measures will be implemented throughout the construction stage to prevent contamination of the soil and adjacent watercourses from oil and petrol leakages and siltation. Suitable bunded areas will be installed for oil and petrol storage tanks. Designated fuel filling points will be put in place with

appropriate oil and petrol interceptors to protect the ground from accidental spills. Spill kits will be provided by the Contractor to cater for any other spills.

Cut off trenches along the northern boundary of the development will be constructed before stripping topsoil. These cut off trenches will have a settlement pond/silt trap at the end of each trench with an overflow. Straw bales will be placed within the cut off trenches at strategic locations and at the outfall of the settlement ponds to the overflow. These measures will be implemented and maintained during the construction phase to prevent silt runoff into the existing ditches/watercourses during the drainage works.

Dampening down measures with water sprays will be implemented during periods of dry weather to reduce dust levels arising from the development works.

The contractor will be obliged to ensure that any sub-contractors engaged on the site are made fully aware of the required mitigation measures and that they are properly implemented as part of any works that they undertake.

After implementation of the above measures which are also outlined in the Construction and Environmental Management Plan, which forms part of the application provided under a separate cover, the proposed development will not give rise to any significant long-term adverse impact. Negative impacts during the construction phase will not be significant and will be short term only in duration.

Operational Stage

Within the development, landscape areas will be topsoiled and planted in accordance with the proposed landscaping plan. Following completion of these reinstatement works and once an appropriate landscape maintenance and replanting programme is adopted during the operational stage, no significant adverse impacts on the lands, soils and geology of the subject lands are envisaged.

A comprehensive drainage network will be constructed comprising Detention Basins, Grass Swales, Filter Drains and Permeable Paving to ensure that the lands drain effectively following their reshaping / re-profiling. The drainage system incorporates sustainable urban drainage methods to clean flows before discharge to the Broadmeadow River. Please refer to the enclosed drainage drawings which provide full details of the drainage network to be constructed withing the development.

17.2.8 Water

Construction Stage

A Construction, Environmental and Waste Management Plan (CEWMP) has been prepared for this application and is included under a separate cover as part of the proposed application that outlines the mitigation measures. It is considered that the CEWMP will be updated by the appointed contractor. To minimise the potential impact of the construction phase of the proposed development on the surrounding surface water and groundwater environs, the following construction stage mitigation measures are to be included in the plan and be implemented in full.

- The contractor will appoint a suitably qualified person to oversee the implementation of measures for the prevention of pollution to the receiving surface water environment.
- To minimise the adverse effects, the prevailing weather conditions and time of year is to be taken into account when the site development manager is planning the stripping back of the site.
- Site stripping will be minimised as far as practicable.
- Cut off trenches together with settlement ponds/silt traps will be provided to prevent silt runoff into the existing sewers/watercourses during the drainage works.
- Regular testing of surface water discharges will be undertaken at the outfall from the subject lands. The location for testing and trigger levels for halting works will be agreed upon between the project ecologist and the site foreman at the commencement of works.
- Where silt control measures are noted to be failing or not working adequately, works will cease in the relevant area. The project ecologist will review and agree on alternative pollution control

measures, such as deepening or redirecting trenches as appropriate, before works may recommence.

- All fuels and chemicals will be bunded, and where applicable, stored within double skinned tanks/containers with the capacity to hold 110% of the volume of chemicals and fuels contents. Bunds will be located on flat ground a suitable distance from any watercourse or other water-conducting features, including the cut off trenches.
- Foul and surface water pipes will be carefully laid to minimise the potential for cross-connections which results in contamination of receiving watercourses.
- Site personnel inductions are to be conducted such that all site personnel are made aware of the procedures the best practice in relation to the management of surface water runoff and groundwater protection.
- Where possible, precast concrete units are to be used to avoid on-site "wet" mix concrete usage. In situ concrete pours are to be managed in accordance with best practice to avoid overspills
- Concrete truck and wheel wash down facilities are to be provided in designated areas. Discharge from these areas is to be directed into the settlement ponds/silt traps.
- Topsoil for landscaping will be located in such a manner as to reduce the risk of washing away into local drainage or watercourses.

Operational Stage

The implementation of the following operation stage mitigation measures will minimise the impact on the hydrology and hydrogeology aspects of the development lands.

- The surface water drainage network has been designed in accordance with the CIRIA SUDS Manual and the Greater Dublin Strategic Drainage Scheme. The appropriate interception mechanisms and treatment train process has been incorporated into the design.
- Surface water outflow will be restricted to the equivalent greenfield runoff rate.
- Flow restrictors with attenuation storage will be used to slowdown and store surface water runoff before discharging at green field rates to the river.
- Attenuation systems will be constructed on-line to intercept the first flush during rainfall events after periods of dry weather.
- Sustainable urban drainage measures, including green roofs, permeable paving and filter strips/ swales will be provided to improve water quality.
- A petrol interceptor will be installed to prevent hydrocarbons from entering the local drainage system.
- The attenuation storage systems will be constructed at a fall to maintain the movement of water and thus prevent stagnation. Silt will be collected at a sump and removed periodically.
- Regular inspection and maintenance of the drainage network, including petrol interceptor.

17.2.9 Population & Human Health

Construction Phase

A range of construction related remedial and mitigation measures are proposed throughout this EIAR with reference to the various environmental topics examined, and the inter-relationships between each topic. Through the provision of these remedial and mitigation measures, any negative impacts on population and human health during the construction phase shall be appropriately mitigated. Readers are directed to Chapter 19 of this EIAR for a summary of mitigation measures proposed as a result of this EIAR.

Operational Phase

The proposed development has been designed to avoid negative impacts on population and human health through the design and provision of physical and social infrastructure as described in Chapter 5 'Description of the Scheme' of this EIAR. Compliance with the proposed design and layout will be a condition of any permitted development. Monitoring will be undertaken by the Building Regulations certification process and by the requirements of specific conditions of a planning permission.

Furthermore, measures outlined in the chapters of this EIAR which address other environmental matters such as water, air quality and climatic factors, landscape and visual impact and noise sufficiently address monitoring requirements. Readers are directed to Chapter 19 of this EIAR for a summary of mitigation measures proposed as a result of this EIA.

17.2.10 Material Assets – Traffic & Transportation

Construction Stage

- Adequate signposting will be located on-site to ensure the safety of all road users and construction workers.
- Due to the proximity of the proposed site along well-serviced bus routes and being well served by cycle lanes, it is intended to limit construction staff parking and to encourage the use of public transport. A limited number of car parking spaces may be provided for senior construction managers within the development site. Suitable locations in the surrounding area may be identified where staff can park and link to public transportation.
- The main contractor as part of their site set up arrangements, shall appoint a Coordinator responsible for the implementation of a Construction Stage Mobility Management Plan and shall carry out the following tasks as part of their role:
    - Provide an extensive information service for public transport options and routes at a public location(s) within the development for construction workers;
    - Update the public transport information adjacent to the development on an ongoing basis; and
    - Advise company staff of tax incentives for public transport and bicycles.
- For those wishing to cycle to and from the development, dedicated cycle parking will be provided for the duration of the works within the site. Shower facilities and lockers will also be provided.
- A dedicated "construction site"' access/egress system will be implemented during the construction phases.
- Hoarding will be set up around the perimeter to prevent pedestrian access.
- Dedicated construction haul routes will be identified and agreed upon with the local authority before the commencement of construction activities on site.
- A material storage zone will also be provided in the Construction Compound area. This storage zone will include material recycling areas and facilities.
- A detailed Construction and Traffic Management Plan will be prepared by the contractor and agreed with the Local Authority before commencing works on site.
- The contractor will be obliged to ensure that any sub-contractors engaged on the site are made fully aware of the required mitigation measures and that they are properly implemented as part of any works that they undertake.

Operational Stage

- To reduce traffic impact and to promote more sustainable modes of transport a Mobility Management Plan will be prepared for the development on an ongoing basis.
- A management company will be appointed by the developer to manage the development. A senior member of staff from the management company who supports the philosophy of the Plan will be appointed as the Coordinator. The Coordinator will be responsible for:
    - Implementation and maintenance of the Plan;
    - Monitoring progress of the Plan
    - Liaison with public transport operators and officers of the Planning and Roads Authorities;
    - Production of information reports for the Developer, the occupier(s) and the Planning and Highway Authorities; and
    - Ongoing assessment of the objectives of the Plan.
- Up to date, local bus timetables will be maintained within the tenant amenity area and other fixed points within the buildings on the site. Residents will be advised of their location. In addition, internet access to travel information will be provided. The developer will provide all new residents with a travel pack showing alternative modes of travel to the development. Where possible, the developer will advise visitors to the site of alternative modes of travel to that of the car.

- Secure bicycle parking facilities will be provided within the basement level for residents and at surface level for visitors and Creche users. The cycle parking has been provided in line with local guidelines and is outlined in detail in the accompanying TTA. Local cycle route information will be provided in the tenant amenity area and at other fixed points within the development and residents will be advised of their location. Details of cycle parking provided are included in the Traffic and Transport assessment accompanying this planning submission.
- The Mobility Management Plan Co-ordinator will be responsible for the management of inappropriate parking within the development. This parking management will ensure that spaces are reserved for those who have rented the space and will be accessible only to those users.

17.2.11 Material Assets – Waste Management

As previously stated, a project specific C&D RWMP has been prepared in line with the requirements of the requirements of the EPA, Best Practice Guidelines for the Preparation of Resource and Waste Management Plans for Construction & Demolition Projects' (2021) and the Best Practice Guidelines for the Preparation of Waste Management Plans for Construction and Demolition Projects (DoEHLG, 2006) Adherence to the high-level strategy presented in this C&D RWMP will ensure effective waste management and minimisation, reuse, recycling, recovery and disposal of waste material generated during the excavation and construction phases of the proposed Development.

- Prior to commencement, the appointed Contractor(s) will be required to refine / update the C&D RWMP in agreement with FCC, or submit an addendum to the C&D RWMP to DCC, detailing specific measures to minimise waste generation and resource consumption, and provide details of the proposed waste contractors and destinations of each waste stream.
- The Contractor will be contractually required to fully implement the C&D RWMP throughout the duration of the proposed construction phase.

A quantity of soil, stone and made ground which will need to be excavated to facilitate the proposed development. Project Engineers have estimated that c. 52,500m^3 of excavated material will need to be removed offsite, however it is envisaged that c. 23,300m^3 excavated material will be reused onsite. Correct classification and segregation of the excavated material is required to ensure that any contaminated materials are identified and handled in a way that will not harm workers or the environments, both on and off-site.

In addition, the following mitigation measures will be implemented:

- Building materials will be chosen with an aim to 'design out waste';
- On-site segregation of waste materials will be carried out to increase opportunities for off-site reuse, recycling and recovery – it is anticipated that the following waste types, at a minimum, will be segregated:
    - Concrete rubble (including ceramics, tiles and bricks);
    - Plasterboard;
    - Metals;
    - Glass; and
    - Timber.
- Left over materials (e.g. timber off-cuts, broken concrete blocks/bricks) and any suitable construction materials swill be re-used on-site, where possible;
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site;
- Any hazardous wastes generated (such as chemicals, solvents, glues, fuels, oils) will also be segregated and will be stored in appropriate receptacles (in suitably bunded areas, where required);

- A waste manager will be appointed by the main contractor(s) to ensure proper management of waste during the excavation and construction works;
- All construction staff will be provided with training regarding the waste management procedures;
- All waste leaving site will be reused, recycled or recovered where possible to avoid material being designated for disposal;
- All waste leaving the site will be transported by suitable permitted contractors and taken to appropriate authorised facilities; and
- All waste leaving the site will be recorded and copies of relevant documentation maintained.
- Nearby sites requiring clean fill material will be contacted to investigate reuse opportunities for clean and inert material, if required. If any of the material is to be reused on another site as by-product (and not as a waste), this will be done in accordance with Article 27 of the EC (Waste Directive) Regulations (2011) as amended). The potential to reuse material as a by-product will be confirmed during the course of the excavation works, with the objective of eliminating any unnecessary disposal of material.

These mitigation measures will ensure that the waste arising from the construction phase of the development is dealt with in compliance with the provisions of the Waste Management Act s1996-21, as amended, associated Regulations and the Litter Pollution Acts 1997 as amended, the EMR Waste Management Plan (2015-2021). It will also ensure optimum levels of waste prevention, reduction, reuse, recycling and recovery are achieved and will encourage sustainable consumption of resources.

Operational Phase

As previously stated, a project specific OWMP has been prepared.

The Operator / Buildings Manager of the Site during the operational phase will be responsible for ensuring – allocating personnel and resources, as needed – the ongoing implementation of this OWMP, ensuring a high level of recycling, reuse and recovery at the Site of the proposed Development.

In addition, the following mitigation measures will be implemented:

- Facilities will be provided for the on-site segregation of all waste materials into appropriate categories including (but not limited to):
  - Organic waste;
  - Dry Mixed Recyclables;
  - Mixed Non-Recyclable Waste;
  - Glass;
  - Waste electrical and electronic equipment (WEEE);
  - Batteries (non-hazardous and hazardous);
  - Cooking oil;
  - Light bulbs;
  - Cleaning chemicals (pesticides, paints, adhesives, resins, detergents, etc.);
  - Furniture (and from time to time other bulky waste); and
  - Abandoned bicycles.
- The Operator / Buildings Manager will be required to ensure that all waste materials will be stored in colour coded bins or other suitable receptacles in designated, easily accessible locations. Bins will be clearly identified with the approved waste type to ensure there is no cross contamination of waste materials;
- The Operator / Buildings Manager will ensure that all waste collected from the Site of the proposed Development will be reused, recycled or recovered, where possible, with the exception of those waste streams where appropriate facilities are currently not available; and

- The Operator / Buildings Manager will ensure that all waste leaving the Site will be transported by suitable permitted contractors and taken to suitably registered, permitted or licensed facilities.

These mitigation measures will ensure the waste arising from the development is dealt with in compliance with the provisions of the *Waste Management Act 1996*, as amended, associated Regulations, the *Litter Pollution Act 1997 as amended* , the *EMR Waste Management Plan (2015 - 2021)* and the FCC waste bye-laws. It will also ensure optimum levels of waste prevention, reduction, reuse, recycling and recovery are achieved.

17.2.12 Material Assets – Utilities

1. Water Supply

Construction Phase

- All existing services will be located using service records, GPR surveys and slit trenches to ensure that their position is accurately identified before excavation works commence.
- All water mains will be cleaned, sterilised and tested to the satisfaction of the Irish Water/Local Authority before connection to the public water main.
- All connections to the public water main will be carried out under the supervision of the Irish Water/Local Authority.

Operational Phase

- It is not envisaged that any other remedial or reductive measures will be necessary upon the completion of the development.

2. Foul Sewerage

Construction Phase

- All existing services will be located using service records, GPR surveys and slit trenches to ensure that their position is accurately identified before excavation works commence.
- Foul water pipes to be laid with sufficient falls to ensure self-cleansing velocity
- Foul pipes will be carefully laid to minimise the potential for cross-connections.
- The provision of a stormwater tank of 2,250m³ to minimize the risk of foul flows to the Broadmeadow River.
- Air vent to control odour on stormwater overflow tank

Operational Phase

- Irish Water through the pre connection enquiry process have assessed the impact of this development together with other committed or known proposed developments in the area and have concluded that, the provision of the Stormwater Storage Tank to be constructed as part of the foul water drainage infrastructure, will ensure that the existing foul water drainage infrastructure, including the Waste Water Treatment Plant at Ringsend will have capacity to accommodate the developments.

The foul network, including the Stormwater Storage Tank will be inspected annually and maintained.

3. Electricity

Construction Phase

- All existing services will be located using service records, GPR surveys and slit trenches to ensure that their position is accurately identified before excavation works commence.
- All works will be carried out in accordance with ESB Networks methods and standards
- Live connections to the existing electricity network will only be made by ESB Networks

Operational Phase

- It is not envisaged that any other remedial or reductive measures will be necessary upon the completion of the development.

4. Gas

Construction Phase

- All existing services will be located using service records, GPR surveys and slit trenches to ensure that their position is accurately identified before excavation works commence.
- Gas Networks Ireland will take full responsibility for the installation of the gas pipework required to serve the site.
- All work will be carried by specialist sub-contractors with specific training for working on gas main networks.

Operational Phase

- It is not envisaged that any other remedial or reductive measures will be necessary upon the completion of the development.

5. Telecommunications

Construction Phase

- All existing services will be located using service records, GPR surveys and slit trenches to ensure that their position is accurately identified before excavation works commence.
- All works will be carried out in accordance with Eir & Virgin Media methods and standards
- Live connections to the existing electricity network will only be made by Eir & Virgin Media

Operational Phase

- It is not envisaged that any other remedial or reductive measures will be necessary upon the completion of the development.

17.3 Residual Impacts

This section collates the predicted residual impacts on the environment as identified in Chapters 5 to 15, arising from the Proposed Development, during Construction and Operational Phases. Residual Impacts, according to the Draft EPA Guidelines (2017, p.3) are: - "*The final or intended effects which occur after the proposed mitigation measures have been implemented."*

17.3.1 Air Quality and Climatic Factors

Construction Stage

Once the dust minimisation measures outlined in Section 7.5 and Appendix 7.3 are implemented, the impact of the proposed development in terms of construction dust will be short-term and not significant at nearby receptors.

Operational Stage

The impact of the proposed development on air quality is considered long-term, negative and imperceptible. The impact to climate is considered long-term, negative and imperceptible.

17.3.2 Noise & Vibration

Construction Noise

Properties located along Jugback Lane/Terrace will experience a potentially significant impact when construction works occur within 40 m of the properties. The impact may be described as:

Quality	*Significance*	*Duration*
Negative	Significant	Short-term

When construction works are at distances of more than 40m from the properties on Jugback Lane/Terrace, and for all other properties surrounding the proposed development the impact can be described as:

Quality	*Significance*	*Duration*
Negative	Moderate	Short-term

Construction Vibration

At the receptors closest to the works vibration may be perceptible but is unlikely to cause disturbance. The impact may be described as:

Quality	*Significance*	*Duration*
Negative	Not Significant	Short-term

Operational Stage - Inward Noise Impact

This assessment identifies facades where mitigation in the form of enhanced glazing and ventilation will be required. The specification of this enhanced façade is discussed in Section **Error! Reference s ource not found.**. Following the provision of these measures the impacts are considered to be:

Quality	*Significance*	*Duration*
Neutral	Not Significant	Permanent

Operational Stage – Additional Traffic on Public Roads

The impacts are predicted to be as follows:

Quality	*Significance*	*Duration*
Neutral	Imperceptible	Permanent

Operational Stage – Mechanical Plant

In terms of outward noise impact a set of criteria has been established using relevant guidance. Plant items will be selected at a later stage and will be designed and located so that the criteria is met, and that there is no negative impact on sensitive receivers within the development itself or on nearby sensitive receptors. With measures in place to ensure that noise emissions meet the assigned thresholds it is expected that any impacts will be:

Quality	*Significance*	*Duration*
Neutral	Not Significant	Permanent

17.3.3 Biodiversity

In the short to medium-term there will be a negative impact to biodiversity through the loss of habitat and construction phase disturbance. It is likely however that the range and abundance of species will be maintained while new landscaping will compensate for lost habitat in the medium to long-term. Residual impacts are assessed as slight.

There will also be a slight residual effect to water courses during the construction phase as it will not be possible to eliminate the likelihood of pollution entering the water.

17.3.4 Archaeological, Architectural & Cultural Heritage

As it is proposed to monitor construction activity and preserve any identified archaeological features by record, no residual impacts are predicted upon the archaeological, architectural or cultural heritage resource.

17.3.5 Landscape & Visual

The landscape and built form design incorporate avoidance and mitigation measures to reduce adverse impacts, and where possible, to enhance the natural elements of the existing landscape, contribute to new placemaking and reflecting local policy objectives. Therefore, the assessment of effects in Section 11.4 included these measures, and the residual effects.

Section 11.4 outlines the landscape and visual effects of the proposed development. The Estuary West Masterplan provides guidance to the development layout and, whilst not a statutory plan, reflects an appropriate analysis of site opportunities and best practice and has informed the proposed development

Landscape Effects

The changes to the physical landscape of the site will result in a **Slight** landscape effect. This reflects the relatively few sensitive landscape receptors on site, and the retention and enhancement of these elements which include existing trees and vegetation along the north-south spine of the site, and along the banks of the Broadmeadow river.

The quality of the effect on the physical landscape features of site is, in the main, considered beneficial, as these spaces are enhanced, and opened up with greater permeability between the site and its surrounds, and an increase in passive surveillance. Parts of the site which are currently open grassland and which are subject to anti-social behaviour, are considered to undergo a change which is beneficial. The removal of trees and hedgerow along Jugback lane can be seen as an initially adverse effect, however, this is mitigated by the proposed tree and shrub planting as this establishes over time..

The proposed development will result in a **Moderate** effect on the landscape character. The more pronounced effects are on the overall character of the site as it changes from semi-rural to urban, and the effect of the higher buildings on the immediate surrounds of the site.

As noted above, this change is consistent with policies for the site in the County Development Plan and as developed in the Estuary West Masterplan. The lower buildings adjacent to Jugback Lane result in a low level of change in character to their surroundings. The larger buildings along Glen Ellan Road, are not considered characteristic of the area in its current form. They introduce a new element to the character of the road and the immediate vicinity to the south of Glen Ellan Road. This area will experience a change in character which is considered Moderate, and localised. The quality of the effect ranges from neutral to the west of the site, to adverse to the south of the site. It is considered that effects on the area north of the site along the Broadmeadow are beneficial.

Visual Effects

Visual Effects as illustrated by the Photomontages 1-4 show no significant visual effects (Not Significant to Slight and neutral) in the Applewood area to the west of the site.

The viewpoints along Glen Ellan Road range from Not Significant to Moderate and neutral in quality. One view from the Southbank residential area was considered Significant. The visual effects are expected to be more pronounced in close proximity to the taller apartment buildings along the Glen Ellan Road, however these effects are relatively localized and over time would improve.

Viewpoints to the north show little change in the views and effects range from None to Not Significant.

17.3.6 Lands & Soil

17.3.7 Construction Stage

After the implementation of the mitigation measures outlined above, the proposed development will not give rise to any significant long-term adverse impact. Negative impacts during the construction phase will not be significant once the appropriate mitigation measures are adopted and will be only short term in duration.

17.3.8 Operational Stage

No significant adverse impacts on soil and geology, resulting from the proposed development are predicted.

17.4 Cumulative Effects

It is not anticipated that potential cumulative impacts will be generated on the land and soils during the construction or operation phases or in the event of future developments adjacent to the site should they implement the appropriate mitigation measures.

17.4.1 Future SHD Development

Evidently, the applicant does not control the entirety of the remaining lands to provide consolidated development to the remaining Estuary West Masterplan. This current application, therefore, relates to the SHD Phase development on lands that can deliver critically required residential units. There has been a carefully considered design approach to development to ensure that the subject application can

be delivered without compromising the future potential school and commercial development of the Estuary West Masterplan and that does not form part of this application.

There are no additional impacts anticipated on Land and Soil as a result of any future development.

17.4.2 Water

Future North SHD Development

Evidently, the applicant does not control the entirety of remaining lands to provide consolidated development to the remaining Estuary West Masterplan. This current application, therefore, relates to the west of the Estuary West Masterplan Development area on lands that can deliver critically required residential units. There has been a carefully considered design approach to development to ensure that the subject application can be delivered without compromising the future potential for the development of the East phase of the West Estuary Masterplan.

The Masterplan successfully integrates this new phase of development with the existing stream to the north of the subject site. The approach has been to set the blocks around different public open spaces, which complements the existing scheme and delivers significant enhancements to the public realm.

As with the proposed development, development of the eastern side of the Estuary West masterplan will increase the impermeable areas and there is potential for an increase in the risk of higher rates of surface water runoff leading to increased downstream flooding. Both phases will discharge surface water to the Broadmeadow River. Both phases are independent of each other with separate outfalls to the Broadmeadow River which will restrict the surface water discharge at a peak rate of 2l/s/ha in line with the Estuary West Masterplan. Therefore, no significant additional impacts are anticipated to arise as a result of any future development.

Construction Stage

Due to the proposed mitigation measures outlined above, and the implementation of a Construction and Environmental Management Plan, the impact during the construction stage on the hydrology and hydrogeological aspects of the lands are not significant.

Operational Stage

Due to the proposed mitigation measures outlined above many of the potential impacts will not arise during the operational phase of the proposed development on surface water and groundwater quality.

Surface water discharge from the site will be restricted using attenuation, therefore, no adverse impact in respect of flooding downstream will arise from the proposed development.

The installation of a Sustainable Urban Drainage System, in line with the SUDS Manual will ensure surface water runoff will be of high quality before discharge to the receiving river to the north of the site and will not have an impact on the receiving watercourse. Further details on the treatment provided to surface water run off is outlined in the accompanying Engineering Assessment Report provided as part of this application.

The impact following the operational phase mitigation measures outlined above is imperceptible.

17.4.3 Population & Human Health

Residual impacts are those which remain following the implementation of the proposed mitigation measures; however, no significant adverse residual impacts have been identified. The character and condition of the land will change from disused, green field site to a residential land use. This change is in alignment with the specific zoning of the site for and the impact is considered acceptable when balanced with the other positive impacts in terms of building a critical mass of population, compact urban development, provision of housing on a strategic, edge of centre site, provision of new local

services and amenities (créche facility, public open space enhancements) and the indirect benefits arising for employment.

17.4.4 Material Assets – Traffic & Transportation

Construction Stage

In line with their experience working on projects of this scale in similar locations, the developer will build a construction car park at the start of works by laying a temporary surface for vehicles. Staff are likely to arrive to site before 8am, before the morning peak hour of 8am -9am however staff are likely to leave during the peak PM hour of 5-6pm. Asthe number of construction staff on site will be less than the number of people on site post development the number of additional vehicles can be accommodated.

Care will be taken to ensure existing pedestrian and cycling routes are suitably maintained or appropriately diverted as necessary during the construction period, which will be addressed by the Contractor as part of the Construction Traffic Management Plan and which will be approved by Fingal County Council. On this basis construction will likely have a negligible impact on pedestrian and cyclists. Due to the proposed mitigation measures outlined above, the impact of the proposed development will be temporary and minimised during the construction stage.

Operation Stage

There will be an increase in the use of the road network by private vehicles. However, a Mobility Management Plan will promote more sustainable forms of transport to help reduce the use of private vehicles by the residents of the proposed development.

There is likely to be an increase in the number of pedestrians and cyclists in the surroundings of the development. However, footpaths and cycling paths, both internally and externally (along the site frontage) are provided as part of the development, thus, the impact should be minimal.

The traffic modelling undertaken includes growth in background traffic flows which accounts for other developments in the area.

The increase in traffic volumes as a result of the proposed development will impact the adjacent existing developments as the traffic flows through access and egress from the site will increase. The transport assessment carried out indicates that all assessed junctions, operating with improved layouts as proposed as part of the subject application, would operate within the capacity and the impact arising from the proposed development would be considered negligible.

17.4.5 Material Assets – Waste Management

The implementation of the mitigation measures outlined in Section 16.6 will ensure that a high rate of waste reuse, recovery and recycling is achieved at the development during the excavation and construction phases as well as during the operational phase. It will also ensure so far as is possible that European, National legislative and bye-law waste requirements with regard to waste are met and that associated targets for the management of waste are achieved.

Construction Phase

A carefully planned approach to waste management as set out in Section 16.6 and adherence to the C&D RWMP during the excavation construction phase will ensure that the effects on the environment and human health will be **short-term, imperceptible** and **neutral**.

Operational Phase

During the operational phase, a structured approach to waste management as set out in Section 16.6 will promote resource efficiency and waste minimisation. Provided the mitigation measures are implemented and a high rate of prevention, reuse, recycling and recovery is achieved, the predicted effect of the operational phase on the environment will be **long-term**, **imperceptible** and **neutral**.

17.4.6 Material Assets- Utilities

Water Supply

Construction Phase

Due to the proposed mitigation measures outlined above, the impact on the water supply infrastructure during the construction phase of the proposed development is slight.

There will be disruption to local traffic during the connection of the watermains from the proposed development to the existing watermain on Glen Ellan Road.

Operational Phase

There will be an increased demand for water supply due to the development resulting in a moderate impact in terms of demand on the water supply infrastructure. This impact will be managed through consultation with Irish Water to ensure necessary upgrades are provided and that connections are carried out in accordance with the Code of Practice.

Foul Sewerage

Construction Phase

Due to the proposed mitigation measures outlined above, the impact on the foul network construction will be not significant.

There may be short term disruption to local traffic on the connection of the foul sewers from the proposed development to the existing foul sewers.

Operational Phase

There will be increased flows in the existing foul water drainage network, resulting in a moderate impact in terms of demand on the receiving foul water network. This impact will be managed through the provision of a 2,250m³ stormwater tank on the foul sewer network to reduce the risk of foul water surcharging overflow to the surface water network. This impact will be further managed through consultation with Irish Water to ensure any additional necessary upgrades measures are provided and further connections are carried out in accordance with the Code of Practice. In addition, the Ringsend Waste Water Treatment Plant currently has the capacity to cater for 1.64million people and is currently undergoing upgrade works to increase the capacity to 2.4million people by 2025 therefore the impact of the proposed development on the Ringsend WWTP is considered negligible.

Electricity

Construction Phase

Due to the proposed mitigation measures outlined above, the impact of the proposed work on the ESB Network will not be significant.

There may be short term disruption to local traffic or temporary interruptions to supply while the tie-ins to the existing networks are being made.

Operational Phase

The impact of the operational phase of the proposed development on the power supply network would be the requirement for an Electrical Diversified Load of 3.0 MW which will be split over up to 6no ESB sub-stations located throughout the scheme.

Gas

Construction Phase

Due to the proposed mitigation measures outlined above, the impact of the proposed work on the Gas Network will not be significant.

There may be short term disruption to local traffic or temporary interruptions to supply while the tie-ins to the existing networks are being made.

Operational Phase

The impact of the operational phase of the proposed development on the gas supply would be the requirement for a Gas diversified load of 6.0 MW to accommodate the development of the lands.

Telecommunications

Construction Phase

Due to the proposed mitigation measures outlined above, the impact of the proposed work on the Telecommunication Network will not be significant.

There may be short term disruption to local traffic or temporary interruptions to supply while the tie-ins to the existing networks are being made.

Operational Phase

The impact of the operational phase of the proposed development on the telecommunications network would be to increase the demand on the existing network.