ENVIRONMENTAL IMPACT ASSESSMENT REPORT

VOLUME II

PROPOSED RESIDENTIAL DEVELOPMENT

AT

Belmount, Academy Street, Navan Co. Meath

Prepared by

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ABBREVIATIONS

AA Appropriate Assessment

ABP An Bord Pleanála

CDP County Development Plan

CMP Construction Management Plan

CA Competent Authority (An Bord Pleanála)

CSO Central Statistics Office

DAHG Department of Arts, Heritage and the Gealtacht

DCENR Department of Communications, Energy and Natural Resources

DEHLG Department of Housing, Planning and Local Government

EIA Environmental Impact Assessment

EIAR Environmental Impact Assessment Report

EMP Environmental Management Plan

EPA Environmental Protection Agency

ESRI Economic and Social Research Institute

GDP Gross Domestic Product

GSI Geology Survey Ireland

IAA Irish Aviation Association

IEEM Institute of Ecology and Environmental Management

IFI Inland Fisheries Ireland

LAP Local Area Plan

NHA/pNHA Natural Heritage Area / proposed Natural Heritage Area

NIAH National Archive of Architectural Heritage

NPWS National Parks and Wildlife Service

NRA National Roads Authority

NPF National Planning Framework

OPW Office of Public Works

PBSA Purpose-Built Student Accommodation

RMP Record of Monuments and Places

RPG Regional Planning Guidelines

RPS Record of Protected Structures

SAC Special Area of Conservation

SMR Sites and Monuments Record

SPA Special Protection Area

SHD Strategic Housing Development

SUDS Sustainable Drainage System

TMP Traffic Management Plan

WFD Water Framework Directive

WCC Wicklow County Council

1.0 INTRODUCTION AND METHODOLOGY

1.1 INTRODUCTION & TERMS OF REFERENCE

John Spain Associates, Planning & Development Consultants, have been commissioned by Coindale Ltd., to prepare an Environmental Impact Assessment Report (EIAR) for a proposed development on a site of c. 15.1 hectares. This chapter of the EIAR was prepared by Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates, and approved by John Spain, John Spain, BBS, MRUP, MRTPI, MIPI, Managing Director, John Spain Associates.

The subject lands extend to approximately c. 15.1 hectares and are located to the west of Academy Street and the R147 Dublin Road, approximately 900 metres south of Navan town centre (Market Square) from the entrance on Academy Street, extending to c. 1.5km to the southern-most portion of the site. The site exists currently as greenfield land and is surrounded by residential properties to the south and west, with a small strip of commercial development occupying lands located between Academy Street and Dublin Road to the east. The River Boyne is located on the eastern side of the R147 (Dublin Road).

The central purpose of the Environmental Impact Assessment Report (EIAR) is to undertake an appraisal of the likely and significant impacts on the environment of the proposed development in parallel with the project design process, and to document this process in the EIAR . This is then submitted to the competent/ consent authority to enable it assess the likely significant effects of the project on the environment. This assessment will then inform the decision as to whether the development should be permitted to proceed.

A full description of the proposed development lands together with a description of the proposed development is provided in Chapter 2 of this EIAR document.

The Strategic Housing Development (SHD) proposal comprises the development of 544 no. dwellings comprising 260 no. houses, 198 no. apartments, 30 no. duplex apartments, and 56 no. units in corner apartment buildings and associated infrastructure, including surface car parking, landscaping and open space as well as 2 no. crèches. The site relates to lands located to the west of Academy Street, Navan, Co. Meath.

This EIAR document has been prepared in accordance with the European Union EIA Directive 85/337/EC as amended by directives 97/11/EC, 2003/4/EC, 2011/92/EU and 2014/52/EU, as well as implementing legislation, i.e. Part X of the Planning and Development Act 2000, as amended (‘***the 2000 Act***’), and Part 10 of the Planning and Development Regulations 2001, as amended, (most recently by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018). A description of the methodological approach to the preparation of this EIAR is provided in the following sections of this chapter.

1.2 DEFINITION OF EIA AND EIAR

Directive 2014/52/EU defines ‘*environmental impact assessment’* as a process, which includes the responsibility of the developer to prepare an Environmental Impact Assessment Report (EIAR), and the responsibility of the competent authority to provide reasoned conclusions following the examination of the EIAR and other relevant information.

Article 1(2)(g) of Directive 2011/92/EU, as amended by the 2014 Directive states that “*environmental impact assessment*” means a process consisting of: *“(i) the preparation of an environmental impact assessment report by the developer, as referred to in Article 5(1) and (2);*

(ii) the carrying out of consultations as referred to in Article 6 and, where relevant, Article 7;

(iii) the examination by the competent authority of the information presented in the environmental impact assessment report and any supplementary information provided, where necessary, by the developer in accordance with Article 5(3), and any relevant information received through the consultations under Articles 6 and 7;

(iv) the reasoned conclusion by the competent authority on the significant effects of the project on the environment, taking into account the results of the examination referred to in point (iii) and, where appropriate, its own supplementary examination; and

(v) the integration of the competent authority's reasoned conclusion into any of the decisions referred to in Article 8a.”

A new definition of "*environmental impact assessment*" is also contained under Section 171A of the 2000 Act, as amended as follows:

'environmental impact assessment' means a process—

(a) consisting of—

(i) the preparation of an environmental impact assessment report by the applicant in accordance with this Act and regulations made thereunder,
(ii) the carrying out of consultations in accordance with this Act and regulations made thereunder,
(iii) the examination by the planning authority or the Board, as the case may be, of—
(I) the information contained in the environmental impact assessment report,
(II) any supplementary information provided, where necessary, by the applicant in accordance with section 172(1D) and (1E), and
(III) any relevant information received through the consultations carried out pursuant to subparagraph (ii),
(iv) the reasoned conclusion by the planning authority or the Board, as the case may be, on the significant effects on the environment of the proposed development, taking into account the results of the examination carried out pursuant to subparagraph (iii) and, where appropriate, its own supplementary examination, and
(v) the integration of the reasoned conclusion of the planning authority or the Board, as the case may be, into the decision on the proposed development, and

(b) which includes—
(i) an examination, analysis and evaluation, carried out by the planning authority or the Board, as the case may be, in accordance with this Part and regulations made thereunder, that identifies, describes and assesses, in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of the proposed development on the following:

(I) population and human health;
(II) biodiversity, with particular attention to species and habitats protected under the Habitats Directive and the Birds Directive;
(III) land, soil, water, air and climate;
(IV) material assets, cultural heritage and the landscape;
(V) the interaction between the factors mentioned in clauses (I) to (IV),
and
(ii) as regards the factors mentioned in subparagraph (i)(I) to (V), such examination, analysis and evaluation of the expected direct and indirect significant effects on the environment derived from the vulnerability of the proposed development to risks of major accidents or disasters, or both major accidents and disasters, that are relevant to that development;

The amended Directive (Directive 2014/52/EU) uses the term environmental impact assessment report (EIAR) rather than environmental impact statement (EIS). Where current national guidelines and regulations refer to an environmental impact statement or an EIS, this can be taken to be the same as an environmental impact assessment report (EIAR).

A definition of Environmental Impact Assessment Report (EIAR) has not been included in the revised directive. However the EPA Guidelines (2017)1 provide the following definition:

"A statement of the effects, 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 (Competent Authority) 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 inform its decision as to whether 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.

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[1] *Guidelines on the Information to be contained in an Environmental Impact Assessment Report, Environmental Protection Agency, 2017*

The EIAR provides a systematic analysis and evaluation of the potentially significant effects of a proposed project on the receiving environment. The amended EIA Directive prescribes a range of environmental factors which are used to organise descriptions of the environment and these factors must be addressed in the EIAR.

The EIAR should be prepared at a stage in the design process where changes can still be made to avoid adverse effects. This often results in the modification of the project to avoid or reduce effects through redesign.

Where significant and likely environmental effects are identified that are unacceptable, the EIA process aims to quantify and minimise the impact specified development projects have on the environment through appropriate mitigation measures. The preparation of an EIAR requires site-specific considerations and the preparation of baseline assessment against which the likely impacts of a proposed development can be assessed by way of a concise, standardised and systematic methodology.

1.3 EIA LEGISLATION

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 the previous EIA Directives in a number of respects by amending the consolidating Directive 2011/92/EU). The purpose of these Directives to ensure that projects likely to have significant effects on the environment are subject to a comprehensive and systematic assessment of environmental effects prior to development consent being given.

The Department is in the process of updating the March 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. The Draft Guidelines prepared by the EPA (August 2017) have also informed this EIAR.

1.4 EIA GUIDELINES

EIA practice has evolved substantially since the introduction of the EIA Directive in 1985. Practice continues to evolve, and takes into account the growing body of experience in carrying out EIARs in the development sector. Table 1.1 sets out the relevant key EIA Guidance which has been consulted in the preparation of this EIAR document. In addition, the individual chapters of this EIAR should be referred to for further information on the documents consulted by each individual consultant.

We would also note that the pre-application discussions with the Planning Authority and An Bord Pleanála, including the Board's opinion informed the content of the EIAR.

Table 1.1 – EIA Guidelines Consulted as Part of the Preparation of this EIAR

Irish
• Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, EPA, August 2017 • Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment August 2018 • Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licensing Systems - Key Issues Consultation Paper, Department of Housing, Planning, Community and Local Government, 2017. • Circular letter PL 1/2017 - Advice on Administrative Provisions in Advance of Transposition (2017). • Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoECLG, March 2013). • Development Management Guidelines (DoEHLG, 2007). • Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003). • Environmental Impact Assessment (EIA), Guidance for Consent Authorities Regarding Sub-Threshold Development (DoEHLG 2003).

- Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).

European Union (in addition to Directives referenced above)
• Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report, European Commission, 2017
• EU Guidance on EIA Screening (DG Environment 2001).
• Guidance on EIA Scoping (DG Environment 2001).
• EIA Review Checklist (DG Environment 2001).
• Study on the Assessment of Indirect & Cumulative Impacts as well as Impact Interaction (DG Environment 2002).

The most recent guidelines are the Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports published by the EPA. The key issues consultation paper published by the Department also provides useful guidance.

The new EPA draft guidelines have been prepared to help practitioners interpret the amended EIA Directive and are likely to be updated and finalised following the updates to the Planning and Development Act 2000 (as amended) and Planning and Development Regulations 2001 (as amended).

They provide practical guidance to planning authorities, An Bord Pleanála, and other relevant stakeholders, on procedural issues and the EIA process, and outline the key changes introduced by Directive 2014/52/EU.

The content of this Environmental Impact Assessment Report has been prepared in accordance with the provisions of Article 5(1) and Annex IV of Directive 2014/52/EU and Schedule 6, Article 94 of the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018.

1.5 EIA PROCESS OVERVIEW

The main purpose of the EIA process is to identify the likely significant impacts on the human environment, the natural environment and on cultural heritage associated with the proposed development, and to determine how to eliminate or minimise these impacts. The EIAR summarises the environmental information collected during the impact assessment of the proposed development.

Several interacting steps typify the early stages of the EIA process and include:-

- Screening;
- Scoping;
- Assessing Alternatives; and
- Assessing and Evaluating.
- Screening: This stage establishes if an EIAR is required for a proposed development.

Screening: Screening is the term used to describe the process for determining whether a proposed development requires an EIA.

Scoping: This stage firstly identifies the extent of the proposed development and associated site, which will be assessed as part of the EIA process, and secondly, it identifies the environmental issues likely to be important during the course of completing the EIA process through consultation with statutory and non-statutory stakeholders. Scoping request letters were issued to a range of stakeholders at the commencement of this EIA process and the responses received have been considered as part of the compilation of the EIAR.

Assessing Alternatives: This stage outlines the possible alternative approaches to the proposed development. Consideration of alternative sites and layouts within the final chosen site are set out in Chapter 2 of this EIAR.

Assessing and Evaluating: The central steps of the EIA process include baseline assessment (desk study and field surveys) to determine the status of the existing environment, impact prediction and evaluation, and determining appropriate mitigation measures where necessary. This stage of the EIAR is presented in Chapters 6 to 17.

1.6 SCREENING – REQUIREMENT FOR EIA

Screening is the term used to describe the process for determining whether a proposed development requires an EIA by reference to mandatory legislative threshold requirements or by reference to the type and scale of the proposed development and the significance or the environmental sensitivity of the receiving baseline environment.

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..

The proposed development falls within categories 10(b)(i) and 10(b)(iv) of Part 2 of Schedule 5 of the Planning and Development Regulations 2001-2015. Category 10(b)(i) refers to 'Construction of more than 500 dwellings'.

Category 10(b)(iv) refers to '*Urban development which would involve an area greater than 2 hectares in the case of business district, 10 hectares in the case of other parts of a built up area and 20 hectares elsewhere.'*

For both of these categories, the proposed development is above the mandatory threshold for EIA.

1.7 SCOPING

The EPA Guidelines state that '*scoping*' is a process of deciding what information should be contained in an EIAR and what methods should be used to gather and assess that information. It is defined in the EC guidance2 as:

'determining the content and extent of the matters which should be covered in the environmental information to be submitted in the EIAR'.

The applicant is committed to ensuring that all of its development projects conducted in a responsible and sustainable manner. A scoping process to identify the issues that are likely to be most important during the Environmental Impact Assessment process was carried out by the applicant, design team and EIAR consultants and informed the format of this EIAR.

Section 173(2) (a) of the Planning and Development Act 2000, as amended, provides that a request for scoping may be submitted to the planning authority, however this is not mandatory. The second paragraph of Article 5(2) of Directive 2014/92/EU provides that Member States can choose to make it mandatory that competent authorities have to give a scoping opinion irrespective of whether the developer so requests. The transposition of this provision is optional and the consultation paper from the Department indicates that it is not intended to introduce mandatory scoping.

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 (as amended) 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:

- Introduction and Methodology,

[2] Guidance on EIA Scoping, EC, 2001

- Project Description and Alternatives Examined,
- Population and Human Health,
- Biodiversity,
- Land and Soils,
- Water,
- Air Quality and Climate,
- Noise and Vibration,
- Landscape and Visual Impact,
- Material Assets Traffic, Waste and utilities,
- Archaeology, Architectural and Cultural Heritage,
- Risk Management,
- Interactions of the Foregoing,
- Principal Mitigation and Monitoring Measures,
- Non-Technical Summary.

In addition to the above a series of standalone reports have been prepared to accompany the application and which have helped inform the above chapters of the EIAR where relevant. Chapter 2 provides details of the envisaged phased delivery of development on the lands.

A series of meetings have taken place with the technical staff of Meath County Council and a consultation meeting has taken place between the Applicant and An Bord Pleanála under the strategic housing development process which assisted in the preparation of this EIAR and the SHD planning application.

1.8 INFORMATION TO BE CONTAINED IN AN EIAR

The content of this Environmental Impact Assessment Report has been prepared in accordance with the provisions of Article 5(1) and Annex IV of Directive 2014/52/EU. Article 5(1) states:-

"The information to be provided by the developer shall include at least:
(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."

Annex IV states:-

"1. A Description of the project, including in particular:

(a) a description of the location of the project;

(a) (b) a description of the physical characteristics of the whole project, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases;

(b) (c) a description of the main characteristics of the operational phase of the project (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;

(c) (d) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operation phases.

2. 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 for selecting the chosen option, including a comparison of the environmental effects.

3. A description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without implementation of the project as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge.

4. A description of the factors specified in Article 3(1) likely to be significantly affected by the project: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.

5. A description of the likely significant effects of the project on the environment resulting from, inter alia:

(a) the construction and existence of the project, including, where relevant, demolition works;

(b) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;

(c) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;

(d) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);

(e) the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;

(f) the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;

(g) the technologies and the substances used.

The description of the likely significant effects on the factors specified in Article 3(1) should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium- term and long-term, permanent and temporary, positive and negative effects of the project. This description should take into account the environmental protection objectives established at Union or Member State level which are relevant to the project.

6. A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.

7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the construction and operational phases.

8. A description of the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or disasters which are relevant to the project concerned. Relevant information available and obtained through risk assessments pursuant to Union legislation such as Directive 2012/18/EU of the European Parliament and of the Council or Council Directive 2009/71/Euratom or relevant assessments carried out pursuant to national legislation may be used for this purpose provided that the requirements of this Directive are met. W here appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for and proposed response to such emergencies.

9. A non-technical summary of the information provided under points 1 to 8.

10. A reference list detailing the sources used for the descriptions and assessments included in the report."

Article 94 and Schedule 6 of the Planning and Development Regulations 2001, as amended, transpose into Irish law the EIA Directive requirements in relation to information to be contained in an EIAR.

Schedule 6 provides for the following information to be furnished:
1. (a) A description of the proposed development comprising information on the site, design, size and other relevant features of the proposed development.
(b) A description of the likely significant effects on the environment of the proposed development.
(c) A description of the features, if any, of the proposed development and the measures, if any, envisaged to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment of the development.
(d) A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment.
2. Additional information, relevant to the specific characteristics of the development or type of development concerned and to the environmental features likely to be affected, on the following matters, by way of explanation or amplification of the information referred to in paragraph 1:
(a) a description of the proposed development, including, in particular—
(i) a description of the location of the proposed development,
(ii) a description of the physical characteristics of the whole proposed development, including, where relevant, requisite demolition works, and the land-use requirements during the construction and operational phases,
(iii) a description of the main characteristics of the operational phase of the proposed development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used, and
(iv) an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation) and quantities and types of waste produced during the construction and operation phases;
(b) 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, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects;
(c) a description of the relevant aspects of the current state of the environment (baseline scenario) and an outline of the likely evolution thereof without the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of environmental information and scientific knowledge;
(d) a description of the factors specified in paragraph (b)(i)(I) to (V) of the definition of 'environmental impact assessment' in section 171A of the Act likely to be significantly affected by the proposed development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape;
(e) (i) a description of the likely significant effects on the environment of the proposed development resulting from, among other things—
(I) the construction and existence of the proposed development, including, where relevant, demolition works,
(II) the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources,
(III) the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste,
(IV) the risks to human health, cultural heritage or the environment (for example due to accidents or disasters),
(V) the cumulation of effects with other existing or approved developments, or both, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources,
(VI) the impact of the proposed development on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the proposed development to climate change, and
(VII) the technologies and the substances used, and
(ii) the description of the likely significant effects on the factors specified in paragraph (b)(i)(I) to (V) of the definition of 'environmental impact assessment' in section 171A of the Act should cover the direct effects and any indirect, secondary, cumulative, transboundary, short term, medium-term and long-term, permanent and temporary, positive and negative effects of the proposed development, taking into account the environmental protection objectives established at European Union level or by a Member State of the European Union which are relevant to the proposed development;
(f) a description of the forecasting methods or evidence used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information, and the main uncertainties involved;

(g) a description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of an analysis after completion of the development), explaining the extent to which significant adverse effects on the environment are avoided, prevented, reduced or offset during both the construction and operational phases of the development;

(h) a description of the expected significant adverse effects on the environment of the proposed development deriving from its vulnerability to risks of major accidents and/or disasters which are relevant to it. Relevant information available and obtained through risk assessments pursuant to European Union legislation such as the Seveso III Directive or the Nuclear Safety Directive or relevant assessments carried out pursuant to national legislation may be used for this purpose, provided that the requirements of the Environmental Impact Assessment Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for, and proposed response to, emergencies arising from such events.

1.9 PURPOSE OF THIS EIAR

The EPA Guidelines state that the main purpose of an EIAR '*is to identify, describe and present an assessment of the likely significant impacts of a project on the environment'*. This informs the CA's assessment process, its decision on whether to grant consent for a project and, if granting consent, what conditions to attach. The EIAR focuses on:

- *Impacts that are both likely and significant;*
- *Impact descriptions that are accurate and credible'*

In addition to identifying and predicting the likely predicted significant environmental impacts resulting from the proposed development, the EIAR should describe the means and extent by which they can be reduced or ameliorated, to interpret and communicate information about the likely impacts and to provide an input into the decision making and planning process.

The EIAR documents the consideration of environmental effects that influenced the evaluation of alternatives. It also documents how the selected project design incorporates mitigation measures; including impact avoidance, reduction or amelioration; to explain how significant adverse effects will be avoided.

It is intended that this EIAR will assist An Bord Pleanála, statutory consultees and the public in assessing all aspects of the application proposals.

1.10 OBJECTIVES OF THIS EIAR

The EPA guidelines list the following fundamental principles to be followed when preparing an EIAR:

- Anticipating, avoiding and reducing significant effects;
- Assessing and mitigating effects;
- Maintaining objectivity;
- Ensuring clarity and quality;
- Providing relevant information to decision makers; and
- Facilitating better consultation.

The amended EIA Directive prescribes a range of environmental factors which are used to organise descriptions of the environment and the environmental impact assessment should 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 prescribed environmental factors which are:

(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 documents the assessment process of the prescribed environmental factors in relation to the proposed development at Belmount, Navan, Co. Meath.

The EIA process was based on the following four key objectives:

- Pursuing Preventative Action;
- Maintaining Environmental Focus and Scope;
- Informing the Decision; and
- Public & Stakeholder Participation.

1.10.1 Pursuing Preventative Action

Pursuing preventative action is the most effective means by which potential negative environmental impacts can be avoided. An assessment of anticipated likely and significant impacts was undertaken during the screening, informal scoping and the considerations of alternatives stages of the EIA process. This involved forming a preliminary opinion, in the absence of complete data, with respect to the approximate magnitude and character of the likely environmental impacts. This assessment was based on the knowledge, experience and expertise of the EIA and project design team with reference to the amended EIA Directive, EIA guidance material and local precedents.

Avoidance of impacts has been principally achieved through the consideration of alternatives and through the review of the project design in light of identified key environmental constraints. This is outlined in greater detail in Chapter 2.

1.10.2 Maintain Environmental Scope and Focus

It is important that the EIAR document remains tightly focussed. This minimises expenses, delays and the potential for a confusing mass of data to obscure relevant facts. The EIA process has been project managed and steered, so as to ensure that the EIAR documentation and analysis are confined to those topics and issues which are explicitly described in the legislation, and where environmental impacts may arise. Evaluation and analysis has been limited to topics where the indirect, secondary or cumulative impacts are either wholly or dominantly due to the project or development under consideration and remain focused on issues that:

- Are environmentally based;
- Are likely to occur; and,
- Have significant and adverse effects.

1.10.3 Informing the Decision

The EIAR document enables the competent/consent authorities to reach a decision on the acceptability of the proposed development in the full knowledge of the project’s likely significant impacts on the environment, if any.

1.10.4 Public & Stakeholder Participation

Decisions are taken by competent/consent authorities through the statutory planning process which allows for public participation and consultation while receiving advice from other key stakeholders and statutory authorities with specific environmental responsibilities.

Public participation and consultation is an integral part of the new Strategic Housing Development process as outlined in the Planning and Development (Housing) and Residential Tenancies Act 2016 and the Planning and Development (Strategic Housing Development) Regulations 2017.

The structure, presentation and the non-technical summary of the EIAR document as well as the arrangements for public access all facilitate the dissemination of the information contained in the EIAR. The core objective is to ensure that the public and local community are aware of the likely environmental impacts of projects prior to the granting of consent.

Informal scoping of potential environmental impacts was undertaken with the Planning Authority through pre-application meetings. Direct and formal public participation in the EIA process will be through the statutory planning application process. A summary of the pre-application discussions are contained in Volume III of this EIAR.

1.11 FORMAT AND STRUCTURE OF THIS EIAR

1.11.1 EIAR Structure

The structure of the EIAR is laid out in the preface of each volume for clarity. It consists of three volumes as follows:-

- Volume I: Non-Technical Summary (A non-technical summary of the information contained within Volume II).
- Volume II: Environmental Impact Assessment Report

This is the main volume of the EIAR. It provides information on the location and scale of the proposed development, details on design and impacts on the environment (both positive and negative) as a result of the proposed development.

Each of the environmental aspects as listed below are examined in terms of the existing or baseline environment, identification of potential construction and operational stage impacts and where necessary proposed mitigation measures are identified. The interaction of the environmental aspects with each other is also examined. Environmental aspects considered include:-

Chapter 3	Population and Human Health;
Chapter 4	Biodiversity;
Chapter 5	Land and Soils;
Chapter 6	Water;
Chapter 7	Climate (Air Quality);
Chapter 8	Air (Noise and Vibration);
Chapter 9	Landscape & Visual
Chapter 10	Material Assets – Traffic
Chapter 11	Material Assets - Waste Management
Chapter 12	Material Assets - Utilities
Chapter 13	Cultural Heritage (Local History, Archaeology & Architectural Heritage);
Chapter 14	Risk Management
Chapter 15	Interactions
Chapter 16	Summary of Mitigation Measures
Chapter 17	References

- Volume III: Technical Appendices (Volume III contains specialists' technical data and other related reports).

1.11.2 EIAR Volume II Structure

The preparation of an EIAR document requires the assimilation, co-ordination and presentation of a wide range of relevant information in order to allow for the overall assessment of a proposed development. For clarity and to allow for ease of presentation and consistency when considering the various elements of the proposed development, a systematic structure is used for the main body of this EIAR document.

The structure used in this EIAR document is a Grouped Format structure. This structure examines each environmental topic[3] in a separate chapter of this EIAR document. The structure of the EIAR document is set out in Table 1.2 below.

Table 1.2 – Structure of this EIAR

[3] In some instances similar environmental topics are grouped.

Chapter	Title	Content
1	Introduction and Methodology	Sets out the purpose, methodology and scope of the document.
2	Project Description and Alternatives Examined	Sets out the description of the site, design and scale of development, considers all relevant phases from construction through to existence and operation together with a description and evaluation of the reasonable alternatives studied by the developer including alternative locations, designs and processes considered; and a justification for the option chosen taking into account the effects of the project on the environment.
3	Population and Human Health	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.
4	Biodiversity	Describes the existing ecology on site and in the surrounding catchment, and assesses the potential impact of the proposed development and mitigation measures incorporated into the design of the scheme.
5	Land and Soils	Provides an overview of the baseline position, the potential impact of the proposed development on the site’s soil and geology and impacts in relation to land take and recommends mitigation measures.
6	Water	Provides an overview of the baseline position, the potential impact of the proposed development on water quality and quantity and recommends mitigation measures.
7	Air Quality and Climate	Provides an overview of the baseline air quality and climatic environment, the potential impact of the proposed development, the vulnerability of the project to climate change, and recommends mitigation measures.
8	Noise and Vibration	Provides an overview of the baseline noise environment, the potential impact of the proposed development and recommends mitigation measures.
9	Landscape & Visual Impact	Provides an overview of the baseline position, the potential impact of the proposed development on the landscape appearance and character and visual environment, and recommends mitigation measures.
10-12	Material Assets	Describes the existing traffic, waste management and services and infrastructural requirements of the proposed development and the likely impact of the proposed development on material assets.
13	Archaeology and Architectural and Cultural Heritage	Provides an assessment of the site, and considers the potential impact of the proposed development on the local archaeology, architectural and cultural heritage; and recommends mitigation measures.

Chapter	Title	Content
14	Risk Management	Provides a review of the potential vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned
15	Interactions of the Foregoing	Describes the potential interactions and interrelationships between the various environmental factors
16	Summary of Mitigation and Monitoring Measures	Sets out the key mitigation and monitoring measures included in the EIAR Document for ease of reference.
17	Reference List	List of references within the chapters of the EIAR

This systematic approach described above employs standard descriptive methods, replicable assessment techniques and standardised impact descriptions to provide an appropriate evaluation of each environmental topic under consideration. An outline of the methodology employed consistently in each chapter to examine each environmental topic is provided below:

Table 1.3 – Methodology Employed to Evaluate Environmental Topic

- **Introduction:** Provides an overview of the specialist area and specifies the specialist who prepared the assessment.
- **Study Methodology:** This subsection outlines the method by which the relevant impact assessment has been conducted within that chapter.
- **The Existing Receiving Environment (Baseline Situation):** In describing the receiving environment, the **context, character, significance and sensitivity** of the baseline receiving environment into which the proposed development will fit is assessed. This also takes account of any proposed developments that are likely to proceed.
- **Characteristics of the Proposed Development:** Consideration of the 'Characteristics of the Proposed Development' allows for a projection of the 'level of impact' on any particular aspect of the proposed environment that could arise. For each chapter those characteristics of the proposed development which are relevant to the area of study are described; for example the chapter on landscape and visual impact addresses issues such as height and impact on the surrounding landscape.
- The characteristics of projects must be considered, with particular regard to: (a) the size and design of the whole project; (b) cumulation with other existing and/or approved projects; (c) the use of natural resources, in particular land, soil, water and biodiversity; (d) the production of waste; (e) pollution and nuisances; (f) the risk of major accidents and/or disasters which are relevant to the project concerned, including those caused by climate change, in accordance with scientific knowledge; (g) the risks to human health (for example due to water contamination or air pollution).
- **Potential Impact of the Proposed Development:** This section provides a description of the specific, direct and indirect impacts that the proposed development may have. This is provided with reference to both the Receiving Environment and Characteristics of the Proposed Development sections while also referring to the (i) magnitude and intensity, (ii) integrity, (iii) duration and (iv) probability of impacts. Impact assessment addresses direct, indirect, secondary, cumulative, transboundary, short, medium and long-term, permanent, temporary, positive and negative effects as well as impact interactions.
- **Do Nothing Scenario:** In order to provide a qualitative and equitable assessment of the proposed development, this section considers the proposed development in the context of the likely impacts upon the receiving environment should the proposed development not take place.

- **Avoidance, Remedial and Mitigation Measures: Avoidance,** remedial and mitigation measures describe any corrective or mitigative measures that are either practicable or reasonable, having regard to the potential impacts. This includes avoidance, reduction and remedy measures as set out in Section 4.7 of the Development Management Guidelines 2007 to reduce or eliminate any significant adverse impacts identified.

- **Predicted Impacts of the Proposed Development:** This section allows for a qualitative description of the resultant specific direct, indirect, secondary, cumulative, transboundary, short, medium and long-term, permanent, temporary, positive and negative effects as well as impact interactions which the proposed development may have, assuming all mitigation measures are fully and successfully applied.

- **Monitoring:** This involves a description of monitoring in a post-development phase, if required. This section addresses the effects that require monitoring, along with the methods and the agencies that are responsible for such monitoring.

- **Reinstatement:** While not applicable to every aspect of the environment considered within the EIAR, certain measures need to be proposed to ensure that in the event of the proposal being discontinued, there will be minimal impact to the environment.

- **Interactions:** This section provides a description of impact interactions together with potential indirect, secondary and cumulative impacts

- **Difficulties Encountered in Compiling:** This section provides an indication of any difficulties encounters by the environmental specialist in compiling the required information.

1.12 EIAR PROJECT TEAM

1.12.1 EIAR Project Management

The preparation of this EIAR was project managed, co-ordinated and produced by John Spain Associates. John Spain Associates role was to liaise between the design team and various environmental specialist consultants. John Spain Associates were also responsible for editing the EIAR document to ensure that it is cohesive and not a disjointed collection of disparate reports by various environmental specialists. John Spain Associates does not accept responsibility for the input of the competent specialist consultants or the design team.

1.12.2 EIAR Competent Experts/Environmental Specialists

Environmental specialist consultants were also commissioned for the various technical chapters of the EIAR document which are mandatorily required as per the EIA Directive and Planning and Development Regulations 2018.

The amended EIA Directive (Directive 2014/52/EU) states the following in relation to the persons responsible for preparing the environmental impact assessment reports:

'Experts involved in the preparation of environmental impact assessment reports should be qualified and competent. Sufficient expertise, in the relevant field of the project concerned, is required for the purpose of its examination by the competent authorities in order to ensure that the information provided by the developer is complete and of a high level of quality'.

In order to outline compliance with this requirement of the amended directive and in line with emerging best practice the EIAR states the names of the environmental consultants who have prepared each element of the EIAR and lists their qualifications and relevant experience; demonstrating that the EIAR has been prepared by competent experts.

Each environmental specialist was commissioned having regard to their previous experience in EIA; their knowledge of relevant environmental legislation relevant to their topic; familiarity with the relevant standards and criteria for evaluation relevant to their topic; ability to interpret the specialised documentation of the construction sector and to understand and anticipate how their topic will be affected during construction and operation phases of development;

ability to arrive at practicable and reliable measure to mitigate or avoid adverse environmental impacts; and to clearly and comprehensively present their findings.

Each environmental specialist was required to characterise the receiving baseline environment; evaluate its significance and sensitivity; predict how the receiving environment will interact with the proposed development and to work with the EIA project design team to devise measures to mitigate any adverse environmental impacts identified.

The relevant specialist consultants who contributed to the EIAR and their inputs are set out in Table 1.4 below.

Table 1.4 – EIAR List of Competent Experts

Organisation	EIAR Specialist Topics / Inputs
John Spain Associates, Planning & Development Consultants, 39 Fitzwilliam Place, Dublin 2, D02 ND61 T: 01 662 5803 Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt	Introduction and Methodology Project Description and Alternatives Examined Population and Human Health Interactions of the Foregoing Principal Mitigation and Monitoring Measures Non-Technical Summary
Openfield, Padraic Fogarty, MSc, MIEMA MSc from Sligo Institute of Technology for research into Ecological Impact Assessment (EcIA) in Ireland. OPENFIELD is a full member of the Institute of Environmental Management and Assessment (IEMA) Dr. Tina Aughney Bat Eco Services Licenced Bat Specialist - Honours degree in Environmental Science from NUI Galway and Ph.D.	Biodiversity Biodiversity (Bats)
Niall Barrett CS Consulting Engineers Chartered Civil, Traffic & Transportation Engineer BEng (Hons), CEng, MIEI, Cert Health & Safety, Cert PSDP, Cert RSA	Land and Soils/ Population and Human Health
Robert Fitzmaurice CS Consulting Engineers Chartered Engineer | B.Eng(Hons), Post.Grad. Dip EE, M.I.E. |C.Eng, MIEI	Water
Pinnacle Consulting Engineers Ronan Kearns, BA, BAI, MSc, MBA, CEng MIEI Chartered Engineer	Material Assets-Traffic
Byrne Environmental Ian Byrne Managing Director, MSc, MIOA, Diploma in Environmental & Planning Law	Material Assets (Waste Management)
Robert Fitzmaurice CS Consulting Engineers Chartered Engineer | B.Eng(Hons), Post.Grad. Dip EE, M.I.E. |C.Eng, MIEI Kieran Morley BEng(hons) MIEI	Material Assets (Utilities)
Byrne Environmental Ian Byrne Managing Director, MSc, MIOA, Diploma in Environmental & Planning Law	Air Quality and Climate (Population and Human Health)
Byrne Environmental Ian Byrne Managing Director, MSc, MIOA, Diploma in Environmental & Planning Law	Noise and Vibration (Population and Human Health)
Emma Oldroyd, BA Hons. (Land Arch) Leeds Beckett University; Post Grad Dip and MA in	Landscape and Visual Impacts

Organisation	EIAR Specialist Topics / Inputs
Landscape Architecture (Leeds Beckett University; CMLI – Cunnane Stratton Reynolds	
Niall Barrett CS Consulting Engineers Chartered Civil, Traffic & Transportation Engineer BEng (Hons), CEng, MIEI, Cert Health & Safety, Cert PSDP, Cert RSA	Risk Management
John Cronin and Tony Cummins of John Cronin and Associates. Mr Cronin holds qualifications in archaeology (B.A. (University College Cork (UCC), 1991), regional and urban planning (MRUP (University College Dublin (UCD) 1993) and urban and building conservation (MUBC (UCD), 1999). Mr Cummins holds primary and post-graduate degrees in archaeology (B.A., 1992 and M.A., 1994 (UCC))	Archaeology, Architectural and Cultural Heritage
John Spain, BBS, MRUP, MRTPI, MIPI, Managing Director, John Spain Associates	Review of EIAR

1.13 NON-TECHNICAL SUMMARY

The EIA Directive requires that one of the objectives of the EIA process is to ensure that the public are fully aware of the environmental implications of any decisions.

The EPA guidelines note that the non-technical summary of the EIAR should facilitate the dissemination of the information contained in the EIAR and that the core objective is to ensure that the public is made as fully aware as possible of the likely environmental impacts of projects prior to a decision being made by the Competent Authority. The 2018 EIA Guidelines prepared by the DHPLG state that the Non-Technical Summary *"should be concise and comprehensive and should be written in language easily understood by a lay member of the public not having a background in environmental matters or an in-depth knowledge of the proposed project."*

A Non-Technical Summary of the EIAR has therefore been prepared which summarises the key environmental impacts and is provided as a separately bound document in Volume I.

1.14 LINKS BETWEEN EIA AND APPROPRIATE ASSESSMENT/NIS

Article 6(3) of the Habitats Directive (92/43/EEC) provides that any project not directly connected with or necessary to the management of a Natura 2000 site but likely to have a significant effect thereon, either individually or in combination with other plans or projects, shall be subject to an Appropriate Assessment of its likely implications for the site in view of the site's conservation objectives.

In January 2010 the DoEHLG issued a guidance document entitled '*Appropriate Assessment of Plans and Projects in Ireland – Guidance for Planning Authorities*'. This guidance document enshrines the '*Source-Pathway-Receptor*' into the assessment of plans and projects which may have an impact on Natura 2000 sites.

The Department of the Environment, Heritage and Local Government are introducing further legislation on this issue of Appropriate Assessment. The Department advises that all projects are screened for Appropriate Assessment.

An Appropriate Assessment screening was undertaken by Openfield in accordance with '*Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites – Methodological Guidance on the Provisions of Article 6 (3) and (4) of the Habitats Directive 92/43/EEC)'.* The AA Screening is submitted with the SHD application.

1.15 AVAILABILITY OF EIAR DOC

A copy of this EIAR document and Non-Technical Summary of the EIAR document is available for purchase at the offices of An Bord Pleanála and Meath County Council (Planning Authority) at a fee not exceeding the reasonable cost of reproducing the document. It can also be viewed on the SHD website – www.BelmountNavanSHD.ie set up by the applicant.

1.16 IMPARTIALITY

This EIAR document has been prepared with reference to a standardised methodology which is universally accepted and acknowledged. Recognised and experienced environmental specialists have been used throughout the EIA process to ensure the EIAR document produced is robust, impartial and objective.

It should be noted that, as highlighted above, an important part of the EIA process is preventative action which causes the project design team to devise measures to avoid, reduce or remedy significant adverse impacts in advance of applying for consent. As a result, where no likely significant impacts have been identified where they might reasonably be anticipated to occur, the design and layout of the proposed development has generally been amended to minimise the potential of any likely significant adverse impacts.

1.17 STATEMENT OF DIFFICULTIES ENCOUNTERED

No particular difficulties, such as technical deficiencies or lack of knowledge, were encountered in compiling any of the specified information contained in this statement, such that that the prediction of impacts has not been possible. Where any specific difficulties were encountered these are outlined in the relevant chapter of the EIAR.

1.18 EIA QUALITY CONTROL AND REVIEW

John Spain Associates is committed to consistently monitoring the quality of EIAR documents prepared both in draft form and before they are finalised, published and submitted to the appropriate competent authority taking into account latest best-practice procedure, legislation and policy. The EPA published draft guidelines on information to be contained in Environmental Impact Assessment Report4 and the Department of Housing, Planning, Community and Local Government have published a consultation paper5, which have been consulted in the preparation of this EIAR. This document includes a detailed EIAR Review Checklist which has been used to undertake a review of this EIAR document.

1.19 ERRORS

While every effort has been made to ensure that the content of this EIAR document is error free and consistent there may be instances in this document where typographical errors and/or minor inconsistencies do occur. These typographical errors and/or minor inconsistencies are unlikely to have any material impact on the overall findings and assessment contained in this EIAR.

[4] *Guidelines on the Information to be contained in an Environmental Impact Assessment Report, Environmental Protection Agency, 2017*

5 *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.*

2.0 DESCRIPTION OF THE PROPOSED DEVELOPMENT AND ALTERNATIVES EXAMINED

2.1 INTRODUCTION AND TERMS OF REFERENCE

This section of the EIAR has been prepared by John Spain Associates, Planning & Development Consultants, and provides a description of the proposed development and also explains the evolution of the scheme design through the reasonable alternatives examined. This chapter of the EIAR was prepared by Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates, and approved by John Spain, Managing Director.

The description of the proposed development is one of the two foundations upon which an EIAR is based (the other being the description of the existing environment described in this chapter and by each of the specialist consultants in the subsequent chapters). It is also a requirement of the EIA Directive (as amended) to present an outline of the main alternatives considered and a justification of the final proposed development.

2.2 DESCRIPTION OF THE LOCATION OF THE PROPOSED DEVELOPMENT

The development will consist of the construction of a residential development of 544 no. dwellings, 2 no. creches and open space as follows:

A) 260 no. houses comprising; 18 no. 2 bedroom houses, 207 no. 3 bedroom houses, 35 no. 4 bedroom houses, [houses are provided with two car parking spaces and solar panels] – House Type F1 & F2, 3 storeys, House Type N8, N8A & N8B – include detached option all other house types 2 storey;

B) 198 no. apartments [with balconies] in 5 no. apartment buildings (Block A - 5 storeys with a 6 storey setback, Block B – 6 storeys, Block C – 5 storeys, fronting onto Academy Street, Block D – 3 and 4 storeys & Block E – 5 storeys along internal access road in northern portion of site) comprising 46 no. 1 bedroom apartments & 152 no. 2 bedroom apartments;

C) 15 no. 2 bedroom duplex apartments [with terraces or balconies] and 15 no. 3 bedroom duplex apartments in 3 no. 3 storey duplex buildings;

D) 8 no. 5 dwelling 3 storey corner blocks [with terraces or balconies] (each comprising, 1 no. 1 bedroom apartment, 1 no. 2 bedroom apartment & 2 no. houses);

E) 2 no. 8 dwelling 3 storey corner blocks (each comprising 4 no. 1 bedroom and 4 no. 2 bedroom units);

F) Provision of 2 no. creches (ground floor of Apartment Building C, approx. 195 sq. m), and a 2 storey creche of c. 443 sq. m beside internal access loop road, ESB kiosks, associated single storey bicycle storage and refuse storage buildings;

G) Provision of open space within the development (including playground areas and communal open space areas); all ancillary landscape works with public lighting, planting and boundary treatments including regrading/re-profiling of site where required as well as provision of footpaths;

H) Access to the subject site will be from 3 no. new junctions onto Academy Street, and a new pedestrian access onto the Dublin Road (R147) at the southern end of the site and includes new signalised junction and improvements on the Dublin Road (R147), as well as 875 no. car parking spaces and 581 no. cycle spaces (northern vehicular access to also facilitate future adjoining school site campus). The proposal includes works to the former access road to Belmount House (a protected structure) as well as landscaping works to associated woodland area;

I) Surface water and underground attenuation systems as well as all ancillary site development works (reprofiling of site as required) as well as to drainage services;

J) Temporary marketing signage for a period of 3 years (located on Academy Street);

K) All associated site development and landscape works all on a site of c. 15.1 hectares;

Figure 2.1 – Site Layout Housing

Source: CCK Architects

2.3 DESCRIPTION OF THE PHYSICAL CHARACTERISTICS OF THE WHOLE PROPOSED DEVELOPMENT

The Site Layout Plan (figure 1.1) prepared by CCK Architects shows the overall layout in context.

The proposed development would provide 544 no. residential units, all associated access, car parking, open space, landscaping and 2 no. crèches. A new road branching west from Academy Street will be constructed to provide access to the western part of the site and also the new proposed primary school sites, (of 3.3 hectares), located to the north of the subject lands.

2.3.1 Demolition

There is no demolition of habitable or any other structures relating to the proposed development.

2.3.2 Residential Development

In summary, the proposed development comprises the construction of 544 no. dwellings consisting of 260 no. houses, 198 no. apartments and 30 no. duplex units as well as 56 no. dwellings in a series of corner apartment buildings.

Table 2.1 – Overall Residential Development Mix

	1 bedroom	2 bedroom	3 bedroom	4 bedroom	Overall	
Houses		18	207	35	260	47.8%
Apartments	46	152			198	36.4%
Duplex Apartments		15	15		30	5.5%
Corner Buildings	16	24	16		56	10.3%
	62	209	238	35	544	
Overall Mix	11.4%	38.4%	43.8%	6.4%		

Source: CCK Schedule

A wide variety of dwelling typologies are included in the proposal, comprising 198 no. apartments in 1, 2 and 3 no. bedroom apartments in 5 no. apartment buildings along with 86 no. duplex units, in a series of buildings dispersed throughout the proposed development. These apartment dwellings comprise c. 52% of the overall mix of units. In addition it is proposed to provide 260 no. 2, 3 and 4 bedroom dwellings in a range of typologies comprising terraces, semi-detached and detached configurations.

The design intent is to provide a range of housing typologies of different heights, which include apartment blocks fronting Academy Street, 2 storey dwellings (in a back to back arrangement) with Limekiln Wood located to the west, along with duplex dwelling buildings of 3 storeys and 2 no. apartment buildings of 4 storeys located opposite the school site, fronting Access 1 within the scheme layout. In addition, variety is provided with the inclusion of 3 storey corner blocks dispersed through the site. This built form provides variety in the street scape and offers a mix of townhouse style dwellings with apartments above.

2.3.3 Houses

The houses are designed as two and three storey family dwellings, in detached, semi-detached and terrace configurations. Individual plot layouts provide good separation to ensure privacy and minimise overlooking. The end-row and end terrace house types have been used to turn corners, with front doors and windows giving activity and passive supervision to the sides and avoiding large blank gables.

The variety of house types provides for a wide choice to suit all potential occupiers and many household types, as well as permitting a very efficient site layout. The mix of house type in any one row creates visual interest and contribute to the specific character of the development, both overall and in each street.

2.4 Apartments

The apartments will be located in two areas of the site, fronting Academy Street and fronting Access Road 1. 3 no. 6 storey apartment buildings (with setback) will be sited fronting Academy Street, forming a strong urban edge to the street, responding to the established existing built form on the adjacent site (Academy Square). 158 no. units will be accommodated within the 3 no. buildings (Blocks A, B and C) comprising 38 no. 1 bedroom and 120 no. 2 bedroom units.

The apartments are orientated east-west benefitting from morning and evening solar access. The apartments will directly overlook Academy Park and the surface parking area to the rear of the building, ensuring passive surveillance of the neighbourhood.

Figure 2.2 – Block B - Elevation

Source: CCK Architects

In addition, 2 no. 4 storey apartment buildings (Blocks D and E) are provided adjacent to Access Road 1 opposite the proposed school site. 8 no. 1 bedroom and 32 no. 2 bedroom units will be accommodated across the 2 no. buildings, providing 40 no. residential units within the buildings.

Blocks D and E overlook a communal open space area to the rear of the buildings offering passive surveillance of the residential amenity area. The buildings also front the surface carparking provision to the front of the buildings. Block D wraps around the corner of the site transitioning to duplex units on the southern elevation. This provides variety in the streetscape and breaks the massing of the building, providing a fine grain treatment of the streetscape as it transitions towards the terraced housing and creche. Block D and duplex units overlook open space area 0.12 hectares to the south-west.

Figure 2.3 – Block D - Apartments and Duplex Units

Source: CCK Architects

2.5 Duplex Units

It is proposed to provide 30 no. duplex units throughout the site in 3 no. duplex blocks. The units are located adjacent to apartment Blocks D and E and in the south-eastern corner of the site. 15 no. 2 bedroom and 15 no. 3 bedroom units are proposed. The units are accommodated in the 3 no. buildings with terraces and direct access to communal open spaces provided at ground level and a balcony or terrace provided at the upper levels.

Figure 2.4 – Duplex Block Elevation

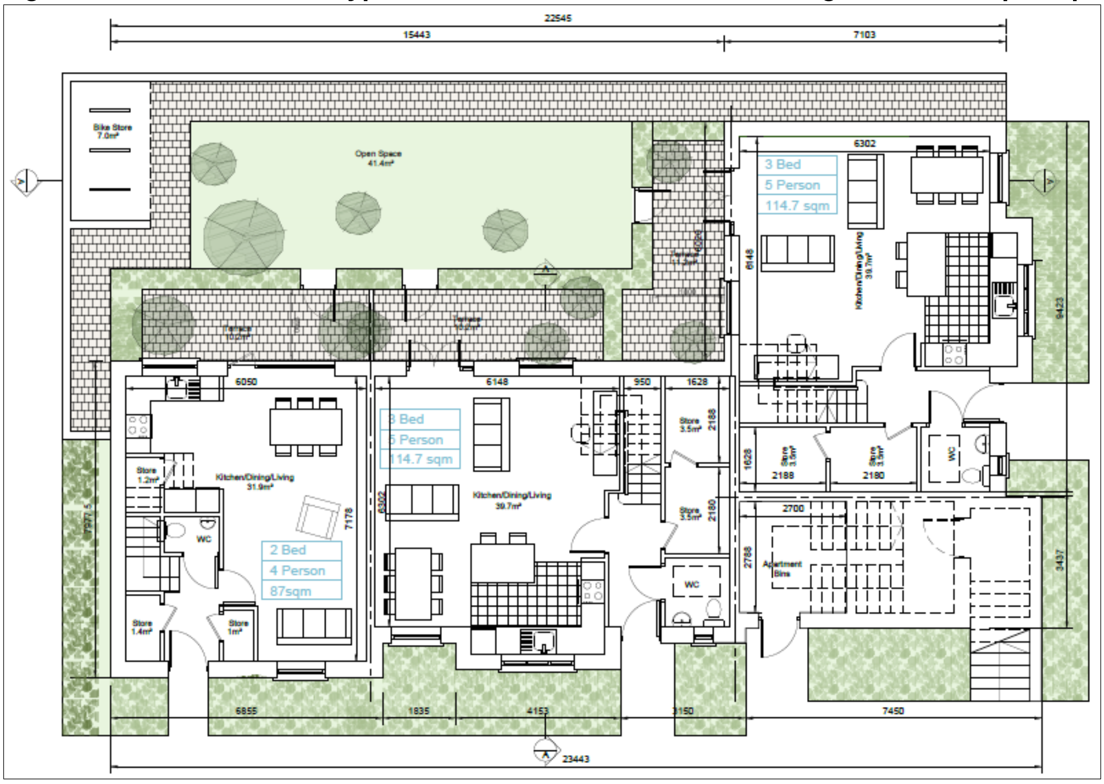
Source: CCK Architects

2.6 Corner Blocks

Corner blocks have been designed to wrap around the corners of the blocks where the development transitions from the main loop road towards the home zones to the west. The 3 storey corner block buildings have been designed to address both street frontages, providing passive surveillance on both sides.

Two different types of corner blocks have been designed and are dispersed throughout the site. 8 no. type CB5 corner blocks are included, providing communal open space to the rear, directly accessible from ground floor units. 8 no. 1 bedroom, 16 no. 2 bedroom and 16 no 3 bedroom units are provided within the 8 no. type CB5 buildings.

Figure 2.5 – Corner Block Type CB5 - Ground Floor Plan including communal open space



Source: CCK Architects

A second corner block building, type CB8 is also proposed. 2 no. type CB8 buildings are proposed at the centre of the site accommodating 16 no. units comprising 8 no. 1 bedroom and 8 no. 2 bedroom units. Similar to the L-shaped type CB5 buildings, type CB8 buildings are designed around an external courtyard communal open space, with direct access provided from ground floor units. Upper level units overlook the courtyard to the rear and include balconies fronting the street.

2.7 Creche Provision

It is proposed to provide 2 no. creches within the scheme. A 195 sq. m creche will be provided at ground floor level of Block C, providing space for c. 41 children. A second 443 sq. m detached creche building is proposed on Access Road 1 providing for c. 89 children. The creche within Block C will be accommodated with 30 no. dual usage car spaces. Visitors and parents/staff of the creche will have access to these 30 no. car parking spaces that will have limited stay restrictions and will be managed by the Management Company. 15 no. car parking spaces will be allocated to the detached creche.

2.7.1 Car Parking and Cycle Parking Provision

It is proposed to provide 502 no. car parking spaces for the houses along with 218 no. car parking spaces for the apartments (including the creche in Block C). In addition, it proposed to provide 140 no. car parking spaces for the duplex apartments. The overall number of car parking spaces is 875. It is also proposed to provide 382 no. cycle spaces for the apartments (including creche in Block C), 88 no spaces are provided for the duplex units, along with 8 no. cycle spaces for the creche beside unit no. 29.

	Car Parking	Cycle Parking
Houses	502	-
Apartments (including creche in Block C)	218	382
Creche (Access Road 1)	15	8
Duplex	140	88
Overall	875	581

Source: CCK Architects

2.8 ACCESS

Four access points (3 no. vehicular and 1 pedestrian) are proposed to the site, connecting the future residents to Navan town centre, its services and facilities and the broader area.

Access No. 1: This vehicular access point will provide a secondary access point to the site connecting the future school site, the creche and the wider residential development. This road will loop through the site, traveling in a southerly direction and connecting to Academy Street and ultimately to the R147 Dublin Road, to the south.

Access No. 2: Primary access to the apartments will be provided off Academy Street via a priority-controlled junction at Access No. 2.

Access No. 3: The main access point to the site will be provided via Access No. 3 (shown on the figure below) from Academy Street. This will form the primary access to the housing component of the scheme and will be via a priority-controlled junction on Academy Street.

Access No. 4: This will provide pedestrian access to bus stops located on the R147 Dublin Road and through to the Boyne Walk. The walkway is overlooked by two dwellings adjacent to the walkway, ensuring passive surveillance.
Pedestrian linkages will be provided to the local estates such as Woodlands and Lime Kiln Hill residential developments. Allowance have also been made for the inclusion of future pedestrian and cycle connections to the proposed future school.

Figure 2.6 – Proposed Site Access Points

Figure 2.7 – Northern Access to lands and Schools Site

Source: 3D Design Bureau

2.9 LANDSCAPING

2.9.1 Introduction

The landscape strategy aims to integrate the new built development with the existing landscape and create a network of attractive and useable open spaces while contributing to the local biodiversity. The character of the landscape proposed is one of large trees, copses of native trees, formal clipped hedges, ornamental shrub and groundcover planting, woodland planting and native hedgerows. We refer the Board to the enclosed Landscape Design Statement and drawings, prepared by CSR – Landscape Architecture.

The landscape strategy for the site has been formed around the retention of the existing Belmount Woodland at the centre of the site. The woodland was connected with Belmount House and provides a unique opportunity to integrate a mature landscape with this new residential scheme, harnessing the character of the land.

The woodland park form the centre of the landscape strategy for the site. A series of smaller parks and ancillary open space are provided throughout the site, linked to the central woodland park.

The landscape strategy is cognisant of Belmont House (a protected structure) on the north-eastern perimeter of the site. The site is in private ownership and falls outside the red line development boundary. This has characterised and influenced the design and layout of the proposal, with existing woodland defining the perimeter of this property retained. Fencing and hedgerow planting will be used to define the development boundary with this property. In addition, the layout presents an attractive frontage to Belmont House.

A series of neighbourhood character areas are formed around public open spaces forming the centre of the neighbourhood character. 2 hectares of public open space is provided through out the site with an additional 0.63ha provided within the open space zoned lands at Academy Park. The following park areas are proposed;

Academy park (0.63ha):

Academy Park is a linear urban park that runs parallel with Academy Street. The design reflects the linearity of the Boyne river valley. The park is directly overlooked by the apartments and offers pedestrians the opportunity to traverse the park taking a direct route to Navan town centre.

Figure 2.8 – Extract - Academy St Park

Source: CSR Landscape Architects

Belmount Hill Park (0.12ha):

This park is located close to one of the main entrances to the development and opposite the future school site. The park will be overlooked by the creche, duplex units and Block D. The park includes a community orchard offering a unique amenity space to school children and local residents alike. An informal play area will also be formed on top of the hill. The playarea and the park will be framed by large trees, in keeping with Belmount Woodland to the south.

Figure 2.9 – Extract - Belmount Hill Park

Source: CSR Landscape Architects

Belmount Woodland Gardens (1.34ha): This park area is on the key focal points of the development. This sensitively design park is set within the existing mature trees and strives to:

- Revive the historical woodland garden for inclusive access for all;
- Provide circulation throughout the woodland;
- Open the woodland up for use by new and existing communities
- Provide informal woodland play features and a large equipped playground

Figure 2.10 – Extract - Belmount Woodland Gardens

Source: CSR Landscape Architects

In addition to these larger feature parks, 4 no. local parks, totally 0.54ha, are proposed, creating the focal point for each neighbourhood character area. The parks have been design by CSR Landscaping to provide for the following features:

- Direct pedestrian access and permeability through the space
- New tree planting
- Focused areas of shrub/ornamental grasses planting to create a sense of enclosure or entry

The parks provide a sense of identity and place to each character area.

Communal Open Space

Within the apartment blocks there is an allowance of semi-private communal open space for use by the residents of the block. The quantum of space for each apartment is in accordance with the DoHPLG Planning Guidelines for Design Standards for New Apartments.

Materials and Site Furniture

A number of the play areas throughout the scheme are designed as a ‘Natural Play Area’, this is where a preference is given to natural play features, materials, and objects over the standard manufactured play equipment. There is a greater emphasis on building, creation, exploration and pretending as activities to extend the interest in the play area for users that visit regularly, as is common in a residential landscape space.

The surfaces will be primarily grass, gravel and sand. Level changes, grass mounds and steps will be incorporated into the scheme as a central feature of the space. Within the space created a number of activities are facilitated such as balancing, jumping, climbing and crawling.

2.10 SERVICES

2.10.1 Foul Sewer

All foul effluent generated from the proposed development shall be collected in pipes of 225mm in diameter and flow under gravity to the existing 225mm diameter foul sewer on Academy Street via a new connection. The drainage network for the development will be in accordance with Part H of the Building Regulations and to the requirements and specifications of Irish Water.

2.10.2 Surface Water Drainage

In accordance with Meath County Council requirements, storm water is to be managed in two phases.

The first is to restrict storm water runoff from the proposed development to greenfield runoff rates. The greenfield runoff has been established as 1.86l/sec/ha; a minimum discharge rate of 2.0l/sec/ha is allowable under Meath County Council guidelines.

Restricting storm water outflow to 36.8 l/sec requires that attenuation be provided for the predicted 1-in-100-year extreme storm event (as increased by 10% for the predicted effects of climate change).

A number of SuDs measures are proposed:

i) To include low water usage sanitary appliances,
ii) To provide for ‘water butts’ to retain rain water on site for local re-use, for landscaping and maintenance purposes,
iii) Permeable paving for car parking bays,
iv) To install local infiltration drains to the rear of the housing units to allow for initial storage of rainwater,

2.10.3 Attenuation

Ultimately storm water storage is required for the extreme storm events. This will be provided by an on-site attenuation tank designed for 100-year event plus 10% climate change. This will have a flow restrictor limited to 36.8 l/s (greenfield runoff rate of 2.0l/s/ha prior to final disposal into the existing river (Boyne River), located to the east of the proposed development.

2.11 CONSTRUCTION MANAGEMENT STRATEGY

It is envisaged that the development of the lands will occur for up to approximately 5 years. Given the nature of the project and the need for flexibility to respond to market demand, the development phases are indicative. A Construction Management Plan and a Construction Traffic Management Plan are included with this SHD application.

This EIAR presents proposed mitigation measures to ensure that the planned development of the lands does not generate significant adverse impacts for residential and working communities in the vicinity of the site.

The proposed development, as described, is detailed on the planning application drawings and particulars which accompany the application.

2.11.1 Site Construction Compound

A site compound, visitor & contractor parking area will be established within the boundary of the subject lands - initially on Phase 3 lands.

The compound may be used as material staging areas, temporary car parking for construction workers, site offices and huts, welfare facilities for workers (including changing rooms & lockers), storage of plant and equipment, etc. The location of the temporary compound is indicated on the site layout. It is noted that the location is indicative, and may change as the scheme is built out.

Designated parking area is provided in the site car park. It is proposed to cater for up to 100 cars /vans in this area to minimise the disruption to the local amenities and parking facilities. There is a designated pedestrian walkway from the car park to the site compound and from the compound the construction works areas located away from the live construction site.

Parking is not permitted in the following areas.

- any other area of the site
- on the public roads
- Within local housing estates.

Local roads will be well maintained by managing the site traffic on hard surfaces inside the site boundary. In addition a road sweeper is available to the site to ensure the local roads are maintained free from mud and other debris from vehicles exiting the site.

Restrictions on Noise

Site Management will ensure all noise levels in the working area are assessed around the site perimeter and within the site, with the relevant appropriate action to reduce the noise emissions, implemented once the noise levels are known.

2.11.2 Scope of the Proposed Construction Works

An indicative construction sequence is outlined below to show the buildability of the project. The actual construction sequence will be confirmed when a contractor is appointed. The main stages of construction will proceed in a general sequence as follows:-

- Enabling Works including demolition, set-up of site construction facilities service diversion works and tree removal.
- Site clearance will include cut and fill of existing ground profiles and formation of key site features.
- Construction of drainage, water supply and utility service distribution network within the site.
- Construction of buildings.
- Landscaping.
- Building fit-out and commissioning.

The proposed development also includes off-site roads and infrastructure upgrade works to waste water drainage, storm water drainage and water supply services.

2.11.3 Main Stages/phases of Construction

The expected construction staging provides for 5 phases. While the pace and timing of this phasing is highly dependent on unpredictable market conditions, the overall site design and phasing strategy takes account of the infrastructure and open space provisions associated with each phase. However, it is feasible that market conditions would require alterations to any programme which is specified at this time and it is likely that it will be reviewed in the course of construction.

Archaeological monitoring of earthmoving works for site preparation will be undertaken to ensure that any features of an archaeological nature that may be revealed are identified, recorded and fully resolved.

Chapter 5, Land and Soils provides detailed information on excavation material and mineralogy. Chapter 11, Waste Management contains more detailed information on Resource and Waste Management associated with the project. Mitigation measures to minimise environmental impacts are described in the relevant sections of the EIAR.

The construction of the temporary construction material storage yard has the potential to generate traffic associated with its construction. It is estimated that construction of this will start in Q2 2020.

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.

A cut and fill model has been produced by Cronin Sutton Consulting Engineers which estimates that there will be a net export (net cut) of 22,000m3 from the site. This equates to c. 740 HGV trips.

Whilst it is not possible at this stage to accurately identify the day to day traffic movements associated with the construction activities, based on 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 15 arrivals and departures during the first 2-3 months of works and decreasing to 3 to 5 thereafter.

Similarly, the general workforce is unlikely to exceed c.50 in number, which with an allowance for shared journeys could equate to a maximum of around 30-40 arrivals and departures per day.

2.11.4 Construction of Services

Following on from completion of site clearance, demolition, site re-profiling works construction activities will focus on the installation of underground utilities to provide the infrastructure required for storm water drainage, foul water drainage, water supply, power and building utility systems.

Temporary Construction Works

During the construction phase it will be necessary to provide contractor welfare facilities for the workers. A site office and staff welfare facilities will be installed at a suitable location centrally within the overall site. All surplus plant and materials shall be stored in this location when not in use. Welfare facilities will include a canteen, drying room, toilets and first aid. Power will be provided using a small petrol generator. The petrol generator and fuel storage containers used for various items of plant will be located within a sealed containment bund.

Temporary portable toilet facilities will be provided on site. These units will be maintained and the waste collected therein will be disposed of using an appropriate contractor. Storage areas will be clearly identified and agreed with all relevant parties in advance of construction.

The site will be secured with hoarding on all open sides and accessible approaches.

Hoarding and Site Segregation

Construction site hoardings are used to provide a secure site boundary to what can be a dangerous environment for people who have not received the proper training and are unfamiliar with construction operations. Site hoarding also performs an important function in relation to minimising some of the potential environmental impacts associated with construction, namely noise, visual impact, and dust deposition.

Hoarding will be established around the site construction area (where required) before any significant construction activity takes place. Hoardings works will be of the same nature as that carried out for similar operations at most construction and building sites.

Contractors must erect hoarding to a minimum of a 2.4m high in either close-sheeted hoarding as appropriate to the works and as per the contractor's approved site plan. Hoarding must be maintained in a presentable condition to ensure safe passage.

2.11.5 Hours of Working

Working hours will be strictly in accordance with the granted planning conditions with no works on Sundays or Bank Holidays. If work is required outside of these hours, written approval will be sought by the contractor from the Local Authority.

It is anticipated that normal working hours may be between the hours of 07:00 and 19:00, Monday to Friday, and 08:00 to 14:00 on Saturdays. There may be occasions where it is necessary to make certain deliveries outside these times, for example, where large loads are limited to road usage outside peak times.

Deliveries of material to site will be planned to avoid high volume periods. There may be occasions where it is necessary to have deliveries within these times. The Contractor will develop, agree and submit a detailed Traffic Management Plan for the project prior to commencement.

2.11.6 Construction Traffic Management Plan

A Construction Traffic Management Plan (CTMP) is included with the SHD application (prepared by Pinnacle Consultants) and will be developed by the main contractor and agreed with the Planning Authority prior to commencement of development in the event of a grant of permission.

The contractor will be contractually required to ensure that the elements of this outline CTMP shall be incorporated into the final CTMP. The contractor shall also agree and implement monitoring measures to confirm the effectiveness of the mitigation measures outlined in the CTMP. On finalisation of the CTMP, the contractor shall adopt the plan and associated monitoring measures. The final CTMP shall address the following issues (including all aspects identified in the outline CTMP):

- Site Access & Egress;
- Traffic Management Signage;
- Routing of Construction Traffic / Road Closures;
- Timings of Material Deliveries to Site;
- Traffic Management Speed Limits;
- Road Cleaning;
- Road Condition;
- Road Closures;
- Enforcement of Construction Traffic Management Plan
- Details of Working Hours and Days;
- Details of Emergency plan;
- Communication;
- Construction Methodologies; and
- Particular Construction Impacts

2.11.6.1 Traffic Management & Construction Access

The following measures are envisaged:-

- No parking on access routes. No unloading or blockages of access routes. Such vehicles will be immediately requested to move to avoid impeding works;

- In accordance with the CMTP, the contractor must appoint a Traffic Management Coordinator responsible for the management of traffic management related activities on site

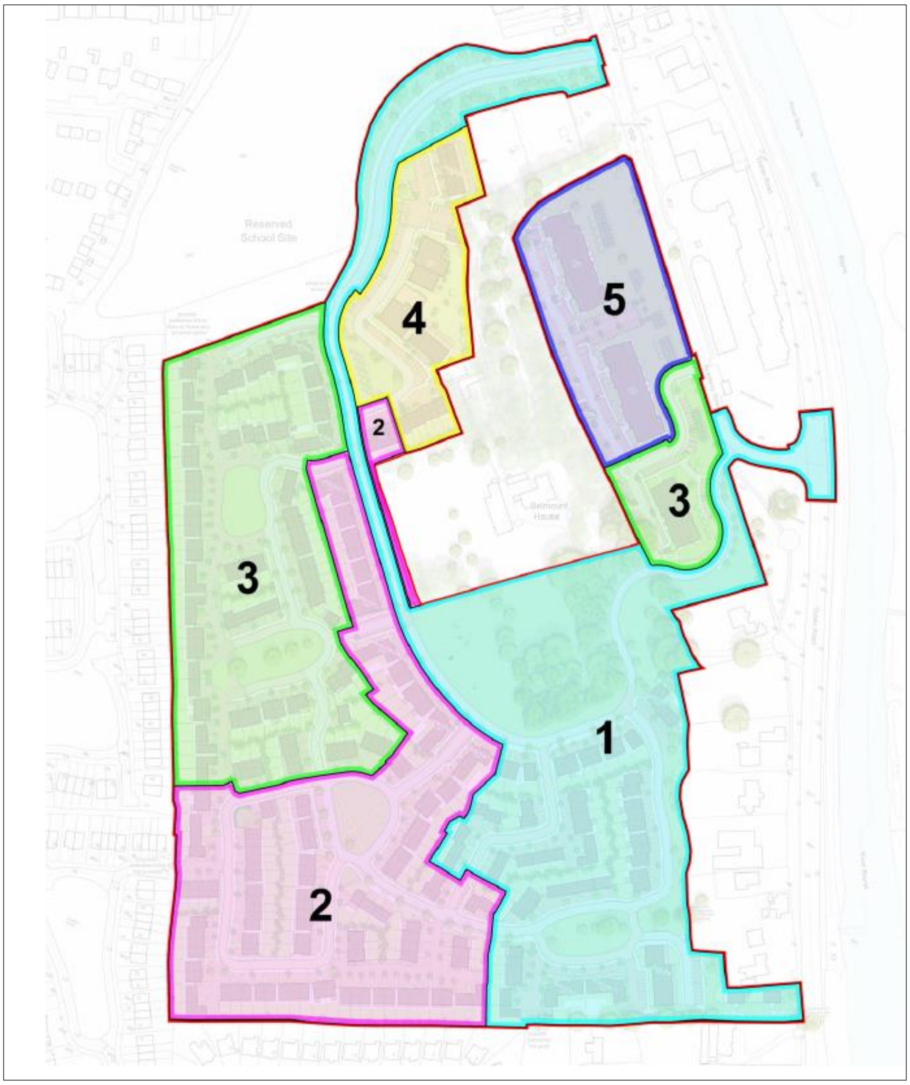
Contractors must adhere to the overall traffic management measures for the internal road network from the preferred construction traffic entrance road to their site. This shall include the following as a minimum:-

- Speed limits;
- Parking restrictions; and
- Safe access/egress to existing internal Hospital access roadway.

2.11.7 Construction Phasing

Drawing 1828 P110 prepared by CCK Architects illustrates the indicative construction staging sequence. For later phases (including Phase 5), Phase 5 will be used as the site compound and material storage with access via the Access No. 2. It is expected that works will commence in Q2 2020 with construction taking up to 5 years (subject to market demand)

Figure 2.11 – Phasing



Phase 1 will comprise:

- Construction of the access and road to primary schools' site as well as internal spine road through the site;
- Woodland Park Area of c. 1.34 hectares & open space of 0.2 hectares;
- 80 dwellings comprising 27 no. duplex/corner blocks & 53 no. houses as follows:

-1 no. duplex block – 12 no. units comprising (6 no. 2 bedroom duplex units & 6 no. 3 bedroom duplex units);

-3 no. Corner blocks - 15 no. units comprising (3 no. 1 bedroom units, 6 no. 2 bedroom units & 6 no. 3 bedroom units)

-1 no. 2 bedroom house, 47 no. 3 bedroom houses and 5 no. 4 bedroom houses.

Phase 2 will comprise:

- Creche 443 sq. m & open space of c. 0.12 hectares;
- 139 dwellings comprising 31 no. corner block dwellings & 108 no. houses as follows:
  - 3 no. 5 unit corner blocks & 2 no. 8 unit corner blocks comprising - 31 no. units comprising (11 no. 1 bedroom units, 14 no. 2 bedroom units & 6 no. 3 bedroom units);
  - 9 no. 2 bedroom houses, 96 no. 3 bedroom houses and 3 no. 4 bedroom houses.

Phase 3 will comprise:

- Creche 195 sq. m (ground floor of Block C)
- Open space of c. 0.23 hectares;
- 135 dwellings comprising 42 no. apartments and corner block dwellings & 93 no. houses as follows:
  - Apartments comprising 15 no. 1 bedroom apartments, 17 no. 2 bedroom apartments, 2 no. 1 bedroom, 4 no. 2 bedroom and 4 no. 3 bedroom corner block units;
  - 4 no. 2 bedroom houses, 82 no. 3 bedroom houses and 7 no. 4 bedroom houses.

Phase 4 will comprise:

- Open space of 0.12 hectares;
- 64 no. dwellings comprising 58 no. apartments/duplex apartments and 6 no. houses as follows:
  - 8 no. 1 bedroom apartments, 32 no. 2 bedroom apartments;
  - 9 no. 2 bedroom duplex apartments and 9 no. 3 bedroom duplex apartments;
  - 4 no. 2 bedroom houses and 2 no. 3 bedroom apartments;

Phase 5 will comprise:

- Open space of 0.63 hectares (zoned F1 lands)
- 126 no. apartments comprising 23 no. 1 bedroom apartments and 103 no. 2 bedroom apartments

Table 2.2 – Overall Phasing

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Houses	53	108	93	6	
Apartments			32	40	126
Duplex Apartments	12			18	
Corner Buildings	15	31	10		
	80	139	135	64	126
Overall Mix	14.7%	25.5%	24.8%	11.8%	23.2%

Source: CCK Site Layout Phasing

2.12 ENERGY STATEMENT

The Kieran Morley report enclosed with the SHD application sets out to demonstrate a number of methodologies in Energy Efficiency, Conservation and Renewable Technologies that will be employed in part or in combination with each other for this development. These techniques will be employed to achieve compliance with the building regulations Part L and NZEB standards currently in public consultation.

2.12.1 Environment / Global Issues

Increasing levels of greenhouse gases have been linked with changes in climate and predicted global warming. By far the biggest human contribution to the greenhouse gases is in emissions of carbon dioxide. The development is likely to increase carbon dioxide levels in the atmosphere by the embodied emissions in the building materials used, and in the operational energy consumed during the life of each building.

To minimise the embodied emissions impact, materials will be sourced locally where possible (reducing carbon dioxide emissions associated with transportation), and preference will be given to reusing materials, and using materials in their natural state (reducing the emissions associated with processing).

2.13 EMISSIONS AND WASTE

2.13.1 Effluents

Effluent arising from foul drainage from the proposed development will be discharged through piped systems to the local authority sewers. Operation of the development will involve the discharge of uncontaminated surface water from the impermeable areas to a proposed network all linking into the established public system in the environs. Details of the impacts and remedial and reductive measures for surface water and foul drainage are recorded at Chapter 7 of this Environmental Impact Assessment Report.

2.13.2 Municipal Waste/Waste Management

A construction and operational waste management plan is included in the SHD application material (prepared by Byrne Environmental).

The proposed Waste Management Plan has been prepared to demonstrate how the Construction Phase will comply with the following relevant legislation and relevant Best Practice Guidelines:

- *Waste Management Acts 1996*
- *Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007)*
- *Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008)*
- *Department of the Environment, Heritage and Local Government – Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects – July 2006*

Each section of the Waste Management Plan presents the potential environmental impacts, proposed monitoring methodologies, limit values where applicable, based on the concept of Best Practice and the proposed mitigation measures to be implemented at the development site. Reference to National and International Standards are also included where relevant.

Waste materials generated by construction activities will be managed according to the Department of the Environment, Heritage and Local Government's 2006 Publication - *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects.*

Waste minimisation and prevention shall be the primary responsibilities of the Construction Project Manager who shall ensure the following:

1. Materials will be ordered on an *"as needed"* basis to prevent over supply
2. Materials shall be correctly stored and handled to minimise the generation of damaged materials
3. Materials shall be ordered in appropriate sequence to minimise materials stored on site

4. Sub-contractors will be responsible for similarly managing their wastes

Construction Waste Disposal Management

It is proposed that from the outset of construction activities, a dedicated and secure compound containing bins, and/or skips, and storage areas, into which all waste materials generated by construction site activities, will be established within the active construction phase of the development site.

Contaminated Soil

In the unlikely event that contaminated soils are discovered, these areas of ground will be isolated, tested for contamination in accordance with *2002 Landfill Directive (2003/33/EC),* and pending the results of laboratory testing, will be excavated and exported off-site by an appropriately Permitted Waste Contractor holding an appropriate Waste Collection permit and that this hazardous material will be sent for appropriate treatment / disposal to an appropriately Permitted / Licenced Waste Facility.

Domestic Waste Management

It shall be the responsibility of the Facilities Management Company to ensure that all domestic waste generated by apartment residents is managed to ensure correct storage prior to collection by an appropriately waste permitted waste collection company on a weekly basis.

Sufficient domestic waste storage areas shall be provided throughout the proposed residential development. It shall be the responsibility of the Facilities Management Company to ensure that appropriate signage is provided in each area notifying apartment residents of the importance to recycle domestic waste items in accordance with the requirements of the contracted Waste Collection contractor.

The proposed development shall be constructed and developed to minimise the generation of construction waste. During the construction Phase, construction waste shall be stored and segregated in dedicated waste storage areas which shall optimise the potential for off-site reuse and recycling. All construction waste materials shall be exported off-site by an appropriately permitted waste contractor.

The development shall be designed to provide adequate domestic waste storage areas for common residential areas (apartments) and individual houses. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development. Waste bin storage areas shall be designed in a manner to ensure that appropriate signage for the correct waste disposal and recycling is available for residents.

The retail units, gymnasium and cafe shall have designated commercial waste bins for both general and recyclable waste which shall be stored within the boundaries of the retail building areas. Waste shall be collected on a weekly basis by an appropriately permitted commercial waste contractor.

2.13.3 Emissions

The principal forms of air emissions relate to discharges from motor vehicles and heating appliances. With regard to heating appliances, the emission of nitrogen oxides and carbon monoxide will be minimised by the use of modern, efficient heating appliances and as a result, the potential impact is estimated to be negligible. Exhaust gases from motor vehicles will arise from car parking areas, and will be discharged directly to the atmosphere. Car parking for motor vehicles is provided at basement and surface levels. In general, it is noted that approximately 80% of all cars in Ireland run on unleaded fuel which can be expected to have a reductive effect on air emissions. It is expected therefore that the potential impact will be negligible.

Noise may be considered in two separate stages, during construction, and when the development is operational. Construction related noise impacts are an inevitable short term limited inconvenience feature which, in general, is accepted by members of the public, subject to the standard controls typical of planning conditions attached to urban based development projects. These impacts can be reduced in a number of ways. It is standard practice to limit construction to normal working hours during the day. In addition, there are a number of regulations relating to noise during construction which the contractor will be expected to adhere to throughout the construction phase.

2.14 DIRECT AND INDIRECT EFFECTS RESULTING FROM USE OF NATURAL RESOURCES

Details of significant direct and indirect effects arising from the proposed development are outlined in Chapters 3-15 which deal with *'Aspects of the Environment Considered'*. No significant adverse impact is predicted to arise from the use of natural resources.

2.15 DIRECT AND INDIRECT EFFECTS RESULTING FROM EMISSION OF POLLUTANTS, CREATION OF NUISANCES AND ELIMINATION OF WASTE

Details of emissions arising from the development together with any direct and indirect effects resulting from same have been comprehensively assessed and are outlined in the relevant in Chapters 3-15 which deal with '*Aspects of the Environment Considered'*. There will be no significant direct or indirect effects arising from these sources.

2.16 FORECASTING METHODS USED FOR ENVIRONMENTAL EFFECTS

The methods employed to forecast and the evidence used to identify the significant effects on the various aspects of the environment are standard techniques used by each of the particular individual disciplines. The general format followed was to identify the receiving environment, to add to that a projection of the *"loading"* placed on the various aspects of the environment by the development, to put forward amelioration measures, to lessen or remove an impact and thereby arrive at net predicted impact.

Where specific methodologies are employed for various sections they are referred to in the Receiving Environment (Baseline Scenario) sections in the EIAR. Some of the more detailed/specialised information sources and methodologies for a number of the environmental assessments are outlined hereunder.

2.17 TRANSBOUNDARY IMPACTS

Large-scale transboundary projects[6] are defined as projects which are implemented in at least two Member States or having at least two Parties of Origin, and which are likely to cause significant effects on the environment or significant adverse transboundary impact.

Having regard to the nature and extent of the proposed development, which comprises a residential development, located in Navan, within the administrative area of County Navan, transboundary impacts on the environment are not considered relevant, in this regard.

2.13 ALTERNATIVES CONSIDERED

The EIA Directive (2014/52/EU) requires that Environmental Impact Assessment Reports *include "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 for selecting the chosen option, including a comparison of the environmental effects."*

Article 94 and Schedule 6, paragraph 1(d) of the Planning and Development Regulations 2001, as amended, requires the following information to be furnished in relation to alternatives:

"(d) A description of the reasonable alternatives studied by the person or persons who prepared the EIAR, which are relevant to the proposed development and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the proposed development on the environment."

The presentation and consideration of various alternatives investigated by the project design team is an important requirement of the EIA process. This section of the EIAR document provides an outline of the main alternatives examined throughout the design and consultation process. This serves to indicate the main reasons for choosing the development proposed, taking into account and providing a comparison the environmental effects. Alternatives may be described at three levels:

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[6] The definition is based on Articles 2(1) and 4 of the EIA Directive and Article 2(3) and (5) of the Espoo Convention, respectively. http://ec.europa.eu/environment/eia/pdf/Transboundry%20EIA%20Guide.pdf

- Alternative Locations.
- Alternative Designs.
- Alternative Processes.

The DHPLG 2018 EIA Guidelines state:

"Reasonable alternatives may relate to matters such as project design, technology, location, size and scale. The type of alternatives will depend on the nature of the project proposed and the characteristics of the receiving environment. For example, some projects may be site specific so the consideration of alternative sites may not be relevant. It is generally sufficient for the developer to provide a broad description of each main alternative studied and the key environmental issues associated with each. ***A 'mini- EIA' is not required for each alternative studied."*** *(Emphasis added).*

Pursuant to Section 3.4.1 of the Draft 2017 EPA Guidelines, the consideration of alternatives also needs to be cognisant of the fact that *"in some instances some of the alternatives described below will not be applicable – e.g. there may be no relevant 'alternative location'…"*

The Draft 2017 Guidelines are also instructive in stating:

"Analysis of high-level or sectoral strategic alternatives cannot reasonably be expected within a project level EIAR… It should be borne in mind that the amended Directive refers to 'reasonable alternatives… which are relevant to the proposed project and its specific characteristics'".

The consideration of the main alternatives in respect of the development of the subject lands was undertaken by the Design Team and has occurred throughout an extensive and coordinated decision-making process, over a considerable period of time. The main alternatives considered are identified below.

2.13.1 Alternative Locations

The site is zoned for residential and open space development under the Navan Town Development Plan 2009-2015 within the Coindale landholding and as such, consideration of alternative sites is not necessary. In effect, an alternative location in this instance i.e., a *'do- nothing'* alternative for the subject site, would mean that these residential zoned lands would not be utilised for the purposes of meeting the need for new residential accommodation within Navan. If development does not occur sequentially from the existing development footprint, it is likely that pressures for the development of land which is either un-zoned or un-serviced and not as close to the town centre would be greater. This would lead to a dispersed and unsustainable form of development.

A *"do-nothing*" scenario was considered to represent an inappropriate, unsustainable and inefficient use of these strategically located residential zoned lands c. 900m from Navan Town Centre. The suitability of the lands for development, as an infill development within Navan as a level I town in the Meath County Plan's hierarchy and the site's location adjacent to local services, is an important consideration, in this regard.

The Draft EIAR Guidelines also note that:-

"Higher level alternatives may already have been addressed during the strategic environmental assessment of relevant strategies or plans. Assessment at that level is likely to have taken account of environmental considerations associated, for example, with the cumulative impact of an area zoned for industry on a sensitive landscape."

On the strategic or *'higher'* matters of already determined policy, we refer to the Meath County Development Plan 2013-2019 and the Navan Town Development Plan 2009-2015 which support the sequential development of Navan.

2.13.2 Alternative Uses

In addition to residential use, there are other land uses which are permitted in principle on these lands. For example it is noted the northern adjacent site zoned A2 residential has been identified as a location for 2 no. primary schools. The proposed (northern) access from Academy Street will also serve the site for the schools. It is not considered that an alternative comprising one of the alternative uses under the A2 land use zoning objective would result in the best use of these lands, particularly having regard to the general acknowledged need for housing.

In addition, in reference to SOCOBJ3, which seeks to investigate in consultation with the HSE a suitable site for a regional hospital for the north east, it is noted that there are 3 no. sites identified for the potential provision of a regional hospital in Navan at Nevinstown, Balreask Old and the subject lands (Limekilnhill).

The subject lands are zoned A2 residential, and a Hospital is not included in the 'permitted' or 'open for consideration' uses.

It is also noted that Appendix 7 of the Navan Town Development Plan have identified the subject lands as the top ranking residential site (out of 19 no. sites) and that, having regard to the positive characteristics of the lands in relation to the ability to deliver a high quality residential development, in close proximity to the town centre and adjacent amenities it is considered that the other 2 no. sites identified would be more suited to the provision of a regional hospital.

2.13.3 Description of Alternative Processes

This is not considered relevant to this EIAR having regard to the nature of the proposed (residential) development.

2.13.4 Alternative Designs

The proposed residential development has been prepared in accordance with the requirements of the National Planning Framework, the Regional Spatial and Economic Strategy for the Mid-East area as well as the relevant Section 28 Guidelines including those relating to Urban Development and Urban Heights 2018, the Apartment Guidelines 2018 and the Sustainable Residential Development in Urban Areas (2009) as well as where relevant the Meath County Development Plan 2013-2019 and the Navan Development Plan 2009-2015 and has been the subject of a number of pre-application meetings with the Planning Authority prior to lodgement of the SHD application with An Bord Pleanála.

The key environmental and practical considerations which have influenced the design of the proposed development and the alternative layouts on the subject lands have been influenced by the following:

- The need to achieve an appropriate density in the context of the Sustainable Residential Guidelines for Planning Authorities having regard to the location of the site close to the south of Navan town centre.
- The need to ensure any residential development provides a good mix of housing typologies which meet current market demand and which are deliverable in the short to medium term.
- The need to provide an appropriate level of housing provision on the residential zoned lands.
- Alternatives in relation to permeability.
- Alternative road junction design
- The need to deliver good quality open space in appropriate locations with a clear hierarchy
- To have regard to the site's topography and to ensure the design the residential development and associated infrastructure respects the existing features and limits the impacts on the land.
- Protection of existing trees and hedgerows where possible, particularly the protected woodland, (which although not specifically listed as individual trees to be preserved, the trees around the Belmount House are mapped as a "*Stand of Trees to be Preserved*" - Navan Development Plan 2009-2015 Variation No 2, which is to be incorporated in to a substantial public open space of c. 1.34 hectares to enhance the amenity of the area.
- The quality of the urban environment to be delivered and the associated positive impact on human health.
- The provision of 10% social housing on site.

2.13.4.1 Alternative Routes for the southern access through Woodland

Several different alternative options for the access road placement were considered as part of the design process for this development. Each was reviewed for its impact on Belmount Woodland. Three options are presented below along with the analysis of the number of trees impacted.

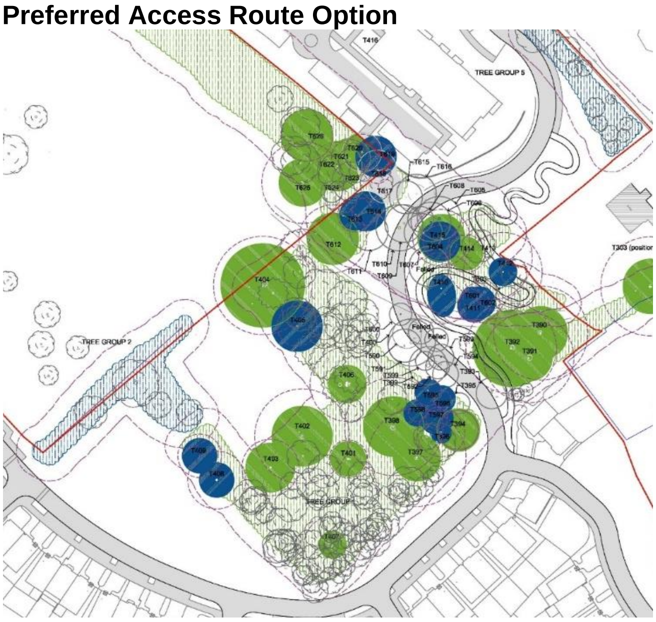
Different options were examined having regard to environmental considerations, in relation to the alignment of the southern access route.

Alternative Option A

Alternative Option B

Alternative Option C

Preferred Access Route Option



Review of Routes – Comparison of Environmental Effects

Following a detailed review by the design team of the options, and taking into account environmental considerations, and a comparison of environmental effects (particularly in reference to the removal of trees and reducing cut and fill the three options above were discounted and a preferred route was chosen.

Criteria	Preferred Access Route Option	Alternative Option A	Alternative Option B	Alternative Option C
Population and Human Health	Positive	Negative	Negative	Negative
Biodiversity	Positive	Negative	Negative	Negative
Soils	Positive	Negative	Negative	Negative
Hydrology, Geology and Hydrogeology	Positive	Negative	Negative	Negative
Air and Noise	Neutral	Neutral	Neutral	Neutral
Air Quality and Climate	Neutral	Neutral	Neutral	Neutral
Landscape and Visual	Positive	Negative	Negative	Negative
Material Assets - Transportation	Neutral	Neutral	Neutral	Neutral
Material Assets - Waste	Positive	Negative	Negative	Negative
Risk Management	Neutral	Neutral	Neutral	Neutral
Cultural Heritage	Neutral	Neutral	Neutral	Neutral

With reference to biodiversity, the preferred alternative was positive as it had the least impact in terms of tree removal compared to the other 3 no. alternatives. Similarly, the preferred option was positive as it had a reduced impact on soils as well as geology and Material Assets - Waste, (reduced cut and fill) compared to the other alternatives. The reduction in the number of trees within the woodland was a positive marker for Landscape and Visual Impacts, compared to the other 3 no. options. In relation to Archaeology, Material Assets – Transportation, Air and Noise and Air Quality, the impacts were similar and considered neutral across the different alternatives.

2.13.4.2 Alternative Site Layouts

Alternative site layouts and siting progressed throughout the design process in order to minimise the impact on the receiving environment at the earliest opportunity. The initial stage involved a constraints analysis of the land within the proposed development site to identify all high-level constraints and aggregate them against the site to allow a suitable layout to be developed.

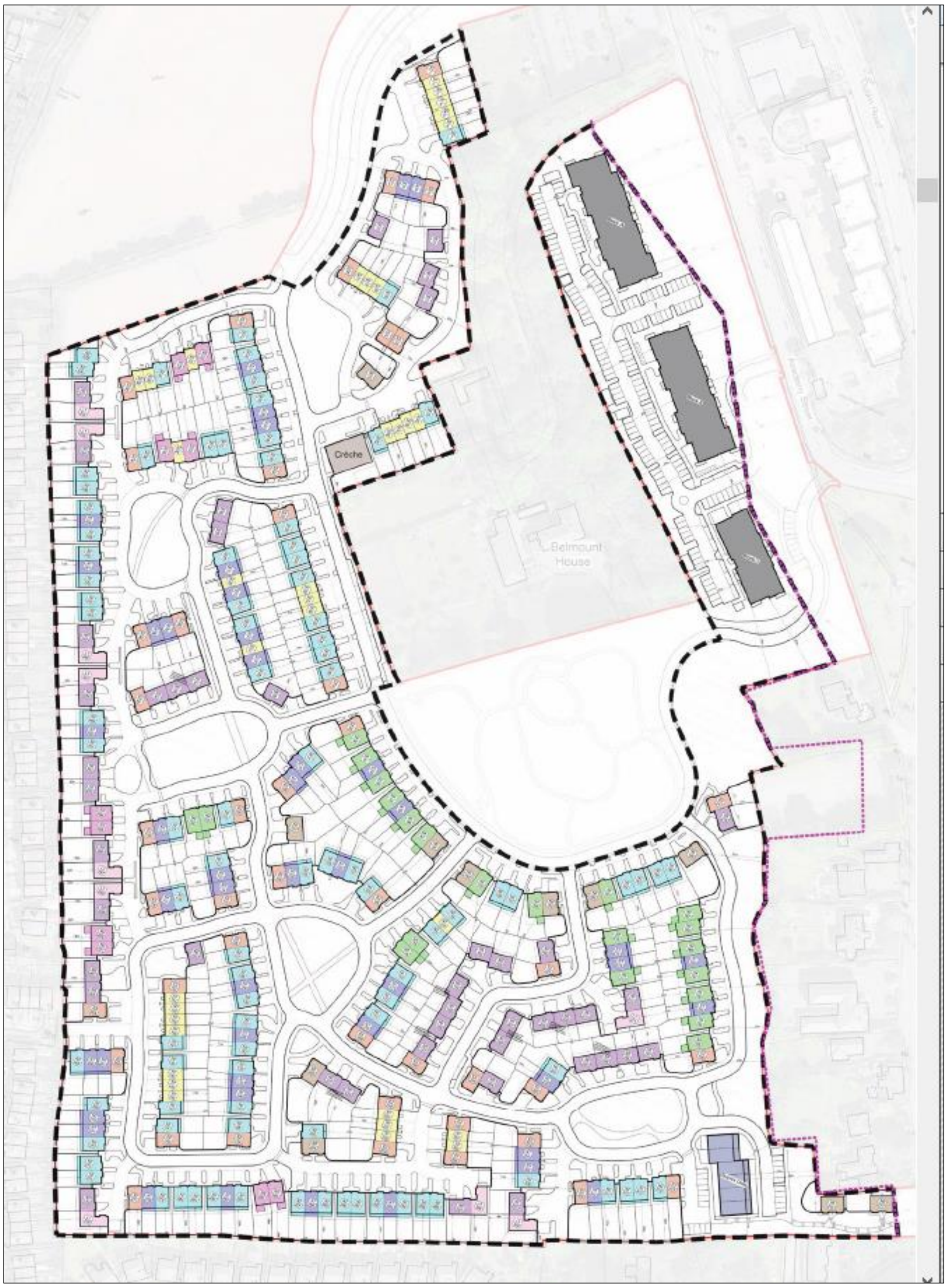
The following analyses alternatives development options considered for the subject site, and then describing design options and changes which were incorporated into the scheme as the proposals progressed through pre-application discussions with the Planning Authority and with An Bord Pleanála. We summarise the key design changes arising following the lodgement of the SHD pre-application to ABP and then provide an overview of the scheme submitted for approval. The principal considerations and amendments to the design of the scheme, having regard to and comparing the key environmental issues, are set out and discussed.

Figure 2.12 – Layout Alternative no. 1

The apartments on Academy Street were moved back within the residential zoning in order to comply with the development plan. Sites off the R147 along the Boyne, which were inaccessible from the upper lands, were left out of the site pending future access arrangements.

The proposals as noted within Alternative 1 above, demonstrate the progression of the scheme in design and layout terms, incorporating variations to landscaping and open space. The siting and layout of the dwellings and apartment buildings on site has been amended and modified to ensure greater legibility, provide a strong uniform frontage onto Academy Street.

Figure 2.13 – Layout Alternative no.2 – An Bord Pleanàla Pre-application



Layout Alternative No. 2 Pre-application SHD Submission to An Bord Pleanála

2.13.5 Final Layout Alternative

With regard to the submitted layout, the iterative process set out above, which included alternative site layouts that were considered with the objective of submitting an overall high-quality designed scheme which has undergone a robust consideration of relevant alternatives in reference to the comparison of environmental effects and meets the requirements of the EIA Directive, based on the multidisciplinary review across all environmental topics.

An Bord Pleanàla Opinion

During the course of the pre-application tripartite meeting with the Board, and within the Opinion of the Board, which was issued thereafter, a number of issues were raised which require further consideration and amendment to constitute a reasonable basis for an application for SHD.

In respect of environmental issues, the Board sought further consideration in relation to floodrisk, surface water management, built heritage and archaeology.

The proposed design consideration for the subject lands were the subject of 1 no. formal pre-application meeting with Meath County Council as well as a formal SHD meeting with An Bord Pleanála (which Meath County Council attended).

The environmental issues which most informed the design process related to tree removal (ecology), land and soils, water, and the potential impacts on existing and future traffic and transport in the area. These environmental considerations have informed the alternative layouts up to the submission of the current scheme as a Strategic Housing Development application to An Bord Pleanála.

Following the receipt of detailed feedback from An Board Pleanála during the course of the pre-application meeting, and following receipt of the opinion of the Board (as well as Meath County Council), which advised on further consideration relating to aspects of the proposed development, the applicant and design team have undertaken a number of significant changes to the development proposal which is reflected within the final submission now set out.

As noted within the development description sections of this chapter, the scheme now comprises a greater overall quantum of residential development (544 no. dwellings) than previously submitted at pre-application stage (487 no. dwellings).

The key changes proposed related to:

- Increase in overall number of dwellings from 487 to 544 to now propose a density of 44.5 units per hectare;
- Broadening of mix;
- Increase in heights of buildings within subject site;
- Inclusion of apartment buildings to the rear of Academy Street;
- Provision of Corner blocks along key internal street intersections;

Responses to each of these items have been provided as part of this final application pack, and the scheme has been updated and improved where necessary as a result.

To conclude, the overall Masterplan of the proposed development takes into account all environmental effects raised with respect to the Pre-application design submitted to An Bord Pleanàla, and within the Board's Opinion, and provides for a sustainable development that has been optimised to emphasise positive environmental effects whilst reducing negative environmental impacts wherever possible.

Figure 2.14 – Preferred Alternative – Proposed Layout

This item has been responded to appropriately within the accompanying Flood Risk Assessment prepared by CS Consulting Engineers, with the proposed drainage strategy noted as compliant with the policies of Meath County Development Plan.

The Infrastructure Design Report details the provision of drainage infrastructure services at the site in accordance with the Greater Dublin Strategic Drainage Study (GDSDS) in terms of water management and discharge. SUDS elements are implemented to attenuate and manage surface water run off including swales, bio-retention areas and permeable paving.

Table 2.3 – Comparison of Environmental Effects

Criteria	Final (Preferred Alternative)	Layout Option 1	Layout Option 2
Population and Human Health	Neutral	Negative	Neutral

Criteria	Final (Preferred Alternative)	Layout Option 1	Layout Option 2
Biodiversity	Positive	Positive	Positive
Soils	Positive	Neutral	Neutral
Hydrology, Geology and Hydrogeology	Positive	Negative	Neutral
Air and Noise	Neutral	Neutral	Neutral
Climate	Neutral	Neutral	Neutral
Landscape and Visual	Positive	Negative	Neutral
Material Assets Transportation	Neutral	Neutral	Neutral
Risk Management	Neutral	Negative	Neutral
Cultural Heritage	Neutral	Neutral	Neutral

For Landscape and Visual, the comparison of environmental effects was considered to be positive through the introduction of variations in height across the preferred layout, providing an enhanced visual appearance and avoiding a monotype development.

With reference to the above, it is noted that the potential impacts to archaeology are broadly similar as the mitigation would be similar for all options.

For Material Assets, transportation, the impacts relate mainly to short term nuisances due to the construction of the development.

The Air and Noise impacts would be broadly similar for the different alternatives, albeit different localities would have the potential to experience some short term noise and dust emissions.

In accordance with the Board's request, a revised Archaeological Assessment Report (now forming part of the EIAR and a stand-alone report) has been prepared by John Cronin Associates and accompanies this submission. This reflects the comments provided by the Department of Culture, Heritage and the Gaeltacht which addresses the method of preservation of the archaeological sites by record.

The main environmental considerations has been to achieve a design solution for the preferred layout which would enable all of the functional and operational requirements of the scheme to be met, whilst also ensuring the sensitive siting of new elements within the site. Having established the quantum, type and mix of residential units, a series of alternatives were considered by the design team. This process has enabled the final proposal to evolve. The preservation of a sense of open space and the desire to ensure that new buildings deferred to adjoining properties has driven the final layout form and design solution as proposed.

Alternative locations for the various built elements of the development were considered and examined at the design stage. The primary elements determining siting included natural site topography, the proximity of the site to adjoining properties, visual impact considerations.

2.14 DESCRIPTION OF THE OPERATION STAGE OF THE PROJECT

Pursuant to the EIA Directive an EIAR document is required to set out a description of the project processes, activities, materials and natural resources utilised; and the activities, materials and natural resources and the effects, residues and emissions anticipated by the operation of the project.

The proposed development is a residential development including associated infrastructural works, creche areas of open space. The primary direct significant environmental effects will arise during the construction stage. As a result, post-construction, the operation of the proposed development is therefore relatively benign and not likely to give rise to any significant additional impacts in terms of activities, materials or natural resources used or effects, residues or emissions which are likely to have a significant impact on population and human health, biodiversity, soils, water, air, climate, or landscape.

The primary likely and significant environmental impacts of the operation of the proposed development are fully addressed in the EIAR document; and relate to Population and Human Health, Landscape and Visual Impact and Noise and Air impacts associated with the traffic generated.

The proposed development also has the potential for cumulative, secondary and indirect impacts particularly with respect to such topics as traffic – which in many instances – are often difficult to quantify due to complex inter-relationships. However, all cumulative secondary and indirect impacts are unlikely to be significant; and where appropriate, have been addressed in the content of this EIAR document.

2.14.1 Description of Changes to the Project

Draft Guidelines on the information to be contained in environmental impact assessment reports were published by the EPA in August 2017.

The draft guidelines state in relation to change:

"Very few projects remain unaltered throughout their existence. Success may bring growth; technology or market forces may cause processes or activities to alter. All projects change and- like living entities - will someday cease to function. The lifecycles of some types of projects, such as quarries, are finite and predictable. Such projects often consider their closure and decommissioning in detail from the outset, while for most projects a general indication of the nature of possible future changes may suffice. While the examination of the potential consequences of change (such as growth) does not imply permission for such growth, its identification and consideration can be an important factor in the determination of the application."

- *Descriptions of changes may cover:*
- *Growth*
- *Decommissioning*
- *Other Changes."*
-

As per the draft EPA guidelines and in the interests of proper planning and sustainable development it is important to consider the potential future growth and longer-term expansion of a proposed development in order to ensure that the geographical area in the vicinity of the proposed development has the assimilative carrying capacity to accommodate future development.

Given the proposed site layout extent and the limitations of physical boundaries, adjoining land uses and land ownership the potential for growth of the proposed development is considered limited and confined primarily to potential minor domestic extensions which will have a negligible impact.

The parameters for the future development of the area in the vicinity of the subject site are governed by the Navan Town Development Plan. Any adjacent undeveloped lands will be the subject of separate planning applications in the future, where they are identified as being suitable for development, and where the provision of the requisite physical and other infrastructure is available.

2.14.2 Description of Secondary and Off-Site Developments

No significant secondary enabling development is deemed necessary to facilitate the proposed development. The planning application includes details of the necessary road works, which are required to facilitate this development. These works are assessed within this Environmental Impact Assessment Report.

2.14.3 Risks of Major Accidents and/or Disasters

The surrounding context consists of a mix of residential, agricultural, employment, educational and open space public amenity lands. It does not include any man-made industrial processes (including SEVESO II Directive sites (96/82/EC & 2003/105/EC) which would be likely to result in a risk to human health and safety.

Article 3 of the Environmental Impact Assessment (EIA) Directive 2014/52/EU, requires the assessment of expected effects of major accidents and/or disasters within an EIA. Article 3(2) of the Directive states that *"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".*

2.15 RELATED DEVELOPMENT AND CUMULATIVE IMPACTS

The proposed development also has the potential for cumulative, secondary and indirect impacts particularly with respect to such topics as traffic which in many instances are often difficult to quantify due to complex inter-relationships. However, all cumulative, secondary and indirect impacts are unlikely to be significant and, where appropriate, have been addressed in the content of this EIAR document.

Each Chapter of the EIAR includes a cumulative impact assessment of the proposed development with other 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 proposes.

As such, with the necessary mitigation for each environmental aspect, it is anticipated that the potential cumulative impact of the proposed development in conjunction with the other planned developments will be minimal.

3.0 POPULATION AND HUMAN HEALTH

3.1 INTRODUCTION

The 2014 Environmental Impact Assessment (EIA) Directive (2014/52/EU) has updated the list of topics to be addressed in an Environmental Impact Assessment Report (EIAR) and has replaced 'Human Beings' with 'Population and Human Health'. This chapter also meets the requirement for assessment of 'Human Beings' as per Schedule 6 of the Planning and Development Regulations 2001-2018. This chapter of the EIAR was prepared by Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates.

It should be noted that there are numerous inter-related environmental topics described throughout this EIAR document which are also of relevance to Population and Human Health. Issues such as the potential likely and significant impacts of the proposed development on landscape and visual impact, biodiversity, archaeology, architectural and cultural heritage, air quality and climate, noise and vibration, water, land and soils, material assets including traffic and transport impacts, residential amenity etc. are of intrinsic direct and indirect consequence to human health. For detailed reference to particular environmental topics please refer to the corresponding chapter of the EIAR.

Population and Human Health comprise an important aspect of the environment to be considered. Any significant impact on the status of human health, which may be potentially caused by a development proposal, must therefore be comprehensively addressed.

Population and Human Health is a broad ranging topic and addresses the existence, activities and wellbeing of people as groups or 'populations'. While most developments by people will affect other people, this EIAR document concentrates on those topics which are manifested in the environment, such as new land uses, more buildings or greater emissions. Matters relating to air pollution, noise are examined by the relevant competent experts in the relevant individual chapters, with a summary below.

3.2 STUDY METHODOLOGY

European Commission guidance relating to the implementation of the 2014 Directive, in reference to "human health" states "Human health is a very broad factor that would be highly Project dependent. The notion of human health should be considered in the context of other factors in Article 3(1) of the EIA Directive and thus environmentally related health issues (such as health effects caused by the release of toxic substances to the environment, health risks arising from major hazards associated with the Project, effects caused by changes in disease vectors caused by the Project, changes in living conditions, effects on vulnerable groups, exposure to traffic noise or air pollutants) are obvious aspects to study[7]".

A desk based study of published reference documents such as Central Statistics Office Census data, the Economic and Social Research Institute (ESRI) Quarterly Economic Commentary, the Navan Town Plan and the Meath County Development Plan was also carried out.

The Department of Environment, Community and Local Government set out an appropriate approach to reflect the requirements of the 2014 EIA Directive in relation to Population and Human Health in their Key Issues Consultation Paper. Firstly, the paper states that 'it is considered that the change from "human beings" to "population and human health" in relation to EIA is primarily clarificatory and to ensure consistency with, in particular, the Strategic Environmental Assessment (SEA) Directive'. Secondly, in terms of practical implications as regards the assessment of effects the paper states that 'it is intended that the consideration of the effects on populations and on human health should focus on health issues and environmental hazards arising from the other environmental factors, for example water contamination, air pollution, noise, accidents, disasters, and not requiring a wider consideration of human health effects which do not relate to the factors identified in the Directive'.

The Draft Guidelines on the information to be contained in environmental impact assessment reports, published by the EPA states that 'in an EIAR, 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'.

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[7] *Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report,* European Commission, 2017 http://ec.europa.eu/environment/eia/eia-support.htm

This chapter of the EIAR document focuses primarily on the potential likely and significant impact on Population, which includes Human Beings as required under the Schedule 6 of the Regulations, and Human Health in relation to health effects/issues and environmental hazards arising from the other environmental factors. Where there are identified, associated and inter-related, potential likely and significant impacts which are more comprehensively addressed elsewhere in this EIAR document, these are referred to. The reader is directed to the relevant environmental chapter of this EIAR document for a more detailed assessment, by the relevant experts.

3.3 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

3.3.1 Introduction

A description of the relevant aspects of the current state of the environment (baseline scenario) in relation to population and human health is provided below. Specific environmental chapters in this EIAR provide a baseline scenario relevant to the environmental topic being discussed. Therefore, the baseline scenario for separate environmental topics is not duplicated in this section; however, in line with guidance provided by the EPA and the Department, the assessment of impacts on population and human health refers to those environmental topics under which human health effects might occur, e.g. noise, water, air quality etc.

An outline of the likely evolution without implementation of the project as regards natural changes from the baseline scenario is also provided.

The existing environment is considered in this section under the following headings:

- Economic & Employment Activity;
- Social Patterns;
- Land-Use and Settlement Patterns;
- Employment;

3.3.2 Economic & Employment Activity

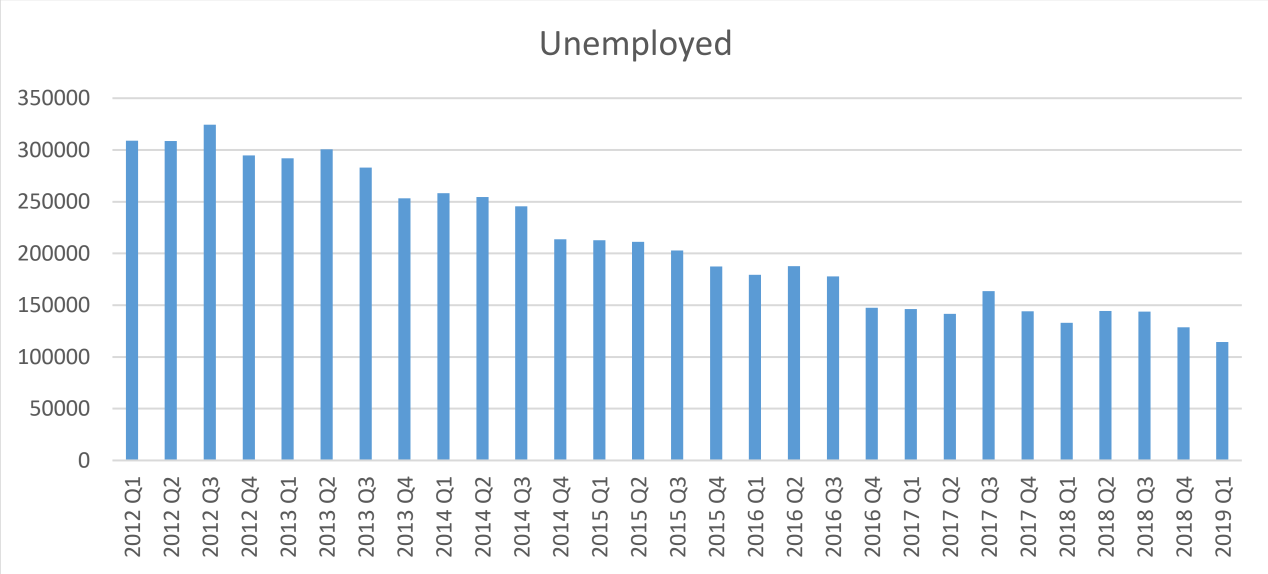
The Central Statistics Office (CSO)'s Quarterly Labour Force Survey (which has now replaced the Quarterly Household Survey) for Q1 2019, indicated that there was an annual increase in employment of 3.7% or 81,200 in the year to the first quarter of 2019, bringing total employment to 2,301,900. This compares to an annual increase of 2.3% or 50,500 in employment in the previous quarter and an increase of 2.9% or 62,100 in the year to Q1 2018.

The increase in total employment of 81,200 in the year to Q1 2019 was represented by an increase in full-time employment of 62,600 (+3.5%) and an increase in part-time employment of 18,600 (+4.1%), representing an improvement in the quality and quantity of employment in the economy. The ESRI Quarterly Economic Commentary for Spring 2019 states that while headline Gross Domestic Product (GDP) suggests a growth rate of over 6.7% for the economy, underlying economic activity grew somewhere in the region of 6% - 6.8%.

According to the ESRI, a relatively benign UK exit from the European Union (EU) (such as the establishment of a European Economic Area agreement) would see the Irish economy grow by 3.8% in 2019, compared to a 1.2% growth where the UK exists under a no-deal Brexit.

According to the CSO's Quarterly Labour Force Survey, Unemployment decreased by 18,600 (-14%) in the year to Q1 resulting in the total number of persons to 114,400 (5.6%), which is the 27th quarter in succession where the overall number of persons unemployed declined on an annual basis.
The above sources demonstrate that the national economy and employment levels were expected to improve further into 2019, with the Government faced with the challenge of sustaining economic activity and competitiveness during a period of likely full employment. This in turn results in increased demand for residential dwellings.

Figure 3.1 – The number of Unemployed in Ireland by month to Q1 2019 *CSO Labour Force Survey*



3.3.3 Social Patterns

The census data illustrates that the population of the Irish State increased between 2011 and 2016 by 3.8%, bringing the total population of the Irish State to 4,761,865 persons. The rate of growth between 2011 and 2016 slowed from 8.1% compared to the previous census, attributable to the slower economic activity in the early part of the census period resulting in a reduced level of immigration, albeit offset to a degree by strong natural increase. The economy has recovered in recent years with consequent population growth predominantly attributed to natural increase, greater economic activity, increased job opportunities and continued immigration.

Growth within Meath County was significantly higher than the national average with a growth rate of 5.9%. Growth within Navan was higher still at 6.4%.

The Central Statistics Office (CSO) provides information on population and socio-economic aspects of the population residing within the Settlement of Navan, which the subject lands are located within the administrative area of Meath County Council. The most recent census of population by the CSO was undertaken in 2016. The census provides demographic trends for the Country, region, county, town and local levels. The CSO population statistics relevant to this EIAR are set out in Table 3.1 below.

Table 3.1 – Population Change in the State, Meath County and Navan 2011 - 2016 (Source: CSO)

Area	Number of Persons		
	2011	2016	% change 11-16
Ireland - State	4,588,252	4,761,865	3.8
Meath County	184,135	195,044	5.9
Navan	29,825	31,736	6.4

Source: Central Statistics Office 2011 and 2016

3.3.4 Land Use & Settlement Patterns

The site is located within the administrative area of Meath County Council. In this respect, the policies and objectives found within the existing Meath County Development Plan 2013-2019 in combination with the Navan Town Plan form the relevant plan for the area. The subject site is zoned for New Residential. The objective of this zoning is to *'To provide for new residential communities with ancillary community facilities, neighbourhood facilities and employment uses as considered appropriate for the status of Navan as a Large Growth Town I.'*

The predominant land use immediately surrounding the subject site consists of a mix of existing residential lands. To the north of the subject site the woodlands estate comprises 2-storey semi-detached houses. Also to the north is Academy Street which 2-storey terraces on one side, and bungalow terraces on the other. Further down on Academy street, to the east of the site, are a series of modern apartment blocks, ranging from 3 to 6 storeys in height. There are also one-off houses along the Dublin road to the east of the site which are 1-2 storeys in height.

Springfield Glen is a development of detached, two-storey houses to the south of the site. To the west both *Limekiln wood* and *Woodview* are housing estates of 2-storey semi-detached houses (Woodview also includes semi-detached bungalows). It is noted Town Centre zoned lands are located further to the north some 800m from the subject site.

The subject lands occupies a substantial portion of undeveloped lands in the southern part of the settlement of Navan. Navan is identified within the plan as a Large Growth Town and the Meath County Development Plan and associated settlement hierarchy directs growth towards the identified Large Growth Towns. According to the Meath County Plan, this growth is to be done in a way which *ensures that the settlements grow in a manner that is balanced, self-sufficient and supports a compact urban form and the integration of land use and transport".* The proposed development will ensure a development of appropriate scale, density and layout is achieved through respecting the zonings at the site as stated within the Navan Town Development Plan and promoting high quality sustainable residential development as set out in the Sustainable Residential Guidelines 2009.

The development will consolidate the existing urban built form and provides a new infill area of residential land use located c. 700-1,000m from the town centre, to the north, which respects the lower density of neighbouring dwellings to the south, north and east along its boundary.

The development will create a positive residential high quality development, providing appropriate development within an existing residential area, while providing substantial residential amenities within an accessible distance to the town centre.

3.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

This section considers the '*level of impact'* on the environment of any particular aspect of the proposed development. For this chapter the potential impact on Population and Human Health is discussed. A full description of the proposed development is provided in Section 2 of this EIAR document. In summary the proposal is for a residential development of 544 no. residential units, all associated access, car parking, open space, landscaping and two crèches.

3.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

3.5.1 Introduction

This section provides a description of the specific, direct and indirect, impacts that the proposed development may have during both the construction and operational phases of the proposed development. As stated, guidance documents from the EPA and the Department outline that the assessment of impacts on population and human health should focus on health issues and environmental hazards arising from the other environmental factors and does not require a wider consideration of human health effects which do not relate to the factors identified in the EIA Directive. Additionally, this section addresses the socio-economic and employment impacts of the proposed development.

The specific chapters of the EIAR (4-15) assess the environmental topics outlined in the EIA Directive.

3.5.2 Economic Activity

Construction Phase

The construction phase of the proposed development is likely to result in a positive net improvement in economic activity in the area of the proposed development site, particularly in the construction sector and in associated and secondary building services industries. The construction sector (including associated services) was documented as one of the most adversely impacted sectors of the Irish economy following the economic downturn in 2008 and subsequent recession. The sector has recovered in recent years and this development will help to further enhance growth and reduce the increasing pressure on the housing market.

The phased construction of the proposed residential units and two childcare facilities alongside associated physical infrastructure will result in a construction period over a 60 month period and will consequently enhance economic activity during this period. It is difficult to estimate the number of employees who will be engaged on a phased residential development such as this. A considerable amount of the work will be undertaken by sub-contractors who will also work elsewhere on a phased basis over the construction phase.

The construction phase will also have secondary and indirect '*spin-off*' impacts on ancillary support services in the area of the site, such as retail services, together with wider benefits in the aggregate extraction (quarry) sector, building supply services, professional and technical professions etc. 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 proposed development could have a slight negative impact on the surrounding area during construction phase due to traffic and associated nuisance, dust and noise. These issues and appropriate mitigation measures are addressed in Chapters 7 & 8 of the EIAR, in the Traffic and Transportation Assessment, Construction Management Plan and the Waste Management Plan which accompany the application. The Traffic and Transportation Assessment recommends that a Construction Traffic Management Plan be implemented for the site which will minimise disruption to the surrounding road network.

Operational Phase

The operational phase of the proposed development will result in the provision of 544 residential units and two creches. This will provide accommodation for approximately 1,496 persons, based upon the existing average occupancy rate of 2.75 persons per household (National Average). This increase in occupancy in the area will enhance local spending power and will assist with the delivery of a critical mass of population which will support a wide range of additional local businesses, services, transport infrastructure and employment opportunities. Provide much needed residential accommodation within the town of Navan and accords with National Policy on delivering Sustainable Residential Communities.

3.5.3 Social Patterns

Construction Phase

The construction phase of the proposed development is unlikely to have any significant impact on social patterns within the surrounding area. Some additional temporary additional local populations may arise out of construction activity. However these impacts are imperceptible and temporary in nature, therefore not considered significant.

It is acknowledged that the construction phase of the project may have the potential for some short-term negative impacts on local residents. Such impacts are likely to be associated with construction traffic and possible nuisances associated with construction access requirements. These impacts are dealt with separately and assessed elsewhere in the EIAR, including Chapter 2 - Project Description and Alternatives Examined, Chapter 7 - Air Quality and Climate and Chapter 9 - Noise and Vibration and also in the Traffic and Transportation Assessment report. Such impacts will be short term and in the longer term, the completed scheme will have beneficial impacts for local businesses, residents and the wider community. Any disturbance is predicted to be commensurate with the normal disturbance associated with the construction industry where a site is efficiently and properly managed having regard to neighbouring activities. The construction methods employed and the hours of construction proposed will be designed to minimise potential impacts to nearby residents. A Construction Management Plan has been prepared and is submitted with this SHD planning application.

Operational Phase

The addition of new residents to the area will improve the vibrancy and vitality of the area and will help to support existing community and social infrastructure. The cumulative development of the lands offer a range of facilities which are beneficial to the wider community. This will help create sustainable and active communities.

3.5.4 Land-Use & Settlement Patterns

Construction Phase

The construction phase of the proposed development will primarily consist of site clearing, excavation and construction works, and has the potential to impact adversely and result in the temporary degradation of the local visual environment on a short-term basis. The visual impacts are assessed in greater detail in Chapter 9.

Secondary indirect land use impacts include off-site quarry activity and appropriate disposal sites for removed spoil. Construction works are likely to take place on a phased basis, which will reduce the potential impacts on adjoining land use. The Construction Management Plan addresses these issues in more detail.

The construction phase may result in a marginally increased population in the wider area due to increased construction employment in the area, however, this would be temporary in nature and the impact would be imperceptible.

Operational Phase

The operational phase of the proposed development will result in the introduction of a residential accommodation land use to the subject site which will provide much needed housing for the growing population of the immediate area. Furthermore, a significant quantity of open space consisting of recreational and amenity space is also provided, promoting healthy communities.

3.5.5 Employment

The impact of the proposed development in relation to employment has been discussed under economic activity.

3.5.6 Potential Cumulative Impacts

The potential cumulative impacts of the proposed development on population and human health have been considered in conjunction with the ongoing changes in the surrounding area.

The cumulative impact of the proposed development will be a further increase in the population of Navan. Completion of this residential zoned land by approximately 1,496 persons. The increase in population has been taken into account in the Strategic Environmental Assessment of the Navan Town Plan. The long term impact is considered to be positive having regard to the zoning objectives relating to the subject lands as well as the promotion of sustainability.

With regard to human health, the cumulative impact of the proposed development will include the provision of a new high quality and sizeable new neighbourhood which will include a large quantum of high quality green space. The potential cumulative impacts with regard to Health have been assessed in Chapters 4-15 of this EIAR, where relevant.

3.5.7 '*Do Nothing'* Scenario

In order to provide a qualitative and equitable assessment of the proposed development, this section considers the proposed development in the context of the likely impacts upon the receiving environment should the proposed development not take place.

A '*do nothing'* scenario would result in the subject lands remaining green-field and undeveloped. This would be an underutilisation of the site from a sustainable planning and development perspective, particularly considering the location of the infill lands.

The lands are considered a logical extension to Navan in the context of the sequential approach promoted by the development plan and will enable the sustainable and organic growth of the settlement whilst improving permeability and west-east connectivity through the proposed pedestrian and cycle links.
The '*do-nothing'* scenario would result in the status of the environmental receptors described throughout this EIAR document remaining unchanged. The potential for any likely and significant adverse environmental impacts arising

from both the construction and operational phases of the proposed development would not arise. In terms of the likely evolution without implementation of the project as regards natural changes from the baseline scenario, it is considered there would be limited change from the baseline scenario in relation to population (human beings) and human health.

3.6 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

Avoidance, remedial and mitigation measures describe any corrective or mitigative measures that are either practicable or reasonable, having regard to the potential likely and significant environmental impacts.

3.6.1 Construction Phase

A range of construction related remedial and mitigation measures are proposed throughout this EIAR document with reference to the various environmental topics examined and the inter-relationships between each topic. These remedial and mitigation measures are likely to result in any significant and likely adverse environmental impacts on population and human health during the construction phases being avoided. Readers are directed to Chapter 15 of this EIAR document which summarises all of the remedial and mitigation measures proposed as a result of this EIA.

POP & HH CONST 1:

In order to protect the amenities enjoyed by nearby residents, premises and employees a full Construction Management Plan (including traffic management) should be prepared by the contractor and implemented during the construction phase.

With reference to the construction phase of the proposed development, the objective of the Construction Waste Management Plan prepared by CS Consulting is to ensure that waste generated during the proposed construction and operation phases will be managed and disposed of in a way that ensures the provisions of the Waste Management Acts 1996 - 2013 are complied with.

During the construction stage, the risk of accidents associated with the proposed development are not predicted to cause unusual, significant or adverse effects to the existing public road network. The vast majority of the works are away from the public road in a controlled environment. The objective of which is to minimise the short term disruption to local residents, and reduce the potential for accidents.

Furthermore, is expected that the risk of accidents would be low during the construction of the proposed development considering the standard construction practices which are to be used.

With reference to natural disasters (e.g. flooding), the proposed development has undergone a Site Specific Flood Risk Assessment, prepared by CS Consulting. The main area of the site where development is proposed is not at risk of fluvial, pluvial or groundwater flooding.

A Health and Safety Plan will be prepared (required by the *Safety, Health and Welfare at Work (Construction) Regulations 2013*) to address health and safety issues from the design stages through to the completion of the construction and maintenance phases. The Health and Safety Plan will comply with the requirements of the Regulations and will be reviewed as the development progresses.

Safety on site will be of paramount importance. Only contractors with the highest safety standards will be selected. During the selection of the relevant contractor and the respective subcontractors their safety records will be investigated.

Prior to working on site, each individual will receive a full safety briefing and will be provided with all of the safety equipment relevant to the tasks the individual will be required to perform during employment on site.

Safety briefings will be held regularly and prior to any onerous or special task. *'Toolbox talks'* will be held to ensure all workers are fully aware of the tasks to be undertaken and the parameters required to ensure the task will be successfully and safely completed.

All visitors will be required to wear appropriate personal protective equipment prior to going on to the site and will undergo a safety briefing by a member of the site safety team.

Regular site safety audits will be carried out throughout the construction programme to ensure that the rules and regulations established for the site are complied with at all times.

3.6.2 Operational Phase

The operation phase is considered to have likely significant positive impacts on human beings in relation to the provision of additional residential units, open space, childcare provision, to cater for the demands of a growing population in accordance with the residential zoning objectives pertaining to the site.

During the operational phase of the development the design of the scheme has undergone a Road Safety Audit and has had regard to Design Manual for Urban Roads and Streets (DMURS) during its design. This will promote a pedestrian friendly environment, promoting sustainable development and reducing the influence of cars. This has the potential to reduce accidents within the proposed development.

3.7 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

This section allows for a qualitative description of the resultant specific direct, indirect, secondary, cumulative, short, medium and long-term permanent, temporary, positive and negative effects as well as impact interactions which the proposed development may have, assuming all mitigation measures are fully and successfully applied. It should be noted that in addition to remedial and mitigation measures, impact avoidance measures have also been built in to the EIA and project design processes through the assessment of alternatives described in Chapter 2 of this EIAR document.

3.7.1 Construction Phase

The construction phase of the proposed development will primarily consist of site clearance, excavation and construction works, which are likely to take place over 5 main phases, which will be largely confined to the proposed development site. Notwithstanding the implementation of remedial and mitigation measures there will be some minor temporary residual impacts on population (human beings) and human health most likely with respect to nuisance caused by construction activities. It is anticipated that subject to the careful implementation of the remedial and mitigation measures proposed throughout this EIAR document any adverse likely and significant environmental impacts will be avoided. Positive impacts are likely to arise out of an increase in employment and economic activity. The overall predicted likely and significant impact of the construction phase will be short-term, temporary and likely to be neutral.

The construction of the sewerage connection to facilitate the proposed development will require works to the public road will likely entail some localised impacts to residents. The Construction Management Plan will ensure that disruption and nuisances will be kept to a minimum.

3.7.2 Operational Phase

The proposed development will result in a generally positive alteration to the existing undeveloped site in terms of the provision of residential units to serve the growing residential and student population of the area in accordance with the objectives of the Meath County Development Plan and the Navan Town Plan. Positive impacts on population and human health will include health benefits associated with the provision of a significant quantity of open space, pedestrian and cyclist routes, a highly permeable layout which connects to adjacent development and delivers the objectives of the Navan Town Plan. The provision of creche facilities on site enhances the quality of the development and helps to create sustainable communities.

The implementation of the range of remedial and mitigation measures included throughout this EIAR document is expected to have the impact of limiting any adverse significant and likely environmental impacts of the operational phase of the proposed development on population and human health.

3.8 MONITORING

In relation to the impact of the development on population and human health it is considered that the monitoring measures outlined in regards to the other environmental topics such as water, air quality and climate and noise etc. sufficiently address monitoring requirements.

3.9 REINSTATEMENT

While not applicable to every aspect of the environment considered within the EIAR, certain measures may be proposed to ensure that in the event of the proposal being discontinued, there will be minimal impact to the environment.

There are no reinstatement works proposed specifically with respect to population and human health.

3.10 INTERACTIONS

As noted above, there are numerous inter-related environmental topics described in detail throughout this EIAR document which are of relevance to human health. This chapter of the EIAR has been instructed by updated guidance documents reflecting the changes within the 2014 EIA Directive. These documents are the Draft Guidelines on the information to be contained in environmental impact assessment reports, published by the EPA in August 2017 and the Key Issues Consultation Paper on the Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licencing Systems, published by the Department of Environment, Community and Local Government in May 2017. In line with the guidance documents referred, this chapter of the EIAR focuses primarily on the potential likely and significant impact on Population and Human Health in relation to health effects/issues and environmental hazards from the other environmental factors and interactions that potentially may occur.

Where there are identified associated and inter-related potential likely and significant impacts which are more comprehensively addressed elsewhere in this EIAR document, these are referred to. However, the reader is directed to the relevant environmental topic chapter of this EIAR document for a more detailed assessment.

3.11 CUMULATIVE ASPECTS

An increase in local housing, and some increase in employment opportunities and service provision (crèche) has the potential to generate direct, indirect impacts. The visual appearance of the landscape will be altered with the introduction of the proposed built elements including infrastructure, in cumulation with other development in the area. Implementation of the remedial and reductive measures in respect of noise/traffic management etc. in the EIAR would ensure a minimal impact on the existing communities of this area during the construction phase.

The construction of the sewerage/water supply connections along the public road (R147) by Irish Water to facilitate the proposed development will require works to the public road will likely entail some localised impacts to residents. The works will require road opening licence under Section 254 of the Planning and Development Acts 2000-(as amended) from Meath County Council. As part of the road opening licence, it is anticipated that a Construction Traffic Management Plan would be agreed with Meath County Council, by the contractor. The objective of which is to minimise the short term disruption to local residents.

There will be some short term impacts during the construction phase as the pipes are laid, particularly in respect of traffic management with regards to sensitive receptors. This may cause local short term inconvenience and disturbance to residents and business in the vicinity of the works. However the works would normally be undertaken in sections on a phased/rolling programme so that the number of persons experiencing local inconveniences at any one time is kept to a minimum.

3.12 DIFFICULTIES ENCOUNTERED IN COMPILING

No significant difficulties were experienced in compiling this chapter of this EIAR document.

4.0 BIODIVERSITY

4.1 INTRODUCTION

This report has been prepared by Padraic Fogarty of OPENFIELD Ecological Services. Pádraic Fogarty has worked for over 20 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. OPENFIELD is a full member of the Institute of Environmental Management and Assessment (IEMA).

This report provides the for an assessment of the potential impacts to biodiversity of the proposed development.

Under Article 6(3) of the Habitats Directive a screening for '*appropriate assessment'* of projects must be carried out to determine if significant effects are likely to arise to Natura 2000 sites. This assessment is carried out by the competent authority, in this case An Bord Pleanàla. The AA Screening and Natura Impact Assessment report is presented separately.

4.1.1 Site Visit

The assessment was carried out in accordance with the following best practice methodology: 'Guidelines for Information to be contained in Environmental Impact Assessment Report (EPA, 2017) and 'Guidelines for Ecological Impact Assessment in the United Kingdom and Ireland' by the Chartered Institute of Ecology and Environmental Management (IEEM, 2016).

Site visits were carried out on the 7th of March 2018 and April 24th 2019. 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). A species list for each habitat was compiled and these are presented in Appendix D of this report. Species abundance was determined using the DAFOR scale (D = Dominant; A = Abundant; F = Frequent; O = Occasional; R = Rare), a subjective estimation but nevertheless a useful mode of habitat description. Sample digital photos were also taken. Data were then uploaded to the ArcView 9.2 GIS software suite.

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).

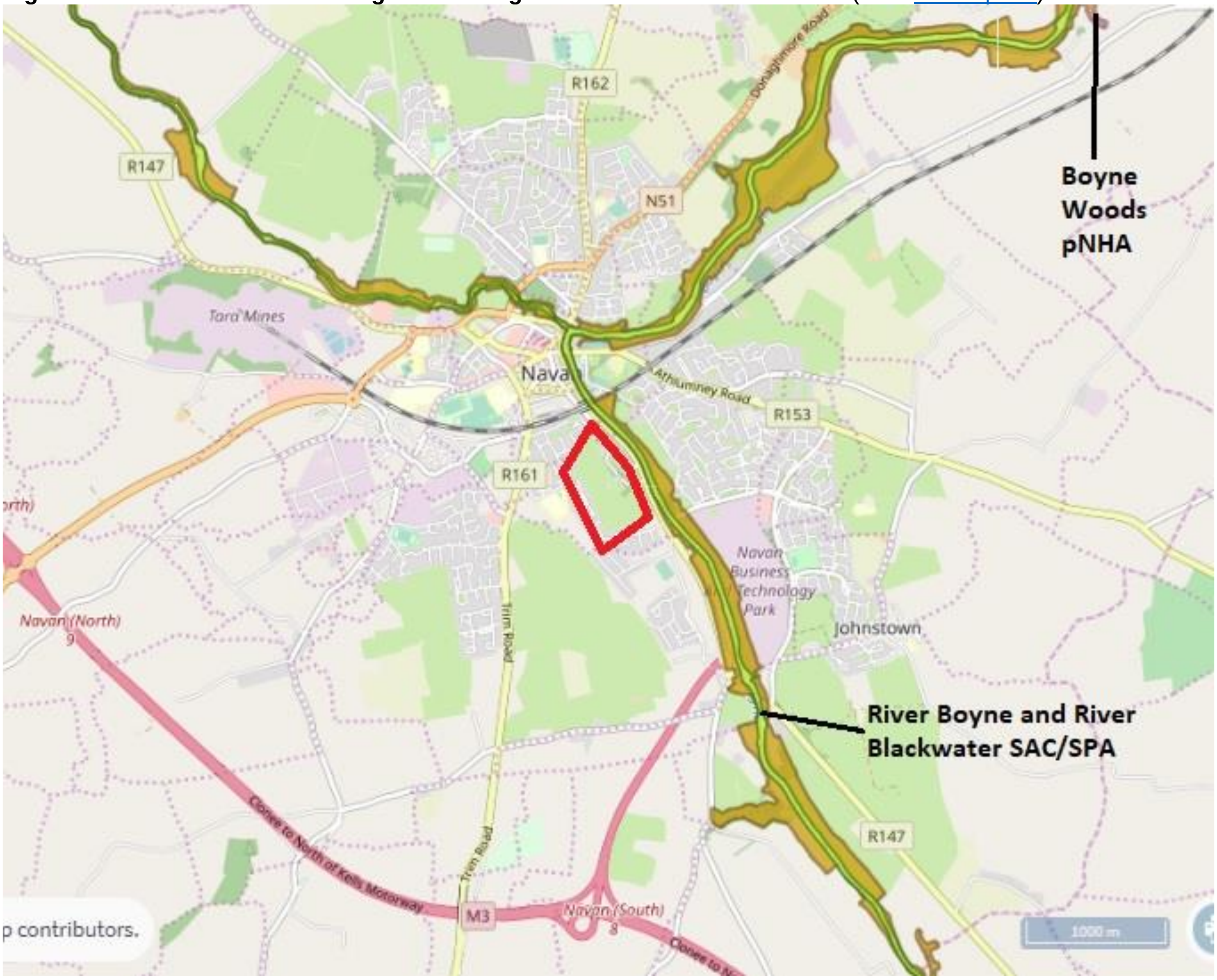
April lies within the optimal survey period for general habitat surveys (Smith et al., 2010) and and so a full characterisation of habitats was possible. March is within the optimal period for mammal surveying (with the exception of bats) as tracks and other field signs can easily be read. Both March and April are within the season for surveying breeding bird activity and amphibians. It was possible to classify all habitats on the site to Fossitt level 3.

4.2 THE EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

4.2.1 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 is shown in figure 4.1.

Figure 4.1 – Site location showing areas designated for nature conservation (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 located within an approximate 2km radius of the application site:

The **River Boyne and River Blackwater Special Area of Conservation** (site code: 2299) drains most of county Meath. They are important salmonid rivers as well as providing habitat for a wide range of aquatic and riparian wildlife. The reasons why the rivers are an SAC are set out in the site's 'qualifying interests' and these are given in table 1.

The boundary of the **River Boyne and River Blackwater SPA** (site code: 4232) lies within the boundary of the SAC but in this case it closely follows the main channel of the Boyne and its immediate riparian zones. It has a single 'feature of interest', the Kingfisher *Alcedo atthis* which is listed on Annex I of the Birds Directive.

Table 4.1 – Qualifying interests of the River Blackwater and River Boyne SAC

Aspect	Level of Protection
Alluvial forest (code: 91E0)	Habitats Directive Annex I priority
Alkaline fens (code: 7230)	Habitats Directive Annex I
Atlantic salmon *Salmo salar* (code: 1106)	Habitats Directive Annex II
River lamprey *Lampetra fluviatilis* (code: 1099)	
Otter *Lutra lutra* (code: 1355)	

The conservation status of these features of interest have not been assessed at the level of the SAC/SPA. At a national level the Kingfisher is considered to be of medium (amber listed) conservation concern (Colhoun & Cummins, 2013). The Boyne system was surveyed as part of a national survey of Kingfisher and it was found that it supported 15-29 territories (Cummins et al., 2010). Habitats and species designated under the Habitats Directive have been assessed as part of Ireland's commitments under Article 17 of that Directive. These assessments are at a national scale only. Table 2 gives the assessment of those features of relevance to the River Boyne and River Blackwater SAC (NPWS, 2013). The conservation status of the Otter, River Lamprey and Atlantic Salmon have been assessed as near threatened, least concern and vulnerable respectively (Marnell et al., 2009; King et al., 2011). The status of Atlantic Salmon in the River Boyne is evaluated annually by Inland Fisheries Ireland. In their most recent report, it was calculated that the numbers of Salmon in that river are only 22% of the *'conservation limit'* (i.e. the lower limit which would allow for sustainable fishing). It can be elucidated from this that the status of Salmon in the Boyne is not satisfactory (IFI, 2016).

Table 4.2 – National assessment of features of interest of the River Boyne and River Blackwater SAC

Feature of Interest	Status
Alluvial forest (code: 91E0)	Bad
Alkaline fens (code: 7230)	Bad
Atlantic salmon *Salmo salar* (code: 1106)	Intermediate
River lamprey *Lampetra fluviatilis* (code: 1099)	Good
Otter *Lutra lutra* (code: 1355)	Good

Alkaline Fens: Threats of 'high importance' are groundwater abstractions, land reclamation, diffuse groundwater pollution, land abandonment/under-grazing. These fen systems are often a complex mosaic of habitats, with tall sedge beds, reedbeds, wet grasslands, springs and open-water often co-occurring at a given fen site. Their integrity is reliant upon a stable, high water table; calcareous/low-nutrient water supply; and controlled mowing and/or grazing.

Alluvial Wet Woodland: This is a native woodland type that occurs on heavy soils, periodically inundated by river water but which are otherwise well drained an aerated. The main pressures are identified as alien invasive species, undergrazing and overgrazing. Pollution from agricultural land may also be significant.

River lamprey: This species spends its entire life cycle in freshwater and is considerably smaller than the larger, and more threatened Sea lamprey. As juveniles they are indistinguishable from Brook lamprey at the species level and are only differentiated by their size at adults. Since surveys are carried out on the juvenile life stage these two species are jointly assessed. Although threatened by pollution, along with all aquatic life, they are assessed as being of 'good' status.

Atlantic salmon: This once abundant fish has suffered a dramatic decline in recent decades. On land they are threatened by pollution and barriers to migration while at sea mortality may occur through industrial fisheries, parasites from aquaculture operations and climate change. The Habitats Directive only protects the salmon in its freshwater habitat and for some SACs specific conservation objectives have been set for water quality. Salmon will only spawn in clean, sediment-free beds of gravel.

Otter: This aquatic mammal lives its entire life in and close to wet places, including rivers, lakes and coastal areas. They will feed on a wide variety of prey items. Despite local threats from severe pollution incidents and illegal fishing, its population is considered stable and healthy, and so is assessed as being of 'good' status.

The **Boyne Woods pNHA** (site code: 1592) is now entirely within the River Boyne and River Blackwater SAC. It was originally identified for designation for its broadleaved woodland habitats.

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 Limekilnhill site is located the N86 square and one species of protected flowering plant is highlighted. This is the Hairy St. John's-wort *Hypericum hirsutum,* a plant of 'woods and shady places' (Parnell & Curtis, 2012). This record dates from 1896 and it has not been recorded in recent times[8].

Additional records of protected species are available from the database of the National Biodiversity Data Centre.

Table 4.3 lists mammal species that are protected under the Wildlife Act 1976 and highlights those for which there are current records in this 10km square. 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.

Table 4.3 – Protected mammals in Ireland

Species	Level of Protection	Habitat	Red List Status[9]
Otter *Lutra lutra*	Annex II & IV Habitats Directive; Wildlife (Amendment) Act, 2000	Rivers and wetlands	Near Threatened
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
Brown long-eared bat *Plecotus auritus*		Woodland	Near Threatened
Leisler's bat *Nyctalus leisleri*		Woodlands and buildings	Least Concern
Common pipistrelle *Pipistrellus pipistrellus*		Farmland, woodland and urban areas	Least Concern
Soprano pipistrelle *Pipistrellus pygmaeus*		Rivers, lakes & riparian woodland	Least Concern

[8] www.bsbi.org

[9] Marnell et al., 2009

Species	Level of Protection	Habitat	Red List Status[9]
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
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	-

(and their known status within the zone of influence (Harris & Yalden, 2008)[10] Those cells that are greyed out indicate no records for this species in the N86 square.)

Water quality in rivers is monitored on an on-going basis by the Environmental Protection Agency (EPA). It assesses 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 = pristine quality and Q5 = grossly polluted (Toner et al., 2005). OSI and EPA mapping show that both the River Blackwater and the River Boyne flow into Navan, joining in the centre of the town. Water quality along the River Blackwater, just upstream of this confluence, was most recently (2012) assessed as Q3-4 (slight pollution). Also above the confluence, a similar score of Q3-4 was recorded along the Boyne in 2003. At this time Q3-4 was also recorded downstream of the town. The Boyne continues to flow eastward and drains into the Irish Sea at Drogheda.

The Blackwater and Boyne are a part of the Blackwater North and Boyne Lower Water Management Units respectively, and much of this river length (>50%) was assessed as unsatisfactory (moderate or poor) in 2010 according to the Programme of Measures in the ERBD Management Plan. This report suggests that main pressures on water quality are from agriculture, abstractions, physical modifications and wastewater discharges. These rivers, as they flow through Navan, have been classified as 'moderate' under the Water Framework Directive (WFD) reporting period 2010-15, although a stretch of the River Boyne through the town has not been classified (from www.epa.ie). These assessments are 'unsatisfactory' and so remedial measures will be required to restore 'good ecological status', something that was due by 2015.

[10] Excludes marine mammals

4.2.2 Stakeholder Consultation

The Development Applications Unit (DAU) of the Department of the Arts, Heritage and the Gaeltacht was contacted for nature conservation observations (reference no. GPre00050/2018) but a response to this was not received at the time of issuing this report.

Details were also sent to Inland Fisheries Ireland. The response, received in March 2018, is reproduced here in full:

"Inland Fisheries Ireland (IFI) is a Statutory Body established on the 1st July 2010 .Under section 7(1) of the Inland Fisheries Act 2010 (No. 10 of 2010) the principal function of IFI is the protection, management and conservation of the inland fisheries resource.

Under section 7(3) of the IFI Act it is stated that without prejudice to subsection (1), IFI shall in the performance of its functions have regard to(g) the requirements of the European Communities (Natural Habitats) Regulations 1997 (S.I. No. 94 of 1997) and the need for the sustainable development of the inland fisheries resource (including the conservation of fish and other species of fauna and flora habitats and the biodiversity of inland water ecosystems),(h) as far as possible, ensure that its activities are carried out so as to protect the national heritage (within the meaning of the Heritage Act 1995).

The EU Water Framework Directive (2000/60/EC) entered into force in December 2000 requires the protection of the ecological status of river catchments – this encompasses water quality and requires the conservation of habitats for ecological communities. One of the primary objectives of the Directive is to establish a framework which prevents further deterioration and protects and enhances the status of aquatic ecosystems. Protection of aquatic ecosystems requires that river systems be protected on a catchment basis.

Article 5 of the 2009 Surface Water Regulations requires that a public authority, in performance of its functions, shall not undertake those functions in a manner that knowingly causes or allows deterioration in the chemical or ecological status of a body of surface water. Also article 28(2) of the said Regulations states that a surface water body whose status is determined to be less than good shall be restored to at least good status not later than the end of 2015.

This site is in close proximity to the River Boyne. The River Boyne is a pSAC and has extremely valuable stocks of Atlantic Salmon, Brown Trout, Sea Trout and lamprey.

This project is generally acceptable to us provided:

- *There is sufficient capacity in Navan WWTP and ancillary pumping Stations.*
- *Measures will be put in place to prevent hydrocarbons and other deleterious matter entering the River Boyne during the construction stage.*
- *With regard to any new surface water connection to the River Boyne we would require some form of oil interception.*
- *Any proposed headwalls protruding into the River Boyne would have to be located in a suitable location as we want it to have the least possible impact on the fisheries habitat. If relevant, the draft design and location of these headwalls should be furnished to IFI at pre-design stage for our written approval. "*

4.2.3 Site Survey

Aerial photography from the OSI shows that land use in this area has been predominantly agricultural with and urban in nature. Historically the subject lands were a part of the Belmount House, which is shown as being surrounding by trees in the early 1800s.

4.2.4 Flora

The site survey showed that seven broad habitat types are present in the study area. These are shown as a habitat map in figure 4.2. The lands can be described as a series of agricultural fields which, at the time of survey, were harvested **arable crops – BC1**. In two small areas, as well as the field facing Academy St., agricultural activities were not underway, and tussocky grassland has developed which can be described as **dry meadow – GS1**. This is dominated by Cock's-foot *Dactylis glomerata,* with Curled Dock *Rumex crispus,* Ribwort Plantain *Plantago lanceolata* and Mouse-ear *Cerastium fontanum.* These are negligible and low biodiversity value habitats respectively.

Figure 4.2 – Habitat map of the Subject lands

Agricultural lands are subdivided by traditional field boundaries, either **hedgerows – WL1** or **treelines – WL2**. These habitats can have a similar species composition however the latter is characterised by tall trees with an average height of 5m. These boundaries can be further classified into 'higher significance' or 'lower significance' in accordance with guidelines from the Heritage Council (Foulkes et al., 2013). This is based on a scoring system depending upon their age, structure and species diversity. Most of these boundaries are shown on 19th maps from the OSI and so are of significant age. Newer treelines are associated with boundaries with residential homes, and may be composed of non-native, horticultural species, e.g. Leyland Cypress *Curprocyparis leylandii.* Lower significance hedgerow is dominated by Brambles, with low diversity and a low number of emergent trees. Higher significance boundaries, in addition to their age, tend to have a high number of trees, especially Ash *Fraxinus excelsior,* Hawthorn *Crataegus monogyna,* Elder *Sambucus nigra,* and Blackthorn *Prunus spinosa.* Ground flora can include Soft-shield Fern *Polystichum setiferum,* Hart's-tongue *Asplenium scolopendrium* or Cow Parsley *Anthriscus sylvestris.* A number of these boundaries are accompanied by **drainage ditches – FW4** which add to their wildlife interest. Higher significance hedgerows and treelines can be considered to be of high local biodiversity value. Many of the hedgerows had been recently cut and this may have limited species identification.

Old farm buildings (**buildings – BL3**) can be found along the site boundary (i.e. outside the site boundary) and are surrounded by **scrub – WS1,** principally Brambles *Rubus fruticosus agg.* and Ash saplings. Lands to the east are associated with the historic Belmont House and a **broadleaved woodland – WD1.** The woodland is made up of tall Beech *Fagus sylvatica,* Ash, Pine *Pinus sylvestris* and non-native varieties, as well as Cherry Laurel *Prunus laurocerasus.* These are largely non-native species but nevertheless have value for local wildlife.

4.2.5 Fauna

The site survey included incidental sightings or proxy signs (prints, scats etc.) of faunal activity, while the presence of certain species can be concluded where there is suitable habitat within the known range of that species. Table 4.2 details those mammals that are protected under national or international legislation in Ireland. Cells are greyed out where suitable habitat is not present or species are outside the range of the study area. No field signs of larger mammals were recorded. There were no signs of Badger activity and no sett was found within the hedgerows or treelines. There are no records of Badgers from this vicinity from the database of the National Biodiversity Data Centre although there are a number of records at the 10km square scale.

Features on the site are considered to be of moderate suitability for bat roosting (i.e. with some old/veteran trees with cavities) (Hundt, 2013). There are no buildings on the development site. Individual bats can roost temporarily in very small crevices that may be present in mature trees. Hedgerows and treelines, particularly those of 'higher significance' are suitable for foraging bats and a variety of species are likely to be present. A dedicated bat survey was carried out by Dr Tina Aughney in September 2017 and May 2019. These dates are within the optimal flight period for bats. This found evidence of foraging/commuting by a number of species, namely Common Pipistrelle, Soprano Pipistrelle, Leisler's Bat, Natterer's Bat and Brown Long-eared Bat. According to the bat report:

"The widespread encounters of common pipistrelles indicate that the survey area is widely used by this species while there was a concentration of the remaining four species around the treelines and woodlands associated with Belmont House. The latter may be a reflection of the roosts recorded in the buildings in this area while the presence of Natterer's bat may be associated with the numerous mature trees with Potential Bat Roosting features.

Roosts were recorded for the following bat species: Leisler's bat, brown long-eared bats, common pipistrelles and soprano pipistrelles. These were recorded in buildings adjacent to the proposed development site. There are no buildings within the proposed development site.

Overall a medium level of bat activity was recorded for the proposed development site and in relation to Table 4.2, it is considered that the local bat populations is of local importance due to the presence of numerous roosts within the Belmont House area and associated woodland."

Suitable habitat for Otter is not present on the site. No evidence of Irish Hare was found although they are recorded from the Meath area and avail of a variety of habitats (Reid et al., 2007). Small mammals such as Irish Stoat *Mustela erminea hibernica,* Hedgehog *Erinaceus europaeus* and Pygmy Shrew *Sorex minutus* are considered are considered widespread and can be assumed to be present (Lysaght & Marnell, 2016).

Rabbit and Fox are likely to be present while other non-protected species such as House Mouse *Mus domesticus,* Wood Mouse *Apodemus sylvaticus* and Brown Rat *Rattus norvegicus* may also be found.

March is within the bird breeding season. Species noted were Blackbird *Turdus merula,* Wood Pigeon *Columba palumbus,* Magpie *Pica pica,* Bullfinch *Pyrrhula pyrrhula*, Great Tit *Parus major,* Chaffinch *Fringilla coelobs,* Song Thrush *T. philomelos,* Starling *Sturnus vulgaris* and Wren *Troglodytes troglodytes* and these are listed as 'low conservation concern' by BirdWatch Ireland. Hedgerows and treelines in particular provide breeding habitat for common garden and woodland species.

In April 2019, in addition to the birds noted above, Long-tailed Tit *Aegithalos caudatus*, Pheasant *Phasianus colchicus,* Yellowhammer *Emberiza citronella,* Goldfinch *Carduelis carduelis,* Robin *Erithacus rubecula,* Hooded Crow *Corvus corone,* House Sparrow *Passer domesticus,* Blue Tit *P. caeruleus,* Blackcap *Sylvia atricapilla* and Dunnock *Prunella modularis.* Magpie, Bullfinch, Chaffinch, Song Thrush and Starling were not noted on this occasion.

Of those species listed as being of high conservation importance in Ireland, Barn Owl *Tyto alba,* Yellowhammer *Emberiza citronella,* Meadow Pipit *Anthus pratensis* and Grey Wagtail *Motacilla cinerea* are recorded from this part of Dublin (Colhoun & Cummins, 2013; Balmer et al., 2013). Yellowhammer (a single calling male) was noted during the survey while the Grey Wagtail is only found close to open water courses. The farm buildings did not have ledges typically used by Barn Owl and no signs of their presence were noted (e.g. staining with droppings or accumulations of prey pellets). This site is not likely to harbour resources for other species of high conservation concern.

Common Frog *Rana temporaria* and Common Lizard *Lacerta vivipara* are protected under the Wildlife Act 1976 and may be present on this site. March is within the spawning season however no spawn was noted (freezing temperatures with snow and ice the previous week may have affected spawning). Smooth Newts Lissotriton vulgaris are to be found in Meath but there are no permanent ponds on this site in which they are likely to be breeding.

Water courses on the site are not of fisheries significance. They are not suitable for salmonids (Atlantic Salmon Salmo salar or Trout S. trutta), European Eels Anguilla anguilla, or Lamprey Lampetra sp. as they are too shallow and are likely prone to drying out. Drainage ditches lead to the River Boyne, the main channel of which lies approximately 30m to the east. The Boyne is of significant fisheries value. Sampling from IFI in 2009 found Atlantic Salmon, Brown Trout, Lamprey Lampetra sp., Eel, Gugeon Gobio gobio, Stone Loach Neomacheillus barbatulus and Minnow Phoxinus phoxinus. The main channel of the Boyne is a designated salmonid water under SI No. 293 of 1988.

4.2.6 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 not within, or adjacent to, any area that has been designated for nature conservation at a national or international level. There are no examples of habitats listed on Annex I of the Habitats Directive or records of rare or protected plants. There are no plants growing on the site which are listed as alien invasive species under SI No. 477 of 2011. There are no significant water courses on the site although drainage ditches lead to the River Boyne, which is of international importance for biodiversity.

Significance criteria are available from guidance published by the National Roads Authority (NRA, 2009). These are reproduced in table 4.3. From this an evaluation of the various habitats and ecological features on the site has been made and this is shown in table 4.4.

Table 4.4 – Site evaluation scheme taken from NRA guidance 2009

Site Rating	Qualifying criteria
A - International importance	SAC, SPA or site qualifying as such. Sites containing 'best examples' of Annex I priority habitats (Habitats Directive). Resident or regularly occurring populations of species listed under Annex II (Habitats Directive); Annex I (Birds Directive); the Bonn or Berne Conventions. RAMSAR site; UNESCO biosphere reserve; Designated Salmonid water

Site Rating	Qualifying criteria
B - National importance	NHA. Statutory Nature Reserves. Refuge for Flora and Fauna. National Park. Resident or regularly occurring populations of species listed in the Wildlife Act or Red Data List 'Viable' examples of habitats listed in Annex I of the Habitats Directive
C - County importance	Area of Special Amenity, Tree Protection Orders, high amenity (designated under a County Development Plan) Resident or regularly occurring populations (important at a county level, defined as >1% of the county population) of European, Wildlife Act or Red Data Book species Sites containing semi-natural habitat types with high biodiversity in a county context, and a high degree of naturalness, or populations of species that are uncommon in the county
D - Local importance, higher value	Sites containing semi-natural habitat types with high biodiversity in a county context, and a high degree of naturalness, or populations of species that are uncommon in the locality Sites or features containing common or lower value habitats, including naturalised species that are nevertheless essential in maintaining links and ecological corridors between features of higher ecological value.
E - Local importance, lower value	Sites containing small areas of semi-natural habitat that are of some local importance for wildlife; Sites or features containing non-native species that are of some importance in maintaining habitat links.

Table 4.5 – Evaluation of the importance of habitats and species on the Limekilnhill site

River Boyne	International importance - A
Higher significance Hedgerows – WL1 and Treelines – WL1 with or without Drainage Ditches – FW4 Mixed broadleaved woodland – WD1	Local importance (higher value - D)
Dry meadow – GS2 Scrub – WS1 Lower significance Hedgerow – WL1	Local importance (lower level - E)
Arable crops – BC1 Buildings and artificial surfaces – BL3	Negligible value

4.3 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposal relates to a residential development of 544 no. dwellings on a site of c. 15.1 hectares comprising 260 no. houses (18 no. 2 bed, 207 no. 3 bed & 35 no. 4 bed) and 198 no. apartments (46 no. 1 bed, 152 no 2 bed), 30 no. duplex apartments (15 no. 2 bed & 15 no. 3 bed), and 56 no. dwellings in corner blocks (16 no. 1 bed, 24 no. 2 bed & 16 no. 3 bed) as well as the provision of two crèches (ground floor of apartment building [c. 195 sq. m] and single storey creche in housing area [c. 443 sq. m]) Open Space including playground areas; all ancillary landscape works with public lighting, planting and boundary treatments including regrading/re-profiling of site where required as well as provision of cycle paths; Provision of vehicular and pedestrian looped access through the site from 3 no. junctions located on Academy Street as well as pedestrian connection in south east of site to Dublin Road and upgrade works to junction onto the Dublin Road; along with 875 no. car parking spaces and 581 cycle spaces and 4 no. car sharing spaces; Surface water attenuation measures and underground attenuation systems as well as all ancillary site development works (reprofiling of site as required) as well as connection to existing public water supply and drainage services. All site development and landscape works.

A full description is included in Chapter 2 of the EIAR.

The construction phase will see the clearance of crop land and grassland as well as sections of hedgerow/treeline habitats.

A new surface water drainage system will be installed and will be fully complaint with sustainable drainage principles. Wastewater will be delivered via the mains sewer network to the municipal treatment plant at Navan. Freshwater is supplied from the mains network, which originates from an abstraction point from the Boyne upstream of the town. Post-construction, the site will be landscaped.

New landscaping will include areas of open space and the planting of a range of native and non-native trees.

The proposed Landscape Masterplan for the site layout is given in figure 4.3.

Figure 4.3 – proposed site layout and landscaping

Source: CSR Landscape Architects

4.4 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT IN THE ABSENCE OF MITIGATION

This section provides a description of the potential impacts that the proposed development may have on flora & fauna in the absence of mitigation. Methodology for determining the significance of an impact has been published by the NRA (NRA, 2009).

4.4.1 Construction Phase

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

Habitat loss: agricultural grassland and disturbed ground habitats are to be lost along with approximately 900m of 'higher significance' hedgerow. A new access road will pass through the existing area of woodland (total area ~12,000m^2) and it is estimated that 4,000m^2 of this will be removed. Figure 4 shows the tree impact drawing.

The loss of habitat will result in local impacts to breeding birds, plants and animals. This will include the pair of Yellowhammer, which is of high conservation concern.

The following is taken from the bat report:

"A variety of habitats occur within the proposed development area, which vary in their importance for bats. The loss of areas of agricultural grassland/arable land within the proposed development area will have a negligible or minor impact on bats. The main impact on bats arises through the loss of hedgerows and treelines within the proposed development area which are widely used by all bat species recorded. Loss of bat habitats such as treelines, hedgerows as a result of construction will impact on commuting bats. Without mitigation measures and a Landscape Plan, the potential impact is considered as Moderate Negative Impact.
2. Loss or fragmentation of foraging habitats may diminish the available insect prey species and reduce feeding area for bats in some locations. This is considered as a Moderate Negative impact."

In the absence of mitigation, the effect of habitat loss is **likely**, **negative**, **significant** and **permanent**.

The direct mortality of species during land clearance or tree felling. This impact is especially acute during the bird nesting season, but can also affect small mammals and other fauna. Under the Wildlife Act 1976 (as amended, 2000) it is prohibited to removed 'uncultivated' vegetation between the months of March and July inclusive. Large trees within the hedgerows and treelines may provide roosting opportunities for bats. The following is taken from the bat report:

"Bats will often use trees as roosting sites. Potential Bat Roosts in trees is also an important area to address and the proposed road route will be assessed for PBRs. There are 21 trees deemed to have roosting potential that are proposed to be felled. The loss of trees in the landscape as a result of proposed development is likely to be Moderate Negative impact."

Without mitigation, this effect is **likely**, **negative**, **significant** and **permanent**.

Figure 4.4 – Tree Retention Drawing

Source: CSR Landscape Architects

Pollution of water courses through the ingress of silt, oils and other toxic substances. The construction of the housing development will remove up to 300m of drainage ditches. Surface water pathways from the site lead to the River Boyne, a significant water course. The ingress of sediment, as well as potentially harmful substances such as concrete, can affect aquatic life and fish spawning habitat for a considerable distance downstream. Best practice site management, as per guidelines from Inland Fisheries Ireland, will minimise the risk of pollution. A preliminary Construction Management Plan has been prepared showing site specific pollution prevention measures to be employed.

In the absence of mitigation measures this effect is **likely**, **negative**, **significant** and **medium-term**.

4.4.2 Operational Phase

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

Disturbance to species from increased human activity (lighting, etc.). Many of the species/habitats present on this site are not considered sensitive to disturbance from noise or general human activity given that this is already present from nearby residential uses. However, some species are sensitive and the majority of the available date relates to impacts to bats. The following is taken from the bat report:

"Proposed lighting of the proposed development post works may impact on all bat species in relation to commuting, roosting and foraging potential. But the degree of impact is dependent on how sensitive the particular bat species is to lighting as some bats are tolerant of lighting. It is also dependent on the type of lighting installed and the location of such lighting.

Leisler's bats are tolerant of street lighting. Common pipistrelles and soprano pipistrelles will tolerate low levels of lighting while brown long-eared bats and Myotis species (Natterer's bat) are lighting sensitive bat species."

In the absence of mitigation, this effect is **likely**, **negative**, **significant** and **permanent**.

Loss of ecological corridors. The removal of linear woodland habitats (i.e. hedgerows) will result in impacts to plant and animal species by disrupting movement corridors which are of value for feeding, resting, breeding and dispersal. The magnitude of this effect is dependant upon the species in question but bats are known to rely heavily on these corridors and can be considered a proxy for wider effects to biodiversity. The following is taken from the bat report:

"There is large number of trees deemed to have roosting potential for bats as well as extensive treeline/hedgerow network within the proposed development site. As a consequence, many of the linear habitat features had bat activity recorded along their length. Particular linear habitats were deemed important for local bat populations.

In particular there is a concern about the number of mature trees to be felled in Belmont woodlands as this will impact on Natterer's bats and brown long-eared bats. Twenty-one of these trees are deemed as Potential Bat Roosts.

The proposed development plan will require internal linear habitats to removed or partially removed to make way for the development. One of these linear habitats was deemed to be of High important for local bat populations, particularly common pipistrelles.

It is recommended that as much existing woodland, treelines and hedgerows is retained as part of the proposed development to ensure that there is foraging, roosting and commuting habitat for local bat populations and that newly planted hedgerows are planted using Irish native tree and shrub species to retain connectivity post development. New planting is particularly important around the external boundary of proposed development site to ensure connectivity for local bat populations."

This effect is related to the installation of artificial lighting which can result in disruption to movement corridors for wildlife. This effect is **likely**, **negative**, **significant** and **permanent**.

Pollution from surface water. Surface water attenuation measures will comply with Local Authority standards. This will include on-site attenuation storage, water harvesting, permeable paving and infiltration drains. Storm water will ultimately pass to the River Boyne via an existing surface water sewer and outfall point.

This effect is **likely**, **neutral**, **imperceptible** and **permanent**.

Pollution of water from foul wastewater arising from the development. Foul wastewater from the development is to be treated at the Navan municipal wastewater treatment plant which discharges treated effluent into the Boyne. The plant is licenced to discharge this effluent by the EPA (licence number D0059-01). The most recent annual report from the plant, for the 2017 calendar year, shows that the plant continues to operate well within its design capacity and was compliant with emission limit standards set out in its licence. The plant discharges treated wastewater to the River Boyne and monitoring of the receiving environment shows that the effluent "does not have an observable negative impact on the water quality".

This effect is **likely**, **neutral**, **imperceptible** and **permanent**.

4.4.3 Impacts to protected areas.

The nearest area designated for nature conservation is River Blackwater and River Boyne SAC/SPA, which can be found approximately 30m to the east of the site boundary at their closest points. Because of this distance there can be no direct impact to habitats within these areas. However, the loss of pollutants, and sediment in particular, can affect fish habitat and water quality for a considerable distance downstream. This is a potentially significant impact to a feature of international importance which will require mitigation.

There is no pathway from the site to the Boyne Woods pNHA and no impact can arise to this area.

A separate screening report for Appropriate Assessment has been presented and this concludes that negative effects to Natura 2000 areas may arise. A Natura Impact Statement is presented which details the mitigation which is necessary to avoid adverse effects. With this mitigation, significant adverse effects are not likely to occur.

In the absence of mitigation measures this effect is **likely**, **negative**, **significant** and **medium-term**.

Table 4.6 – Significance level of likely impacts in the absence of mitigation

Impact		Significance
Construction phase		
1	Habitat loss of features of local value (hedgerows/woodland) including impacts to Yellowhammer	likely, negative, significant and permanent
2	Mortality to animals during construction	likely, negative, significant and permanent
3	Pollution of water during construction phase	likely, negative, significant and medium-term
4	Disturbance from lighting	likely, negative, significant and permanent
5	Disruption to ecological corridors	likely, negative, significant and permanent
6	Surface water pollution	likely, neutral, imperceptible and permanent
7	Wastewater	likely, neutral, imperceptible and permanent
8	River Boyne and River Blackwater SAC	likely, negative, significant and medium-term

Overall, in the absence of mitigation, it can be seen that six potentially significant negative effects are predicted to occur as a result of this project.

4.4.4 Potential Cumulative impacts

The additional demand from this project for wastewater treatment capacity at the Navan plant will add to existing pressures. However, the plant is operating in accordance with its licence standards, and mean loading in 2017 was only approximately 20% of its design capacity.

Change of land use from open or agricultural, or urban-style residential, can result in cumulative losses of habitats. In this case the loss of high local value hedgerows/woodland can be seen to be impacted in a cumulative way. To compensate for this loss, it is necessary to include biodiversity-friendly landscape measures within new housing estates.

Some separate Irish Water upgrade works may be needed to facilitate development in general in Navan, including the subject lands, but do not form part of this application. The location of these works is shown on drawing no. D061-069, prepared by CS Consulting Engineers. The construction of the sewerage/water supply connections along the public road (R147) by Irish Water to facilitate the proposed development will require works to the public road.

The construction of the sewerage/water supply connections along the public road (R147) by Irish Water to facilitate the proposed development will require works to the public road will involve the excavation of soils/subsoils along the length of its route. This will be replaced with upgraded pipelines (300mm Foul Sewer for c. 470m, 300mm trunk watermain c. 1.5km) and the granular fill surrounding it. The top of the trench will comprise standard backfilled material.

The construction of the pipelines will be to Irish Water specifications and the construction management (including the implementation of appropriate mitigation measures) will ensure that there are no significant impacts arising.

It is unlikely that the works would have the potential to impact upon water quality, given the that the route is located within the existing public road. Irish Water as a public body would be required to ensure that appropriate measures are in place to mitigate the potential for impacts on the adjoining River Boyne.

The sewerage/water supply connections do not directly impinge on any part of a Natura 2000 site, and as such construction works would not be expected to impact upon a protected site through destruction or fragmentation of habitat, disturbance of habitat or direct reduction in species density during the construction phase.

4.5 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

This report has identified six impacts that were assessed as significant. Mitigation is suggested where minor negative effects can be avoided or reduced.

4.5.1 Construction Phase

1. Loss of high local value hedgerows/woodland

2. Mortality to animals during site clearance.

3. Pollution to River Boyne during construction

4.Disturbance from lighting

5. Disruption to ecological corridors

4.5.2 Mitigation Measures Proposed

The following mitigation measures are proposed for the development

Recommendation 1: The loss of mature trees or hedgerows has been avoided to the greatest extent possible. Where the road passes through the woodland this route has been designed to minimise the loss of trees (19 in total). Acknowledging this, the landscaping scheme has been designed to compensate for the loss of habitat. This includes biodiversity friendly planting of natural meadow areas and clusters of native trees. Species have been chosen to be pollinator and wildlife friendly. There will be approximately 1,250m of new hedgerow and linear woodland in addition to trees and shrubs scattered throughout the development and areas of meadow grassland. These features can be seen in figure 4.3. Although direct replacement of lost habitat is not possible, in time these new features will mature and will provide habitat for much of the biodiversity which is on site at present. The retention of hedgerows and establishment of new meadow areas may allow for Yellowhammer to remain on the site.

Recommendation 2: The removal of vegetation should not take place between March and July as per section 40 of the Wildlife Act. Where this cannot be avoided, vegetation must first be inspected by a suitably qualified ecologist for signs of nesting. Where no nesting is observed, vegetation can be removed within 48 hours. Where nesting is underway, vegetation cannot be removed unless under licence from the NPWS.

The following measure is taken from the bat survey report:

"Where possible, trees, which are 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 [potential bat roost] value determines the methodology of felling. Trees with PBR Category 1 are highly suitable for roosting bats and require more intensive procedures prior to felling."

Recommendation 3: A Construction Management Plan has been prepared as part of the planning application with regard to guidelines on the protection of fish habitat from Inland Fisheries Ireland. This include detailed measures for the prevention of pollution. In particular this will include measures to prevent silt from entering the River Boyne. Under no circumstances should silt-laden water enter the River Boyne. Water leaving the site must first pass through suitably designed silt traps or settlement ponds. These shall be inspected on at least a daily basis, and more frequently during periods of heavy rainfall. The site manager shall be responsible for ensuring that pollution does not occur.

Recommendation 4: The following measures are taken from the bat report:

"The following principles will be followed especially in relation to the general residential area and will also be implemented for the greenway and the active open area: - Artificial lights shining on bat roosts, their access points and the flight paths away from the roost must always be avoided. This includes alternative roosting sites such as bat boxes.
- Lighting design should be flexible and be able to fully take into account the presence of protected species. Therefore, appropriate lighting should be used within a proposed development and adjacent areas with more sensitive lighting regimes deployed in wildlife sensitive areas.
- Dark buffer zones can be used as a good way to separate habitats or features from lighting by forming a dark perimeter around them. This should be used for habitat features noted as foraging areas for bats.
- Buffer zones can be used to protect Dark buffer zones and rely on ensuring light levels (levels of illuminance measured in lux) within a certain distance of a feature do not exceed certain defined limits. The buffer zone can be further subdivided in to zones of increasing illuminance limit radiating away from the feature or habitat that requires to be protected.
- Luminaire design 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.
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.
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.
Planting of screening will also be effectively used to prevent lighting spillage areas where bat foraging is recorded. In particular, lighting will not shine onto important commuting and foraging areas identified for local bat populations."

Recommendation 5: Disruption to ecological corridors

The landscaping design has maintained ecological connectivity by establishing/strengthening native woodland/hedgerows along external boundaries (see figure 4.3). This will take time to mature but will ensure continued foraging/commuting ability by biodiversity through and across the site.

4.6 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

Table 4.7 shows the assessment of impacts when mitigation is fully implemented.

Table 4.7 – Significance level of likely impacts after mitigation

Impact		Significance
Construction phase		
1	Habitat loss of features of local value (hedgerows/woodland) including impacts to Yellowhammer	likely, negative, moderate and permanent
2	Mortality to animals during construction	likely, negative, imperceptible and permanent
3	Pollution of water during construction phase	likely, negative, imperceptible and medium-term
4	Disturbance from lighting	likely, negative, imperceptible and permanent
5	Disruption to ecological corridors	likely, negative, moderate and permanent
6	Surface water pollution	likely, neutral, imperceptible and permanent
7	Wastewater	likely, neutral, imperceptible and permanent
8	River Boyne and River Blackwater SAC	likely, negative, not significant and medium-term

5.0 LAND AND SOILS

5.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) considers & assesses the potential impacts on Land & Soils in regard to the proposed scheme. Measures to mitigate any likely significant adverse impacts of the proposed scheme are reviewed and analysed.

This report was prepared by Robert Fitzmaurice of CS Consulting, Chartered Engineer with Engineers Ireland, qualifications BEng (Hons) degree in Civil & Environmental Engineering, Post Graduate Diploma in Environmental Engineering and a Masters Degree in Industrial Engineering.

This report also addresses earthworks proposed on site including cut and fill works required.

5.2 METHODOLOGY

The following section outlines the legislation and guidelines considered, and the adopted methodology for preparing this chapter.

5.2.1 Guidelines

The following documents were reviewed in the preparation of this chapter:

- Guidelines for the Preparation of Soil, Geology and Hydrogeology Chapters of Environment Impact Statements (Institute of Geologists of Ireland (IGI) 2013);
- Revised Guidelines on the Information to be contained in Environmental Impact Statements (EPA 2015a);
- Advice Notes for Preparing Environmental Impact Statements (EPA 2015b);
- Draft Guidelines on the Information to be contained in Environmental Impact Assessments Reports (EPA 2017).

In order to identify the current ground conditions and to establish any potential impacts for the proposed development it is necessary to undertake a desk top review of the existing geological conditions for the subject lands.

The existing soil, geological & hydrogeological conditions have been interpreted from a desk top study & intrusive geotechnical investigation carried out by the client for lands adjacent to the subject site.

5.2.2 Consultation

To establish same the following list of statutory bodies were consulted:

- Meath County Council;
- Geological Survey of Ireland;
- Ordnance Survey of Ireland;
- Environmental Protection Agency;
- Teagasc;
- Office of Public Works.

5.2.3 Desktop Study

The following sources of information were reviewed to evaluate the soils, geological & hydrogeological aspects of the site:

- Current & historical Ordnance Survey Maps (1829 – 1842,1837 – 1842 & 1888, 1913),
- Aerial photography (1995 & 2000),
- The Geology of Ireland, Ed. C. H. Holland, (Dunedin Academic Press, 2001),
- Geological maps of the site produced by the GSI,
- Quaternary Maps,
- Bedrock Mapping,

- Groundwater Vulnerability Mapping,
- Aquifer Yield Maps.
- Teagasc & Environmental Protection Agency *Soil Information system*,
- Historic Mines Sites, Inventory & Risk Classification, (EPA & GSI).
- Historic Ground Investigation.

5.2.4 Application of Methodology

The potential impact of the proposed scheme on soils and geology environment has been assessed by classifying the importance of the relevant attributes and quantifying the likely magnitude of any potential impact.

This impact assessment methodology takes on board the broad direction of the Guidelines for the Preparation of Soils, Geology & Hydrogeology Chapters of Environmental Impact Statements (IGI 2013).

5.2.5 Study Area

The soils & geology study are is confined to the clients lands for the submitted application, refer to the planning drawings, notably CS Consulting Drawing D061-010 Topographical Survey. The subject lands cover an area of 15.10Ha.

5.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

The site is generally 'green field'. Provisional site investigation results have been obtained from on-site geotechnical works, indicates 300mm of top soil underlain with 1.1m of firm brown clay underlain with stiff dark clay.

5.3.1 Topsoil

Based on the Teagasc data base the top soil has been defined as: Fine loamy drift with limestone.

5.3.2 Bedrock Geology

A review of the GSI database for the subject lands gives the bedrock classification a Dark Limestone & Shale 'Calp', which forms part of the LUCAN formation.

5.3.3 Quaternary & Soil

Topsoil is underlain with firm to stiff sandy gravelly CLAY. The Quaternary Sediments: TILL derived from Limestones.

5.3.4 Hydrogeological aspects

The hydrogeological characteristics can be expressed as a Locally Important Aquifer with a generally productive bedrock in a moderately productive zone. The vulnerability classification is given as high. There are no active boreholes or wells on site.

5.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposal relates to a residential development of 544 no. dwellings on a site of c. 15.1 hectares comprising 260 no. houses (18 no. 2 bed, 207 no. 3 bed & 35 no. 4 bed) and 198 no. apartments (46 no. 1 bed, 152 no 2 bed), 30 no. duplex apartments (15 no. 2 bed & 15 no. 3 bed), and 56 no. dwellings in corner blocks (16 no. 1 bed, 24 no. 2 bed & 16 no. 3 bed) as well as the provision of two crèches (ground floor of apartment building [c. 195 sq. m] and single storey creche in housing area [c. 443 sq. m]) Open Space including playground areas; all ancillary landscape works with public lighting, planting and boundary treatments including regrading/re-profiling of site where required as well as provision of cycle paths; Provision of vehicular and pedestrian looped access through the site from 3 no. junctions located on Academy Street as well as pedestrian connection in south east of site to Dublin Road and upgrade works to junction onto the Dublin Road; along with 875 no. car parking spaces and 581 cycle spaces and 4 no. car sharing spaces; Surface water attenuation measures and underground attenuation systems as well as all ancillary site development works (reprofiling of site as required) as well as connection to existing public water supply and drainage services. All site development and landscape works.

Refer to Chapter 2.0 (Description of Development and Alternatives) for a detailed site and development description.

It is anticipated that the main construction activities impacting soils and geology will comprise the following:

- Removal of topsoil and subsoil to allow road construction, foundation excavation, services installation.
- It is estimated that approximately 42,000m3 of cut and 20,000m3 of fill (generally comprising normal stone material used in the construction of roads, footpaths and buildings) will be required across the development. The standard stone fill material used will be primarily sourced from the cut material on site.
- Construction of the main access routes into the development.
- Installation of main underground services and utilities to serve the site.
- Construction of the surface water storage systems (underground and overground).
- Construction of linear park and public open space areas.

5.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

5.5.1 Construction Phase

To facilitate the proposed development land take will be required that will change the existing use of the site from greenfield to residential. Soils will be removed, (if required) to facilitate the construction of the development.

As noted above should material be required to be removed from the subject land it will be done so in accordance with current legislation. The proposed apartment buildings will not have an underground basement and as such the volume of material to be excavated will be minimised following detailed design.

Care will be required for the environmental management of the site to ensure that no potential contamination issues are experienced which may impact on the overall groundwater quality.

Potential impacts of the proposed development during the construction include the following:

- Approximately 39,000m3 (approximately 0.3m depth of topsoil across the site) of topsoil shall be excavated from the existing ground level in order to form a building platform for the new houses and associated roads infrastructure. This will result in the exposure of the subsoil to various elements including weather and construction traffic. Therefore, the impact may be characterised as a likely, short term, slight, adverse impact on the natural strength of the subsoil and subsequently resulting in deeper foundations being required.
- Rutting and deterioration of the topsoil layer and any exposed subsoil layers or bedrock by earthworks plant and construction traffic. As such, the impact may be characterised as likely, short term, moderate, adverse impact on subsoil, the consequence of which will be erosion and generation of sediment laden runoff.
- Earthworks are required in the open space areas to accommodate underground and overground surface water storage systems and detention basins and other SuDS features. This landscaping activity will likely have a moderate, positive, permanent, impact on the soil and ground profile. Earthworks to road infrastructure is also required due to the existing steep topography of the site for access.
- During the construction period, large machinery and associated fuel and fuel storage will be present on site. As a result, accidental spills and leaks (e.g. storage of oils and fuels on site), use of cement and concrete during construction works are inevitable during the construction phase. Therefore, the unlikely impact may be characterised as a likely, short term, moderate, slight impact on subsoil and ground water.
- Approximately 20,000m3 of fill (generally comprising normal stone used in the construction of roads, footpaths and buildings) will be required across the development, with some of this material originating from cut material on site. Therefore, the likely impact may be characterised as, permanent, slight impact on subsoil and ground water.

5.5.1.1 Stripping of Topsoil

Removal of the existing topsoil layer will be required across the site. Stripping of topsoil will result in exposure of the underlying subsoil layers to the effects of weather and construction traffic and may result in subsoil erosion and generation of sediment laden runoff.

Table 5.1 – Preliminary Estimated Topsoil Volumes (Approximate)

	Volume (m^3)
Topsoil Strip (300mm thick layer)	39,000
Topsoil Reuse (landscaping of open spaces etc.)	23,000

5.5.1.2 Excavation of Subsoil Layers

Excavation of existing subsoil layers will be required in order to allow road construction, foundation excavation, drainage and utility installation and provision of surface water attenuation facilities.

Where feasible, excavated material will be reused as part of the site development works (e.g. use as fill material beneath roads) however, unsuitable excavated subsoil is expected and will have to be removed to an approved landfill.

Table 5.2 – Estimated Cut/Fill Volumes (Approximate)

	Volume (m^3)
Cut	42,000
Fill	20,000
Removal of Unsuitable Material	22,000

5.5.1.3 Construction Traffic

Earthworks plant (e.g. dump trucks) and vehicles delivering construction materials to site (e.g. road aggregates, concrete deliveries etc.) have potential to cause rutting and deterioration of the topsoil layer and any exposed subsoil layers, resulting in erosion and generation of sediment laden runoff. This issue can be particularly noticeable at site access points (resulting in deposition of mud and soil on the surrounding road network). Dust generation can also occur during extended dry weather periods as a result of construction traffic.

5.5.1.4 Accidental Spills and Leaks

During the construction phase there is a risk of accidental pollution from the sources noted below. Accidental spills and leaks may result in contamination of the soils underlying the site.

- Storage of oils and fuels on site
- Oils and fuels leaking from construction machinery
- Spillage during refuelling and maintenance of construction machinery
- Use of cement and concrete during construction works

5.5.1.5 Geological Environment

It is not envisaged that this will have any discernible impact on the geological environment. Excavations associated with development of the site have been designed as shallow as possible and no bedrock was encountered in the site investigation. Where bedrock is encountered it will be crushed, screened and tested for use within the designed works.

5.5.1.6 Human Health

A potential risk to human health due to the associated works during construction is the direct contact, ingestion or inhalation of receptors (i.e. construction workers) with any soils which may potentially contain low level hydrocarbon concentrations from Site activities (potential minor leaks, oils and paint).

No human health risks associated with long term exposure to contaminants (via. direct contact ingestion or inhalation) resulting from the proposed development are anticipated.

5.5.2 Operational Phase

Once the development is completed the operational impacts on the land and soils would be minimal. The biggest risk item is cross contamination of ground water from the operational phase of the development from accidental oil spillages, refer to the Mitigation section below for proposed remedial issues.

5.5.3 *"Do-Nothing"* Scenario

Should no development be proposed for the site and the site remains as open undeveloped land this would remove any potential for contamination issues over the operational or post development phase. Notwithstanding this, the land is zoned for the sort of development applied for and as part of the national strategy to provide accommodation, the proposed development is required. As such the "Do-Nothing" Scenario is not applicable.

5.6 MITIGATION MEASURES

5.6.1 Incorporated Design Mitigation

The proposed development and planning drawings submitted have taken into account potential contamination issues and upon completion the development has a system in place to ensure rainwater runoff from the site passes through an oil separator prior to out falling into the proposed storm water drainage system.

5.6.2 Construction Phase Mitigation

A Construction Management Plan (CMP) (prepared by CS Consulting) is included in the SHD application material. The CMP will be put in place by the Contractor to implement the mitigation measures and will be prepared and submitted to the planning authority and will be maintained by the contractor during the construction phase. The CMP includes a range of site-specific measures which will include the following mitigation measures:

In order to reduce the impacts on the soils, geology and hydrogeological environment a number of mitigation measures will be adopted as part of the construction works on site. The measures will address the main activities of potential impact which include:

- Control of Soil Excavation and Export from Site;
- Sources of fill and aggregates for the project;
- Fuel and Chemical handling, transport and storage; and
- Control of Water during Construction.

In advance of work starting on site, the appointed Contractor will prepare a Construction and Environmental Management Plan (CEMP). The Plan sets out the overarching vision of how the construction of the project will be managed in a safe and organised manner by the Contractor. The CEMP will set out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures outlined in the EIAR and any subsequent conditions relevant to the project.

Care will be required for the environmental management of the site to ensure that no potential contamination issues are experienced which may impact on the overall groundwater quality.

Potential issues can be mitigated against by ensuring that the developments environmental management plan is adhered to prevent accidental onsite oil spillages and the regular maintenance of onsite plant to eliminate potential risks.

Soil stripping, earthworks and stockpiling of soil will be carried out during the works. Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated through the implementation of an appropriate earthworks handling protocol during construction. It is anticipated that any stockpiles will be formed within the boundary of the excavation and there will be no direct link or pathway from this area to any surface water body. It is anticipated that only local/low level of stockpiling will occur as the bulk of the material will be excavated either straight into trucks for transport off site or will be reused in other areas of the site as fill.

Dust suppression measures (e.g. damping down during dry periods), vehicle wheel washes, road sweeping, and general housekeeping will ensure that the surrounding environment are free of nuisance dust and dirt on roads.

The following mitigation measures will be taken at the construction site in order to prevent any spillages to ground of fuels and prevent any resulting soil and/or groundwater quality impacts:

- Designation of bunded refuelling areas on the site (if required);
- Provision of spill kit facilities across the site;
- Where mobile fuel bowsers are used the following measures will be taken:
- Any flexible pipe, pump, tap or valve will be fitted with a lock and will be secured when not in use;
- All bowsers to carry a spill kit and operatives must have spill response training; and
- Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

In the case of drummed fuel or other potentially polluting substances which may be used during construction the following measures will be adopted:

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside concrete bunded areas;
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the site, they should be done so secured and on spill pallets; and
- Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.

5.6.3 Operational Phase

Upon completion of the Construction Phase of the proposed scheme, issues pertaining to the development would in general be issued such as odour or noise control. There are no residual issues relating to soils & geology for the development.

During the operational phase of the proposed development there is limited to no potential for site activities to impact on the geological environment of the area.
Following best practice, the potential for the ground water to become polluted via oil spills will be reduced as far as is practical by the use of an oil separator to take run off from carparking areas and passing through same prior to disposal.

5.7 PREDICTED IMPACT FOLLOWING MITIGATION (RESIDUAL IMPACT)

The proposed development will alter the current land use from agricultural to a residential development and associated public open space and landscape areas. The impact on land, soil, geology and hydrogeology from accidental spillages of fuel and lubricants used during the construction phase of the development is predicted to be minimal when stored and used in a responsible manner. After implementation of the mitigation measures recommended above for the construction phase, the proposed development will not give rise to any significant long term adverse impact. Moderate negative impacts during the construction phase will be short term only in duration.
Implementation of the measures outlined in Section 5.6 will ensure that the potential impacts of the development on soils and the geological environment are minimised during the construction phase and that any residual impacts will be short term.

Residual Impacts such as loss of agricultural land / earthworks haulage & the risk of contamination of groundwater are deemed to be of minor risk, as the proposal for apartment type residential accommodation would not be seen as a potential high-risk development post construction.

5.8 "*WORST-CASE"* SCENARIO

5.8.1 Construction Phase

The worst-case scenario is that there is an accidental on-site incident in which the site development works are on-going, and a pollution incident occurs. This could lead to a direct discharge of oils or fuels into the ground water table.

A lesser risk is that soils on site are found to contain contaminated material and that this material then has to be removed from site in accordance with statutory requirements to a suitable disposal facility.

5.8.2 Operational Phase

As noted from an operation view point the worst-case scenario would be an accidental spill of oils from cars or effluent from or a leak in the foul drainage system or damage to the oil separator serving the carparking for the proposed scheme.

5.9 MONITORING

The proposed foul drainage & potable water network will be vested to Irish Water, and as the statutory agency will have responsibility for the maintenance of the foul drainage & potable water network once completed. The stormwater system will be taken in charge by Meath County Council who will carry out maintenance on the system if required.

5.9.1 Monitoring measures – construction

Proposed monitoring during the construction phase in relation to the soil and geological environment are as follows:

- Adherence to the "*Construction Management Plan (CMP)*". The developer will be responsible for ensuring adherence with the *"Construction Management Plan".* If construction works are not in accordance with the plan, then the developer will ensure that this is remedied.
- Construction monitoring of the works (e.g. inspection of existing ground conditions on completion of cut to road sub-formation level in advance of placing capping material, stability of excavations etc.).
- Inspection of fuel / oil storage areas. If these are found to be sub-standard then the developer will ensure that they are made fit for purpose.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and provision of vehicle wheel wash facilities. If these measures are found to be inadequate and the adjacent road network is negatively impacted, the developer will ensure that this is remedied and will ensure that dust suppression measures are implemented more regularly and all vehicles exiting the site use vehicle wheel wash facilities provided.
- Monitoring of contractor's stockpile management (e.g. protection of excavated material to be reused as fill; protection of soils from contamination for removal from site).
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.). The developer is responsible for ensuring that these measures are fit for purpose. If they are found to be inadequate, then the development will ensure that they are made good and fully utilised.
- Soil removed during the construction phase will be monitored to maximise potential for re-use on site.
- The quantities of topsoil, subsoil and rock removed off site will be recorded.

5.9.2 Monitoring measures – operational phase

Monitoring of the "taken in charge", public open space areas by Meath County Council will be on-going. They will ensure that the detention basins and other SuDS features such as swales are adequately maintained. If they are found to be not adequately maintained, then they will be responsible for increasing the maintenance schedule.

5.10 DIFFICULTIES ENCOUNTERED

No difficulties were encountered while developing this report.

5.11 CUMULATIVE IMPACTS

Cumulative phase looks at the increased overall implications the proposed development may have on the enviros due to the degree of development locally.

The primary potential cumulative impact considered is local increase in hard standing and subsequent decrease in local groundwater recharge.

As part of the proposed development features such as open bottom attenuation, swales, tree pits, permeable paving, surface water runoff from roofs will be routed to the proposed surface water pipe network via porous aggregates beneath permeable paved driveways are included as part of the design which all promote groundwater recharge. Given these features and the geological and hydrogeological environments of the proposed development, i.e. the "local important" bedrock aquifer with low vulnerability the potential cumulative impact to the land, soils, geology and hydrogeology of the local and surrounding areas is deemed to be insignificant.

Each project currently permitted or under construction is subject to EIA and/or planning conditions which include appropriate mitigation measures to minimise impacts on the land, geological and hydrogeological environment. Cumulative impacts, if any, will be limited to the construction stage and will, therefore, be temporary to short-term in duration. As long as mitigation measures for the developments are carried out as permitted, there will be no significant cumulative impacts on the land, geological and hydrogeological environment.

Should any future developments be under construction or planned in the vicinity of the site, potential cumulative impacts are not anticipated once similar mitigation measures are implemented. In addition, to the north of the subject lands a site has been ear marked for two number proposed new primary schools. The development of this application would provide local infrastructure to allow adjacent developments to be serviced, subject to agreements and suitable planning permissions being in place.

Some separate Irish Water upgrade works may be needed to facilitate development in general in Navan, including the subject lands, but do not form part of this application. The location of these works is shown on drawing no. D061-069, prepared by CS Consulting Engineers.

The construction of the sewerage/water supply connections along the public road (R147) by Irish Water to facilitate the proposed development will require works to the public road will involve the excavation of soils/subsoils along the length of its route. This will be replaced with upgraded pipelines (300mm Foul Sewer for c. 470m, 300mm trunk watermain c. 1.5km) and the granular fill surrounding it. The top of the trench will comprise standard backfilled material.

During excavation works for the pipeline there is potential for entry of sediment laden run-off to the River Boyne if appropriate mitigation measures are not put in place.

The construction of the pipelines will be to Irish Water specifications and the construction management (including the implementation of appropriate mitigation measures) will ensure that there are no significant impacts arising.

5.12 INTERACTIONS

There are interactions between land and soils, water and material assets and built asset (traffic).

There are interactions between land and soils and water, with changes in depth and type of overburden impacting the protection provided to aquifers. The likely impact will be permanent, slight and adverse.

There are interactions between land and soils and water, with some surface water conveyed and stored in SuDS features such as swales and discharging to the ground where possible. The likely impact will be permanent, slight and favourable.

There are interactions between lands and soils and material assets, with the construction of drainage and utilities impacting the quantity of soil, subsoil and rock as these materials will be removed to facilitate construction. The likely impact will be permanent slight and adverse.

There are interactions between lands and soils and material assets, with the delivery of normal stone fill under buildings and roads and footpaths resulting in additional construction vehicles on roads adjacent to the site. The likely impact will be temporary, slight and adverse.

6.0 WATER AND HYDROLOGY

6.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) considers & assesses the potential impacts on Water & Hydrology in regard to the proposed scheme. Measures to mitigate any likely significant adverse impacts of the proposed scheme are reviewed and analysed.

This report was prepared by Robert Fitzmaurice of CS Consulting, Chartered Engineer with Engineers Ireland, qualifications BEng (Hons) degree in Civil & Environmental Engineering, Post Graduate Diploma in Environmental Engineering and a Masters Degree in Industrial Engineering.

6.2 METHODOLOGY

The methodology followed for this section is in accordance with the EPA *Guidelines on the Information to be contained in Environmental Impact Assessment Reports* (Draft) 2017, *Advice Notes for Preparing Environmental Impact Statements* (Draft) 2015 and 2018 DHPLG *Guidelines on Environmental Impact Assessment for Planning Authorities and An Bord Pleanala*. The following section outlines the legislation and guidelines considered, and the adopted methodology for preparing this chapter.

6.2.1 Guidelines

The following documents were reviewed in the preparation of this chapter.

- Historical Flood Data, obtained from the national hazard Mapping Website, (www.opw.ie);
- CIRIA C753 – The SuDs Manual;
- *Revised Guidelines on the Information to be contained in Environmental Impact Statements* (EPA 2015a);
- *Advice Notes for Preparing Environmental Impact Statements* (EPA 2015b);
- *Draft Guidelines on the Information to be contained in Environmental Impact Assessments Reports* (EPA 2017);
- Department of Housing, Planning & Local Government (2018). Guidelines for Planning Authorities & Bord Pleanála on Carrying Out environmental Impact Assessments;
- Greater Dublin Strategic Drainage Study, (DCC 2005);
- Regional Code of Practice for Drainage Works, (DCC 2005);
- The Planning System and Flood Risk Management, Guidelines for Planning Authorities, Former Dept of Environment, Heritage & Local government, (Government of Ireland 2009);
- Meath County Council Development Plan.
- Guidelines on Protection of Fisheries During Construction Works in and adjacent to Waters (IFI, 2016)

A Flood Risk Assessment (FRA) and an Engineering Services Report (ESR) have been completed by CS Consulting and accompany this application under separate cover. The findings and outcomes from both the FRA and ESR have informed this assessment.

In order to identify the current conditions and to establish any potential impacts for the proposed development it is necessary to undertake a desk top review of the existing water features and site topography conditions for the subject lands. The existing conditions have been interpreted from a desk top study.

To establish same the following list of statutory bodies were consulted.

- Meath County Council;
- Geological Survey of Ireland;
- Ordnance Survey of Ireland;
- Environmental Protection Agency;
- Office of Public Works.

6.2.2 Desktop Study

The following sources of information were reviewed to evaluate the Water & Hydrology aspects of the site.

- Current & historical Ordnance Survey Maps (1829 – 1842,1837 – 1842 & 1888, 1913);
- Aerial photography (1995 & 2000);
- Office of public Works, Historical Flood Mapping;
- Office of Public Works, Flood Risk Management Plans;
- Meath County Council, Development Plan, 2017 – 2023.

6.2.3 Application of Methodology

The potential impact of the proposed scheme on Water & Hydrology environment has been assessed by classifying the importance of the relevant attributes and quantifying the likely magnitude of any potential impact.

6.2.4 Study Area

The Water & Hydrology study are is confined to the clients lands for the submitted application, refer to the planning drawings, notably CS Consulting Drawing D061-010 Topographical Survey. The subject lands cover an area of 15.10Ha.

6.3 RECEIVING ENVIRONMENT (BASELINE SCENARIO)

In order to identify the current conditions and to establish any potential impacts for the proposed development it is necessary to undertake a desk top review of the existing water features and site topography conditions for the subject lands. The existing conditions have been interpreted from a desk top study.

In accordance with the recommendations of the Greater Dublin Strategic Drainage Study, the pre-development ‘green field’ runoff rate was established as being 2.47/sec/Ha, therefore giving a pre-development runoff rate as 36.8l/sec.

6.3.1 Existing Water & Hydrology

The subject lands currently falls from west to east, with an average topographical level varying from 50.50mAOD down to 32.50mAOD, (refer to CS Consulting drawing D061/010 for a detailed topographical survey). The lands falls away to the east and ties in with Academy St.. The subject lands are currently undeveloped and have been used for agricultural purposes. While the subject lands has no watercourses traversing same there are local drainage ditches which have served the subject lands. These land drains ultimately outfalled into the River Boyne via a storm culvert under the Dublin Road.

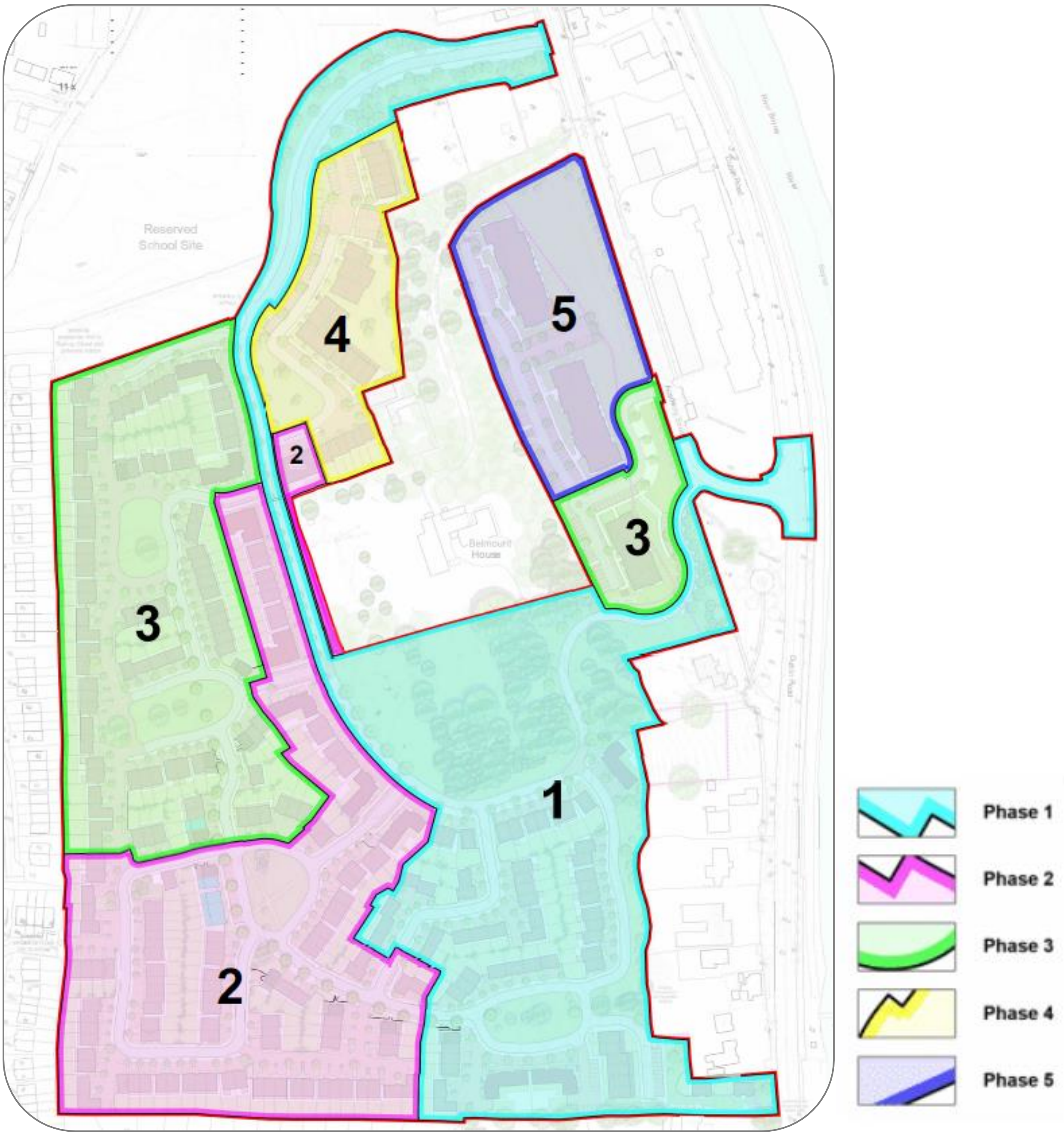
6.3.2 Flooding

The OPW’s Eastern Catchment Flood Risk Assessment & Management Study & Meath County Councils Strategic Flood Risk Assessment which forms part of the Development Plan all indicate that the majority of the subject site (all the proposed residential housing units) has no history of flooding and based on the current flood maps is located in Flood Zone ‘C’. The proposed apartment blocks adjacent to Academy Street have an element of the proposed car parking located in Flood Zone ‘B’, all of the apartment blocks footprints are located in Flood Zone ‘C’. Refer to the site specific flood risk assessment submitted with this application for a more detailed analysis of potential flooding. Based on the historical and predicated flooding information the proposed development is appropriate.

Discussions with the planning board & the local authority indicated that the propose development must adhere to the recommendations of governmental policy to ensure not only that property and people would not be effected by potential flooding events but also that should Academy Street experience flooding, emergency vehicular access must be maintained to the site. This is discussed and addressed in greater detail in the Site Specific Flood Risk Assessment submitted with this application.

6.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposal relates to a residential development of 544 no. dwellings on a site of c. 15.1 hectares comprising 260 no. houses (18 no. 2 bed, 207 no. 3 bed & 35 no. 4 bed) and 198 no. apartments (46 no. 1 bed, 152 no 2 bed), 30 no. duplex apartments (15 no. 2 bed & 15 no. 3 bed), and 56 no. dwellings in corner blocks (16 no. 1 bed, 24 no. 2 bed & 16 no. 3 bed) as well as the provision of two crèches (ground floor of apartment building [c. 195 sq. m] and single storey creche in housing area [c. 443 sq. m]) Open Space including playground areas; all ancillary landscape works with public lighting, planting and boundary treatments including regrading/re-profiling of site where required as well as provision of cycle paths; Provision of vehicular and pedestrian looped access through the site from 3 no. junctions located on Academy Street as well as pedestrian connection in south east of site to Dublin Road and upgrade works to junction onto the Dublin Road; along with 875 no. car parking spaces and 581 cycle spaces and 4 no. car sharing spaces; Surface water attenuation measures and underground attenuation systems as well as all ancillary site development works (reprofiling of site as required) as well as connection to existing public water supply and drainage services. All site development and landscape works.



(imagery data: Conroy Crowe Kelly Architects)

Refer to Chapter 3.0 (Description of Development) for a detailed site and development description.

The proposed development will require that the aforementioned local land drains be removed as the site is developed. The sites proposed storm water drainage system has been designed to drain into the existing storm water infrastructure along Academy Street. As per the requirements of the Greater Dublin Strategic Drainage Study all new developments are to limit the run-off from post development sites to pre-development rates. In addition, storm water flows being restricted provision must be made through the use of sustainable urban drainage systems to provide sufficient capacity to retain on site the predicated storm water flows generated by an extreme storm event, (a 1-in-100 year storm event increased by 10% for the predicted effects of climate change).

6.4.1 Hydrogeology

At soakaway test locations and trial pits locations from a site investigation carried out in 2019 (Appendix C - 6.A), excavations were carried out to depths of 4.5m below existing ground level. Groundwater was encountered at approximately 1.2 – 2.0m below ground level.

During construction, the deepest excavations are expected to be required for installation of surface water drainage lines and attenuation tanks. Notwithstanding the site investigation results infiltration of groundwater into excavations may be possible due to seasonal changes and ground variations across the site.

6.4.2 Flood Risk

The site is considered to have a low probability of flooding based on our review of OPW's Flood Hazard Mapping, and the Eastern CFRAM. 1. Refer to Section 6.3.3 above, which outlines that the majority of the Site is within Flood Zone C, with a small percentage in Flood Zone 'B'.

6.4.3 Water Quality

As surface water drainage design has been carried out in accordance with the Greater Dublin Strategic Drainage Study, and SuDS methodologies are being implemented as part of a treatment train approach. The SuDS surface water treatment train approach, whereby storm water will be directed into local filter drains to the rear of houses, permeable paving & tree pits, prior to additional storm water storage being provided in underground attenuation tanks. Installation of a Hydrobrake devises limiting surface water discharge from the site to greenfield runoff rates. Surface water discharge will pass via a Class 1 fuel / oil separator (sized in accordance with permitted discharge from the site.)

6.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

6.5.1 Construction Phase

During the construction phase there will be a number of personnel based on site who will require canteen and toilet facilities, which will be tankered off to a licensed facility until a connection to the public sewer has been established. At no time during construction will foul sewerage be allowed to discharge to the surface water network.

Construction of the proposed development will require the removal of a large part of the topsoil and extensive earthworks to facilitate the construction of the dwellings, infrastructure service provision, road construction, surface water storage systems etc. Given the extent of disturbance, there is potential for weathering and erosion of the surface soils from precipitation and run-off.

Surface water runoff from the construction phase may also contain increased silt levels or result in pollution from the construction processes. The discharge of these contaminants, such as concrete and cement, which are alkaline and corrosive, to the River Boyne has the potential to cause pollution. Accidental oil or fuel spillages or leaks from construction activities also have the potential to find their way into the adjacent water courses. Both increased silt and contaminant levels have the risk of reducing water quality in the adjoining water courses.

Excavation of soil and sub-soil layers will reduce the ability of the lands to recharge groundwater. The majority of surface water runoff will therefore be collected and positively discharged from the development to the public stormwater sewer located in Academy Street. It is likely that this activity will have a slight, adverse, permanent, residual, impact on groundwater.

Potential impacts that may arise during the construction phase are noted below:

- Surface water runoff during the construction phase may contain increased silt levels (e.g. runoff across areas stripped of topsoil) or become polluted by construction activities.
- Discharge of rainwater pumped from excavations.
- Accidental spills and leaks associated with storage of oils and fuels, leaks from construction machinery and spillage during refuelling and maintenance contaminating the surrounding surface water and hydrogeological environments.
- Concrete runoff, particularly discharge of wash water from concrete trucks.
- Discharge of vehicle wheel wash water.
- Infiltration of groundwater into excavations.

Accidental pollution of water from plant, machinery or temporary storage areas is possible, due to the nature of construction. This likely but brief impact would be imperceptible in nature as any potential pollution would be indirect as it would percolate through the soil, prior to reaching the local groundwater. Excavation works are required, to strip the site's topsoil and for the installation of proposed drainage infrastructure.

Heavy rain fall or a high level of ground water could produce ponding in open trenches. Discharge of this water pumped from excavations to existing streams could reduce the capacity of the existing surface water network. This impact may be characterised as a likely, slight, temporary, adverse impact.

The temporary effects of these works are anticipated to be imperceptible neutral effects. Care will be required for the environmental management of the site to ensure that no potential contamination issues are experienced which may impact on the overall storm water quality. The submitted construction management plan submitted with the planning application indicates the proposed measures required to avoid same.

6.5.2 Operational Phase

Once the development is completed the operational impacts on the water & hydrology aspects of the site would be minimal. The biggest risk item is cross contamination of surface water from the operational phase of the development from accidental oil spillages, refer to the Mitigation section below for proposed remedial issues. A positive impact from the development will be the reduction in storm water runoff experienced during extreme storm events, as the flow from the development will be restricted. The downstream water course will be at a reduced risk from flooding during extreme storm events.

During the operational phase of the development the following potential risks to surface water have been identified:

- Increased impermeable surface area will reduce local groundwater recharge and potentially increase surface water runoff (if not attenuated to greenfield runoff rate).
- Accidental hydrocarbon leaks and subsequent discharge into piped surface water drainage network (e.g. along roads and in driveway areas).
- Foul waste and surface water discharging to ground through leakage in the drainage systems.
- Contamination risks arising from development use / leaking pipes / contaminated surface water runoff.

6.5.3 Risks to Human Health

A risk to human health from water, hydrology and hydrogeology can be linked to the potential for contamination of the potable water supply. The ground water and supply network would present possible pathways. The risk is considered below.

<u>Groundwater Supply</u>
The receiving groundwater is a locally important aquifer. The risk to the contamination of this source from surface water run-off from the development during construction and operation is considered to be low given the low infiltration rates obtained as part of the preliminary site investigation undertaken.

<u>Network Supply</u>
As noted above surface water outflow from the site ultimately discharges to the River Boyne. If surface water is not adequately treated and managed in accordance with the GDSDS it has the potential to impact human health.

Surface water drainage for the development has been designed in accordance with the GDSDS therefore the risk to human health has been mitigated.

6.5.4 "Do-Nothing" Scenario

Should no development be proposed for the site and the site remains as open undeveloped land there will be no alterations to the current arrangements. If the proposed development does not proceed, there will be no impacts to the existing hydrology aspects of the site. If the proposed development does not proceed there would be no additional impact on the local water systems. The current rate of surface water run-off would continue to operate in its natural state.

Notwithstanding this, the land is zoned residential development as applied for and as part of the national strategy to provide accommodation the proposed development is required.

Fluvial flooding events would continue as they have historically in this area with the existing floodplains.

Groundwater status would also remain unchanged if the existing agricultural land use continued.

6.6 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

6.6.1 Incorporated Design Mitigation

The proposed development and planning drawings submitted have taken into account potential contamination issues and upon completion the development has a system in place to ensure rainwater runoff from the site passes through an oil separator prior to outfalling into the proposed storm water drainage system.

Mitigation measures follow the principles of avoidance, reduction and remedy. The most effective measure of avoidance is dealt with during the site selection and design stage, by ensuring that the development does not traverse or come in close proximity to sensitive hydrological attributes.

Where avoidance of the feature has not been possible, consideration has been given to locally modify the proposed development so as to reduce / minimise the extent of the impact. If any modifications are proposed to reduce hydrological impacts, it is necessary to also consider any associated impacts to the hydrological and ecological regimes.

6.6.2 Construction Phase Mitigation

The following mitigation measures are recommended for the construction phase of the development:

- Works will be in accordance with the requirements of the Office of Public Works (OPW) and Inland Fisheries Ireland (IFI).
- Pollution prevention measures in accordance with guidance from Inland Fisheries Ireland (2016) or as otherwise agreed with the IFI. This will include the installation of sediment traps and culverting of drainage ditches 'in the dry', where required.
- No direct discharges made to waters where there is potential for cement or residues in discharge;
- Designated impermeable cement washout areas must be provided;
- Any in-situ concrete work to be lined and areas bunded (where possible) to stop any accidental spillage
- Any spoil or waste material generated from the construction process is to be temporarily stored at an approved location on site, before being removed to an accepting licensed waste disposal facility;
- All new infrastructure is to be installed and constructed to the relevant codes of practice and guidelines;
- All surface water infrastructure are to be pressure tested by an approved method during the construction phase and prior to connection to the public networks, all in accordance with Local Authority Requirements;
- Connections to the public network are be carried out to the approval and / or under the supervision of the Local Authority prior to commissioning;
- All new sewers are to be inspected by CCTV survey post construction; to identify any possible physical defects for rectification prior to operational phase;
- Care will be required for the environmental management of the site to ensure that no potential contamination issues are experienced which may impact on the overall surface water quality.

- Potential issues can be mitigated against by ensuring that the developments environmental management plan is adhered to prevent accidental onsite oil spillages and the regular maintenance of onsite plant to eliminate potential risks. As outlined in the Construction Management Plan submitted with the planning application.
- Implement best practice construction methods and practices complying with relevant legislation to avoid or reduce the risk of contamination of watercourses or groundwater.
- A Site Specific Construction and Environment Management Plan will be developed and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the Construction and Environment Management Plan.
- Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.
- Weather conditions and seasonal weather variations will also be taken account of when planning stripping of topsoil and excavations, with an objective of minimizing soil erosion.
- The extent of sub-soil and topsoil stripping to be minimised to reduce the rate and volume of the run-off during construction until the topsoil and vegetation are replaced.
- Precast concrete units fabricated off site will be specified for culvert and bridging structures with cast in-site requirements minimised.
- Concrete batching will take place off site or in a designed area with an impermeable surface.
- Concrete wash down and wash out of concrete trucks will take place off site or in an appropriate facility.
- Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds.
- Oil and fuel stored on site for construction should be stored in designated areas. These areas shall be bunded and should be located away from surface water drainage and features.
- Refuelling of construction machinery shall be undertaken in designated areas away from surface water drainage in order to minimise potential contamination of the water environment. Spill kits shall be kept in these areas in the event of spillages.
- Hazardous construction materials shall be stored appropriately to prevent contamination of watercourses or groundwater.
- Spill kits should be kept in designated areas for re-fuelling of construction machinery.
- Dewatering measures should only be employed where necessary.

6.6.3 Operational Phase

Upon completion of the Construction Phase of the proposed scheme, issues pertaining to the development would in general be issues such as accidental pollution incidents into the storm water system.

Sustainable Drainage Systems will be incorporated, where practicable, in order to improve the quality of the surface water discharging from site and reduce the runoff volume and rate; thus providing a positive impact on the receiving surface water network and downstream waterbody. The surface water drainage design, for this development, was designed in accordance with the Local Authority requirements. All SuDS measures will be provided in accordance with the Greater Dublin Strategic Drainage Study Regional Drainage Policy Volume 2 - New Development (GDSDS-RDP Volume 2). Specific design requirements for SuDS systems are established by the Construction Industry Research and Information Association's publication CIRIA C753 – The SuDS Manual.

Following best practice, the potential for the storm water to become polluted via oil spills will be reduced as far as is practical by the use of an oil separator to take run off from carparking areas and passing through same prior to disposal.

Irish Water would maintain the foul & potable water systems while Meath County Council will maintain the storm water network.

As such this type of development would not increase the risk to surface water or downstream flooding. As the site is provided with a new storm sewer to replace the existing water course and all storm water generated on site will now be attenuated to ensure that the runoff from the site is kept to green field rates down stream lands would not be flooded when an extreme storm is experienced. The overall storm water quality will also be enhanced as SuDs features are included in the proposed development and all surface waters are to pass through an oil separator prior to outfalling into the proposed new storm sewer.

The following measures will be employed:

- Surface water runoff from the development to be collected by an appropriately designed system with contaminants removed prior to discharge i.e. petrol interceptor.
- A regular maintenance and inspection programme of the flow control devices, attenuation storage facilities, gullies and petrol interceptor will be required during the Operational Phase to ensure the proper working of the development's networks and discharges.
- A regular maintenance and inspection programme for the culverts and bridge structure will be required during the Operational Phase to ensure the proper working of the development's infrastructure.
- Waste generated by the everyday operation of the development should be securely stored within designated collection areas with positive drainage collection systems to collect potential runoff.
- Operational waste should be removed from site using licenced waste management contractors.

6.7 PREDICTED IMPACT FOLLOWING MITIGATION (RESIDUAL IMPACT)

Residual Impacts such as loss of agricultural land / earthworks haulage & the risk of contamination of surface water are deemed to be of minor risk, as the proposal for apartment type residential accommodation and housing would not be seen as a potential high risk development post construction.

6.7.1 Impact on Climate

The proposed development is likely to have a positive impact on the climate, due to the designed reduction in rainfall runoff rate entering the public surface water drainage network and the improvement in water quality discharging from site as a result of the proposed SuDS measures.

Further, the surface water drainage network has been designed to allow for an increase in rainfall intensity of 10%; to account for adverse future conditions due to climate change.

6.7.2 Worst Case Scenario

6.7.3 Construction Phase

The worst-case scenario is that there is an accidental on site incident in which the site development works are ongoing and a pollution incident occurs. This could lead to a direct discharge of oils or fuels into the surface water system.

6.7.4 Operational Phase

As noted from an operation view point the worst case scenario would be an accidental spill of oils or foul effluent from a leak in the foul drainage system or an oil spill from the oil-separators.

6.8 MONITORING

Proposed monitoring during the construction phase in relation to the water and hydrogeological environment are as follows:

- Adherence to 'Construction Management Plan'. If construction works are found to be not in accordance with the aforementioned plan, then the developer will ensure that measures are put in place to ensure compliance.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and vehicle wheel wash facilities. If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.
- Monitoring of run-off from the site including pumping / dewatering. If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.) If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.

- Monitoring of discharge from sediment retention ponds (e.g. pH, sediment content). If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.
- A dust management programme should be implemented during the construction phase of the development. If these measures are found to be inadequate or inadequately implemented, then the developer will ensure that measures are put in place to remedy this.

6.8.1 Operational phase

Proposed monitoring during the operational phase in relation to the water and hydrogeological environment are as follows:

- The taking in charge of the water infrastructure will ensure the system is regularly inspected and maintained. If specific maintenance is required on the water network, then the Local Authority will be responsible for ensuring that these maintenance measures are implemented.
- The performance of all SuDS features will be monitored by the relevant authorities during the life of the development. If specific maintenance is required for SuDS features, then the Local Authority will be responsible for ensuring that these maintenance measures are implemented.
- Monitoring of the installed 'Hydrobrake' (flow control) and gullies will be required to prevent contamination and increased runoff from the site. If specific maintenance is required on the surface water 'Hydrobreak' and on gullies, then the Local Authority will be responsible for ensuring that these maintenance measures are implemented.
- Although no specific monitoring will be required as part of the proposed development, it is envisaged that EPA Monitoring will continue in the area through the life of the development.

As noted, once the development is complete the foul drainage system & potable water system will be vested to Irish Water who will then operate and maintain the network. The storm water system will be taken in charge by Meath County Council who will maintain the network. As the proposed apartment block will have a management company, who as part of their ongoing inspection and maintenance requirements will inspect the oil separators serving the site in accordance with the manufacturers requirements. This will ensure that the separators are cleaned out periodically or as required.

6.9 CUMULATIVE IMPACTS

Cumulative phase looks at the increased overall implications the proposed development may have on the environs due to the degree of development locally. The type of development experienced in the area over the last decade is very similar in type, primarily residential accommodation.

To the north of the subject site there is a parcel of land which has been earmarked for the provision of two future primary schools. These schools, which do not form part of this application, could connect into the services being proposed for the application site. Thereby the proposed residential development would aid in providing the required infrastructure to enhance the surrounding developable lands.

Some separate Irish Water upgrade works may be needed to facilitate development in general in Navan, including the subject lands, but do not form part of this application. The location of these works is shown on drawing no. D061-069, prepared by CS Consulting Engineers.

The construction of the sewerage/water supply connections along the public road (R147) by Irish Water to facilitate the proposed development will require works to the public road will involve the excavation of soils/subsoils along the length of its route. This will be replaced with upgraded pipelines (300mm Foul Sewer for c. 470m, 300mm trunk watermain c. 1.5km) and the granular fill surrounding it. The top of the trench will comprise standard backfilled material.

The construction of the pipelines will be to Irish Water specifications and the construction management (including the implementation of appropriate mitigation measures) will ensure that there are no significant impacts arising.

6.10 DIFFICULTIES ENCOUNTERED

No difficulties were encountered while developing this report, the range and scope of desk top data.

7.0 AIR QUALITY AND CLIMATE

7.1 INTRODUCTION

Byrne Environmental Consulting Ltd have assessed the potential air quality and climatic impacts that the proposed development in Belmount, Navan, Co. Meath may have on the receiving environment during the construction and operational phases of the project. The assessment includes a comprehensive description of the existing air quality in the vicinity of the subject site; a description and assessment of how construction activities and the operation of the development may impact existing air quality; the mitigation measures that will be implemented to control and minimise the impact that the development may have on local ambient air quality and reduce the impact on the local micro climate; and, finally, a description as to how the development will be constructed and operated in an environmentally sustainable manner.

The proposal relates to a residential development of 544 no. dwellings on a site of c. 15.1 hectares comprising 260 no. houses (18 no. 2 bed, 207 no. 3 bed & 35 no. 4 bed) and 198 no. apartments (46 no. 1 bed, 152 no 2 bed), 30 no. duplex apartments (15 no. 2 bed & 15 no. 3 bed), and 56 no. dwellings in corner blocks (16 no. 1 bed, 24 no. 2 bed & 16 no. 3 bed) as well as the provision of two crèches (ground floor of apartment building [c. 195 sq. m] and single storey creche in housing area [c. 443 sq. m]) Open Space including playground areas; all ancillary landscape works with public lighting, planting and boundary treatments including regrading/re-profiling of site where required as well as provision of cycle paths; Provision of vehicular and pedestrian looped access through the site from 3 no. junctions located on Academy Street as well as pedestrian connection in south east of site to Dublin Road and upgrade works to junction onto the Dublin Road; along with 875 no. car parking spaces and 581 cycle spaces and 4 no. car sharing spaces; Surface water attenuation measures and underground attenuation systems as well as all ancillary site development works (reprofiling of site as required) as well as connection to existing public water supply and drainage services. All site development and landscape works.

Ian Byrne MSc. Environmental Protection, Dip Environmental & Planning Law, Member of the Institute of Acoustics, is the Principal Environmental Consultant of Byrne Environmental Consulting Ltd and prepared all aspects of this EIAR Chapter. Ian Byrne has over 23 years-experience in the monitoring and assessment of air quality and climatic impacts that residential, commercial and industrial developments may have on the receiving environment.

7.2 STUDY METHODOLOGY

The general assessment methodology of the potential impact of the proposed development on air quality and climate has been conducted in accordance with:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, August 2018).
- 2017 EPA Guidelines on information to be contained in Environmental Impact Assessment Reports.
- Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).
- Environmental Protection Agency, 2015. Revised Guidelines on the Information to be Contained in Environmental Impact Statements.
- Planning and Development Regulations 2001, as amended, in particular by the European Union (Planning & Development)(Environmental Impact Assessment) Regulations 2018 (SI No. 296 of 2018).
- Environmental Impact Assessment of Projects – Guidance on the preparation of the EIAR, European Commission, 2017.
- Climate Action and Low Carbon Development Act 2015

7.2.1 Air Quality Assessment Methodology

7.3 RECEIVING ENVIRONMENT (BASELINE SCENARIO)

The existing ambient air quality in the vicinity of the site has been characterised with information obtained from a number of sources as follows:

- Environmental Protection Agency's Annual Air Quality in Ireland 2018 Report;
- Site specific air quality monitoring surveys at site boundaries;

The ambient air quality data collected and reviewed for the purpose of this study focused on the principal substances (dust, vehicle exhaust emissions and boiler emissions) which may be released from the site during the construction and operation phases and which may exert an influence on local air quality.

7.3.1 Impact Assessment Methodology

Legislation and guidance

Air quality standards and guidelines are available from a number of sources. The guidelines and standards referenced in this report include those from Ireland and the European Union.

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 (Ref Table 7.1).

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 National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011), which incorporate European Commission Directive 2008/50/EC which has set limit values for the pollutants SO2, NO2, PM10, benzene and CO Council Directive 2008/50/EC combines the previous Air Quality Framework Directive (96/62/EC) and its subsequent daughter directives (including 1999/30/EC and 2000/69/EC). Provisions are also made for the inclusion of new ambient limit values relating to $PM_{2.5.}$

The European 2008/50/EC Clean Air For Europe (CAFÉ) Directive is the current air quality directive for Europe which supersedes the European Directives 1999/30/EC and 2000/69/EC.

In order to assess a wider range of air pollutants in the development area it is necessary to review current air quality monitoring data from published sources such as the most recent EPA's 2017 Annual report entitled Air Quality in Ireland. This EPA report provides detailed monitoring data collected from a number of monitoring locations throughout Ireland on an annual basis to assess national compliance with National Air Quality Regulations. Given the location of the site in Navan, Co. Meath it is characterised as a Zone C area as defined by the EPA.

EU legislation on air quality requires that Member States divide their territory into zones for the assessment and management of air quality. The zones in place in Ireland in 2018 are as follows:

- Zone A is the Dublin conurbation,
- Zone B is the Cork conurbation
- Zone C comprising 23 large towns in Ireland with a population >15,000.
- Zone D is the remaining area of Ireland.

The air quality in each zone is assessed and classified with respect to upper and lower assessment thresholds based on measurements over the previous five years. Upper and lower assessment thresholds are prescribed in the legislation for each pollutant. The number of monitoring locations required is dependent on population size and whether ambient air quality concentrations exceed the upper assessment threshold, are between the upper and lower assessment thresholds, or are below the lower assessment threshold. A summary of the EPA's Annual report entitled Air Quality in Ireland 2018 is detailed below in Table 7.2.

Table 7.1 – Air Quality Standards Regulations 2011 (based on EU Council Directive 2008/50/EC)

Pollutant	Regulation	Limit Criteria	Tolerance	Limit Value
Nitrogen Dioxide	2008/50/EC	Hourly limit for the protection of human health – not to be exceeded more than 18 times/year Annual limit for the protection of human health Annual limit for the protection of vegetation	40% until 2003 reducing linearly to 0% by 2010 40% until 2003 reducing linearly to 0% by 2010 None	200 µg/m3 40 µg/m3 400 µg/m3 NO & NO2
Lead	2008/50/EC	Annual limit for the protection of human health	100%	0.5 µg/m3
Sulphur Dioxide	2008/50/EC	Hourly limit for protection of human health – not to be exceeded more than 24 times/year Daily limit for protection of human health – not to be exceeded more than 3 times/year Annual and Winter limit for the protection of ecosystems	150 µg/m3 None None	350 µg/m3 125 µg/m3 20 µg/m3
Particulate Matter PM10	2008/50/EC	24-hour limit for protection of human health – not to be exceeded more than 35 times/year Annual limit for the protection of human health	50% 20%	50 µg/m3 40 µg/m3
Particulate Matter PM2.5 Stage 1	2008/50/EC	Annual limit for the protection of human health	20% from June 2008. Decreasing linearly to 0% by 2015	25 µg/m3
Particulate Matter PM2.5 Stage 2	2008/50/EC	Annual limit for the protection of human health	None	20 µg/m3
Benzene	2008/50/EC	Annual limit for the protection of human health	20% until 2006. Decreasing linearly to 0% by 2010	5 µg/m3
Carbon Monoxide	2008/50/EC	8-hour limit (on a rolling basis) for	60%	10 mg/m3

Pollutant	Regulation	Limit Criteria	Tolerance	Limit Value
		protection of human health		
Dust Deposition	German TA Luft Air Quality Standard Note 1	30 Day Average	None	350 mg/m2/day

Note 1 Dust levels in urban atmospheres can be influenced by industrial activities and transport sources. There are currently no national or European Union air quality standards with which these levels of dust deposition can be compared. However, a figure of 350 mg/m^2-day (as measured using Bergerhoff type dust deposit gauges as per German Standard Method for determination of dust deposition rate, *VDI 2129*) is commonly applied to ensure that no nuisance effects will result from industrial or construction activities.

Table 7.2 – EPA 2018 Assessment Zone Classification

Pollutant	EPA 2016 Assessment Classification
NO_2	
Zone A & B	Above lower assessment threshold
Zone C & D	Below lower assessment threshold
SO_2	
Zone A & B	Below lower assessment threshold
Zone C & D	Below lower assessment threshold
CO	
Zone A & B	Below lower assessment threshold
Zone C & D	Below lower assessment threshold
Ozone	
Zone A & B	Below long term objective
Zone C & D	Above long term objective
PM_{10}	
Zone A & B & C	Above lower assessment threshold
Zone D	Below lower assessment threshold
$PM_{2.5}$	
Zone A & B	Below lower assessment threshold
Zone C & D	Above lower assessment threshold
Benzene	
Zone A & B	Below lower assessment threshold
Zone C & D	Below lower assessment threshold
Heavy Metals (As, Ni, Cd, Pb)	
Zone A & B	Below lower assessment threshold
Zone C & D	Below lower assessment threshold
Poly Aromatic Hydrocarbons (PAH)	
Zone A & C & D	Above lower assessment threshold
Zone B	Above upper assessment threshold

7.3.2 Construction Impact Assessment Criteria

Transport Infrastructure Ireland's (formally the NRA) 'Guidelines for the Treatment of Air Quality during the Planning and Construction of National Road Schemes' (Revision 1, 2011) states that "*it is very difficult to accurately quantify dust emissions arising from construction activities*" and that "*it is thus not possible to easily predict changes to dust soiling rates or PM_{10} concentrations.*" The guidance advises the use of a semi-quantitative approach to determine the likelihood of a significant impact which should be combined with an assessment of the proposed mitigation measures.

The construction assessment criteria, reproduced from the TII (formerly NRA) guidance, are set out in Table 7.3 below.

Table 7.3 – Assessment criteria for the impact of duct emissions from construction activities with standard mitigation in place (TII 2011)

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

The impact of construction related dust emissions is assessed by estimating the area over which there is a risk of significant impacts as per the NRA guidance. The significance of impact is assessed in terms of the significance criteria outline in the EPA's 2017 Guidelines on the information to be contained in Environmental Impact Assessment Reports.

In relation to construction related traffic, air quality significance criteria are assessed on the basis of compliance with the appropriate standards air limit values. The Air Quality Standards Regulations 2011 replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

7.3.3 Operational Impact Assessment Criteria

Once operational, the proposed residential development may impact on air quality as a result of the requirements of new buildings to be heated and with the increased traffic movements associated with the development.

Air quality significance criteria are assessed on the basis of compliance with the national air quality limit values. The Air Quality Standards Regulations 2011 replace the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and S.I. No. 33 of 1999.

7.3.4 Climate Assessment Methodology

Climate has implications for many aspects of the environment from soils to biodiversity and land use practices. The proposed development may impact on both the macro-climate and micro-climate. The macro-climate is the climate of a large geographic area such as Ireland. The micro-climate refers to the climate in the immediate area.

With respect to microclimate, green areas are considered to be sensitive to development. Development of any green area is generally associated with a reduction in the abundance of vegetation including trees and a reduction in the amount of open, undeveloped space. The removal of vegetation or the development of man-made structures in these areas can intensify the temperature gradient.

To assess the impacts of converting vegetative surfaces to hard-standing with residential buildings and its significance, the amount of vegetative surfaces associated with the proposed development that will be converted to residential buildings and hard-standing has been considered.

The impact of the proposed scheme upon the macro-climate is assessed through the consideration of the change in CO2 emissions that will occur due to the changes in traffic flow that occur in response to the proposed scheme.

The most recent Conference of the Parties to the Convention (COP23) occurred in November 2017 and focussed on advancing the implementation of the Paris Agreement. The Paris Agreement was established at COP21 in Paris in 2015 and is an important milestone in terms of international climate change agreements. The "Paris Agreement", agreed by 200 nations, has a stated 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 greenhouse gas emissions will be based on Intended Nationally Determined Contributions (INDCs) which will form the foundation for climate action post 2020. Significant progress has also been made on elevating adaption onto the same level as action to cut and curb emissions. The EU, on the 23/24th of October 2014, agreed the "2030 Climate and Energy Policy Framework" (EU, 2014). The European Council endorsed a binding EU target of at least a 40% domestic reduction in greenhouse gas emissions by 2030 compared to 1990. The target will be delivered collectively by the EU in the most cost-effective manner possible, with the reductions in the ETS and non-ETS sectors amounting to 43% and 30% by 2030 compared to 2005, respectively. Secondly, it was agreed that all Member States will participate in this effort, balancing considerations of fairness and solidarity. The policy also outlines, under "Renewables and Energy Efficiency", an EU binding target of at least 27% for the share of renewable energy consumed in the EU in 2030.

European Commission Directive 2001/81/EC, the National Emissions Ceiling Directive (NECD) (2014), prescribes the same emission limits as the 1999 Gothenburg Protocol. A National Programme for the progressive reduction of emissions of these four transboundary pollutants has been in place since April 2005 (DEHLG, 2007a; 2004). Data available from the EU in 2010 indicated that Ireland complied with the emissions ceilings for SO2, VOCs and NH3 but failed to comply with the ceiling for NOX (EEA, 2012). Directive (EU) 2016/2284 "On the Reduction of National Emissions of Certain Atmospheric Pollutants and Amending Directive 2003/35/EC and Repealing Directive 2001/81/EC" was published in December 2016.The Directive will apply the 2010 NECD limits until 2020 and establish new national emission reduction commitments which will be applicable from 2020 and 2030 for SO2, NOX, NMVOC, NH3, PM2.5 and CH4. In relation to Ireland, 2020-29 emission targets are for SO2 (65% below 2005 levels), for NOX (49% reduction), for VOCs (25% reduction), for NH3 (1% reduction) and for PM2.5 (18% reduction). In relation to 2030, Ireland's emission targets are for SO2 (85% below 2005 levels), for NOX (69% reduction), for VOCs (32% reduction), for NH3 (5% reduction) and for PM2.5 (41% reduction).

The following guidelines and EU Directives relating to Climate Change aspects of EIA reports have been applied to this assessment in order to determine the potential impacts that the proposed development may have an climate change.

- 2017 EPA Draft Guidelines on information to be contained in Environmental Impact Assessment Reports.
- European Union (Planning & Development)(Environmental Impact Assessment) Regulations 2018 (SI No. 296 of 2018).
- European EIA Directive 2014/52/EU
- The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings amended in 2017 includes requirements for all residential dwellings to be "Nearly Zero Energy Buildings" (NZEB's) by 31st December 2020.

7.4 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

7.4.1 Description of the baseline environment

The subject site is located in Belmount, Navan, Co. Meath on the southern side of Navan town. The south-eastern and southern aspects of the site borders existing residential development. The southwestern, western northern and north-eastern aspects of the site are bordered by existing residential development. The R147 Dublin to Navan Road Is located further east of the site and Academy Street is located to the east and northeast of the site. The Springfield Glen road is located to the south of the site which gives access to the existing residential estates located adjacent to the southern, western and northern site boundaries. Lands adjoining the northern site boundary are reserved for future school development.

The subject development lands were formerly part of the Belmount House estate. Belmount House will be located within the development site area as shown in Figure 7.1 below.

The development area is located within a zone which includes sources of existing transportation related air emissions principally from local road infrastructure and sources of domestic, retail and commercial building heating. It is noted that there are no other major sources of industrial air emissions within 5km of the site.

The M3 Dublin to Kells Motorway is located approximately 3km west of the site.

Figure 7.1 – Image of completed development at Belmount, Navan, Co. Meath

7.4.2 Description of Existing Climate

The nearest representative synoptic meteorological station to the subject site is at Dublin Airport which is located approximately 35km southeast of the Belmount site in Navan and as such, long-term measurements of wind speed/direction and air temperature for this location are representative of prevailing conditions experienced at the subject site. Recent meteorological data sets for Dublin Airport were obtained from Met Éireann for the purposes of this assessment study.

Rainfall

Precipitation data from the Dublin Airport meteorological station for the period 2011-2018 indicates a mean annual total of about 762 mm. This is within the expected range for most of the eastern half of the Ireland which has between 750 mm and 1000 mm of rainfall in the year.

Temperature

The annual mean temperature at Dublin Airport (2011-2018) is 9.5ºC with a mean maximum of 15.3ºC and a mean minimum of 4.0ºC. Given the relative close proximity of this meteorological station to the proposed development site, similar conditions would be observed. Table 7.4 sets out meteorological data for Dublin Airport from 2011-2018.

Table 7.4 – Meteorological Data for Dublin Airport 2011-2018

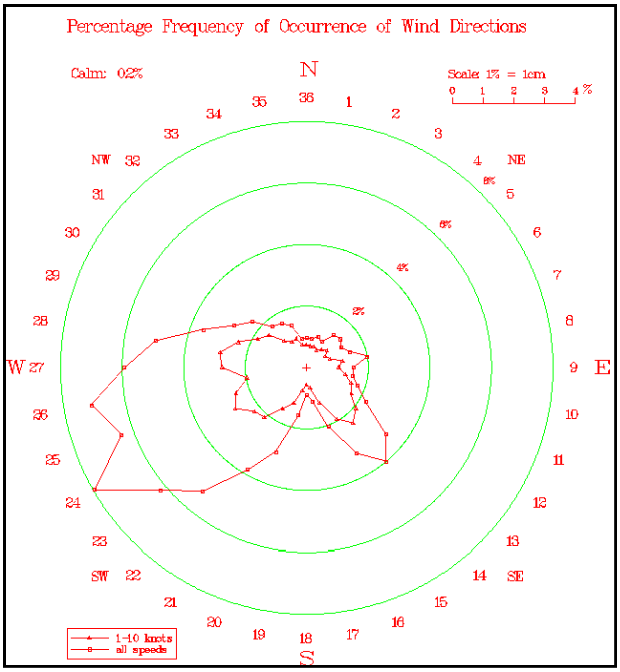
Year	Period	Rainfall (mm)	Maximum mean Temperature (ºC)	Minimum mean Temperature (ºC)	Mean Temperature (ºC)
2011	Annual Mean	672	16.7	3.1	9.4
2012	Annual Mean	850	15.3	5.4	9.3
2013	Annual Mean	764	14.0	3.6	9.9
2014	Annual Mean	870	15.8	5.4	10.6
2015	Annual Mean	766	14.0	4.0	9.0
2016	Annual Mean	725	15.7	4.4	10.1
2017	Annual Mean	661	15.0	5.3	9.9
2018	Annual Mean	709	14.8	4.8	9.7
Mean		762	15.3	4.0	9.5

Note 1: Data supplied by Met Eireann

Wind

Wind is of key importance for both the generation and dispersal of air pollutants. Meteorological data for Dublin Airport indicates that the prevailing wind direction, in the Dublin area, is from the West and Southwest and blows Northeast across the proposed development. The mean annual wind speed in the Dublin area between 2009 - 2018 is 5.7 m/s.

Figure 7.2 – Windrose for Dublin Airport



7.4.3 Description of existing air quality

The existing ambient air quality at and in the vicinity of the site is typical of an urbanised rural location and as such, domestic and commercial heating sources and road traffic are identified as the dominant contributors of hydrocarbon, combustion gases and particulate emissions to ambient air quality.

Trends in air quality

Annual air quality monitoring programs have been undertaken in recent years by the EPA and Local Authorities. The most recent annual report on air quality "Air Quality in Ireland 2018– Key Indicators of Ambient Air Quality" details the range and scope of monitoring undertaken throughout Ireland. Belmount Navan can be catagorised as Zone C.

The most recent 2018 EPA publication includes a number of Zone C monitoring locations which would be broadly comparable to the expected air quality at the subject site at Belmount Navan. The various Zone C air quality monitoring stations within Ireland provide a comprehensive range of air quality monitoring data sets which have been selected as part of this assessment to describe the existing ambient air quality at the subject site.

Nitrogen Dioxide

The Air Quality Standards Regulations 2011 specify a limit value of 40 µg/m^3, for the protection of human health, over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.
Long term NO_2 monitoring was carried out at three Zone C locations in 2018. The NO_2 annual mean in 2018 for these sites ranged from 6 - 14 µg/m^3. Therefore, long term averages were below the annual average limit of 40 µg/m^3.

Sulphur Dioxide

The Air Quality Standards Regulations 2011 specify a daily limit value of 125 µg/m3 for the protection of human health. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term SO_2 monitoring was carried out at two Zone C locations in 2018. The daily SO_2 daily means in 2018 for these sites ranged from 3 – 3.8 µg/m^3. Therefore, long term averages were significantly below the daily limit of 125 µg/m^3.
The annual mean SO_2 concentrations in Ireland have being slightly declining since 2003. This trend is reflective in the shift in fuel choice across Ireland in both residential heating and the energy production sector.

Carbon Monoxide

The Air Quality Standards Regulations 2011 specify an 8-hour limit value (on a rolling basis) for the protection of human health of 10,000 µg/m^3. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term CO monitoring was carried out at one Zone C location in 2018. The 8-hour CO concentrations was 0.2 – 0.5mg/m^3 in 2017 which is below the 8-hour limit value (on a rolling basis) of 10 mg/m^3.

Particulate Matter PM_{10}

The Air Quality Standards Regulations 2011 specify a PM_{10} limit value of 40 µg/m^3 over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term PM_{10} monitoring was carried out at two Zone C locations in 2018. The PM_{10} average in 2018 for these sites ranged from 11 - 16µg/m^3. Therefore, long term averages were below the annual average limit of 40 µg/m^3.

Particulate Matter $PM_{2.5}$

The Air Quality Standards Regulations 2011 specify a $PM_{2.5}$ limit value of 25 µg/m^3 over a calendar year.

Long term $PM_{2.5}$ monitoring was carried out at two Zone C locations in 2018. The $PM_{2.5}$ average in 2018 for these sites ranged from 6 - 10µg/m^3. Therefore, long term averages were below the target value 25 µg/m^3.

Benzene

The Air Quality Standards Regulations 2011 specify a benzene limit value of 5 µg/m^3 over a calendar year. The standard, taken from the 2008 CAFÉ Directive 2000/69/EC, came into force in 2011.

Long term benzene monitoring was carried out at Zone A & C locations .The benzene average in 2018 for Zone C was <.16 μg/m³. Therefore, long term averages were below the limit value 5 μg/m³.

Table 7.5 below presents a summary of the 2018 Air Quality data obtained from the Zone C locations which may be considered to be broadly representative to that of the subject site.

Table 7.5 – Summary of the 2018 Air Quality data obtained from Zone C areas

Pollutant	Regulation	Limit type	Limit value	EPA monitoring data 2018
Nitrogen dioxide	2008/50/EC	Annual limit for protection of human health	40 μg/m³	–6 * 14 μg/m³
Sulphur dioxide	2008/50/EC	Daily limit for protection of human health (not to be exceeded more than 3 times per year)	125 μg/m³	–3 – 3.8 μg/m³
Carbon monoxide	2008/50/EC	8-hour limit (on a rolling basis) for protection of human health (Zone C)	10,000 μg/m³	200 - 500μg/m³
Particulate matter (as PM_{10})	2008/50/EC	Annual limit for protection of human health	40 μg/m³	11 – 16 μg/m³
Particulate matter (as $PM_{2.5}$)	2008/50/EC	Annual limit for protection of human health	25 μg/m³	– 6 - 10 μg/m³
Benzene	2008/50/EC	Annual limit for protection of human health	5 μg/m³	< 0.20 μg/m³

7.4.4 Baseline air quality monitoring

A site specific short-term monitoring study was conducted for Nitrogen oxides, Sulphur dioxide and BTEX (Benzene, Toluene, Ethylbenzene and Xylene). All pollutants were measured at two locations (AQM1, AQM2) using passive diffusion tubes over a two week period. Figures 7.3 identifies the monitoring locations. The baseline survey was conducted during October 2018 when the potential for higher ambient levels of fossil fuel generated pollutants would be present as a result of the colder winter period.

These locations were chosen in order to obtain short-term sample concentrations for the identified parameters from the principal sources of pollution i.e. vehicle exhaust emissions and home heating fossil fuel emissions.

The survey was indicative only and results obtained cannot be used to demonstrate compliance with short-term or annual limit values detailed in Table 7.1 above. The survey does, however, aid in identifying the influence of sources in the vicinity of the proposed development site. The results from the monitoring surveys are presented in Table 7.6.

The concentrations of NO_2, SO_2 ,BTEX and dust deposition levels measured during the short term measurement survey were significantly below their respective annual limit values and comparable with levels reported by the EPA.

Table 7.6 – Results of passive diffusion tube monitoring at the Belmount development site

Pollutant	Sampling period	Concentration A1 Eastern Site Boundary	Concentration A2 Western site boundary	Assessment criteria
Nitrogen dioxide	October 2017	<2.3 μg/m³	<3.2 μg/m³	40 μg/m³ (as annual average)
Sulphur dioxide	October 2017	8.4 μg/m³	<2.1 μg/m³	125 μg/m³ (as annual average)
Benzene	October 2017	<0.29 μg/m³	<0.39 μg/m³	10 mg/m³ (as annual average)

Pollutant	Sampling period	Concentration A1 Eastern Site Boundary	Concentration A2 Western site boundary	Assessment criteria
Ethylbenzene	October 2017	<1.1 µg/m^3	<1.5 µg/m^3	N/A
Toluene	October 2017	<4.9µg/m^3	<6.7 µg/m^3	N/A
m/p-Xylene	October 2017	<0.24 µg/m^3	<0.33 µg/m^3	N/A
o-Xylene	October 2017	<1.1 µg/m^3	<1.5 µg/m^3	N/A
Dust	Sept -Oct 2018	<52 mg/m^2-day	<52mg/m^2-day	350 mg/m^2-day

Note 1: Annual limit

Note 2 < value indicates below Laboratory limit of detection

7.4.5 Significance

Based on published EPA air quality data for the Zone C area in which the subject site is located together with site specific monitoring data, it may be concluded that the existing baseline air quality at the subject site may be characterised as being good with no exceedances of the National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011) limit values of individual pollutants. The quality of existing air quality at the subject site must be maintained and improved where possible as a result of the proposed development to ensure that local human health and the ecological environment is not adversely affected.

7.4.6 Sensitivity

The subject site shall be developed by ground clearance and site preparation works and the subsequent construction of residential buildings, creches, playgrounds, cycle paths, open landscaped areas and road and path infrastructure. The principal local receptors that may be impacted by the development are existing residential developments to the north, east, south and west of the site.

Figure 7.3 – Baseline Air Quality Locations A1 & A2

7.5 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

When considering a development of this nature, the potential impact on air quality and climate must be considered for each distinct stage: the short (1-5 years) and medium term (6-9 years) impact of the construction phase and the longer term impact of the operational phase. The construction phase will be undertaken over a 3-5 year period. It is important that there are no unacceptable decreases in ambient air quality levels predicted during the construction phases and during the operational phase. Details of the indicative phased delivery of the proposed development set out in Chapter 2 of the EIAR.

7.5.1 Potential impacts of the proposed development

The construction phase of the development has the potential to generate short term fugitive dust emissions during ground preparation and enabling works and from general site construction activities, however, these emissions will be controlled by appropriate mitigation techniques and through the implementation of a construction phase air quality management and monitoring plan throughout the duration of the construction phase to ensure that existing adjacent residential properties and lands will not be adversely impacted by a deterioration in air quality associated with the construction phase.

The operational phase of the development will see the operation of modern, well insulated thermally efficient buildings in which energy efficiency shall be achieved by implementing sustainable features into the building design.

National air quality standards shall not be adversely affected as a result of the short-term construction phase or the operational phase, thus ensuring that the potential for adverse impacts on human health is negligible.

The proposed development does not include the construction of any high structures (maximum 5-story height) which may impact on the local micro climate by means of shadowing effects or wind sheer effects, therefore the proposed development will not to have an adverse impact on shading or temperature profiles at the nearest existing residential properties or on the local receiving environment in the vicinity of the site boundaries.

Road traffic and residential heating are the typical sources of greenhouse gas emissions associated with a residential or mixed use development. EPA guidance states that a development may have an influence on global climate where it represents *“a significant proportion of the national contribution to greenhouse gases”.*

7.5.2 Potential Impacts – Construction & Operational Phases

Various elements of both the construction and operational phases of the proposed development have the potential to impact on the local receiving environment, on adjacent residential properties and on human health which are considered with regard to National Air Quality Standards designed to protect human health. The likely potential impacts for both construction and operation of the proposed scheme prior to mitigation are described in this section of the EIAR. The mitigation measures are described in Section 7.8 and the predicted impacts in Section 7.9.

7.5.3 Construction Phase Impacts

Air quality

The development of the site will be conducted in the following phased stages:

- Enabling works - Site set up and Site clearance
- Construction works including site infrastructure, houses, apartment buildings and landscaping

Construction impacts with both of these phased stages are considered below.

Enabling works - Site Set Up and Clearance

Works activities associated with the ‘Site set up’ will be undertaken prior to construction works commencing in each sub-phase. The setting up of the site shall involve the construction of site security hoarding and site compounds, site offices, materials and waste storage areas and staff welfare facilities. These temporary activities will have a minimal potential to generate fugitive dust emissions or combustion gas emissions.

Site clearance and ground excavation works will be undertaken in separate phases and these activities have the potential to generate fugitive windblown dust emissions rising from the operation of mechanical plant such as dozers, excavators and tipper trucks and the movement of these vehicles on exposed surfaces at the site. With regard to the phased development approach, only one phase at a time shall be developed with the remaining phased areas remaining generally undisturbed until such a time as they are developed. Infrastructural works will be required to facilitate site services but it is not predicted that there would be bulk excavations of stripped soils until such a time as the development of subsequent phases are commenced.

With regard to the volume of waste material (top and sub soils) generated during site clearance there will be a requirement for HGV trucks to remove the material from the site. Stripped top-soils shall be stockpiled and covered on site for re-use during final landscaping works. Trucks shall be loaded with material on-site by mechanical excavators and loading shovels which will generate fugitive dust emissions as a result of the transfer of the excavated materials comprised principally of soils and stones from stockpile to truck.

The movements of construction vehicles on the site shall also generate windblown dust emissions. Where dusty waste material is loaded onto exposed open trucks, fine dusts may be released as the truck travels along public roads.

It is estimated that there will be a maximum of 4 (No.) x 20 tonne tipper truck movements per hour or an average of 32 movements per day associated with site clearance works for each phase of development. This relatively small volume of truck movements will have a negligible impact on local ambient air quality. In general, site clearance works would occur for an approximate 2 - 3 month period.
The impact on local air quality during Site Set-Up and Clearance will be temporary in nature and will result in a potentially minor impact on local air quality and sensitive receptors.

Building and Site Infrastructure Construction Works

During the construction phase there will be extensive site works, involving construction machinery, construction activities on site which have the potential to generate fugitive windblown dust emissions.

Construction equipment including generators and compressors will also give rise to some exhaust emissions. However, due to the size and nature of construction activities, exhaust emissions during construction will have a negligible impact on local air quality and therefore on human health.

Construction traffic to and from the site shall result in a short term increase in the volume of diesel fuelled HGV's along the local road network which will generate additional hydrocarbon and particulate emissions from the vehicle exhausts.

The construction phase activities will result in a minor impact on local air quality.

Climate

During the construction phase, existing vegetated areas throughout the development site will be removed due to site clearance works and associated movement of construction traffic thus impacting the micro-climate. Whilst this will impact the evapotranspiration rates of vegetation, there will be no impact upon the moisture evaporation from the exposed soil. Therefore, there will be no significant impacts on microclimate.

CO_2 will be released into the atmosphere as a result of the movement of construction vehicles and use of plant. However emissions associated with such activities will occur over a short-term period (c. 3-5 years) which will not result in an adverse impact on the local micro or the broader macro climate.

7.5.4 Operational Phase Impacts

Air quality

The operational phase of the proposed development will result in a slight impact on local air quality primarily as a result of the requirements of new buildings to be heated and with the increased traffic movements associated with the development.

Traffic movements associated with the development have been evaluated and assessed as part of the Traffic & Transport Assessment by Pinnacle Consulting Engineers. The split in am and pm peak traffic movements will not result in an adverse impact on local air quality at any of the junctions and it is predicted that the impact of car engine exhaust emissions will have a negligible impact on local ambient air quality. It is expected that a proportion of the commuting residents will avail of the Bus Eireann and private bus operators commuter services which operate along the R147 Dublin to Navan Road located to the east of the site. The availability of public transport for residents of the development will reduce the number of private vehicles exiting and entering the development during am and pm peak times.

The design and construction of all buildings in accordance with National Building Regulations *(The Irish Building Regulations Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings)* shall ensure that modern building materials are used and that they are designed to be thermally efficient resulting in a reduction in the volume of fossil fuels required to heat the buildings. It is predicted that fossil fuel combustion gas emissions including Carbon Dioxide, Sulphur Dioxide, Nitrogen Oxides, Carbon Monoxide and hydrocarbon particulate emissions will be slight and will not have an adverse significant impact on the existing ambient air quality in the vicinity of the proposed development site.

In order to counteract the potential impact of the development on the existing and future climate, the design of the proposed residential apartments and houses shall consider a number of sustainable heating and energy saving features.

Climate

The development site will include open space and landscaped areas. The overall development includes the construction of buildings and roadways which will have the effect of marginally raising localised air temperatures, especially during the warmer summer period. It is predicted that the proposed development will not have an adverse impact on the local micro-climate or on the local receiving environment and therefore human health in the vicinity of the development site.

The development of open areas on the site will continue to contribute albeit in a minor way to the adsorption of Carbon Dioxide from the atmosphere and the release of Oxygen to the atmosphere.

The proposed development includes apartment structures which will have a minor impact on the local micro-climate by means of wind sheer effects. There will however be no unacceptable impact within or beyond the overall site.

Greenhouse gases occur naturally in the atmosphere (e.g. carbon dioxide, water vapour, methane, nitrous oxide and ozone) and in the correct balance, are responsible for keeping the lower part of the atmosphere warmer than it would otherwise be. These gases permit incoming solar radiation to pass through the Earth's atmosphere, but prevent most of the outgoing infrared radiation from escaping from the surface and lower atmosphere into the upper levels. However, human activities are now contributing to an upward trend in the levels of these gases, along with other pollutants with the net result of an increase in temperature near the surface.

Motor vehicles are a major source of atmospheric emissions which contribute to climate change, however, vehicle exhaust emissions generated from vehicles associated with the development will have a negligible impact on the macro-climate given modern technological developments in cleaner and more efficient vehicle engines. Current trends suggest that vehicle manufacturers are ceasing the manufacture of large diesel engines for private cars and instead adopting hybrid engine and all electric technologies which will contribute to the reduction of engine exhaust emissions including particulate matter, Nitrogen Oxides, Sulphur Dioxide, Carbon Dioxide and Carbon Monoxide.

To further reduce the climatic impact of the operational phase of the development, electric vehicle charging points shall be installed in dedicated parking spaces at each apartment block to facilitate residents who own electric vehicles and to encourage other residents to purchase electric vehicles.

The scheme has been designed to provide thermally efficient buildings which will reduce the consumption of fossil fuels within each individual dwelling. This will reduce the impact the operational phase of the development will have on the micro and macro climate. In particular, there will be no "traditional" passive air vents in the apartments which are both thermally and acoustically inefficient. Mechanical Ventilation and Heat Recovery (MVHR) systems shall be incorporated into the design of the apartments. The MVHR systems together with thermally and acoustically rated window sets will reduce the potential future impacts that the external climate will have in terms of wind and changing temperatures on the internal environment within the residential units. These design features will ensure the units are thermally efficient thus reducing the use of fossil fuels leading to a reduction of the impact on climate.

The thermal efficiency of the buildings will ensure that the development will be sustainable and will be protected against the impacts of future climate change which may include storm events and prolonged colder periods during the winter season. These factors will contribute to reducing the impact the operational development has on the local and global climate which will ultimately contribute in a positive manner in reducing the impact on local and further afield human health.

7.5.5 Cumulative Impacts

In accordance with *Schedule 6, Part 2(c) of the Planning and Development Regulations 2001-2018*, this section has considered the cumulative impact of the proposed development in conjunction with future and current development in the vicinity of the subject site.
The European Commission's report of May 1999 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions' defines cumulative impact as follows:

"Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project".

The cumulative air quality impact of the proposed residential development, other local currently under construction residential developments and existing local transport infrastructure is assessed with regard to having established the baseline air quality and then predicting the impact that the proposed development will have on the baseline air quality. Together the combined impact can be assessed to determine if there is sufficient *"atmospheric budget*" to facilitate the proposed development.

It is predicted that the cumulative impact of the construction and operational phases of the subject development and the currently under construction residential developments to the east of the site will not have an adverse long-term impact on the receiving environment.

The construction of the separate sewerage/water supply connections along the public road (R147) by Irish Water to facilitate the proposed development will require works to the public road will involve the excavation of soils/subsoils along the length of its route. This will be replaced with upgraded pipelines (300mm Foul Sewer for c. 470m, 300mm trunk watermain c. 1.5km) and the granular fill surrounding it. There may be some short term air quality impacts during the construction phase as the pipes are laid, particularly in respect of traffic management with regards to sensitive receptors. This may cause local short term inconvenience and disturbance to residents and business in the vicinity of the works. However the works would normally be undertaken in sections on a phased/rolling programme so that the number of persons experiencing local inconveniences at any one time is kept to a minimum.

The *Irish Water Code of Practice for water infrastructure – Connections and Developer Services – Design and Construction requirements. Dec 2017* specifies that noise, vibration and odours shall be minimised during Irish Water works. The contractor engaged to conduct the works on behalf of Irish Water will conduct the monitoring to assess the impacts of works on air quality, noise and vibration.

It is considered that, in the absence of mitigation measures, there will be the potential for a short term slight negative cumulative impact associated with the construction phase of the subject development on ambient air quality and climate primarily as a result of the use of diesel to fuel construction plant and equipment.

7.5.6 *'Do Nothing'* Impact

The subject site is currently comprised of agricultural lands and if they remain undeveloped the site will continue to have no adverse impact on existing ambient air quality or on the local micro-climate.

Based on the projected increase in traffic up to the reference year of 2037, the increase in traffic related emissions, based on projected Traffic Impact Assessment figures without the subject development would be slight. This increase above the existing situation would be minor and would not result in a perceptible change in the existing local air quality environment.

7.5.7 Risk to Human Health

Construction Phase

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. Therefore, the impact of construction of the proposed development is likely to be negative, short-term and imperceptible with respect to human health.

Operational Phase

Operational traffic emissions as a result of the proposed development are compliant with all National and EU ambient air quality limit values which are set for the protection of human health and therefore, will not result in an adverse or harmful impact on human health.

7.6 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

This section provides the measures that shall be implemented during the construction and operational phase and into the design of the development to minimise the impacts on the receiving environment, local population and human health, livestock and agricultural lands, local flora and fauna, local businesses and on climate.

7.6.1 Construction Phase

In order to ensure that adverse air quality impacts are minimised during the construction phase and that the potential for soiling of property and amenity and local public roads is minimised, the following mitigation measures shall be implemented during the course of all construction activities:

AQ CONST 1: Air Quality Mitigation Measures

- Avoid unnecessary vehicle movements and manoeuvring, and limit speeds on site so as to minimise the generation of airborne dust.
- Use of rubble chutes and receptor skips during construction activities.
- During dry periods, dust emissions from heavily trafficked locations (on and off site) will be controlled by spraying surfaces with water and wetting agents.
- 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 only.
- Re-suspension in the air of spillages material from trucks entering or leaving the site will be prevented by limiting the speed of vehicles within the site to 10kmh and by use of a mechanical road sweeper.
- The overloading of tipper trucks exiting the site shall not be permitted.
- Aggregates will be transported to and from the site in covered trucks.
- Where the likelihood of windblown fugitive dust emissions is high and during dry weather conditions, dusty site surfaces will be sprayed by a mobile tanker bowser.
- Wetting agents shall be utilised to provide a more effective surface wetting procedure.
- Exhaust emissions from vehicles operating within the construction site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised by routine servicing of vehicles and plant, rather than just following breakdowns; the positioning of exhausts at a height to ensure adequate local dispersal of emissions, the avoidance of engines running unnecessarily and the use of low emission fuels.
- All plant not in operation shall be turned off and idling engines shall not be permitted for excessive periods.
- 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.
- Material stockpiles containing fine or dusty elements including top soils shall be covered with tarpaulins.
- Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system.
- A programme of air quality monitoring shall be implemented at the site boundaries for the duration of construction phase activities to ensure that the air quality standards relating to dust deposition and PM_{10} are not exceeded. Where levels exceed specified air quality limit values, dust generating activities shall immediately cease and alternative working methods shall be implemented.
- A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated.

7.6.2 Operational Phase

The Operational Phase of the Belmount Navan development site will not generate air emissions that would have an adverse impact on local ambient air quality or local human health and as such there are no mitigation measures specified for the Operational Phase.

The operational phase includes mitigation measures relating to the design of the development to minimise the impact of the operational phase of the development on air quality and climate are as follows:

AQ OP1 : Climate Impact Mitigation Measures

- Energy Efficiency - All proposals for development shall seek to meet the highest standards of sustainable design and construction with regard to the optimum use of sustainable building design criteria such as passive solar principles and also green building materials.
- All residential units shall be designed and constructed in accordance with The Irish Building Regulations *Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings* amended in 2017 includes requirements for all residential dwellings to be "Nearly Zero Energy Buildings" (NZEB's) by 31st December 2020.
- In order to reduce energy consumption, the following key design features have been considered in the design process and will be incorporated into the construction of the residential units:
- Passive solar design including the orientation, location and sizing of windows
- The use of green building materials: low embodied energy & recycled materials
- Energy efficient window units and frames with certified thermal and acoustic insulation properties
- Building envelope air tightness
- Installation of Mechanical Ventilation & Heat Recovery systems in all apartment units which operate by extracting warm air from kitchens and bathrooms, cleaning it and distributing it to other rooms in the unit.
- Thermal insulation of walls and roof voids of all units

AQ OP2: Air Quality Mitigation Measures

- Natural Gas heating
- Inclusion of electric car charging points to encourage electric vehicle ownership
- Proximity of Bus Eireann and private bus operator's commuter services on the R147 Navan-Dublin Road to the east of the development to provide public transport to residents.
- Provision of open landscaped areas and playgrounds within the development to encourage residents to avail of active lifestyle options.

7.7 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

7.8 CONSTRUCTION PHASE

Various elements associated with the construction phase of the proposed development have the potential to impact local ambient air quality, human health and climate. However the potential construction phase impacts shall be mitigated as detailed above to ensure there is no adverse impact on ambient air quality for the duration of all construction phase works. It is predicted that the operational phase of the development will not generate air emissions that would have an adverse impact on local ambient air quality or local human health or local livestock welfare.

7.9 OPERATIONAL PHASE

The sustainable features that are incorporated into the design of all residential units will ensure that the operational phase of the development at Belmount Navan will not have an adverse impact on human health, local air quality or on local or global climate patterns. The residential units will be designed to ensure that they can withstand the potential changes in climate which may generate more extreme and prolonged meteorological events in the future.

7.10 MONITORING

7.10.1 Construction Phase

This section describes the dust monitoring methodologies that shall be implemented at the site during the construction phases to ensure that dust and construction vehicle exhaust emissions as NO_2 generated by site activities does not cause nuisance or cause adverse health effects to residential areas and other receptors located in the vicinity of the site boundaries.

Dust Deposition Monitoring Methodology

Dust deposition levels will be monitored to assess the impact that site construction site activities may have on the local ambient air quality and to demonstrate that the environmental control measures in place at the site are effective in minimising the impact of construction site activities on the local receiving environment including existing residential developments and lands bordering the site. The following procedure shall be implemented at the site on commencement of site activities:

The dust deposition rate will be measured by positioning Bergerhoff Dust Deposit Gauges at strategic locations near the boundaries of the site for a period of 30 +-2 days. Monitoring shall be conducted on a monthly basis during periods when the highest levels of dust are expected to be generated i.e., during site preparation works and soil stripping activities and on a quarterly basis thereafter. The proposed monitoring locations (D1 – D4) are presented below in Figure 7.4.

The selection of sampling point locations will be completed after consideration of the requirements of *Method VDI 2119* with respect to the location of the samplers relative to obstructions, height above ground and sample collection and analysis procedures. The optimum locations will be determined by a suitably qualified air quality expert to ensure that the dust gauge locations are positioned in order to best determine potential dust deposition in the vicinity of the site boundaries and existing on-site buildings.

After each (30 +-2 days) exposure period, the gauges will be removed from the sampling location, sealed and the dust deposits in each gauge will be determined gravimetrically by an accredited laboratory and expressed as a dust deposition rate in mg/m^2-day in accordance with the relevant standards.

Technical monitoring reports detailing all measurement results, methodologies and assessment of results shall be subsequently prepared and maintained by the Construction Site Manager. Monitoring reports shall be made available to the Local Authority as requested.

A dust deposition limit value of 350 mg/m^2-day (measured as per German Standard Method VDI 2119 – Measurement of Particulate Precipitations – Determination of Dust Precipitation with Collecting Pots Made of Glass (Bergerhoff Method) or Plastic. is commonly specified by Local Authorities and by the EPA to ensure that no nuisance effects will result from specified activities and it is to this Best Practice standard method that this programme of dust monitoring and control has been prepared.

The *German Federal Government Technical Instructions on Air Quality Control - TA Luft* specifies an emission value for the protection against significant nuisances or significant disadvantages due to dustfall. This limit value is 350 mg/m^2-day and it is to this limit value that all measured dust deposition levels shall be assessed. This limit value is commonly specified by Local Authorities at construction sites.

The results of all dust deposition surveys shall be maintained by the Project Manager and shall be made available to Meath County Council.

Figure 7.4 Construction Phase dust monitoring (D1-D4) Monitoring Locations

NO_2 Monitoring Methodology

In order to assess the impact on existing air quality that vehicle and plant exhaust emissions associated with the construction phase of the development may have, it is proposed that a programme of Nitrogen Dioxide monitoring shall be undertaken for a 1 year period at the baseline air quality locations, A1 & A2 as shown above in Figure 7.3. The purpose of this monitoring programme will be to verify the effectiveness of the various construction phase mitigation measures and to quantify by measurement, the concentration of NO2 in the ambient air to allow for the assessment of measured NO_2 levels against levels measured in EPA Zone D areas over a similar period. NO2 levels shall also be assessed against the annual limit value NO_2 as defined in National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011) which specify an annual limit value of 40 µg/m^3, for the protection of human health, over a calendar year.

7.10.2 Operational Phase

Not required.

7.11 REINSTATEMENT

Reinstatement issued are not relevant to this Chapter of the EIAR, with regard to the construction and operational phases.

7.12 INTERACTIONS

The traffic data used in the assessment of air quality impact was obtained from the traffic and transport consultant, Pinnacle, for the proposed development.

The principal interactions between Air & Climate impacts and Population and Human Health have been addressed in Section 7.8 of this report which describes in detail the mitigation measures that shall be implemented to ensure that human health, residential amenity and livestock welfare are not adversely impacted by any aspect of the construction or operational phases of the development.

Similarly, the mitigation measures have also been designed to minimise the potential impact that the construction and operational phases of the development may have on the receiving environment which includes flora and fauna The concept of control and attenuation at source of potential emission sources that may impact the receiving environment is the principle that has been adapted in the design, construction and operational phases of the development.

7.13 DIFFICULTIES ENCOUNTERED IN COMPILING INFORMATION

There were no difficulties encountered in compiling this Chapter of the EIAR.

8.0 NOISE AND VIBRATION

8.1 INTRODUCTION

This section of the EIAR has been prepared by Byrne Environmental Consulting Ltd to identify and assess the potential noise and vibrational impacts associated with a proposed Strategic Housing Development at Belmount, Navan, Co. Meath during both the Construction and Operational Phases of the development.

This document includes a comprehensive description of the receiving ambient noise climate in the vicinity of the subject site; a description of how the construction and operational phases may impact the existing ambient noise climate, the mitigation measures that shall be implemented to control and minimise the impact that the development may have on existing ambient noise levels.

The mitigation measures designed for the development shall demonstrate how the development shall be constructed and operated in an environmentally sustainable manner in order to ensure its minimal impact on the receiving noise climate and at any existing or future receptors in the vicinity of the development site.

Ian Byrne MSc. Environmental Protection, Dip Environmental & Planning Law, Member of the Institute of Acoustics, is the Principal Environmental Consultant of Byrne Environmental Consulting Ltd and prepared all aspects of this EIAR Chapter. Ian Byrne has over 23 years experience in the monitoring and assessment of noise and vibration impacts that the construction and operation of residential, commercial and industrial developments may have on the receiving environment.

Based on academic qualifications and professional experience, Ian Byrne is defined as a *“Competent Person”* as defined in the *EPA’s 2016 Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).*

8.2 STUDY METHODOLOGY

The general assessment methodology of the potential noise and vibrational impacts that the proposed development will have on the receiving environment has been prepared in accordance with:

- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, August 2018).
- 2017 EPA Draft Guidelines on information to be contained in Environmental Impact Assessment Reports.
- Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).
- Environmental Protection Agency, 2015. Revised Guidelines on the Information to be Contained in Environmental Impact Statements
- Environmental Protection Agency, 2015. Draft Advice Notes for Preparation of Environmental Impact Statements
- Development Management Guidelines (DoEHLG, 2007).
- Planning and Development Regulations 2001, as amended by European Union (Planning & Development)(Environmental Impact Assessment) Regulations 2018.

8.2.1 Noise Assessment Methodology

Baseline Environment

The baseline noise environment in the vicinity of the proposed development site has been defined by field surveys conducted during September 2018 and during July 2019 at site boundaries adjacent to existing residential development. Sound level measurements were conducted in favourable weather conditions when there was no precipitation and when mean windspeeds were <5m/sec.

The existing ambient noise climate in the vicinity of the site has been characterised with information obtained from site specific baseline noise surveys conducted in the vicinity of the closest noise sensitive receptors to the subject site. Baseline noise surveys were conducted in accordance with *ISO 1996-1: 2017*: *Acoustics – Description, measurement and assessment of environmental noise* and with regard to the EPA’s 2016 *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4).*

8.2.2 Impact Assessment Methodology

The impact of the proposed development has been determined through prediction of future noise levels associated with the scheme using established calculation techniques.

Construction noise and vibration impacts have been assessed in accordance with Transport Infrastructure Irelands (TII) guidance document *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014*). Indicative construction noise calculations have been undertaken using the methodology set out in *BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise 2009+A1 2014.*

Impacts associated with road traffic movements on the development when operational have been assessed with regard to the NRA's *Good Practice Guidance for the Treatment of Noise during the Planning of National Road Schemes (March 2014*). *UK Department of Transport (Welsh Office) - Calculation of Road Traffic Noise [CRTN]* and the *Highways Agency Design Manual for Roads and Brides Part 7 HD 213/11 – Revision 1 Noise and Vibration.*

The operational phase of the development has been assessed with regard the *Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound.* Acoustic design of apartments refers to the 2018 Ministerial Guidelines "Sustainable Urban Housing – Design Standards for New Apartments. Paragraph 1.18 of the document refers specifically to the Building Regulations Technical Guidance Documents and states that the construction of the apartment building shall comply with all relevant requirements.

8.2.3 Construction Impact Assessment Criteria

The construction noise limits, which are presented in Table 8.1 represent a reasonable compromise between the practical limitations in a construction project, and the need to ensure an acceptable noise level for the nearby residents and other sensitive receptors including amenity space. Table 8.1 specifies the recommended Project Noise Limit Criteria in accordance with *BS 5228 – 1:2009+A1 2014 Code of practice for noise and vibration control on open sites: Part 1 Noise*. Noise limit criteria are based on the noise measured at the external façade of a receptor.

Table 8.1 – BS5228-2014 Construction Phase Noise Limit Criteria

Construction Phase Noise Limit Criteria		
Location / Day	**Assessment Period**	**External Noise Limit Criteria**
All Receptors Monday to Friday Morning	07:00hrs – 08:00hrs	70 dB(A), $L_{Aeq, 1hr}$
All Receptors Monday to Friday Daytime	08:00hrs – 18:00hrs	75dB(A), $L_{Aeq, 10hr}$
All Receptors Monday to Friday Early Evening	18:00 – 19:00hrs	70 dB(A), $L_{Aeq, 1hr}$
All Receptors Monday to Friday Late Evening	19:00hrs – 22:00hrs	65 dB(A), $L_{Aeq, 3hr}$
All Receptors Monday to Friday Nightime	22:00hrs – 07:00hrs	55 dB(A), $L_{Aeq, 1hr}$
All Receptors Saturday Morning	07:00hrs – 08:00hrs	70 dB(A), $L_{Aeq, 1hr}$
All Receptors Saturday Daytime	08:00hrs – 13:00hrs	75dB(A), $L_{Aeq, 5hr}$
All Receptors Saturday Midday	13:00 – 14:00hrs	70 dB(A), $L_{Aeq, 1hr}$
All Receptors Saturday Afternoon-Evening	14:00 – 22:00hrs	65 dB(A), $L_{Aeq, 3hr}$
All Receptors Monday to Friday Nightime	22:00 – 07:00hrs	55 dB(A), $L_{Aeq, 1hr}$
All Receptors Sundays and Public Holidays Daytime	07:00hrs – 21:00hrs	65 dB(A), $L_{Aeq, 1hr}$
All Receptors Sundays and Public Holidays Nightime	21:00 – 07:00hrs	55 dB(A), $L_{Aeq, 1hr}$

8.2.4 Operational Impact Assessment Criteria

Relative impact assessment criteria associated with road traffic noise is set out in Table 8.2 below.

Table 8.2 – Likely impact associated with change in traffic noise level

Change in sound level (L_{10})	Subjective reaction	Impact
<3	Inaudible	Imperceptible
3-5	Perceptible	Slight
6-10	Up to a doubling of loudness	Moderate
11-15	Over a doubling of loudness	Significant
>15		Profound

A change in traffic noise of less than 2dBA is generally not noticeable to the human ear whilst a change of 3dBA is generally considered to be just perceptible. Changes in noise levels of 3 to 5 dBA would however be noticeable and, depending on the final noise level, there may be a slight or moderate noise impact. Changes in noise level in excess of 6dBA would be clearly noticeable, and depending on the final noise level, the impact may be moderate or significant. However, a significant change in traffic volumes or traffic category i.e. increase in the use of a road by HGVs, would be required to result in such increases.

The UK Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, Part 7) states that a change in noise level of 1dB $L_{A10,18h}$ is equivalent to a 25% increase or a 20% decrease in traffic flow, assuming other factors remain unchanged and a change in noise level of 3dB $L_{A10,18h}$ is equivalent to a 100% increase or a 50% decrease in traffic flow.

Traffic noise levels in excess of 60dBA (L_{DEN}) are considered to be potentially intrusive. L_{DEN} is the day-evening-night composite noise indicator for assessing overall noise annoyance. For new roads projects the National Roads Authority design goal is to mitigate when predicted levels exceed 60dB L_{den}. However, for existing roads the Dublin Agglomeration, within the Noise Action Plan, have set a level of 70dB (L_{Day}) and 55dB (L_{Night}) above which mitigation measures should be considered.

The World Health Organisation (WHO) in their 2018 publication entitled *Environmental Noise Guidelines for the European Region* has proposed new guidelines for community noise. In this guidance, a L_{DEN} threshold daytime noise limit of 53dB is suggested to protect against adverse health effects. L_{NIGHT} Levels of 45dB or less are proposed at night-time to protect against adverse effects on sleep.

The operational phase of the development shall be assessed with regard to the 2018 WHO guidelines and appropriate acoustic design of residential units to ensure that they comply with the *Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound.*

8.2.5 Vibration Assessment Methodology

Impact Assessment Methodology

Vibration standards come in two varieties: those dealing with human comfort and those dealing with cosmetic or structural damage to buildings. In both instances, it is appropriate to consider the magnitude of vibration in terms of Peak Particle Velocity (PPV).

Construction impacts have been assessed in accordance with *BS 7385-2:1993 – Evaluation and Measurement for Vibration in Buildings: Part 2 – Guide to Damage Levels from Groundborne Vibration and BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration 2009+A1 2014.*

Operational impacts have been assessed in accordance with the Transport Infrastructure Ireland, TII (formerly NRA) *Guidelines for the Treatment of Noise & Vibration in National Road Schemes.*

8.2.6 Construction Impact Assessment Methodology

Table 8.3 details the limits above which cosmetic damage could occur for transient vibration. Minor damage is possible at vibration magnitudes which are greater than twice those shown in Table 8.3, and major damage to a building structure would only generally occur at values greater than four times the tabulated values. These values only relate to transient vibration. If there is a continuous vibration, the guide values shown in Table 8.3 shall be reduced by up to 50%.

This guidance is reproduced from *BS 5228-2:2009+A1 2014 – Code of Practice for Noise and Vibration Control on Construction and Open Sites: Part 2 – Vibration and BS 7385-2:1993 – Evaluation and Measurement for Vibration in Buildings: Part 2 – Guide to Damage Levels from Groundborne Vibration.*

Table 8.3 – Transient vibration guide values for cosmetic damage

Type of building	PPV (mm/s) in frequency range of predominant pulse	
	4-15Hz	15Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings.	50mm/s at 4Hz and above.	50mm/s at 4Hz and above.
Unreinforced or light framed structures. Residential or light commercial buildings.	15mm/s at 4Hz increasing to 20mm/s at 15Hz.	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above.

Table 8.4, reproduced from *BS 5228 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration 2009+A1 2014* outlines the vibration levels (in terms of PPV) from construction activities and their likely effect on humans.

Table 8.4 – Guidance on the effect of construction vibration levels on humans

Vibration Level (PPV)	Effect
0.14mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.30mm/s	Vibration might be just perceptible in residential environments.
1.0mm/s	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.
10mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

8.2.7 Operational Impact Assessment Methodology

It is acknowledged that humans are particularly sensitive to vibration stimuli and that any perception of vibration may lead to concern. In the case of road traffic, vibration is perceptible at around 0.5mm/s and may become disturbing or annoying at higher magnitudes.

Ground vibrations produced by road traffic are unlikely to cause perceptible structural vibration in properties located near to well-maintained and smooth road surfaces. Vibration impacts associated with road traffic can therefore be largely avoided by good maintenance of the road surface.

8.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

8.3.1 Description of the baseline environment - Environmental Noise Context

The south-eastern and southern aspects of the subject site borders existing residential development. The southwestern, western northern and north-eastern aspects of the site are bordered by existing residential development. The R147 Dublin to Navan Road Is located further east of the site and Academy Street is located to the east and northeast of the site. The Springfield Glen road is located to the south of the site which gives access to the existing residential estates located adjacent to the southern, western and northern site boundaries. Lands adjoining the northern site boundary are reserved for future school development.

The most dominant noise source in the local area has been identified during the baseline noise monitoring periods to be road traffic on the R147 Dublin to Navan Road which is located approximately 60m at the closest point to the development. Road traffic noise is not considered to be intrusive at the Belmount site.

8.3.2 Baseline environmental noise survey

Baseline noise data in the vicinity of the closest residential receptors to the proposed development site boundaries has been obtained from noise monitoring surveys conducted by Byrne Environmental Consulting Ltd during May 2018 and July 2019. The baseline monitoring locations were selected in accordance with *ISO 1996,2, 2017: Acoustics – Description, Measurement and Assessment of environmental noise* and the 2016 EPA publication, *"Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)* and included locations in proximity to existing residential dwellings adjacent to the development areas and within the site itself to assess the inward impact of local road traffic noise within the site.

8.3.3 Measurement locations

Baseline noise measurements were conducted at five locations as shown in Figure 8.1 below and as described in Table 8.5 below. Noise monitoring surveys were conducted under free-field conditions at a height of approximately 1.5m above ground and approximately 3.5m away from reflecting surfaces for a period of 72 hours (3 days) at each location in order to obtain detailed noise data and assess the existing noise climate at the locations accurately.

Table 8.5 – Baseline noise measurement locations

Location N1	Eastern site boundary
Location N2	Residential houses opposite the southern site boundary
Location N3	Residential houses along the western site boundary
Location N4	Residential houses along the northern site boundary

Figure 8.1 – Baseline Noise Monitoring Locations N1 – N4

The noise parameters used to describe the existing ambient noise climate are described as follows:

L_{Aeq}:	The equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.
L_{A10}:	The sound level that is exceeded for 10% of the sample period. It is typically used as a descriptor for traffic noise.
L_{A90}:	The sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.
L_{Amax}:	The instantaneous maximum sound level measured during the sample period.
1/3 Octave band analysis	The frequency analysis of a sound such that the frequency spectrum is subdivided into bands of one-third of an octave each. Used to determine tonal components of a sound source.
L_{Amax}:	The instantaneous maximum sound level measured during the sample period.
L_{den}	Day-evening-night indicator 24hrs
L_{day}	Day indicator 07:00hrs – 19:00hrs
L_{night}	Night indicator 23:00hrs – 07:00hrs
$L_{evening}$	Evening indicator 19:00hrs – 23:00hrs

Noise levels are measured using a logarithmic noise scale (decibel) and are denoted dBA. The "A" indicates that a frequency weighting has been applied to allow for the variation in the sensitivity of the human ear.

8.3.4 Baseline noise measurement results

Table 8.6 – Location N1 Eastern site boundary

Period 5th September 2018	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,}$	L_{A10}	L_{A90}	L_{AMax}
Daytime period 07:00 – 19:00hrs	56	59	51	81
Nightime period 23:00 – 07:00hrs	52	56	42	77
LDen 58 dBA LNight 48 dBA	The Lden and Lnight surveys were conducted at N1 over a 3 day period in July 2019			

During the daytime, evening and nightime periods the noise climate at N1 is primarily influenced by occasional passing road traffic noise.

Vibration was not perceptible during the survey period at Location N1.

The EPAs strategic road related noise maps been reviewed as part of this assessment as published by the EPA in the Round 3 Noise Mapping Programme.

Figures 8.2 and 8.3 present the 2017 Noise Maps as Lden and Lnight values for R147 road traffic and the associated modelled noise levels at the eastern boundary of the site.

The noise map in Figure 8.2 indicates that traffic noise during the 24-hour period Lden will be 55-59dB(A) at the façade of the closest apartment block to the R147 Road.

The noise map in Figure 8.3 indicates that traffic noise during the 8-hour night period Lnight is 50-54dB(A) at the site boundary. As the closest apartment block will be set back from this boundary it is therefore predicted that the actual Lnight level will be <50 dB(A) at the façade of the apartment blocks along the eastern site boundary.

The results of the EPA strategic noise maps are verified by the measured levels at the same location during July 2019 as presented in Table 8.6.

Table 8.7 – Strategic Noise Mapping Results for Subject Site

Source	Lden dB(A)	Limit Criteria Lden dB(A)	L_{Night} dB(A)	Limit Criteria L_{Night} dB(A)
Road Traffic	<55	55	<50	50
Rail	<50	55	<50	50
Aircraft	<50	55	<50	50

The Noise Action Plan for Fingal County 2019-2023 specifies desirable and undesirable noise levels for residential developments as reproduced below.

“Noise Exposure Levels There are currently no national criteria in relation to noise limit values. In 2009, the EPA issued guidance notes on the development of noise action plans. The guidance on noise values where and action should be invoked, are in terms of average night time and 24-hour values. In the current Noise Action Plan they are expressed as average day and night time values. For this reason, it is proposed to use a Lnight desirable level of 50 dB(A) and an undesirable level of 55 dB(A) for the Noise Action Plan that are in line with the recommended interim target. In addition, Lden levels below 55 dB(A) are considered desirable, and Lden levels greater than 70 dB(A) are considered to be undesirable.”

Figure 8.2 – EPA Lden Strategic Noise Map of R147

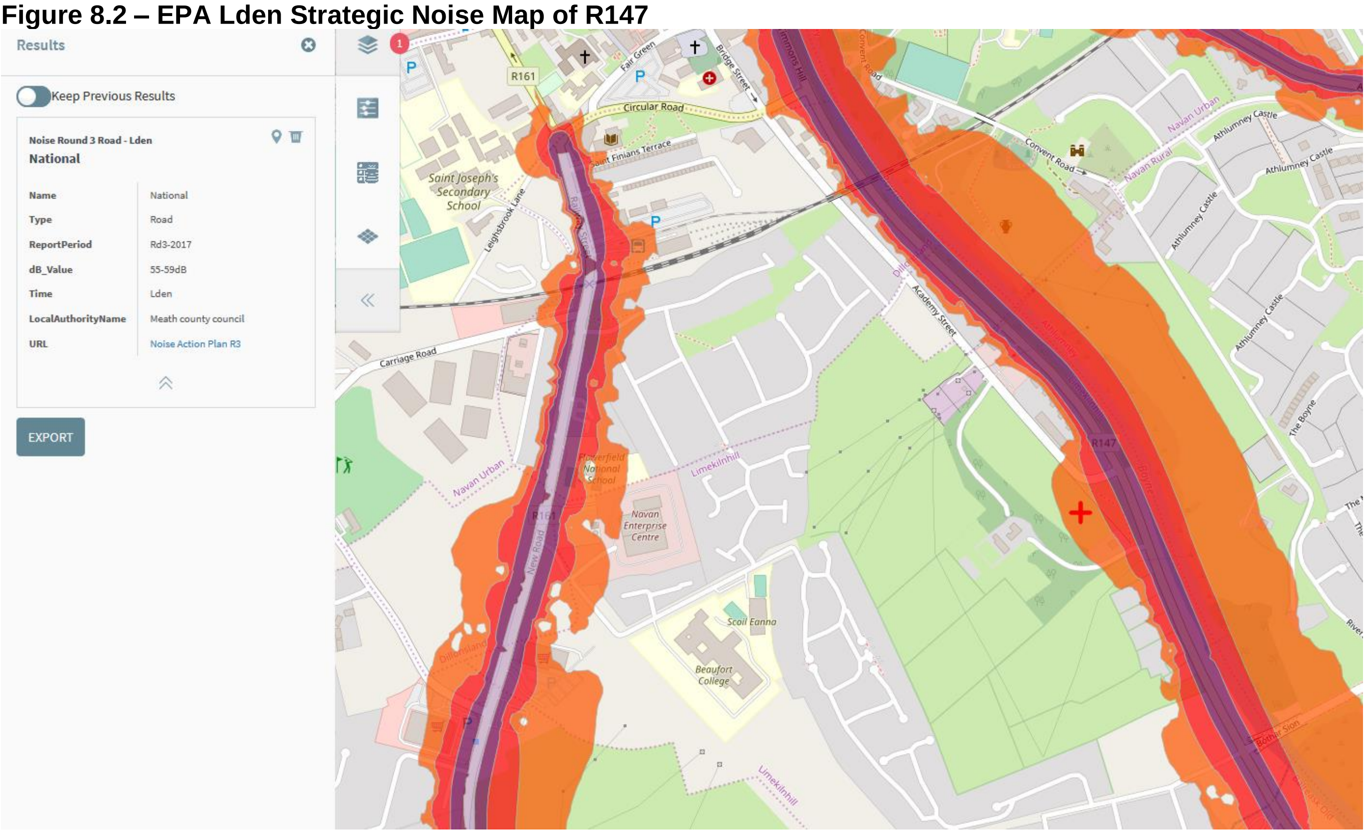


Figure 8.3 – EPA Lnight Strategic Noise Map of R147

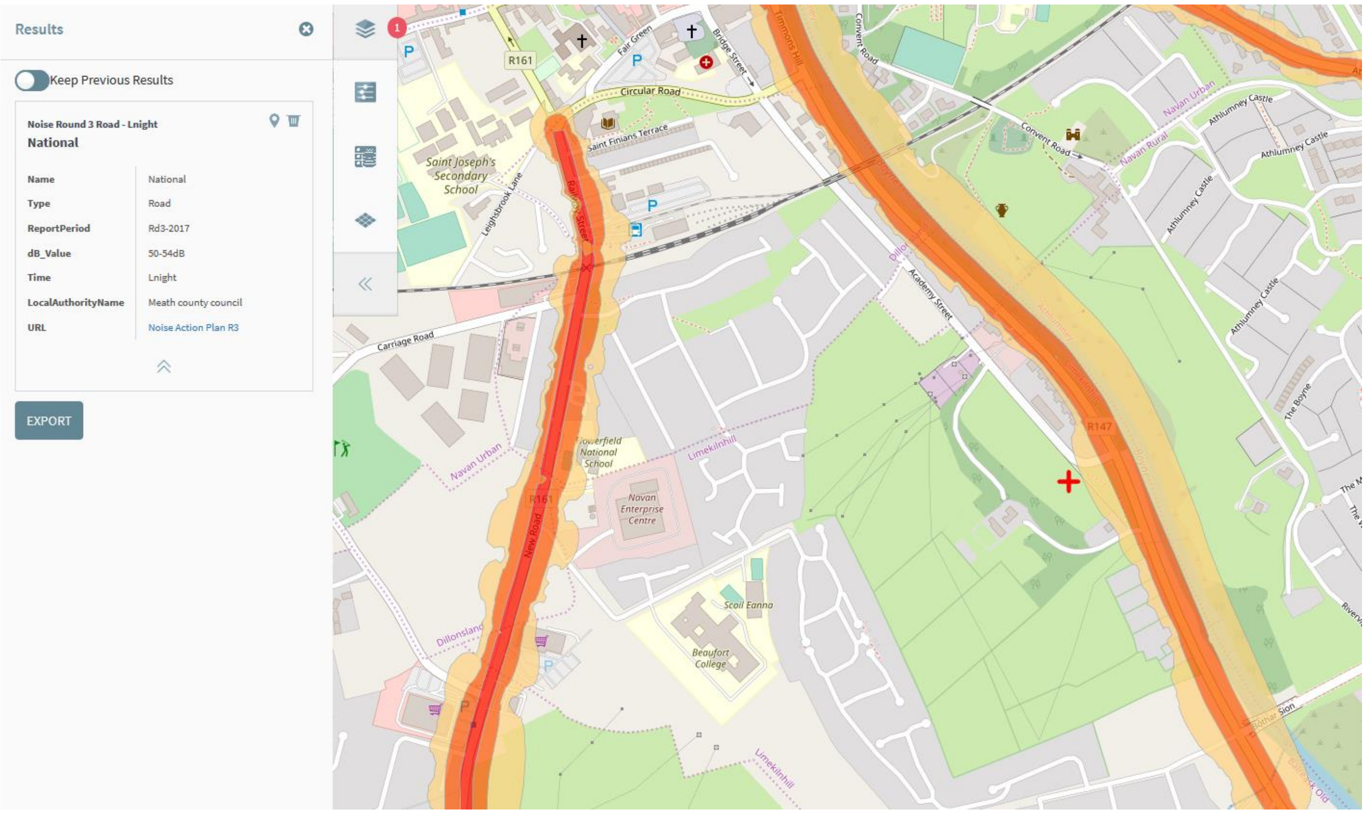


Table 8.8 – Location N2 Existing residential Houses opposite southern site boundary

Period 6th September 2018	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,}$	L_{A10}	L_{A90}	L_{AMax}
Daytime period 07:00 – 19:00hrs	56	59	51	82
Nightime period 23:00 – 07:00hrs	48	56	45	74

During the daytime, evening and nightime periods the noise climate at N2 is primarily influenced by passing road traffic noise along the Springfield Glen Road.

Vibration was not perceptible during the survey period at Location N2.

Table 8.9 – Location N3 Existing residential Houses opposite southern site boundary

Period 7th September 2018	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,}$	L_{A10}	L_{A90}	L_{AMax}
Daytime period 07:00 – 19:00hrs	53	55	45	76
Nightime period 23:00 – 07:00hrs	43	44	36	67

During the daytime and nightime periods the noise climate at N3 is primarily influenced by occasional road traffic noise within the existing residential estate.
Vibration was not perceptible during the survey period at Location N3.

Table 8.10 – Location N4 Existing residential Houses opposite north eastern site boundary

Period 8th September 2018	Measured sound pressure levels dBA (re 20µPa)			
	$L_{Aeq,}$	L_{A10}	L_{A90}	L_{AMax}
Daytime period 07:00 – 19:00hrs	53	55	50	68
Nightime period 23:00 – 07:00hrs	43	47	40	64

During the daytime and nightime periods the noise climate at N4 is primarily influenced by occasional passing road traffic noise on Academy Street.

Vibration was not perceptible during the survey period at Location N4.

8.3.5 Significance

Based on the recorded baseline noise surveys conducted in the vicinity of the proposed development site it may be concluded that the existing ambient noise levels are low to moderate at the closest existing and proposed residential receptors.

The impact of local road traffic noise from the R147 has a slight impact at location N1 however both measured and published noise data demonstrate that road traffic at this location will not have an adverse impact on the daytime or nightime noise climate at the closest proposed apartment block of the Belmount development.

Local road traffic noise has an influence on the ambient noise climate at site boundaries and at local existing residential receptors noise source throughout the day, but traffic noise recede during the evening and nightime periods.

8.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposal relates to a residential development of 544 no. dwellings on a site of c. 15.1 hectares comprising 260 no. houses (18 no. 2 bed, 207 no. 3 bed & 35 no. 4 bed) and 198 no. apartments (46 no. 1 bed, 152 no 2 bed), 30 no. duplex apartments (15 no. 2 bed & 15 no. 3 bed), and 56 no. dwellings in corner blocks (16 no. 1 bed, 24 no. 2 bed & 16 no. 3 bed) as well as the provision of two crèches (ground floor of apartment building [c. 195 sq. m] and single storey creche in housing area [c. 443 sq. m]) Open Space including playground areas; all ancillary landscape works with public lighting, planting and boundary treatments including regrading/re-profiling of site where required as well as provision of cycle paths; Provision of vehicular and pedestrian looped access through the site from 3 no. junctions located on Academy Street as well as pedestrian connection in south east of site to Dublin Road and upgrade works to junction onto the Dublin Road; along with 875 no. car parking spaces and 581 cycle spaces and 4 no. car sharing spaces; Surface water attenuation measures and underground attenuation systems as well as all ancillary site development works (reprofiling of site as required) as well as connection to existing public water supply and drainage services. All site development and landscape works.

When considering a development of this nature, the potential impacts of noise and vibration must be considered for each distinct stage: the medium term (3-10 years) impact of the construction phase and the ongoing long term impact of the operational phase. It is important that there is no unacceptable increase in ambient noise levels during the construction phases and during the operational phase.

Short term noise exposure during the construction phase must be managed and controlled to acceptable levels. There are a number of existing residential noise sensitive receptors located in proximity to the development site boundaries. It is fundamental that the proposed development or any aspect of the proposed development must not adversely impact the existing noise levels experienced at these receptors over the long term.

The operation of the proposed development will not include any commercial or retail activities and noise associated with its operation will be limited to normal domestic activities such as internal residential vehicle movements, children playing, pedestrians, bin collections and occasional delivery van movements. These normal residential activities are not considered “noise” as they are part of everyday living.

It is also important that adequate sound insulation is provided within the proposed residential units to mitigate the internal impact of future noise sources within the development from the proposed Active Open Space, which includes playing pitches, and a car-parking area.

8.5 POTENTIAL IMPACTS OF THE PROPOSED DEVELOPMENT

Various elements of both the construction and operational phases of the proposed development have the potential to impact on the receiving on the local receiving noise environment, on adjacent residential properties and on human health. The likely potential impacts for both construction and operation of the proposed scheme prior to mitigation are described in this chapter of the EIAR. The mitigation measures are described in Section 8.7 and the predicted impacts with the development in place and the mitigation measures incorporated in Section 8.9.

8.5.1 Construction Impacts

The development of the site will be conducted in the following phased stages:

- Archaeological site investigations (completed in 2018)
- Enabling works - Site set up and Site clearance
- Construction works including infrastructure and building construction and landscaping

Enabling works - Site Set Up and Clearance

Works activities associated with the 'Site set up' will be undertaken prior to construction works commencing. The setting up of the site shall involve the construction of site security hoarding and site compounds, site offices, materials and waste storage areas and staff welfare facilities. These short-term activities will have a minimal potential to generate excessive noise levels.

The proposed development involves the ground clearance of the existing site to facilitate the proposed development including buildings, internal roads and hard standing areas, services and landscaped areas.

Site clearance, levelling and an element of ground excavation shall also occur at this stage. A variety of items of plant will be in use during site clearance and ground excavation. These will include excavators, dump trucks, compressors and generators. The operation of these items of plant has the potential to generate short term elevated noise levels beyond the site boundary.

During the site clearance works, Construction and Demolition (C&D) waste shall be segregated as per the requirements of the Construction, Demolition and Operational Waste Management Plan for the site and shall be exported off-site by an appropriately permitted waste contractor. The movement of these trucks to and from the site shall result in an increase in the volume HGV's within the immediate area and along the proposed haul routes which will generate additional noise levels.

A quantity of excavated top and subsoils will be stockpiled on site and used for landscaping purposes. These stockpiles will act to attenuate the propagation of noise through the site as they will in effect be an absorbent noise barrier.

Construction Works

During the construction phase there will be extensive site works, involving construction machinery, construction activities on site, and construction traffic, which will all generate noise. The highest noise levels will be generated during the general construction activities. The construction noise levels will be of relatively short term duration and will only occur during daytime hours which will serve to minimise the noise impacts at local existing receptors.

It is predicted that the construction phases shall result in a short term increase in noise levels in the area as well as introducing tonal and impulsive noise as a result of construction activities such as pneumatic breaking, cutting, excavating, vehicle movements and general manual construction activities.

Due to the phased nature of the development which will occur over an approximate 3-5 year period, there will be slight to moderate impacts on the existing residential estates and houses located opposite the site boundaries.

The noise and vibrational impacts of construction works will only be prevalent when construction works are occurring in proximity to these residential receptor areas and as such the impacts will not extend over the entire duration of the total construction phase.

The proposed construction phase noise mitigation measures as detailed in Section 8.7 shall ensure that all construction activities are controlled and managed and audited by an independent acoustic consultant to confirm that the mitigation measures are implemented throughout the construction phase.

Construction noise predictions

The predicted construction noise levels that will be experienced at the nearest residential receptors as a result of construction activities have been calculated using the activity L_{Aeq} method outlined in *BS 5228 1:2009+A1 2014 – Code of Practice for noise and vibration control on construction and open sites – Part 1 Noise.*

Tables 8.11 to 8.12 detail assumed plant items during the key phases of construction with the associated source reference from *BS 5228: 2009+A1 2014.* The closest residential properties to the proposed development site are located at distances ranging from approximately 10-50m. Construction noise calculations have therefore been conducted both with and without noise mitigation at distances of 10 to 50m from the works for the Site Clearance and Main Construction phases, representing the nearest properties to the works.

Table 8.11 – Indicative construction noise predictions associated with Site Enabling works

Plant Item	BS 5228 Reference	Calculated sound pressure levels L_{Aeq} dB at distances from receptors	
		10	50
Generator (enclosed)	C.4 Ref 84	68	54
Compressor (enclosed)	D.6 Ref 19	71	57
Tracked Excavator	C.2 Ref 3	76	62
Wheeled Excavator	C.2 Ref 26	77	63
HGV	C.4 Ref 19	75	61
Dozer	C.2 Ref 11	79	65
Combined $L_{Aeq,period}$ without mitigation		**83**	**70**
Combined $L_{Aeq,period}$ with mitigation		**63**	**50**

Table 8.12 – Indicative construction noise predictions associated with building construction works

Plant Item	BS 5228 Reference	Calculated sound pressure levels L_{Aeq} dB at distances from receptors	
		10	50
Generator (enclosed)	C.4 Ref 84	68	54
Compressor(enclosed)	D.6 Ref 19	71	57
Tracked Excavator	C.2 Ref 3	76	62
Wheeled Excavator	C.2 Ref 26	77	63
HGV	C.4 Ref 19	75	61
Concrete / Steel Cutting Equipment	Various	82	68
Dump truck	C.2 Ref 30	77	63
Combined $L_{Aeq,period}$ without mitigation		**86**	**72**
Combined $L_{Aeq,period}$ with mitigation		**66**	**52**

The results of the assessment has indicated that, in general, at distances of greater than 10m from the works site provided all mitigation measures including site hoarding are implemented, the construction day time noise limit of 75dB $L_{Aeq, 11hr}$ can typically be complied with during both enabling and construction works. It is also important to note that the impact due to construction activities will be transient in nature and the noise levels detailed in Tables 8.11 and 8.12 represent worst case scenarios when all items of plant are operating simultaneously without noise mitigation measures in place.

The proposed construction phase noise mitigation measures as detailed in Section 8.7 shall ensure that all construction activities are controlled and managed and audited by an independent acoustic consultant to confirm that the mitigation measures are implemented throughout the construction phase.

Where works are occurring at distances of less than or at 10m from existing residential receptors, enhanced noise mitigation measures including the use of acoustic screens between the activities and the receptors will be required to reduce the impact of works. These measures are detailed in Section 8.7.

Construction Traffic Noise

Based on the assumption of up to 40 HGV movements per day on the haul routes to and from the site along public roads, the resulting average predicted traffic noise level at the closest receptors is calculated as follows:

The predicted noise levels at any receptor located within 5m of the haul route road has been calculated using a standard international acoustical formula as described below.

$L_{Aeq,\,T}$ = SEL + $10\log_{10}(N) - 10\log_{10}(T) + 20\log_{10}(r_1/r_2)$ dB

where $L_{Aeq,\,T}$ is the equivalent continuous sound level over time period (T) (3600 sec);
SEL is the A weighted Sound Exposure Level of the noise event (77dB);
N is the number of events over the time period T (40);
r1 is the distance at which SEL is assessed (5m)
r2 is the closest distance to the receptor from the road (10m)

The calculations assumed a maximum scenario of 4 truck movements per hour based on a 10 hour working day a maximum Sound Exposure Level of 77dBA for the trucks and the minimum distance between the local road passing by each of the nearest noise sensitive receptors to the public road (10m). No attenuation, above geometric spreading, has been considered within these calculations may be considered the worst case scenario.

The maximum predicted $L_{Aeq,\,period}$ values as a result of the HGV traffic movements at the nearest noise sensitive receptors located along the haul route roads is predicted to be 51 dBA, $L_{Aeq,\,period}$.

It is not expected that the predicted short-term increase in HGV movements associated with the construction phase of the development will have an adverse impact on the existing noise climate of the wider area or on local receptors.

Vibration

The most significant potential sources of ground borne vibrations that may be generated during the construction phase of the development will be generated by the following practices:

- Ground preparation excavation activities that require the use of pneumatic rock breakers
- Movement of site vehicles bulldozers, tracked excavators and dump trucks on ground surfaces
- Hard core surfaces and haul road compaction with vibro-rolling vehicles
- Road construction surface vibro-rolling

Vibration impacts have been considered from any particular plant items that have the potential to generate perceptible levels of vibration.

The nearest off-site residential receptors will be c. 10m from construction works. Depending on the methods of construction, there is the possibility of construction related vibration impacts on human beings as a result of ground preparation and concrete foundation excavation activities. However, such sources of vibration shall be temporary and intermittent.

It is highly unlikely that any construction generated vibrations at buildings 10m from the proposed development would result in cosmetic damage. Experience of similar construction projects has shown that beyond this distance there is no risk of cosmetic damage occurring within buildings.

A programme of structural vibration monitoring shall be conducted at residential receptors located within <20m of site activities as detailed in Section 8.9 below.

8.5.2 Operational Phase

The noise aspects to be considered for the completed development can be divided into two categories:

- Noise impacts on neighbouring residential receptors during construction works
- Inward noise impacts on the development and other existing receptors from traffic

Traffic Noise Impact

The main potential for altering the noise environment once the development is operational, and thus impacting neighbouring residential receptors, is from road traffic noise and facilities associated with the development.

The Traffic and Transportation Assessment Report prepared by Pinnacle Consulting Engineers submitted with this application includes a detailed assessment of the traffic impact associated with the proposed development. As part of this assessment, detailed traffic flow information as Annual Average Daily Traffic (AADT) has been derived for the existing road network for the "No development" and the "With development" scenarios.

The percentage traffic increase associated with the development has considered 3 no Scenarios for the R147, Academy Street and Springfield Glen Road junctions.

The maximum predicted traffic increase on the R147 Dublin – Navan Road will be 9% for the AM Peak and 8% for the PM Peak
The maximum predicted traffic increase on the Academy Street will be 194% for the AM Peak and 94% for the PM Peak

The maximum predicted traffic increase on the Springfield Glen will be 8% for the AM Peak and 7% for the PM Peak

The UK Design Manual for Roads and Bridges (DMRB, Volume 11, Section 3, Part 7) states that it takes a 25% increase or a 20% decrease in traffic flows in order to get a 1dBA change in traffic noise levels. On this basis, the traffic flow increases associated with the development for all year scenarios will result in a negligible increase of less than 1dBA on existing ambient noise levels at existing residential receptors along the R147 Road and along Academy Street resulting in an imperceptible impact.

There will be an 6dBA change in existing noise levels along Academy Street which will result in a moderate noise impact on existing noise levels as a result of the development.

On-Site Noise Sources

Internal Residential Traffic Noise

The subject development includes the provision of surface and under-croft car parking spaces for the residential units. Vehicles within the residential areas will generally travel at speeds <20kmph as a result of speed limit signage and speed reducing ramps throughout the development which result in relatively low noise levels being generated by internal vehicle movements.

Neighbourhood Noise

Within the proposed development, sounds generated by everyday domestic activities including waste collection activities, pedestrians, children, and use of open spaces, are part of everyday living, and are not considered "noise" in the sense of a potential nuisance. These activity noises would not have any potential for impact beyond the boundaries of the site.

Potential Inward Noise impacts on the proposed development

Regarding noise aspects within the proposed development itself, the aspects to be considered are:

- Suitability for residential development, in terms of the existing noise climate
- Avoidance of potential conflict in terms of activity noise within the development itself

The main potential noise impact on the proposed development relates to traffic flows on the surrounding road network. Based on measured and publish traffic noise data, it has been established that there will not be an adverse noise impact at any area within the development as a result of existing ambient noise levels.

In order to assist with the interpretation of the noise associated with vehicular traffic on public roads, Table 8.13 offers guidance as to the likely impact associated with any particular change in traffic noise level.

8.5.3 Vibration

The only source of vibration predicted, once the development has been constructed and is operational, is vibration associated with internal road traffic movements.

As a vehicle travels along a road, vibration can be generated in the road and subsequently propagate towards nearby buildings. Such vibration is generated by the interaction of a vehicle's wheels and the road surface and by direct transmission through the air of energy waves. Some of these waves arise as a function of the size, shape and speed of the vehicle, and others from pressure fluctuations due to engine, exhaust and other noises generated by the vehicle.

Ground vibrations produced by residential road traffic are unlikely to cause perceptible, cosmetic or structural vibration in properties located near to well-maintained and smooth road surfaces. Vibration impacts associated with road traffic in particular commercial van and trucks can therefore be largely avoided by good maintenance of the road surface.

It has been assessed that vibration levels related to road traffic movements, including those additional movements due to the proposed development would be significantly lower than those levels required to lead to disturbance of occupiers or to cause cosmetic or structural damage to buildings.

8.5.4 '*Do Nothing'* Scenario

If the site remains undeveloped it shall continue to have no noise or vibrational impact on the receiving environment. Based on the projected increase in traffic up to the design year of 2034 the increase in traffic noise levels in the area without the subject development would be < 3dB. This increase above the existing situation would be minor and would not result in an imperceptible change in the existing noise climate at any local receptor.

8.6 CUMULATIVE NOISE IMPACTS

In accordance with *Schedule 6, Part 2(c) of the Planning and Development Regulations 2001-2018*, this section has considered the cumulative impact of the proposed development in conjunction with existing adjacent development and future development in the vicinity of the subject site. This section relates to the cumulative impact on the subject site itself and on surrounding sites.

The European Commission's report of May 1999 'Guidelines for the Assessment of Indirect and Cumulative Impacts as well as Impact Interactions' defines cumulative impact as follows:

"Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project".

The construction of the sewerage/water supply connections along the public road (R147) by Irish Water to facilitate the proposed development will require works to the public road will involve the excavation of soils/subsoils along the length of its route. This will be replaced with upgraded pipelines (300mm Foul Sewer for c. 470m, 300mm trunk watermain c. 1.5km) and the granular fill surrounding it.

The construction of the sewerage/water supply connections along the public road (R147) by Irish Water to facilitate the proposed development will require works to the public road will likely entail some localised impacts to residents. The works will require road opening licence under Section 254 of the Planning and Development Acts 2000-(as amended) from Meath County Council.

The *Irish Water Code of Practice for water infrastructure – Connections and Developer Services – Design and Construction requirements. Dec 2017* specifies that noise, vibration and odours shall be minimised during Irish Water works. The contractor engaged to conduct the works on behalf of Irish Water will conduct the monitoring to assess the impacts of works on air quality, noise and vibration.

The proposed pipeline route works would involve breaking of the road surface and trenching. These works would occur within 10 to 20 metres of residences, which could be exposed noise levels of up to 85 dBA while the highest noise generating activities such as the pneumatic breaking of concrete surfaces are occurring. However, these maximum noise levels would be limited to a few hours per day, and would only occur during the initial ground preparation on each phase of the pipeline. Each phase of the pipeline would also only occur for a few days in the immediate vicinity of individual noise sensitive receptors before moving to the next section of the route.

The worst case scenario associated with the Irish Water works construction noise is not predicted to exceed the *BS 5228 – 1:2009+A1 2014 Code of practice for noise and vibration control on open sites: Part 1 Noise* weekday limit of 75dB(A), $L_{Aeq,\,10hr}$ or the Saturday limit of 75dB(A), $L_{Aeq,\,10hr\ 6hr}$. Therefore, it is anticipated that there would be a moderate impact, for limited periods of time, on the closest local residences within the vicinity of the development during construction. Noise mitigation measures such as the installation of acoustic screens between the works and the receptors would be required to reduce the noise impact associated with construction activities to within recommended levels.

Irish Water works in particular the pneumatic breaking of ground surfaces will generate ground vibrations which may have an impact on properties and structures in proximity to the works. Vibration limit values are defined *BS 5228-2:2009+A1 2014 – Code of Practice for Noise and Vibration Control on Construction and Open Sites: Part 2 – Vibration and BS 7385-2:1993 – Evaluation and Measurement for Vibration in Buildings: Part 2 – Guide to Damage Levels from Groundborne Vibration.* To ensure that vibration limits relevant for any specific structure are not exceeded and thus ensure there is no adverse vibrational impact, works will be monitored utilising vibration monitoring systems at the closest properties to the works areas.

Lands to the north of the subject site may be developed as sites for a school in the future. There are currently no other adjoining or adjacent lands that may be subject to development or redevelopment. The noise impact that an operational school will be primarily limited to the daytime period between 8am – 4pm. Therefore it may be concluded that any potential cumulative noise impacts associated with other potential development will be slight during the daytime and negligible during the nightime period.

Internal Noise Control – Apartments and Semi-detached houses

At the earliest stage during the construction phase, test apartment units and semi-detached houses shall be constructed to their finished level and shall be tested by a suitably qualified independent Acoustic Engineer to ensure that they comply with *Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound.* Table 8.14 provides detail on the recommended sound insulation values that shall be achieved to ensure acoustic privacy between adjoin apartment units.

Table 8.13 – Recommended sound insulation values for internal party walls / floors

Dwellings	Airborne Sound Insulation D_{nTw} (dB)	Impact Sound Insulation L_{nTw} (dB)
Floors and Stairs	53	58
Walls	53	N/A

The main potential noise impact on existing receptors associated with the proposed development relates to additional traffic flows on the surrounding road network. Given that traffic from the development will make use of existing and new road infrastructure, it is appropriate to consider the increase in traffic noise level that arises as a result of vehicular movements associated with the development using the L_{A10} parameter which is typically used to describe traffic noise.

For other non-traffic related sources appropriate guidance on internal noise levels for dwellings is contained within *BS 8233: 2014: Guidance on Sound Insulation and Noise Reduction for Buildings.* This British Standard sets out recommended noise limits for indoor ambient noise levels in dwellings as detailed in Table 8.15.

Table 8.14 – Recommended Indoor Ambient Noise Levels from BS 8233: 2014

Typical situations	Design Range, $L_{Aeq,T}$ dB	
	Daytime $L_{Aeq,16hr}$ (07:00 to 23:00hrs)	Night-time $L_{Aeq, 8hr}$ (23:00 to 07:00hrs)
Living / Dining Rooms	35 / 40	n/a
Bedrooms	35	30

8.7 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

8.7.1 Construction Phase

General Construction Site Management

The following noise management measures shall be implemented at the site from the outset of site activities to control and manage noise levels during the construction phase of the proposed development:

NV CONST 1 Noise Mitigation Measures

An independent acoustic consultant shall be engaged by the contractor prior to the commencement of site activities to ensure that all noise mitigation measures as specified in this Section of the EIAR are implemented and to prepare a site specific *Construction Phase Noise Management Plan.* The Plan shall include all relevant noise and vibration control measures as specified in this Chapter of the EIAR. The Plan shall be submitted to Meath County Council for approval as required.

The nominated contractor shall appoint a designated person to manage all environmental complaints including noise and vibration.

A noise complaint procedure shall be implemented in which the details of any noise related complaint are logged, investigated and where required, measures are taken to ameliorate the source of the noise complaint.

Appropriate signage shall be erected on all access roads in the vicinity of the site to inform HGV drivers that engines shall not be left idling for prolonged periods and that the use of horns shall be banned at all times.

HGV's queuing on any local or public road shall not be permitted and it shall be the responsibility of site management to ensure this policy is enforced.

Typical construction hours are:

07:00hrs – 19:00hrs Monday to Friday
08:00hrs – 14:00hrs Saturday
Closed on Sundays and Bank/Public Holidays

All onsite generator units (if required) used to supply electricity to the site shall be silenced models or enclosed and located away from any receptor.

The site compound shall be located at a point on site furthest away from any residential development.

Mains power shall be used to supply electricity to all site offices and site lighting at the earliest instance.

The use of generators during the night-time shall be avoided.

Construction Phase Noise Control & Mitigation

The following shall be implemented to mitigate construction noise impacts in order to ensure that the construction phase of the development does not have an unacceptable impact on sensitive receptors:

NV CONST 2 Construction Works Noise Mitigation Measures

- A strictly enforced noise management programme shall be implemented at the site from the outset of construction activities.

- The Construction Project Manager shall appoint an acoustic consultant to conduct continuous noise surveys which shall be conducted at the baseline noise monitoring locations throughout the construction phase of the development to assess compliance with the construction noise limit criteria detailed in Table 8.1 above and to assess the effectiveness and implementation of the specific Construction Phase noise mitigation measures detailed in this document.

- The principal of controlling noise at source shall be implemented at the site. Best practice mitigation techniques as specified in *BS 5228:2009+A1 2014 – Noise and Vibration Control on Construction and Open Sites* shall be implemented during the construction phase and are detailed in this Section.

- Noisy stationary equipment shall be sited away from sensitive site boundaries as far as practicable.

- Where reasonable practicable, noisy plant or activities shall be replaced by less noisy alternatives if noise breaches and/or complaints occur.
- Proper use of plant with respect to minimising noise emissions and regular maintenance will be required.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and will be maintained in good efficient order
- Where noisy plant is required to operate in works areas next to residential houses low noise plant options will be used wherever practicable.
- Dumpers and any plant used for moving materials around the site will have high performance exhaust silencers.
- Selected use of rubber-tyred equipment over steel track equipment where practicable.
- The use of inherently quiet plant is required where appropriate – all compressors and generators will be "sound reduced" or "super silent" models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use, and all ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers.
- All compressors, generators and pumps shall be silenced models fitted with properly lined and sealed acoustic covers or enclosures, which will be kept closed whenever the machines are in use.
- All pneumatic percussive tools such as pneumatic hammers shall be fitted with dampers, mufflers or silencers of the type recommended by the manufacturer.
- Fixed items of plant shall be electrically powered in preference to being diesel or petrol driven.
- Vehicles and mechanical plant utilised on site for any activity associated with the works shall be fitted with effective exhaust silencers and shall be maintained in good working order and operated in a manner such that noise emissions are controlled and limited as far as reasonably practicable.
- Any plant, equipment or items fitted with noise control equipment found to be defective in shall not be operated until repaired / replaced.
- Machines in intermittent use shall be shut down in the intervening periods between works or throttled down to a minimum during periods when not in use.
- Static noise emitting equipment operating continuously shall be housed within suitable acoustic enclosure, where appropriate.
- All excavator mounted pneumatic breakers used for demolition and ground breaking activities shall be fitted with effective dampeners and /or enclosed within a noise adsorbing blanket structure to minimise noise emissions.
- Site activities shall be staggered when working in proximity to any receptor, that is concrete cutting and rock breaking should where possible. This proposed method of working will provide effective noise management of site activities to ensure that any receptor is not exposed to unacceptably high levels of noise over extended periods.
- Excessive reviving of all vehicles shall be avoided.
- Unnecessary dropping of heavy items onto ground surfaces shall be banned.
- The use of an excavator bucket to break up slabs of concrete or tarmacadam shall not be permitted.
- The dragging of materials such as steel covers, plant or excavated materials along ground surfaces shall not be permitted.

- The use of acoustic screens to attenuate noise at source shall be implemented as deemed necessary.
- Plant Reversing Alarms: Where reasonably practicable and deemed safe by risk assessment, taking into account onsite hazards and working environment, the tonal reversing alarms of mobile plant shall be replaced with broadband alarms.
- A nominated person from the Project Management team will be appointed to liase with local residents and businesses regarding noise nuisance events.
- In the event of the requirement for out of hours work to occur which will involve the generation of noise levels that are predicted to exceed out of hours noise limit criteria, Meath County Council shall be immediately notified prior to the works commencing.
- A nominated person from the Project Management team will be appointed to liaise with and inform local residents and Meath County Council regarding out of hours works.
- An independent acoustic consultant shall review the implementation of the recommended mitigation measures on a monthly basis.

The images below describe the use of noise screens for construction activities.

It is recommended that high performing acoustic barriers are utilised such as Echo Barrier products or Ventac products.

Double height acoustic blanket enclosure

Acoustic blankets screening piling and excavations

3 sided Acoustic enclosure for surrounding breaking, cutting works

Construction Phase Vibration Control & Mitigation

The following specific vibration mitigation and control measures shall be considered during the construction phase:

NV CONST 3 Vibration Mitigation Measures

- Breaking out concrete elements using low vibration tools
- Choosing alternative, lower-impact equipment or methods wherever possible
- Scheduling the use of vibration-causing equipment, such as jackhammers, at the least sensitive time of day
- Routing, operating or locating high vibration sources as far away from sensitive areas as possible
- Sequencing operations so that vibration causing activities do not occur simultaneously
- Isolating the equipment causing the vibration on resilient mounts
- Keeping equipment well maintained.
- Confining vibration-generating operations to the least vibration-sensitive part of the day which could be when the background disturbance is highest
- A nominated person from the Project Management team will be appointed to liaise with local residents and businesses regarding vibrational nuisance events.
- An independent acoustic consultant shall review the implementation of the recommended mitigation measures on a monthly basis.

In order to ensure that site construction activities are conducted to minimise the vibration impacts on the receiving environment, structural vibration monitoring shall be conducted during the course of the project works if required.

It is proposed that vibration monitoring will be conducted at properties adjacent to or within 50m of the site as required using calibrated vibration monitors and geophones capable of transmitting live text and email alerts to ensure that if vibration levels approach or exceed specified warning and limit values, site personnel will be alerted to cease at the earliest instance and appropriate mitigation measures may then be implemented to minimise the vibrational impacts of protected structures.

As detailed in Section 8.2.2 the transient vibration guide values for cosmetic damage as specified in British Standard BS 7385:, Evaluation and measurement for vibration in buildings, Part 2 1993 Guide to damage levels arising from ground borne vibration is 15 mm/sec Peak Component Particle Velocity at 4 Hz increasing to 20 mm/sec at 15 Hz.

This limit value rises to 50 mm/sec at frequencies of 40 Hz and greater. The applied conservative limit of 12.5 mm/sec PPV (peak particle velocity) applied for this assessment is significantly lower than these levels.

Having regard to the above we suggest the inclusion of the following mitigation measure for ease of reference:

N V CONST 4

In order to protect the amenities enjoyed by nearby residents, premises and employees a full Construction Management Plan (including traffic management) shall be put in place prior to the commencement of development. This will have regard to the mitigation measures set out in Section 8.7 of this document.

8.7.2 Operational Phase Noise Mitigation

N&V OPERA 1: External noise can enter rooms within dwellings through windows, ventilators, walls, roof and doors. In most cases, however, windows provide the main path.

Acoustic Design requirements for residential buildings

Windows
In order to ensure a sufficient level of sound insulation is provided for all dwellings within the development, the following lists the minimum sound insulation performance of windows and window frame sets in terms of the in-situ weighted sound reduction index (R_W):

30dB R_W for Living rooms & Bedrooms
30dB R_W for Kitchen – Dining Rooms.

The acoustic performance specifications detailed are the minimum requirements which shall apply to the overall glazing system when installed on site. 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. All exterior wall and door frames should be sealed tight to the exterior wall construction.

Ventilation Systems
The ventilation strategy for the development will be in accordance with Part F of the Building Regulations. The apartment units shall include mechanical heat recovery ventilation systems which will negate the requirement for passive wall vents in bedrooms and living spaces which would otherwise allow the transfer of external noise into the building through the air gaps in the passive vents. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice. This design feature of the residential units will ensure that the building structure is acoustically insulated from the external environment.

Wall Constructions
The wall construction typically provides the highest level of sound insulation performance to a residential building. The residential dwellings will be built using either masonry or a timber framed construction. The minimum sound insulation performance of the chosen wall construction will be 55dB Rw.

Roof Construction
The insulated roof constructions proposed across the site will provide an adequate level of sound insulation to the properties within the development site. A minimum sound insulation value of 40dB Rw should be used for roof spaces. At the earliest stage during the construction phase, residential test units shall be constructed to their finished level and shall be tested by a suitably qualified independent Acoustic Engineer to ensure that they comply with *Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound.* Table 8.14 above provides detail on the recommended sound insulation values that shall be achieved to ensure acoustic privacy between adjoining residential units and to assess compliance with external noise intrusion criteria as defined in *BS 8233: 2014: Guidance on Sound Insulation and Noise Reduction for Buildings.*

The operational phase of the development is predicted not to have an adverse noise impact on the receiving environment or on existing residential developments adjacent to the site during the operational phase of the scheme. Therefore, no mitigation measures additional to those set out above are proposed.

8.7.3 ‘*Worst-case’* scenario

The worst-case scenario would be that the attributes and mitigation measure were not carried out and subsequently not appropriately enforced by the local authority.

The main potential for adverse impacts on local quality will occur during the construction phase. The worst-case scenario, therefore, corresponds to the situation where the mitigation measures for construction activities fail or are not implemented. Should noise mitigation measures not be implemented during the construction phase, significant noise nuisance is likely in areas close to the construction site. There would be significant adverse effect on human health in the absence of such mitigation measures.

8.8 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

8.8.1 Construction phase

Risks to Human Health

Construction phase noise and vibration emissions will be temporary and transient and will be managed so as to minimise impact to population and human health by complying with all relevant guidance, as such the impact will be short-term and have a slight impact overall.

Operational phase noise will also be managed to achieve relevant noise limit values and is predicted to meet all such requirements. No operational phase vibration impacts are predicted. Therefore, the operational phase noise impacts will be neutral for the life of the development.

Outward Noise Impact

During the construction phase there is the potential for minor impacts on nearby noise sensitive properties due to noise generated by construction site activities. The implementation of the construction phase noise and vibration mitigation measures and a continuous noise monitoring programme as detailed in Section 8.7 above and Section 8.9 below, will minimise the potential noise and vibration impact on the receiving environment including existing residential receptors.

8.8.2 Operational Phase

Inward Noise Impact

The noise impact generated by additional traffic movements associated with the development is predicted to be of an imperceptible impact on existing ambient noise levels at receptors along the local road network.

It may be concluded that during daytime and night-time periods, acceptable internal noise levels can be achieved in all residential units as defined in *BS 8233* with windows closed, using the measures detailed above in Section 8.7.2 above.

With regard to the recommended mitigation by design measures as specified above, it may be concluded that residential properties located within the proposed development can be appropriately designed and constructed to achieve acceptable internal noise levels and to ensure the required acoustic performance of adjoining residential units.

8.9 MONITORING

8.9.1 Construction Phase

Proposed Noise Monitoring Programme During Site Construction

This section describes the noise and vibration monitoring methodologies that shall be implemented at the site to ensure that construction site activities do not cause excessive nuisance or cause cosmetic or structural damage to properties or structures in the vicinity of the site.

On commencement of the site construction activities, continuous noise monitoring systems shall be installed at site boundary locations to measures and assess the impact that site activities may have on ambient noise levels at local receptors.

The environmental noise measurements will be completed in accordance with the requirements of *ISO 1996-1: 2017*: *Acoustics – Description, measurement and assessment of environmental noise* and with regard to the EPA's 2016 *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4)*. The measurement parameters to be recorded include wind speed, temperature, L_{Aeq}, L_{A90}, L_{A10} and L_{Amax} , 1/3 Octave Frequency analysis and impact noise analysis.

Noise Monitoring Locations

The monitoring locations selected for the noise monitoring survey will be at residential noise sensitive receptors adjacent to the site boundaries and as identified in the baseline noise assessment.

Proposed Vibration Monitoring Programme During Site Construction

In order to ensure that site construction activities are conducted to minimise the vibration impacts on the receiving environment, it is proposed that structural vibration monitoring may be implemented during the course of the construction phase if and as required. It is proposed that vibration monitoring will be conducted at adjacent properties opposite the site boundaries as required using calibrated vibration monitors and geophones with live text and email alert functionality to ensure that if vibration levels approach or exceed specified warning and limit values, site personnel will be alerted to cease at the earliest instance and appropriate mitigation measures may then be implemented to minimise the vibrational impacts of protected structures.

Vibration Monitoring Locations

The monitoring points chosen for locating the geophone of the vibration measuring instrument will be chosen according to the guidelines in British Standard *BS 7385:, Evaluation and measurement for vibration in buildings, Part1 1990 Guide for measurement of vibrations and evaluation of their effects on buildings* and *Part 2 1993 Guide to damage levels arising from groundborne vibration.*

8.9.2 Operational Phase

No monitoring required.

8.10 REINSTATEMENT

Reinstatement issues are not relevant to this Chapter of the EIAR, with reference to the construction and operational phase.

8.11 INTERACTIONS

The principal interactions between Noise & Vibration impacts and Human Beings have been addressed in this report which describes in detail the mitigation measures that shall be implemented to ensure that human health and residential amenity are not adversely impacted by any aspect of the construction or operational phases of the development.

8.12 DIFFICULTIES ENCOUNTERED IN COMPILING

There were no difficulties encountered in compiling this Chapter of the EIAR.

9.0 LANDSCAPE AND VISUAL IMPACT ASSESSMENT

9.1 INTRODUCTION

This chapter was prepared by Emma Oldroyd, BA Hons. (Land Arch) Leeds Beckett University; Post Grad Dip and MA in Landscape Architecture (Leeds Beckett University; CMLI; of Cunnane Stratton Reynolds Ltd (CSR). The Landscape and Visual Impact Assessment (LVIA) was informed by a desktop study and a survey of the site and receiving environment in March 2019. The report identifies and discusses the landscape and visual constraints and opportunities in relation to the proposed Development of Lands at Belmount, Academy Street, Navan, County Meath.

The subject lands are approximately 15.1 hectares in size and are located on Academy Street, Navan close to Navan town centre and to the west of the Dublin Road. The site exists on lands surrounding the 19th century Belmount House and comprises three distinct landscape types which are;

- **Agricultural fields** (7 in total). These are small to medium in size and are divided by hedgerow lined ditches. The hedgerows range in condition and contain a few scattered distinctive hedgerow trees.
- **Belmount woodland.** A mature and characterful woodland containing some distinctive native and non-native trees, remnants of historic paths and two well defined laneways. There is a clearing within the woods and a few attractive views through the trees to Belmount House.
- **Seminatural grassland.** This enclosed area lies between Academy Street and the woodland of Belmount House. The lands slope gradually towards the woods. The slope inclines more steeply to the SW.

The site is located on the southern fringe of Navan town centre although the immediate landscape context of the subject lands is peri-urban and includes housing estates, the Boyne River and associated habitats. The three proposed vehicular site entrances are located between 750m and 1km away from Market Square on Academy Street.

The development proposed on the subject lands is principally residential with 544 dwellings planned with two creches. The apartments are proposed in the urban part of the site along Academy Street and opposite the proposed school site. Houses and duplexes are located within the remainder of the site. The lands to the north of the site are reserved for a new primary school and are not part of this planning application.

9.2 STUDY METHODOLOGY

9.2.1 Definition of Landscape

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.

9.2.2 Forces for Landscape Change

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.

9.2.3 Guidance

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 informed by 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 Statements, 2002, published by the Environmental Protection Agency (and the Revised Guidelines on the Information to be Contained in Environmental Impact Statements, Draft 2015).

9.2.4 Key Principles of the GLVIA

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 Belmount development on Academy Street, the impact would include the construction of the residential accommodation along with the two creches, as well as supporting road and utility infrastructure and public open space. In addition, there is also the localised change on the site, mostly from the existing agricultural use, and the works required to facilitate this change.

'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 focusses on these effects.

9.2.5 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.

9.2.6 Methodology for Landscape Assessment

In section 9.7 of this report the landscape effects of the development are assessed. The nature and scale of changes to the landscape elements and characteristics are identified, and the consequential effect on landscape character and value are discussed. Trends of change in the landscape are taken into account. The assessment of significance of the effects takes account of the sensitivity of the landscape resource and the magnitude of change to the landscape which resulted from the development.

9.2.7 Sensitivity of the Landscape Resource

The sensitivity of the landscape is a function of its land use, landscape patterns and scale, visual enclosure and the distribution of visual receptors, and the value placed on the landscape. It also relates to the nature and scale of development proposed. It includes consideration of landscape values as well as the susceptibility of the landscape to change.

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.

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.

Sensitivity is therefore a combination of Landscape Value and Susceptibility.

For the purpose of assessment, five categories are used to classify the landscape sensitivity of the receiving environment as presented in Table 9.1**Error! Reference source not found.** below.

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 principle 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 or has evidence of alteration to / degradation / erosion of elements and characteristics. 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 principle management objective is to facilitate change through development, repair, restoration or enhancement.

Sensitivity	Description
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 principle management objective for the area is to facilitate change in the landscape through development, repair or restoration.

9.2.8 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 as described overleaf in Table 9.2.

Table 9.2 – Categories of Landscape Change

Magnitude of Change	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 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 to 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 to 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 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.

9.2.9 Significance of Effects

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 (see Table 9.3).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 – Guide to Classification of Significance of Landscape Effects

		Sensitivity of the Landscape 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

The matrix above is used as a guide only. The assessor also uses professional judgement informed by their expertise, experience and common sense, to arrive at a classification of significance that is reasonable and justifiable.

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.

9.2.10 Methodology for Visual Assessment

The visual effects of the development are assessed in section 9.8. Visual assessment considers the changes to the composition of views, the character of the views, and the visual amenity experienced by visual receptors. The assessment is made for a number of viewpoints selected to represent the range of visual receptors in the receiving environment. The significance of the visual effects experienced at these locations is assessed by measuring the viewpoint sensitivity against the magnitude of change to the view resulting from the development. Definitions of viewpoint sensitivity are provided below in

Table 9.4 – Categories of Viewpoint Sensitivity

Sensitivity	Description
Very High	Iconic viewpoints - towards or from a landscape feature or area - that are recognised in policy or otherwise designated as being of national value. The composition, character and quality of the view are such that its capacity for accommodating change in the form of development is very low. The principle management objective for the view is its protection from change.
High	Viewpoints that 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 focused on the landscape). The composition, character and quality of the view may be such that its capacity for accommodating compositional change in the form of development may or may not be low. The principle management objective for the view is its protection from change that reduces visual amenity.
Medium	Viewpoints representing people travelling through or past the affected landscape in cars or on public transport, i.e. viewing but not focused on the landscape which is regarded as moderately scenic. 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, tranquillity or some rare element in the view.

Low	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, or on heavily trafficked routes etc. The view may present an attractive backdrop to these activities but is not regarded as particularly scenic or an important element of these activities.
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.

9.2.11 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 takes into account the geographical extent of the change, the duration and the reversibility of the visual effects.

Five categories are used to classify magnitude of change in the view as described below in Table 9.5.

Table 9.5 – Categories of Visual 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.

9.2.12 Significance of Visual Effects

As for landscape effects, in order to classify the significance of visual effects, the magnitude of change to the view is measured against the sensitivity of the viewpoint, using the guide in Table 9.5.

9.2.13 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.

Impacts/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.

9.2.14 The Proposed Development

The development is described in Section Two of the EIAR and also in the accompanying Design Statements. Those elements that have landscape and visual impacts include the;

- Construction of 10 new residential neighbourhoods of predominantly 2-3 storey housing and duplex units with apartment buildings rising to 6 storeys to be delivered over 5 phases.
- Proposed materials for the architecture which include brick and render with slate roofs.
- Construction of two crèches, one in the apartments on Academy Street and a second, single storey facility upon the hillside close to the school site – each with their own play areas.
- Construction of all associated internal roads, parking, cycleways and pedestrian pathways
- Construction and planting of all new parkland, woodland, public open spaces, swales and play facilities increasing diversity, accessibility and connectivity.
- Retained woodland blocks and hedgerows
- New tree and shrub planting throughout the development.
- Trees to be removed to facilitate the development and which need to be removed due to poor condition in accordance with good arboricultural practice facilitate landscape, ecological or habitat renewal.
- Construction of 4 attenuation tanks throughout the development
- Overhead powerlines to be rediverted underground
- Loss of open agricultural land.
- Loss of internal hedgerows and hedgerows.

9.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

9.3.1 Relevant Planning Policy

The following statutory plans are referenced in this section, owing to their relevance to the site location and its proposed development:

- Meath County Development Plan 2013-2019
- Navan Development Plan 2009-2015

Meath County Development Plan 2013-2019

The Meath County Development Plan (MCDP) contains a range of policies relevant to establishing the landscape and visual values and sensitivities for the site and site environs. These are set out below.

Core Strategy and Strategic Goals
The county's core strategy includes the following relevant aims which outline the need to facilitate sustainable, compact development and protect and support environmental resources;

"To facilitate the development of sustainable and socially inclusive communities which generate pride, a sense of place, and a healthy lifestyle; are safe, well connected, well served, environmentally sensitive, thriving and well designed."

To support the sustainable heritage of the County by safeguarding the cultural, natural and built heritage and natural resources, including biodiversity, of the County.

To support the creation of a compact urban form in all settlements in Meath (p8).

Navan is identified County Settlement Hierarchy as one of the county's "Large Growth Towns I", which are described as being a, *"key destination, economically active supporting surrounding area, located on multi-modal corridor in metropolitan hinterland"* (p.10).

The strategic objective to focus economic development in Navan outlined in policy CS OBJ 2 which states the requirement, *"to facilitate and encourage the sustainable development of designated core economic areas, such as would allow the creation of a critical mass, in terms of residential population and economic activities, sufficient to service the proposed expanded economic function of such centres. The promotion and facilitation of large-scale employment generating developments will occur within the Primary Economic Areas/ Primary Economic Growth Areas and Secondary Economic Growth Areas"* (p.21). Progress towards achieving such a critical mass involves the development of the subject site and change in land use according to and in keeping with Development Plan/s.

Sustainable Heritage
County Meath is home to a range of unique heritage sites of national and international importance, which contribute to its identity and character. The Development Plan notes the intrinsic link between the County's character and cultural assets and economic success. Two core goals are to;

"To ensure that features of Meath's natural heritage and green infrastructure that provide ecosystem services are protected and that tourist and recreational uses are facilitated in a sustainable manner.

To protect the landscape character, quality and local distinctiveness of County Meath." (p.22).

Settlement Planning
Policy on settlement planning seeks to consolidate development to achieve a more compact urban form and maximise the potential of rural areas as evidenced in SS OBJ 3, 4 and 5. SS OBJ 8 states the policy; *"to develop Navan and the Drogheda Environs as the primary development centres in Meath and to ensure that the settlements grow in a manner that is balanced, self-sufficient and supports a compact urban form and the integration of land use and transport" (p.45).*

Housing
The Development Plan states that *"the primary aim of the Planning Authority in relation to residential development is to deliver high quality living environments to serve the needs of residents"* (p.53). In relation to the assessment of the impact of residential development on landscape and visual amenity, the following policies are relevant;

HS POL 2 states that it is policy; *"to require a high standard of design in all new residential schemes that are built in a style and scale that is appropriate to the landscape setting".*
HS POL 3 states that it is policy; *"to integrate new housing into the existing social and urban fabric of the County's settlements" (p.55).*

Tourism
The development proposal includes the introduction of new walking and cycling routes that connect existing facilities. Therefore, Policy ED POL 45 is relevant which supports, *"developments which will enable and encourage countryside recreation and an increased appreciation of the natural environment, through facilitating the development of community walks, off road trails / rural trail developments, parks and other outdoor amenities and recreational infrastructure" (p.82).*

Sporting and Leisure Facilities/Recreation/Open Space
The Development Plan recognises the growing need for and emphasis on *"the requirement for quality designed open space and recreational opportunities for residents, especially those living in urban areas".* SOC POL 32 states it is policy; *"to promote the development of high-quality open space areas, for both active and passive use, and formal and informal activities in accordance with the Core Strategy and Settlement Strategy"* (p.98).

The value of public and private open space is defined and iterated within the development along with its benefits to quality of life, the environment and ecology. The Development Plan prescribes *"accessible, useable, dedicated open spaces and recreational facilities to meet both passive and active recreational needs are vital for residential and recreational amenity"* (p.99). SOC POL 41 states it is policy, *"to facilitate the development of children's play areas and playgrounds in proximity to existing and proposed neighbourhood centres, where feasible"* (p.99).

Cultural and Natural Assets
MCDP outlines the wealth of cultural and natural assets found in County Meath. Policy exists to protect cultural and natural assets. Two types of cultural designations are relevant to this site; Architectural Conservation Areas and Archaeological Sites and Monuments

The are no National Monuments located on or the site on the zoned site (see Figure 9.1). It is Council Policy, *"to protect archaeological sites and monuments, underwater archaeology, and archaeological objects, which are listed in the Record of Monuments and Places, and to seek their preservation in situ (or at a minimum, preservation by record) through the planning process"* (CH OBJ 7)(p174).

There are no ACAs in the immediate vicinity of the development site.

Figure 9.1 – Excerpt from Geohive showing the location of National Monuments in the area.

Figure 9.2 – Excerpt from Geohive showing the location of the SAC

Natural Heritage and Designated Sites
MCDP describes the County's natural heritage to include scenic river valleys, rolling farmland, a network of mature hedgerows and diverse coastal habitats. The River Boyne is a valuable natural and cultural asset. There is a Special Area of Conservation ("SAC") located on the opposite side of the Dublin Road (see Figure 9.2)

The value of Green infrastructure, woodlands, trees and hedgerows are supported by the MCDP. It is noted that Meath is one of the least wooded counties in Ireland. Small and fragmented woodlands are located particularly along the river Boyne as found to the east of the site along the riverbank. As such, the following policies are relevant;

NH POL 1 is policy, "to protect, conserve, and seek to enhance the County's biodiversity" (p.181).

NH POL 2 is policy, "to promote measures to protect biodiversity in the development management process by creating and improving habitats, where possible" (p.182).

NH POL 5 is policy, "to permit development on or adjacent to designated Special Areas of Conservation, Special Protection Areas, National Heritage Area or those proposed to be designated over the period of the plan, only where an assessment carried out to the satisfaction of the Meath County Council, in consultation with National Parks and Wildlife Service, indicates that it will have no significant adverse effect on the integrity of the site" (p.183).

GI POL 2 is policy, "to protect existing green infrastructure within the County and to provide additional green infrastructure, where possible" (p.184).

NH POL 13 states the policy, "to encourage the retention of hedgerows and other distinctive boundary treatments in rural areas and prevent loss and fragmentation, where possible. Where removal of a hedgerow, stone wall or other distinctive boundary treatment is unavoidable, mitigation by provision of the same type of boundary will be required" (p.186).

NH POL 14 policy, "to promote and encourage planting of native hedgerow species of local provenance" (p.186).

NH POL 16 policy, "to seek to maintain the natural heritage and amenity of the county by promoting the preservation and enhancement of native and semi-natural woodlands, groups of trees and individual trees" (p.186).

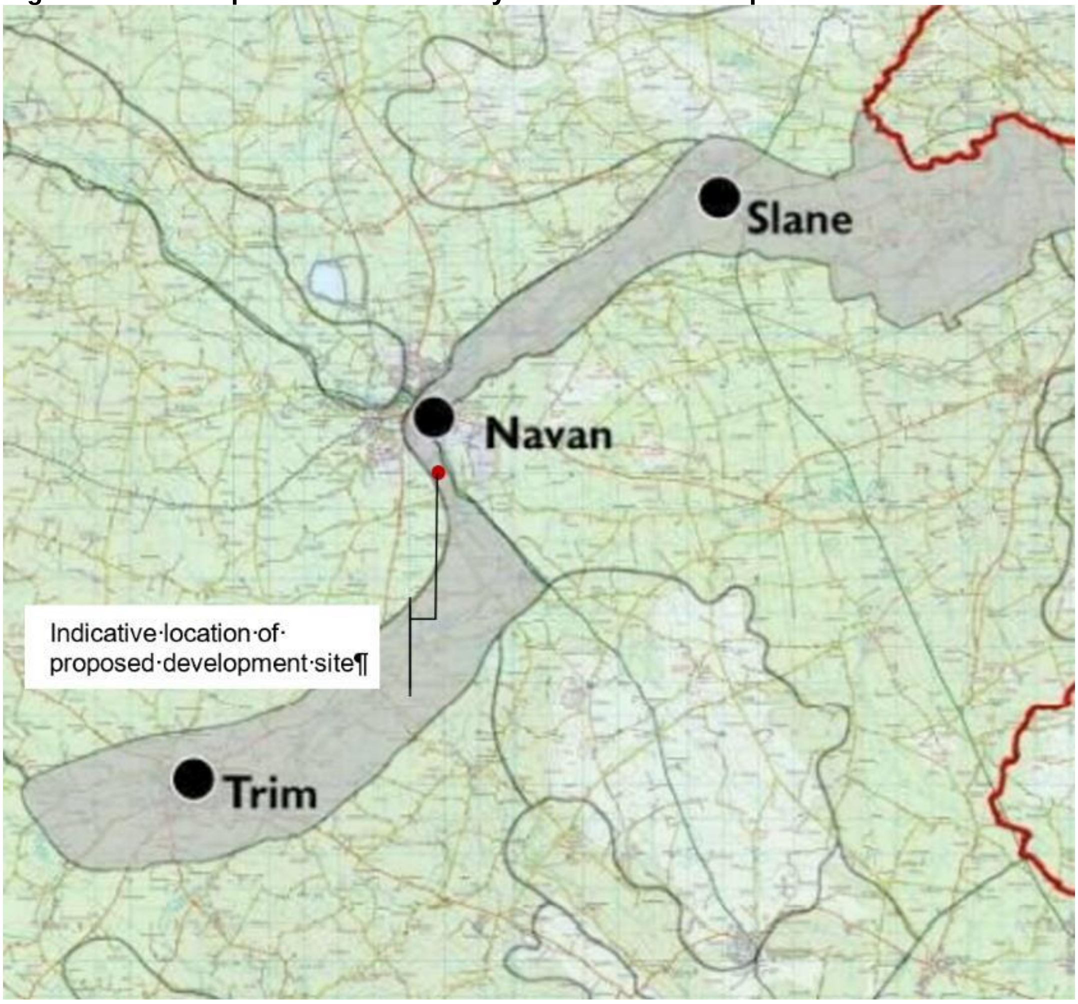
NH POL 18 policy, "to encourage the retention of mature trees and the use of tree surgery rather than felling where possible when undertaking, approving or authorising development" (p.187).

Landscape Character

The Development Plan outlines the importance of landscape on a European and National Level. At a County Level, Meath has embedded landscape within policy and has undertaken a Landscape Character Assessment that has identified landscape character types, areas sensitivity and capacity for change. It is strategic policy "to protect the landscape character, quality, and local distinctiveness of County Meath in accordance with *relevant government policy and guidelines and the recommendations included in Meath Landscape Character Assessment (2007) in Appendix 7*" (LC SP 1)(p.191). It is an objective of Meath County Council "*to seek to ensure the preservation of the uniqueness of all landscape character types, and to maintain the visual integrity of areas of exceptional value and high sensitivity*" (LC OBJ 1)(p.191).

The Meath Landscape Character Assessment locates the Belmount Development site within Landscape Character Area 5 "Boyne Valley" (see Figure 9.3 below).

Figure 9.3 – Excerpt from Meath County Council's Landscape Character Assessment



Characteristics of the area include;

- The most significant and highly valued landscapes in the county because it contains the Bru na Boinne World Heritage Site
- Settlements such as Trim, Slane and the southern fringe of Navan.
- Southern edge of Navan: Mix of residential and industrial units.
- Settlements have a high proportion of vernacular buildings.
- A steep river valley with areas of rolling lowland adjacent to the River Boyne
- A well - wooded river corridor.
- A strong network of hedgerows in most parts
- Mix of medium - large pasture/arable fields
- Long established mixed scale farmland.
- Ground conditions that suit those trees that thrive in free draining soil such as beech, oak and lime with birch, larch and willow associated with the River Boyne
- Estate landscapes - Mix of Sycamore, Yew, Alder and Beech associated with these.

- The **Landscape Value** of this LCA has been assessed as **Exceptional**
- The **Landscape Sensitivity** of this LCA has been assessed as **High**
- The **Landscape Importance** of this LCA has been assessed as **International**

The potential capacity of the LCA in relation to the proposal is as follows:

"Due to the exceptional landscape value and high sensitivity of the Boyne Valley, this LCA has low potential capacity to accommodate multi-house residential developments. It provides the setting for historic features of international importance (Bru na Boinne, WHS)" (p.45).

It should be noted that the above statement relates to the whole of the Boyne Valley Landscape Character Area. Local Development Plans reflect these landscape sensitivities in the zoning of lands as noted below in a summary of relevant Policy in the Navan plan.

The following recommendations in relation to the Boyne Valley are relevant:

> *"6. Enhance the appearance of urban fringe areas through planting of trees and hedgerows and maximise the potential for amenity areas adjacent to population centres to provide buffer zones between urban and rural areas.*
>
> *8. Have regard to the fact that the entire River corridor is designated as a SAC and the stretch between Navan and Drogheda is also an NHA. Development should not conflict with the reasons for which these designations have been made.*
>
> *9. When siting development have regard to the nature of views within this area: the river valley is narrow and high sided so views along its length and across to either side are clear and often uninterrupted. Development on the skyline should be avoided unless it is demonstrated to have no adverse visual impacts that cannot be mitigated against" (p.45).*

The following strategic policies note the importance of Meath's landscape character:

Strategic Policy CSA SP 2 states it is policy, "*to ensure that features of Meath's natural heritage and green infrastructure that provide ecosystem services are protected; that biodiversity is conserved and where possible enhanced, and; that the character of landscapes are maintained and enriched, and that tourist and recreational uses are facilitated in a sensitive manner"* (p.166).

CSA SP 2 states it is policy, *"to promote the understanding of County Meath's landscape in terms of its inherent and unique character and to recognise what elements should be preserved, conserved or enhanced"* (p.167).

Views and Prospects

The Development Plan highlights the importance of views and prospects in the County. It is an objective of the Council; *"to preserve the views and prospects and the amenity of places and features of natural beauty or interest listed in Appendix 12 and shown on Map 9.5.1 from development that would interfere with the character and visual amenity of the landscape"* (p.192). Importantly, the Development Plan notes that, *"in assessing the potential impacts on views and prospects of development proposals, it is not proposed that this should give rise to the prohibition of development in these locations. Rather such development, where permitted, should not hinder or obstruct these views and prospects and should be designed and located so as not to be intrusive in the landscape as seen from these vantage points"* (p.192).

There are no protected views in the vicinity of the site.

Navan Development Plan 2009-2015

Navan Now
"Navan enjoys a relatively compact urban structure though it has expanded to a considerable degree in line with the major population growth experienced over the time span of the last Development Plan. The town straddles both sides of the River Boyne and River Blackwater, with development generally well balanced on all sides" (p.20).

Navan's Future Development
"The challenge for Navan in the future is to achieve a balanced approach towards development, encouraging appropriate and sensitive new development in accordance with regional guidance which respects the town's architectural and natural heritage while at the same time creating a dynamic and successful town" (p.19).

"The overall Masterplan for Navan seeks to make the town a more accessible and attractive town that could accommodate an ultimate population horizon of 60,000 persons." (p.11).

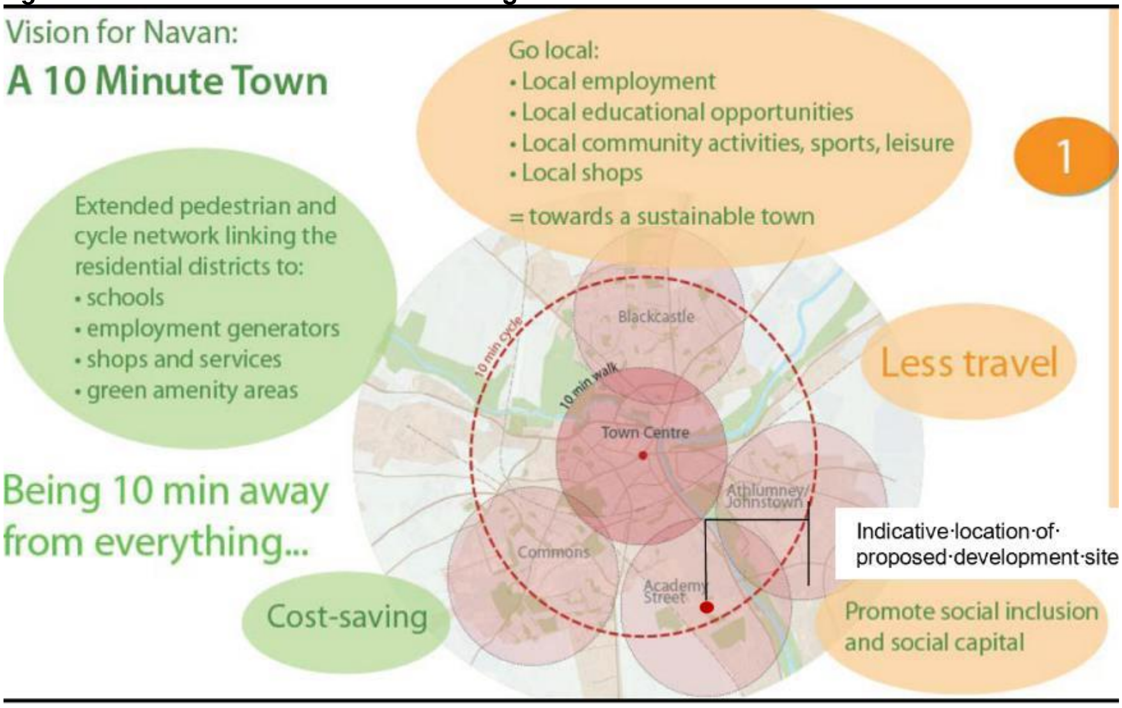
Sites for Residential Development
A set of criteria were used to determine the suitability of specific lands for residential development which are considered to constitute the proper planning and sustainable development of Navan. These are:

- Proximity to the Town Centre – maximise the utility of existing and proposed future infrastructure including public transport options;
- Environmental Constraints (i.e. impact of biodiversity, proximity to Natura 2000 site and outcome of SEA / AA)
- Sustainable Transport. To maximise public transport investment, it is important that land use planning underpins its efficiency by sustainable transport patterns. This includes higher densities within 500 metres walking distance of a bus stop. Proximity to R147 public transport corridor and is considered of priority;
- Whether new distributor roads were required to serve the lands;
- Whether the lands would contribute to creating sustainable communities;
- Whether the site represented an infill opportunity and thus would contribute to consolidating the town.

The site on Academy Street was identified as one of the best sites for developing a sustainable community according to the criteria above (and other more detailed considerations). The Navan Plan recognises the role that the environment and landscape character has in creating sustainable communities. It is policy to, *"promote and facilitate the development of sustainable communities through land use planning, by providing for land uses capable of accommodating employment, community, leisure, recreational and cultural facilities having regard to the quality of the environment, including the natural environment, landscape character and the archaeological and architectural heritage"* (CS OBJ 1)

Transport
The '10 minute town' concept is central to Navan's movement strategy, which *"envisages Navan town centre as the core of the town, surrounded by local neighbourhoods which have the common characteristic of being largely within a 10 minute cycle to the town centre*" (p.42).

Figure 9.4 – Navan's 10 minute town diagram



Settlement & Housing
"The vision for the future of Navan over the plan period is to ensure the continued development of Navan in a manner that will provide a high quality environment, which is attractive to residents, workers, visitors and investors, balanced with the protection of inherent qualities of the built environment" (p.48).

The vision quoted above is supported by the following policies which have been selected due to their particular reference to the proposals for the Academy Street site. It is Policy to; *"develop the public realm and amenities of Navan so that quality of life for residents can be improved"* (Settlement Strategy OBJ 8).

- *"promote the use of walking and cycling and reduce the reliance on the private car"* (Settlement Strategy OBJ 11).

- *"ensure the protection of flora, fauna, quality landscapes and the promotion of bio-diversity* (Settlement Strategy OBJ 12).

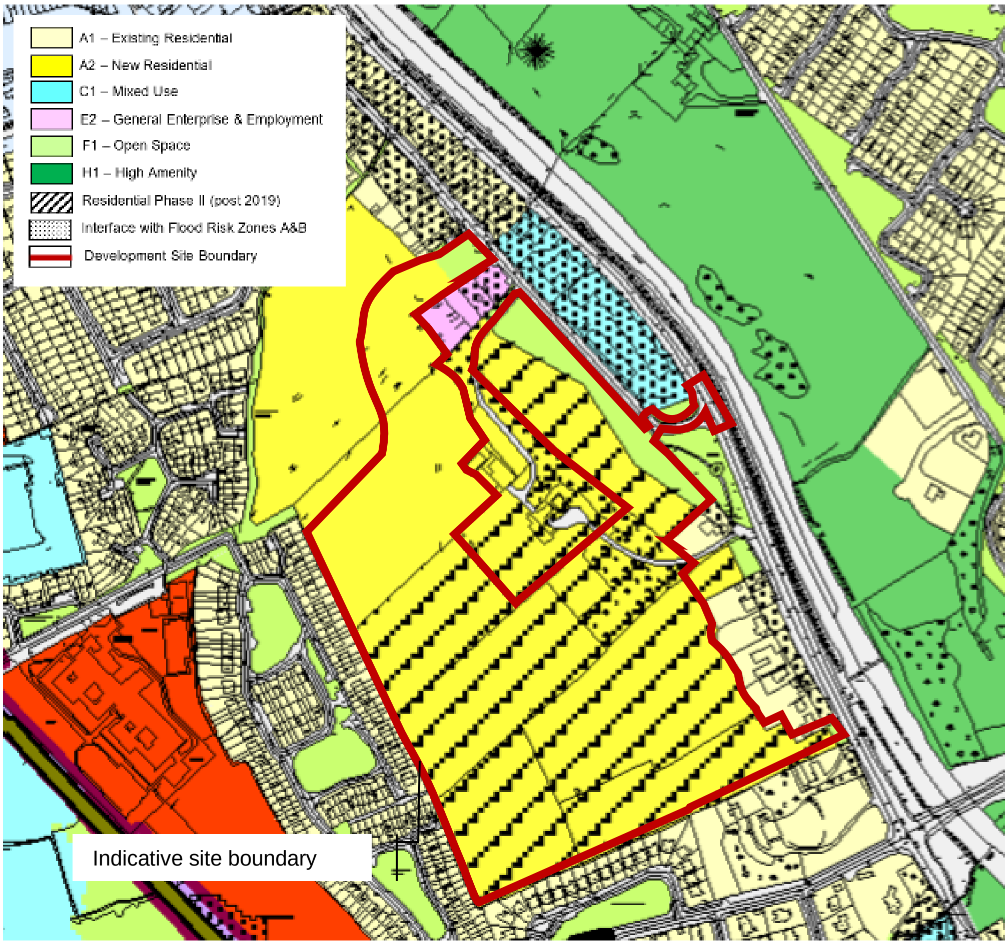
Land Use Zoning
The following land use objectives relate to the proposed residential development site and indicate future land uses;

A1 Existing Residential; *"To protect and enhance the amenity of developed residential communities"*.

- A2 New residential; *"To provide for new residential communities with ancillary community facilities, neighbourhood facilities and employment uses as considered appropriate for the status of the centre in the Settlement Hierarchy".*
- F1 Open Space; *"To provide for and improve open spaces for active and passive recreational amenities".*
- H1 High Amenity: *"To protect and improve areas of high amenity".*

These are mapped on Figure 9.5.

Figure 9.5 – Excerpt from the Navan Development Plan (2009-2015)



Residential Development
The development of high-quality new development is driven by the following factors: *"Place, Public Space, Permeability, Hierarchy, Longevity, Scale, Enclosure Decoration, and Community"* (p.69/70). It is encouraged through the following policies. It is Policy:

"To promote a high standard of design and layout in new residential developments with regard to the local character of the townscape and landscape" (Residential Policy 1 p.68).

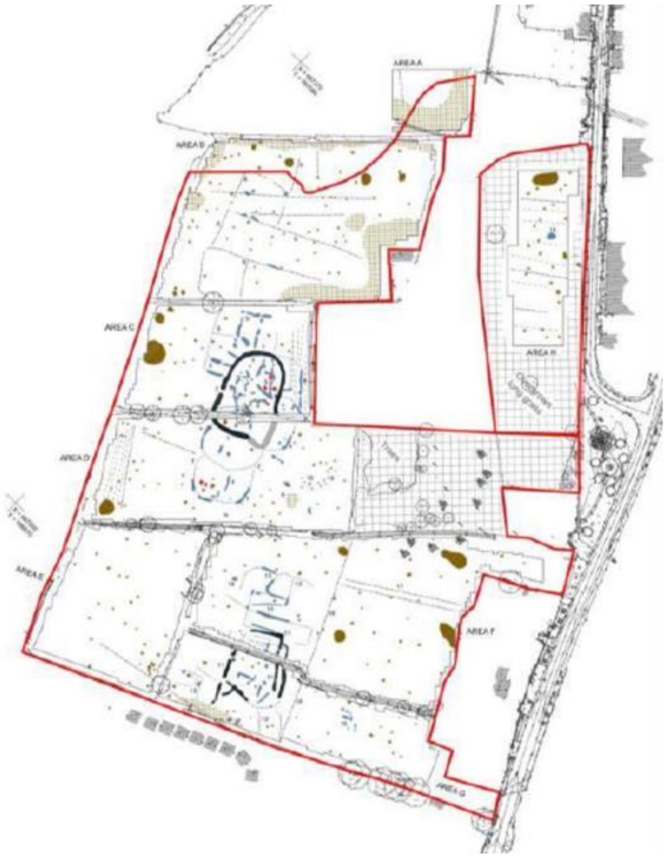
"To provide for the integration of new housing into the natural and built environment in a manner that makes a positive contribution to the overall environment in the locality" (p.70).

"To promote the development of new neighbourhood centres to serve the needs of new or expanded residential areas with basic facilities, such as local convenience shopping, community facilities, children's playgrounds, etc" (p.82).

Architectural and Natural Heritage
The Navan development plan recognised the town's rich architectural heritage and natural features.

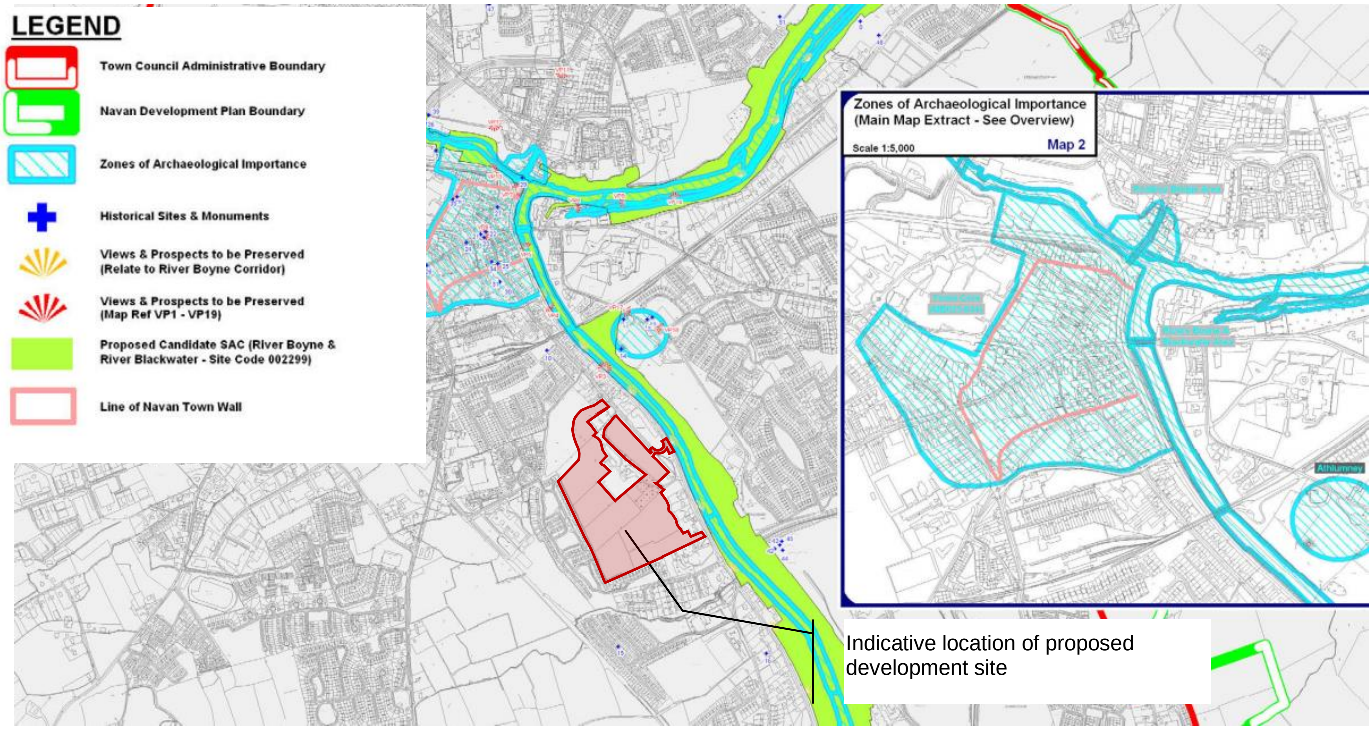
Architectural Heritage: Archaeological evidence suggests a long history of settlement in the area where Navan now stands. According to the archaeological review (John Cronin & Associates, September 2018) of the site, there are "two previously unrecorded archaeological enclosures within the landholding as well as potential external associated features". These are likely to date from the mediaeval period and are shown in Figure 9.6.

Figure 9.6 – Geophysical Survey (courtesy of John Cronin & Associates)



Architectural Conservation Areas. There are no Architectural Conservation Areas on or close to the site (see Fig. 9.7).

Figure 9.7 – Excerpt from Navan DC's Archaeological and Natural Heritage Map (3)



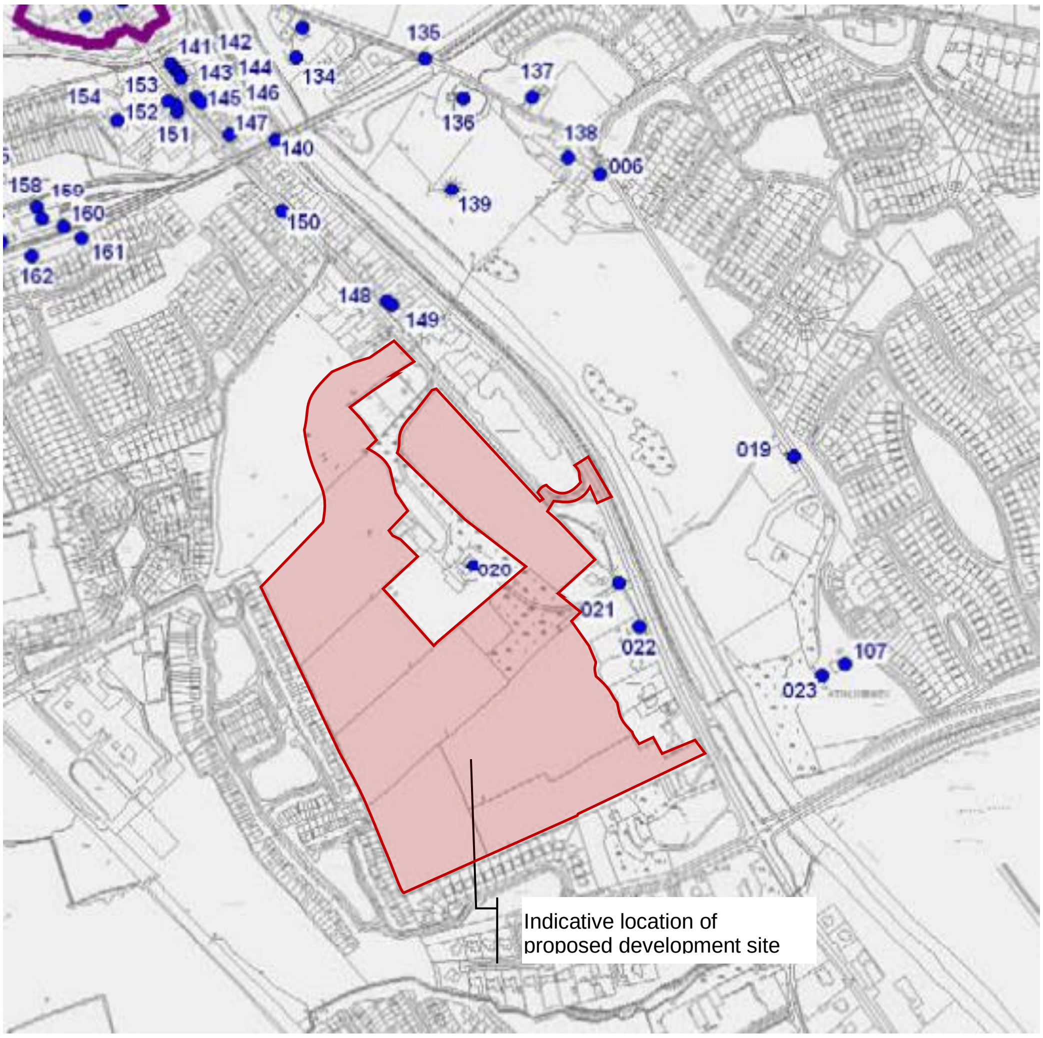
Protected Structures. There are no protected structures on the site (see Figure 9.8 below) however there are three within the immediate vicinity which are;

- 020: Belmount House - Detached four-bay two-storey house over basement, c.1825. Reoriented, enlarged and porch added c. 1910.
- 021: Belmount House Entrance Gates - Gateway consisting of ashlar limestone piers, quadrant walls, cast iron railings and pair of gates, c.1850
- 022: Russell's B & B - Detached three-bay single-storey house c.1900

In addition, several protected structures exist in the wider area of the subject lands including Athlumney Church (Ref 136), Athlumney Castle (Ref. 137) and Saint Mary's Convent of Mercy (Ref. 138). The LVIA will test the extent to which the proposal effects the character of these structures.

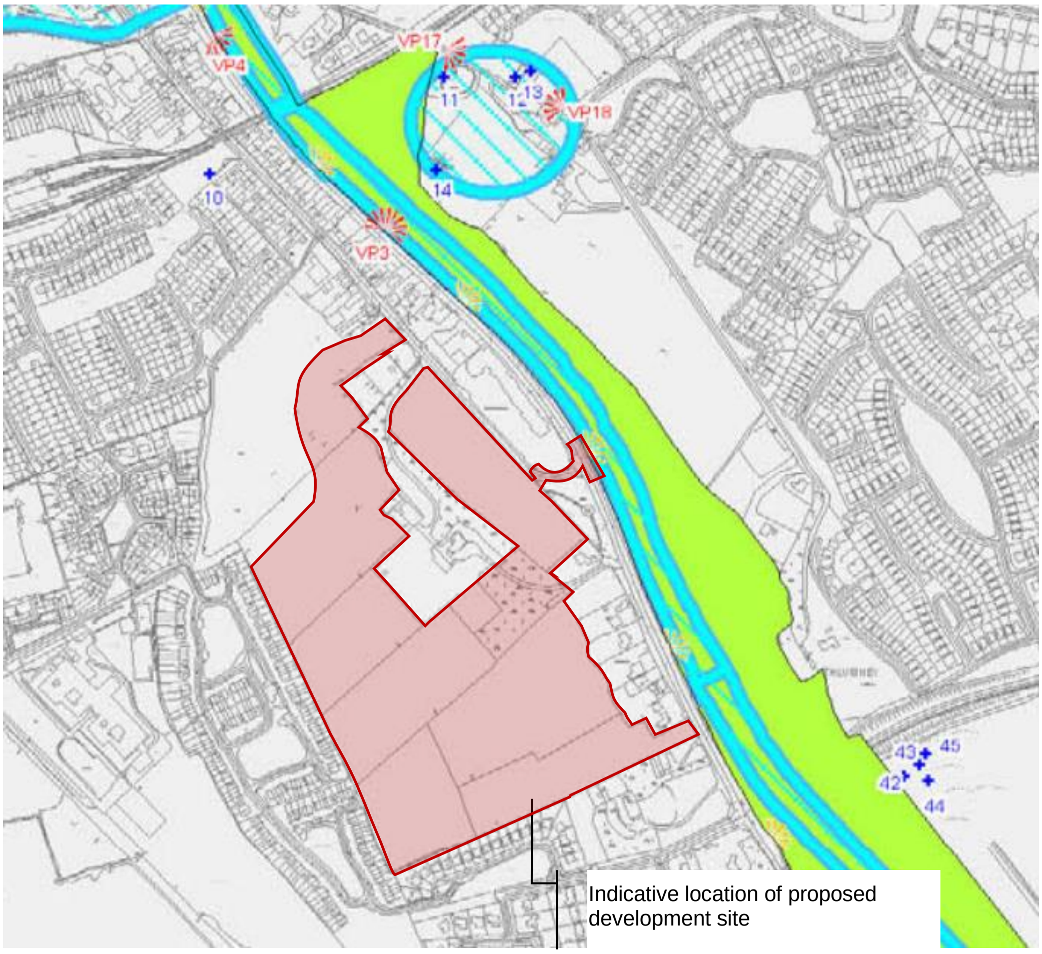
Protect structures are safeguarded by Heritage Policy 9, which safeguards the structure, it's integrity and character. The following excerpt is relevant, which requires that, *"all planning applications relating to protected structures shall be accompanied by drawings and documents sufficient to describe the impact of the proposed development on the character of the structure" (p.130).*

Figure 9.8 – Excerpt from Navan DC's Archaeological and Conservation Map (4)



Protected Views. Heritage Policy 4 safeguards protected views. There are several protected viewpoints located along The Dublin Road and around Athlumney Castle. None of the Protected Views are directed towards the subject lands (see Fig. 9.9).

Figure 9.9 – Excerpt from Navan DC's Archaeological and Conservation Map (4) showing protected viewpoints.



Gateway Sites: Navan has a number of gateway sites marking the entrance to the town. The site on Academy Street is located close to the town renewal sculpture (see Figure 9.10). It is a Council Objective to; *"ensure the high-quality design and architectural treatment of key landmark sites as identified on the Development Objectives Map"* (p.83).

Natural Heritage
Navan has a rich natural heritage with the Rivers Boyne and Blackwater flowing through the town. Navan's Natural Heritage is protected by the following Policies;

Heritage Policy 11 serves, *"To protect, conserve and enhance the biodiversity and natural heritage of Navan including wildlife (flora & fauna), and particularly all Annex II species, habitats, geology, landscapes and/or landscape features of importance to wildlife or which play a key role in the conservation and management of natural resources such as rivers, streams, canals, lakes, and associated wetlands including reed-beds and swamps, ponds, springs, bogs, fens, trees, woodlands and scrub, hedgerows and other boundary types such as stone walls and ditches which occur outside of designated areas providing a network of habitats and corridors essential for wildlife to flourish"* (p.135).

Heritage Policy 13 serves to *"To discourage development that would lead to a loss of, or cause damage to, the character, the principal components of, or the setting of parks, gardens and demesnes of special historic interest"* (p.135)

Heritage Policy 15 requires *"runoff from a developed area will not result in the deterioration of the quality of downstream watercourses or habitats."* (p.135).

The subject lands are in close proximity to the Special Area for Conservation that flanks the River Boyne (see Figure 9.2). It is Council Policy to *"To protect the River Boyne and River Blackwater cSAC and SPA in Navan and any additional sites that may be proposed for designation during the lifetime of this Plan and to ensure that development* *within the Navan Development Plan boundary will not give rise to negative impacts on the River Boyne and River Blackwater cSAC and SPA outside of the Plan area"* (Her Pol 16 p.136).

The development plan recognises the importance of Green Infrastructure and as noted in Heritage Policy 21B, will *"encourage and facilitate the development of green infrastructure that recognises the synergies that can be achieved with regard to the following:*

- Provision of open space amenities
- Sustainable management of water
- Protection and management of biodiversity
- Protection of cultural heritage
- Protection of protected landscape sensitivities" (p.139).

The importance of habitats and species outside of designated sites is protected by the following Policy;

Heritage Policy 22 seeks; *"To ensure that, where possible, proposals for development protect and enhance biodiversity by minimising adverse impacts on existing habitats, (whether designated or not,) and by including mitigation and/or compensation measures"* (p.140).

Heritage Policy 23 seeks; *"To establish ecological corridors within new development which permit the potential movement of wildlife and which include indigenous vegetation and which will link with existing biodiversity features and ecological networks"* (p.140)

Heritage Policy 24 seeks; "*To encourage the use of native tree and hedgerow species in the landscaping of new developments"* (p.140).

Landscape and Landscape Character
Navan falls into a number of the MCC character areas.
It is Council Policy to *"maintain and enhance the diverse and high quality landscape in Navan and its environs"* (Heritage Policy 29p.141).

Trees and Woodlands
The development plan recognised the importance and value of the *"many large trees and groups of trees of considerable merit which enhance the urban fabric of the town"* (p.141). It is Council Policy; *"to retain trees and hedgerows of value as illustrated on the relevant map forming part of this development plan"* (Heritage Policy 30 p.141).

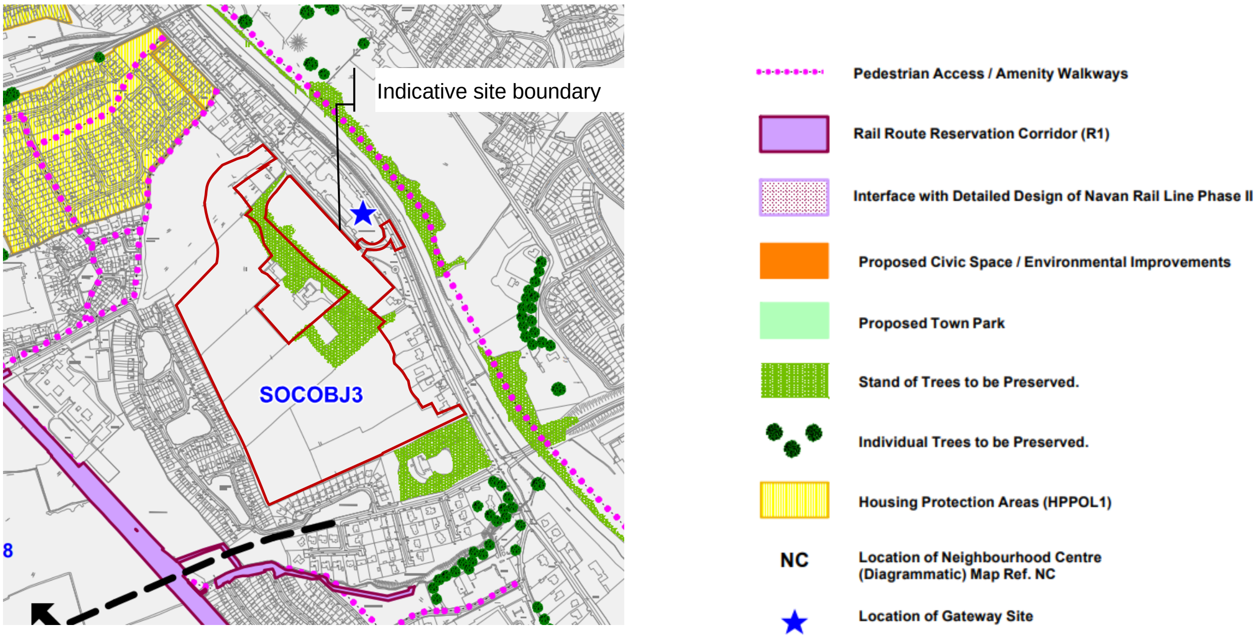
"to have a presumption in favour of the retention of existing trees and their incorporation into any new development unless this can be shown to be impractical, and to protect, preserve and ensure effective management of trees and groups of trees considered to be of special amenity value and to prepare Tree Preservation Orders where considered appropriate" (Heritage Policy 31 p.141).

Two of Navan's Stands of Protected Trees are located on or adjacent to the subject lands (see Figure 9.10 overleaf). These are;

- The stand of mature trees around Belmount House - which partially extends into the subject lands
- The stand of mature trees around Knockboyne House.

Of the stand of trees located around Belmount House, approximately 44.5% of the whole area of trees is in the subject lands (0.93ha). Within this area there are approximately 133 individual trees.

Figure 9.10 – Excerpt from Navan DC's Development Objectives Plan (2)



In terms of open space, it is the policy of Meath County Council and Navan Town Council:

"*To encourage a balance in the location and types of open space provided within the town and environs and to ensure the development of high quality open space areas, for both active and passive use, and formal and informal activities of the population of Navan"* (Social Policy 21 p.164).

"To develop an integrated green structure for the town, linking open spaces along the riverbanks of the Boyne & Blackwater with the town centre and its environs and historical features, in such a manner so as not to significantly negatively impact on the cSAC or SPA either alone or in combination with other objectives in this or other plans" (Social Policy 23 p.164).

"To facilitate the development of children's playgrounds in proximity to existing and proposed neighbourhood centres, where feasible" (Social Policy 25 p.164).

9.3.2 Landscape Baseline: Description of the Proposal Site and Environs

The Existing Site
The site and its environs are described below in terms of:

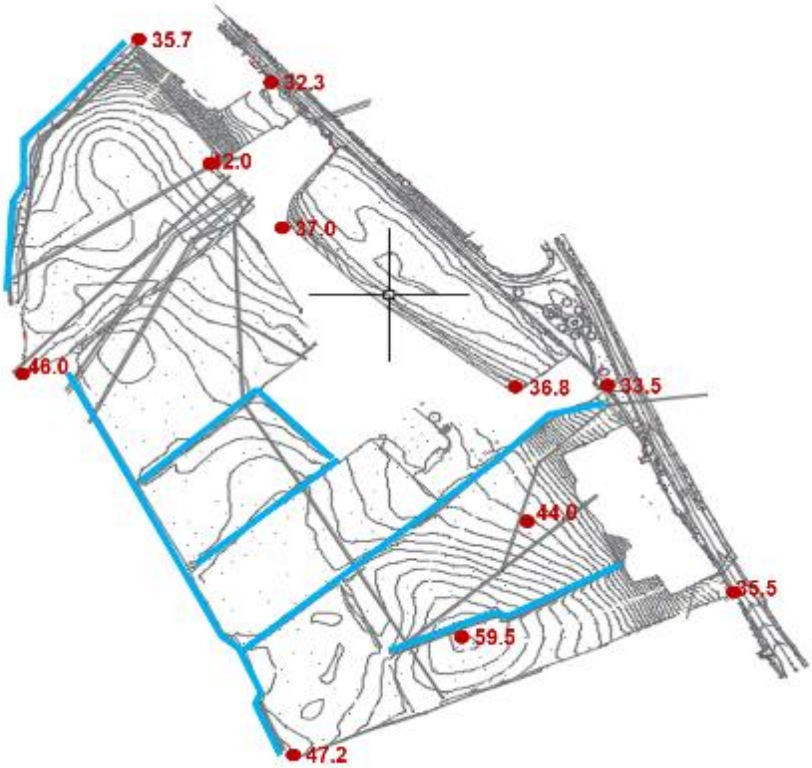
- Location and overview;
- Topography and Drainage;
- Site Boundaries, Landcover, Field patterns and Vegetation
- Land Use and Green Infrastructure
- Access;
- Built and Cultural Heritage;
- Landscape character;
- Landscape and visual amenity;
- Landscape Value and Susceptibility
- Visibility

Location and Overview

The site is located approximately 700m from the south of Navan town centre and to the west of the Boyne Valley over the Dublin Road. The proposed site entrances are located between 750m and 900m SE of the market square along Academy Street, which historically, was one of the main roads leading into the town. (see Figure 9.11 below).

Figure 9.11 – Aerial photograph showing the proposed development site in its landscape context

Figure 9.12 – Contours, indicative levels and ditches



Landform. Topography and drainage
The topography of the site is illustrated on Figure 9.12. The highest point of the site is located to the south of the site at a level of 59.5mAOD. The land slopes gradually towards the NE edge at an average slope of 2% with local undulations and towards the valley top. At this point, the slope steepens considerably to approximately 10% towards Academy Street, the Dublin Road and the Boyne River.

Run-off appears to be directed towards the River Valley and is directed along drainage ditches within and around the fields.

Field patterns, Site Boundaries, Landcover and Vegetation
The site comprises;

- Agricultural fields (7 in total).
- Belmount woodland.
- Seminatural grassland.

The agricultural fields are small to medium in size and are divided by hedgerow lined ditches. The hedgerows range in condition and contain several scattered hedgerow trees hedgerow trees, some of which look particularly distinctive although range in physiological condition. At the time of the site visit, the fields were planted with an arable crop.

Belmount Woodland is a mature and characterful woodland containing some distinctive native and non-native trees, remnants of historic paths and two well defined laneways. There are several clearings of different sizes in the woods and a few attractive views through the trees to Belmount House, a handsome stone property built circa 1835. To the SE and SW, the woodland boundary follows ditches. To the SW of the woodland, the ditch takes on the appearance of an old access track. To the NE of the woodland, the lands are fenced off behind a barn complex, which is out of use. The overall stand of woodland around Belmount House is protected in the Navan Plan.

The area of semi-natural grassland lies between Academy Street and the woodland of Belmount House. The lands slope up generally gradually towards the woods. The slope inclines more steeply to the SW. The boundary between the subject lands and Academy Street is distinct through the presence of a coursed limestone wall.

The subject site mostly abuts private property boundaries except for on its NW edge where it flanks Academy Street. The site wraps around Belmount House and the electrical interchange located immediately north. The boundaries comprise a combination of fences (of differing types), walls, ditches, hedgerows and woodland edges.


Plate 1. View north across the fields


Plate 2. View SW across the semi-natural grassland towards Belmount Woodland


Plate 3. Belmount Woodlands


Plate 4. Properties on Academy Street in the NE corner of the site


Plate 5. Properties on Dublin Road in the SE corner of the site


Plate 6. Properties along the SW edge of the site

Land Use and Green Infrastructure
The lands, as described above are all currently in private use for residential or agricultural purposes.

The Boyne River Valley is a connected and protected wildlife corridor containing several different habitats. The site is located close to the riverbank but is disconnected from it by the Dublin Road and further north, Academy Street and the development in-between these two streets. Within the site itself, there is a large area of protected stand of trees located around Belmount House. However, this is disconnected from the protected stand of trees around Knockboyne, which lies to the SE of the site and the established garden vegetation lying between the woods. There is a good level of East-West habitat connectivity on the site due to the presence of hedgerows.


Plate 7. View north across the fields


Plate 8. Internal hedgerows


Plate 9. Internal hedgerows


Plate 10. Belmont Woodland with Knockboyne in the far background

Access
As the site has historically been largely in private agricultural or residential use, there is currently no general public access to it. There are three fingers of fields that slope steeply down to the NE and connect the main body of the subject lands to Academy Street (in two instances) and the Dublin Road. Of these, the middle stretch, closest to the Navan Gateway sculpture, is gated.

There is a public footpath flanking the NE site boundary, located behind a mature hedgerow. A gated access to this path from the proposed school site is has been used for fly-tipping.

There are several cul-de-sac ends and streets located around the site which have the potential to connect through into the site in the future. These are located on the following streets;

- Woodlands
- Limekiln Hill
- Limekiln Wood
- St Columbus Crescent.

Plate 11. A section of the site that is located between the main site area and the Dublin Road

Plate 12. Gates access from the proposed school site to the public footpath that wraps around the northern boundary of the site

Plate 12. Cul-de-sac adjacent to the site on Limekiln Wood

Built and cultural heritage

The Boyne valley has long attracted human settlement evidence for which dates to pre-historic eras. On the subject site, there is evidence of a previously unrecorded archaeological enclosure from the Middle Ages (see Figure 9.6)

Sporadic activity continued around these sites through the Iron Age and grew from the early ages of Christianity. The subject site is likely to have been part of 700acres of lands which were part of Navan Abbey. Navan Abbey lands which were located across the River Boyne from the site. The abbey dates from 1189 and was located approximately 5.25km NW of the site. The Cistercians were influential in shaping the landscape and agricultural development in their lands which were subdivided into granges or outlying farms. From 1641, 66acres of lands around the site were owned by James Dillon.

Athlumney Castle is visible from the subject site and is located 300m NE from it at Athlumney. This castellated mansion dates from the 16th century. Athlumney Cemetery contains the remains of the Medieval (14th century) church.

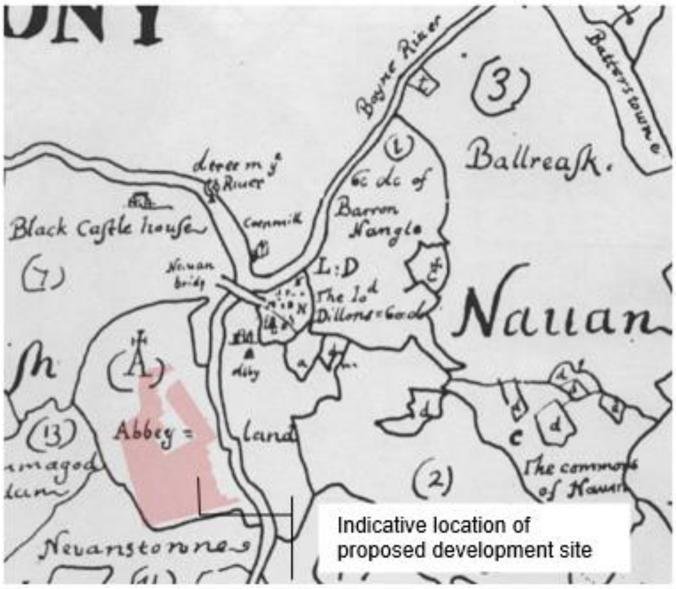


Figure 9.13 – Extract from the Down Survey Map (1654) showing the approximate location of Navan Abbey near the confluence of the Boyne and Blackwater (courtesy of Navan & District Historical Society).

Plate 13. Athlumney Castle

Plate 14. Athlumney Cemetery and the remains of the church

From within the site, it is possible to see the two churches of St Mary's on the horizon when travelling south to north.

The site boundary of the subject lands wrap around Belmount House, which is an early 19th century house originally builtc.1825 and expanded and reoriented under the ownership of the Spicer family c.1910. The house is listed as a Protected Structure (NT025-177 and NT025-178) and is also included in the National Inventory of Architectural Heritage (NIAH ref. 14013039).

A farm building, dating from c.1825 is located to the north of the house. Outside of the proposed development site, is also included in the NIAH (14013035).

Plate 15. Belmount House

Plate 16. Farm buildings adjacent to the site

Plate 17. Views of the two churches of St. Mary's in Navan town from within the site – looking north.

Landscape and visual amenity

The site offers landscape amenity as a backdrop to publicly accessible places around its periphery and makes a contribution to the wider landscape character of the area however offers negligible immediate amenity value because the lands are in private property.

To the west, the western slopes of the site are generally visible along with the treetops of Belmount Woodland. Closer, partial views of the site are available from the upper floors of some of the properties around the eastern part of the site and from small gaps between properties and cul-de-sac ends. The existing apartments on Academy Street overlook the NE section of the site between Academy Street and Belmount House. Partial views of the site are experienced when travelling along the Dublin Road towards Navan, crossing St. Martha's bridge and from the public realm and upper storeys of some properties along Academy Street. A schedule of potential viewpoints is provided in section 9.3.3.

A detailed description of visual influence and the views themselves will be provided in the full Landscape and Visual Impact Assessment.

Plate 18. Oblique view from a detached property on Convent Road.

Indicative area of the site visible.

Plate 19. Panoramic view of the site along Academy Street (southern section)

Plate 20. Views towards the site from the northern end of Academy Street

Landscape Character

The landscape character of the subject lands is of a greenfield site containing strong urban influences – particularly to the west. It is defined by its;

- Landform which slopes gently across the plateau of the site and then steeply towards the Boyne River valley to the NE.

- Existing arable use of the fields for single crops / monocultures
- Internal, sometimes degraded hedgerows with sporadic hedgerow trees running east-west
- Established woodland around Belmount House and Knockboyne containing some mature specimen trees and evidence of an old laneways and drive.
- Ditches through and around the site.
- Some historical features evident but these are in poor condition and are not well-integrated into the current landscape.
- Shared boundaries with residential, suburban estates.
- Proximity and views towards Navan town.
- Limited access to the landscape due to its arable use and private ownership
- Overhead electrical cables and pylons leading to a substation on the site's northeastern boundary.
- Views towards Belmount Woodland.
- Limited and short-distance views to Belmount House.
- Long distance views north towards Athlumney Castle, Meath City Council and the Boyne Valley.

The landscape has certain valued elements such as the Protected stand of Trees and the views towards Navan and Athlumney Castle but has other eroded elements such as the integrity of the hedgerows and historical features in the woods. Despite its attractive rural qualities, the site is currently surrounded by landscape change and the rapid urbanisation of its setting – it is becoming an anomaly in this context. Nonetheless it offers attractive characteristics to contribute to a new residential environment.

As such, the landscape sensitivity of the subject lands is Medium

9.3.3 Zone of Visual Influence and Potential Visual Receptors.

Based on the assessment of the landscape characteristics, values and sensitivities, 26 representative viewpoints were selected to assess the visibility of the site and likely visual impact and effects. The 26 views are listed below in Table 9.6 with a brief description, a rationale for the selection of each viewpoint and a brief indication of the extent of the site visible. Grey shading illustrates a lack of visibility from the selected viewpoint. The subject lands were visible from 22 of the 26 receptors identified. All views are mapped in Figure 9.14 overleaf. Of the 26 viewpoints visited, 15 were selected for full assessment. These viewpoints have been selected to provide a good representation of visual impact from around the subject lands. Sensitive viewpoints and those suggesting more rather than less visibility have been prioritised. This assessment will be provided in the full Landscape and Visual Impact Assessment report.

Table 9.6 – Schedule of viewpoints visited

Vwpt Ref.	Short description of receptor and view	Rationale for selection	Approx. Distance from site	Site visibility
1	View SSW from Riverside	Residential receptor	290m	No
2	View SW from Convent	Potential residential receptor	345m	Yes-partial
3	View SW over Athlumney Castle Cemetery wall	Representative of views experienced by road receptors adjacent in and around the National Monument.	345m	Yes-restricted
4*	View SW from Athlumney Castle Cemetery	Area of High Amenity used as a pubic open space.	290m	Yes-restricted
5	View SW from Athlumney Castle	Representative of views from a protected National Monument.	306m	No
6	View SW from gateway on Convent Road	Representative of views from residential receptor	306m	No

Vwpt Ref.	Short description of receptor and view	Rationale for selection	Approx. Distance from site	Site visibility
7*	View SW from gate on Convent Road	Representative of views from the upper storeys of front elevations on Athlumney Castle Cul-de-Sac.	287m	Yes-restricted
8*	View W from residential property on Convent Lane	Representative of oblique views available from the property boundary and views experienced from the access road.	252m	Yes - partial
9*	View WSW from residential property on Convent Lane	Representative of oblique views available from the property boundary	176m	Yes-partial
NB – A single viewpoint will be used to represent both viewpoints 8 and 9				
10	View W from Riverside	Potential views from residential receptors	280m	No
11*	View W from MCC council offices	Representative of views from the NW side of the civic building.	250m	Yes
12*	View NW from St. Martha's bridge	Representative of views available to pedestrian and vehicular bridge users	130m	Yes-partial
13*	View SWW from the bus stop on the Dublin Road	Representative of views received when using the bus stop, road and pathway	25m	Yes-partial
14*	View NW along Academy Street from the Dublin Road	Representative of views experienced by road and pathway users when approaching Navan.	55m	Yes - restricted
15*	View NW along Academy Street from the pocket park	Representative of views experienced by road and pathway users when approaching Navan.	55m	Yes
16*	View SW along Academy Street from Dublin Road	Representative of views experienced by road and pathway users.	68m	Yes
17*	View SSE from Academy Street	Representative of views from front elevations of residential receptors, businesses, road and pathway users	15m	Yes
18*	View SW from Academy Street	Representative of views from front elevations of residential receptors located on Academy Street	16m	Yes - partial
19	View SE from Woodlands	Representative of views from rear elevations and upper storeys of homes on Woodlands	50m	Yes-restricted

Vwpt Ref.	Short description of receptor and view	Rationale for selection	Approx. Distance from site	Site visibility
20	View NEE from Woodview	Representative of views from rear elevations and upper storeys of homes on Woodview	42m	Yes-restricted
21*	View NE from St. Columbus Crescent	Representative of views experienced daily by school users	129m	Yes - partial
22	View NW from Limekiln Wood	Representative of views from side elevations and upper storeys of homes on Limekiln Wood	20m	Yes-restricted
23*	View NE from Limekiln Wood	Representative of views from rear elevations and upper storeys of homes on Limekiln Wood	90m	Yes - partial
24*	View NE from Limekiln Wood	Representative of views from rear elevations and upper storeys of homes on Limekiln Wood	12m	Yes - partial
25	View NE from SW corner of the site	Representative of views from rear elevations and upper storeys of homes on Lime Kiln Hill and Limekiln Wood	0m	Yes
26*	View NE / SE and SW of the site from Belmount House	Representative of views from the residential property	0-30m	Yes

* denotes the 15 viewpoints selected for the full assessment.

In summary, the visual analysis undertaken to date concludes the following;

- The site is visible from 22 of the 26 viewpoints visited although 7 viewpoints offer an unrestricted view towards the site.
- More open views towards the site are available from the north-east.
- The properties along the western edge of the site blocks most of the views from the west. Most views available from this direction are from upper floors of homes looking over and through any boundary and garden vegetation present.
- All views towards the site are from a distance of under 400m.
- Close proximity views are all within a distance of 250m.
- There are no long-distance views towards the site.
- The site is not visible from Navan town centre.

It important to note that the visibility of the site or the scheme is not necessarily problematic. An impact assessment of 15 selected viewpoints is provided in section 9.8. The viewpoints have been selected to provide a good representation of visual impacts and effects from around the subject lands. Sensitive viewpoints and those suggesting more rather than less visibility have been prioritised.

Figure 9.14 – Map of Visual Scoping Exercise.

Site boundary

1-26 Viewpoints visited during the scoping exercise

Viewpoints from which site is visible to be assessed

Viewpoints from which the site is visible – not for assessment (representative views are covered elsewhere)

Viewpoints from which site is not visible

9.3.4 Value and Susceptibility

The values and characteristics of the site are listed below and can be categorised in two ways – values which should be conserved, and those that provide opportunity for enhancement.

The values to be conserved indicate those aspects of the receiving environment which are valued and sensitive and could be negatively impacted on by the proposed development. These include:

- Recognition of this area's cultural significance, ecological features, highly sensitive regional landscape character, and designated sites in Policy (including the Stand of Trees to be Preserved, the SAC and Protected Structures).
- Mature (protected) woodland around Belmount House and Knockboyne and the established hedgerows and trees though the site.
- The network of ditches and their role as wildlife and hydrological networks.
- The historical laneways located within Belmount Woodland.
- Retention or enhancement of landscape character (while recognising the significance of this site as Navan's priority site for a new sustainable community).
- Close and medium distance views from the surrounding area.
- The aesthetic quality derived from the site currently being vegetated contributes to the scenic qualities of the area from particularly from the east. The canopy of Belmount Woods is seen in several views.
- The relationship between Belmount House and the site in terms of views, boundary treatments and character.
- The views from the (currently private and therefore inaccessible) site towards Athlumney Castle and across the Boyne Valley (although some detractors are visible here).
- The setting and presence of the Welcome to Navan sculpture.
- Built and cultural heritage of the subject site including the bronze age enclosure and historical site features and specimen trees.

The values to be enhanced represents the site's capacity to accommodate change and therefore reflects landscape susceptibility. These include:

- Objectives for Navan as an expanding town and designated Large Growth Town I
- Zoning of lands for residential development.
- Objectives to support compact, well-connected, high quality urban development with a strong sense of place.
- Objectives for development to improve public access to open space and the countryside.
- Objectives to improve the diversity, quality and recreational value of open space.
- The degraded nature of some of the site's characteristics including the internal hedgerows and the presence of pylons, overhead wires and the substation.
- The site has been in long standing agricultural use which has therefore limited the accessibility and diversity of the lands.

  The enhancement values reflect change that is occurring in the landscape and its inherent robustness – this includes the site's location on the edge of the urban area.

9.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposal relates to a residential development of 544 no. dwellings on a site of c. 15.1 hectares comprising 260 no. houses (18 no. 2 bed, 207 no. 3 bed & 35 no. 4 bed) and 198 no. apartments (46 no. 1 bed, 152 no 2 bed), 30 no. duplex apartments (15 no. 2 bed & 15 no. 3 bed), and 56 no. dwellings in corner blocks (16 no. 1 bed, 24 no. 2 bed & 16 no. 3 bed) as well as the provision of two crèches (ground floor of apartment building [c. 195 sq. m] and single storey creche in housing area [c. 443 sq. m]) Open Space including playground areas; all ancillary landscape works with public lighting, planting and boundary treatments including regrading/re-profiling of site where required as well as provision of cycle paths; Provision of vehicular and pedestrian looped access through the site from 3 no. junctions located on Academy Street as well as pedestrian connection in south east of site to Dublin Road and upgrade works to junction onto the Dublin Road; along with 875 no. car parking spaces and 581 cycle spaces and 4 no. car sharing spaces; Surface water attenuation measures and underground attenuation systems as well as all ancillary site development works (reprofiling of site as required) as well as connection to existing public water supply and drainage services. All site development and landscape works.

The proposed development is described in Section Two of the EIAR. The proposed landscape characteristics are defined by:

- Neighbourhoods that are focussed around and draw their identity from their relationship with open space
- A new urban park named 'Academy Park' along Academy Street

- A new woodland park in and amongst the existing woodland currently associated with Belmount House and gardens
- Wildlife corridors connected through and around the development
- A sweeping avenue leading through the development
- Direct pedestrian connections through a range of interesting and varied parks, streets and squares.
- A hierarchy of spaces which become more local to the west
- A strong network of proposed street and garden trees

9.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

This section identifies potential impacts of the construction and operational phases of the development on the landscape and visual resource study area.

9.5.1 Construction Phase

Potential Landscape Impacts

The potential construction impacts on the landscape include the:

- Retention and safeguarding of existing trees and boundary vegetation
- Removal of the omission of selected mature trees, small groups of young trees and all internal hedgerows
- Extensive change of the landscape from agricultural lands to a construction site and the resultant change in landscape character
- Movement of soil and storage of materials

Potential Impacts on Views

The potential construction impacts on views include the:

- Gradual erection of buildings and all engineering, building and landscape works required with associated site infrastructure, fencing and plant.
- Visibility of site plant and machinery, which will be both still and moving. Cranes will be visible over the roofs of existing buildings.
- Removal of ground layer vegetation as it is stripped and stock-piled. Bare earth will be visible.
- Omission of selected mature trees, small groups of young trees and all internal hedgerows in views.
- Retention and protection of the majority of the trees on site which will continue to screen and soften some views towards and within the site.

9.5.2 Operational Phase

Potential Landscape Impacts

The potential construction impacts on the landscape include the:

- Change in character from agricultural lands to a residential development and series of parks
- Preservation of ecological habitats

Potential Impact on Views

The potential operational impacts on views include the:

- Introduction of new residential buildings into the view
- Introduction of new movement infrastructure – roads, cycle paths and pedestrian paths into the view
- Potential change in the skyline
- Potential screening of more expansive views
- Introduction of a more designed landscape
- Removal of overhead power lines
- Screening of the electricity sub-station

- Retention of the mature trees and woodland as elements within the view
- Gradual establishment of new vegetation and planting in the streets, open spaces, gardens and along sections of the site boundary including around the existing electricity substation.

9.5.3 Potential Cumulative Impacts

The proposed development is part of the wider expansion of Navan town. For some visual receptors this will mean the visibility of further development occurring adjacent to this proposal, including the proposed school site to the north of this application. Cumulatively this is transformative of this medium-quality rural landscape in accordance with local policy. New development needs to seek to maintain Green Infrastructure networks, landscape structure – trees and woods – and a consistent materiality, particularly to ensure the site's landscape potential is achieved and to ensure the protection of views from designated locations/routes. These recommendations have been accommodated within the masterplan submitted.

9.5.4 'Do Nothing' Impact

The '*do-nothing'* impact refers to the non-implementation of the proposed development. The primary effect of this would be that the impacts and effects identified would not directly occur. In this regard the following issues are relevant.

The current agricultural land use of the subject site is not a land use which is likely to persist in the longer term due to the current zoning.

If the site is left in its current state, as agricultural land use, the management of the fields and hedgerows will be likely to continue in its current manner and hence a neutral impact will persist on the existing landscape. Belmount Woodland is likely to be left unmanaged and could potentially deteriorate in the long term. The semi-natural grassland adjacent to Academy Street, left un-managed, would in the medium-term become overgrown with scrub / woodland.

9.6 AVOIDANCE, REMEDIAL & MITIGATION MEASURES

The following recommendations are put forward to mitigate against the negative impacts mentioned above and to reinforce the positive impacts of the proposed development. Mitigation measures are proposed and considered only on the lands of the subject site.

9.6.1 Construction Phase

During construction there will be a change to the landscape and there will be negative visual impacts for residents and visitors to the areas adjacent to the site associated with construction activity.

The remedial measures proposed revolve around the implementation of appropriate site management procedures – such as the control of site lighting, storage of materials, placement of compounds, delivery of materials, car parking, etc. Visual impact during the construction phase will be mitigated somewhat through appropriate site management measures and work practices to ensure the site is kept tidy, dust is kept to a minimum, and that public areas are kept free from building material and site rubbish.

Site hoarding will be appropriately scaled, finished and maintained for the period of construction of each section of the works as appropriate. To reduce the potential negative impacts during the construction phase, good site management and housekeeping practices will be adhered to. The visual impact of the site compound and scaffolding visible during the construction phase are of a temporary nature only and therefore require no remedial action other than as stated above.

Existing trees and woodlands to be retained and are shown in the CSR Design Statement and Arboricultural Reports. Existing trees to be retained are particularly sensitive to negative impacts during the construction phase if proper protection measures are not adhered to. With regard to the protection of the retained trees on site during proposed construction works, reference should be made to BS5837: Trees in relation Design, Demolition and Construction – Recommendations (BSI, 2012). Tree protection details will be included with the application to the Board.

Adverse impacts both during construction and at operation phases could be mitigated through undertaking the following site works early on in the construction process in order to soften and screen views as early on as possible.

In areas not subject to the construction of buildings, – Academy Park, the school approach road and around the electrical sub-station, advance planting can take place to build landscape capacity and establish and mature during development and ahead of occupation. Where feasible and sensible, planting larger sized specimen trees (c 18-20 girth) to the north-east of the site.

Reducing the footprint of all construction works wherever feasible and ensuring the remainder of the land is retained as green field will also limit any adverse effects during the construction phase

9.6.2 Operational Phase

The scheme design incorporates significant consideration and mitigation in respect of potential impacts.

The retention of much of the existing landscape structure including the Protected Stand of Trees, most existing hedgerow trees and periphery vegetation around the site boundary. The location of the existing trees and archaeological features have directed the location of pocket parks in the proposed layout.

The architectural layout aims to address visual impacts by proposing variety in scale and massing of buildings. Academy Street has been treated in a more urban way in response to it being a principle road leading to the town. The development on top of the slope has been designed to create neighbourhoods. Towards the river valley, the layout follows the contours to maximise on views and light and to allow trees planted on streets to soften views looking into the development.

The extensive planting of additional trees and shrubs throughout the site where possible will reduce the visual mass of the buildings, soften and partially screen the development over time from various viewpoints, as identified in the assessment, thereby minimising the visual impacts.

Landscape works are proposed to reduce and offset any impacts generated due to the proposed development, where possible. The planting of substantial numbers of new trees and other planting in the open spaces the site boundaries and internal roads, both native and ornamental varieties, will enhance the overall appearance of the new development and compensate for the removal of hedgerows and trees where needed for the construction works and increase the overall landscape capacity of the site to accommodate development.

Native and appropriate planting for biodiversity has been incorporated into the scheme in accordance with the advice of the Project Ecologist.

Public open spaces have been designed as part of an overall design strategy that focuses on creating a '*sense of place'* and individual character for the development area. The quality of the public realm scheme is of a high standard and the quality of materials proposed is similarly high and robust.

Design of public open space that forms part of a network of spaces that includes areas for passive and active recreation, social / community interaction and play facilities catering for all ages.

Application of best practice horticultural methods to ensure that mitigation measures establish and grow appropriately.

9.6.3 '*Worst-case'* Scenario

The '*worst-case'* scenario would be if the proposed development failed to safeguard any of the existing valued landscape features such as the Protected Stand of Trees or was laid out in a way that failed to respond to surrounding landscape and townscape character, scale, sensitivities and views. Similarly, if the proposed development is approved but failed to integrate proposed green infrastructure and if the positive attributes of the design and mitigation measures were not carried through in full or enforced by the Local Authority.

An example of this would be if trees were felled as per the application, but no replacement tree planting was carried out.

9.7 PREDICTED LANDSCAPE IMPACTS (RESIDUAL IMPACTS)

The subject lands directly affect the physical character of Meath CC LCA 5 – Boyne Valley and the subject lands itself. The predicted landscape effect on these two landscape areas is assessed in this section.

The subject lands are adjacent Meath CC LCA 6 Central Lowlands. This character area will not be affected physically in any way as a result of the development proposals. A review of the extent to which the development will affect the views experienced from adjacent landscapes are examined in section 9.8 of this report.

Assessments are made during the construction stage of the project and at operation. Effects are considered under the following headings:

- temporary effects (construction phase up to five years);
- short-term effects (operation phase up to seven years);
- medium-term effects (operation phase, seven to fifteen years) and
- long-term effects (operation phase, fifteen years and beyond).

9.7.1 Landscape Sensitivity Assessments

The Landscape Sensitivity of the baseline landscapes defined in 9.3 and is as follows:

The landscape sensitivity of **Meath CC's LCA 5 – Boyne Valley LCA** is High in accordance to the MCC's assessment.

The landscape sensitivity of **the subject lands** is Medium in accordance with the landscape conservation and enhancement values listed section 9.3.4.

9.7.2 Construction Impacts and Effects on the Landscape

Construction Impacts on the Landscape
The construction stage will result in ongoing infrastructure, building and related works for approximately 5 years as phased. This will entail:

- The protection of the majority of the trees on site.
- The removal of 26 selected mature trees and internal hedgerows.
- The temporary movement and stock piling of earth and materials (avoiding cordoned off protected archaeological areas).
- The temporary movement of machinery in and out of the site.
- All engineering, building and landscape works required with associated site infrastructure, fencing and plant.

Overall, the impacts described are generally short-term, destructive and visually adverse in nature.

Operational Effects on the Landscape
These impacts would have the following effects on the baseline landscape areas as follows:

MCC LCA 5 – Boyne Valley

The effects during construction would relate to a very small geographical extent of this LCA, which in its totality includes lands to the east of Slane and to the west of Trim. During construction, it would introduce that are uncharacteristic with the LCA in a small geographical area to a Low extent / magnitude of change which generates a Moderate-Slight Significance of effects.

The Subject Lands:

The extent of change in relation to the subject lands would be moderate to large in extent resulting in the loss of agricultural lands and hedgerows across the site – excluding the existing mature woodland which would largely be retained and protected. This change would gradually alter the character of the landscape to a High extent / magnitude of change which generates a Significant effect.

Qualitatively, it expected that all construction works would have an Adverse impact. Although valued features would be protected, the works would change and degrade the lands until they are re-made into the proposed neighbourhoods. The construction works are expected to take approximately 5 years and therefore are considered as temporary.

9.7.3 Operational Impacts and Effects on the Landscape

The site's Enhancement Values reflect a significant body of policy that is supportive of major landscape change at this location to form a new residential community. Despite its attractive rural qualities, the site is currently surrounded by landscape change and the urbanisation of its setting – it is becoming an anomaly in this context. Nonetheless it offers attractive characteristics to contribute to this new environment (reflected in its Conservation Values).

The site's Conservation Values predominantly reflect its character of trees, the stand of woodland at Belmount, fields and hedgerows and as a rural or agricultural landscape with patterns of tree lines and hedgerows.

The impact of the development is the change of the site from open agricultural landscape to a new residential area. Locally some trees and hedgerows will be affected, however the new development has been laid out to incorporate many of these existing landscape '*green infrastructure'* features within its landscape structure of open spaces and networks. The semi-naturalised field on Academy Street would alter from being an inaccessible meadow to an accessible public park with meadow-like qualities (reduced in size). This would be located to the fore of three apartment blocks (and associated surface car parking) which are set back from Academy Street in keeping with Public open Space zoning. Belmount Woodland would be restored as a woodland garden but with public access. The scheme is responsive to landform, contours and field patterns.

The proposed development has been prepared in accordance with best practice national guidelines local guidance in the Meath County Development Plan and National Guidance – Urban Design Guide 2009 by the Department of Environment, Heritage and Local Government and the Design Manual for Urban Roads and Streets by the Department of Transport, Tourism and Sport. The site layout has been sensitive to the landscape elements of value on the site, incorporating them into the development, adding value to them and enhancing their role.

The effects of this in terms of alteration of the landscape character are assessed below:

Operational Effects on MCC LCA 5 – Boyne Valley.

The effects of the development at operation would relate to a very limited geographical extent of this LCA. The scheme in general complements the scale, landform and pattern of the landscape and townscape in most places and is also in keeping with policy objectives. Change is relatively limited in scale, resulting in minor alteration the landscape, and introduction of elements that that are characteristic of the context.

Immediately post-construction, the intensified residential use is likely to contrast with more established adjacent landscapes and townscape character. As the landscape proposals mature, the contrast between the scheme and its surroundings will reduce and the development will result in no change to the overall landscape character of LCA-5.

As such, in the short term, the Magnitude of Change relative to the whole character area is considered Low and the Significance is therefore Moderate-Slight. Qualitatively, the landscape effect is Adverse because although the change in the landscape achieves policy objectives, landscape quality has not yet been replaced. This would be marginally improved in the medium term but not to the extent to change the assessment.

In the long-term, the Magnitude of Change relative to the whole character area is considered Negligible and the Significance is therefore Slight-Not Significant. The scheme would be in keeping with its scale and context and therefore qualitatively is Neutral.

Operational Effects on the subject lands

The development would impact the full extent of the subject lands resulting in the loss of the majority of some landscape characteristics such as the agricultural lands and semi-natural meadow on Academy Street. The proposal would introduce residential development into the landscape which although will be may be new and initially potentially prominent from some viewpoints (see the visual assessment for detail), is not uncharacteristic of the area. The change achieves national Policy objectives and is in keeping with local zoning. Valuable characteristics of the landscape such as most of the existing trees in hedgerows and in Belmount Woodland – along with its presence in the landscape as a stand of trees, are retained.

In the short term, the Magnitude of Change is considered High to the subject lands resulting in a Significant effect. Qualitatively, the effect is Adverse. Although the scheme complements the scale, landform and pattern of the landscape and townscape in most places and will have some immediate benefits such as the restoration of Belmount Woodland, the change in the landscape has not yet wholly replaced the quality lost. In addition, surface carparking around the apartments on Academy Street and the new access roads detract from the perceived continuity of open space in Academy Park.

As the development becomes established and in the medium-term, this effect would improve to Neutral because of the mixture of beneficial and adverse effects remaining, which overall, although include some changes in characteristics, complement the general character and context of the townscape. These effects would continue into the long-term and are summarised below.

Beneficial effects are that:

- Academy Street will be improved to create a smart urban edge on one of town's key approach roads.
- Some existing valuable landscape features would be restored, and their role improved on (such as Belmount Woodland Garden)
- some parts of the proposed scheme would introduce more ecological diversity (the gardens and parks are likely to be more ecologically rich than fields containing a monoculture).
- Some parts of the landscape would change in character but would become more accessible to the public (the agricultural fields would become a network of streets, gardens and public open spaces and Academy Park would become an accessible public open space).

Adverse effects are that:

- Some ecological richness would be lost – for example the semi-natural field on Academy Street is likely to become ecologically less rich, despite the diversity of planting proposed.

9.7.4 Summary of Effects on the Landscape

The following table summarises the results of the assessment of the effects of the proposed development on the landscape resource.

Table 9.7 – Summary of Landscape Impacts

Landscape Character Area	Sensitivity	Significance, Term and Quality				
		Assessment Categories	Construction Phase – temporary effects	Operational Phase		
				Short-term effects (up to 7 years)	Medium-term effects (7-15 years)	Long term effects (15 years and beyond)
MCC LCA 5 – Boyne Valley	High	**Magnitude of Change**	Low	Low	Low	Negligible
		Significance of Effect	Moderate-Slight	Moderate-Slight	Moderate-Slight	Slight-Not Significant
		Qualitative Assessment	Adverse	Adverse	Adverse	Neutral
Subject Lands	Medium	**Magnitude of Change**	High	High	High	High

		Significance of Effect	Significant	Significant	Significant	Significant
		Qualitative Assessment	Adverse	Adverse	Neutral	Neutral

The proposed development is expected to have an adverse effect on the landscape resource during construction, despite the most valuable of the site's features being preserved. Over time, while the characteristics of the landscape will change significantly on the subject lands, the overall lasting landscape effect is expected to be Neutral, which is defined as a scheme that complements the scale and pattern of the landscape and maintains its quality. The scheme does have a few, localised adverse effects as described above, however, the long-lasting effects are predominantly beneficial associated with the positive;

- response to the existing contours, views and woodland blocks
- inclusion of more diverse and more accessible open spaces and makes more provision for active and passive recreation.
- correlation with future planning objectives for the area.

9.8 PREDICTED VISUAL EFFECTS (RESIDUAL IMPACTS)

Based on the assessment of the landscape characteristics, values and sensitivities, 15 representative viewpoints were selected to assess visual impact and effects. These are scheduled and mapped below. Existing photographs and proposed photomontages are provided by 3D Design Bureau.

Verified views were captured in early October 2019 when the trees were still mostly in leaf. The landscape architect's site survey was conducted in March 2019 when deciduous trees and shrubs were budding. As such, the description of existing views provided in this section reflects summer and winter scenarios.

The assessed viewpoints are shown on Figure 9.15 overleaf and are listed in Table 9.8.

Table 9.8 – Schedule of assessed visual receptors

Viewpoint	Description
IMMEDIATE ENVIRONS (viewpoints located under 250m from the site)	
VP A	NE Academy Street
VP B	Academy Street
VP C	Welcome to Navan sculpture / public open space
VP D	Academy Street / Dublin Road junction
VP E	Along Academy Street from the Dublin Road
VP F	Bus stop on the Dublin Road
VP G	St Martha's Bridge
VP H	Meath City Council Offices
VP I	Cul-de-sac on Limekiln Wood
VP J	Limekiln Wood
VP K	St. Columbus Crescent
VP L	Belmount House
SITE CONTEXT (viewpoints located between 250-400m from the site)	
VP M	Athlumney Castle Cemetery
VP N	Gate on Convent Road
VP O	Convent Lane in between residential properties.

Figure 9.15 – Map of Viewpoints

Visual effects are assessed initially in the Construction phase and thereafter in the Operational Phase. Effects are considered under the following headings:

- temporary effects (construction phase up to five years);
- short-term effects (operation phase up to seven years);
- medium-term effects (operation phase, seven to fifteen years) and
- long-term effects (operation phase, fifteen years and beyond).

Existing photographs and proposed photomontages at operation are provided by 3D Design Bureau using verified view methodology. Full A3 versions of the photographs are provided in the CGI Consultants booklet. These need to be printed out and viewed at arm's length to achieve a realistic impression of what the eye sees.

9.8.1 Construction Impacts and Effects on Visual Receptors

The construction phase is expected to be phased over five years, which will limit the extent of impact at any given time which is associated with construction.
There will be moderate negative impacts associated with the construction works over a phased basis for this development. This will be due to the substantial site clearance and building processes required to construct the proposed development. Effects visual receptors are tabulated in the representative viewpoints below, but by their

nature are predominantly adverse in nature, varying in magnitude and significance. All effects on visual receptors resulting from the construction stage are expected to last under five years and are all therefore considered temporary effects.

Table 9.9 – Summary of Visual Effects – Construction Stage

Viewpoint	Description	Sensitivity	Magnitude of Change	Significance, Quality & Longevity
Immediate Environs				
VP A	NE Academy Street	*Medium*	*Medium.* The works will create a partial intrusion in the view over site hoardings and the short-term change to its character and composition.	*Moderate* *Adverse,* *Temporary effect*
VP B	Academy Street	*Medium*	*High.* There will be an extensive intrusion of construction works through the middle distance of this view which is likely to obstruct views to the woodland and will alter the character of the view from one of rural qualities to one of a construction site.	*Significant,* *Adverse,* *Temporary effect.*
VP C	Welcome to Navan sculpture / public open space	*High*	*Medium.* Construction works will create a partial intrusion in the view which is not in keeping with its overall character. This will alter one or two elements in the view but overall will not change its composition.	*Significant,* *Adverse,* *Temporary effect.*
VP D	Academy Street / Dublin Road junction	*Medium*	*Medium.* The works will create a moderate intrusion not in keeping with the overall character of the view but will not alter the presence of existing valued features such as the Gateway sculpture. The change described is likely to be prominent, but development is planned and expected on this site and therefore is not uncharacteristic in context.	*Moderate* *Adverse,* *Temporary effect*
VP E	Along Academy Street from the Dublin Road	*High*	*Negligible.* Any intrusion is heavily screened and very minor and would not impact the key components of the view. or visual amenity.	*Slight-Not Significant, Adverse,* *Adverse,* *Temporary effect.*
VP F	Bus stop on the Dublin Road	*Medium*	*Medium.* Although the effects are prominent and moderate in extent, development is planned and is expected close to town centres and therefore not uncharacteristic in content.	*Moderate* *Adverse,* *Temporary effect.*
VP G	St Martha's Bridge	*Medium*	*Medium.* Construction works would be visible in a small part of the view through the trees in winter but mostly screened by trees in leaf otherwise. The intrusion into the view would be partial. Visual amenity would be retained.	*Moderate,* *Adverse,* *Temporary effect.*
VP H	Meath City Council Offices	*Low*	Construction works will create a minor intrusion into the view. The overall character of the view and level of amenity will remain unchanged.	*Not Significant,* *Adverse,* *Temporary effect.*
VP I	Cul-de-sac on Limekiln Wood	*Medium*	*Medium.* It is likely that views of construction works in the immediate vicinity will be available between the	*Moderate-Slight,* *Adverse,*

			houses over the existing perimeter vegetation.	*Temporary effect.*
VP J	Limekiln Wood	*High*	*Low.* Construction works will create a minor intrusion into the view. The overall character of the view and level of amenity will remain unchanged.	*Moderate-Slight,* *Adverse,* *Temporary effect.*
VP K	St. Columbus Crescent	*Low*	*Medium.* The works will result in a partial change and intrusion into the view and while the change is not in keeping with the characteristics of the site, would not detract from existing visual amenity.	*Slight,* *Adverse,* *Temporary effect.*
VP L	Belmount House	*High*	*Medium.* The soft-works would introduce activity and movement into the view, changing its character although not the extent of visual amenity.	*Significant,* *Adverse,* *Temporary effect.*
Site context				
VP M	Athlumney Castle Cemetery	*High*	*Negligible.* Construction impacts are limited in scale and would not change the greater visual amenity from this viewpoint.	*Slight-Not Significant,* *Adverse,* *Temporary effect.*
VP N	Gate on Convent Road	*Medium*	*Negligible.* Construction works would be barely discernible and there would be no change to overall visual amenity here.	*Not Significant,* *Adverse,* *Temporary effect.*
VP O	Convent Lane inbetween residential properties.	*High*	*Low.* Construction works would create a minor intrusion into the view on the horizon behind existing trees. Visual amenity would not change.	*Moderate-Slight,* *Adverse,* *Temporary effect.*

Descriptions of the existing views and a justification for the attribution of receptor sensitivity is provided in the visual effects at operation.

9.8.2 Operational Impacts and Effects on Visual Receptors

IMMEDIATE ENVIRONS

Viewpoint A: NE Academy Street

Existing view
This is a close-range view is from Academy Street looking south-west towards the site, which is approximately 15m away. The view is representative of views experienced by pathway and road users and people living and working in the properties on the north-side of the street.

Much of the foreground of this view is accommodated by Academy Street. The site and its boundaries occupy part of a central and of the view between the street and the sky. This band also includes part of Belmount Woodland to the far left hand side, the full extent of a large electricity substation left of centre, the site itself, which exists in the form of a steeply sloping bank of rough grass to the right of centre and a private property including a house its rear garden and outbuildings. The existing site boundary is a dilapidated limestone wall which is divided centrally with a graffitied, corrugated metal sheet which acts as a gateway. To the right-hand side of the gate, the wall is heavily overgrown with ivy. Above ground level, the sky is repeatedly punctuated with pylons and criss-crossed with wires leading from the sub-station.

Overall, this is view, while not unpleasant, has a mixed and incongruous character and contains several detractors.

The <u>Sensitivity of the Visual Receptor</u> is <u>Medium</u> reflecting the presence of residential receptors but also the susceptibility of the view to change.

Visual Impacts and Effects
The view would change to include the new road which would dissect the landform, leading the eye up the hill and inviting and facilitating access. A new parkland character will be adopted, which would be much smarter in appearance. Many of the overhead wires and pylons would have been removed from the view and there would be a generous panting belt alongside the substation all the way along its northern and eastern boundaries, screening it.

In the short-term, the Magnitude of Change in the view would be Medium due to the number of introduced landscape elements resulting in a Moderate significance. The effect would be Beneficial due to the enhancement of townscape character and visual quality experienced.

Over time, into the Medium and Long-term, the Magnitude of Change would be High due to the screening effect achieved by the proposed vegetation of the existing sub-station resulting in a Significant effect. The effect would remain as Beneficial.

Viewpoint B: Academy Street

Existing view
This is a close-range view is from Academy Street looking south towards the site, which is approximately 15m away. The view is representative of views experienced by pathway and road users and people living and working in the properties on the north-side of the street.

Academy Street and its pavements and the approximately 1.5m high limestone wall are present in the foreground of this view. The wall separates the street from the semi-natural grassland of the subject lands which stretch towards the treeline of Belmount Woodland. which includes a wide belt of mixed woodland and shrubs. The section of woodland located in the subject lands is present from the centre to the left-hand side of the view. The gable end of the property at the field head marks the change in site ownership.

Overall the outlook is of a pleasant, rural landscape which is surprising given its proximity to the town centre. The view to the south of Academy Street contrasts with the urbanised character of the street and properties on its the northern edge.

The Sensitivity of the Visual Receptor is Medium reflecting the scenic qualities of the view and its susceptibility to change.

Visual Impacts and Effects
The view would retain some of the sense of openness currently experienced in this view. The wooded backdrop would be hidden by the proposed apartments with a few tree tops visible over rooftops and extending to the left-hand side of the view. The horizon would remain unchanged. The most valuable components of the view would be retained. The new buildings would be a partial and prominent addition, introducing an element that while is in keeping with the context of the area and responds well to Academy Street's urban edge would change the character of this view.

In the short-term, the Magnitude of Change in the view would be Medium due to the prominent but complementary changes across a partial extent of the view resulting in a Moderate significance. The effect would be Neutral because although landscape and visual elements are changed, their quality is maintained.

Over time, into the Medium and Long-term, the quality of the effect would become Beneficial through the maintenance of an accessible, structured urban park providing good user and visual amenity. The maturing trees would screen and filter views towards the apartment blocks and create a strong sense of rhythm supporting the urban context of the view.

Viewpoint C: Welcome to Navan sculpture / public open space

Existing View
This is a close-range view is from within the Gateway space at the Academy Street / Dublin Road junction looking north towards Academy Street. The direction of the view is north-west towards the site which is approximately 55m away. The view is representative of views experienced by pathway users and those driving into Navan along Academy Street.

This view draws the eye north along the brick pedestrian path through the copse of deciduous trees towards Academy Street. Mown grass either side of the pathway is prominent in the foreground of the view. In the middle ground, an approximately 1.5m high capped limestone wall which runs along the south side of Academy Street signalling its importance as an approach to the town. High garden vegetation for screening is present to the left-hand side of the view which contrasts with the sense of openness and light from the grassland to the south of Academy Street which is part of the subject lands. Parts of Belmount woodland form the backdrop of the view around the edges of the grassland. It is possible to identify the electrical sub-station through the trees to the middle-right of this view. To the right-hand side of the view, there is a row of apartments, which further emphasise the form of the street. At present, the apartments are surrounded with hoarding which detracts from the view but should be a temporary treatment.

Overall the view is of a well-structured approach to Navan with some important urban characteristics, a strong network of trees and contrasting landscape treatments that create interest and change in the visual sequence.

The Sensitivity of the Visual Receptor is High reflecting the importance of the Gateway site and visual sequence when approaching Navan. The role the receptor has in outdoor recreational activities is also recognised.

Visual Impacts and Effects
Visual amenity and the key elements of this view would be retained (the existing mature trees, the wall, the gateway space). The view would include partial views of the three proposed apartment blocks which will be prominent and setback from the road to the left of the proposed Academy Park. The apartments block views towards Belmount Woodland. The apartments would accommodate a moderate portion of the view which although are new in this location, are in keeping with local characteristics and mirror relatively recent development on the opposite side of the road. The sense of openness currently created by the existing grassland will be partially retained and replicated through the delivery of Academy Park with its linear swathes of grasses. It would be possible to see parked cars to the fore of the apartments at particular times of day but these are not particularly prominent and are typical in the urban context of the view.

In the short-term, the Magnitude of Change in the view would be Medium due to the prominent but complementary changes across a partial extent of the view resulting in a Significant effect. The effect would be Neutral because although landscape and visual elements are changed and in general their quality is maintained, the proposed vegetation, at this stage is not yet mature.

In the medium to long-term, the Magnitude of Change in the view would be Medium due to the prominent but complementary changes across a partial extent of the view resulting in a Significant effect. The effect would be Neutral because the scheme compliments and strengthens the urban character of Academy Street

Over time, into the Medium and Long-term, the quality of the effect would remain as above.

Viewpoint D: Academy Street / Dublin Road junction

Existing View
This is a close-range view is from Academy Street / Dublin Road junction. within the Gateway space at the Academy Street / Dublin Road junction looking north towards Academy Street. The direction of the view is south-south-west towards the site which is approximately 65m away. The view is representative of views experienced by road pathway users and demonstrates the approaching Navan town centre.

This view overlooks the Dublin Road / Academy Street junction. The Gateway to Navan space is part of this important nodal space. The hoarding associated with the apartments on Dublin Road are visible to the right-hand side of the view. This is a detractor and reduces the quality of the view, but it is also a temporary measure and so will not affect the visual assessments below. The subject lands from the backdrop to the view. The grasslands gradually incline towards the edge of Belmount Woodland which creates a well-treed horizon. To the left-hand side of the Gateway sculpture, the trees and shrubs present are located in private gardens along the Dublin Road. Above these, the tops of hedgerow teres located on the subject lands are visible on the horizon.

Overall the view is of an open and inviting approach to Navan with some important urban characteristics, a strong network of trees and contrasting landscape treatments that create interest and change in the visual sequence.

The Sensitivity of the Visual Receptor is Medium. The scenic qualities here combine to create a gateway space into Navan. This view is not designated but overlooks a designated space. Most people experiencing this view will be travelling by foot or by vehicle.

Visual Impacts and Effects
The proposed entrance to the development would be visible in the middle distance on the right-hand side of the view. The access would snake from this point left towards the treeline and would be partially screened by the retained existing wall. The entrance to the development would also be the entrance to the park and there will be an increased sense of openness and green connectivity around the Gateway space. The southernmost apartment would be prominent against the treetops of Belmount Woodland. The proposed park would be visible to the fore of the apartment block. Parked cars would also be visible in this view. This change would have an urban character, which contrasts to the existing setting of this part of the development but in keeping with the townscape along Academy Street at this point.

In the short-term, the Magnitude of Change in the view would be Medium due to the prominent but complementary changes across a partial extent of the view resulting in a Moderate effect. Initially the effect would be Adverse due to visibility of parked cars and the lack of established screening. Over time, in the medium and long term, as proposed vegetation becomes more established, the quality of the effect would become Neutral and then Beneficial as vegetation matures to screen parked cars.

Viewpoint E: Along Academy Street from the Dublin Road

Existing View
This view is from the pavement flanking the southern bank of the River Boyne on the Dublin Road looking along Academy Street. The direction of the view is north-west along Academy Street and towards the site which is approximately 68m away. The view is representative of views experienced by all road and pathway users. The pathway itself is wide and tree-lined designed to encourage pedestrian use. The view is aligned to the Gateway sculpture which is a designated gateway site.

This view north along the Dublin Road has Navan's gateway space includes its distinctive sculpture and a prominent copse of trees in the middle-right hand side of the view. The apartments on Dublin Road – still under construction are prominent behind the sculpture. Academy Street is visible to the left of the copse and the vista along it is aligned with St. Mary's Church – which is particularly visible in winter. Together these urban features create a strong sense of arrival to the town. In summer, this view has a high presence of deciduous trees which flank the River Boyne to the right-hand side of the view, break up and signal the gateway space right of the centre and are present in gardens and open spaces along the south side of Dublin Road and Academy Street. There is a wall that runs along much of the south-side of Academy Street which is more visible in winter and is a strong linear form that leads the eye along the street. The subject lands are located to the left of the wall.

Overall this view is an of attractive approach towards Navan town containing some strong urban elements and a good network of trees.

The Sensitivity of the Visual Receptor is High reflecting the importance of the Gateway site and visual sequence when approaching Navan. The role the receptor has in outdoor recreational activities is also recognised.

Visual Impacts and Effects
The view from this point would remain almost the same in summer months. In winter, the apartments are likely to be visible through the branches of bare trees but these are well-set back from the vista towards St Mary's Church. Therefore, the development would have a barely discernible intrusion into the view from this viewpoint.

In the short-term, the Magnitude of Change in the view is Negligible resulting in a Slight-Not Significant effect. The effect would be Neutral due to the minimal change to this view. Over time (into the medium and long term), the effect would remain the same.

Viewpoint F: Bus stop on the Dublin Road

Existing View

This is a close-range view is from the bus-stop on the north side of the Dublin Road. The direction of the view is South-west-west towards the site approximately 25m away. The view is representative of views experienced by all road users and people waiting to catch a bus.

The Dublin Road accommodates approximately half of the direct view towards the subject lands, which can be heavily trafficked. The presence of traffic would limit views towards the site. Views towards the site include the mature woodland of Knockboyne House which forms the southern site boundary. The mature hedgerows and trees lead the eye up the slope, along the edge of a narrow field to the brow of the hill, which forms a small proportion of the horizon to the top-third of the view. To the right of the field is a detached bungalow which marks the start of a series of individual residential properties located along the Dublin Road. The facades of the existing homes are painted / rendered in white which stands out from surrounding vegetation. Garden vegetation surrounds the properties helping to screen the existing site. Hedgerow trees visible to the rear of the homes form the horizon to the right-hand side of the view. Telegraph poles and wires and aerials cross the view in the mid-ground.

Overall this view includes a mixture of urban and rural qualities – the most impressive of the latter are the mature trees on and adjacent to the site. The view forms an attractive backdrop to the Dublin Road.

The Sensitivity of the Visual Receptor is Medium reflecting that people waiting at the bus stop, although stationary, are primarily engaged in travelling and the view acts as an attractive back-drop to that activity. However, people taking the riverside walk for recreational purposes would experience this view.

Visual Impacts & Effects
The view will include a detached property located perpendicular to the view and built into the hillside. This partial but prominent addition to the view breaks the horizon line and limits mid-range views towards the brow of the existing escarpment. The position of the house, being set back from the road mimics existing characteristics of development along the Dublin Road. The gable end includes four windows which creates a positive relationship with human scale. The houses will be built in a warm brick with a pale render on rear facades. Brick and render have been used in other properties along the Dublin Road however the scale and proportion of the proposed house contrasts with properties immediately adjacent to the site boundary. That said, there is a great degree of variance in property size, scale, form and style along the Dublin Road.

Stepped access to the Dublin Road and carparking for the properties is provided to the left-hand side of the houses, along the site boundary adding a prominent new, engineered structure into the view. Over time, this will be softened by proposed vegetation. Although existing trees to the left-hand side of the view are retained and there are proposed trees to be planted along the Dublin Road, this view will become more suburban and engineered in character. Despite this, the new elements introduced are prominent but are not substantially uncharacteristic in the context of an expanding town.

In the short-term, the Magnitude of Change in the view is Medium resulting in a Moderate effect. The effects are considered Adverse due to the variance issues raised above, the incongruous design of the steps and diminished quality of the landscape. In the Medium term, shrub vegetation would be established enough to provide a screening effect and therefore the quality of the view would improve to Neutral. Characteristics would have changed across a partial extent of the view, but changes are complimentary to the context of the view. In the Long-term, as vegetation becomes established and the scheme ages, the degree of contrast with the immediate vicinity of the site would be reduced. The quality of the effect remains Neutral.

Viewpoint G: St Martha's Bridge

Existing View
This view is from the northern side of St Martha's bridge looking down the River Boyne towards Navan. The direction of the view is north-west towards the site 130m away. The view is representative of views experienced by all road users.

The foreground of this view is largely accommodated by the River Boyne, which is wide and deep at this point and sweeps towards the centre right of the view towards Navan town centre – the presence of which is indicated by the 5 storey apartments on the Dublin Road. The Dublin Road flanks the southern bank of the river on the left-hand side of the view. It can be glimpsed though the trees in winter but in summer is identifiable by the presence of traffic, signage and lighting. Properties along the Dublin Road are similarly more visible in winter. White rendered treatments stand out visually from the vegetated backdrop which is partially formed by Belmount woodland and hedgerow trees located on the site.

Overall this peri-urban view is pleasant and interesting with the river being a key focal point within it.

The Sensitivity of the Visual Receptor is Medium reflecting the fact that people travelling through or past the landscape might appreciate the view but are not usually focussed on it although it is a scenic view.

Visual Impacts & Effects
The gap in the trees would open up towards ‘South Park a proposed pocket park. New homes would be visible through existing retained hedgerow trees within the site and around its edges much more so in winter almost forming a second tier of development flanking the existing homes along the Dublin Road. The materials and proportions of the buildings are at a slight variance to those along the Dublin Road and there would clearly be a white rendered stripe of older properties and a red-brick stripe of new properties. However, these observations are not out of character with a developing town and reflect changing living standards. In addition, there are some brick-built buildings in the vicinity including the new apartments on the Dublin Road / Academy street junction which are visible to the right of the view. The proposed homes would, in winter form parts of the horizon to the left of the view. In winter the development would be partial and prominent intrusion into a small part of the central populated and urbanised part of the view. In summer they would be barely visible.

There will be a slight change to the tree line of Belmount Woodlands following the removal of a small number of selected trees. Overall, the predicted change to this view is barely discernible in summer and would not affect the overall visual amenity, focus on the river or general character.

In the short-term, the Magnitude of Change in the view is Low resulting in a Slight effect. The effects are considered Adverse representing the new intrusions into the horizon and the lack of established proposed vegetation. In the Medium term, the effect would remain the same. In the Long-term, the effect would improve to Neutral as proposed vegetation becomes more established close to the proposed buildings, better integrating it into its surroundings.

Viewpoint H: Meath County Council Offices

Existing View
This view is from the westernmost point of the Meath County Council office carpark. The direction of the view is west towards the site 250m away. The view is representative of views from the NW side of the civic building.

A variety of landscape types are present in this view. The rough grassland and scrub, managed grassland (separated from the scrub by a low post wire mesh fence) immediately adjacent to the Council offices and St Martha’s Bridge (and associated infrastructure, lighting and traffic) accommodate the fore and mid-ground of the view (and stand out more in winter). The mid-ground is broken up with scrub and clipped shrubs. The woodland of Knockboyne House is present in the centre of the view between the bridge and the horizon, which is wooded. Glimpses of the fields of the subject lands can be seen through woodland. The hedges on the site preventing more distant views and hedgerow trees creating a sense of perspective and distance. The trees of Belmount Woodland form a small section of the horizon to the right-hand side of the view.

Overall the view is varied, and while still predominantly green, represents a place that is becoming urbanised between and around important semi-natural vegetation.

The Sensitivity of the Visual Receptor is Low reflecting the fact that people experiencing this view are generally not involved in activities primarily focussed on the landscape.

Visual Impacts & Effects
A very small portion of the central part of this view will change in the middle to far distance to include a small number of new homes, replacing existing fields. The new buildings will be visible through gaps in existing established woodland and trees and over the top of some hedgerows changing the horizon in a very small part of the view but replacing a longer distance view across fields and an established hedgerow. The effect of this change will introduce more urban development into the view limiting the sense of distance currently created by the presence of the existing fields and fore-shortening the view. The new elements introduced are noticeable but are not substantially uncharacteristic in the context.

In the short-term, the Magnitude of Change in the view is Low resulting in a Not Significant effect. The effect is Adverse until vegetation planted within the scheme becomes established, which will better integrate the development into the surrounding area. From this distance, established vegetation would not fulfil this role until approximately year 15 after planting and therefore effects will remain the same in the short and medium term, improving to Neutral in the long term.

Viewpoint I: Cul-de-sac on Limekiln Wood

Existing View
This is a close-range view is from Limekiln Wood looking north-east towards the site, which is approximately 15m away. The view is representative of views from the rear of properties overlooking the site.

The properties along Limekiln Wood would offer views across the site over the top of existing boundary finishes and the perimeter hedgerow which is visible between the houses in this view. The backdrop of the existing view is likely to include part so the existing fields with Belmount Woodland forming a feature within the view. It is likely that existing landform and trees would prevent views into the valley bottom. Some longer distance views may be available from upper storeys.

Overall, the view from these properties would be of worked farmland with offering with an open, rural quality.

The receptor is immediately adjacent to lands that are a high priority for zoned development and therefore the receptors are highly susceptible to change of this type.

The Sensitivity of the Visual Receptor is Medium reflecting the views from the upper storeys of residential receptors and the amenity of people using the street and front gardens in close-proximity existing cul-de-sacs.

Visual Impacts & Effects
Views experienced from the rear elevations of all properties along Limekiln Wood which would change from a view over open fields to a view towards houses and rear gardens. These views would be filtered initially by existing garden and boundary vegetation. Views experienced from the street would change to include new buildings, reducing the amount of sky and vegetation visible.

The view from the cul-de-sac would become more far-reaching. The existing vegetated fence would be replaced with a (lower) 2m high rendered wall. Beyond this, it would be possible to see the proposed houses almost mirroring the cul-de-sac within the development. The fronts of the proposed houses, visible from this particular viewpoint would be perceived as a continuation of the existing development line.

In the short-term, the Magnitude of Change in the view is Medium resulting in a Moderate effect. The nature of the proposed change is in keeping with the context of the receptor. However, the loss of and change to the fields, which is a key characteristic of a proportion of the views experienced from the representative homes would a negative effect. It worth noting that this change is unlikely to be perceived from rear gardens backing onto proposed rear gardens except thought the loss of some boundary vegetation within the development site. The effect is initially Adverse.

In the medium term and long term, as proposed boundary and garden vegetation becomes established, views from gardens would be somewhat restored and the contrast between the existing and new development would have been softened. Despite this, the loss of openness and visual amenity from the rear properties is considered a negative effect of development. Therefore the ongoing effect remains as Adverse.

Viewpoint J: Limekiln Wood

This is a close-range view is from a residential street on Limekiln Wood looking north-east towards the site, which is approximately 90m away. The view is representative of views from the front elevations of existing properties and represents the visual amenity of people using local streets and public open spaces.

The presence of a grassed pubic open space with several maturing deciduous trees accommodates much of the foreground of this view. A row of smart looking semi-detached and terraced properties overlook the green. These are finished in brick and render and have slate roofs. Existing vegetation on the site boundary is visible over the roof tops and between the houses.

Overall, the view is one of an intact suburban residential character with partial glimpses of hedgerows between buildings.

The Sensitivity of the Visual Receptor is High reflecting everyday experience of the views and lack of susceptibility to change.

Visual Impacts and Effects
At operation, the view would stay the same except for the partial introduction of new rooftops and gables which are likely to be visible through the gaps between houses over the existing retained boundary vegetation. This will complement the pattern and character of the existing townscape visible from this receptor. As the development matures, there will be no real change to the elements visible in this view.

In the short-term, the Magnitude of Change in the view is Low resulting in a Moderate-Slight effect. The effects are considered Neutral. The effect would remain the same through the Medium and Long term.

Viewpoint K: St. Columbus Crescent

This view is from St Columbus Crescent opposite the Gaelscoil Éanna Fortnite looking north-east towards the site, which is approximately 130m away. The view is representative of views experienced as a backdrop to daily trips made by road and on foot.

The view is of a residential, suburban setting with existing trees located on the subject lands forming the backdrop of the view over a 1.8m high boundary fence and wall located centrally in the middle distance of the view. St Columbus Crescent is a residential street typical of the age of surrounding development with grass verges, narrow pedestrian paths and rendered concrete boundary walls and building facades. A higher boundary wall and a lower section topped with steel vertical bar railings forms the boundary of the school with a row of semi-mature deciduous trees planting inside it. A single mature tree to the left side of the view is a prominent feature in the near distance. Towards the subject lands, the wooded backdrop varied in canopy height and species and contains several overhead power cables and pylons.

The Sensitivity of the Visual Receptor is Low

Visual Impacts and Effects
One or two new properties would be visible behind the existing boundary treatment and through existing trees. Mature hedgerow vegetation and trees would be retained creating an immediate screening effect. It would be possible to see more of the buildings in winter than in summer. The effect of this partial change would be to extend the existing landscape / townscape treatments which although is keeping with the surrounding character and context would have a slight foreshortening effect on the view.

In the short-term, the Magnitude of Change in the view is Low resulting in a Not Significant effect. The effects are considered Neutral. Although vegetation planted close to the proposed buildings would become more established over time improving on screening, the qualitative effect would remain the same through the Medium and Long term.

Viewpoint L: Belmount House

Existing view
This is a close-range view is from Belmount House south-east through and towards Belmount Woodland. The photograph is taken from the site boundary. The view is representative of views from this façade of Belmount House and was selected in absence of permission to access the private property.

The view looks over a clearing in the trees located to the south-east of Belmount Woods. The clearing is surrounded on all other sides by woodland. To the right and rear of the viewpoint is the entrance to Belmount House. The woodland does not appear to have been managed and there is no visual evidence of the historic woodland garden in this view. The view would be visible from the windows on this facade.

Overall, this view is of a still, pleasant wooded landscape with a sense of tranquillity and timelessness.

The Sensitivity of the Visual Receptor is High reflecting the views from a historical residential receptor.

Visual Impacts and Effects
The view south from the house would change to include a more manicured woodland garden with attractive planting, soft level changes, lawns and a formal looking railing along the site boundary (not shown on the montages). The landscape would be accessible and would be used by the general public so there would be more people and more movement present in the view. This change would not affect overall visual amenity and the fundamental aspects of the view would stay the same. However, the making of a public park, the introduction of the railing and other parkland elements would change the sense of privacy and create more colour, activity and interest in the view. There would be a loss of a sense of wilderness.

In the short-term, the Magnitude of Change in the view is Low resulting in a Moderate-Slight effect. The effects are considered Adverse initially until proposed vegetation, in particular proposed boundary vegetation, which will have a screening effect, becomes established.

In the medium term, within two or three years, the proposal will complement the character of its setting and the effect will be Neutral. In the long term, the establishment of the vegetation will soften the contrast between public / private new / old and new although there will be no material change in the main elements in the view. As such, the assessment of effects remains Neutral.

Viewpoint M: View SW from Athlumney Castle Cemetery

Existing View
This view is from Athlumney Castle Cemetery, from the SW wall overlooking the valley. The direction of the view is south west towards the site 290m away. Athlumney Castle Cemetery is in an area designated as High Amenity and is used a public open space.

The view includes grazed fields interspersed with bushy hedgerows and the occasional hedgerow trees in the fore and middle ground. The apartments opposite the site on Academy Street are discernible through mature trees in winter. The wooded backdrop forming the horizon to the right and left of the apartments is formed by Belmont Woodland. To the left-hand side of the view, the electrical sub-station is visible over the hedgerows of the Boyne and to the fore of the properties on Woodlands.

Overall the view is of a pleasant, rural landscape with limited intrusion of recent urbanisation in the area.

The Sensitivity of the Visual Receptor is High reflecting its recognition in Policy and viewpoint from a locally valued place for recreation.

Visual Impacts & Effects
The proposed development would be barely noticeable from this viewpoint. The side elevations of proposed apartments and homes on School Hill would be visible to the right of existing vegetation, to the right in the middle-far distance. It is possible that in winter, more of the proposed buildings would also be visible. Together, these introductions into the view accommodate a very small part of it and have no impact on overall visual amenity or character.

In the short-term, the Magnitude of Change in the view is Negligible resulting in a Slight-Not Significant effect. The effects are considered Neutral because the change compliments the character of an expanding town and is keeping with its surrounding pattern, scale and landform. Over time, it is likely that vegetation in the foreground of the view could grown to provide a further screening effect, but this is not certain. As such, the effect described above continues into the medium and long term.

Viewpoint N: View SW from gate on Convent Road

Existing View
This view is from a farm gate adjacent on Convent Road, which at this point is an access lane only. The direction of the view is south west towards the site 287m away. The view from the gate is representative of views experienced by road / track users and from the front upper storeys of '*Athlumney Castle'*, which is a local road in the Athlumney Abbey Estate. This viewpoint was selected to represent the residential views due to ground level screening in place at the roadside along Athlumney Castle.

The view offers a predominantly rural outlook with grazed fields, hedgerows and farm gates and fencing in the foreground. A line of trees and shrubs along the sloping sides of the Boyne River Valley and in adjacent gardens to the north-west and wouth-east of the River form the backdrop of the view. To the left-hand side of the view, the vegetation forming the horizon is part of the eastern boundary of the subject lands. The canopies of trees in Belmount woodland are visible in the backdrop of the central part of this view. The presence of the non-native conifers in the woodland suggests the presence of a sizeable residential property. Glimpses of properties located along the Dublin Road and Academy Street are visible through the trees in summer and winter to the right-hand side of the view marking Navan's urban edges.

Overall the view is of a pleasant, predominantly rural landscape with very limited intrusion of recent urbanisation in the area.

The Sensitivity of the Visual Receptor is Medium reflecting the fact that the receptor is representative of visual amenity from a suburban house.

Visual Impacts & Effects
The proposal is barely discernible in summer with a very small area of the development being visible through a gap in the existing trees to the right of the treeline. In winter it is possible that more of the development would be visible through the trees, but due to the generous tree cover between the receptor and the developer, a good level of screening will still be achieved. Should the development be visible, it would be viewed as part of an expanding tow, as indeed the residential area captured here is. The horizon will remain as existing.

In the short-term, the Magnitude of Change in the view is Negligible resulting in a Not Significant effect. The effects are considered Neutral. This effect will continue through the Medium and Long term.

Viewpoint O: Convent Lane in-between residential properties.

Existing View
This view is from a point near the end of Convent Road near Riverview House. The direction of the view is west towards the site 200m away. The view is representative of daily visual amenity of two nearby properties, which are both well vegetated around their front gardens with an oblique location relative to the site. Potential views from upper storeys is also represented here.

The foreground of this view is largely taken up with a grazed field sloping towards the busy Dublin Road which dissects the view horizontally and brings movement, lighting and traffic into it. The Boyne River located just to the fore of the Dublin Road is not visible and is discernible only from the riparian vegetation on its steeply sloping banks. Woodland blocks associated with residential properties are present centrally in the view. Belmount Woodland forms the horizon across much of this view with some of the most distinctive trees in it (the mature Beeches and Pines) are identifiable. Some properties adjacent to the Dublin Road are clearly visible from this view, and those with white rendered facades stand out against the mixed, vegetated mid-ground of the view which includes formal boundary hedges, bushy native hedges, large, clipped shrubs and small areas of the fields associated with the subject land that slope to the Dublin Road.

Overall the view is of a pleasant, predominantly rural landscape with a discernible intrusion of urbanisation through the presence of the Dublin Road and properties located adjacent to it.

The Sensitivity of the Visual Receptor is High reflecting the fact that the viewpoint is representative of views experienced from houses looking over the valley.

Visual Impacts & Effects
New duplexes and houses located on the brow of the hill will introduce new built form into the view to the left of Belmount Wood intruding into the view to a minor extent. The proposed buildings will be visible through and between existing trees and vegetation which will continue to form parts of the horizon in places. Proposed trees located near the buildings and along proposed streets serve to integrate the buildings into their surroundings, but this effect will not be perceived until the trees are established. The nature of the change described is in keeping with the characteristics of the area and those of an expanding town.

In the short-term, the Magnitude of Change in the view is Low resulting in a Moderate-Slight effect. The effects are considered Adverse because although the change compliments the character of an expanding town, until proposed vegetation becomes established, it will contrast with its surroundings. Over time, proposed vegetation will help to to integrate the development into its surroundings and the effect will improve to Neutral in the medium and long term.

9.8.3 Summary of Visual Effects

Table 9.10 – Summary of Visual Assessment

No.	Location	Sensitivity	Degree of Change	Significance, Term and Quality		
				Short	**Medium**	**Long**
Immediate Environs						
VP A	NE Academy Street	*Medium*	*Medium*	*Moderate, Beneficial*	*Significant, Beneficial*	
VP B	Academy Street	*Medium*	*Medium*	*Moderate, Neutral*	*Moderate, Beneficial*	
VP C	Welcome to Navan sculpture / public open space	*High*	*Medium*	*Significant, Beneficial*		
VP D	Academy Street / Dublin Road junction	*Medium*	*Medium*	*Moderate, Adverse*	*Moderate, Neutral-Beneficial*	
VP E	Along Academy Street from the Dublin Road	*High*	*Negligible*	*Slight-Not Significant, Neutral*		
VP F	Bus stop on the Dublin Road	*Medium*	*Medium*	*Moderate, Neutral*		
VP G	St Martha's Bridge	*Medium*	*Low*	*Slight, Adverse*		*Slight, Neutral*
VP H	Meath City Council Offices	*Low*	*Low*	*Not Significant, Adverse*		*Not Significant, Neutral*
VP I	Cul-de-sac on Limekiln Wood	*Medium*	*Medium*	*Moderate, Adverse*		
VP J	Limekiln Wood	*High*	*Low*	*Moderate-Slight, Neutral*		
VP K	St. Columbus Crescent	*Low*	*Low*	*Not Significant, Neutral*		
VP L	Belmount House	*High*	*Low*	*Moderate-Slight, Adverse*	*Moderate-Slight, Neutral*	
Site Context / Middle distance						
VP M	Athlumney Castle Cemetery	*High*	*Negligible*	*Slight-Not Significant, Neutral*		
VP N	Gate on Convent Road	*Medium*	*Negligible*	*Not Significant, Neutral*		
VP O	Convent Lane inbetween residential properties.	*High*	Low	*Moderate-Slight, Adverse*	*Moderate-Slight, Neutral*	

Summary

Close proximity views from Academy Street will change substantially to include the three proposed apartment blocks with Academy Park to the fore. These changes respond positively to development planning and are in keeping with the characteristics of an expanding town and have been generally assessed as beneficial. Landscape features are retained such as the extent of Belmount Woodland and the its presence on the horizon. The sense of openness created by the existing semi-natural grassland on Academy Street is replicated through the proposed location of Academy Park, which incorporates elements of semi-natural grassland are incorporated into its design. That said, the assessment has found that the continuity of the park and sense of openness could be improved by reducing the presence of carparking to the fore of the apartment blocks and increasing the distance between the main access to the development and the secondary access to the apartments.

The effect on views from Belmount House will be complimentary to its character and will introduce more movement and interest into the view -albeit by reducing the sense of wilderness currently experienced.

The vast majority of views available from receptors located to the north, south and west of the site are from the rear elevations of properties. These views will be partially screened by existing boundary walls and garden vegetation. The proposal is for backs of gardens to mirror backs of gardens therefore proposed garden vegetation will add to this screening effect and the proposal extends existing townscape character. However, people experiencing this view from cul-de-sacs or from upper stories of existing homes will experience a reduced sense of openness and an adverse change in the character of the view.

Middle distance views of the site from Athlumney Cemetery and the detached proprieties along Convent Road are not expected to alter significantly and have been mitigated by the proposed planting within the scheme.

9.9 MONITORING

9.9.1 Construction Phase

Landscape tender drawings and specifications will be produced to ensure that the landscape work is implemented in accordance with best practice. This document will include tree work procedures, soil handling, planting and maintenance. The contract works will be supervised by a suitably qualified landscape architect.

The planting works will be undertaken in the next available planting season after completion of the main civil engineering and building work.

9.9.2 Operational Phase

This will consist of weed control, replacement planting, pruning etc. All landscape works will be in an establishment phase for the initial three years from planting. The company responsible for site management of the scheme will be responsible for the ongoing maintenance of the site after this three-year period is complete.

9.10 REINSTATEMENT

The proposed landscape development works in the form of tree and shrub planting will be used to re-instate the site, post-construction. These works will be carried out by an appointed landscape contractor and will be supervised by a suitably qualified landscape architect or manager.

9.11 DIFFICULTIES ENCOUNTERED IN COMPILING

It was not possible to seek permission to photograph the site from Belmount House itself therefore viewpoint (L) represents views from this receptor.

9.12 CONCLUSION

This LVIA has assessed the impact of the proposed residential development at the application site on Academy Street, Navan, County Meath. The subject lands are zoned for housing and the proposed application meets that need. A high-quality proposal has been submitted that adheres to local planning policy and has been developed with the aim of the provision of an excellent place to live. The design process has incorporated into it a number of mitigative measures (see section 9.6) that have contributed towards the positive conclusions reached within the assessments included in sections 9.7and 9.8.

The predicted landscape effects on both Meath County Council's Landscape Character Area 5 (Boyne Valley") and the subject lands themselves have been assessed as 'Neutral' at operation in the long-term once the landscape proposals have matured. See section 9.7.49.7.4 for a summary table of the predicted landscape effects.

Visual effects on the 15 views identified for assessment led to the following conclusions;

- The are no views of the development site from Athlumney Castle.
- The Protected Stand of Trees at Belmount House will remain as a woodland block and a visual feature in the landscape even though select trees from within the woodland will be lost and replaced to build the proposed access road.
- Three views, all located along Academy Street, will receive a long-term beneficial effect
- Nine views will receive a long-term Neutral impact
- One close-proximity receptor, representing the changing views from properties flanking the south-west and south-east will receive a long-term Adverse effect of a Moderate significance and is associated with a loss of openness experienced from adjacent properties once the fields within the subject lands are developed. It should be noted that this assessment has taken account of susceptibility to change, which is high for this particular receptor given its proximity to zoned lands which are recognised in Policy as a high priority for development.
- The proposed development is in keeping with its zoning status and the emerging trends of development proposed in the vicinity.

10.0 TRAFFIC AND TRANSPORTATION

10.1 INTRODUCTION

This chapter of the EIAR assesses the likely effects of the proposed development in terms of vehicular, pedestrian and cycle access during the construction and operational phases of the proposed development.

This Chapter of the EIAR has been prepared by the following:

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Chartered Engineer

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 remedial or reductive measures required to prevent, reduce or offset any significant adverse effects.

10.2 BACKGROUND

As part of the SHD process numerous meetings, both statutory (Section 247) and non-statutory, where held with the Senior Executive Engineer, Transportation of Meath County Council in addition to the formal Pre-Planning Meeting with An Bord Pleanala.

A summary of Point 7 An Bord Pleanàla on the pre-planning submission in so far as they relate to traffic and transportation are outlined below:

1. Trip generation;
2. Impact on junctions;
3. Car parking

10.2.1 Trip Generation

The Local Authority deemed that the trip rates from the apartment element of the proposed development were too low and should be more in line with the trip rates associated with the houses.

A full review was undertaken of the apartment trip rates. To that end, TRICS was interrogated to determine the total peak hour trip rate (the sum of the arrivals/departures for the AM peak and PM Peak) that would produce the largest trip rate to/from the development. The sites selected for these calculations include sites in Dundalk and Drogheda.

These trip rates were used to calculate the number of trips to/from the apartments/duplexs within the development. This is illustrated in Section 4.3 of this report.

In addition to the apartment trip rates, the Local Authority had concerns relating to the number of trips to/from the proposed school site. At the time of the Pre-Planning Meeting with An Bord Pleanala little was known about the school site.

Since the Pre-Planning Meeting, the Department of Education has provided clarity on its future use. Using statics from the CSO and the Department of Education a more robust approach to determine the number of internal and external trips to/from the school site has been established. This is illustrated in Section 4.4 of this report.

10.2.2 Impact on junctions

The Local Authority expressed concerns regarding the impact that the proposed development would have on the Academy Street/R147 Dublin Road priority-controlled junction. Anecdotally, the Local Authority had concerns that vehicles on Academy Street wishing to turn right currently experience difficulties in doing so and that this would be further exacerbated upon completion of the development.

It is noted from Local Authority's opinion that the priority-controlled junction, as modelled, operates within capacity with the proposed development included but anecdotally some drivers wishing to turn right may find it difficult to do so resulting in queuing and delays.

The Applicant acknowledges this but notes that this is a pre-existing condition and one which would be experienced at similar junctions throughout the county.

In order to mitigate the pre-existing condition and to facilitate the bus gate proposed in the Meath County Development Plan 2013-2019 for the benefit of Navan, the Applicant is proposing to upgrade the Academy Street/Dublin Road priority-controlled junction to a signal-controlled junction.

Refer to the attached Cronin Sutton Consulting Engineers drawing for a general arrangement of the proposed upgraded junction.

Given that the Applicant will incur costs in constructing common infrastructure and/or infrastructure that will be of benefit to others i.e. bus gate, the Applicant will enter a separate consultation with Meath County Council to agree a method of calculation whereby the costs determined can be set off against Development Contribution Levies payable by the Applicant under the Planning Permission. All particulars pertaining to this method of calculation and methodology for levy offset will form part of a Legal Agreement between Meath County Council and the Applicant.

10.2.3 Car Parking

Using current practice, as outlined in Design Standards for New Apartments - Guidelines for Planning Authorities (March 2018), the Applicant has sought to reduce the level of surface car parking for the apartment block that fronts Academy Street.

The Local Authority fear that this may lead to illegal or inconvenient parking taking place within the development or the overspill in to surrounding residential areas.

Aside from the enforcement issues that the Applicant has no control over once development roads have been taken in charge, they have sought to provide a particle and sustainable level of parking.

No consensus was reached between the Applicant and the Local Authority on this matter, but the Applicant is satisfied that the quantum of car parking provided, along with the mitigation measures offered, is sufficient to offer a long-term sustainable level of parking for residents.

The rational for the car parking strategy refer to the Traffic and Transport Assessment.

10.3 METHODOLOGY

The approach to this assessment accords with policy and guidance both at a national and local level. Accordingly, the adopted methodology responds to best practices, current and emerging guidance, exemplified by a series of publications, all of which advocate this method of analysis. The following methodology has been adopted for this assessment:

- Environmental Protection Agency (EPA) Guidelines on the information to be contained in the EIAR;
- Transport Infrastructure Ireland (TII) (Formerly National Roads Authority) Traffic and Transportation Assessment Guidelines.
- Traffic and Transport Assessment Guidelines' (May 2014) National Road Authority;
- 'Traffic Management Guidelines' Dublin Transportation Office & Department of the Environment and Local Government (May 2003);
- 'Guidelines for Traffic Impact Assessments' The Institution of Highways and Transportation;
- Meath County Development Plan 2013-2019;
- Review of relevant available information including where available Development Plans, 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 Meath County Council (MCC) Roads Department to agree the site access arrangements and determine the scope of the traffic analysis required to accompany a planning application;

- Detailed estimation of the transport demand that will be generated by the development. The morning and evening peak times will be addressed as well as an estimation of the construction stage traffic; and
- Assessment of the percentage impact of traffic on local junctions, car parking requirements and accessibility of the site by sustainable modes including walking, cycling and public transport.

10.4 RECEIVING ENVIRONMENT

This section considers the baseline conditions, providing background information for the site in order to determine the significance of any traffic implications. This section also considers the existing accessibility of the site by sustainable modes of transport.

10.4.1 Site location

The application site is located within Meath County Council approximately 900m south of Navan Town Centre, immediately west of the Boyne River. The site is bounded to the north by Academy Street; the R147 Dublin Road to the west; and residential developments to the south and east.

10.4.2 Local road network

The road network surrounding the site provides a variety of movement functions. Academy Street provides access to Navan town centre. The R147 Dublin Road provides access to Dublin via the M3 motorway. Academy street is the primary access point which then links to the R147 Dublin Road. These routes provide for pedestrians, cyclists and motorists alike and a general commentary on these facilities is presented below:

Academy Street

Academy Street is a local street forming a priority-controlled junction with the R147 Dublin Road to the east and the R161 Circular Street to the west. The carriageway width is approximately 8.0m along the site frontage along Academy Street with footpaths of various widths on each side. Academy Street has a local road character providing access to local businesses and housing. Local business in the vicinity of the entrance include office, retail and commercial premises. A speed limit of 50km/h was noted on Academy Street along the site frontage. No cycle facilities were noted along Academy Street. Academy Street is within walking distance to the local bus stop for bus routes including the 109,109A, 134, 136 and 179 with good pedestrian facilities that the proposed development can tie into.

R147 Dublin Road

The R147 Dublin Road is a road that links the M3 motorway to the east to Navan town. The carriageway width is approximately 12.0m along the site frontage with footpaths and verges of various widths on each side. A speed limit of 50km/h was noted on R147 Dublin Road adjacent to the site. No cycle facilities were noted along the R147 Dublin Road. An NX bus stop is located on the R147 Dublin Road adjacent to the proposed pedestrian access to the development.

Figure 10.1 – Site location and local road network (Source: CCK)

10.4.3 Proposed road improvements

The following recommended infrastructure improvements LTP Action 10 is outlined in the Navan Development Plan 2009-2015:

The following is an extract from LTP Action 10:

'The capacity of the R153 Kentstown Road, the Academy Street and the junction of Sion Road with the R147 is identified as a key constraint in allowing the planned growth of east / south east Navan to proceed. The delivery of LDR 6 is considered necessary to alleviate such constraints. The Planning Authority shall consider the need to phase the delivery of this link and in particular the under bridge of the Navan – Drogheda rail line with the proper planning and sustainable development of the area. INF OBJ 11 also proposes the investigation of the need for an additional river crossing of the Boyne linking the Boyne and Slane Roads and this is supported by the conclusions of the Navan Traffic Model.'

In addition, the following is also noted:

'The analysis recommends the consideration of a further river crossing of the Boyne to link the Slane and Academy Street s to alleviate such pressures. The analysis assumes that various sections of the orbital road network are in place before 2022 such as LDR 5 (Slane Road to Proudstown Road), LDR 4 (Rathaldron Road to Kells Road, LDR 6 (Kentstown Road to Academy Street on a phased basis), and LDR 1(a) (Dublin Road to Trim Road). Other sections of the orbital road network are not required during the period up to 2022. Together these form an orbital road network that allows significant levels of through-traffic to be removed from the town centre. This future step-change to the

available routing options in Navan has been recognised by the Navan Local Transport Plan, which aims to take full advantage of the opportunities provided in the town centre.'

Note that Framework Plan (FP2) is to be renamed as Master Plan 12 in Variation No.2 of the Navan Development Plan 2009 – 2015.

10.4.4 Baseline traffic data

It is proposed that the subject site will be accessed directly from the Academy Street with 3 No. vehicular access points. An additional pedestrian only access is located on the south east of the proposed development.

In order to quantify the volumes of traffic movements at key points on the road network adjacent to the site, a set of classified turning movement traffic counts were commissioned. The location of these counts was agreed in consultation with the senior executive engineer of Meath County Council's Transportation Department.

Accordingly, classified counts were carried out on the 14th of September 2017 at the following junction locations:

Site 1 – Kells Road/Dublin Road/Circular Road Signal Controlled Junction
Site 2 – Bridge Street/Circular Road/Academy Street Priority Controlled Junction
Site 3 – Site Access
Site 4 – Dublin Road/Academy Street Priority Controlled Junction
Site 5 – Dublin Road/Local Access Priority Controlled Junction
Site 6 – Dublin Road/Sion Road/Springfield Glen Signal Controlled Junction.

The surveys were carried out on the dates identified above to ensure that flows were representative of normal term time and hence not affected by school holidays or other public holidays or events. As such they provide a reasonable representation of a neutral month during a period of normal school and employment activity. The surveys are designed to provide representative values encompassing AM and PM peak periods during normal traffic conditions.

The results of the traffic surveys are also set out in Appendix B (Volume III) of this EIAR report.

The locations of the surveys are each pertinent to the proposal in terms of being at key nodes in the road network that would be affected by traffic assignment and distribution of flows associated with the development site.

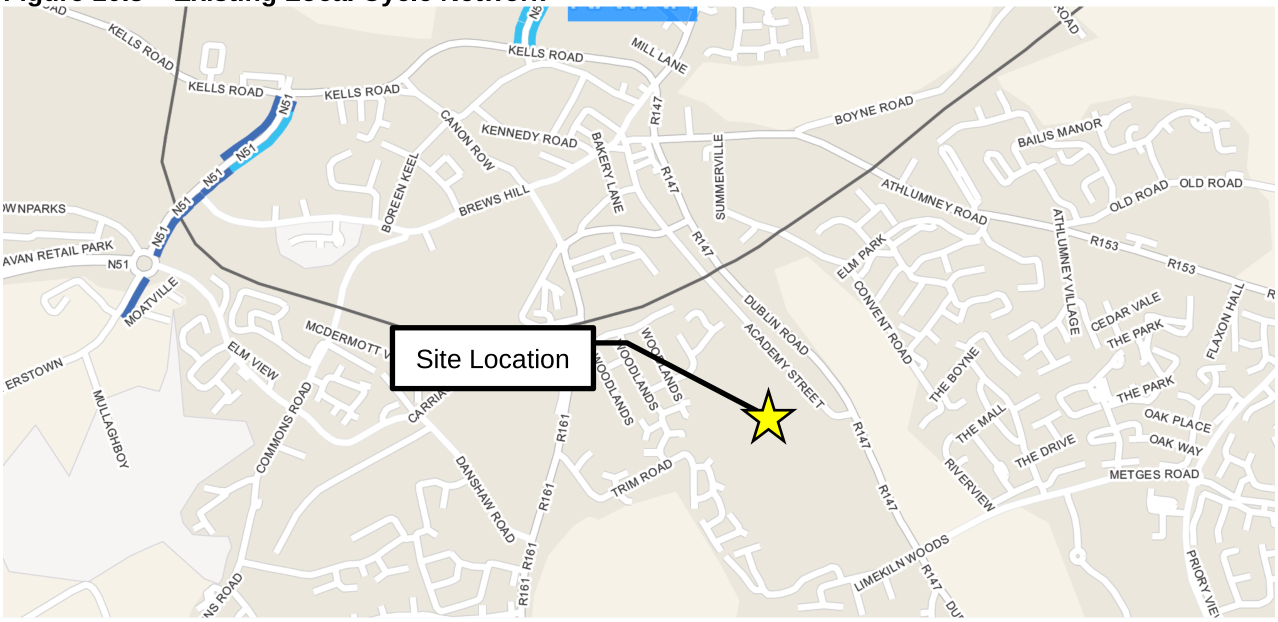
The location of the survey points is depicted below at Figure 10.2.

Figure 10.2 – Survey Locations

10.4.5 Pedestrian and cycling facilities

A footpath is available on both sides of Academy Street along the site frontage measuring approximately 1.5m to 2.0m wide for pedestrians. Existing cycle routes identified by the National Transport Authority (NTA) in the vicinity of Proposed development are indicated in Figure 10.3 below.

Figure 10.3 – Existing Local Cycle Network



Legend:

B1 - Bus Lane (no cycle lane)	G1 - Cycle Trail or Greenway	Greenline Tram Stops
C1 - Cycle Track - separated from road	S2 - Shared Walking & Cycling	Redline Tram Stops
C2 - Cycle Track - immediately adjacent	Study Area	Stations
C3 - Cycle Lane (even within Bus Lane)	County Council Boundaries	

(Source: NTA)

There were no cycle facilities noted within the vicinity of the proposed development.

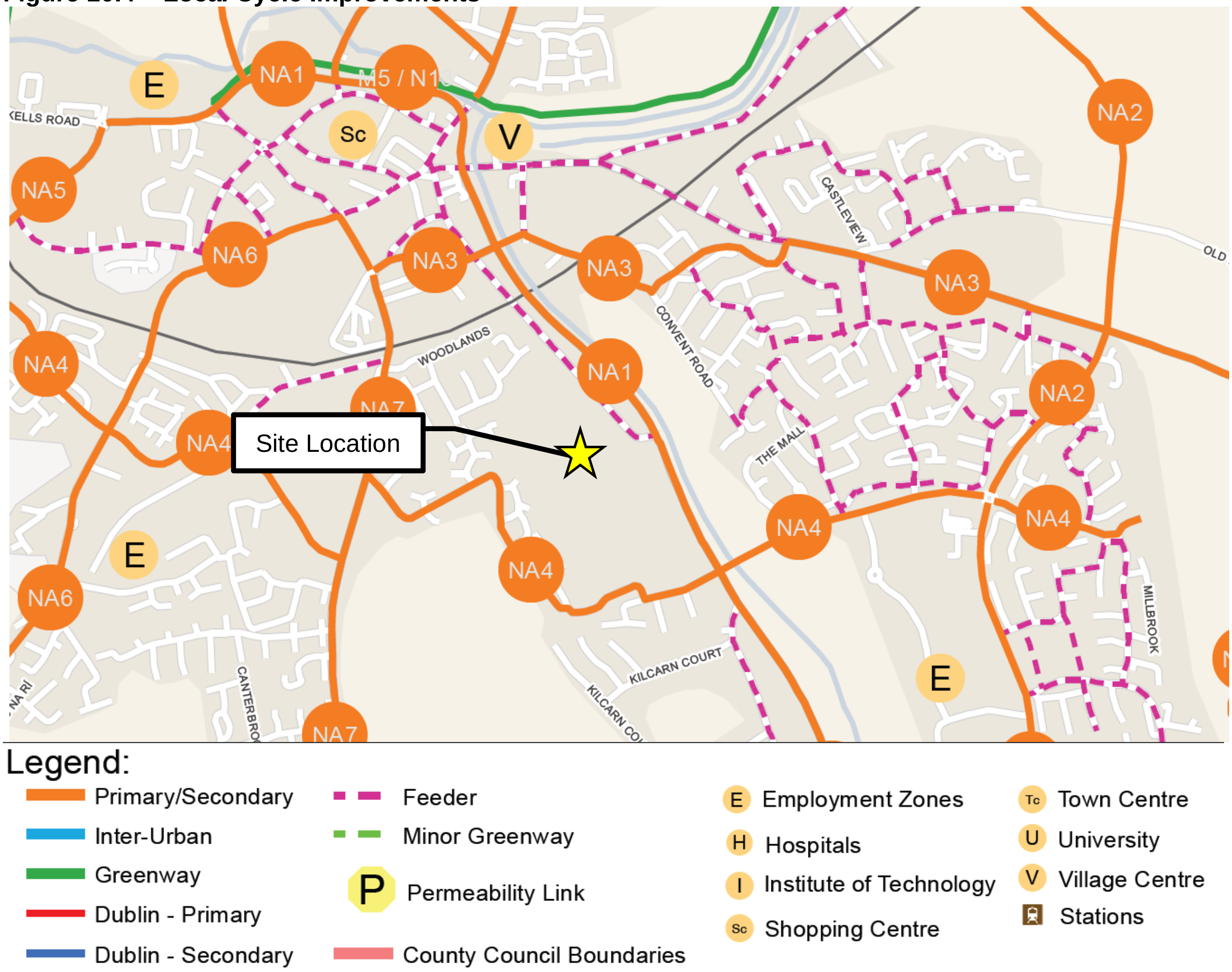
10.4.6 Proposed cycle improvements

In accordance with the National Transport Authority's Cycle Network Plan for the Greater Dublin area the following improvements to the local cycle networks are proposed:

- Na1 R147 Dublin/Kells Road between the N51 and Old Balreask Woods.
- Na2 Metges Road / East Orbital.
- Na3 Fairgreen to Johnstown with a new bridge over the River Boyne.
- Na4 Southern Ring from Johnstown to Athboy Road.
- Na5 Northern Cross from Athboy Road to Slane Road.
- Na6 Windtown Road to Commons Road.
- Na7 Proudstown Road to Trim Road.

The proposed cycle routes are illustrated in Figure 10.4 below.

Figure 10.4 – Local Cycle Improvements



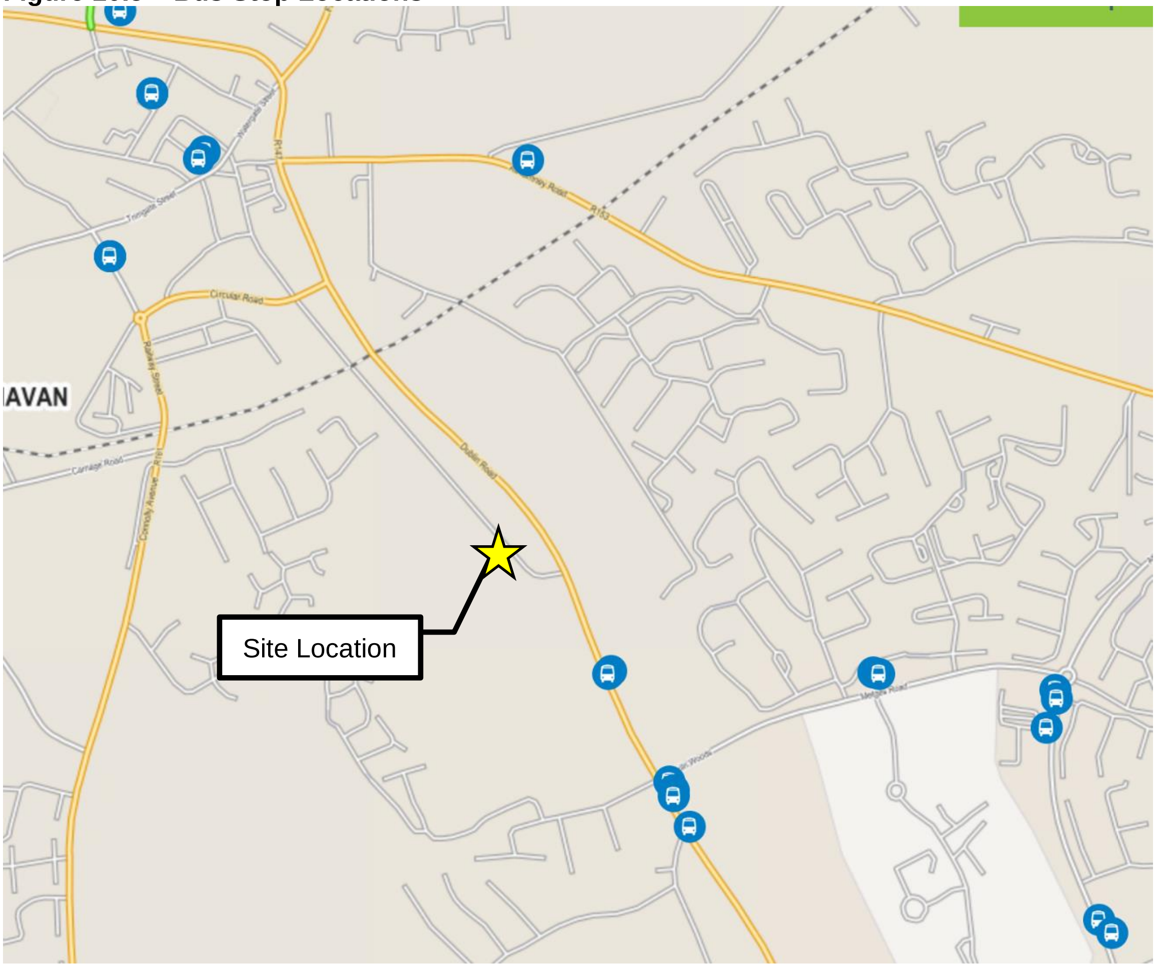
(Source: NTA)

10.4.7 Public transport accessibility

Bus

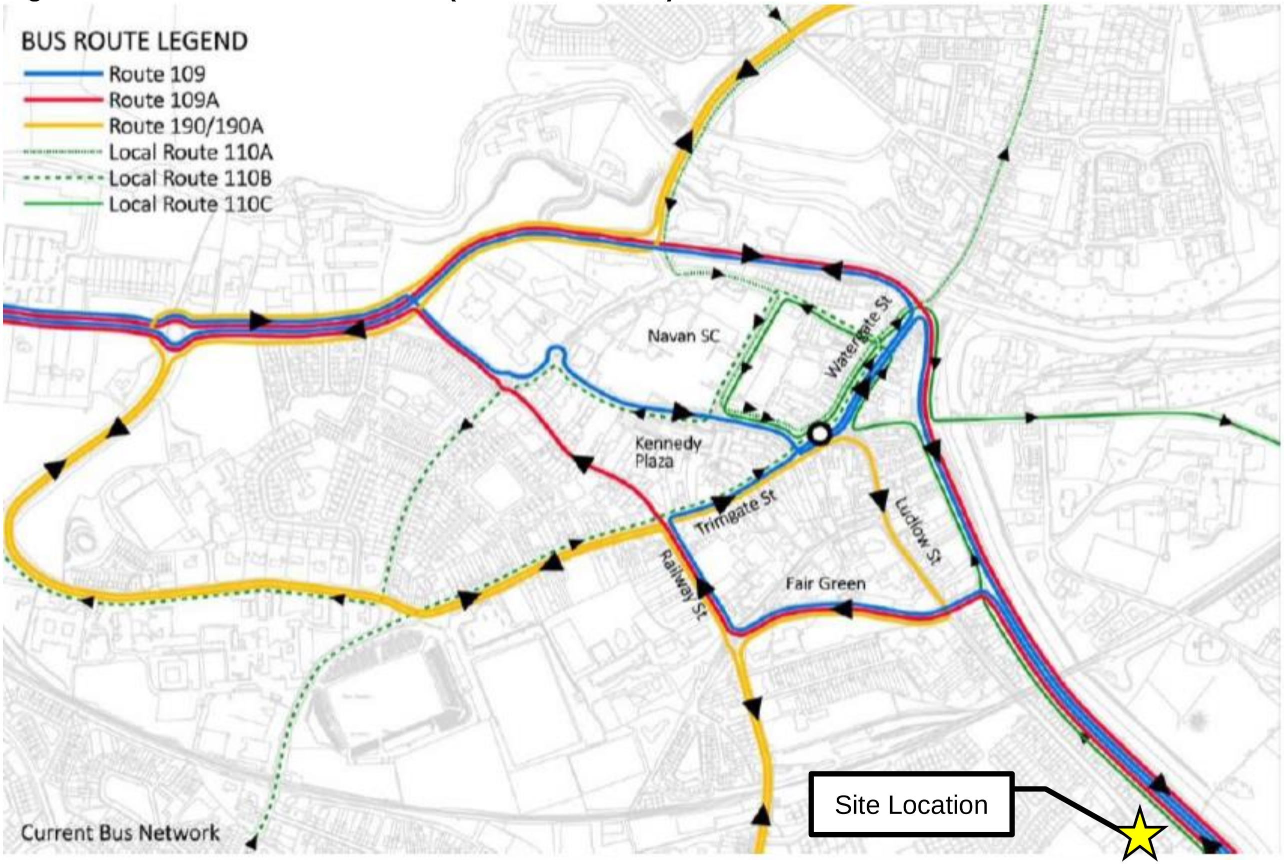
Bus transport within the vicinity of the proposed development is illustrated in Figure 10.5.

Figure 10.5 – Bus Stop Locations



(Source: TFI Transport Planner)

Figure 10.6 – Current Bus Network (Navan 2027 Plan)



Note, the site is located off the page c. 300m to the south east of Figure 10.6.

The figure above illustrates the relationship between the proposed development and the existing public transport infrastructure.

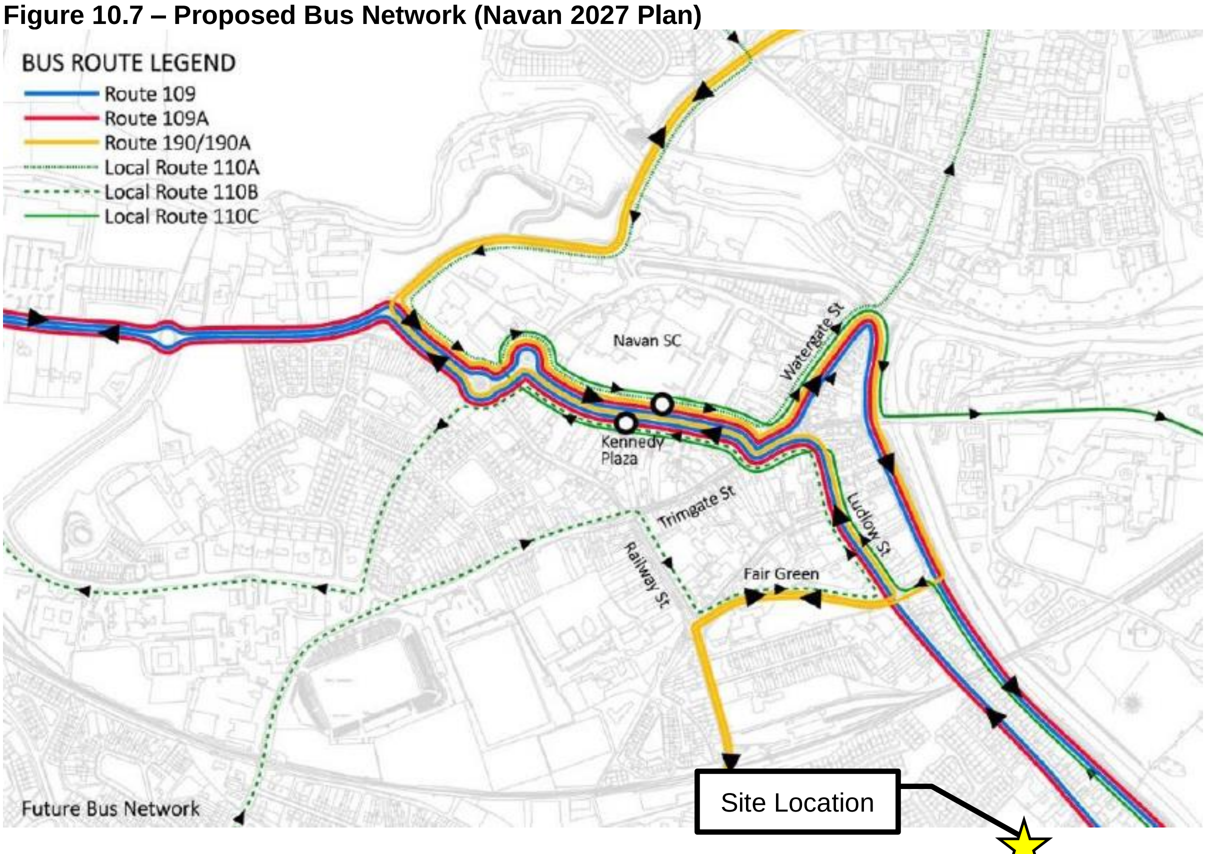
There are numerous bus operators providing a bus service to Navan and within walking distance to the site, with further details shown in Table 10.1 below. Table 10.1 illustrates that there are regular services within walking distances of the proposed development.

Table 10.1 – Local Bus Services

No.	Route	Service		Mon-Fri	Sat	Sun
NX	Wilton Terrace – Navan Mercy Convent	Wilton	First	05:40	06:02	07:00
			Last	23:12	23:10	23:30
		Navan	First	06:05	06:00	07:00
			Last	22:30	00:35	00:55
		Frequency		20 Mins	30 Mins	60 mins
179	Market Street, Cootehill - UCD	Troytown Navan	First	06:23	6:23	6:23
			Last	16:08	10:03	19:28
		UCD	First	13:00	16:35	16:35
			Last	18:10	16:35	16:35
		Frequency		Up to 9/day	Up to 1/day	Up to 1/day
109	Busáras - Virginia	Busáras	First	06:45	06:45	15:5
			Last	23:45	22:45	17:45
		Navan	First	05:32	05:29	7:27
			Last	21:29	19:27	21:29
		Frequency		Up to 14/day	Up to 17/day	Up to 3/day
109a	Busáras - Kells (Opp Business Park)	Dublin	First	02:46	02:46	02:46
			Last	23:15	23:15	23:15

No.	Route	Service		Mon-Fri	Sat	Sun
		Navan	First	05:32	05:32	05:32
			Last	23:05	23:05	23:05
		Frequency		Up to 24/day	Up to 24/day	Up to 24/day
109x	Busáras - Cavan Bus Station	Dublin	First	07:15	07:15	09:15
			Last	21:15	21:15	21:15
		Navan	First	05:58	06:20	08:45
			Last	22:05	22:05	22:05
		Frequency		Up to 9/day	Up to 7/day	Up to 6/day
110a/b/c	Navan (Shopping Centre) - Navan (Shopping Centre)	Navan (Shopping Centre)	First	07:45	-	-
			Last	18:15	-	-
		Frequency		Up to 16/day	-	-
190/a	Drogheda - Navan - Trim	Navan	First	07:00	07:00	08:12
			Last	21:20	21:20	20:20
		Frequency		Up to 15/day	Up to 15/day	Up to 12/day

Figure 10.7 – Proposed Bus Network (Navan 2027 Plan)



The nearest stop is located approximately 750m from the site which equates to 10 minutes walking time. There is an additional concertation of services located on Market Square, including the 70, 103x,107,109,179,190 and NX, which is located between 900m and 1.5km (8-16 minutes' walk time) north of the proposed development. The plans for improvements and enhancements to local bus network are proposed under the Navan 2027 Plan as illustrated in Figure10.7.

10.5 CHARACTERISTICS OF THE PROPOSAL

The proposed development will include the following primary components:

The proposal relates to a residential development of 544 no. dwellings on a site of c. 15.1 hectares comprising 260 no. houses (18 no. 2 bed, 207 no. 3 bed & 35 no. 4 bed) and 198 no. apartments (46 no. 1 bed, 152 no 2 bed), 30 no. duplex apartments (15 no. 2 bed & 15 no. 3 bed), and 56 no. dwellings in corner blocks (16 no. 1 bed, 24 no. 2 bed & 16 no. 3 bed) as well as the provision of two crèches (ground floor of apartment building [c. 195 sq. m] and single storey creche in housing area [c. 443 sq. m]) Open Space including playground areas; all ancillary landscape works with public lighting, planting and boundary treatments including regrading/re-profiling of site where required as well as provision of cycle paths; Provision of vehicular and pedestrian looped access through the site from 3 no. junctions located on Academy Street as well as pedestrian connection in south east of site to Dublin Road and upgrade works to junction onto the Dublin Road; along with 875 no. car parking spaces and 581 cycle spaces and 4 no. car sharing spaces; Surface water attenuation measures and underground attenuation systems as well as all ancillary site development works (reprofiling of site as required) as well as connection to existing public water supply and drainage services. All site development and landscape works.

The upgrade works to junction onto the Dublin Road will include the signalisation of the Academy Street/Dublin Road. This new signalised junction will be linked to the Dublin Road/Bothar Sion/Springfield Glen which will facilitate the construction of the bus gate proposed under Navan 2030.

10.5.1 Physical infrastructure

The proposed site access points are illustrated in Figure 10.8 below.

Figure 10.8 –Proposed Access

f

Primary access to the houses will be provided off Academy Street via a priority-controlled junction at Access No. 3. The school access, Access No. 1, will be used as a secondary access. Primary access to the apartments will be provided off Academy Street via a priority-controlled junction at Access No. 2. Access No. 4 will provide pedestrian access to bus stops located on the R147 Dublin Road.

Permeability will be provided to adjoining developments at various locations. Refer to architects' drawings for more details.

Servicing

An AutoTrack analysis has been carried on the internal service access to demonstrate its capability to cater for residents and service vehicles such as refuse vehicles. The results of this analysis show that the proposed development can accommodate the anticipated service vehicles that will serve the proposed development.

Trip generation – Including Cumulative Assessment

The Trip Rate Information Computer System [TRICS] database has been interrogated to derive trip rates commensurate with developments of the character proposed in this case, notably a 544-unit residential development.

The use of the TRICS database has also enabled the profile of arrivals and departures throughout the day to be assessed and this has served to confirm the choice of the highest respective peak hours for use in the analyses.

This database is a well-established and constantly updated tool used in the determination of generated traffic for developments since it is a substantial source of validated empirical data on the arrival and departure rates for a range of differing types and sizes of developments in a variety of locations.

A full review was undertaken of the apartment trip rates. To that end, TRICS was interrogated to determine the total peak hour trip rate (the sum of the arrivals/departures for the AM peak and PM Peak) that would produce the largest trip rate to/from the development.

The sites selected for these calculations include sites in Dundalk and Drogheda. Dundalk and Drogheda have similar population levels, public transport accessibility, car ownership levels, etc making them comparable to Navan in terms of site selection.

For details on the accumulative assessment refer to Section 10.8.

The trip rates for the proposed development are outlined in Table 10.2 below.

Table 10.2 – Peak Hour Trip Rates

Peak Hour Trip Rates					
Trip Generation from TRICS		**Weekday AM 08:00-09:00**		**Weekday PM 17:00-18:00**	
Usage	Units	Arrivals	Departures	Arrivals	Departures
Houses – Privately Owned	Per Bed	0.202	0.635	0.380	0.202
Apartments – Privately Owned	Per Bed	0.055	0.176	0.202	0.097
School	Per pupil	0.176	0.094	0.022	0.019

10.6 POTENTIAL IMPACT OF THE PROPOSAL

10.6.1 Construction Phase

The likely impact of the construction works will be short-term in nature. The number of staff on site will fluctuate over the implementation of the subject scheme. Nevertheless, based upon the experience of similar projects, it would be expected that c. 50 will be on site at any one time, subsequently generating low levels of two-way vehicle trips during the peak AM and PM periods over the period of the construction works. Were possible, construction workers will use shared transport. On-site employees will generally arrive before 08:00, thus avoiding the morning peak hour traffic. These employees will generally depart after 16:00.

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.

A cut and fill model has been produced by Cronin Sutton Consulting Engineers which estimates that there will be a net export (net cut) of 22,000 m^3 from the site. This equates to c. 740 HGV trips.

Whilst it is not possible at this stage to accurately identify the day to day traffic movements associated with the construction activities, based on 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 15 arrivals and departures during the first 2-3 months of works and decreasing to 3 to 5 thereafter.

Similarly, the general workforce is unlikely to exceed c.50 in number, which with an allowance for shared journeys could equate to a maximum of around 30-40 arrivals and departures per day.

It is estimated that construction will start in Q3 2020

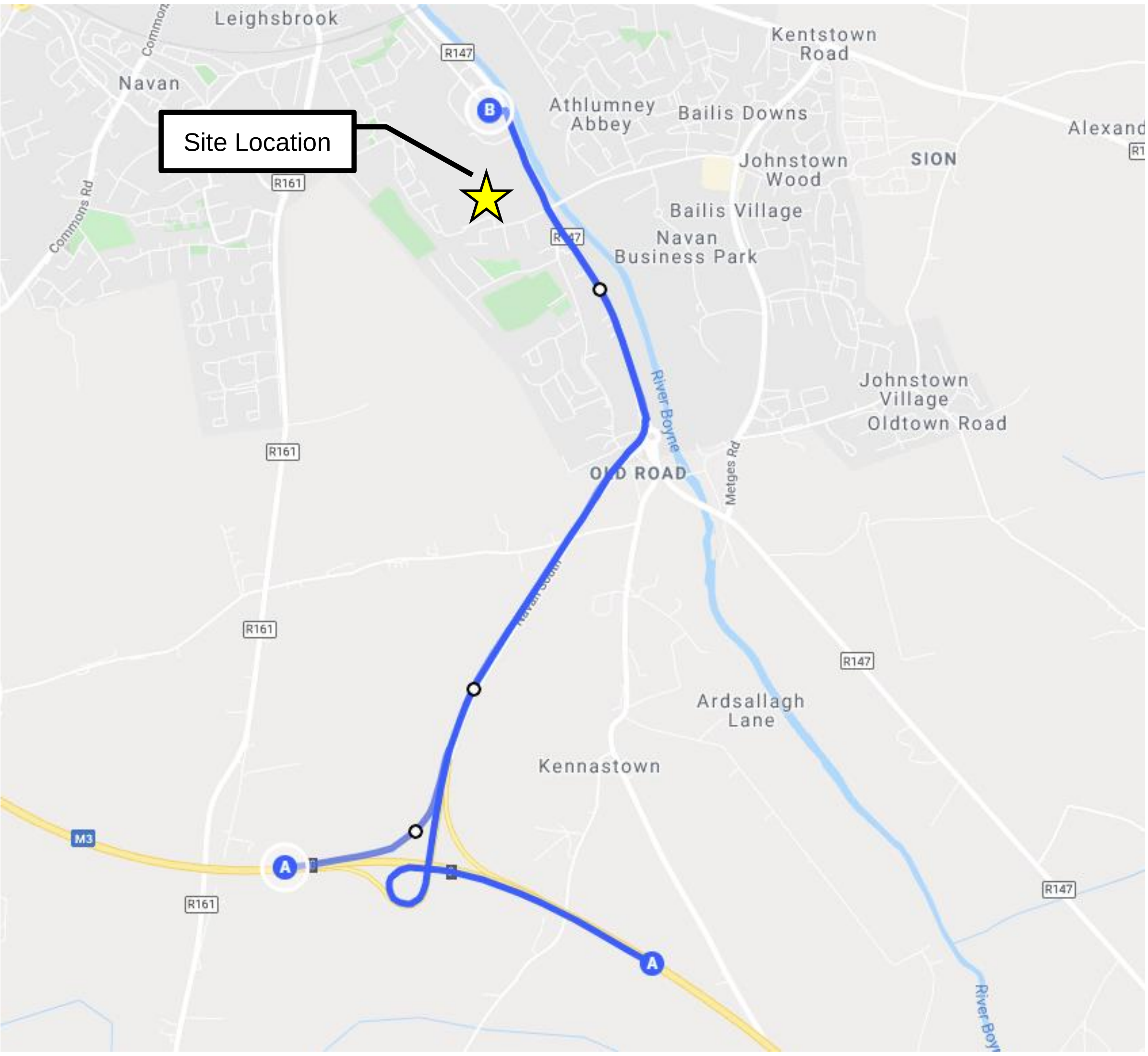
Materials such as steel and concrete required in the construction of the proposed development are likely to be sourced from manufacturers that are not situated within the immediate vicinity of the proposed development. Accordingly, a temporary construction material storage yard will be the source destination from which construction traffic, particularly for steel deliveries, will be generated.

Vehicles will access the road network to/from the construction site using the R147 Dublin Road via the M3. Return trips will be via the same route.

The construction traffic impacts of the proposed development are dependent on the capacity of the local road network to facilitate access to the development by HGV's and heavy construction machinery associated with the construction phase. The ability to accommodate temporary parking for contractors and storage of materials on site is another key consideration.

The potential impact during the construction phase with all the above considered would have a short-term effect on the surrounding road network, however, with the measures outlined Construction Traffic Management Plan, this will have imperceptible effect in Navan Town Centre, along the R147, the M3 and key traffic corridors within the town.

Figure 10.9 – Haul Route



10.6.2 Operational Phase

This section considers the possible types of effects a development proposal of this kind is likely to produce. The potential traffic and transport impacts of the development are considered below.

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.

Traffic impact

The traffic impact of the development is dependent upon the background traffic on the local road network, the capacity of the existing road network, and the amount of additional traffic generated as a result of the proposed development.

Traffic Generation - Including Cumulative Assessment

The trip rates outlined above in conjunction with the proposed schedule of accommodation to determine the resultant total trips generated by the proposed development.

For the proposed development, these figures can be seen in Table 10.3 below.

Table 10.3 – Peak Hour Trips

Peak Hour Trips					
Trip Generation from TRICS		**Weekday AM 08:00-09:00**		**Weekday PM 17:00-18:00**	
Usage	Units	Arrivals	Departures	Arrivals	Departures
Houses – Privately Owned	260	16	50	57	28
Apartments/Duplex– Privately Owned	284	53	165	99	53
School	234	100	54	13	11
Creche*	-	-	-	-	-
Peak Total		168	269	169	92
Two Way Total		437		261	

* It is expected that the majority of the trips to/from the creche will be linked to the proposed development. Those trips that are not linked to the development will be tips that are already exist on the network and will divert to the proposed development. The expected level of arrivals/departures to/from the creche site will be zero.

It can be seen from the above that the total vehicle movements generated by the proposed development will be 168 arrivals and 269 departures in the AM peak (two-way total of 437). The total number of vehicle movements in the PM peak hour will be 169 arrivals and 92 departures (two-way total of 261).

Traffic distribution

It is expected that the origins and destinations of traffic to/from the proposed development will be similar to the distribution of the current traffic patterns on the local roads.

Car parking

One of the key principles of a residential development such as this, is the sufficient provision of car parking spaces within the development so as to avoid the need for excessive on-street parking in the vicinity of the site. A balanced approach is required which provides a compromise between a sufficient number of spaces and the need to promote greater usage of public transport and to encourage walking and cycling trips. This is covered in more detail later in the chapter.

Walking and cycling infrastructure

It is also necessary to ensure that the proposal incorporates appropriate access facilities for pedestrians, cyclists and public transport users in order to facilitate trips by these modes.

10.6.3 “*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.

10.7 REMEDIAL OR REDUCTIVE MEASURES

10.7.1 Construction phase

The Construction Management Plan incorporates a range of integrated control measures and associated management initiatives with the objective of mitigating the impact of the proposed developments on-site construction activities.

To minimise disruption to the surrounding environment, the following mitigation measures will be implemented:

- During the pre-construction phase, the site will be securely fenced off from adjacent properties, public footpaths and roads.
- All road works will be adequately signposted and enclosed to ensure the safety of all road users and construction personnel.
- A dedicated 'construction' site access / egress junction will be provided during all construction phases.
- Provision of sufficient on-site parking and compounding to ensure no potential overflow of construction generated traffic onto the local network.
- Site offices and compound will be located within the site boundary. The site will be able to accommodate employee and visitor parking throughout the construction period through the construction of temporary hardstanding areas.
- A material storage zone will also be provided in the compound area. This storage zone will include material recycling areas and facilities.
- A series of 'way finding' signage will be provided to route staff / deliveries into the site and to designated compound / construction areas.
- Dedicated construction haul routes will be identified and agreed with the local authority prior to the commencement of constructions activities on-site.
- Truck wheel washes will be installed at construction entrances if deemed necessary and any specific recommendations with regard to construction traffic management made by the Local Authority will be adhered to.
- On completion of the works all construction materials, debris, temporary hardstands etc. from the site compound will be removed off site and the site compound area reinstated in full on completion of the works.

All construction related parking will be provided on site. Construction traffic will consist of the following two principal categories:

- Private vehicles owned and driven by site construction staff and by full time supervisory staff;
- Excavation plant and dumper trucks involved in site development works and material delivery vehicles for the following: granular fill materials, concrete pipes, manholes, reinforcement steel, ready mix concrete and mortar, concrete blocks, miscellaneous building materials, etc.

It is anticipated that the generation of HGV's during the construction period will be evenly spread throughout the day and as such will not impact significantly during the peak traffic periods.

10.7.2 Operational phase

- The local area provides suitable infrastructure and transport services for travel by sustainable modes. A key barrier to modal shift towards sustainable modes of travel is often a lack of information about potential alternatives to the car. As such, it is proposed that residents and visitors of the proposed development are made aware of potential alternatives including information on walking, cycle routes and public transport.
- A number of walking and cycling connection points are proposed within the development. These connection points will provide access for pedestrians and cyclists onto Academy Street and the R147 Dublin Road, which is proposed to become a public transport gate under the Navan 2030 proposals.
- These facilities will provide attractive, convenient and safe routes for residents. Therefore, there are good links proposed for residents to travel by more sustainable modes.
- As part of the remedial or reductive measures for the site, it is proposed to upgrade the R147 Dublin Road/Academy Street junction to a signal-controlled junction. Introducing a signal control at this location, including measures to provide the maximum degree of safety and convenience for all road users including pedestrians, can enhance efficiency by reducing congestion and conflict between different vehicle movements, within the available road space.

- The introduction of a pedestrian phase at the new signalised junction will enhance pedestrian safety at this location.
- A Mobility Management Plan (MMP) will be prepared for both residents within the apartment units and staff within the creche in order to guide the delivery and management of coordinated initiatives post construction. The MMP ultimately seeks to encourage sustainable travel practices for all journeys to and from the proposed development.
- It is proposed to provide car parking in accordance with the recommendations of the 'Sustainable Urban Housing – Design Standards for New Apartments' published by the Department of Housing, Planning and Local Government (2018). Therefore, the recommended car parking will be less than that required under the Meath Development Plan.
- The number of trips to/from a development is linked to the number of car parking spaces. The restriction of car parking spaces acts as a demand management tool and will reduce the impact on the surrounding road network. It will also encourage a shift away from non-sustainable car ownership models where people who only occasionally use one no longer keep one.
- For occasional car use, it is proposed to introduce a car club to the development. Car Clubs gives you a '*car on call',* whenever you need it. Car clubs have developed as a modern service in many European cities and are a good alternative to high levels of private car use and 'driver only' occupancy rates. The principal of a car club is to ensure that the optimal use of a small number of vehicles to meet the needs of a wide group of people.
- International experience to date shows that healthy car clubs, such as those run by GoCar, operate at a provision of 30 clients per car and every car can replace up to 4 private vehicles thereby significantly reducing the number of traffic movements.
- The introduction of new pedestrian routes, pedestrian phases on the new signalised junction, reduced car parking numbers and Car Clubs will further reinforce the efforts been made towards a modal shift away from car-based trips
- Residents will be encouraged to avail of these facilities for travel to and from work. Provision of this information would be made upon opening of the proposed development , as this represents the best opportunity to secure travel behaviour change. It is anticipated that this measure may help to reduce the level of traffic at the proposed development, thus providing mitigation against the already minimal traffic and transport effects of the development.

10.8 PREDICTED IMPACT OF THE PROPOSAL

When considering a development of this nature, the potential traffic impact on the surrounding area must be considered for each of two stages; the construction phase and operational phase. These two distinct stages are considered separately within this section.

10.8.1 Construction phase

At this initial stage, it is expected that the proposed residential dwellings will be constructed at a rate of 100 units per year (subject to market forces). It is envisaged that the full scheme is not likely to be fully completed until before 2025.

All construction activities will be governed by the Construction Traffic Management Plan (CTMP),and outline CTMP is included with this application and the details of which will be agreed with the local authority prior to commencement of construction on site.

An outline CTMP has been prepared as part of this application. This document addresses a number of potential issues including the working hours of site staff, the traffic management for the site, the waste management, noise and vibration impacts as well as other issues to be addressed.

The outline CTMP provides the content of the final Construction Traffic Management Plan (CTMP) which shall be prepared by the appointed main contactor prior to construction of the proposed development. It shall be a requirement of the contract that, prior to construction, the appointed contractor shall liaise with the relevant authorities including the Transport Infrastructure Ireland (TII), Local Authorities and Emergency Services for the purpose of finalising the CTMP, which will encompass all aspects of this outline Construction Traffic Management Plan.

The CTMP shall be termed a 'Live Document', such that any changes to construction programme or operations can be incorporated into the CTMP.

The contractor will be contractually required to ensure that the elements of this outline CTMP shall be incorporated into the final CTMP. The contractor shall also agree and implement monitoring measures to confirm the effectiveness of the mitigation measures outlined in the CTMP. On finalisation of the CTMP, the contractor shall adopt the plan and associated monitoring measures. The final CTMP shall address the following issues (including all aspects identified in this outline CTMP):

- Site Access & Egress;
- Traffic Management Signage;
- Routing of Construction Traffic / Road Closures;
- Timings of Material Deliveries to Site;
- Traffic Management Speed Limits;
- Road Cleaning;
- Road Condition;
- Road Closures;
- Enforcement of Construction Traffic Management Plan
- Details of Working Hours and Days;
- Details of Emergency plan;
- Communication;
- Construction Methodologies; and
- Particular Construction Impacts

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 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 15 arrivals and departures during the first 2-3 months of works and decreasing to 3 to 5 thereafter.

Similarly, the general workforce is unlikely to exceed c.50 in number, which with an allowance for shared journeys could equate to a maximum of around 30-40 arrivals and departures per day. A construction car park for workers immediately adjacent to the new access from the new Academy Street will be created on the start of works by the laying of a temporary surface for vehicles. This number of construction vehicle movements is considered to be relatively low compared to the wider road network. It should be noted that the majority of such vehicle movements would be undertaken outside of the traditional peak hours, and it is not considered this level of traffic would result in any operational problems.

Care will be taken to ensure existing pedestrian and cycling routes are suitably maintained or appropriately diverted as necessary during the construction period, and temporary car parking is provided within the site for contractor's vehicles. It is likely that construction will have a negligible impact on pedestrian and cycle infrastructure.

10.8.2 Operational phase

To assess the resultant impact on the surrounding road network, the anticipated traffic generation and distribution through the network has been applied to the traffic model in order to assess comparative flow levels at the surveyed locations and to analyse resultant junction performance.

In addition to traffic generated due to the proposed development, there is also an expected increase in traffic flows due to general development and an increase in car ownership that needs to be considered. Using Table 5.5.1 of the Project Appraisal Guidelines – Unit 5.5 Link-Based Traffic Growth Forecasting published by the NRA, reference has been made to the percentage increase expected on all roads surrounding the site.

Growth Factors

The estimated opening year for the proposed development is 2022. This has therefore been the focus of the road network assessment. These flows are shown in Diagrams D.1 to D.16 and for the weekday AM and PM peaks respectively.

The factor used are outlined in Table 10.4.

Table 10.4 – Growth Factors

Traffic Growth Rates, NRA Project Appraisal Guidelines		
Year	To Year	Extract from Table 5.5.1 of Project Appraisal Guidelines
2017	2022	1.05
2017	2027	1.11
2017	2037	1.15

Confirmation of the opening year will be agreed in advance based on confirmation of the phasing of the development.

Junction Capacity Analyses

Junction capacity analyses have been undertaken at the site access junction and at the key junctions at which existing flow data had been obtained. These tests have been carried out using industry standard and approved software for the existing junctions with no development and the assumed year of opening of the development, namely 2022, and for a 5-year design horizon, namely 2027 and for a 15-year design horizon, namely 2037 with development flows added. It may be the case at some nodes within the network that following the distribution and assignment of the traffic generated by the development, the actual proportional impact or change in traffic demand would not necessarily warrant further assessment. For the purpose of a full and frank assessment, all junctions have been put forward for assessment.

The use of the TRL capacity model programme PICADY [Priority Intersection Capacity and Delay] is well established and accepted by the Meath County Council for the prediction of capacity and incurred delay at priority junctions, whilst ARCADY [Assessment of Roundabout Capacity and Delay] is similarly accepted and used to provide comparable measures of the operational efficiency of roundabout junctions. OSCADY (Optimised Signal Capacity and Delay: Phase-based Rapid Optimisation) is a computer program for optimising phase-based signal timings and calculating capacities, queue lengths and delays (both queuing and geometric) for traffic signal-controlled junctions. Similarly, LinSig is a computer program for optimising phase-based signal timings and calculating capacities, queue lengths and delays (both queuing and geometric) for traffic signal-controlled junctions.

With these well-established methods the results are expressed in terms of a ratio of flow to capacity (RFC) on each approach and the maximum queue length on that approach during the period tested. If the RFC value approaches 1.0 then queuing and delay can be expected to increase. It is normal practice to ensure that the RFC is below 0.85 to achieve a theoretical reserve capacity of greater than 15%, although a value of 0.85 can be marginally exceeded in a future design year situation without any detrimental effect on the satisfactory and safe operation of the junction.

LinSig and OSCADY results are expressed in terms of queues generated and the ‘Degree of Saturation’ (DoS). A Dos value of 85% or below indicates that the junction is operating within capacity. A DoS value of between 85% and 100% indicates that the junction remains within capacity but is beginning to show signs of queuing and delay. A DoS value of less than 100% is desirable in urban areas during peak period traffic. However, values of greater than 100% are typical at many junctions. For the purpose of these calculations the results are reported in terms of maximising the capacity of the junction analysed.

The results of the various capacity assessments are summarised in a series of tables. For each flow condition and for each junction the PICADY or ARCADY output has been assessed and the maximum Ratio of flow to Capacity [RFC] tabulated together with the maximum (end) queue value for the relevant time segment. For signalised junctions the OSCADY/ LinSig output will be in terms of maximum (end) queue value and DoS.

For the corresponding flow diagrams refer to Appendix B of the EIAR (Volume 3).

For the detailed junction analysis refer to Appendix B of the EIAR (Volume 3).

Geometric Parameters

The geometric parameters used for the junctions have been ascertained from the topographical survey details of the junction and other relevant sources. In this way a very good approximation of the relevant geometric inputs has been used. For the proposed junction, the geometry has been obtained by reference to the initial design drawing. This has also enabled an iterative process to be adopted if necessary, to ensure that the junction is designed in accordance with relevant design standards and to achieve sufficient levels of capacity.

In this case, the surveyed junctions will each be analysed to determine the extent of resultant highway impact and the need, if any, for mitigating measures. It is anticipated that the capacity analyses will show how the proposal will be accommodated with a reasonable degree of reserve capacity.

Trip Distribution

The trips generated by the proposed development have been distributed on the surrounding road network using the directional flows on the surrounding road network. The proposed movements created by the development in the AM and PM peak hour are shown in Appendix B of the EIAR.

Junction Capacity Analysis

For the full junction capacity analysis refer to the submitted Traffic and Transport Assessment. A summary of the analysis is provided below.

<u>Circular Road/Kells Road</u>
The base model has been created using the data provided by Pinnacle Consulting Engineers. This model was then used to model the future year scenarios. All traffic signal timings have been optimised for the future year scenarios and existing base data.

The results show that the junction is currently running within capacity. When running a 60 second cycle time the AM peak has a PRC of 16.3% and the PM peak has a PRC of 0.4% with Arm 1 - Circular Road being 89.7% saturated.

<u>R161 Circular Road/R896 Bridge Street/Academy Street crossroads</u>

The operation of the crossroads was modelled using Junctions 8 PICADY software, and tested with the 2017 base year, 2022 Opening year, 2027 Opening year +5 years and 2037 opening year.

In the 2037 opening year +15 years without development, all the roads operate within the 85% design threshold ratio of flow capacity (RFC) in both the morning and evening peak hours. The maximum RFC recorded was 0.73 with a corresponding queue of 2.55

The additional of the development traffic has a minimal impact on the operation of the junction which continues to operate within capacity in both the peak hours. The junction delay in the evening peak is forecast to increase by 7.13 seconds from 13.1 seconds in 2017 base year to 20.23 seconds in 2037 opening year +15 years (with development). Therefore, the additional of the development traffic has a minimal impact on the operation of the junction, hence this is not a severe impact and no mitigation measures are required.

<u>Academy Street/Site Access</u>

The operation of the crossroads was modelled using Junctions 8 PICADY software, and tested with the 2017 base year, 2022 Opening year, 2027 Opening year +5 years and 2037 opening year.

In the 2037 opening year +15 years without development, all the roads operate within the 85% design threshold ratio of flow capacity (RFC) in both the morning and evening peak hours. The maximum RFC recorded was 0.57 with a corresponding queue of 1.28 in the 2037 AM Peak.

The new junction operates with a max delay of 13.65s.
Dublin Road / Academy Street Priority Controlled Junction
The operation of the crossroads was modelled using Junctions 8 PICADY software, and tested with the 2017 base year, 2022 Opening year, 2027 Opening year +5 years and 2037 opening year.

In the 2037 opening year +15 years without development, all the roads operate within the 85% design threshold ratio of flow capacity (RFC) in both the morning and evening peak hours. The maximum RFC recorded was 0.62 with a corresponding queue of 0.65 in the AM Peak.

The additional of the development traffic has a minimal impact on the operation of the junction which continues to operate within capacity in both the peak hours. The junction delay in the evening peak is forecast to increase by 9.31 seconds from 27.34 seconds in 2017 base year to 18.03 seconds in 2037 opening year +15 years (with development). While delay at the junction has increased it is within acceptable norms based on an RFC of less than 0.85.

Dublin Road/Bothar Sion/Springfield Glen & Dublin Road/Academy Street

The Navan 2030 plan considers two key elements that would support and promote sustainable development in Navan Town through:

Enhancing the physical attractiveness of the town; and,
Improving movement and access in and out of the town centre.

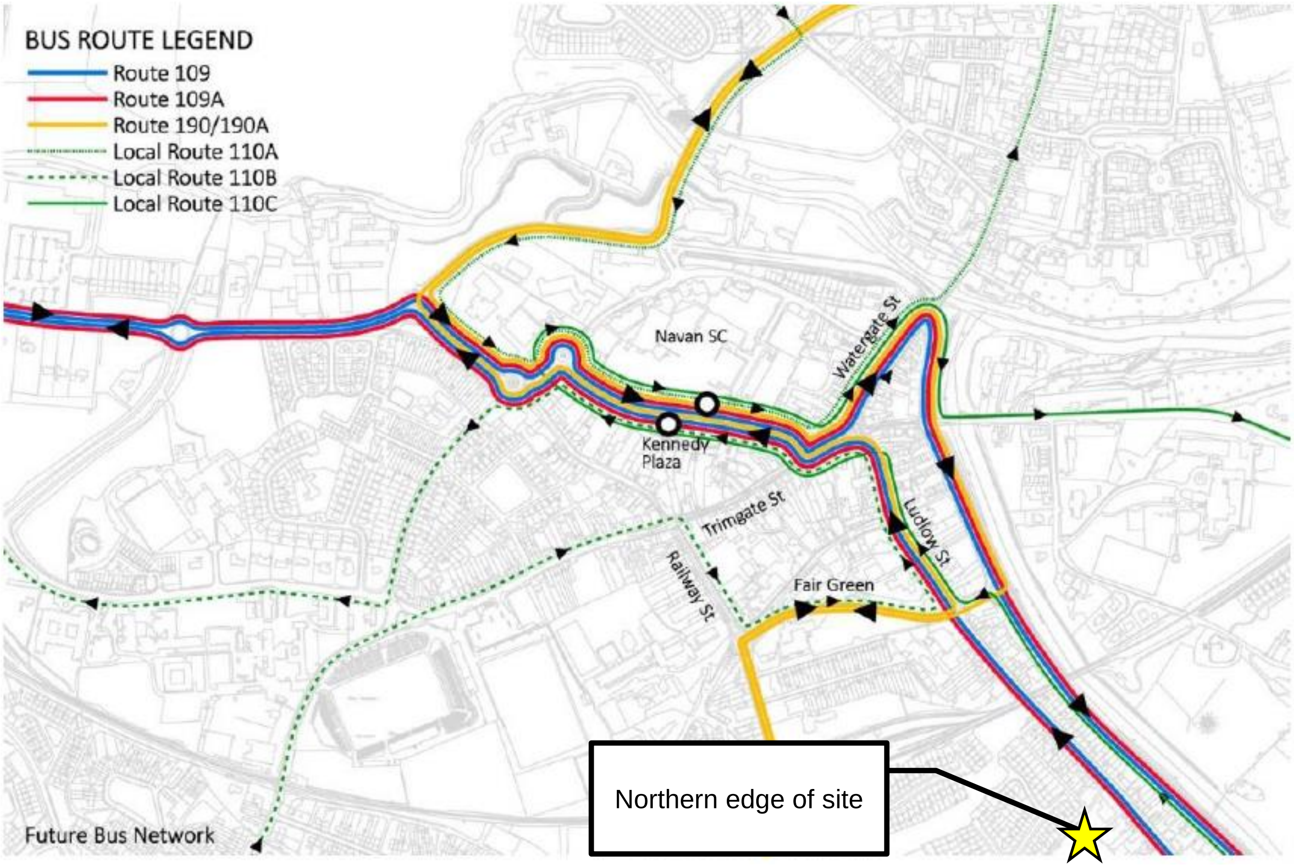
Navan 2030 sets out the following in relation to public transport

As Navan grows, access to efficient public transport is becoming increasingly important. Public transport services must be developed so as to be convenient, accessible and reliable, and local and regional buses must be integrated. Public transport must not only provide a high-quality service to the people and the town, but also should benefit Navan by bringing people into the town centre.

Public transport services must be developed as a real alternative to private transport, both for local and regional trips. Routes and services must be fully integrated, and in a manner that benefits the community of Navan and also supports the businesses in the town.‘

This strategy will be delivered through the diversion of bus services, the provision of dedicated bus taxi termini and out of town car parking. Diversion of bus services will create a bus priority through Academy Street as indicated in the Navan 2030 map below.

Figure 10.10 – Diverted Bus Routes



In addition, the following junctions were assessed as part of a signalised network to determine the future potential to accommodate bus priority along Academy Street through the provision of linked signal junctions:

- Academy Street/Site Access T-junction/R147 Dublin Road/Academy Street Signalised Junction
- Unnamed Junction
- Dublin Road/Bothar Sion/Springfield Glen

The Dublin Road/Bothar Sion/Springfield Glen 4 arm junction, the Academy Street/R147 3 arm junction, and the Site Access/Academy Street junction have all been modelled as a signalised network. Due to the short distance between the sites the Academy Street/R147 and the Academy Street/Site Access junction they have been modelled as one traffic signal-controlled junction incorporating one stage stream to ensure rigid linking between the sites.

Pease note that these works aren't necessary for the proposed development as outlined modelling of isolated junctions and are included for information purposes only.

The base model has been created using the data formulated by Pinnacle Consulting Engineers. This model was then used to model the future year scenarios. All traffic signal timings have been optimised for the future year scenarios and existing base data.

The Academy Street/Site Access T-junction/R147 Dublin Road/Academy Street Signalised Junction currently works with capacity running a 82 second cycle time. All scenarios operate within capacity by running the current cycle time and reoptimizing the green splits such that they complement the junction 'Y' values. The worst-case scenario is AM 2037 with development traffic which operates at a PRC of 9.8% and a DOS of 82.0s%.

The Unnamed junction (residential access) operates within capacity for all scenarios. The worst-case scenario is AM 2037 with development traffic which operates with a DOS of 59.3%.

The Dublin Road/Bothar Sion/Springfield Glen currently works with capacity running a 164 second cycle time. All scenarios operate within capacity by running the current cycle time and reoptimizing the green splits such that they complement the junction 'Y' values. The worst-case scenario is AM 2037 with development traffic which operates at a PRC of 10.1% and a DOS of 77.2%.

Car parking provision

Houses

Car parking for the houses will be provided in accordance with Section 11.9 of Meath County Development Plan 2013-2019 as illustrated in Table 10.5.

Table 10.5 – Car Parking Standards

Car Parking Standards	
Land Use	Standards
Dwelling - Standard	2 per convention dwelling
House Type N7	1 per 2-bed house

Table 10.6 – Parking Provision - Houses

Parking Provision		
Land Use	Standards	Provided
House – Privately Owned	484	484
Dwelling – House Type N7	18	18
Total	502	502

A total of 502 parking spaces will be provided in accordance with Section 11.9 of the Meath County Development Plan as illustrated in Table 10.6.

All houses have on-curtilage car parking except units 171, 178, 179, 180, 181, 257, 385 & 386 who have all their spaces on-street. Unit 160 has one space on-curtilage and one on-street.

Car Parking – Apartment & Duplex

The 'Sustainable Urban Housing – Design Standards for New Apartments' published by the Department of Housing, Planning and Local Government sets out alternative designer standards for apartments and has been applied to the parking provision for the duplexs.

The new design standards set out alternative criteria for the provision of car parking spaces based on the link between the proposed development, access to local amenities and access to public transport.

A comparison between development plan standards and the new apartment guidelines is illustrated in Table 10.7 below.

Table 10.7 – Car Parking Standards – Apartments & Duplexs

Car Parking Standards – Apartments & Duplex		
Land Use	Standards	
	Development Plan Standards	'Sustainable Urban Housing – Design Standards for New Apartments' DoECLG(2018)
Apartments/Flats/ Duplex	1.25 per 1 & 2-bedroom unit; 2 per 3-4 bed unit	Depends on Design & Location
Visitors	1 space per 4 apartments	

Based on the guidance outlined in 'Sustainable Urban Housing – Design Standards for New Apartments' DoECLG (2018) it is proposed to provide 140 car parking spaces for the duplex units in accordance with Table 10.8.

Table 10.8 – Duplex Parking Provided

Duplex Parking Provided				
No. of Units		Standards		
		Development Plan Standards	'Sustainable Urban Housing – Design Standards for New Apartments' DoECLG(2018)	
I Bed	16	20	General car parking spaces	118
2 Bed	39	49		
3 Bed	31	62		
Visitor		22	Visitor	22
Total		157	Total	140

For Apartment Block A, B, C (Including creche in block C) The 'Sustainable Urban Housing – Design Standards for New Apartments' published by the Department of Housing, Planning and Local Government has been used for the car parking standards.

A comparison between development plan standards and the new apartment guidelines is illustrated in Table 10.9 below.

Table 10.9 – Parking Standards Apartment A,B & C (Including creche in block C)

Car Parking Standards - Apartment A,B & C (Including creche in block C)				
No. of Units		Standards		
		Required	'Sustainable Urban Housing – Design Standards for New Apartments' DoECLG(2018)	
I Bed	38	47.5	General car parking spaces	129
2 Bed	120	150	Accessible car parking spaces	7
3 Bed	-	0	Go Car Spaces	4
Creche *		15	Dual Usage (Creche/Visitor)	30
Visitor		39.5		
Total		237	Total	170

Based on the guidance outlined in 'Sustainable Urban Housing – Design Standards for New Apartments' DoECLG (2018) it is proposed to provide 170 car parking spaces as follows:

- General car parking spaces 129
- Dual Usage/Limited Time Stage (Creche, Visitor) 30
- Accessible car parking spaces 7
- Go Car Spaces 4

- Total: 170

Equivalency: 204

Visitors and parents/staff of the creche will have access to 30 car parking spaces that will have limited stay restrictions that will be managed by the Management Company. It is proposed to provide 170 spaces comprising of 129 general car parking spaces, 30 dual usage spaces, 7 accessible spaces and 4 car club spaces. Based on feedback from GoCar this is the equivalent of 204 spaces.

For Apartment Block D&E The 'Sustainable Urban Housing – Design Standards for New Apartments' published by the Department of Housing, Planning and Local Government has been used for the car parking standards. A comparison between development plan standards and the new apartment guidelines is illustrated in Table 10.10 below.

Table 10.10 – Parking Standards Apartment D&E

Car Parking Provision - Apartment D&E				
No. of Units		Standards		
		Required	'Sustainable Urban Housing – Design Standards for New Apartments' DoECLG(2018)	
I Bed	8	10	General car parking spaces	40
2 Bed	32	40	Accessible car parking spaces	2
3 Bed	-	0	Visitor	6
Visitor		10		
Total		60	Total	48

Based on the guidance outlined in 'Sustainable Urban Housing – Design Standards for New Apartments' DoECLG (2018) it is proposed to provide 48 car parking spaces as follows:

General car parking spaces 40
Accessible car parking spaces 2
Visitor 6

Total: 48

For Apartment Block D & E, there are 48 no. spaces available. This results in a ratio of 1 space per apartment.

Car Parking Standards – Creche

The Meath Development Plan requires 8 no. set-down and 7 staff spaces for the creche. A total of 15 spaces will be provided.

Car Parking – Summary

A total of 875 parking spaces will be provided for the development.

Parking will be provided within the curtilage of each house. On street surface car parking will be provided for the apartments, duplexs, creches and visitor car parking spaces.

The development plan standard suggests a total of 297 spaces for the Apartment Block A-E. This is based on a mix of 1 and 2 apartments and a creche.

Without car parking dominating the proposal and taking into account the guidance set out in publications like DMURS and 'Sustainable Urban Housing – Design Standards for New Apartments' it was proposed to provide 170 spaces including 4 car club spaces for Apartment Block A-C and 48 spaces for Apartment Block D & E.

This level of parking will both meet the demand for spaces but will also act as demand management tool for trips to/from the proposed development.

The car parking strategy is to provide an equivalent rate of 204 spaces for Apartment Block A,B & C which is 96% of the requirement of Meath County Council and is in line with Section 4.20 the 'Design Standards for New Apartments For Planning Authorities' for Apartment Block A, B & C.
For Apartment Block D & E, there are 48 no. spaces available. This results in a ratio of 1 space per apartment or 80% of the requirement of Meath County Council.

Therefore, a balance has been struck for the car parking provision taking into account the Development Plan standard and the anticipated demand.

Table 10.11 – Overall Parking Provision

Overall Parking Provision	
Land Use	Standards Provided
3 Bed House	484
2 Bed House	18
Apartment Block A, B, C (including creche in Block C)	170
Apartment Block D & E	48
Duplex	140
Creche (Next to unit No. 29	15
Total	875

Cycle Parking Standards

Section 11.9.2 of the Meath County Development Plan sets out the cycle parking standards as follows:

'The number of stands required will be a third of the number of car spaces required for the development, subject to a minimum of one stand.'

Under the Meath County Development Plan total of 56 cycle parking spaces are required.

Section 4.17 of the Sustainable Urban Housing – Design Standards for New Apartments' published by the Department of Housing, Planning and Local Government (2018) has the following cycle parking requirements:

'Quantity – a general minimum standard of 1 cycle storage space per bedroom shall be applied. For studio units, at least 1 cycle storage space shall be provided. Visitor cycle parking shall also be provided at a standard of 1 space per 2 residential units.'

A total of 581 cycle parking spaces will be provided. This is in excess of the required amount as outlined in Development Plan and accordance with Para 4.17 'Sustainable Urban Housing – Design Standards for New Apartments' DoECLG(2018).

This level of cycle parking provision will cater for local trips by residents and will mitigate the reduced level of car parking supply.

Bike parking will not be provided within individual apartments. Secure, covered communal parking will be provided at ground floor level adjacent to the main entrances.

A total of 581 cycle parking spaces will be provided for the development.

Table 10.12 – Overall Parking Provision

Overall Cycle Parking Provision	
Land Use	Standards Provided
Houses	-
Apartments (including creche in Block C)	417
Corner Blocks	104
Creche (Access Road 1)	14
Duplex	46
Total	581

Remedial or reductive measures

Construction phase
It is considered that a Construction Traffic Management Plan (CTMP) would be prepared by the appointed contractor in order to minimise the potential impact of the construction phase of the proposed development on the safety and amenity of other users of the public road.

Operational phase
Not applicable in respect of traffic and transport.

10.9 MONITORING

During the construction stage, the following monitoring exercises are proposed;

- Compliance with construction vehicle routing practices,
- Compliance with construction vehicle parking practices,
- Internal and External road conditions,
- Timings of construction activities.

A MMP will be prepared for both residents within the apartment units and staff within the creche in order to guide the delivery and management of coordinated initiatives post construction. The MMP ultimately seeks to encourage sustainable travel practices for all journeys to and from the proposed development. In order to minimise the impacts of the development and to encourage sustainable modes of transport the MMP will address the following items in order to achieve this:

- Introduction of appropriate parking management;
- Optimise links with public transport;
- Provide and enhance cyclist and pedestrian facilities;
- Encourage modes of transport other than single than car trips.

Post occupancy surveys are to be carried out in order to determine the success of the measures and initiatives as set out in the proposed MMP document. The information obtained from the monitoring surveys will be used to identify ways in which the MMP measures and initiatives should be taken forward in order to maintain and further encourage sustainable travel characteristics.

10.10 REINSTATEMENT

Not applicable in respect of traffic and transport.

10.11 POTENTIAL CUMULATIVE IMPACTS

Potential cumulative impacts have been assessed in relation to the existing and permitted transportation schemes. The traffic modelling undertaken includes growth in background traffic flows which accounts for other developments in the area. A desktop study was conducted of planning applications in the vicinity of the subject development on the MCC planning database to assess any cumulative impacts from granted or committed applications close to the subject scheme.

These developments will be included the modelling of the impacted junctions. Where a Traffic & Transport Statement is available the figures will be taken directly. If no Traffic & Transport Statement is available TRICS will be used to estimate flows from the development and traffic surveys used for distribution.

Part of the Belmont lands include a site that is zoned for a school. The applicant is in the process of selling these lands to the Department of Education, or an agent acting on their behalf, in order for the site to be developed.

Typically, the Department of Education has a requirement for schools with between 6 to 24 classrooms. It is understood, through the negotiations pertaining to the design of the site, that the site has been earmarked for two primary schools of up to 30 classrooms.

According to the Department of Education, the Average Class Size in Primary Schools (2014/15 - 2018/19) ranges from 24.9 to 24.3 with an overall downward trend. Based on an average of 24 pupils per classroom there is a potential pupil population of 720.

According to the Census 2016 Summary Results - Part 1 published by the CSO, the average household size is 2.75. Census 2016 shows the population of the primary school age group (5-12) stood at 548,693. Census 2016 results show that Ireland’s population stood at 4,761,865. Therefore, the primary school age group (5-12) equates to 11.5% of the overall population.

Based on 544 total units, it is estimated that up to 172 children from within the development will be of primary school going age.

There is the potential for up to 172 local students to cycle/walk to the school site from within the proposed development. Therefore, the total external school population would be up to 548 pupils.
It is reasonable to assume that not all local children from the proposed development will attend the local school. Accordingly, school site will be tested for an external pupil population of 570.

These assumptions will attract higher trips to the proposed development as the external population is bigger and therefore offers a robust assessment of the potential trip rates to/from the school site via the external road network.

10.12 INTERACTIONS

The projected increase in vehicle traffic during the operational stage may lead to a slight increase in noise levels during peak trip generation periods, however, implementation of the mitigation measures described in the Noise and Air Quality Section of this Environmental Impact Assessment Report will prevent and minimize the potential impacts of this interaction.

Air Quality: The Air Quality and Climate Chapter of this EIAR states that the impact of the proposed development on air quality and climate is considered Long-term and imperceptible for the Operational Stage of the proposed development.

The design team has been in regular contact with each other throughout the design process to minimise environmental impacts and to ensure a sustainable and integrated approach to the design of the proposed development.

There is the interaction between Land and Soils Chapter where the import and export of construction materials is considered. It is noted that the designs have been developed to achieve a near balance of the cut and fill materials on site, which minimise construction related traffic. The associated construction traffic has been considered in the construction stage impacts and Construction Management Plan included with the application.

Temporary negative impacts to human health may be likely during the construction phase due to noise, dust, air quality and visual impacts which are discussed in other chapters within this EIAR. The traffic impacts, which would also be temporary in duration are not considered to be significant due to the implementation of the mitigation measures identified.

10.13 RISKS TO HUMAN HEALTH

During the construction stage, the risk of accidents associated with the proposed development are not predicted to cause unusual, significant or adverse effects to the existing public road network. The vast majority of the works are away from the public road in a controlled environment. Measures will be put in place to reduce the risk of road traffic accidents during the construction phase. Furthermore, it is expected that the risk of accidents would be low during the construction of the proposed development considering the standard construction practices which are to be used and no unusual substance or underground tunnelling works required or predicted.

10.13.1 Construction Stage

A number of temporary risks to human health may occur during construction phase related to noise, dust, air quality and visual impacts which are addressed in other sections of this EIAR. Traffic impacts are considered to be negligible due to the implementation of mitigation measures identified.

10.13.2 Operational Stage

There will be a slight increase in traffic on the local road network.

11.0 MATERIAL ASSETS – WASTE MANAGEMENT

11.1 INTRODUCTION

This chapter was prepared by Ian Byrne MSc, MIOA, Dip Environmental & Planning Law and presents the Waste Management Plan for the control and management and monitoring of waste associated with the proposed residential development at Belmount, Navan, Co. Meath during both the Construction and Operational Phases of the development.

11.2 STUDY METHODOLOGY

The proposed Construction Waste Management Plan has been prepared to demonstrate how the Construction Phase will comply with the following relevant legislation and relevant Best Practice Guidelines:

- *Waste Management Acts 1996;*
- *Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007);*
- *Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008);*
- *Department of the Environment, Heritage and Local Government – Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects – July 2006.*

The proposed Operational Waste Management Plan has been prepared to demonstrate how the Operational Phase will comply with the following relevant guidance and Meath County Councils Waste Management Policies and Objectives.

- *Waste Management Acts 1996;*
- *Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007);*
- *Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008);*
- *Eastern-Midlands Region Waste Management Plan 2015-2021.*

Each section of the Waste Management Plan presents the potential environmental impacts, proposed monitoring methodologies, limit values where applicable, based on the concept of Best Practice and the proposed mitigation measures to be implemented at the development site. Reference to National and International Standards are also included where relevant.

The projection of material assets of human origin was conducted and resource use and management of wastes generated were assessed for both the constructional and operational phases of the proposed development and their associated impacts assessed. Mitigation and best practice waste management are proposed where appropriate.

11.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

The construction and operation of the proposed residential development will introduce new aspects of waste to the local area in terms of the short-term generation of construction waste and the longer-term generation of domestic waste when the development is occupied.

The Meath County Development Plan 2013 – 2019 has a Waste Management Strategy, the purpose of which is to promote and facilitate best practice in prevention, re-use, recovery, recycling and disposal of all waste and environmental emissions produced in the County.

It is the policy of Meath County Council, as set out in the Eastern-Midlands Region Waste Management Plan 2015-2021, to:

- *prevent or minimise the production of waste in the first instance;*
- *reduce, re-use and recycle to the maximum extent possible;*
- *endeavor to recover energy from waste where possible; and*
- *ensure the efficient and safe disposal of any residual waste.*

Meath County Council's Waste Management Policies and Objectives relevant to the proposed development are as follows:

WM POL 7

To encourage the recycling of construction and demolition waste and the reuse of aggregate and other materials in future construction projects.

WM POL 08

To promote and facilitate communities to become involved in environmental awareness activities and community-based recycling initiatives or environmental management initiatives that will lead to local sustainable waste management practices.

WM POL 09

To encourage and support the expansion and improvement of the green bin, bio-degradable waste service in order to increase the quality and quantity of materials collected for recycling

WM OBJ 10

To support the continued expansion of Bring Bank networks to a target density of 1 bank per 500 households.

WM OBJ 11

To ensure that household waste recycling is adequately addressed in all proposed new residential developments, by taking this into account during the Planning Application process.

WM OBJ 17

To require developers to prepare construction and demolition waste management plans for new construction projects over certain thresholds which shall meet the relevant recycling/recovery targets for such waste in accordance with National legislation and national and regional waste management policy.

11.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposal relates to a residential development of 544 no. dwellings on a site of c. 15.1 hectares comprising 260 no. houses (18 no. 2 bed, 207 no. 3 bed & 35 no. 4 bed) and 198 no. apartments (46 no. 1 bed, 152 no 2 bed), 30 no. duplex apartments (15 no. 2 bed & 15 no. 3 bed), and 56 no. dwellings in corner blocks (16 no. 1 bed, 24 no. 2 bed & 16 no. 3 bed) as well as the provision of two crèches (ground floor of apartment building [c. 195 sq. m] and single storey creche in housing area [c. 443 sq. m]) Open Space including playground areas; all ancillary landscape works with public lighting, planting and boundary treatments including regrading/re-profiling of site where required as well as provision of cycle paths; Provision of vehicular and pedestrian looped access through the site from 3 no. junctions located on Academy Street as well as pedestrian connection in south east of site to Dublin Road and upgrade works to junction onto the Dublin Road; along with 875 no. car parking spaces and 581 cycle spaces and 4 no. car sharing spaces; Surface water attenuation measures and underground attenuation systems as well as all ancillary site development works (reprofiling of site as required) as well as connection to existing public water supply and drainage services. All site development and landscape works.

Construction waste will arise during the construction phase. Operational phase waste generation will comprise domestic waste from the residential units and commercial waste from the creche's.

The Waste Management Plan shall be implemented throughout the construction phase and operational stage of the development to ensure the following:

- That all site activities are effectively managed to minimise the generation of waste and to maximise the opportunities for on-site reuse and recycling of waste materials.
- To ensure that all waste materials generated by site activities are removed from site by appropriately permitted waste haulage contractors and that all wastes are disposed of at approved waste licensed / permitted facilities in compliance with the Waste Management Act 1996 and all associated Waste Management Regulations.
- The Waste Management Plan for the Operational Phase of the development which will ensure that users of the development are provided with sufficient facilities to store, segregate and recycle waste.

11.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

11.5.1 Construction Phase

The development of the subject site will initially require the stripping of top and subsoils and the excavation of ground to basement level. The range of works required for the Construction Phases are summarised in Table 11.1. The expected construction wastes that will be generated throughout the course of the development are described in Table 11.2.

Construction wastes if not managed and segregated on-site will have the potential to be difficult to separate into different waste streams to allow for further processing, recovery, re-use or to be recycled.

11.5.2 Description of Proposed Development Site Activities

The range of development works to which this Waste Management Plan will be integrated into during the design phase, construction phase and operation phase of the site are summarised as follows:

Table 11.1 – Sequence of Construction Works

Activity Sequence	General Description
Identification of Existing Utility Services	Set up bunting, mark location of live services, including E.S.B., Gas etc.
Removal of Vegetation	e.g. Trees and vegetation
Site stripping	Removal and stockpiling of top and sub soils
Transport of material off site	Segregation of materials on site
Substructure	Rebar, Formwork and Pour
Superstructure	Rebar, Formwork and Pour
Roof	Rebar, Formwork and Pour and Waterproof
External Envelope	Place façade to superstructure
Internal Finishes	Mechanical & Electrical etc.
External Landscaping	Hard and soft landscaping

Table 11.2 – Typical Construction Waste Composition

Description of Waste	%
Mixed Construction & Demolition Waste	33
Wood	28
Plasterboard (Gypsum materials)	10
Ferrous Metals	8
Concrete Mixed other wastes *Total*	6 15 *100*

Table 11.3 – Predicted Waste Generation

Waste Type	Predicted tonnage to be produced	Re-Use		Recyclable		Disposal	
		Tonnage	%	Tonnage	%	Tonnage	%
Mixed C&D	1,250	125	10	1000	80	125	10
Timber	1,000	400	40	550	55	50	5
Plasterboard	500	150	30	300	60	50	10
Metals	250	12.5	5	225	90	12.5	5
Concrete	200	60	30	130	65	10	5
Mixed waste	800	160	20	480	60	160	20
Total	4,000	907.5		2685		407.5	

11.5.3 Soil Waste

It is estimated that c. 42,000m^3 of soils will be excavated to facilitate the development.

The volume of fill is estimated to be c.20,000m^3 which will result in c.22,000m^3 being exported off-site.

Landscaping of the development will re-use stockpiled excavated top soils and will utilise up to 10% or c.2,000 m^3 of topsoil.

Excavated excess soils that are required to be exported off-site shall be tested to determine their classification as hazardous or non-hazardous in accordance with EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous. Non-Hazardous soils may be suitable for re-use in other construction sites and may be declared as a by-product in accordance with Article 27* of the *European Communities (Waste Directive) Regulations 2011*.

Where feasible non-hazardous excavation material may be re-used within the proposed scheme as engineering fill or in landscaping. This will be investigated by the contractor and is subject to appropriate testing to ensure material is suitable for its proposed end use. Where excavation material may not be re-used within the proposed scheme the Contractor will endeavour to send material for authorised recovery or recycling so far as is reasonably practicable. All wastes generated from the proposed development will be delivered to authorised waste facilities granted a Waste Licence, Waste Facility Permit or Certificate of Registration.

11.5.4 Operational Phase

11.5.5 Waste Types & Quantities Operational Phase

The development consists of 544 no. dwellings and 2 no. creche units on a site of c. 15.1 hectares.

The 2014 EPA Publication, National Waste Prevention Programme, 2013 Annual Report, states:

“The household waste per person in Ireland has been decreasing over the period 2006 to 2012 from 470 kg/person in 2006 to 344 kg/person in 2012. This indicates success in national campaigns and awareness as regards waste minimisation – though effects of reduced consumption are also likely to have contributed. In addition, it suggests an economy and society that are improving the efficiency of consumption patterns with respect to waste generation.”

A value of 0.942Kg of waste generated per person per day has been therefore assumed for the purposes of this report to estimate the volume of waste to be generated at the residential development as detailed below in Tables 11.4 – 11.5.

Table 11.4 – Calculated daily domestic waste generation

House Type	# Units	Occupants	Waste/Day	Waste/week

	No.	No.	Kg	Kg
Residential Units	544	2,325	2,190	15,331
Creche	2	150	141	707
Total for development	n/a	2,475	2,331	16,038

Table 11.5 – Calculated domestic waste composition Residential Development

Waste Type	% Waste	Kg/day	m3/day	kg/week
Organic waste	30.6	670	1.11	4691
Paper	12.5	274	1.24	1916
Cardboard	3.6	79	0.37	552
Composites	1	22	0.08	153
Textiles	15.5	339	3.15	2376
Plastics	13.6	298	7.42	2085
Glass	3.4	74	0.09	521
Metals	3.1	68	0.76	475
Wood	1.2	26	0.30	184
Hazardous municipal waste	0.9	20	0.07	138
Unclassified combustables	1.4	31	0.11	215
Unclassified incombustables	1.2	26	0.10	184
Fines	11.7	256	0.96	1794
Bulky Waste & WEEE	0.3	7	0.02	46
Totals	***100***	***2190***	***16***	***15331***

If waste infrastructure and appropriate waste management systems are not integrated into the design and the operation of the proposed development, domestic waste will not be segregated at source or appropriately managed on-site and the operation of the development will not function in accordance with the waste management policies of Meath County Council or comply with the waste reduction and recycling and re-use targets defined in the *Eastern-Midlands Region Waste Management Plan 2015-2021.*

11.5.6 *Do Nothing'* Scenario

Should the site not be developed for residential use and remain in agricultural use, it will continue not to have any impact or demand on local waste services or on the receiving environment.

11.6 POTENTIAL CUMULATIVE IMPACTS

With regard to other existing, under construction and proposed residential developments in the general Navan area, together with the proposed development at Belmount, there will be a greater demand on existing local waste management services and on waste acceptance facilities. It is necessary that the subject development in addition to others are operated in a sustainable manner that reduces the generation and disposal of un-segregated domestic mixed waste and that provide the infrastructure and management services to assist residents to segregate domestic waste at source.

11.7 AVOIDANCE, REMEDIAL AND MITIGATION MEASURES

The Construction and Operational Waste Management Plans have been designed to ensure that the construction and operational phases of the proposed development will be managed to reduce the generation of unsegregated wastes, to maximise the potential for recycling, recovery and re-use and to demonstrate how the development will operate in a sustainable manner in terms of waste management and contribute to the achievement of the Regions compliance with the waste reduction targets specified in *The Eastern-Midlands Region Waste Management Plan 2015-2021* (and any subsequent future revisions).

The general principles and key aspects of the Construction and Operational Waste Management Plans are detailed as follows:

11.7.1 Construction Phase Waste Management Plan

The Construction Phase Waste Management Plan prepared by Byrne Environmental (included with the SHD application) specifically addresses the following points:

Waste materials generated by construction activities will be managed according to the Department of the Environment, Heritage and Local Government's 2006 Publication - *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects.*

- Analysis of waste arisings / material surpluses
- Specific Waste Management objectives for the Project including the potential to re-use existing on-site materials for further use in the construction phase.
- Methods proposed for Prevention, Reuse and Recycling
- Waste Handling Procedures
- Waste Storage Procedures
- Waste Disposal Procedures
- Record Keeping
- Record Keeping

Waste minimisation and prevention shall be the primary responsibilities of the Construction Project Manager who shall ensure the following:

Materials will be ordered on an *"as needed"* basis to prevent over supply

Materials shall be correctly stored and handled to minimise the generation of damaged materials

Materials shall be ordered in appropriate sequence to minimise materials stored on site

Sub-contractors will be responsible for similarly managing their wastes

11.7.1.1 Programme of Waste Management for Construction Works

It is proposed that the construction Contractor as part of regular site inspection audits will determine the effectiveness of the waste management statement and will assist the project manager in determining the best methods for waste minimisation, reduction, re-use, recycling and disposal as the construction phase progresses and waste materials are generated.

11.7.1.2 Construction Waste Disposal Management

It is proposed that from the outset of construction activities, a dedicated and secure compound containing bins, and/or skips, and storage areas, into which all waste materials generated by construction site activities, will be established within the active construction phase of the development site.

In order to ensure that the construction contractor correctly segregate waste materials, it is the responsibility of the site construction manager to ensure all staff are informed by means of clear signage and verbal instruction and made responsible for ensuring site housekeeping and the proper segregation of construction waste materials.

It will be the responsibility of the Project Construction Manager to ensure that a written record of all quantities and natures of wastes exported -off site are maintained on-site in a Waste File at the Project office.

It is the responsibility of the Project Construction Manager or his/her delegate that all contracted waste haulage drivers hold an appropriate Waste Collection Permit for the transport of waste loads and that all waste materials are delivered to an appropriately licenced or permitted waste facility in compliance with the following relevant Regulations:

Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007)
Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008)
Waste Management (Facility Permit and Registration) Regulations S.I.821 of 2007 and the Waste Facility Permit under the Waste Management (Facility Permit and Registration) Amendment Regulations S.I.86 of 2008.

Prior to the commencement of the project, the Project Construction Manager shall identify a permitted Waste Contractor who shall be employed to collect and dispose of all wastes arising from the project works. In addition, the Project Construction Manager shall identify and all waste licensed / permitted facilities that will accept all expected waste exported off-site and will maintain copies of all relevant Waste Permits / Licences as required.

All waste soils prior to being exported off-site, shall be classified as inert, non-hazardous or hazardous in accordance with the *EPA's Waste Classification Guidance – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* document dated 1st June 2015 to ensure that the waste material is transferred by an appropriately permitted waste collection permit holder and brought to an appropriately permitted or licensed waste facility.

11.7.1.3 On-Site Waste Reuse and Recycling Management

Construction waste material such as soils, damaged or broken concrete slabs, blocks, bricks and tiles generated that is deemed by the Project Engineer to be suitable for reuse on the Project site for ground-fill material and landscaping. This initiative shall provide a positive environmental impact to the construction phase as follows:

- Reduction in the requirement for virgin aggregate materials from quarries
- Reduction in energy required to extract, process and transport virgin aggregates
- Reduced HGV movements associated with the delivery of imported aggregates to the site
- Reduced noise levels associated with reduced HGV movements
- Reduction in the amount of landfill space required to accept C&D waste
- Reduction in the volume of soils to be exported off-site

11.7.1.4 Waste Storage Compound

A waste storage compound shall be set up on-site from the commencement of site activities. The compound shall include the following:

Separate waste skips labelled with signage stating the nature of waste materials that can only be placed in the skips

Waste oils / containers shall be placed in dedicated mobile bunds units.

Soils contaminated by accidental on-site spillages of oils / construction hydrocarbons shall be stored in clearly identified hazardous waste storage containers.

Spill kits with instructions shall be located in the waste storage compound.

11.7.1.5 Soils

As the subject development site is currently greenfield and in agricultural use with no evidence of historic dumping or industrial use, it is predicted that the top and subsoils will be characterised as being inert in accordance with *Landfill Directive (2003/33/EC).*

Top and subsoils shall be re-used on-site for landscaping purposes to minimise the volume of soils to be exported off-site

Excess soils shall be exported to an appropriately waste permitted/licenced facility.

The Project Construction Manager shall inform Meath County Council of the volume of excess soils generated and the permitted / licenced waste facility they shall be exported to.

Excess soils shall be removed off-site throughout the duration of the construction phase. Prior to being removed off-site the excess soils shall be characterised as being inert, non-hazardous or hazardous in accordance with *Landfill Directive (2003/33/EC).* The classification of the soils shall be established by WAC testing which shall occur throughout the construction phase.

Excavated excess soils that are required to be exported off-site shall be tested to determine their classification as hazardous or non-hazardous in accordance with EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous. Non-Hazardous soils may be suitable for re-use in other construction sites and may be declared as a by-product in accordance with Article 27* of the *European Communities (Waste Directive) Regulations 2011*. Article 27 requires that the material classified not a waste but a by-product must meet specific criteria and that that a declaration of a material as a by-product is notified to the EPA.

11.7.1.6 Contaminated Soils

Where contaminated soils/materials are discovered or occur as a result of accidental spillages of oils or fuels during the construction phase, these areas of ground will be isolated and tested in accordance with the *2002 Landfill Directive (2003/33/EC)* for contamination, and pending the results of laboratory WAC testing, will be excavated

11.7.1.7 Record Keeping

It is the responsibility of the Project Construction Manager or his/her delegate that a written record of all quantities and natures of all wastes reused / recycled and exported off-site and Article 27 declarations during the project are maintained in a Waste File at the Project office.

The following information shall be recorded for each load of waste exported off-site:

- Waste Type EWC Code and description
- Volume of waste collected
- Waste collection contractor's Waste Collection Permit Number and collection receipt including vehicle registration number
- Destination of waste load including Waste Permit / Licence number of facility
- Description of how waste at facility shall be treated : disposal / recovery / export
- The waste records shall be issued to Meath County Council as required / requested.

11.7.1.8 Waste Management Auditing

In order to ensure that construction wastes generated during the course of the development are being effectively managed and recorded, a waste management audit shall be conducted on a routine basis by an independent waste management consultant to determine compliance with the Construction Phase Waste Management Plan.

11.7.2 Operational Phase Waste Management Plan

An Operational Phase Waste Management Plan (OWMP) has been prepared as a stand-alone report to accompany this planning application. The OWMP has been prepared to demonstrate how the required infrastructure will be incorporated into the design and operational management of the development to ensure that domestic wastes will be managed and monitored with the objective of maximizing the quantity of waste segregated at source and maximizing the volume of clean recyclable materials generated by the residents of the development.

The Goal of the OWMP is to achieve a compliance with *The Eastern-Midlands Region Waste Management Plan* 2015-2021 which defines the following Waste Targets:

- *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.*
- *Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill.*

The Operational Waste Management Plan has been prepared in accordance with strategy, policy and objectives of the *Meath County Development Plan 2013 – 2019*.

Key Aspects of the OWMP to achieve Waste Targets:

- All residential units shall be provided with information on the segregation of waste at source and how to reduce the generation of waste by the Facilities Management Company.
- All waste handling and storage activities shall occur in the dedicated communal apartment waste storage areas.
- The development's Facility Management Company shall appoint a dedicated Waste Services Manager to ensure that waste is correctly and efficiently managed throughout the development.

The Operational Phase of the Waste Management Plan is defined by the following stages of waste management for both the residential and commercial aspects of the development:

- Stage 1 Occupier Source Segregation
- Stage 2 Occupier Deposit and Storage
- Stage 3 Bulk Storage and On-Site Management
- Stage 4 On-site treatment and Off-Site Removal
- Stage 5 End Destination of wastes

The OWMP has been prepared with regard to *British Standard BS 5906:2005 Waste Management in Buildings-Code of Practice* which provides guidance on methods of storage, collection, segregation for recycling and recovery for residential building.

The apartments which will include a 3-bin waste segregation at source system together with the communal waste storage areas have been designed with regard to *Section's 4.8 and 4.9 Refuse Storage of The Department of Housing, Planning and Local Government – Sustainable Urban Housing : Design Standards for New Apartments – Guidelines for Planning Authorities. 2018.*

The proposed residential development at Belmount shall be designed and managed to provide residents with the required waste management infrastructure to minimise the generation of un-segregated domestic waste and maximise the potential for segregating and recycling domestic waste fractions.

The **Objective** of the OWMP is to maximise the quantity of waste recycled by residents by providing sufficient waste recycling infrastructure, waste reduction initiatives and waste collection and waste management information services to the residents of the development.

The **Goal** of this Waste Management Plan is to achieve a residential recycling rate of 50% of managed municipal waste by 2020 (and future targets in subsequent Regional Waste Management Plans).

All apartments, duplex units and houses will have a 3-bin system (non-recyclable, organic and recyclable) in each kitchen to encourage residents to segregate waste at source.
Apartment residents will be provided with waste recycling and waste disposal information by the development's Facility Management Company who will be responsible for providing clean, safe and mobility impaired accessible communal waste storage areas for the apartment blocks.

House residents shall engage private waste collection contractors who provide a 3-bin waste collection service.

The Facility Management Company shall maintain a register of all waste volumes and types collected from the development each year including a break-down of recyclable waste and where necessary, shall introduce initiatives to further encourage residents to maximise waste segregation at source and recycling. They shall also provide an annual bulky waste and WEEE collection service for all residents.

The development shall be designed to provide adequate domestic waste storage areas for each apartment blocks. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development. Communal waste bin storage areas shall be designed in a manner to ensure that appropriate signage for the correct disposal and recycling of waste is available for residents.

11.8 PREDICTED IMPACTS

11.8.1 Construction and Operational Phases

The management of wastes generated during the construction of the proposed development will be in accordance with a Construction Phase Waste Management Phase (which is included with the SHD application). As long as the construction is completed in accordance with the plan it is envisaged that the impact of the construction (excavation and construction waste) phase will be temporary and slight.

With regard to how it has been demonstrated how construction and domestic wastes will be managed through design, management and waste reduction and recycling initiatives at the proposed development, it is predicted that the impact of the development on the receiving environment, existing material assets and local waste management services will be minor.

With the implementation of the proposed mitigation measures:

The predicted impact of operational waste will be long term, moderate and negative.

There is likely to be significant available capacity within existing Irish waste management infrastructure to manage operational phase wastes from the proposed development.

The development shall be designed to provide adequate domestic waste storage areas for common residential areas (apartments), duplex units and individual houses. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development.

11.8.2 ‘*Worst-case’* Impacts

There are no worst-case impacts associated with the proposed development as sufficient capacity and waste storage space will be provided for both the construction and operational phases. Sufficient waste storage space will be provided for both the construction and operational phases.

11.8.3 Cumulative Impacts

The Belmount development comprising 544 no. dwellings would result in 15,331Kg of domestic waste per week.

Table 11.4 – Calculated daily domestic waste generation

House Type	# Units	Occupants	Waste/Day	Waste/week
	No.	No.	Kg	Kg
Residential Units	544	2325	2190	15,331

Creche	2	150	141	707
Cumulative Total Estimate	546	2475	2,331	16,038

The legislative and best practice mitigation measures set out above would also be applicable to these projects and the implementation of these measures will ensure that there are no negative cumulative impacts on the environment from the management of waste materials from these projects with the proposed development, should all projects proceed.

The Construction and Operational Waste Management Plans that have been designed for the proposed development will provide the designers the information to ensure that the potential impact of the construction and operational phases of the development will have a negligible impact on the receiving environment. Mitigation measures included above will result in a short term and imperceptible impact in respect of soil removal.

The compliance requirements and mitigation measures set out above would also be applicable to other new and proposed residential developments in the area, and the implementation of these measures will ensure that there are no negative cumulative impacts on the environment from the management of waste materials, during the operational phase.

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.

11.9 MONITORING

The Facility Management Company shall prepare an annual report for the Local Authority and residents of the development on the quantities of waste generated within the development to demonstrate how waste reduction and recycling targets are being achieved with regard to the targets defined in *The Eastern-Midlands Region Waste Management Plan 2015-2021.*

11.10 REINSTATEMENT

No reinstatement is required.

12.0 MATERIAL ASSETS - UTILITIES

12.1 INTRODUCTION

This chapter of the Environmental Impact Assessment Report (EIAR) considers & assesses the potential impacts on local utilities in regard, to the proposed scheme. Measures to mitigate any likely significant adverse impacts of the proposed scheme are reviewed and analysed.

This report was prepared by Robert Fitzmaurice of CS Consulting, Chartered Engineer with Engineers Ireland, qualifications include BEng (Hons) degree in Civil & Environmental Engineering, Post Graduate Diploma in Environmental Engineering and a Master's Degree in Industrial Engineering.

12.2 METHODOLOGY

The following section outlines the legislation and guidelines considered, and the adopted methodology for preparing this chapter.

12.2.1 Guidelines

The methodology followed for this section is in accordance with the EPA *"Revised Guidelines on the Information to be contained in Environmental Impact Statements, Draft September 2015"* and "Advice Notes for Preparing Environmental Impact Statements Draft September 2015".

The following legislation, standards and guidelines were consulted to inform the assessment:

- Guidelines on the information to be contained in Environmental Impact Statements, 2002, EPA;
- Advice Notes on Current Practice (in preparation of Environmental Impact Statements), 2003, EPA;
- EPA: Draft Revised Guidelines on The Information to be Contained in Environmental Impact Assessment Reports, August 2017;
- EPA: Advice Notes for Preparing Environmental Impact Statements, Draft, September 2015;
- Irish Waters Code of Practice for Water Infrastructure;
- Irish Waters Code of Practice for Wastewater Infrastructure;
- Greater Dublin Strategic Drainage Study, (DCC 2005);
- Regional Code of Practice for Drainage Works, (DCC 2005);
- The Planning System & Flood Risk Management – Guidelines for Planning Authorities, Dept. of Environment, Heritage & Local Government. (Government of Ireland 2009).

As part of assessing the likely impact of the proposed development, surface water runoff, foul drainage discharge and water usage calculations were carried out in accordance with the following guidelines:

- Greater Dublin Strategic Drainage Study (GDSDS);
- IS EN752, "Drain and Sewer Systems Outside Buildings";
- Irish Water's Pre-Connection Enquiry Application (water demand and foul water loading);

12.2.2 Study Area

The study is confined to the client's lands for the submitted application, refer to the planning drawings, notably CS Consulting Drawing D061-010 Topographical Survey. The subject lands cover an area of 15.1 Ha.

12.3 EXISTING RECEIVING ENVIRONMENT (BASELINE SCENARIO)

The subject lands are located within the administrative jurisdiction of Meath County Council. The site is bounded to the west and south by existing dwellings; to the east by existing dwellings and Academy Street to the north and by agricultural lands and Belmount House located in proximity to the centre of the subject site.

12.3.1 Existing Storm Water Infrastructure

Public storm water infrastructure in Navan is under the administrative control of Meath County Council. A review of the publicly available records indicate a number of existing storm water sewers in the area. These will be utilized for the ultimate attenuated disposal of stormwater from the development.

12.3.2 Existing Foul Water Infrastructure

All public foul sewerage infrastructure is under the administrative control of Irish Water. A review of their records indicate a number of foul sewers in the vicinity of the subject lands. Irish Water records indicate an existing 300mm foul sewer located to the north east of the subject lands on Dublin Road. This sewer drains to the north west into an existing Irish Water foul pumping station before ultimate treatment at the regional Wastewater treatment plant in Navan.

Furthermore, Irish Water records indicate an existing 225mm foul sewer north west of the subject site which drains north toward the above mentioned 300mm foul sewer on the Dublin Road. Refer to CS Consulting Drawing D061/012 and **D061/013** for details of same.

12.3.3 Existing Potable Water Infrastructure

As with the Foul infrastructure, potable water services are under the administrative control of Irish Water. A review of the available records indicate a 250mm OD PE100 SDR 11 main to the north east of the subject lands.

12.3.4 Existing ESB Infrastructure

There is an ESB distribution substation located adjacent to the site with access onto Academy street. There are a number of overhead 10kv distribution lines traversing the site which will require diversion/undergrounding prior to commencement of the development works. Initial discussions with the local ESB office indicates no major issues with this proposal and ESB design will commence once a formal application is submitted post planning approval. There is also Siro infrastructure ducted from this sub-station location and distributed via Academy street. Again, careful planning and co-ordination with ESB will be required to develop a strategy for any diversion works.

12.3.5 Existing Broadband Infrastructure

There is substantial existing broadband infrastructure in the vicinity of the proposed development site with EIR, Virgin and Siro networks located on the adjacent Academy Street. Broadband infrastructure will be provided to the new development which will connect to existing infrastructure at the site boundary. Initial discussions with all utility providers indicate capacity is available in existing networks.

12.3.6 Existing Gas Infrastructure

There is an existing 4 Bar gas main installed to the site boundary on Academy street with a pressure reducing station located at the apartment site opposite the site on Academy Street. Initial discussions with Gas Networks indicates sufficient capacity in the network if gas is considered as a heat source for some or a portion of the site.

12.4 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposal relates to a residential development of 544 no. dwellings on a site of c. 15.1 hectares comprising 260 no. houses (18 no. 2 bed, 207 no. 3 bed & 35 no. 4 bed) and 198 no. apartments (46 no. 1 bed, 152 no 2 bed), 30 no. duplex apartments (15 no. 2 bed & 15 no. 3 bed), and 56 no. dwellings in corner blocks (16 no. 1 bed, 24 no. 2 bed & 16 no. 3 bed) as well as the provision of two crèches (ground floor of apartment building [c. 195 sq. m] and single storey creche in housing area [c. 443 sq. m]) Open Space including playground areas; all ancillary landscape works with public lighting, planting and boundary treatments including regrading/re-profiling of site where required as well as provision of cycle paths; Provision of vehicular and pedestrian looped access through the site from 3 no. junctions located on Academy Street as well as pedestrian connection in south east of site to Dublin Road and upgrade works to junction onto the Dublin Road; along with 875 no. car parking spaces and 581 cycle spaces and 4 no. car sharing spaces; Surface water attenuation measures and underground attenuation systems as well as all ancillary site development works (reprofiling of site as required) as well as connection to existing public water supply and drainage services. All site development and landscape works.

Refer to Chapter 2.0 (Description of Development and Alternatives) for a detailed site and development description.

12.4.1 Surface Water Drainage

A new surface drainage system that will collect runoff from roads and roofs together with any additional runoff from landscape areas which does not percolate to ground.

Given the size of the development, the site has been divided in three areas for surface water collection purposes. It is proposed to provide a network varying in pipe diameter from 225mm to 600mm diameter pipes for each of these areas and to connect them to separate attenuation tanks.

The tanks have been sized to provide storage for 1 in 100-year rainfall event including a 10% increase for a climate change for the entire development with the discharge rate limited from 0.6l/s l/s to 30.1 l/s depending on the zone that the attenuation tank is located in. Surface water drainage will discharge from the Attenuation Tanks to a gravity surface water sewer just to the north of the site entrance at Academy St.

Proposed attenuation tanks have the following volumes:

Table 12.1 – Attenuation Tank Volumes

Attenuation Tank	Location	Contributing Area (m2)	Vol. required (m3)	Vol. provided (m3)
A1 & A2	See drawing *D061-012* *D061-015*	24,800	737	742
B	See drawing *D061-014*	63,800	2315	2315
C & D & E	See drawing *D061-012* *D061-013* *D061-014*	49,800	1532	1548
SW-63B	See drawing *D061-012*	360	8	8

All surface water drainage shall be constructed in accordance with Greater Dublin Regional Code of Practice for Drainage Works and Meath County Council Requirements.

As part of the development, a number of different SuDS measures are proposed to minimise the impact on water quality and quantity of the runoff and maximise the amenity and biodiversity opportunities within the site.

The Ground Investigation Report indicates variable permeability across the site, which makes the use of groundwater recharge difficult to determine. Therefore, the measures detailed below have been designed to take account of potential percolation, but have not been incorporated into any storage calculations. This will result in additional storage being available in extreme events.

The SuDS design for the proposed development is based on dividing the site into several smaller catchment areas in order to provide source control.

It is proposed to provide the following SuDS measures:

- Individual *water 'Butts'* to rainwater retention & local reuse,
- Infiltration trench to rear of housing units,
- Permeable Paving,
- Swales,
- Petrol Interceptor.

The attenuation tanks have been sized to provide storage for runoff from the roofs, footpaths and any runoff from the green areas which does not percolate to the ground. The volumes of the attenuation tanks include a 10% increase in rainfall depth to allow for climate change.

Permeable paving will be provided for car parking spaces and driveways within the site. It is proposed to provide storage beneath the permeable paving areas to attenuate any surface water runoff from these areas. These storage areas will have a depth of 300mm and will have a voids ratio of 30%.

12.4.2 Foul Drainage

All foul effluent generated from the proposed development shall be collected in pipes of 225mm in diameter and flow under gravity to the existing 225mm diameter foul sewer on Academy Street via a new connection. The drainage network for the development will be in accordance with Part H of the Building Regulations and to the requirements and specifications of Irish Water.

As required by Irish Water, who since 2014 are in control of foul drainage services, a pre-connection enquiry, PCE, is required to be submitted for all SHD applications to ensure that the current existing infrastructure. CS Consulting submitted the PCE to Irish Water and received a response on the 26/02/2018. Their response gave details of substantial offsite works which would be required to facilitate the proposed development.

Discussions were held with Irish Water who reviewed their response and carried out additional checks on the current network. Following Irish Waters internal review a second pre-connection enquiry was lodged with Irish Water for which a response was received on the 19/08/2019. This response indicated that a section of foul sewer was required to be constructed for the development. Please see Appendix D of Engineering Services Report for the Confirmation of Feasibility Letter. No third party permissions are required for the connection or up-grade works**.**

In addition a Statement of Design Acceptance has been issued for the proposed development and is included with the planning application.

All foul drainage shall be constructed in accordance with Greater Dublin Regional Code of Practice for Drainage Works and Irish Water requirements.

12.4.3 Water Supply

A review of Irish Water records indicates a 250OD PE100 watermain along Academy St. It is proposed to connect into the existing potable water supply located on Academy Street. A pre-connection enquiry was submitted to Irish Water to determine the suitability of the proposed water supply to the site. A new Pre-Connection Enquiry response was issued by Irish Water.

Discussions were held with Irish Water who reviewed their response and carried out additional checks on the current network. Following Irish Waters internal review a second pre-connection enquiry was lodged with Irish Water for which a response was received on the 19/08/2019. This response indicated that a section of watermain was required to be constructed for the development. In addition a Statement of Design Acceptance has been issued for the proposed development and is included with the planning application. No third party permissions are required for the connection or up-grade works.

The daily demand has been calculated as 229.77 m3/day as per the Engineering Report.

All watermains will be constructed in accordance with Irish Water requirements following consultation with Irish Water New Connections at construction stage.

12.4.4 ESB Power

Various options are under consideration with regard to possible heating & energy strategy for the site Following feasibility and appraisals of the various options, the impact and loading for utilities will determined. One option under consideration for heating and hot water to dwellings/apartment units comprises air to water heat pump units. As such, there will be no requirement for gas services to apartment units. However, gas is still under consideration. Provision for gas supply is under consideration to commercial units. Individual gas connections will be provided to commercial units where provided and will be served from the existing gas network adjacent to the building. The existing gas network local to the building comprises a high pressure gas network main at 4 bar which will require pressure reducing station local to the development if gas is extended into the site.

At this stage of the project utility demand calculations are being undertaken to determine the loading the proposed development will require. Utility providers have been contacted to determine the location and availability of supply in the areas surrounding the site and where their preferred tie-in location exists. Following this, distribution routes within the site will be developed and coordinated with design team to ensure the most efficient and flexible distribution of utility supply.

Initial discussions and engagement with ESB have been ongoing and sub station locations and metering strategy has been determined in accordance with ESB requirements. Electrical services will be assessed and designed in accordance with prevailing standards and guidance documents comprising but not limited to the following:

- ETCI Regulations ET101
- Building regulation technical guidance documents
- IS3217
- IS3218
- IS EN 60439;
- IS EN 60947;
- IS EN 60529
- BS 604:2000 (2006).
- The IEE regulation for electrical installation.
- Health & safety requirements.
- Fire authority requirements.

12.4.5 Gas

If gas is adopted as the fuel source of choice for the heating systems in the scheme, a new gas connections be made at the eastern boundary of the site at the Academy Street boundary. 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 with the possible exception of a gas pressure reduction station if required by Gas Networks Ireland.

12.4.6 Telecommunications - Eir

A new connection will be made to the existing Eir network at the eastern boundary of the site at the Academy Street entrance. The exact extent and location of these connections will be agreed with Eir during the design stage of the project.

All works on the Eir supply infrastructure will be carried out in accordance with Eir's relevant guidelines. All Eir infrastructure will be below ground with the possible exception of a Fibre Cabinet if required by Eir.

12.4.7 Telecommunications – Virgin Media

A new connection will be made to the existing Virgin Media network at the eastern boundary of the site at the Academy Street entrance. The exact extent and location of these connections will be agreed with Virgin Media during the design stage of the project.

All works on the Virgin Media supply infrastructure will be carried out in accordance with Virgin Media's relevant guidelines. All Virgin Media infrastructure will be below ground with the possible exception of a Fibre Cabinet if required by Virgin Media.

12.5 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

12.5.1 Construction Phase

Power and water would be required during construction activities and servicing of the temporary site compound. The development site would be connected to the local electricity grid network system and mains water supply. Given the scale and transient nature of construction works, the power and water demand on the local electricity and mains water systems would not be considered significant and would not be anticipated to impact upon local power or water supply.

Telecommunications requirements during the construction phase would be provided using mobile phones / broadband. There would be no anticipated impacts to the local telecommunications system.

Foul water from staff welfare facilities generated during the construction phase would be collected on site in designated waste holding containers / port-a-loo units and emptied on a regular basis by a licenced waste contractor. The construction works contractor would liaise with the relevant utilities provider prior to works commencing, with ongoing consultation throughout the proposed development. Where new services would be required, the construction works contractor would apply to the relevant utility provider and adhere to the requirements outlined in the connection permit / licence.

Power, Gas & Telecommunications

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 impact on neighbouring properties.

Potential loss of connection to the Gas Networks Ireland infrastructure while carrying out works to provide service connections. This likely adverse impact may be characterised as a temporary, regionally short term, moderate impact. Potential loss of connection to the Telecommunications infrastructure while carrying out works to provide service connections. This likely adverse impact may be characterised as a temporary, regionally short term, moderate impact. The site compound will require a power and telecommunications connection. This likely adverse impact will be temporary and negligible.

12.5.2 *‘Do-nothing’* scenario

There are no predicted impacts on these material assets should the proposed development not proceed.

12.5.3 Operational Impacts

Potential operational phase impacts on the water infrastructure are noted below:

Surface Water
During the operational phase of the works, the surface water drainage has been designed to maintain the flows from the site at the greenfield run-off rates.

Foul Water
The impact of the operational phase of the proposed development on the foul drainage network would be the increased flows to the foul network. Irish Water have confirmed in the pre-connection response that a section of foul sewer is required to be constructed for the development.

The impact of the operational phase of the proposed development on the foul drainage network would be to increase the demand on the existing network.

Watermains
The impact of the operational phase of the proposed development on the water supply network would be the increased demand on the local system. Irish Water have confirmed in the pre-connection response that there is a section of watermain required to be up-graded for the development.

12.5.4 Power, Gas & Telecommunications

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 2.5MW which will be split over up to 5 substations located throughout the housing 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 5.5MW 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.

12.6 MITIGATION MEASURES

12.6.1 Construction Mitigation

The construction works contractor shall liaise with the relevant utilities provider prior to works commencing, with on-going consultation throughout the proposed development. Where new services would be required, the construction works contractor shall apply to the relevant utility provider and adhere to the requirements outlined in the connection permit / licence.

The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services unless this has been agreed in advance with the relevant service provider.

All works in the vicinity of utilities apparatus will be carried out in ongoing consultation with the relevant utility company or local authority and will be in compliance with any requirements or guidelines they may have.

Where new services or diversions to existing services are proposed, the Contractor will apply to the relevant utility company for a connection permit where appropriate, and will adhere to their requirements.

Mitigation measures proposed in relation to the drainage and water infrastructure include the following:

A detailed *"Construction Management Plan"* will be developed and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the "Construction Management Plan".

Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.

In the event of groundwater being encountered during the construction phase, mitigation measures will include dewatering by pumping to an appropriate treatment facility prior to discharge. Other measures would include excluding contaminating materials such as fuels and hydrocarbons from sensitive parts of the site i.e. highly vulnerable groundwater areas.

In order to reduce the risk of defective or leaking sewers, all new sewers should be laid in accordance with Irish Water standards, pressure tested and CCTV surveyed to ascertain any possible defects.

The construction compound will include adequate staff welfare facilities including foul drainage and potable water supply. Foul drainage discharge from the construction compound will be removed off site to a licensed facility until a connection to the public foul drainage network has been established.

The construction compound's potable water supply shall be protected from contamination by any construction activities or materials.

Where possible backup network supply to any services will be provided should the need for relocation or diversion or existing services be required otherwise relocation or diversion works will be planned to incur minimal impact, with users notified in advance of any works.

Connections to the existing gas and telecommunications networks will be coordinated with the relevant utility provider and carried out by approved contractors.

12.6.2 Stormwater Infrastructure

In accordance with the Greater Dublin Regional Code of Practice for Drainage Works, all sites are required to develop a drainage system which separates storm & foul water on site.

In addition to improving overall storm water quality following Meath County Council sustainable urban drainage systems, SuDs protocols, there is also a requirement to reduce storm water runoff rates to pre-development levels. To achieve this the scheme will provide internal stormwater attenuation tanks to provide the storm water required for the predicated 1-in-100 year, increased by 10% for the predicated effects of climate change. The proposed attenuation volume to be provided for the development has been calculated at 4,594m^3. The proposed development will have three locations where it connects into the public stormwater system, before ultimate disposal into the Boyne River.

The proposed restriction of storm water flows from the site during extreme weather events will increase the capacity of the existing infrastructure to convey storm flows.

12.6.3 Foul Infrastructure

All foul water infrastructure is under the control of Irish Water. The proposed development will be serviced by a new separate internal foul network for the proposed development. The proposed development will have two connection locations from the development to the existing foul drainage infrastructure.

As required by the SHD process, Irish Water are required to review the schemes foul drainage proposal & to issue a letter of Design Acceptance, this has been received by the design team and is included as an appendix in the CS Consulting Engineering Service Report accompanying this submission.

A requirement from the Irish Water review for the development is to up-grade part of the local foul drainage network, as these works are located outside of the subject lands these works will be carried out by Irish Waters regional contractor, and agreement for same will form part of the Applicants connection agreement post planning.

12.6.4 Potable Water Infrastructure

All potable water infrastructure is under the control of Irish Water. The proposed development will be serviced by a new separate internal water network for the proposed development. The proposed development will have two connection locations from the development to the existing 250mm OD watermain located in Academy St.

As required by the SHD process Irish Water are required to review the schemes potable water proposal & to issue a letter of Design Acceptance, this has been received by the design team and is included as an appendix in the CS Consulting Engineering Service Report accompanying this submission.

A requirement from the Irish Water review for the development is to up-grade part of the local potable water network, as these works are located outside of the subject lands these works will be carried out by Irish Waters regional contractor, and agreement for same will form part of the Applicants connection agreement post planning.

12.6.5 Operational Mitigation

Please refer to Chapter 6 of the EIAR – Water for mitigation measures associated with the surface water treatment. All new drainage lines (foul and surface water) will be pressure tested and will be subject to a CCTV survey to identify any possible defects prior to being made operational.

Chapter 6 includes the mitigation measures associated with the surface water system for the development.

Water conservation methods such as the use of low flush toilets and low flow taps should be incorporated into dwellings to reduce water volumes and related treatment and abstraction costs of the development.

Similarly, water conservation methods would reduce the loading on the foul sewer network. As part of the development, a number of different SuDS measures are proposed to minimise the impact on water quality and quantity of the runoff and maximise the amenity and biodiversity opportunities within the site.

The measures detailed below have been designed to take account of potential percolation, but have not been incorporated into any storage calculations. This will result in additional storage being available in extreme events.
The proposed SuDS measures will include a combination of Source Control, Site Control and Regional Control measures as part of a Management Train whereby the surface water is managed locally in small sub-catchments rather than being conveyed to and managed in large systems further down the catchment. The combination of the SuDS measures outlined below will maximise the potential for surface water infiltration to the subsoil, reducing the impact on the existing surface water drainage network. The proposed techniques will offer a high level of treatment processes and nutrient removal of the turnoff, particularly during the “first flush”.

On completion of the construction phase no further mitigation measures are proposed in relation to the electrical, gas and telecommunications infrastructure.

The proposed development is located within an area designated for the type of development proposed. As such the services pertaining to the development are required to facilitate the proposed scheme. It is not possible to not provide the services required. Notwithstanding this, the potable water, foul & stormwater services have all been designed in accordance with the requirements of the various stake holders, notable Irish Water for the foul & potable water utilities and Meath County Council for the surface water services.

12.6.6 ESB Infrastructure

ESB have been engaged at an early stage to ensure an potential issues with utility connections are reviewed and mitigated as early in the process as possible. ESB will not engage with design process until such time as planning has been approved and scheme name and numbering is approved. However, initial discussions and proposal have been positive.

The proximity to the existing ESB sub-station ensures access to MV network which avoids the need for extensive network upgrades and infrastructure.

12.7 CUMULATIVE IMPACTS

12.7.1 Stormwater Infrastructure

The cumulative impacts of the proposed development are that the local hydraulic pressure on the storm sewer will be reduced. The requirement to attenuate the subject site to pre- development run-off rates will ensure that during extreme storm events the surface water from the development is limited, this will ‘free up’ capacity in the existing storm sewer. The use of sustainable urban drainage features will aid in improving overall storm water quality prior to ultimate discharge.

12.7.2 Foul Infrastructure

The potential impacts on the local and regional foul drainage system are that the proposed development would reduce capacity in the adjoining sewer and the capacity in the Regional WasteWater Treatment Plant in Navan. Notwithstanding same, the lands are zoned for residential development and local up-grades to the regional infrastructure combined with the adequate capacity in the WwTP in Navan.

12.7.3 Potable Water Infrastructure

The potential impacts for the local public potable water are that the proposed development will reduce the capacity in the public main.

12.7.4 ESB Infrastructure

Potential impacts for ESB are impact on existing network capacity and potential issues with current harmonics if heat pumps are selected as energy source.

12.7.5 Broadband Infrastructure

Potential impacts for ESB are impact on existing network capacity.

12.7.6 ‘DO NOTHING’ IMPACT

In the “do-nothing” scenario the proposed site would not be redeveloped and therefore there would be no adverse impacts to the foul, stormwater & potable water system.

12.8 PREDICTED IMPACTS OF THE PROPOSED DEVELOPMENT

12.8.1 Stormwater Infrastructure

The predicated impacts are that the use of an attenuation system to restrict storm water flow from extreme storm events will aid in the freeing up of hydraulic capacity in the existing sewer during extreme storm water events. By reducing the storm water run-off during extreme storm events will increase the capacity in the existing sewer. The use of SuDs sytems will also have the effect in removing polluting matter from the first flush of rainfall event, which will improve the overall storm water quality leaving the site.

12.8.2 Foul Infrastructure

The proposed development will reduce the overall capacity of the Regional Waste Water Treatment Plant in Navan. Notwithstanding, the WwTP Plant has hydraulic & qualitive capacity. The proposed effluent treatment requirement has been assessed by Irish Water and sufficient capacity in the local network is in place to facilitate the proposed development.

12.8.3 Potable Water

The proposed development will reduce the spare capacity in the local network, but as with the waste water requirement, Irish Water has assessed the requirement and have determined that sufficient capacity is in place and the proposed development can be accommodated.

12.9 RESIDUAL IMPACTS

12.9.1 Construction Phase

Implementation of the measures outlined in Section 12.6 will ensure that the potential impacts of the proposed development on the sites material assets do not occur during the construction phase and that any residual impacts will be short term.

12.9.2 Operational Phase

The demand on power supply, gas supply and telecommunications supply will all increase due to the development of the lands. The total increase in the capacity of the local electrical infrastructure as a result of the proposed development will be approximately 2MW and the increased in the required capacity of the gas network will be approximately 1.5MW. The infrastructure of both networks in the in the immediate vicinity of the site is adequate to meet these anticipated demands and there will be no adverse effect on the ability of the respective network to meet the existing demands in the areas surrounding the site. The development of the lands will be constructed in phases, with the final phase being due for completion circa 2023.

12.10 MONITORING

All internal potable water & drainage services within the proposed building will be monitored by the management firm & their maintenance personnel will routinely inspect and carry out maintenance as required. The external potable water and foul effluent (and the combined outfall including restricted storm water flows) connections to the public system will be maintained by Irish Water.

12.11 REINSTATEMENT

As the proposed development will be a ‘new build’ there will be no reinstatement within the site boundary required. The external connections into the potable water and combined sewer will be carried out by Irish Waters regional contactor and reinstated to Meath County Councils requirements.

12.12 INTERACTIONS

CS Consulting lodged *pre-connection enquiry* information to Irish Water, (copies of their response and design acceptance are appended to the Engineering Services Report). In addition, consultations were held as part of the SHD system with Meath County Council.

12.13 DIFFICULTIES ENCOUNTERED IN COMPILING

No difficulties were encountered while compiling this chapter.

13.0 CULTURAL HERITAGE

13.1 INTRODUCTION

This chapter was prepared by John Cronin and Tony Cummins of John Cronin and Associates. Mr Cronin holds qualifications in archaeology (B.A. (University College Cork (UCC), 1991), regional and urban planning (MRUP (University College Dublin (UCD) 1993) and urban and building conservation (MUBC (UCD), 1999). Mr Cummins holds primary and post-graduate degrees in archaeology (B.A., 1992 and M.A., 1994 (UCC)). Both individuals have each amassed over twenty years industry experience in the compilation of archaeological, architectural and cultural heritage impact assessments.

This chapter assesses the impacts of the proposed development on the known and potential cultural heritage resource (concerning the integrity, continuity and context of same for future generations. UNESCO define the term 'Cultural Heritage' as encompassing several aspects of tangible assets (*immovable*: archaeological sites and monuments, architectural heritage structures; *movable*: artefacts; and *underwater:* shipwrecks, submerged features) and intangible assets (e.g. folklore, oral tradition and language). Based on this assessment the chapter then identifies appropriate mitigation strategies.

The recorded and potential cultural heritage resource within a study area, encompassing both the proposed development site and the lands extending for 500m from its boundary, was assessed in order to compile a comprehensive cultural heritage baseline and context.

13.2 LEGAL AND PLANNING FRAMEWORK

The management and protection of cultural heritage in Ireland is achieved through a framework of national laws and policies which are in accordance with the provisions of the Valetta Treaty (1995) (formally the *European Convention on the Protection of the Archaeological Heritage, 1992*) ratified by Ireland in 1997*;* the *European Convention on the Protection of Architectural Heritage* (Granada Convention, 1985), ratified by Ireland in 1997; and the *UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003*, ratified by Ireland in 2015.

The national legal statutes and guidelines relevant to this assessment include:

- National Monuments Act (1930) (and amendments in 1954, 1987, 1994 and 2004);
- Heritage Act (1995);
- National Cultural Institutions Act (1997);
- Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act (1999);
- Planning and Development Act (2000);
- *Architectural Heritage Protection: Guidelines for Planning Authorities* (Department of Arts, Heritage, and the Gaeltacht, 2011); and
- *Framework and Principles for the Protection of the Archaeological Heritage* (Department of Arts, Heritage, Gaeltacht and the Islands, 1999)

13.2.1 Archaeological Heritage

The following section presents a summary of the legal and policy frameworks designed to protect the Irish archaeological resource and further information is available in the *Framework and Principles for the Protection of the Archaeological Heritage*[11] published by the Department of Arts, Heritage, Gaeltacht and the Islands (1999).The administration of national policy in relation to archaeological heritage management is the responsibility of the National Monuments Service (NMS) which is currently based in the Department of Arts, Heritage and the Gaeltacht. The National Monuments Act of 1930, and its Amendments, are the primary means of ensuring the satisfactory protection of the archaeological resource. They include a number of provisions that are applied to secure the protection of archaeological monuments. These include the designations of nationally significant sites as National Monuments, the Register of Historic Monuments, the Record of Monuments and Places, the Sites and Monuments Record, and the placing of Preservation Orders and Temporary Preservation Orders on endangered sites.

[11] https://www.archaeology.ie/sites/default/files/media/publications/framework-and-principles-for-protection-of-archaeological-heritage.pdf

Section 2 of the National Monuments Act, 1930 defines a National Monument as *'a monument or the remains of a monument, the preservation of which is a matter of national importance'*. The State may acquire or assume guardianship of examples through agreement with landowners or under compulsory orders. The prior written consent of the Minister is required for any works at, or in proximity to, a National Monument in the ownership or guardianship of the State, the Minister or a local authority, or those which are subject to a Preservation Order. There is one National Monument in State guardianship within the study area; Athlumney castle and house (National Monument no. 287) which are located c.360m north of the proposed development site.

The National Monuments (Amendment) Act, 1994 made provision for the establishment of the Record of Monuments and Places (RMP) which comprises the known archaeological sites within the State. The RMP, which is based on the earlier Register of Historic Monuments (RHM) and Sites and Monuments Record (SMR), provides county-based lists of all recorded archaeological sites with accompanying maps. All archaeological sites listed in the RMP receive statutory protection under the National Monuments Act 1994 and the NMS must be given two months' notice in advance of any work proposed at their locations. There are no recorded archaeological monuments located within the proposed development site while there are fifteen examples within the surrounding study area, none of which are located within 250m of the boundary of the proposed development site. Further information on these recorded archaeological monuments are provided in **Section 13.5** and their published inventory descriptions are presented in **Appendix A 13.1**.

The locations of World Heritage Sites (Ireland) and the Tentative List of World Heritage Sites submitted by the Irish State to UNESCO were also reviewed and none are located within the environs of the proposed development.

The County Meath Development Plan 2013 outlines a number of policies and objectives in relation to the protection of the archaeological resource and these include the following:
CH POL 7
To ensure that development in the immediate vicinity of a recorded monument is sensitively sited and designed so that it does not significantly detract from the monument. Where upstanding remains exist, a visual impact assessment may be required.

CH POL 9
To inform and seek guidance from the National Museum of Ireland if an unrecorded archaeological object is discovered, or the National Monuments Service of the Department of Arts, Heritage and the Gaeltacht in the case of the discovery of an unrecorded archaeological site, in accordance with National Monuments legislation.

CH OBJ 7
To protect archaeological sites and monuments, underwater archaeology, and archaeological objects, which are listed in the Record of Monuments and Places, and to seek their preservation in situ (or at a minimum, preservation by record) through the planning process.

CH OBJ 8
To seek to protect important archaeological landscapes from inappropriate development.

The Navan Town Development Plan includes the following policy in relation to the protection of the archaeological resource:

HER POL 10 (a) To protect (in-situ where practicable or as a minimum, preservation by record) all monuments included in the Record of Monuments and Places (including those newly discovered).

13.2.2 Architectural Heritage

The following presents a summary of the legal and policy frameworks designed to protect the Irish architectural heritage resource and further information is available in the *Architectural Heritage Protection: Guidelines for Planning Authorities*, published by the Department of Arts, Heritage, and the Gaeltacht (2011). Protection of architectural heritage is provided for through a range of legal instruments that include the *Heritage Act (1995)*, the *Architectural Heritage (National Inventory) & National Monuments (Misc. Provisions) Act (1999),* and the *Planning and Development Act (2000)*. The Heritage Act (1995) (as amended) defines architectural heritage as including:

all structures, buildings, traditional and designed, and groups of buildings including streetscapes and urban vistas, which are of historical, archaeological, artistic, engineering, scientific, social or technical interest, together with their setting, attendant grounds, fixtures, fittings and contents.

The National Inventory of Architectural Heritage (NIAH) was established under the *Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999*, to record architectural heritage structures within the State. While inclusion in the NIAH does not provide statutory protection to a structure it is intended to advise local authorities on compilation of their Record of Protected Structures. The NIAH also includes a Designed Landscapes and Historic Gardens Survey which comprises a non-statutory, desk-based survey of such features. While the NIAH lists a total of 35 structures within the study area the majority of these are located within the Navan urban area to the north. There are a number of listed structures located within nearby properties and these include Belmount House (NIAH 14013039), its entrance gateway (NIAH 14013041), an associated farm building (NIAH ref. 14013035) and Russell's B & B (NIAH 14013042).

The conservation principles of care and protection of architectural heritage and the facilitation of the listing of significant buildings of architectural heritage merit are set out in *Part IV of the Planning and Development Act (2000)*. This requires planning authorities to maintain a Record of Protected Structures (RPS) of structures with special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest, to be included in their Development Plans. Any changes that materially affect the character of a protected structure require planning permission. A protected structure also includes the land and other structures within its curtilage. While the notion of curtilage is not defined by legislation, the *Architectural Heritage Protection Guidelines for Local Authorities* (Dept. Arts, Heritage and the Gaeltacht 2011), describes it as the parcel of land immediately associated with a structure and which is (or was) in use for the purposes of the structure. In addition, planning authorities must provide for the preservation of places, groups of structures and townscapes of architectural heritage significance within their administrative areas through the designation of Architectural Conservation Areas (ACAs).

The Navan Town Development Plan lists 15 Protected Structures located within the study area and, while none of these are within the site boundary, three examples, Belmount House (PS NT025-177), Belmount House entrance gateway (PS NT025-178) and Russell's B & B (PS NT025-179), are located in adjacent properties. The proposed development site is not located within an ACA.

The County Meath Development Plan 2013 outlines a number of policies and objectives to ensure the protection of the architectural heritage resource within the County and these include:

CH POL 10 To conserve and protect the architectural heritage of Meath.

CH POL 11 To require that all planning applications relating to Protected Structures contain the appropriate accompanying documentation in accordance with the
Architectural Heritage Protection Guidelines for Planning Authorities (2011) or any variation thereof, to enable the proper assessment of the proposed works

CH POL 12 To encourage the retention, sympathetic reuse and rehabilitation of Protected Structures. In certain cases, land use zoning restrictions may be relaxed in order to secure the conservation of the protected structure.

The Navan Town Development Plan also the following policy in relation to the protection of the architectural heritage resource within the town:

HER POL 1 To preserve, protect and enhance the architectural heritage of Navan and to ensure that new development makes a positive contribution to the historic character of Navan.

13.2.3 EIA Legislative Framework

The EIA Directives (from 1985 to 2014) set out the requirement for an EIA in European law. This assessment has been prepared in accordance EIA requirements of codified Council Directive 2011/92/EU as amended by EIA Council Directive 2014/52/EU, per current Planning Legislation, concerning EIA assessment: *Planning and Development Act, 2000 (as amended) (Part X)* and in *Part 10 of the Planning and Development Regulations, 2001 (as amended).*

Ireland has transposed EU Directive 2014/52/EU by way of the *European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018* which came into operation on 1 September 2018. The

Regulations provide for the transposition of the 2014 EIA Directive and give further effect to the 2011 EIA Directive by way of extensive amendments to existing planning law.

13.3 METHODOLOGY

13.3.1 Introduction

This section commences with an outline of the criteria used to assess the nature of impacts on the known and potential elements of the cultural heritage resource within the study area. The baseline information on this resource was established by a combination of desk-based research and a site inspection which were undertaken to identify features of cultural heritage significance likely to be affected by the proposed development.

13.3.2 EIA Council Directive 2014/52/EU

The methodology used for this assessment is based on EPA (2003) *Advice Notes on Current Practice in the preparation of Environmental Impact Statements* and EPA (2002) *Guidelines on the Information to be contained in Environmental Impact Statements.* However more recent (draft) guidance methods have also been utilised per EPA (2015) *Draft Advice Notes for Preparing an EIS* and (2017) *Draft Guidelines for Information to be Contained in EIAR*, in accordance EIA requirements of codified EU Directive 2011/92/EU as amended by EU Directive 2014/52/EU, per current Planning Legislation, concerning EIA assessment: *Planning and Development Act, 2000 (as amended) (Part X)* and in *Part 10 of the Planning and Development Regulations, 2001 (as amended).*

The following summation of the criteria applied to determine the nature of effects is provided in order to clearly and concisely outline the methodology specifically applied to the cultural heritage resource.

Assessment was achieved by a consideration of the **duration, quality, type, value and magnitude** of effect(s) on the cultural heritage resource:

Duration of Effect

The duration of effects is assessed based on the following criteria:

- Momentary (seconds to minutes)
- Brief < 1 day
- Temporary <1 year
- Short-term 1-7 years
- Medium Term 7-15 years
- Long Term 15-60 years
- Permanent > 60 years
- Reversible: Effects that can be undone, for example through remediation or restoration

Quality of Effect

The quality of an effect on the cultural heritage resource can be **positive, neutral or negative**.

Positive – a change which improves the quality of the cultural heritage environment (e.g. increasing amenity value of a site in terms of managed access, signage, presentation etc. or high-quality conservation/restoration and re-use of an otherwise vulnerable derelict structure).

Neutral – no change or effects that are imperceptible, within the normal bounds of variation for the cultural heritage environment.

Negative – a change which reduces the quality of the cultural heritage resource (e.g. visual intrusion on the setting of an asset, physical intrusion on features/setting of a site etc.)

Type of Effect

The type of effect on the cultural heritage resource can be **direct, indirect or no predicted effect**.

Direct – where a cultural heritage site is physically located within the footprint of the proposed development, which will result in its complete or partial removal.

Indirect – where a cultural heritage site, or its setting, is located in close proximity to the footprint of the proposed development.

No predicted effect – where the proposed development will not adversely or positively affect a cultural heritage site.

Significance of the Effect is based on an assessment largely of the Magnitude of the Impact (graded from High to Negligible, based on a consideration of character, duration, probability and consequences) and the Value (graded from High to Negligible, based on a consideration of significance/sensitivity) of the heritage asset.

Magnitude of Impact (degree of change, incorporating any mitigation measures) can be negative or positive, and should be ranked without regard to the value of the asset according to the following scale: **High; Medium; Low and Negligible**.

The evaluation of the **Value** of a cultural heritage asset is largely based on its significance criteria, and should not be considered definitive, but rather an indicator which contributes to a wider judgment based on the individual circumstances of each feature. Generally, the more criteria that are evident for a given asset, the higher in scale its respective Value shall be. Criteria considered in addition to any legal designations include the condition/preservation; documentary/historical significance; group value; rarity; visibility in the landscape; fragility/vulnerability and amenity value.

The Value of all known or potential assets that may be affected by the proposed project are ranked according to the following scale: **High; Medium; Low and Negligible**. The below criteria (Table 13.1) has been informed by the International Council on Monuments and Sites *Guidance on Heritage Impact Assessments for Cultural World Heritage Properties* (ICOMOS 2011, 14-17).

Table 13.1 – Factors for assessing the Value of Cultural Heritage Assets (after ICOMOS 2011[12])

Value	*Asset Type*
Very High	Assets of International Significance including: • World Heritage Sites (including Tentative List properties) • Assets that can contribute significantly to acknowledged international research objectives
High	Assets of National Significance including: • Designated *National Monuments* (archaeological) • Assets of significant quality and importance, including designated RMP sites • Archaeological Landscapes and Zones with significant inter-group value • Assets that can contribute significantly to acknowledged national research objectives • Protected Structures of national significance/National NIAH Grade Buildings • Conservation Areas containing significant buildings of importance, including group value
Medium	Assets of Regional Significance including: • Assets of good quality and importance, including designated RMP sites • Assets that can contribute significantly to acknowledged regional research objectives • Protected Structures and NIAH Buildings of regional significance • Other undesignated buildings that can be shown to have exceptional qualities in their fabric or historical associations • Undesignated assets with potential of national or regional importance (archaeological, potential 'new sites')

[12] This table is intended to be used as guidance for assessment of values which is to be combined with a consideration of the condition/preservation; documentary/historical significance; group value; rarity; visibility in the landscape; fragility/vulnerability and amenity value of individual Cultural Heritage assets on a case-by-case basis

Value	*Asset Type*
	• Conservation Areas containing buildings that contribute significantly to its historic character • Historic townscape or built-up areas with important historic integrity in their buildings, or built settings (e.g. including street furniture and other structures)
Low	Assets of local importance including: • Assets compromised by poor preservation and/or poor survival of contextual associations • Assets of limited value, but with potential to contribute to local research objectives • Historic Townscape or built-up areas of limited historic integrity in their buildings, or built settings (e.g. including street furniture and other structures)
Negligible	• Assets with very little or no surviving archaeological interest • Buildings of no architectural or historical note; buildings of an intrusive character

The Significance of Effect can be described as Profound, Very Significant, Significant, Moderate, Slight, Not Significant or Imperceptible.

Table 13.2 – Significance of Effects (per EPA Draft Guidelines 2017)

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

Table 13.3 – Significance of Effects Matrix (after EPA Draft Guidelines 2017)

Magnitude of Impact	**High**	Not Significant/ Slight	Moderate/ Significant	Significant/ Very Significant	Very Significant/ Profound
	Medium	Not Significant	Slight	Moderate/ Significant	Significant/ Very significant
	Low	Not Significant/ Imperceptible	Slight/ Not Significant	Slight	Moderate
	Negligible	Imperceptible	Not Significant/ Imperceptible	Not Significant/ Slight	Slight
		Negligible	**Low**	**Medium**	**High**
Value/Sensitivity of the Asset					

13.3.3 Desktop Study

The desktop study sought to identify all recorded archaeological, architectural and other cultural heritage sites within the study area and also endeavoured to identify any hitherto unrecorded features or areas of cultural heritage significance. The collated information has provided an insight into the historical development of the study area over time and assisted in an evaluation of the potential presence of unrecorded cultural heritage sites.

The *Sites and Monuments Record* (SMR) and the *Record of Monuments and Places* (RMP) for County Meath, both published by the Archaeological Survey of Ireland, were the principal sources consulted for identifying known archaeological sites. The Record of Protected Structures (RPS) and the National Inventory of Architectural Heritage (NIAH) were consulted to assess the designated architectural heritage resource.

The following presents an overview of the sources consulted as part of the desktop study:

- *The Navan Development Plan 2009-2015 (Consolidated) and the Meath County Development Plan 2013-2019:* these publications list the buildings and structures included in the Record of Protected Structures and also present the policies and objectives designed for the protection of the archaeological and architectural heritage resources within the town and county.

- *Archaeological Inventory of County Meath:* This publication presents summary descriptions of the recorded archaeological sites within this county and the relevant entries are presented in **Appendix A 13.1**. In addition, the current national database (online) resources pertaining to same were accessed: Historic Environment Map Viewer (www.archaeology.ie) and Heritage Maps (The Heritage Council) (www.heritagemaps.ie).

- *UNESCO designated World Heritage Sites and Tentative List:* UNESCO seeks to encourage the identification, protection and preservation of cultural and natural heritage around the world considered to be of outstanding value to humanity. There are two world heritage sites in Ireland and a number of other significant sites are included in a Tentative List (2010) that has been put forward by Ireland for consideration in 2010.

- *National Inventory of Architectural Heritage (NIAH):* Relevant current datasets (including the Garden Survey for County Meath) were accessed via www.buildingsofireland.ie in September 2019.

- *Database of Irish Excavation Reports:* This database contains summary accounts of all licensed archaeological excavations carried out in Ireland (North and South) from 1970 to 2019. The database entries for investigations carried out within townlands in the study area are provided in **Appendix A 13.2**. Current data was accessed via www.excavations.ie in September 2019.

- *National Museum of Ireland (NMI) Topographical Files:* these files record the discovery locations and other recorded information on Irish archaeological artefacts, including those within the museum's collections. The files are archived in the National Museum of Ireland (NMI), Kildare Street, Dublin and were inspected in February 2019.

- *Historical publications and cartographic sources:* various published and unpublished sources and historical maps were consulted. The historical maps and other figures are presented within the chapter and a list of consulted publications is provided in Section 13.9 of this chapter.

- *Aerial Imagery:* available current online aerial images of the proposed development site were consulted in order to determine if any traces of unrecorded, sub-surface archaeological sites were evident.

- *Placenames Database of Ireland:* this current online database provides a comprehensive management system for data, archival records and place names research conducted by the State. Current data was accessed via www.logainm.ie in September 2019.

- *Irish National Folklore Collection*: transcribed material from the National Folklore Collection archive has been digitised and published on www.duchas.ie, which also publishes relevant images the archive's Photographic Collection. The foundational collection - the *Irish Folklore Commission Collection 1935-1970* - was inscribed into the UNESCO *Memory of the World Register* (2017) in recognition of its 'world significance' and 'outstanding universal value to culture'. Current data was accessed via www.duchas.ie in September 2019.

13.3.4 Site Inspections

The proposed development site and its environs were inspected in on a number of occasions in 2018 and 2019. The lands were assessed in terms of landscape, land use, vegetation cover, presence or lack of unrecorded archaeological and architectural heritage sites and features. All lands within the site boundary were accessible and there were no constraints encountered during the field survey.

13.3.5 Geophysical Survey

A geophysical survey of the proposed development site was undertaken by Jo Leigh in May 2018 (NMS Licence ref. 18R0084) and, in summary, two enclosures and a number of potential associated external features were identified. A summary of the results of the survey are presented within the chapter and a report has also been submitted to the National Monuments Service (NMS).

13.3.6 Archaeological Test Trenching

A programme of licensed archaeological test trenching was undertaken within the proposed development site by Tony Cummins of John Cronin and Associates in August 2018 to investigate the results of the geophysical survey while minimising excavations within the interior of both enclosures during this preliminary phase of site investigations. A summary of the results of the test trenching are presented within the chapter and further details are presented in Appendix A (13.4).

13.3.7 Statutory Consultations

Consultation was carried out with the Department of Culture, Heritage and the Gaeltacht during the compilation of the assessment, which included the submission of licence applications and reports for the geophysical survey and test trenching investigations. The Department have been appraised of the proposed archaeological mitigation measures.

13.4 RECEIVING ENVIRONMENT

13.4.1 Tangible Archaeological and Historical Assets

The following section presents brief summary details of the main periods within the Irish archaeological record with references to the recorded archaeological sites located within the study area. Datasets have been interrogated and retrieved largely from State Body organisations and are considered accurate and current per publicly available information (Historic Environment Viewer: Dept. Culture, Heritage & Gaeltacht www.archaeology.ie; Excavation Summaries www.excavations.ie). The dating framework used for each period of the archaeological record is based on the *Guidelines for Authors of Reports on Archaeological Excavations* published by the National Monuments Service[13].

[13]https://www.archaeology.ie/sites/default/files/media/publications/excavation-reports-guidelines-for-authors.pdf

While the SMR and RMP do not record any archaeological sites within the proposed development site, or within 250m of its boundary, there are 15 recorded examples located within the surrounding 500m wide study area (Table 13.4 and Figure 13.1). The published inventory descriptions of these sites are presented in **Appendix A (13.1)**. These include one National Monument (Nat Mon. ref. 287), which comprises a castle site (ME025-032001-) and an adjoining 16th/17th-century house (ME025-032002-) which are located within Athlumney townland. These structures are now situated within a green field area in a modern suburban area located 360m to the north of the proposed development site.

Table 13.4 – Recorded archaeological sites within the study area

Monument Ref.	***Class***	***Townland***	***ITM***	***Distance from proposed development***
*ME025-030----	Souterrain	Dillonsland	687222,767419	300m to north
ME025-031----	Church	Athlumney	687503,767537	330m to north
ME025-031001-	Graveyard	Athlumney	687505,767530	330m to north
ME025-031002-	Graveslab	Athlumney	687504,767540	330m to north
ME025-031003-	Font	Athlumney	687495,767539	330m to north
ME025-032001- (Nat. Mon. 287)	Castle - tower house	Athlumney	687604,767544	360m to north
ME025-032002- (Nat. Mon. 287)	House - 16th/17th century	Athlumney	687588,767535	360m to north
ME025-033----	Castle - motte	Athlumney	687494,767427	250m to north
*ME025-035----	Souterrain	Balreask Old	687479,766352	250m to south
*ME025-036----	Church	Balreask Old	688013,766330	480m to south
*ME025-036001-	Graveyard	Balreask Old	688013,766327	480m to south
*ME025-049001-	Souterrain	Athlumney	688104,766648	320m to southeast
*ME025-049002-	Souterrain	Athlumney	688125,766623	360m to southeast
*ME025-049003-	Souterrain	Athlumney	688151,766641	375m to southeast
*ME025-049004-	Souterrain	Athlumney	688193,766670	400m to southeast

Figure 13.1 – Location of recorded archaeological sites within study area

(layout of proposed development indicated in yellow)

13.4.2 Early prehistoric periods

Until recent years the earliest recorded evidence for human settlement in Ireland dated to the Mesolithic period (7000–4000 BC) although recently discovered evidence of a butchered bear bone recovered from a cave site in Co. Clare suggests that humans were present on the island c.12,500 years ago during the Palaeolithic period (Dowd and Carden 2016). While the Mesolithic period hunter-gatherers did not construct any settlements or monuments that leave any above ground traces, their presence in an area can often be identified by scatters of worked flints in ploughed fields, shoreline shell middens and traces of temporary camps occasionally uncovered during ground works. The archaeological record indicates that these nomadic groups tended to favour coastal, lake and river shorelines which provided a transport resource as well as a source for elements of their varied diet. There are no recorded Mesolithic sites within the study area but it is noted that it comprises a riverside location often occupied during this period.

The Neolithic period (4000-2400 BC) began with the arrival and establishment of agriculture, based on animal husbandry and cereal cultivation, as the principal form of economic subsistence, which resulted in more permanent settlements within farmlands created in areas of cleared forestry. As a consequence of the more settled nature of agrarian life, new site-types, such as substantial rectangular timber houses and various types of megalithic tombs, and new artefacts, including pottery, begin to appear in the archaeological record during this period. While the RMP and SMR do not list any Neolithic sites within the study area, archaeological investigations in advance of the construction of Navan Business Park located approx. 400m to the southeast of the proposed development site identified phases of occupation dating to this period (**Appendix A - 13.2**; Licence 97E0322 ext.). Neolithic ritual activity within the environs of the River Boyne in the wider region is attested to by the *Brú na Bóinne* complexes at Newgrange, Knowth and Dowth which have been designated as UNESCO World Heritage Sites. These monuments are located *c.*12km to the east of Navan town.

13.4.3 Late prehistoric periods

Metalworking arrived in Ireland with the advent of the Bronze Age period (c. 2400–500 BC) and saw the introduction of a new artefactual assemblage, including metal and ceramic objects, to the island. This period was also associated with the construction of new monument types such as standing stones, stone rows, stone circles and burnt mounds known as *fulachta fia*. The development of new burial practices during this period also saw the construction of funerary monuments such as cairns, barrows, boulder burials and cists. While the RMP and SMR do not list any Bronze Age sites within the study area, the archaeological investigations within Navan Business Park located approx. 400m to the southeast also identified phases of occupation dating to this period (Appendix A - 13.2; Licence 97E0322 ext.). The arrival of iron-working technology in Ireland saw the advent of the Iron Age (600 BC – 400 AD). This period has traditionally been associated with a Celtic ‘invasion’, but recent archaeological evidence points instead to a gradual acculturation of the Irish Bronze Age communities following centuries of contacts with Celtic-type cultures in Europe. Relatively little was known about Iron Age settlement and ritual practices in Ireland until recent decades when the corpus of evidence has been greatly increased by the discovery of sub-surface sites dating to this period during archaeological investigations in advance of development projects. There are no recorded Iron Age sites located within the study area but activity from the period has been recorded at the Hill of Tara complex located *c.*8km to the south of Navan town.

13.4.4 Early medieval period

This period began with the introduction of Christianity in Ireland and continued up to the arrival of the Anglo-Normans during the 12th century (*c.* 400–1169 AD). The establishment of the Irish church was to have profound implications for political, social and economic life and is attested to in the archaeological record by the presence of church sites, associated places for burial and holy wells. The early medieval church sites were morphologically similar to ringforts but are often differentiated by the presence of features such as church buildings, graves, stone crosses and shrines. This period saw the emergence of the first phases of urbanisation around the large monasteries and the Hiberno-Norse ports. However, the dominant settlement pattern of the period continued to be rural-based in sites such as ringforts, which comprise roughly circular enclosures delimited by roughly circular earthen banks formed of material thrown up from a concentric external ditch, and stone-built equivalents known as cashels which are concentrated in western counties. These monuments comprise one of the most numerous site-types in the Irish landscape and their early medieval names (*rath/lios*) still form some of the most common place-name elements in the country. Archaeological excavations indicate that the majority comprised enclosed farmsteads with internal timber buildings and were surrounded by associated field systems, stockades, barns, mills and drying-kilns. Ringforts may also contain artificial sub-surface passage-and-chamber known as souterrains, a term which derives from the French *sous terrain* (underground), although unenclosed examples of these sites also exist. While the RMP and SMR do not record any ringforts within the study area they do list six recorded souterrains which demonstrate that lands within sections of the study area on both sides of the river were occupied during the early medieval period. The Navan area has been traditionally associated with an early ecclesiastical site named *Nuacgangball* which has been attributed to Saint Fechin. There is no recorded location for this site, but it may be associated with a medieval parish church in Athlumney townland (see Section 1.5.1.4). There is also some recorded Viking activity within the Navan area during the early medieval period, including tentative evidence of a Viking fleet landing in the area (Kelly 2015). A Viking burial was discovered on the eastern bank of the River Boyne during the construction of the section of the railway on the east side of the river in the 1840s. The nearest element of that section of the railway line is *c.*360m to the north of the proposed development site.

13.4.5 High and late medieval periods

The arrival and conquest of large parts of Ireland by the Anglo-Normans in the late 12th century broadly marks the advent of the Irish high medieval period which continued to *c.*1400 and was followed by the late medieval period which extended to *c.*1550. These periods saw the continuing expansion of Irish urbanisation as many of the port cities developed into international trading centres and numerous villages and towns began to develop throughout the country. By the 15th century the native Irish chieftains and lords began to construct tower houses as fortified residences within their landholdings. Navan town has originated as an Anglo-Norman settlement following the granting of the area to the de Angulo family, whose name was later changed to Nangle, by Hugh de Lacy in the late 12th century. The existing streetscape within the town still retains the original medieval layout, including the marketplace square and an extant section of the defensive town wall. The proposed development site is located approx. 500m outside the southern end of the Zone of Archaeological Notification surrounding the historic core of the town and appears to have formed part of the settlement's agricultural hinterland during the high and late medieval periods.

The lands within Athlumney townland on the opposite side of the river from the proposed development site contain a complex of archaeological monuments to the east of the town that date to the high and late medieval periods. The first Anglo-Norman structure constructed in the area was an earthwork known as a 'motte' (ME025-033----) which was sited overlooking a river ford that was presumably of strategic significance at the time. This monument survives as a truncated, grass-covered earthen mound, measuring 5.3m in maximum height, and is located *c.*250m to the north of the proposed development site. Archaeological excavations in the vicinity of this monument uncovered features potentially associated with an adjoining bailey although the possibility for earlier origins for these features were not discounted (Kelly 1983). The remains of Athlumney Castle (ME025-032001-) and an adjoining 16th/17th-century house (ME025-032002-) are located in a green field area within a modern suburb to the north of the motte monument and these structures have been designated as a National Monument (ref. 287). The castle structure contains a tower of likely 15th century date with a later vaulted room while it has been suggested that the house dates to *c.*1600 (Harbison 1992). It was held by the Maguires when Cromwellian forces were besieging the town and was burnt rather than left to be captured (*ibid.*). The *Archaeological Inventory of County Meath* (Moore 1987) notes that, according to the Civil Survey (1654-6), Lawrence Dowdall owned 200 acres at Athlumney in 1640, and the property included 'A castle and a large stone howse, a water mill and a tuck mill, two fishing weares, and a church and two open quarries'. The ruins of the castle and house are located *c.* 360m to the north of the nearest section of the proposed development site. The remains of a medieval church are recorded within Athlumney to the west of the castle (ME025-031). The *Archaeological Inventory of County Meath* (Moore 1987) notes that church at this location is listed in the ecclesiastical taxation records of 1302-06 and historical records indicate it was in ruins by the 17th century. The church site is located *c.*330m to the north of the proposed development.

13.4.6 Post-medieval and early modern periods

The centuries following 1550 are referred to as the post-medieval period, which is generally considered to continue into the mid-19th century and the period thereafter is described as early modern. The following section includes a general overview of the study area as depicted on historic maps dating from the 17th century onwards, while a more detailed analysis of the historic mapping of the proposed development area is provided in **Section 13.5.1.8**.

The early part of the post-medieval period was a turbulent time in Irish history and in the later decades of the 16th century the Tudors began to re-assert English control. The resultant wars between the 1560s and 1603 brought this unsettled period to a temporary end although further widespread strife ensued during the Cromwellian Wars which ended with extensive dispossession of forfeited Gaelic lands. An agricultural boom in the late 18th and early 19th centuries saw a rise in prices for both tillage and dairy produce which resulted in landlords investing in extensive land improvement works within their holdings to increase land productivity. This included extensive enclosure of open lands into bounded field systems many of which survive to the present-day. The post-medieval period saw the development of high and low status stone houses throughout the Irish countryside and rural settlement clusters at this time typically consisted of single-storey thatched cottages with associated farm buildings while two-storey farmhouses became more common in the 19th century. The settlement pattern throughout much of the rural landscape was greatly affected by the famine period in the middle of the 19th century.

The proposed development site is wholly contained within the townland of Limekilnhill which is listed in the 17th-century Down Survey as being in the ownership of James Dillon at the time of the 1641 and 1670 surveys when it was described as containing 66 profitable plantation acres [14]. The Down Survey map does not indicate any notable buildings within the Limekilnhill area and the Placenames Database does list any references to the townland prior to the 19th century (www.logainm.ie). While Navan town began to expand outside of its medieval core during the 18th century, the Limekilnhill area appears to have remained outside the settlement and is not included on William's 1756 map of the town.

The subject site encompasses a number of tillage fields surrounding Belmount House, which is outside the boundary of the proposed development area. The house is not listed in the 1824 Pigot's Directory of Navan[15] and the NIAH dates its construction to *c.*1825. Lewis (1837) records that it was the residence of J. Goggan in the 1830s and it was described as a 'neat house, with a garden and pleasure ground attached' in the Ordnance Survey Field Name Books (1835-6)[16]. The first edition 6-inch OS map of 1841 shows a wooded area between the house and the roadside to the east while a formal garden plot is shown to the west of the house. The map also shows two access lanes to the house which extend from the road to the east along the north and south ends of the wooded area. The location of the west garden is outside the boundary of the proposed development while sections of the vacant woodland area to the east and part of the southern access lane are within the boundary.

At the time of the compilation of the *Griffith's Valuation* in 1854, Belmount House and its garden to the west and roadside area to the east were occupied by Rev. Maurice Nelligan who lived in Navan between 1852-54 and then moved to Dublin where he eventually became the Chaplin of Christ Church[17]. The Valuation also records that the field to the west of the house were leased by Nicholas Russell while the fields in the southern end of the proposed development site were among the possessions of the Duke of Bedford, a major 19th century landlord within the Navan area, and were being leased by a number of sub-tenants. Belmount was recorded as the residence of Patrick Nicholls in the 1870s[18] and the 1901 Census lists the occupant as Elizabeth Nicholls. The 1901 Census also records that the house contained 13 occupied rooms and had 14 outbuildings, including a stables and coach house. The detail on the 25-inch OS map of 1900 indicates that all of these outbuildings were located outside the boundary of the proposed development site. The map also shows the location of a lodge building at the gateway along the southern access lane. This area is also outside the boundary of the proposed development and a modern residence now occupies the former location of the lodge building. The 1911 Census records that the house had come into the ownership of John Spicer III, a local entrepreneur and politician who ran a number of milling operations in Navan town. The house continued to remain in the ownership of the Spicer family for the remainder of the 20th century.

13.4.7 Excavations Database

The Excavation Database contains a number of entries for archaeological investigations undertaken within townlands in the study area. The published database descriptions of these investigations are provided in **Appendix A - 13.2** and the following presents a summary of relevant results. Monitoring of the construction of the R161-R153 link road in the area to the north of the subject site uncovered nothing of archaeological significance (**Appendix A - 13.2**; Licence 03E0613). Archaeological test trenching of a sub-circular field boundary within the grounds of Beaufort College, located to the west of the subject site, demonstrated that the feature was not archaeological in origin (**Appendix A -13.2**; Licence 15E0065). Archaeological investigations within a business park located in Athlumney townland at a distance of approx. 340m to the southeast of the subject site, and on the opposite bank of the River Boyne, uncovered four souterrains (**Appendix A-13.2**; Licence 98E0596). Further programmes of investigations at this location identified evidence for prehistoric activity (**Appendix A-13.2**; Licence 97E0322 ext.) and an enclosure site containing an early medieval burial ground (**Appendix A - 13.2**; Licence 07E0892). A previously unrecorded enclosure of potential early medieval or medieval date was also revealed during archaeological test trench

[14] http://downsurvey.tcd.ie/landowners.php#mc=53.649282,-6.679152&z=14

[15] https://www.swilson.info/wp/?p=1149

[16] http://www.navanhistory.ie/inde13.php?page=belmount

[17] http://www.mageoughchapel.dublin.anglican.org/The%20Story%20of%20the%20Mageough.pdf

[18] https://www.ancestry.ie/boards/thread.aspx?mv=flat&m=232&p=topics.researchresources.land-tax

investigations within an area of Athlumney townland located approx. 1.4km to the east of the proposed development site (**Appendix A- 13.2**; Licence 11E240).

13.4.8 National Museum of Ireland (NMI) Topographical Files

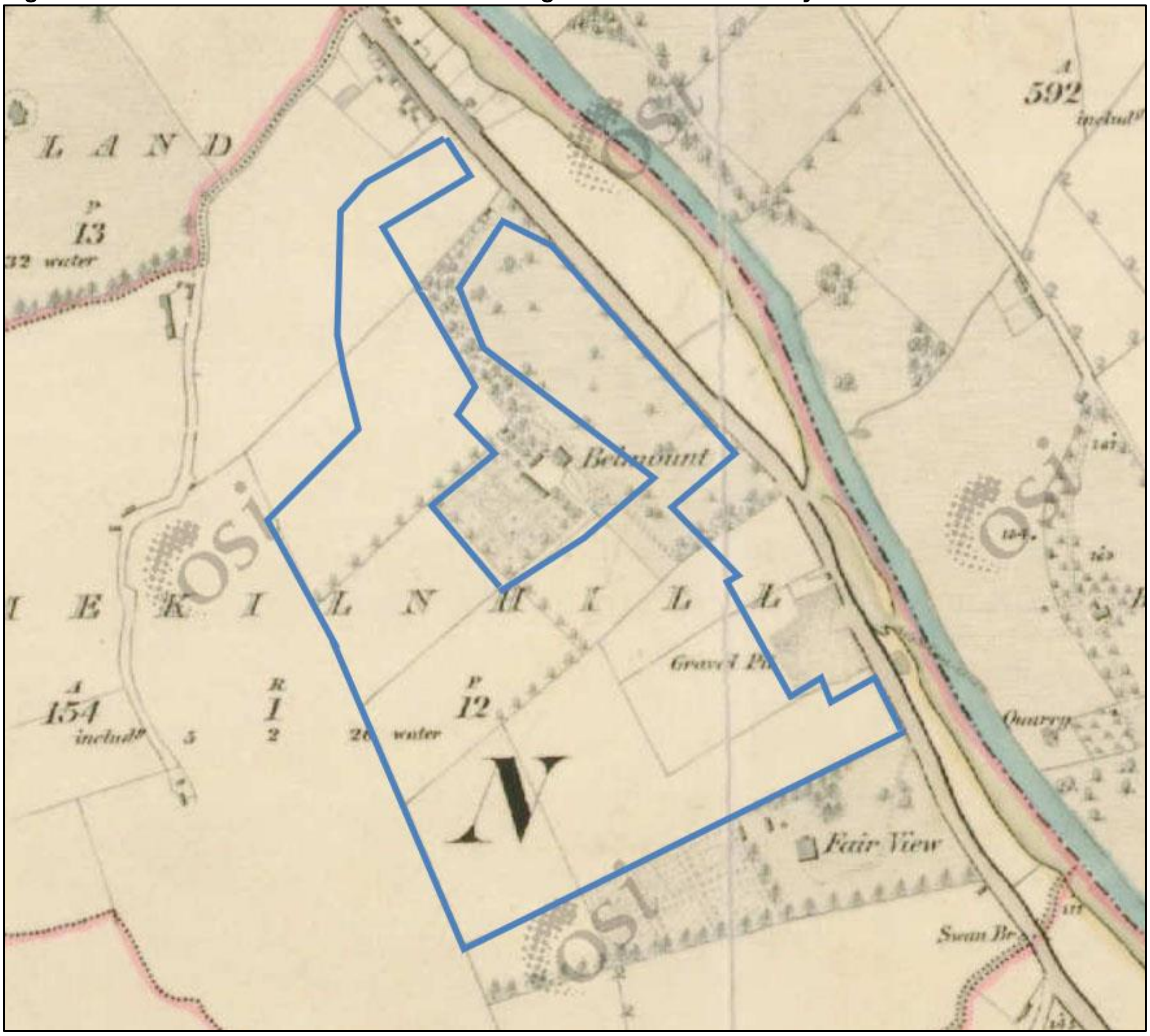
The topographical file archive held in the National Museum of Ireland, Kildare Street was reviewed in February 2019 and contain no files recording the discovery of archaeological artefacts within Limekilnhill townland. The archive does contain a number of files recording the discovery of post-medieval pottery sherds and one stone axehead in Athlumney townland to the east.

13.4.9 Cartographic Sources

The detail on historic cartographic sources demonstrates the nature of past settlements and land use patterns in recent centuries and highlights the extent of modern developments and agricultural practices. This information can also aid in the identification of the location and extent of unrecorded or partially levelled features of archaeological or architectural heritage interest. The cartographic sources examined for the study area comprised the 17th-century Down Survey map, William's 1756 map of Navan town, the first edition 6-inch OS map (1841) (Figure 13.2) and the 25-inch second edition OS map (1901) (Figure 13.3).

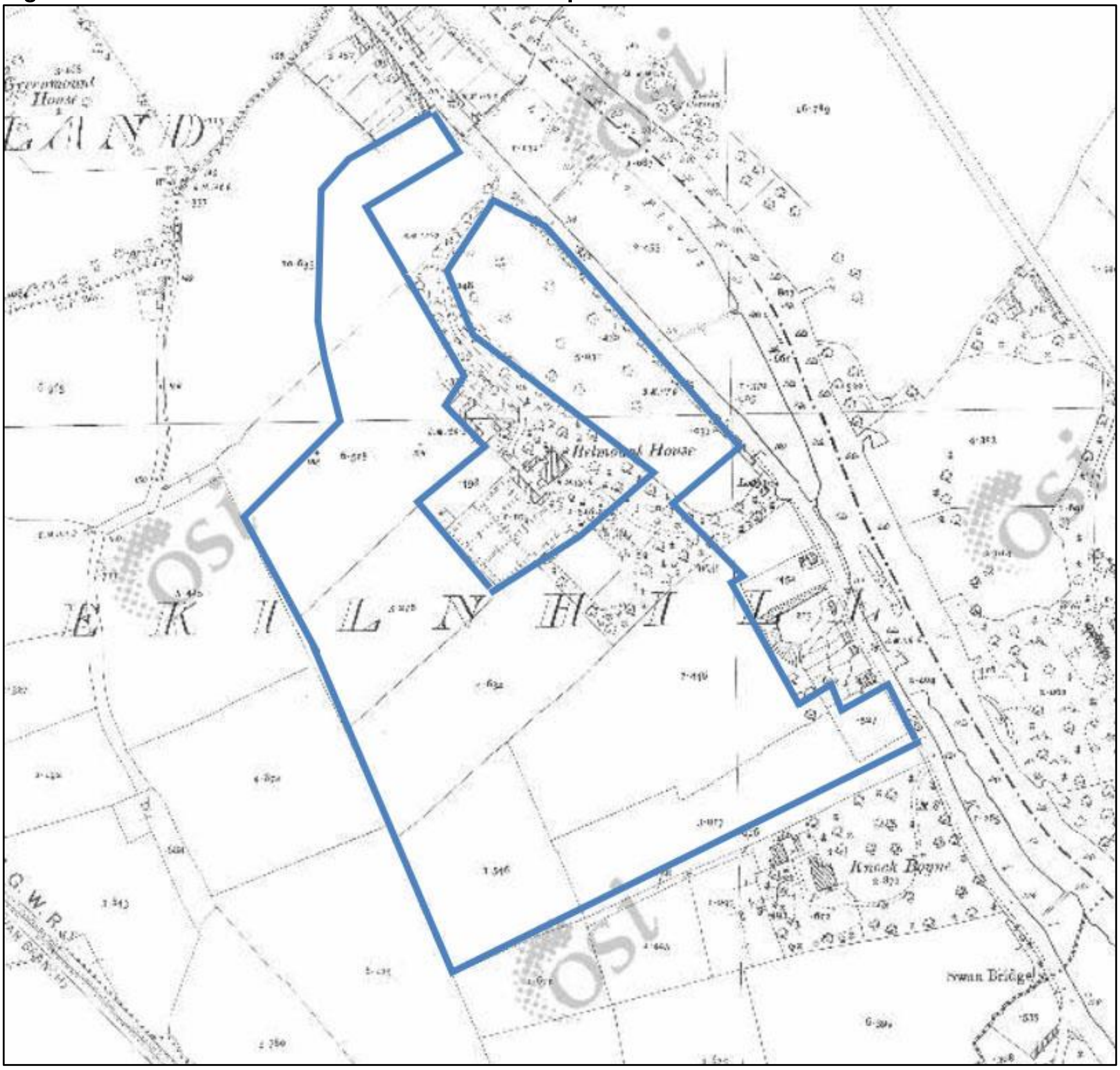
The 17th-century Down Survey map does not indicate any buildings or settlements within the Limekilnhill area but it is noted that these maps typically only depict major structures and transport routes such as castles, churches, bridges and roads. The location of the proposed development site is not included in Williams's 1756 map of Navan town which indicates that it was in an area that remained outside the urban area at that time. The subject site is shown as enclosed fields around an early 19th-century country house (Belmount House) on the 1st edition 6-inch (1841) and 25-inch (1901) Ordnance Survey (OS) maps (Figures 13.2 and 13.3). The field system within the site boundary shown on both editions is broadly similar to the existing layout other than a number of boundaries that were levelled during the 20th century. There are no potential unrecorded archaeological sites, buildings, demesne features or townland boundaries indicated within the boundary of the proposed development site on either edition. The historic OS maps typically depict extant archaeological enclosures and other earthworks and the absence of any traces of features, such as banks or ditches, associated with the enclosures identified within the proposed development site during the geophysical survey (see **Section 13.5.2**) suggests that both may have been levelled prior to the 19th century.

Figure 13.2 – Location of recorded archaeological sites within study area



Extract from 1st edition 6-inch OS map c.1841 with approx. layout of proposed development indicated (OSI Licence No. SU0003319 © OSI/Government of Ireland)

Figure 13.3 – Extract from 25-inch edition OS Map c. 1901



with approx. layout of proposed development indicated (OSI Licence No. SU0003319 © OSI/Government of Ireland)

13.4.10 Aerial Imagery

Various online aerial images of the proposed development site were consulted as part of the assessment, including those published by OS Ireland, Google and Bing. These provide overviews of the site from 1995 onwards and all of the images show ploughing activity in each of the fields indicating that the lands have used as tillage farmland for at least the past two decades. There were no traces of differential soil-marks that may indicate the presence of sub-surface archaeological sites identified on any of the aerial images, including at the locations of the two enclosures subsequently identified during the geophysical survey (Figure 13.4).

Figure 13.4 – Aerial image of locations of enclosures

Note: identified during geophysical survey indicated (OSI Licence No. SU0003319 © OSI/Government of Ireland)

13.4.11 Geophysical Survey

The geophysical survey was undertaken by J. M. Leigh (Licence 18R0084) in May 2018 within all areas of the proposed development site apart from a small wooded area to the south of Belmount House and an overgrown area in the field to the east of the house. The survey identified two archaeological enclosures and potential associated external features within the ploughed fields to the west of the house (Figures 13.5 and 13.6) and the following presents direct extracts from the survey report's description these features:

<u>Northern Enclosure</u>

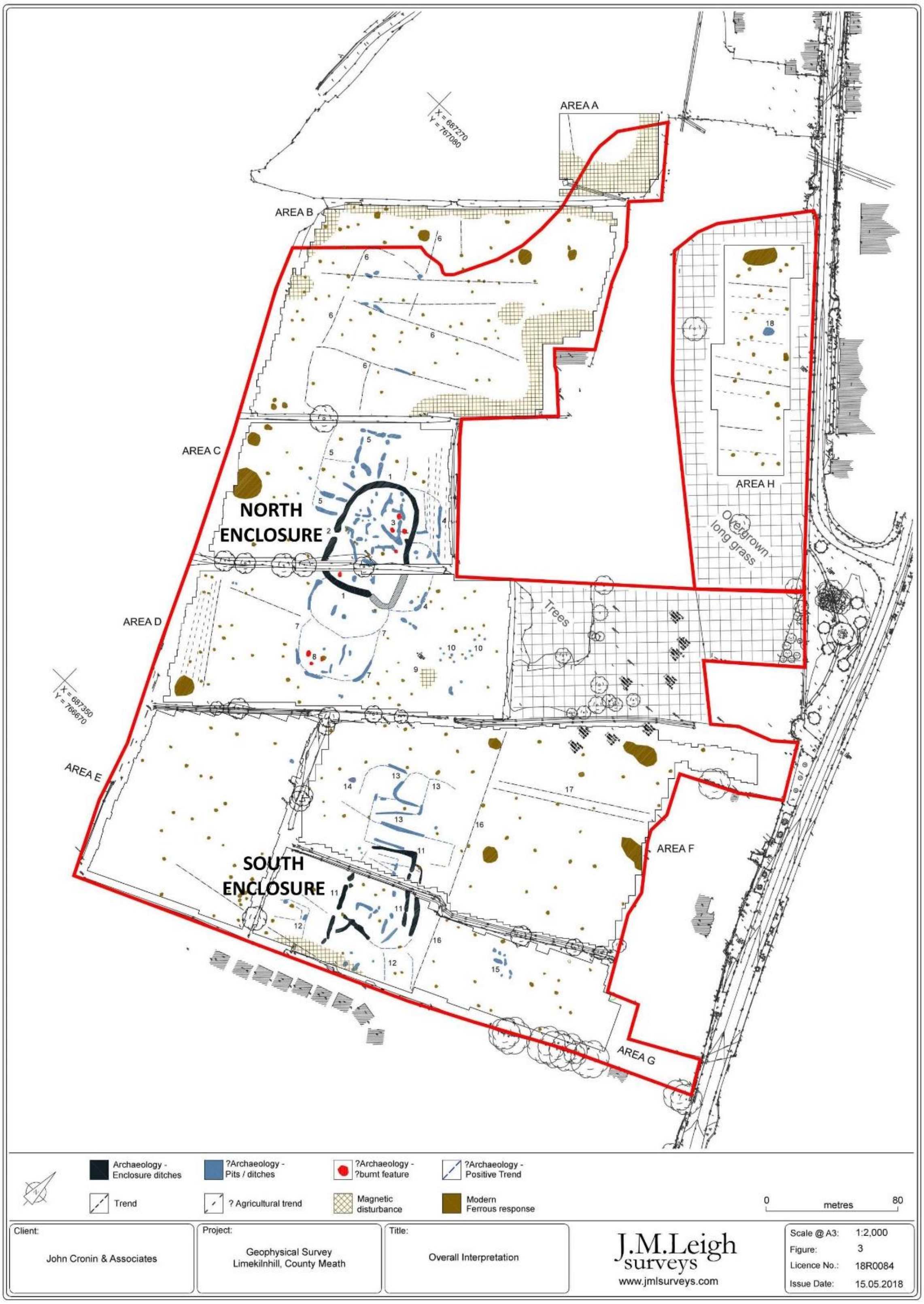
The northern enclosure, measuring.45m x 68m, comprises of a clear sub-rectilinear enclosure ditch with a possible entranceway in the west of the site. A cluster of responses within the enclosure are indicative of habitation activity, with possible fired features such as hearths. Annexes of the enclosure are evident to the east and south and rectilinear responses to the north may represent a small associated field system. A rectilinear annex to the east of the main enclosure ditches is represented by trends and fragmented responses. Plough trends are evident in the data set here and show some correlation with the orientation of the annex responses. Their possible association with the enclosure is unknown. A series of responses to the north-east of the main enclosure form a fragmented rectilinear pattern. This may represent an annex to the main enclosure, or represent associated agricultural plots. Extending north from, into Area B, are further trends. Although these are magnetically weak they form a pattern indicative of a possible field system, perhaps associated with the enclosure. Another possible annex is located to the south and is represented by curvilinear trends and responses. The trends are magnetically weak, perhaps indicative of plough damage. Within the annex there are magnetically strong isolated responses. These may *represent pits or possible burnt features. To the east of the annex there is an area of magnetic disturbance. Although this is typical of modern disturbance, it is also possible that a spread of burnt material of archaeological interest is represented here. It is noted that isolated responses are located to the immediate north. These may represent a cluster of pit-type features. Although interpretation is tentative, these responses must be considered to be of archaeological potential.*

<u>Southern Enclosure</u>
This enclosure is similar in shape and form [to the northern site]. The main enclosure ditches measure c. 48m x 56m. The enclosure appears more fragmented than [the northern example], perhaps suggesting plough damage has occurred. Nevertheless, the responses present a clear enclosure with linear trends extending to the north and south. Linear trends extend to the south and it is speculated that features associated with the enclosure would have continued to the south, where modern housing is now located. Trends and responses extend from the north. These form a rectilinear pattern and perhaps represent another annex feature or associated small field system. An isolated response has a broad magnetic signal and may represent a large pit-type feature. A cluster of responses, in Area G, has no clear pattern or form. It is possible that these represent modern material. However, an archaeological interpretation must be considered. These responses may represent plough damaged ditch-type features or perhaps a cluster of pits. Given the proximity to the enclosure site, an archaeological interpretation must be considered.

<u>Other features</u>
Area H is contained within a level field immediately adjacent to the road on the east side of the landholding. Parallel linear trends orientated west to east most likely represent ploughing activity. Within the ploughing there is a broad response of archaeological potential. Although there are no further responses in the vicinity, it is possible that a large pit feature is represented here.

Figure 13.5 – Greyscale image of geophysical survey results

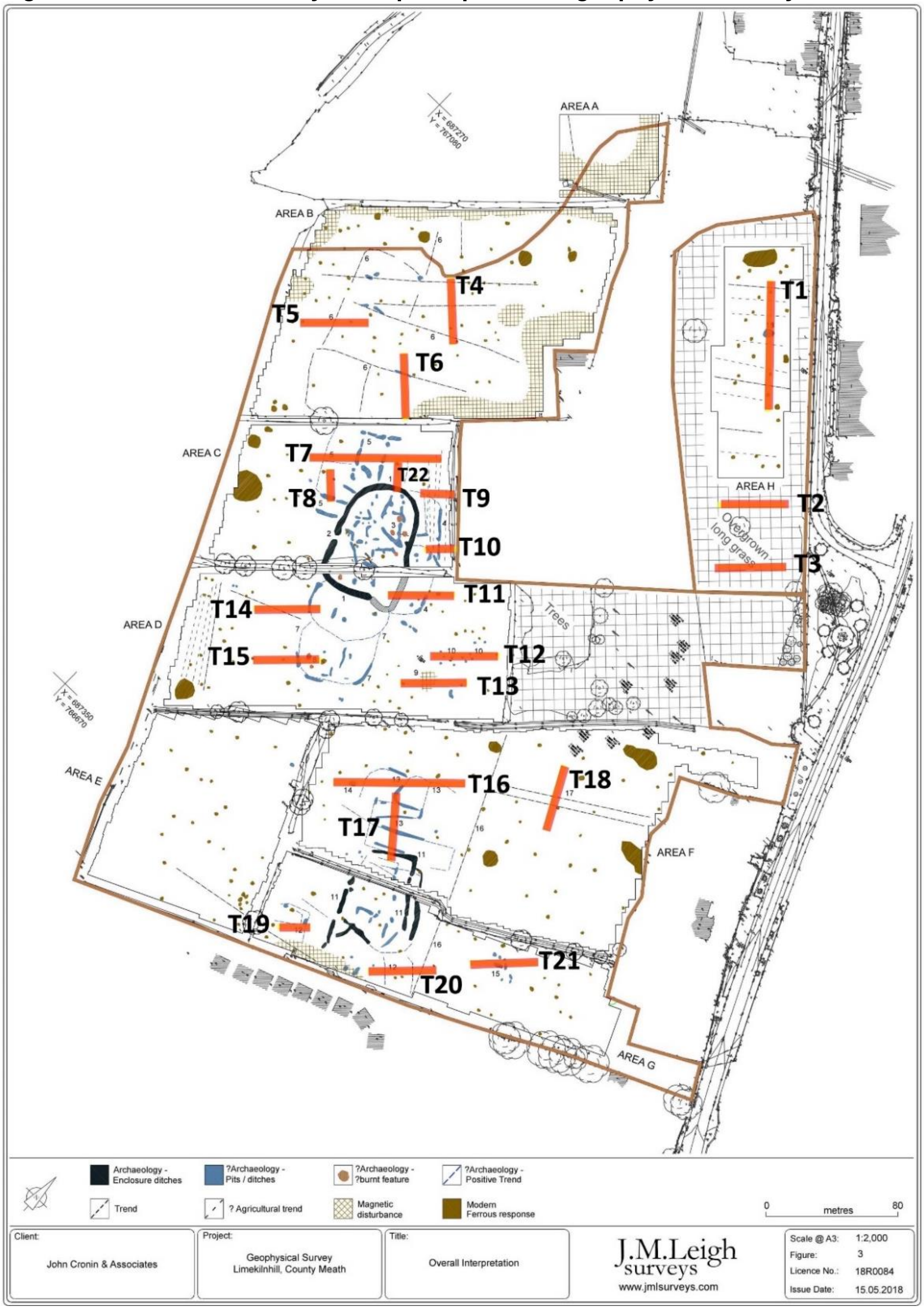
Figure 13.6 – Interpretation of geophysical survey results



13.4.12 Archaeological Test Trenching

The following section presents an overview of the results of the test trench excavations while more detailed results, including extracts from the photographic record, are provided in a catalogue format in **Appendix A - 13.3**. The archaeological test trench investigations were carried out by Tony Cummins (John Cronin and Associates) under a licence issued by the National Monuments Service (18E0499) and a detection licence for the use of a metaldetector was also obtained in order to assist in artefact retrieval (18R0171). A total of eighteen test trenches were excavated within the proposed development site by a machine operating with a 1.8m wide toothless bucket and their layout was designed to intersect with various geophysical anomalies of archaeological potential (Figure 13.7). There was no access permitted to the location of three proposed trenches (Trenches 1, 2 and 3) within an overgrown field within the area to the east of Belmount House and a trench in the southern end of the site was left unexcavated due to the presence of a low-hanging overhead ESB line (Trench 19).

Figure 13.7 – Test trench layout superimposed on geophysical survey results



The trench layout was designed to concentrate preliminary investigations of the geophysical anomalies within the areas outside the enclosures that have been identified as being of archaeological potential (annexes, field systems, pits, etc.). The aim of this phase of investigation was to result in a balance of an examination of these potential archaeological features while minimising impacts on any potential sub-surface features or deposits. A limited amount of trenching along the outer edges of both enclosures was also undertaken in order to ascertain the widths of the enclosing ditches, the depth of the overlying ploughsoil, the nature of any cultural inclusions within that layer and the extent of plough disturbance on the surface of the underlying natural subsoil in order to allow some assessment of the potential for the survival of occupation deposits within both enclosures. As stated in the methodology submitted to the NMS as part of the licence application, the excavations were undertaken to the surface of potential archaeological features which were then cleaned, recorded and left to remain *in situ*. All of the trenches were backfilled with the upcast ploughsoil at the completion of site investigation works.

A visual inspection of the ploughsoil surface on the footprint of both of the enclosures (and associated potential annexes) was carried out prior to the commencement of trenching. The crops within the fields had been cut prior to works and the ploughsoil surface was clearly visible amongst the low stubble. Two sherds of unglazed pottery, both with dark red, gritty fabrics, were identified on the surface of the ploughsoil within the interior of the northern enclosure and are tentatively interpreted as originating from imported early medieval wares. The combination of the visual inspection, and subsequent test trenching, also revealed the widespread presence of pottery and other materials dating from the 18th century onwards with a predominance of inclusions dating to the 19th and 20th centuries. Trenching subsequently revealed that early modern inclusions extended down into the surface of the natural subsoil and clearly demonstrated the extent of ground disturbance created by ploughing activity. There were occasional metallic inclusions noted during visual inspections and metal-detecting of the soil upcast from the test trenches and these comprised modern materials such as nails and agricultural tool/machine parts. The range of inclusions noted was consistent with material originating from farmyard manure periodically spread across the tillage fields during recent centuries. The frequency of these inclusions steadily decreased in the fields furthest from Belmount House, indicating that they may have originated from the farmyard located in this area. Despite the townland name, there were no obvious inclusions of lime fragments noted within the soil profiles although the oyster shell fragments noted throughout the ploughzone appears to have originated as element of manure material.

The ploughsoil within all the trenches was composed of a homogenous dark silty clay loam (average depth 20cm) containing moderate inclusions of small stones as well as cultural inclusions such as 18th-20th century pottery sherds and small fragments of coal and clay tobacco pipes, bricks and oyster shells, the latter perhaps introduced as a manure. The upper ploughsoil in many areas overlay a shallow interface layer of disturbed subsoil (average 10cm deep) which formed the base of the plough zone. The upper surface of this interface layer was truncated by frequent thin ploughmarks which are the result of the ongoing modern cultivation activity within the fields. The underlying natural subsoil was composed of a yellow brown silty clay, the surface of which was truncated by extensive ploughing activity.

The combined results of the geophysical survey and test trench excavations have demonstrated the presence of two previously unrecorded archaeological enclosures within the subject site. The fields containing the enclosures were found to have been extensively impacted by ploughing activity and the widespread presence of 18th-20th century inclusions noted down to the level of the natural subsoil indicates that this farming practice has been ongoing during recent centuries. The test trenches were excavated to the surface of geophysical anomalies that are located within a plough zone that is still subject to tillage farming and no excavation of identified deposits or features was carried out during this preliminary phase of investigation. Without recourse to full excavation it was not always possible to establish the extent of features within the disturbed ploughzone and the following general observations are, therefore, based on a combination of their layouts as indicated by the geophysical survey and their visible surface expressions revealed during the test trench investigations.

<u>The North Enclosure</u>

The geophysical survey clearly demonstrates that the northern enclosure comprises an irregularly-shaped sub-rectilinear enclosure, measuring 45m x 68m, with a possible entranceway in the west end and a cluster of internal responses indicative of habitation activity, with possible fired features such as hearths. The presence of two sherds of possible imported early medieval pottery noted on the surface of the plough soil during systematic field-walking of the internal area of this enclosure may suggest the period of its construction. The presence of these sherds on top of the modern ground surface also indicates the movement of material within the ploughzone and the consequential disturbance of underlying archaeological deposits and features. The geophysical survey indicates that this enclosure is univallate and, while conjectural, it is noted that its layout, and that of the second enclosure to the south, is reminiscent of excavated sub-circular and sub-rectangular enclosures that have been dated to the early medieval period, e.g. Colp West, Co. Meath, Cappydonnell Big Co. Offaly and Killickaweeny, Co. Kildare (Corlett & Potterton 2011). These sites may form variants to the ringfort enclosures of that period and has been recorded that, as appears to be the case with the Limekilnhill enclosures, approx. 88% of ringforts in County Meath were univallate (Stout 1997, 17). It is noted that the geophysical survey indicates that the northern enclosure has an entrance on the west side while many ringforts have eastern entrances in order to provide shelter from prevailing winds. It is may be of some significance that this entrance opens towards the potential field system identified during geophysics rather than orientated to face away from prevailing winds or towards the location of the southern enclosure.

The excavation of two trenches (T11 and T22) extending outwards from the inner edge of the enclosure ditch suggested that this feature may measure up to 4m in total width, although the possibility that this width may encompass at least one 2m wide recut of the ditch was noted. Slight traces of the basal remains of an inner bank were noted on the north side of the enclosure (T22) and the presence of re-deposited subsoil within the ploughzone above the ditch may form a spread of material from the levelled bank. No surface traces of an internal bank were noted along the east side (T11) and the geophysical survey indicates that this area has been subject to an increased amount of plough disturbance. Manual cleaning of both exposed surfaces of the upper ditch fill revealed early modern inclusions which provides another demonstration of the extent of the disturbance of the underlying soil profiles created by ploughing activity.

The geophysical survey clearly shows two conjoined, semi-circular annex-type features located outside the southern line of the enclosure ditch and indicates that these contain a far more limited amount of internal features which may suggest that they may have fulfilled some ancillary agricultural function, such as animal stockades or work areas. The extents of these annex features respect each other and the adjoining enclosure ditch suggesting that they are likely to be contemporary. The excavation of two test trenches extending westwards from the interior of both features (T14 and 15) did not reveal any obvious traces of internal features on the subsoil surface although the caveat that such features may be concealed within the base of the ploughzone applies. The west ends of both annexes were delimited by bands of barely perceptible re-deposited subsoil (2m wide in T14 and 2.5m wide in T15). The potential that the observed surface widths of both features are the result of soil movement within the base of the ploughzone was noted and it is possible that the underlying ditches are narrower in extent. Test trenching immediately to the east of the enclosure did not uncover obvious remains of a potential rectangular annex identified by the geophysical survey in this area.

South Enclosure

While the geophysical survey report notes that the southern enclosure is similar in shape and form to the example to the north it also observes that its responses are more fragmented and are suggestive of more intense plough disturbance in this area. The enclosure ditch encompasses an area measuring c. 48m x 56m and while the survey indicates some internal activity it does not appear to be as widespread as that identified in the northern enclosure, which may perhaps indicate a stockade function. There is also some variance in the layout of the ditch when compared to the broadly curvilinear character of northern example with a sharp right-angled corner in the northeast quadrant and a straight line along the western side. The east side contains both a linear and an (outer) curvilinear response which may be suggestive of at least two phases of ditches in this area.

The trench (T17) excavated northwards from the inner edge of the north line of the ditch revealed the upper fill to be composed of a 1.2m wide dark brown deposit with charcoal inclusions. This was narrower than the ditch feature around the north enclosure and was also quite distinct from the mid-brown fills of the series of east-west orientated ditch features noted within the adjacent potential annex area to the north. The linear layout of the trends forming this potential northern annex is also different to the semi-circular examples identified on the south side of the north enclosure and are more similar in shape to the potential agricultural plots to the north of the northern enclosure rather than an enclosed stockade. While not demonstrable during the preliminary phase of testing, the orientations of the southernmost of the external linear cuts and the adjacent enclosure ditch indicated that they inter-cut in the area to the east of Trench 17 and may, therefore, not be contemporary.

External Features

Settlement enclosures of the early medieval period may often form the visible element of wider agricultural centres, known as airlise, which may contain sub-surface archaeological features such as associated field systems, souterrains, stockades, barns, mills and drying kilns (e.g. Bolger 2012). The linear trends shown extending outwards from the northwest quadrant of the northern enclosure on the geophysical survey are reminiscent of the petal-shaped fields known to radiate out from ringfort enclosures. It has been suggested that these fields were used as localised areas of tillage within farmlands otherwise primarily devoted to dairy farming (Stout 1997, 37). The test trenches excavated at the locations of the potential field plots in this area did not reveal surface expressions of the boundary features shown on the geophysical survey, perhaps due to a combination of plough disturbance and the potential that they have been backfilled with soils similar in composition to the natural subsoil. While the inclusions within the cultivation furrows noted throughout the site dated exclusively to the 18th-20th century the possibility exists that this is the result of later plough disturbance the potential exists that this area may contain relict remains of earlier agricultural activity associated with the occupation of the enclosure.

Test trenching revealed the presence of various small potential pits/postholes within the areas outside the two enclosures including a cluster to the east of the southeast end of the northern enclosure (Trench 11) as well as examples to the west (Trench 16) and east (Trench 21) of the southern enclosure. The geophysical survey does not indicate the presence of any structural features or enclosures within the proximity of these external features and the potential that they represent areas of ancillary activity associated with the occupation of the enclosures is noted.

13.4.13 *Architectural Heritage Assets*

Figure 13.8 – ***Location of designated architectural heritage structures***

(labelled "A", "B", "C" and "D") within the immediate environs of proposed development site

As noted earlier, the Navan Town Development Plan lists 15 Protected Structures within the study area (500m of the development site) and the majority of these are located within the urban area of Navan town and also include a number of the archaeological monuments located in Athlumney townland to the north which have been discussed in earlier sections of this assessment. There are no protected structures within the site boundary though three examples, Belmount House (Protected Structure Ref. NT025-177), a former entrance gateway (NT025-178) and Russell's B & B (NT025-179), are located in adjoining properties. In addition, the NIAH record a single-storey farmyard complex (NIAH Ref. 14013035) adjacent to the development site. The following section provides a summary of the RPS and NIAH structures within properties located adjacent to the proposed development site along with their published NIAH descriptions. Four structures of architectural heritage interest (see **Figure 13.8** & **Table 13.5** below) are located within the immediate environs of the development site.

Table 13.5 – Designated architectural heritage sites

Ref.	***NIAH Ref.***	***Protected Structure Ref.***	***Name***	***Classification***	***Distance from proposed development***
A	14013039	NT025-177	Belmount House	Country House	35m to south-west (development site largely encloses the grounds of the house)
B	14013041	NT025-178	Former entrance to Belmount House, Dublin Road, Navan	Gates/railings/walls	32m to south-east
C	14013035	N/A	Single-storey farmbuilding, Limekilnhil	Farmyard complex	11m to north-east
D	14013042	NT025-179	Russell's B & B, Dublin Road	House	56m to north-east

within the immediate environs of the development site

The most notable of the four structures is Belmount House which is situated within its own tree-lined grounds and is accessed by a long driveway that commences at a formal entrance to the north on the Academy Street; the house is a Protected Structure (NT025-177) and is also included in the NIAH (ref. 14013039). The NIAH describes the building as follows:

"Detached five-bay two-storey house over basement, c.1825. Re-orientated, enlarged and porch added, c.1910. Windows refitted c.1994. Double-pitched and hipped roof, natural slates, decorative clay ridge tiles, nap rendered chimneys. Rendered ruled and lined, limestone string course - east façade. Stone cills, uPVC casement windows - except for some basement sash windows, balustraded porch, bay window - west façade. Standing in its own grounds."

Figure 13.9 – Front elevation of Belmount House

(Image Source: National Inventory of Architectural Heritage)

Plate 13.1: *View from drone looking NE towards Belmount House: the house is bounded close by to the north-west (left of photo) and the north-east by dense tree belts whilst the areas immediately to south-east and south-west consist of open gardens that are bounded by mature hedgerows. The hedge in the foreground forms a boundary to the development site.*

The house is very well-screened from the development site by mature trees and hedgerows. The remains of second driveway that formerly connected the house to the Dublin Road (R147) (to the south-east) is cut into the hillside, is overgrowth and extends into the development site and then into a private property on the Dublin Road where the former entrance gates (a protected structure (NT025-178)) survive but act as the entrance to a modern dwelling.

The gates, walls and railings that make up the former entrance which fronts onto the Dublin Road (R147) are a Protected Structure (NT025-178) and are also listed in the NIAH (ref. 14013041). This entrance is located outside the boundary of the proposed development site and have been described by the NIAH as follows:

"Gateway consisting of ashlar limestone piers, quadrant walls, cast-iron railings and pair of gates, c.1850. Painted ashlar limestone piers."

Plate 13.2: *View of the former southern entrance to Belmount House (on the Dublin Road). This now forms the entrance to a modern private residence; the driveway that led towards Belmount House is no longer in use and extends into the proposed development site.*

Plate 13.3: *View NW along the curving former southern driveway that led to Belmount House. The majority of this driveway is within the development site*

A house located in a property adjoining the southeast corner of the proposed development site, which is now in use as a B&B, is a Protected Structure (PS NT025-179) and is also listed in the NIAH (ref. 14013042) which describes it as follows:

"Detached three-bay single-storey house, c.1900, with exposed rubble façade and projecting brick porch. Three-bay single-storey extension added c. 1993. Now also in use as guest house. Double-pitched roof, concrete tiles - 1993, brick chimney stacks. Exposed rubble stonework to walls with flush brick dressings to window opes, brick porch. Round-headed door opening, T & G door, eight by two pane sash windows. Single leaf wrought-iron gate to site."

Plate 13.4: *View of Russells B&B, a protected structure, located roadside on the Dublin Road and to the south-east of the development site.*

To the north-west of Belmount House is a farmyard complex that is recorded by the NIAH (ref. 14013035) but which is not a protected structure. The farmyard complex borders the proposed development site and consists of a steel-frame barn and a single-storey farm building; the NIAH describes the single-storey building as follows:

"Detached four-bay L-plan single-storey farm building, c.1825, set in walled cobbled yard. Double-pitched and hipped roof, corrugated iron. Uncoursed rubble walls - whitewashed. T & G deal double doors, brick dressings, narrow vent loops. Cobbled paving to yard. Rubble stone wall to north-east of yard with brick-dressed openings."

Plate 13.4: *Aerial view (from south-west) of the farmyard complex located to the north-west of Belmount House; the single-storey structure recorded by the NIAH is heavily-overgrown and it is not a protected structure. The hay barn is a modern addition and devoid of architectural heritage interest.*

13.4.14 Undesignated Cultural Heritage Assets

While encompassing the designated archaeological and architectural heritage resources, cultural heritage also includes various undesignated assets such as historic settlements, demesne landscapes, vernacular structures, folklore, place names and townland boundaries.

13.1.1.1 Toponomy

Townlands are the smallest unit of land division in the Irish landscape and many may preserve early Gaelic territorial boundaries that pre-date the Anglo-Norman conquest. The layout and names of the Irish townlands was recorded and standardised by the work of the Ordnance Survey in the 19th century. The Irish roots of townland names often refer to natural topographical features but some name elements may also give an indication of the presence of past human activity within the townland, e.g. *dun, lios or rath* indicate the presence of a ringfort while *temple, saggart, termon or kill* record associations with a church site. The translations of the townland names within the study area were sourced from www.logainm.ie and mainly record topographical features and associations with past landowners. The proposed development site is wholly located in Limekilnhill townland and while the surrounding study area site extends into a further four townlands (see Table 13.5) there are no townland boundaries located within or adjacent to the proposed development site. While the name Limekilnhill suggests an association with a kiln activity there are no examples in the townland listed in the SMR, NIAH or RPS and none are indicated on the historic OS maps.

Table 13.6 – Translation of townland names within study area (Source: www.logainm.ie)

Name	***Irish***	***Translation***
Limekilnhill	*Cnoc na Tinílеach*	Limekiln Hill
Balreask Old	*Seanbhaile Réisc*	Old townland of the morass
Athlumney	*Áth Luimnigh*	The ford of the expanse of water’
Dillonsland	-	Dillon’s Land
Townparks	*Páirceanna an Bhaile*	Field of the town

13.1.1.2 Other undesignated assets

As noted above, while the proposed development site is located adjacent to a number of Protected Structures, including Belmount House, there were no undesignated architectural heritage structures or demesne features noted within the tillage fields that occupy the majority of the lands within its boundary. The online resource of the National Folklore Collection (www.duchas.ie) was consulted as part of the assessment and contains no records pertaining to Limekilnhill townland.

13.5 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

The proposal relates to a residential development of 544 no. dwellings on a site of c. 15.1 hectares comprising 260 no. houses (18 no. 2 bed, 207 no. 3 bed & 35 no. 4 bed) and 198 no. apartments (46 no. 1 bed, 152 no 2 bed), 30 no. duplex apartments (15 no. 2 bed & 15 no. 3 bed), and 56 no. dwellings in corner blocks (16 no. 1 bed, 24 no. 2 bed & 16 no. 3 bed) as well as the provision of two crèches (ground floor of apartment building [c. 195 sq. m] and single storey creche in housing area [c. 443 sq. m]) Open Space including playground areas; all ancillary landscape works with public lighting, planting and boundary treatments including regrading/re-profiling of site where required as well as provision of cycle paths; Provision of vehicular and pedestrian looped access through the site from 3 no. junctions located on Academy Street as well as pedestrian connection in south east of site to Dublin Road and upgrade works to junction onto the Dublin Road; along with 875 no. car parking spaces and 581 cycle spaces and 4 no. car sharing spaces; Surface water attenuation measures and underground attenuation systems as well as all ancillary site development works (reprofiling of site as required) as well as connection to existing public water supply and drainage services. All site development and landscape works.

13.6 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

13.6.1 Construction Phase

13.1.1.3 Archaeology

The RMP and SMR do not list any archaeological sites within 250m of the proposed development site and the construction phase will, therefore, have no predicted impacts on the recorded archaeological resource located within the surrounding study area.

The ground works required for housing construction within the proposed development site will have a permanent, direct, significant, negative impact on the entirety of the two previously unrecorded, sub-surface archaeological enclosures and associated external features identified within the site boundary during the geophysical and test trenching investigations undertaken as part of this assessment.

13.1.1.4 Architectural Heritage

There are no designated or undesignated architectural heritage buildings located within the proposed development site while there are a number of examples located in adjoining private properties. No access to these neighbouring properties will occur during the construction phase and there are, therefore, no predicted impacts during this phase.

Belmount House is a protected structure (Reg. No NT025-177) that sits within a land parcel that is largely surrounded by the proposed development scheme. The majority of the proposed development will be accommodated on farmland rather than former parkland or woodland associated with the house; the only area of former parkland proposed for development are lands that flank the western side of Academy Street. The house is situated on elevated ground that is screened by generous gardens and mature tree belts. The landscape and visual assessment undertaken for this development appraisal confirms that Belmount House will contain only a partial and / or oblique view of the proposed development and the woodland located around Belmount House will remain as a visual feature and a backdrop to views from the house. The principal approach to the house is from Academy Street and the entrance there will not be impacted by the development (a second entrance to the estate located on the Dublin Road survives and is a protected structure but the connecting driveway is abandoned, overgrown and is now in multiple ownerships). The only alteration to the setting of the protected structure is that a proposed access road for the development will cut across an abandoned driveway that formerly connected Belmount House to the Dublin Road to the south-east; this intervention will involve localised ground-reduction and removal of a number of trees and this represents change to a now-redundant historic landscape element resulting in discreet and localised change to historic landscape character of the environs of Belmount House but no loss to the visual amenity and setting of the protected structure. Overall the impact on the setting of the house and the former demesne is considered to be *negligible*.

The impact on the other buildings or features of architectural heritage within the environs of the development is also considered to be *negligible*. Protected structures such as Russell's B & B and the former entrance gates at Dublin Road along with the NIAH-recorded farm complex to the north-west of Belmount House will be unaffected by the development works.

13.6.2 Operational Phase

13.1.1.5 **Archaeology**

Following the successful implementation of the archaeological mitigation measures presented in **Section 13.7** it is predicted that no further direct impacts on the identified archaeological sites within the proposed development site will arise during the operational phase.

The northern end of the proposed development site is approx. 360m to the south of Athlumney Castle (ME025-032001-) which has been designated as a National Monument (No. 287). The proposed development site is also approx. 250m south of a motte mound (ME025-033----) in Athlumney townland. The views between the proposed development site and the locations of these monuments are screened by the trees within the Belmount House property, various modern buildings, including a five-storey apartment building, that flank the R147 road as well as a planted tree line along the west bank of the River Boyne. The proposed development will, therefore, have no predicted indirect impacts on the existing setting of these monuments during the operational phase.

13.1.1.6 **Architectural Heritage**

The operational phase of the proposed development will result in *negligible* impacts on the settings of the Belmount House (PS NT025-177), the former Belmount House entrance gateway (Protected Structure Reg. NT025-178), Russell's B & B (PS NT025-179)) and the single-storey farm building within the Belmount House property which is listed in the NIAH (ref. 14013035).

13.6.3 "*Do-Nothing"* Scenario

A 'Do Nothing Scenario' will see the continued preservation of recorded and potential cultural heritage features within the study area.

13.6.4 Cumulative Impacts

The location of a reserved school site within a tillage field to the north of the proposed development site was reviewed as part of the assessment of cumulative impacts and this included a walkover survey of this area during the site investigations. There are no recorded archaeological sites or structures of architectural heritage significance located within this area or within its close environs.

A number of archaeological sites were uncovered and recorded during the construction of the Navan Business Park in an area located approximately 320m to the southeast of the proposed development site. The mitigation measure entailing the preservation by record by a systematic excavation of the previously, unrecorded archaeological enclosures and external features identified within the proposed development site as part of this assessment, will result in a slight/moderate, direct, negative cumulative impact on the archaeological resource within the study area.

There are a number of modern developments, including a housing estate to the west and a five-storey apartment building to the east, located within the environs of the Protected Structures, including Belmount House, within properties adjoining the proposed development. The proposed development will result in a *neutral* impact on the architectural heritage resource.

13.7 MITIGATION MEASURES AND MONITORING

13.7.1 Construction Phase

13.1.1.7 Archaeology

The geophysical survey and test trenching investigations undertaken as part of this assessment have identified two archaeological enclosures, with associated external features, within the proposed development site. It is proposed these enclosures will be preserved in record by a full systematic archaeological excavation under licence from the National Monuments Service. The extent, phasing and methodology of these excavations, and subsequent post-excavation specialist analyses, will be agreed in advance with the National Monuments Service and will be clearly detailed in a method statement submitted as part of the licence application process. A programme of licensed archaeological monitoring will be undertaken within all other areas of the proposed development site during the construction phase. In the event that any archaeological sites or features are uncovered, ground works will halt in that area, the sites/features will be cordoned off and recorded and the NMS will be consulted to determine appropriate mitigation measures.

There a number of obligatory processes to be undertaken as part of archaeological licence applications for excavation projects and these will allow for monitoring of the successful implementation of the archaeological mitigation measures. All archaeological excavations will be carried out under licence issued by the National Monuments Service following the approval of a submitted detailed method statement outlining all proposed archaeological strategies. A preliminary report presenting a summary of results will be compiled and submitted to the National Monuments Service and National Museum of Ireland within one month of the completion of the excavations. This will include details on all proposed specialist post-excavation analyses. A final detailed report, which will include the results of specialist post-excavation analyses, will be submitted within twelve months of the completion of excavations.

Subject to grant of planning permission, the following is an ***outline/indicative*** schedule for the implementation of the proposed archaeological mitigation measures:

- Appointment of the services of a suitably qualified archaeologist to co-ordinate the mitigation proposals
- Archaeological method statements shall be submitted to the Department of Culture, Heritage and the Gaeltacht for review and agreement
- Subject to approval by the Department of Culture, Heritage and the Gaeltacht, the following archaeological mitigation measures shall be undertaken under licence from the National Monument Service:

A. **Pre-development archaeological test excavations** in the field to the east of the Belmount House (referred to as “Area H” in the geophysical survey);

B. **A programme of archaeological excavation** (“preservation-by-record”) of (a) two archaeological enclosures, with associated external features, identified during archaeological testing conducted in 2018 (Excavation Licence No. 18E0499) and (b) any features of archaeological interest that may be found during the testing of “Area H”, and

C. **Archaeological monitoring of all site development works**. In the event of archaeological features being uncovered they shall, subject to agreement by National Monuments Service, be fully recorded and excavated. A report, containing the results of the archaeological monitoring and any associated excavations shall be submitted to the Department of Culture, Heritage and the Gaeltacht on completion of site development works.

13.1.1.8 Architectural Heritage

No architectural heritage mitigation measures are required during the construction phase.

13.7.2 Operational Phase

13.1.1.9 Archaeology

Following the successful implementation of the mitigation measures detailed in Section 13.7.1.1 it is envisioned that no further archaeological mitigation measures will be required during the operational phase.

13.1.1.10 Architectural Heritage

No architectural heritage mitigation measures are required during the operational phase.

Table 13.7 – Summary of predicted impacts on cultural heritage assets within study area and mitigation measures

Asset Designation	***Description***	***Value***	***Magnitude of Impact***	***Construction Phase: Duration, Type, Quality & Significance of Impacts (if any)***	***Operational Phase: Duration, Type, Quality & Significance of Impacts (if any)***	***Mitigation Measures***	***Monitoring of mitigation***
ME025-030----	Souterrain (removed)	Medium	Negligible	None	None	None required	None required
ME025-031----	Church	High	Negligible	None	None	None required	None required
ME025-031001-	Graveyard	Medium	Negligible	None	None	None required	None required
ME025-031002-	Graveslab	Medium	Negligible	None	None	None required	None required
ME025-031003-	Font	Medium	Negligible	None	None	None required	None required
ME025-032001- ME025-032002- Nat. Mon. 287	Castle and house	High	Negligible	None	None	None required	None required
ME025-033----	Motte	High	Negligible	None	None	None required	None required
ME025-035----	Souterrain (removed)	Medium	Negligible	None	None	None required	None required
ME025-036----	Church (removed)	Medium	Negligible	None	None	None required	None required
ME025-036001-	Graveyard (removed)	Medium	Negligible	None	None	None required	None required
ME025-049001-	Souterrain (excavated)	Medium	Negligible	None	None	None required	None required
ME025-049002-	Souterrain (excavated)	Medium	Negligible	None	None	None required	None required
ME025-049003-	Souterrain (excavated)	Medium	Negligible	None	None	None required	None required
ME025-049004-	Souterrain (excavated)	Medium	Negligible	None	None	None required	None required
None	Previously unrecorded archaeological sites within PDS	Potentially medium to high	High	Permanent, direct, negative, significant	None following implementation of mitigation measures	Pre-construction archaeological excavation at locations of identified sites and archaeological monitoring of ground	Licence application (including excavation method statements) and

Asset Designation	***Description***	***Value***	***Magnitude of Impact***	***Construction Phase: Duration, Type, Quality & Significance of Impacts (if any)***	***Operational Phase: Duration, Type, Quality & Significance of Impacts (if any)***	***Mitigation Measures***	***Monitoring of mitigation***
						works in remainder of development areas	reports to be submitted to NMS
RPS NT025-177 NIAH 14013039	Belmount House and curtilage	Medium	Negligible	None	None	None required	None required
RPS NT025-178 NIAH 14013041	Belmount House gateway	Medium	Negligible	None	None	None required	None required
NIAH 14013035	Farm complex	Low	Negligible	None	None	None required	None required
RPS NT025-179 NIAH 14013042	Russell's B&B, Dublin Road	Medium	Negligible	None	None	None required	None required

13.8 RESIDUAL IMPACTS

13.8.1 Construction and Operational Phase

Archaeology

Construction stage impacts identified on the archaeological resource shall be mitigated by the measures outlined in Section 13.7.1. Preservation by record of the identified archaeological sites within the proposed development area shall result in a high magnitude of impact, albeit ameliorated by the creation of a full and detailed archaeological record, the results of which shall be publicly disseminated. This shall result in a slight/moderate significance of effect in the context of residual impact on the archaeological resource.

Architectural heritage

No residual impacts on architectural heritage resources are expected.

14.0 RISK MANAGEMENT FOR MAJOR ACCIDENTS AND/OR DISASTERS

14.1 INTRODUCTION

The 2014 EIA Directive (2014/52/EU) has updated the list of topics to be addressed in an EIAR and has included 'Risk Management' as a new chapter to be addressed. Article 3 of the new EIA Directive requires that the EIA shall identify, describe and assess in the appropriate manner, the direct and indirect significant effects on population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage, and landscape deriving from (amongst other things) the *"vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned".*

The Planning and Development Regulations 2001, as amended, Schedule 6 paragraph 2(h) indicate that it may be appropriate to furnish additional information in relation to the following:

"(h) a description of the expected significant adverse effects on the environment of the proposed development deriving from its vulnerability to risks of major accidents and/or disasters which are relevant to it. Relevant information available and obtained through risk assessments pursuant to European Union legislation such as the Seveso III Directive or the Nuclear Safety Directive or relevant assessments carried out pursuant to national legislation may be used for this purpose, provided that the requirements of the Environmental Impact Assessment Directive are met. Where appropriate, this description should include measures envisaged to prevent or mitigate the significant adverse effects of such events on the environment and details of the preparedness for, and proposed response to, emergencies arising from such events."

The chapter identifies and assesses the likelihood and potential significant adverse impacts on the environment arising from the vulnerability of the proposed development to risks of major accidents and / or natural disasters. It considers whether the proposed development is likely to cause accidents and / or disasters and its vulnerability to them.

The purpose of the chapter is to ensure that the safety and precautionary measures necessary to protect the proposed development in the event of a major accident and / or natural disaster are identified and that appropriate mitigation measures are provided that would protect the environment in the event of such occurrences.

This chapter will identify the types of major accidents / natural disasters that the project is vulnerable to; whether major accidents or natural disasters and the responses to these give rise to significant adverse environmental impacts; the nature of these impacts and the measures needed to prevent or mitigate the likely adverse impact of such events on the environment

14.2 STUDY METHODOLOGY

The starting point for the scope and methodology of this assessment is that the proposed development has been designed and will be constructed in line with best practice and, as such, major accidents and / or natural disasters will be very unlikely. The identification, control, and management of risk is an integral part of the design and assessment process throughout all stages of a project lifecycle. For example, a Flood Risk Assessment was carried out. Measures to control risks associated with Construction Phase activities are incorporated into the Stage 1 Construction Management Plan.

The following sections set out the requirements as stated in the new EIA Directive and in the EPA draft Guidelines on the information to be contained in an Environmental Impact Assessment Report (EIAR). The scope and methodology presented is based on the new EIA Directive, the draft EPA guidelines, on other published risk assessment and on professional judgement of the consultants with this responsibility in the construction and operation of the proposed development. A risk analysis-based approach methodology which covers the identification, likelihood and consequence of major accidents and / or natural disasters has been used for the assessment. This type of risk assessment approach is an accepted methodology.

Recital 15 of the EIA Directive states that:

"In order to ensure a high level of protection of the environment, precautionary actions need to be taken for certain projects which, because of their vulnerability to major accidents, and/or natural disasters (such as flooding, sea level rise, or earthquakes) are likely to have significant adverse effects on the environment. For such projects, it is important to consider their vulnerability (exposure and resilience) to major accidents and/or disasters, the risk of those accidents and/or disasters occurring and the implications for the likelihood of significant adverse effects on the environment. In order to avoid duplications, it should be possible to use any relevant information available and obtained through risk assessments carried out pursuant to Union legislation, such as Directive 2012/18/EU."

The intent of the directive is that a major accident and/or natural disaster assessment should be mainly applied to COMAH (Control of Major Accident Hazards involving Dangerous Substances) sites or nuclear installations. The proposed development in this instance is residential development on a greenfield site which when completed, will not give rise to ongoing significant risks in its operating environment.

The 2017 EPA Draft Guidelines on the information to be contained in an EIAR refer to major accidents and/or disasters in a number of sections:

Characteristics of the Project – the draft guidelines state that the project characteristics should *"a description of the Risk of Accidents – having regard to substances or technologies used."*

Impact assessment - the draft guidelines state that the impact assessment should include "the risks to human health, cultural heritage or the environment (for example due to accidents or disasters)".

Likelihood of Impacts - the draft guidelines state the following:

"To address unforeseen or unplanned effects the Directive further requires that the EIAR takes account of the vulnerability of the project to risk of major accidents and / or disasters relevant to the project concerned and that the EIAR therefore explicitly addresses this issue. The extent to which the effects of major accidents and / or disasters are examined in the EIAR should be guided by an assessment of the likelihood of their occurrence (risk). This may be supported by general risk assessment methods or by systematic risk assessments required under other regulations e.g. a COMAH assessment."

There are also a number of mechanisms which currently manage accidents outside of the EIA process. These would include the Stage 1 Construction Management Plan, which would deal with pollution risks during construction (See Chapters 5, 6 and 8 on Land, Soils, Air and Water) and risk of accidents during construction, including traffic accidents. The risk of flooding is dealt with in Chapter 8; Water. There is no risk of flooding within the site. Separately, the risk of fire is managed through the Fire Safety Certification process, which is an integral part of the design of the proposed development.

14.2.1 Site Specific Risk Assessment Methodology

This section identifies the potential of unplanned but potential events that could occur during construction and operation of the proposed development.

Risks are set out according to the classification of risk, taken from the Guide to Risk Assessment in Major Emergency Management (Department of the Environment, Heritage & Local Government, 2010), as follows:

Table 14.1 – Risk Classification

Table 2 - Classification of Likelihood

Ranking	Classification	Likelihood
1	Extremely Unlikely	May occur only in exceptional circumstances; Once every 500 or more years
2	Very Unlikely	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or very few incidents in associated organisations, facilities or communicates; and / or little opportunity, reason or means to occur; May occur once every 100-500 years.
3	Unlikely	May occur at some time; and /or few, infrequent, random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisations worldwide; some opportunity, reason or means to occur; may occur once per 10-100 years.
4	Likely	Likely to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years
5	Very Likely	Very likely to occur; high level of recorded incidents and/or strong anecdotal evidence. Will probably occur more than once a year.

14.2.2 Hazard identification

The site is not in an area prone to natural disasters. Risks were reviewed through the identification of plausible risks in consultation with relevant specialists. Therefore the risks set out below are considered the most relevant potential risks, with the likelihood identified from extremely unlikely (1) to very likely (5).

A risk matrix can be prepared against which the proposed development can be tested.

Table 14.2 – Risk Matrix

Likelihood Rating							
	Very likely	5					
	Likely	4					
	Unlikely	3					
	Very unlikely	2					
	Extremely Unlikely	1					
			Minor	Limited	Serious	Very Serious	Catastrophic
			1	2	3	4	5
			Consequence Rating				

Table 14.3 – Risk Likelihood

Category	Risk Factor Type	Likelihood
Weather	Storms, snow	3
Hydrological	Risk from flooding	1
Excavation work	Collapse	2
Road	Traffic accident	2
Industrial accident	General housebuilding construction	1
Explosion	General Construction materials no explosive products used.	1
Fire	Hot works close to timber frame structures.	3
Building Collapse	Structural failure during construction. There are no existing buildings and no demolition works.	1
Hazardous substance escape	General housebuilding construction products.	2
Pollution	Construction	3

The risks are then tested in terms of consequences. It should be noted that when categorising the Consequence Rating, the rating assigned assumes that all proposed mitigation measures and safety procedures have failed to prevent the major accident and/or disaster. In addition, Meath County Council have in place a 'Major Emergency Plan' which, if implemented as intended, will work to reduce the effect of any major accident or disaster.

The impact ratings are taken from the Guide to Risk Assessment in Major Emergency Management (Department of the Environment, Heritage & Local Government, 2010).

14.3 RECEIVING ENVIRONMENT

The surrounding context consists of a mix of residential and agricultural. It does not include any man-made industrial processes (including SEVESO II Directive sites (96/82/EC & 2003/105/EC) which would be likely to result in a risk to human health and safety.

The surrounding context consists of a mix of residential and agricultural. It does not include any man-made industrial processes (including SEVESO II Directive sites (96/82/EC & 2003/105/EC) which would be likely to result in a risk to human health and safety.

Article 3 of the Environmental Impact Assessment (EIA) Directive 2014/52/EU, requires the assessment of expected effects of major accidents and/or disasters within an EIA. Article 3(2) of the Directive states that *"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".*

14.4 POTENTIAL IMPACT OF THE PROPOSED DEVELOPMENT

14.4.1 Health & Safety/ Risks of Major Accidents and/or Disasters

14.4.1.1 Construction Phase

It is considered that the main risks associated with the proposed development will arise during the construction phase.

The construction phase of the proposed development may give rise to short-term impacts associated with construction traffic, migration of surface contaminants, dust, noise and littering. Secondary impacts may include resulting increased traffic arising from hauling building materials to and from the proposed development site which are likely to affect population and human health distant from the proposed development site, including adjacent to aggregate sources and landfill sites. Potential spillage (diesel and petrol) have the potential to occur.

Construction impacts are likely to be short term and are dealt with separately in the relevant chapters of this EIAR document and will be subject to control through the Construction Management Plan. The construction methods employed and the hours of construction proposed will be designed to minimise potential impacts. The development will comply with all Health & Safety Regulations during the construction of the project. Where possible, potential risks will be omitted from the design so that the impact on the construction phase will be reduced.

14.4.2 Operational Phase

The proposed development is a residential development of 544 units, entailing 316 houses, 30 duplex units and 198 apartments, and which includes provision of 2 no. creches and open space areas.

The main risk identified during operation is the risk of fire. It should be noted that the proposed uses are considered normal hazard fire risks as would be encountered in most residential developments and do not include any hazards which would be regarded as presenting an exceptional environmental fire hazard.

The fire risk mitigation for the project will comprise all fire safety measures necessary to comply with the requirements of Part B (Fire) of the Second Schedule to the Building Regulations 1997-2017. It is noted that these measures will be validated under the Building Control Act 1990-2007 through the obtaining, in due course, of statutory Fire Safety Certificates under Part III of the Building Control Regulations 1997-2018 from Meath County Council.

The measures will include inter alia:

- Provision of fire-rated walls and floors to restrict the spread of fire within and between buildings in accordance with relevant design guidance e.g. Technical Guidance Document B, BS9991, and BS9999. These measures will, in conjunction with the provision of automatic fire suppression in the taller blocks, serve to control/limit the size of conflagrations;
- Provision of early warning fire detection systems to ensure the earliest possible intervention in the event of fire occurrence;
- Use of materials which do not support fire spread with particular reference, inter alia, to internal wall and ceiling linings and external wall cladding.
- Facilities to assist the fire service including fire tender access proximate to all units, dry rising mains, and external fire hydrants
- A bespoke Fire Emergency Evacuation Plan [FEEP] will be prepared for the apartment and duplex blocks in advance of occupation.
- The cleaning of windows in the buildings will be undertaken by a specialist contractor on behalf of the owners management company. Window cleaning infrastructure has been designed into the scheme.
- Public lighting has been designed and incorporated as part of the scheme to ensure areas are well light for public use minimising risks to pedestrians and road users. A road safety and quality audit has also been undertaken to ensure potential risks to pedestrians and road users are designed out.

14.4.3 '*Do Nothing'* Scenario

In the do-nothing scenario, the potential risk of the proposed development causing, or being affected by a disaster and / or accident would be low, given that the site is currently an undeveloped greenfield site.

14.5 MITIGATION MEASURES

The Construction Management Plan and the Health and Safety Plan, as well as good housekeeping practices will limit the risk of accidents during construction. Fire safety will be dealt with under the Fire Safety Code at design and construction stage. The estate management company will have responsibility for fire safety during operations. In relation to falls these have been dealt with during design.

The proposed development will involve the ground works to facilitate the proposed development. Site investigations have been carried out and have not identified any hazardous material. Further testing will be carried out prior to construction to inform the detailed design. In the event that any hazardous material is identified the appropriate measures will be taken in accordance with the requirements of the EPA. The excavation and movement of soil from the site will be undertaken by a registered specialist contractor and removed to a licenced facility. The following are outlined:

- Hazardous materials used during construction will be appropriately stored so as not to give rise to a risk of pollution.

- In the event of storms or snow, construction activity can be halted and the site secured. The construction activity will involve a number of potential risks, as set out below. The risks identified include traffic management, and fire strategy.

- During the construction stage, the risk of accidents associated with the proposed development are not predicted to cause unusual, significant or adverse effects to the existing public road network. The vast majority of the works are away from the public road in a controlled environment. The objective of which is to minimise the short term disruption to local residents, and reduce the potential for accidents.

- Furthermore, is expected that the risk of accidents would be low during the construction of the proposed development considering the standard construction practices which are to be used.

- With reference to natural disasters (e.g. flooding), the proposed development has undergone a Site Specific Flood Risk Assessment, prepared by Cronin & Sutton Consulting Engineers. The main area of the site where development is proposed is not at risk of fluvial, pluvial or groundwater flooding.

- A Health and Safety Plan will be prepared (required by the *Safety, Health and Welfare at Work (Construction) Regulations 2013*) to address health and safety issues from the design stages through to the completion of the construction and maintenance phases. The Health and Safety Plan will comply with the requirements of the Regulations and will be reviewed as the development progresses.

- Safety on site will be of paramount importance. Only contractors with the highest safety standards will be selected. During the selection of the relevant contractor and the respective subcontractors their safety records will be investigated.

- Prior to working on site, each individual will receive a full safety briefing and will be provided with all of the safety equipment relevant to the tasks the individual will be required to perform during employment on site.

- Safety briefings will be held regularly and prior to any onerous or special task. *'Toolbox talks'* will be held to ensure all workers are fully aware of the tasks to be undertaken and the parameters required to ensure the task will be successfully and safely completed.

- All visitors will be required to wear appropriate personal protective equipment prior to going on to the site and will undergo a safety briefing by a member of the site safety team.

- Regular site safety audits will be carried out throughout the construction programme to ensure that the rules and regulations established for the site are complied with at all times.

Table 14.4 – Strategy for tackling potential risks – Academy St

1. BASIC RISK INFORMATION			**2.RISK ASSESSMENT INFORMATION**		**3. RISK RESPONSE INFORMATION**
Risk Number	Risk Description / Risk Event Statement	Responsible	Impact H / M / L	Probability H / M / L	Actions
Provide a unique identifier for risk	A risk event statement states (I) what might happen in the future and (ii) its possible impact on the project.	Name or title of team member responsible for risk	Enter H (High); M (Medium); or L (Low) according to impact definitions	Enter H (High), M (Medium) or L (Low) according to probability definitions	List, by date, all actions taken to respond to the risk. This does not include assessing the risk
C01	Logistics - Traffic Management Plan to be developed.	Project Supervisor Construction Stage	M	M	PSCS to develop Traffic Management Plan. All material is within the site boundary. All parking is within the site boundary to limit any interaction with local areas or estates. This will avoid back up of traffic on approach, consideration of allocation of holding area. The road access to the site is mainly off secondary roads and as such a booking system should be considered whereby contractor deliveries and collections can be managed to avoid traffic delays. The PSCS to provide an internal traffic management plan. The plan to include segregation of vehicles from staff and visitors

1. BASIC RISK INFORMATION			2.RISK ASSESSMENT INFORMATION		3. RISK RESPONSE INFORMATION
					that will be present on the site.
C02	Scaffolding	PSCS	H	M	Working at height required throughout the project. Installation of scaffolding for all working at height activities to be subject to a full temporary works design submission. In order to fully Co-Ordinate any temporary works submission the Project Supervisor for the Design Process must receive the following items before reviewing any submission; A full design submission, Calculations for the design, Design Risk Assessment, Copy of designer's PI insurances, Designers CV. This submission can then be reviewed by the Permanent Works Engineer to ensure the design will not impact on the permanent structure.
C03	Fire Strategy	PSCS/ PSDP / Fire SC.	H	M	Fire strategy must be put in place in advance of start on site which must take into consideration the requirement for hot works and the provision of Hot Works Permit systems to manage Hot works when needed. A fire marshal will be required - full co-operation from site supervisors and contractors will be required.

1. BASIC RISK INFORMATION			2.RISK ASSESSMENT INFORMATION		3. RISK RESPONSE INFORMATION
CO4	Lifting Operations	PSCS / PSDP	H	M	Lifting operations using cranes will be a requirement during the project. The PSDP must identify this as a risk factor ensuring the ground conditions are tested and appropriate to point loading from mobile cranes. The PSCS must ensure there is a fully risk assessed lift plan to manage all lifting operations on site.
C05	Existing Utilities	PSCS / PSDP	H	M	The PSDP must highlight the existence of live overhead ESB cables on site. The sequence of work to be planned to avoid working in close proximity to the lines. The PSCS to arrange for the relocation of the lines prior to working around them. The PSCS must follow the ESB code of practice and provide a risk assessed RAMS document to manage this hazard.

14.6 PREDICTED IMPACTS - RISK OF MAJOR ACCIDENTS AND/OR DISASTERS

A Risk Register has been developed which contains the main risks identified with the construction and operation of the Proposed Project. These have been identified as follows:

Table 14.5 – Risk Register

Risk No.	Risk Event	Possible Cause
1	Accidents during construction	Traffic accident Interaction with moving plant. Working at height /scaffolding Risk of fire Groundwater pollution Noise Dust
2	Fire during Construction	Work with timber frame construction. Hot works requirements for gas installation, balconies and roof work.
3	Lifting Operations	High winds Poor ground conditions Untrained personnel. Failures in lifting gear.
4	Fire following occupation	Inappropriate use of electrical devices / cooking etc.
5	Falls	Window cleaning

14.6.1 Risk Analysis

Following identification of risks, the next stage is to analyse how likely this is to occur and the consequences, should the risk arise. This will provide a risk score, i.e. the consequences versus the likelihood of the event taking place.

Table 14.6 – Risk Analysis

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score
1a	Accidents during construction	Movement of vehicles	Injury or loss of life	3	Construction accident statistics	3	Could result in loss of life	9
1b		Manual handling	Injury or loss of life	3	Construction accident statistics	3	Could result in loss of life	9
1c		Slips or falls	Injury or loss of life	3	Construction accident statistics	3	Could result in loss of life	9
1d		Ground water pollution	Impact on aquatic life, illness	1	Lack of direct pathways, controls of run-off during construction	3	Could result in environmental pollution	3
2a	Fire during Construction	Hot Works	Fire Loss of life	3	Type of construction	3	Fire could result in loss of life	3
3a	Lifting Operations	Poor planning	Loss of life	3	Construction Statistics.	3	Poor planning could result in failure of lifting gear or cranes.	9
4	Fire following occupation	Electrical equipment / cooking	Injury or loss of life	1	Causes of fire statistics	3	Could result in loss of life	3
5	Falls	Loss of balance	Injury or loss of life	1	CSO statistics	3	Could result in loss of life	3

14.6.2 Risk Evaluation

Taking the above table, and applying it below, the red zone represents 'high risk' scenarios', the amber zone represents 'medium risk scenarios' and the green zone represents 'low risk scenarios.'

Table 14.7 – Risk Evaluation

Likelihood Rating	Very Likely	5					
	Likely	4					
	Unlikely	3			1a – 9, 1b – 9 1c – 9, 1d – 3 4 – 3, 5 - 3		
	Very Unlikely	2					
	Extremely Unlikely	1				2a - 3	
			Minor	Limited	Serious	Very Serious	Catastrophic
			1	2	3	4	5
			Consequence Rating				

14.6.3 Main risks

The man risks arise during the construction period. Consequences may be limited but severe for the individuals concerned. Geographical widespread environmental consequences are not anticipated.

14.7 INTERACTIONS

There are interactions with Population and Human Health, Land, Soils, Geology and Hydrogeology, Surface Water, Noise, Climate and Air, Material Assets, Traffic and Transport, Landscape and Visual, and Cultural Heritage. However, subject to implementation of mitigation measures, good working practices and codes, the interactions between these areas have been sufficiently considered in relation to risk management.

14.8 RESIDUAL IMPACTS

Through the implementation of mitigation measures, there are no identified incidents or examples of major accidents and or natural disasters that present a sufficient combination of risk and consequence that would lead to significant residual impacts or environmental effects.

14.9 CUMULATIVE IMPACTS

The cumulative interactions with Population and Human Health, Land, Soils, Geology and Hydrogeology, Surface Water, Noise, Climate and Air, Material Assets, Traffic and Transport, Landscape and Visual, and Cultural Heritage. However, subject to implementation of mitigation measures, good working practices and codes, the interactions between these areas have been sufficiently considered in relation to risk management.

Works on the public road, such as the construction of the signalised junction on the Dublin Road / Academy St and the laying of underground pipes would be carried out on behalf of the relevant statutory undertakers, and would be subject to separate construction management plans. This would apply to the construction of the potential future schools, located to the north of the subject site, which would have their own Construction Management Plan to mitigate potential impacts.

15.0 INTERACTIONS OF THE FORGOING AND CUMULATIVE IMPACTS

15.1 INTRODUCTION

The purpose of this section of the EIAR is to draw attention to significant interaction and interdependencies in the existing environment. In preparing the EIAR each of the specialist consultants have and will continue to liaise with each other and will consider the likely interactions between effects predicted as a result of the proposed development during the preparation of the proposals for the subject site and this ensures that mitigation measures are incorporated into the design process.

This approach is considered to meet with the requirements of Part X of the Planning and Development Act 2000 and Part 10, and schedules 5, 6 and 7 of the Planning and Development Regulations 2001 as amended. The detail in relation to interactions between environmental factors will be covered in each chapter of the EIAR.

All environmental factors are interlinked to a degree such that interrelationships exist on numerous levels. Interactions within the study area can be one-way interactions, two-way interactions and multiple-phase interactions which can be influenced by the proposed development. As this EIAR document has been prepared by a number of specialist consultants an important aspect of the EIA process is to ensure that interactions between the various disciplines have been taken into consideration. This chapter of the EIAR was prepared by Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates.

The purpose of this requirement of an EIAR is to draw attention to significant interaction and interrelationships in the existing environment. John Spain Associates, Planning & Development Consultants, in preparing and co-ordinating this EIAR ensured that each of the specialist consultants liaised with each other and dealt with the likely interactions between effects predicted as a result of the proposed development during the preparation of the proposals for the subject and ensuring that appropriate mitigation measures are incorporated into the design process.

Having regard to the above, JSA require that a specific section on Interactions is included in each of the environmental topic chapters of the EIAR. This approach is considered to meet with the requirements of Part X of the Planning and Development Act 2000, as amended, and Part 10, and Schedules 5, 6 and 7 of the Planning and Development Regulations 2001-2018.

Having regard to the approach taken, the aspects of the environment likely to be significantly affected by the proposed development, during both the construction and operational phases, have been considered in detail in the relevant Chapters of this EIAR document. In addition, likely interactions between one topic and another have been discussed under each topic Chapter by the relevant specialist consultant.

The primary interactions can be summarised as follows:

- Engineering bridge design with biodiversity and archaeology;
- Landscape design, engineering services with biodiversity and archaeology;
- Visual impact with biodiversity;
- Biodiversity with water and soils;
- Noise and vibration and traffic; and
- Air quality and climate and traffic.

The relevant consultants liaised with each other and the project architects, engineers and landscape architects where necessary to review the proposed scheme and incorporate suitable mitigation measures where necessary. As demonstrated throughout this EIAR, most inter-relationships are neutral in impact when the mitigation measures proposed are incorporated into the design, construction or operation of the proposed development.

15.2 SUMMARY OF PRINCIPAL INTERACTIONS

The following are the interactions anticipated from the proposed development:-

Table 15.1 – Summary of Potential Interactions / Inter-relationships

Subject	Interaction With-	Interactions / Inter-Relationships
Population and Human Health	Climate	The completed development will generate additional emissions to the atmosphere due to associated with the development, and due to plant equipment within the development. However, air quality in the region of the site is expected to be within the limits set by the air quality standard. During construction there may be potential for slight dust nuisance in the immediate vicinity of the site. However, dust control measures, as set out in the *Dust Control Management Programme* which include a range of measures such as wheel washes and covering of fine materials will minimise the impact on air quality. The effect of construction on air quality will not be significant following the implementation of the proposed mitigation measures. It is proposed to adhere to good working practices and dust mitigation measures to ensure that the levels of dust generated will be minimal and are unlikely to cause an environmental nuisance. There is no significant impact from dust once the development is completed. Overall, it is envisaged that the proposed development will not have a significant impact on air quality.
Population and Human Health	Noise	The greatest potential for noise and vibration impact arising from the proposed development will be in the construction phase. However following the implementation of the proposed mitigation measures in relation to noise, the impact associated with the construction phase of the proposed development is predicted to be moderate, transient and temporary. No significant impacts on the local noise and vibration climate are predicted during the operational phase of the proposed development.
Population and Human Health	Land and Soils	There is an interaction between the potential of the underlying bedrock to emit radon and human health and this is dealt with in Chapter 3 Population and Human Health
Air Quality	Soils	Exposed soil during the construction phase of the proposed development may give rise to increased dust emissions. However, the implementation of the dust management and dust control measures will ensure that the proposed development will not give rise to the generation of any significant quantities of dust.
Material Assets	Air Quality	The proposed development is located in a semi-rural area, with agricultural activities to the north. The production of dust during construction has a nuisance value and livestock may be at risk to eye irritation from high levels of wind blowing dust particles. Given the proposed mitigation measures for dust control and dust suppression, the potential for dust to impact upon livestock would be considered very low.

Subject	Interaction With-	Interactions / Inter-Relationships
Water	Biodiversity	A deterioration in water quality in nearby watercourses, which would adversely impact aquatic biodiversity, could occur during the construction phase of the proposed development due to rainwater run-off containing sediments, concrete and hydrocarbon spillages, and during the operational phase due to the discharge of domestic wastewater. During the construction phase, surface water quality would be protected through the implementation of mitigation measures, which include the regular maintenance and inspection of construction plant, the appropriate storage of potentially polluting substances, the supervision of all concrete works and use of appropriate silt control features where required. Therefore, no potential significant impacts upon water quality is anticipated during the construction phase. There would be no potential impacts to water quality during the operational phase of the development, as all domestic wastewater would be directed to the Navan Waste Water Treatment Plant for treatment prior to discharge.
Material Assets Waste	Water	Should waste be incorrectly handled or stored at the development site during construction works, it has the potential to cause an adverse impact upon water quality in the area through leaching of materials to groundwater or surface water. However, as mentioned above, waste would be segregated and stored in suitably contained waste receptacles at the site compound, considerably reducing the potential risk of pollution to water. It is not considered that there would be any significant risk to water quality as a result of waste management during the operational phase, given that waste would be collected by private, licenced waste contractors and recovered, recycled or disposed of at appropriately licenced waste facilities, which would have environmental controls in place as standard.
Material Assets Waste	Biodiversity	Waste has the potential to impact upon biodiversity during the construction phase, by causing pollution to soils and water and by potentially attracting pests / vermin to the site. However, as discussed in the sections above, wastes would be stored in suitably contained waste receptacles at the site compound, reducing the potential of pollution to soils and water. Furthermore, the majority of wastes generated during the construction phase would be inert materials, which would reduce the potential for issues regarding pests / vermin. It is not considered that there would be any significant impact upon biodiversity due to waste management during the operational phase, given that waste would be collected by licenced waste contractors and recovered, recycled or disposed of at appropriately licenced waste facilities, which would have environmental controls in place as standard.

Subject	Interaction With-	Interactions / Inter-Relationships
Water	Material Assets – Waste Management	There is an interaction between the water environment and waste management as there may be the requirement for removal of contaminated soil off site to a suitable licensed facility to prevent contamination of water. This is dealt with in Chapter 11 Waste Management.
Material Assets - Waste	Human Beings	Should waste be incorrectly handled or stored at the development site, it has the potential to cause an adverse impact upon human beings through nuisance, including visual, odour and pests, and pollution to soils and water. It should also be noted that given the inert nature of the majority of C&D waste types, it is unlikely that issues regarding odour or pests would arise. During the operational phase, suitably contained wheelie bins / waste receptacles would be provided to the residential area and childcare facility by private waste contractors, thus there would be no significant risk of pollution to soils. Waste would be collected on a regular basis, typically on a two-weekly basis alternating between recyclables and municipal waste. Therefore, waste would not be envisaged to accumulate to high enough volumes to cause nuisance.
Material Assets – Waste	Landscape	Waste and litter have the potential to adversely affect the appearance of the landscape. However, as waste management measures would be implemented as part of the proposed development, it is considered that there would be no significant adverse impact upon the landscape.
Air, Population and Human Health	Biodiversity	An adverse impact on air quality has the potential to impact upon human health, cause dust nuisance and cause disturbance to fauna. However, the risk to air quality as a result of the proposed development would not be considered significant, both at the local community level and on a broader national / global scale. During the construction phase of the development, there would be potential for dust emissions, which could impact upon the communities and residents on the roads to the site and fauna in the surrounding area. The potential impact of dust would be temporary, given the transient nature of construction works. Dust control would be an integral part of construction management practices, with mitigation measures implemented where required, including sweeping of roads and hardstand areas, appropriate storage and transport of material and dust suppression measures where required. It should be noted that an important interaction exists between air quality and flora, whereby vegetation can play an important role in acting as an air purifier by absorbing carbon dioxide and giving out oxygen. It would therefore be anticipated that potential carbon dioxide emissions generated by home heating systems and discharged from vehicle exhausts would be somewhat mitigated by vegetation in the environs of the site and large area of forestry to the east/north-east of the site.

Subject	Interaction With-	Interactions / Inter-Relationships
Air & Climate	Surface Water / Groundwater	The interactions between Air & Climate and surface water and groundwater will be mainly limited to the construction phase and are mitigated by the drainage design and proposed mitigation measures.
Air Quality	Biodiversity	An increase in dust emissions during the construction phase has the potential to adversely impact upon flora by blocking leaf stomata, interfering with photosynthesis, respiration and transpiration processes. However, given the transient nature of construction works, and given that standard dust control measures would be implemented, no significant impact would be anticipated.
Air & Climate	Biodiversity	During construction there are potential issues for biodiversity if the trees were to be covered in dust during construction. However, this will be mitigated by the implementation of a proposed dust minimisation plan and then there should be no impacts on nearby trees.
Noise	Population and Human Health/Biodiversity	Increased noise levels during the construction phase will be temporary only and are not expected to have a long-term significant adverse effect upon Population and Human Health in the general area. Furthermore the application of binding noise limits and hours of operation, along with the implementation of appropriate noise and vibration control measures, will ensure that noise and vibration impact is kept to a minimum. There will be no significant increase in ambient noise levels arising during the operational phase of the proposed development. Noise generated during the construction and operational phases of the proposed development has the potential to impact upon Population and Human Health and fauna within the vicinity of the site. During the construction phase, noise may be generated due to increased vehicle movements and the operation of construction plant. It is anticipated that there would be a moderate impact, for limited periods of time, on the nearest local residences and fauna within the vicinity of the development. Control and mitigation measures would be implemented to reduce noise and vibration, including measures relating to equipment operation and timing of activities. Given the transient nature of construction works, and provided mitigation measures are implemented, noise from construction would not be considered to pose a significant impact upon human beings or Biodiversity.

Subject	Interaction With-	Interactions / Inter-Relationships
Landscape	Population and Human Health	Changes to the landscape character of the site itself will include the development of new buildings and associated landscape. The landscape and visual impact associated with Population and Human Health focuses on the effects to dwellings. The settlement pattern comprises residential development to the west and south, with the town centre located to the south east. The proposed development generates visual effects, and the effects and associated amelioration of these effects is discussed in the impact section of the chapter.
Landscape	Biodiversity	The long-term effects of the proposed development will have a positive effect on the tree cover associated with the development. The long-term effects of the retention and enhancement of existing hedgerows and the planting of new native trees will have a slightly positive effect. Further consultation with the Ecological Consultant will take place at detailed design, implementation and monitoring stages to ensure adherence to best practice and sound ecological principles.
Surface Water / Groundwater	Soils/geology/Waste Management	There is a close link between soils & geology and water (hydrogeology and hydrology). For example, the erosion of sediments during the construction phase can, if not mitigated result in additional siltation in nearby surface watercourses. Due to this inter-relationship, the impacts discussed in this section will be considered applicable to both the geological water and ecological environment. Impacts on the geological environment will also affect the agricultural environment. The removal of agricultural soils during the proposed construction project is inevitable. Waste Management and dust management is also considered in interactions as soil removal will be required for this development. Interactions between soils/geology will be mainly limited to the construction phase due to material excavation.
Material Assets	Biodiversity	The proposed development would alter flora cover and the species of fauna supported due to land take and soil disturbance works. This impact would be slight, given that the majority of the existing habitats are modified and of low ecological value.
Material Assets - Utilities	Material Assets - Waste management, and Water (hydrogeology)	The proposed works result in an increase in surface water runoff, if not catered for adequately this may have an effect on the hydrogeology.
Material Assets – Waste management	Traffic and Transportation/Soils and Geology	Waste management interacts with traffic and transportation, soils and geology. The direct and indirect effects of waste-related transport are considered in Chapter 10, Traffic and Transportation and the geotechnical characterisation of the scheme is considered in Chapter 5, Soils and Geology.

Subject	Interaction With-	Interactions / Inter-Relationships
Material Assets – Traffic	Population and Human Health	Temporary negative impacts to human health may be likely during the construction phase due to noise, dust, air quality and visual impacts which are discussed in other chapters within this EIAR. The traffic impacts, which would also be temporary in duration are not considered to be significant due to the implementation of the mitigation measures identified in section 10.6.1.

15.3 CUMULATIVE IMPACTS

As outlined in Chapter 2 this EIAR where relevant the EIAR also takes account of other development within the area. These impacts have been addressed in the relevant chapters of the EIAR.

To determine traffic impacts in Chapter 10 the traffic generated by the proposed development is combined with the baseline traffic generated by the traffic on the road network in the area. The potential traffic impacts from other developments were also considered in the assessment (e.g. primary school site - adjacent to the north).

For the noise impact assessment in Chapter 8 the potential noise emissions arising from the proposed development during construction and operation are combined (using cumulative AADT figures from Traffic chapter) with background noise levels (predominantly road traffic) were assessed.

Each of the relevant specialists has considered the potential for cumulative impact in preparing their assessments. While there is the potential for negative impacts to occur during the construction stage of the scheme, with the implementation of the appropriate mitigation outlined in the EIAR, the residual cumulative impact is not considered to be significant.

15.3.1 General Irish Water Upgrade Works

Some separate Irish Water upgrade works may be needed to facilitate development in general in Navan, including the subject lands, but do not form part of this application. The location of these works is shown on drawing no. D061-069, prepared by CS Consulting Engineers.

The works will require road opening licence under Section 254 of the Planning and Development Acts 2000-(as amended) from Meath County Council. As part of the road opening licence, it is anticipated that a Construction Traffic Management Plan would be agreed with Meath County Council, by the contractor. The objective of which is to minimise the short term disruption to local residents.

There will be some short term impacts during the construction phase as the pipes are laid, particularly in respect of traffic management with regards to sensitive receptors. This may cause local short term inconvenience and disturbance to residents and business in the vicinity of the works. However the works would normally be undertaken in sections on a phased/rolling programme so that the number of persons experiencing local inconveniences at any one time is kept to a minimum.

16.0 SUMMARY OF EIA MITIGATION AND MONITORING MEASURES

16.1 INTRODUCTION

The central purpose of EIA is to identify potentially significant adverse impacts at the pre-consent stage and to propose measures to mitigate or ameliorate such impacts. This chapter of the EIAR document has been prepared by John Spain Associates and sets out a summary of the range of methods described within the individual chapters of this EIAR document which are proposed as mitigation and for monitoring. It is intended that this chapter of the EIAR document will provide a useful and convenient summary to the competent/consent authority of the range of mitigation and monitoring measures proposed. This chapter of the EIAR was prepared by Rory Kunz, BA (MOD), MScERM, MAT&CP, Dip EIA Mgmt., Executive Director with John Spain Associates.

EIA related conditions are normally imposed by the competent/consent authority as part of conditions of planning consent and form a key part of the Impact Anticipation and Avoidance strategy. Conditions are principally used to ensure that undertakings to mitigate are secured by explicitly stating the location, quality, character, duration and timing of the measures to be implemented. A secondary role of EIA related conditions is to ensure that resources e.g. bonds / insurances will be available and properly directed for mitigation, monitoring or remedial action, in the event that the impacts exceed the predicted levels.

Monitoring of the effectiveness of mitigation measures put forward in the EIAR document, both by the competent authorities and the developer, is also an integral part of the process. Monitoring of environmental media and indicators arise either from undertakings or from conditions.

In the case of mitigation and monitoring measures it is important for all parties to be aware of the administrative, technical, legal and financial burdens that can accompany the measures proposed. It is also important to ensure that, where monitoring is provided for, it is clearly related to thresholds, which if exceeded cause a clearly defined set of actions to be implemented.

16.2 MITIGATION STRATEGIES

16.2.1 Introduction

There are three established strategies for impact mitigation - avoidance, reduction and remedy. The efficacy of each is directly dependent on the stage in the design process at which environmental considerations are taken into account (i.e. impact avoidance can only be considered at the earliest stage, while remedy may be the only option available to fully designed projects).

16.2.2 Mitigation by Avoidance

Avoidance is generally the fastest, cheapest and most effective form of impact mitigation. Environmental effects and consideration of alternatives have been taken into account at the earliest stage in the project design processes. The consideration of alternatives with respect to the development of the subject lands has been described in Chapter 2.

16.2.3 Mitigation by Reduction

This is a common strategy for dealing with effects which cannot be avoided. It concentrates on the emissions and effects and seeks to limit the exposure of the receptor. It is generally regarded as the "end of pipe" approach because it does not seek to affect the source of the problems (as do avoidance strategies above). As such this is regarded as a less sustainable, though still effective, approach.

16.2.4 Reducing the Effect

This strategy seeks to intercept emissions, effects and wastes before they enter the environment. It monitors and controls them so that acceptable standards are not exceeded. Examples include wastewater treatment, filtration of air emissions and noise attenuation measures.

16.2.5 Reducing Exposure to the Impact

This strategy is used for impacts which occur over an extensive and undefined area. Such impacts may include noise, visual impacts or exposure to hazard. The mitigation is effected by installing barriers between the location(s) of likely receptors and source of the impact (e.g. sound barriers, tree screens or security fences).

16.2.6 Mitigation by Remedy

This is a strategy used for dealing with residual impacts which cannot be prevented from entering the environment and causing adverse effects. Remedy serves to improve adverse conditions which exist by carrying out further works which seek to restore the environment to an approximation of its previous condition or a new equilibrium.

Mitigation and Monitoring Measures

The following provides a list, for ease of reference, of the mitigation and monitoring measures recommended in each chapter of the EIAR.

16.3 PROJECT DESCRIPTION & ALTERNATIVES EXAMINED

16.3.1 Construction Management Strategy

It is envisaged that the development of the lands subject of the proposed development will occur over a 48-54 week period. Given the nature of the project and the need for flexibility to respond to market demand, the development phases are indicative. An Outline Construction Environment Plan has been prepared by Stutec Consulting Engineers, has been reviewed by the relevant EIAR consultants and is included in the SHD application.

Construction Traffic Management Plan
A Construction Traffic Management Plan (CTMP) will be prepared by the main contractor and agreed with the Planning Authority prior to commencement of development in the event of a grant of permission.

16.4 POPULATION AND HUMAN HEALTH

A range of construction related remedial and mitigation measures are proposed throughout this EIAR document with reference to the various environmental topics examined and the inter-relationships between each topic. These remedial and mitigation measures are likely to result in any significant and likely adverse environmental impacts on population and human health during the construction phases being avoided. Readers are directed to Chapter 15 of this EIAR document which summarises all of the remedial and mitigation measures proposed as a result of this EIA.

POP & HH CONST 1:

In order to protect the amenities enjoyed by nearby residents, premises and employees a full Construction Management Plan (including traffic management) should be prepared by the contractor and implemented during the construction phase.

With reference to the construction phase of the proposed development, the objective of the Construction Waste Management Plan prepared by CS Consulting is to ensure that waste generated during the proposed construction and operation phases will be managed and disposed of in a way that ensures the provisions of the Waste Management Acts 1996 - 2013 are complied with.

During the construction stage, the risk of accidents associated with the proposed development are not predicted to cause unusual, significant or adverse effects to the existing public road network. The vast majority of the works are away from the public road in a controlled environment. The objective of which is to minimise the short term disruption to local residents, and reduce the potential for accidents.

Furthermore, is expected that the risk of accidents would be low during the construction of the proposed development considering the standard construction practices which are to be used.

With reference to natural disasters (e.g. flooding), the proposed development has undergone a Site Specific Flood Risk Assessment, prepared by CS Consulting. The main area of the site where development is proposed is not at risk of fluvial, pluvial or groundwater flooding.

A Health and Safety Plan will be prepared (required by the *Safety, Health and Welfare at Work (Construction) Regulations 2013*) to address health and safety issues from the design stages through to the completion of the construction and maintenance phases. The Health and Safety Plan will comply with the requirements of the Regulations and will be reviewed as the development progresses.

Safety on site will be of paramount importance. Only contractors with the highest safety standards will be selected. During the selection of the relevant contractor and the respective subcontractors their safety records will be investigated.

Prior to working on site, each individual will receive a full safety briefing and will be provided with all of the safety equipment relevant to the tasks the individual will be required to perform during employment on site.

Safety briefings will be held regularly and prior to any onerous or special task. *'Toolbox talks'* will be held to ensure all workers are fully aware of the tasks to be undertaken and the parameters required to ensure the task will be successfully and safely completed.

All visitors will be required to wear appropriate personal protective equipment prior to going on to the site and will undergo a safety briefing by a member of the site safety team.

Regular site safety audits will be carried out throughout the construction programme to ensure that the rules and regulations established for the site are complied with at all times.

16.4.1 Operational Phase

The operation phase is considered to have likely significant positive impacts on human beings in relation to the provision of additional residential units, open space, childcare provision, to cater for the demands of a growing population in accordance with the residential zoning objectives pertaining to the site.

During the operational phase of the development the design of the scheme has undergone a Road Safety Audit and has had regard to Design Manual for Urban Roads and Streets (DMURS) during its design. This will promote a pedestrian friendly environment, promoting sustainable development and reducing the influence of cars. This has the potential to reduce accidents within the proposed development.

16.5 BIODIVERSITY

16.5.1 Mitigation Measures Proposed

The following mitigation measures are proposed for the development

Recommendation 1: The loss of mature trees or hedgerows has been avoided to the greatest extent possible. Where the road passes through the woodland this route has been designed to minimise the loss of trees (19 in total). Acknowledging this, the landscaping scheme has been designed to compensate for the loss of habitat. This includes biodiversity friendly planting of natural meadow areas and clusters of native trees. Species have been chosen to be pollinator and wildlife friendly. There will be approximately 1,250m of new hedgerow and linear woodland in addition to trees and shrubs scattered throughout the development and areas of meadow grassland. These features can be seen in figure 4.3. Although direct replacement of lost habitat is not possible, in time these new features will mature and will provide habitat for much of the biodiversity which is on site at present. The retention of hedgerows and establishment of new meadow areas may allow for Yellowhammer to remain on the site.

Recommendation 2: The removal of vegetation should not take place between March and July as per section 40 of the Wildlife Act. Where this cannot be avoided, vegetation must first be inspected by a suitably qualified ecologist for signs of nesting. Where no nesting is observed, vegetation can be removed within 48 hours. Where nesting is underway, vegetation cannot be removed unless under licence from the NPWS.

The following measure is taken from the bat survey report:

"Where possible, trees, which are 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 [potential bat roost] value determines the methodology of felling. Trees with PBR Category 1 are highly suitable for roosting bats and require more intensive procedures prior to felling."

Recommendation 3: A Construction Management Plan has been prepared as part of the planning application with regard to guidelines on the protection of fish habitat from Inland Fisheries Ireland. This include detailed measures for the prevention of pollution. In particular this will include measures to prevent silt from entering the River Boyne. Under no circumstances should silt-laden water enter the River Boyne. Water leaving the site must first pass through suitably designed silt traps or settlement ponds. These shall be inspected on at least a daily basis, and more frequently during periods of heavy rainfall. The site manager shall be responsible for ensuring that pollution does not occur.

Recommendation 4: The following measures are taken from the bat report:

"The following principles will be followed especially in relation to the general residential area and will also be implemented for the greenway and the active open area: - Artificial lights shining on bat roosts, their access points and the flight paths away from the roost must always be avoided. This includes alternative roosting sites such as bat boxes.
- Lighting design should be flexible and be able to fully take into account the presence of protected species. Therefore, appropriate lighting should be used within a proposed development and adjacent areas with more sensitive lighting regimes deployed in wildlife sensitive areas.
- Dark buffer zones can be used as a good way to separate habitats or features from lighting by forming a dark perimeter around them. This should be used for habitat features noted as foraging areas for bats.
- Buffer zones can be used to protect Dark buffer zones and rely on ensuring light levels (levels of illuminance measured in lux) within a certain distance of a feature do not exceed certain defined limits. The buffer zone can be further subdivided in to zones of increasing illuminance limit radiating away from the feature or habitat that requires to be protected.
- Luminaire design 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.
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.
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.
Planting of screening will also be effectively used to prevent lighting spillage areas where bat foraging is recorded. In particular, lighting will not shine onto important commuting and foraging areas identified for local bat populations."

Recommendation 5: Disruption to ecological corridors

The landscaping design has maintained ecological connectivity by establishing/strengthening native woodland/hedgerows along external boundaries (see figure 4.3). This will take time to mature but will ensure continued foraging/commuting ability by biodiversity through and across the site.

16.6 LAND AND SOILS

16.6.1 Incorporated Design Mitigation

The proposed development and planning drawings submitted have taken into account potential contamination issues and upon completion the development has a system in place to ensure rainwater runoff from the site passes through an oil separator prior to out falling into the proposed storm water drainage system.

16.6.2 Construction Phase Mitigation

A Construction Management Plan (CMP) (prepared by CS Consulting) is included in the SHD application material. The CMP will be put in place by the Contractor to implement the mitigation measures and will be prepared and submitted to the planning authority and will be maintained by the contractor during the construction phase. The CMP includes a range of site-specific measures which will include the following mitigation measures:

In order to reduce the impacts on the soils, geology and hydrogeological environment a number of mitigation measures will be adopted as part of the construction works on site. The measures will address the main activities of potential impact which include:

- Control of Soil Excavation and Export from Site;
- Sources of fill and aggregates for the project;
- Fuel and Chemical handling, transport and storage; and
- Control of Water during Construction.

In advance of work starting on site, the appointed Contractor will prepare a Construction and Environmental Management Plan (CEMP). The Plan sets out the overarching vision of how the construction of the project will be managed in a safe and organised manner by the Contractor. The CEMP will set out requirements and standards which must be met during the construction stage and will include the relevant mitigation measures outlined in the EIAR and any subsequent conditions relevant to the project.

Care will be required for the environmental management of the site to ensure that no potential contamination issues are experienced which may impact on the overall groundwater quality.

Potential issues can be mitigated against by ensuring that the developments environmental management plan is adhered to prevent accidental onsite oil spillages and the regular maintenance of onsite plant to eliminate potential risks.

Soil stripping, earthworks and stockpiling of soil will be carried out during the works. Stockpiles have the potential to cause negative impacts on air and water quality. The effects of soil stripping and stockpiling will be mitigated through the implementation of an appropriate earthworks handling protocol during construction. It is anticipated that any stockpiles will be formed within the boundary of the excavation and there will be no direct link or pathway from this area to any surface water body. It is anticipated that only local/low level of stockpiling will occur as the bulk of the material will be excavated either straight into trucks for transport off site or will be reused in other areas of the site as fill.

Dust suppression measures (e.g. damping down during dry periods), vehicle wheel washes, road sweeping, and general housekeeping will ensure that the surrounding environment are free of nuisance dust and dirt on roads.

The following mitigation measures will be taken at the construction site in order to prevent any spillages to ground of fuels and prevent any resulting soil and/or groundwater quality impacts:

- Designation of bunded refuelling areas on the site (if required);
- Provision of spill kit facilities across the site;
- Where mobile fuel bowsers are used the following measures will be taken:
- Any flexible pipe, pump, tap or valve will be fitted with a lock and will be secured when not in use;
- All bowsers to carry a spill kit and operatives must have spill response training; and
- Portable generators or similar fuel containing equipment will be placed on suitable drip trays.

In the case of drummed fuel or other potentially polluting substances which may be used during construction the following measures will be adopted:

- Secure storage of all containers that contain potential polluting substances in a dedicated internally bunded chemical storage cabinet unit or inside concrete bunded areas;
- Clear labelling of containers so that appropriate remedial measures can be taken in the event of a spillage;
- All drums to be quality approved and manufactured to a recognised standard;
- If drums are to be moved around the site, they should be done so secured and on spill pallets; and
- Drums to be loaded and unloaded by competent and trained personnel using appropriate equipment.

16.6.3 Operational Phase

Upon completion of the Construction Phase of the proposed scheme, issues pertaining to the development would in general be issued such as odour or noise control. There are no residual issues relating to soils & geology for the development.

During the operational phase of the proposed development there is limited to no potential for site activities to impact on the geological environment of the area.
Following best practice, the potential for the ground water to become polluted via oil spills will be reduced as far as is practical by the use of an oil separator to take run off from carparking areas and passing through same prior to disposal.

The proposed foul drainage & potable water network will be vested to Irish Water, and as the statutory agency will have responsibility for the maintenance of the foul drainage & potable water network once completed. The stormwater system will be taken in charge by Meath County Council who will carry out maintenance on the system if required.

16.6.4 Monitoring measures – construction

Proposed monitoring during the construction phase in relation to the soil and geological environment are as follows:

- Adherence to the "*Construction Management Plan (CMP)*". The developer will be responsible for ensuring adherence with the *"Construction Management Plan".* If construction works are not in accordance with the plan, then the developer will ensure that this is remedied.
- Construction monitoring of the works (e.g. inspection of existing ground conditions on completion of cut to road sub-formation level in advance of placing capping material, stability of excavations etc.).
- Inspection of fuel / oil storage areas. If these are found to be sub-standard then the developer will ensure that they are made fit for purpose.
- Monitoring cleanliness of adjacent road network, implementation of dust suppression and provision of vehicle wheel wash facilities. If these measures are found to be inadequate and the adjacent road network is negatively impacted, the developer will ensure that this is remedied and will ensure that dust suppression measures are implemented more regularly and all vehicles exiting the site use vehicle wheel wash facilities provided.
- Monitoring of contractor's stockpile management (e.g. protection of excavated material to be reused as fill; protection of soils from contamination for removal from site).
- Monitoring sediment control measures (sediment retention ponds, surface water inlet protection etc.). The developer is responsible for ensuring that these measures are fit for purpose. If they are found to be inadequate, then the development will ensure that they are made good and fully utilised.
- Soil removed during the construction phase will be monitored to maximise potential for re-use on site.
- The quantities of topsoil, subsoil and rock removed off site will be recorded.

5.9.2 Monitoring measures – operational phase

Monitoring of the "taken in charge", public open space areas by Meath County Council will be on-going. They will ensure that the detention basins and other SuDS features such as swales are adequately maintained. If they are found to be not adequately maintained, then they will be responsible for increasing the maintenance schedule.

16.7 WATER

16.7.1 Incorporated Design Mitigation

The proposed development and planning drawings submitted have taken into account potential contamination issues and upon completion the development has a system in place to ensure rainwater runoff from the site passes through an oil separator prior to outfalling into the proposed storm water drainage system.

Mitigation measures follow the principles of avoidance, reduction and remedy. The most effective measure of avoidance is dealt with during the site selection and design stage, by ensuring that the development does not traverse or come in close proximity to sensitive hydrological attributes.

Where avoidance of the feature has not been possible, consideration has been given to locally modify the proposed development so as to reduce / minimise the extent of the impact. If any modifications are proposed to reduce hydrological impacts, it is necessary to also consider any associated impacts to the hydrological and ecological regimes.

16.7.2 Construction Phase Mitigation

The following mitigation measures are recommended for the construction phase of the development:

- Works will be in accordance with the requirements of the Office of Public Works (OPW) and Inland Fisheries Ireland (IFI).
- Pollution prevention measures in accordance with guidance from Inland Fisheries Ireland (2016) or as otherwise agreed with the IFI. This will include the installation of sediment traps and culverting of drainage ditches 'in the dry', where required.
- No direct discharges made to waters where there is potential for cement or residues in discharge;
- Designated impermeable cement washout areas must be provided;
- Any in-situ concrete work to be lined and areas bunded (where possible) to stop any accidental spillage
- Any spoil or waste material generated from the construction process is to be temporarily stored at an approved location on site, before being removed to an accepting licensed waste disposal facility;
- All new infrastructure is to be installed and constructed to the relevant codes of practice and guidelines;
- All surface water infrastructure are to be pressure tested by an approved method during the construction phase and prior to connection to the public networks, all in accordance with Local Authority Requirements;
- Connections to the public network are be carried out to the approval and / or under the supervision of the Local Authority prior to commissioning;
- All new sewers are to be inspected by CCTV survey post construction; to identify any possible physical defects for rectification prior to operational phase;
- Care will be required for the environmental management of the site to ensure that no potential contamination issues are experienced which may impact on the overall surface water quality.
- Potential issues can be mitigated against by ensuring that the developments environmental management plan is adhered to prevent accidental onsite oil spillages and the regular maintenance of onsite plant to eliminate potential risks. As outlined in the Construction Management Plan submitted with the planning application.
- Implement best practice construction methods and practices complying with relevant legislation to avoid or reduce the risk of contamination of watercourses or groundwater.
- A Site Specific Construction and Environment Management Plan will be developed and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the Construction and Environment Management Plan.
- Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.
- Weather conditions and seasonal weather variations will also be taken account of when planning stripping of topsoil and excavations, with an objective of minimizing soil erosion.
- The extent of sub-soil and topsoil stripping to be minimised to reduce the rate and volume of the run-off during construction until the topsoil and vegetation are replaced.
- Precast concrete units fabricated off site will be specified for culvert and bridging structures with cast in-site requirements minimised.
- Concrete batching will take place off site or in a designed area with an impermeable surface.
- Concrete wash down and wash out of concrete trucks will take place off site or in an appropriate facility.
- Discharge from any vehicle wheel wash areas is to be directed to on-site settlement ponds.
- Oil and fuel stored on site for construction should be stored in designated areas. These areas shall be bunded and should be located away from surface water drainage and features.
- Refuelling of construction machinery shall be undertaken in designated areas away from surface water drainage in order to minimise potential contamination of the water environment. Spill kits shall be kept in these areas in the event of spillages.
- Hazardous construction materials shall be stored appropriately to prevent contamination of watercourses or groundwater.
- Spill kits should be kept in designated areas for re-fuelling of construction machinery.
- Dewatering measures should only be employed where necessary.

16.7.3 Operational Phase

Upon completion of the Construction Phase of the proposed scheme, issues pertaining to the development would in general be issues such as accidental pollution incidents into the storm water system.

Sustainable Drainage Systems will be incorporated, where practicable, in order to improve the quality of the surface water discharging from site and reduce the runoff volume and rate; thus providing a positive impact on the receiving surface water network and downstream waterbody. The surface water drainage design, for this development, was designed in accordance with the Local Authority requirements. All SuDS measures will be provided in accordance with the Greater Dublin Strategic Drainage Study Regional Drainage Policy Volume 2 - New Development (GDSDS-RDP Volume 2). Specific design requirements for SuDS systems are established by the Construction Industry Research and Information Association's publication CIRIA C753 – The SuDS Manual.

Following best practice, the potential for the storm water to become polluted via oil spills will be reduced as far as is practical by the use of an oil separator to take run off from carparking areas and passing through same prior to disposal.

Irish Water would maintain the foul & potable water systems while Meath County Council will maintain the storm water network.

As such this type of development would not increase the risk to surface water or downstream flooding. As the site is provided with a new storm sewer to replace the existing water course and all storm water generated on site will now be attenuated to ensure that the runoff from the site is kept to green field rates down stream lands would not be flooded when an extreme storm is experienced. The overall storm water quality will also be enhanced as SuDs features are included in the proposed development and all surface waters are to pass through an oil separator prior to outfalling into the proposed new storm sewer.

The following measures will be employed:

- Surface water runoff from the development to be collected by an appropriately designed system with contaminants removed prior to discharge i.e. petrol interceptor.
- A regular maintenance and inspection programme of the flow control devices, attenuation storage facilities, gullies and petrol interceptor will be required during the Operational Phase to ensure the proper working of the development's networks and discharges.
- A regular maintenance and inspection programme for the culverts and bridge structure will be required during the Operational Phase to ensure the proper working of the development's infrastructure.
- Waste generated by the everyday operation of the development should be securely stored within designated collection areas with positive drainage collection systems to collect potential runoff.
- Operational waste should be removed from site using licenced waste management contractors.

16.8 AIR QUALITY AND CLIMATE

16.8.1 Construction Phase

In order to ensure that adverse air quality impacts are minimised during the construction phase and that the potential for soiling of property and amenity and local public roads is minimised, the following mitigation measures shall be implemented during the course of all construction activities:

AQ CONST 1: Air Quality Mitigation Measures
- Avoid unnecessary vehicle movements and manoeuvring, and limit speeds on site so as to minimise the generation of airborne dust.
- Use of rubble chutes and receptor skips during construction activities.
- During dry periods, dust emissions from heavily trafficked locations (on and off site) will be controlled by spraying surfaces with water and wetting agents.
- 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 only.
- Re-suspension in the air of spillages material from trucks entering or leaving the site will be prevented by limiting the speed of vehicles within the site to 10kmh and by use of a mechanical road sweeper.
- The overloading of tipper trucks exiting the site shall not be permitted.
- Aggregates will be transported to and from the site in covered trucks.

- Where the likelihood of windblown fugitive dust emissions is high and during dry weather conditions, dusty site surfaces will be sprayed by a mobile tanker bowser.
- Wetting agents shall be utilised to provide a more effective surface wetting procedure.
- Exhaust emissions from vehicles operating within the construction site, including trucks, excavators, diesel generators or other plant equipment, will be controlled by the contractor by ensuring that emissions from vehicles are minimised by routine servicing of vehicles and plant, rather than just following breakdowns; the positioning of exhausts at a height to ensure adequate local dispersal of emissions, the avoidance of engines running unnecessarily and the use of low emission fuels.
- All plant not in operation shall be turned off and idling engines shall not be permitted for excessive periods.
- 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.
- Material stockpiles containing fine or dusty elements including top soils shall be covered with tarpaulins.
- Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system.
- A programme of air quality monitoring shall be implemented at the site boundaries for the duration of construction phase activities to ensure that the air quality standards relating to dust deposition and PM_{10} are not exceeded. Where levels exceed specified air quality limit values, dust generating activities shall immediately cease and alternative working methods shall be implemented.
- A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated.

16.8.2 Operational Phase

The Operational Phase of the Belmount Navan development site will not generate air emissions that would have an adverse impact on local ambient air quality or local human health and as such there are no mitigation measures specified for the Operational Phase.

The operational phase includes mitigation measures relating to the design of the development to minimise the impact of the operational phase of the development on air quality and climate are as follows:

AQ OP1 : Climate Impact Mitigation Measures

- Energy Efficiency - All proposals for development shall seek to meet the highest standards of sustainable design and construction with regard to the optimum use of sustainable building design criteria such as passive solar principles and also green building materials.
- All residential units shall be designed and constructed in accordance with The Irish Building Regulations *Technical Guidance Document L – Conservation of Fuel & Energy – Dwellings* amended in 2017 includes requirements for all residential dwellings to be “Nearly Zero Energy Buildings” (NZEB’s) by 31st December 2020.
- In order to reduce energy consumption, the following key design features have been considered in the design process and will be incorporated into the construction of the residential units:
- Passive solar design including the orientation, location and sizing of windows
- The use of green building materials: low embodied energy & recycled materials
- Energy efficient window units and frames with certified thermal and acoustic insulation properties
- Building envelope air tightness
- Installation of Mechanical Ventilation & Heat Recovery systems in all apartment units which operate by extracting warm air from kitchens and bathrooms, cleaning it and distributing it to other rooms in the unit.
- Thermal insulation of walls and roof voids of all units

AQ OP2: Air Quality Mitigation Measures

- Natural Gas heating
- Inclusion of electric car charging points to encourage electric vehicle ownership
- Proximity of Bus Eireann and private bus operator’s commuter services on the R147 Navan-Dublin Road to the east of the development to provide public transport to residents.

- Provision of open landscaped areas and playgrounds within the development to encourage residents to avail of active lifestyle options.

16.8.3 Monitoring

16.8.3.1 Construction Phase

This section describes the dust monitoring methodologies that shall be implemented at the site during the construction phases to ensure that dust and construction vehicle exhaust emissions as NO_2 generated by site activities does not cause nuisance or cause adverse health effects to residential areas and other receptors located in the vicinity of the site boundaries.

Dust Deposition Monitoring Methodology

Dust deposition levels will be monitored to assess the impact that site construction site activities may have on the local ambient air quality and to demonstrate that the environmental control measures in place at the site are effective in minimising the impact of construction site activities on the local receiving environment including existing residential developments and lands bordering the site. The following procedure shall be implemented at the site on commencement of site activities:

The dust deposition rate will be measured by positioning Bergerhoff Dust Deposit Gauges at strategic locations near the boundaries of the site for a period of 30 +-2 days. Monitoring shall be conducted on a monthly basis during periods when the highest levels of dust are expected to be generated i.e., during site preparation works and soil stripping activities and on a quarterly basis thereafter. The proposed monitoring locations (D1 – D4) are presented below in Figure 7.4.

The selection of sampling point locations will be completed after consideration of the requirements of *Method VDI 2119* with respect to the location of the samplers relative to obstructions, height above ground and sample collection and analysis procedures. The optimum locations will be determined by a suitably qualified air quality expert to ensure that the dust gauge locations are positioned in order to best determine potential dust deposition in the vicinity of the site boundaries and existing on-site buildings.

After each (30 +-2 days) exposure period, the gauges will be removed from the sampling location, sealed and the dust deposits in each gauge will be determined gravimetrically by an accredited laboratory and expressed as a dust deposition rate in mg/m^2-day in accordance with the relevant standards.

Technical monitoring reports detailing all measurement results, methodologies and assessment of results shall be subsequently prepared and maintained by the Construction Site Manager. Monitoring reports shall be made available to the Local Authority as requested.

A dust deposition limit value of 350 mg/m^2-day (measured as per German Standard Method VDI 2119 – Measurement of Particulate Precipitations – Determination of Dust Precipitation with Collecting Pots Made of Glass (Bergerhoff Method) or Plastic. is commonly specified by Local Authorities and by the EPA to ensure that no nuisance effects will result from specified activities and it is to this Best Practice standard method that this programme of dust monitoring and control has been prepared.

The *German Federal Government Technical Instructions on Air Quality Control - TA Luft* specifies an emission value for the protection against significant nuisances or significant disadvantages due to dustfall. This limit value is 350 mg/m^2-day and it is to this limit value that all measured dust deposition levels shall be assessed. This limit value is commonly specified by Local Authorities at construction sites.

The results of all dust deposition surveys shall be maintained by the Project Manager and shall be made available to Meath County Council.

Figure 7.4 Construction Phase dust monitoring (D1-D4) Monitoring Locations

NO_2 Monitoring Methodology

In order to assess the impact on existing air quality that vehicle and plant exhaust emissions associated with the construction phase of the development may have, it is proposed that a programme of Nitrogen Dioxide monitoring shall be undertaken for a 1 year period at the baseline air quality locations, A1 & A2 as shown above in Figure 7.3. The purpose of this monitoring programme will be to verify the effectiveness of the various construction phase mitigation measures and to quantify by measurement, the concentration of NO2 in the ambient air to allow for the assessment of measured NO_2 levels against levels measured in EPA Zone D areas over a similar period. NO2 levels shall also be assessed against the annual limit value NO_2 as defined in National Air Quality Standards Regulations 2011 (S.I No. 180 of 2011) which specify an annual limit value of 40 µg/m^3, for the protection of human health, over a calendar year.

16.8.3.2 Operational Phase

Not required.

16.9 NOISE AND VIBRATION

16.9.1 Construction Phase

General Construction Site Management

The following noise management measures shall be implemented at the site from the outset of site activities to control and manage noise levels during the construction phase of the proposed development:

NV CONST 1 Noise Mitigation Measures

An independent acoustic consultant shall be engaged by the contractor prior to the commencement of site activities to ensure that all noise mitigation measures as specified in this Section of the EIAR are implemented and to prepare a site specific *Construction Phase Noise Management Plan.* The Plan shall include all relevant noise and vibration control measures as specified in this Chapter of the EIAR. The Plan shall be submitted to Meath County Council for approval as required.

The nominated contractor shall appoint a designated person to manage all environmental complaints including noise and vibration.

A noise complaint procedure shall be implemented in which the details of any noise related complaint are logged, investigated and where required, measures are taken to ameliorate the source of the noise complaint.

Appropriate signage shall be erected on all access roads in the vicinity of the site to inform HGV drivers that engines shall not be left idling for prolonged periods and that the use of horns shall be banned at all times.

HGV's queuing on any local or public road shall not be permitted and it shall be the responsibility of site management to ensure this policy is enforced.

Typical construction hours are:

07:00hrs – 19:00hrs Monday to Friday
08:00hrs – 14:00hrs Saturday
Closed on Sundays and Bank/Public Holidays

All onsite generator units (if required) used to supply electricity to the site shall be silenced models or enclosed and located away from any receptor.

The site compound shall be located at a point on site furthest away from any residential development.

Mains power shall be used to supply electricity to all site offices and site lighting at the earliest instance.

The use of generators during the night-time shall be avoided.

Construction Phase Noise Control & Mitigation

The following shall be implemented to mitigate construction noise impacts in order to ensure that the construction phase of the development does not have an unacceptable impact on sensitive receptors:

NV CONST 2 Construction Works Noise Mitigation Measures

- A strictly enforced noise management programme shall be implemented at the site from the outset of construction activities.

- The Construction Project Manager shall appoint an acoustic consultant to conduct continuous noise surveys which shall be conducted at the baseline noise monitoring locations throughout the construction phase of the development to assess compliance with the construction noise limit criteria detailed in Table 8.1 above and to assess the effectiveness and implementation of the specific Construction Phase noise mitigation measures detailed in this document.

- The principal of controlling noise at source shall be implemented at the site. Best practice mitigation techniques as specified in *BS 5228:2009+A1 2014 – Noise and Vibration Control on Construction and Open Sites* shall be implemented during the construction phase and are detailed in this Section.

- Noisy stationary equipment shall be sited away from sensitive site boundaries as far as practicable.

- Where reasonable practicable, noisy plant or activities shall be replaced by less noisy alternatives if noise breaches and/or complaints occur.
- Proper use of plant with respect to minimising noise emissions and regular maintenance will be required.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and will be maintained in good efficient order
- Where noisy plant is required to operate in works areas next to residential houses low noise plant options will be used wherever practicable.
- Dumpers and any plant used for moving materials around the site will have high performance exhaust silencers.
- Selected use of rubber-tyred equipment over steel track equipment where practicable.
- The use of inherently quiet plant is required where appropriate – all compressors and generators will be "sound reduced" or "super silent" models fitted with properly lined and sealed acoustic covers, which will be kept closed whenever the machines are in use, and all ancillary pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers.
- All compressors, generators and pumps shall be silenced models fitted with properly lined and sealed acoustic covers or enclosures, which will be kept closed whenever the machines are in use.
- All pneumatic percussive tools such as pneumatic hammers shall be fitted with dampers, mufflers or silencers of the type recommended by the manufacturer.
- Fixed items of plant shall be electrically powered in preference to being diesel or petrol driven.
- Vehicles and mechanical plant utilised on site for any activity associated with the works shall be fitted with effective exhaust silencers and shall be maintained in good working order and operated in a manner such that noise emissions are controlled and limited as far as reasonably practicable.
- Any plant, equipment or items fitted with noise control equipment found to be defective in shall not be operated until repaired / replaced.
- Machines in intermittent use shall be shut down in the intervening periods between works or throttled down to a minimum during periods when not in use.
- Static noise emitting equipment operating continuously shall be housed within suitable acoustic enclosure, where appropriate.
- All excavator mounted pneumatic breakers used for demolition and ground breaking activities shall be fitted with effective dampeners and /or enclosed within a noise adsorbing blanket structure to minimise noise emissions.
- Site activities shall be staggered when working in proximity to any receptor, that is concrete cutting and rock breaking should where possible. This proposed method of working will provide effective noise management of site activities to ensure that any receptor is not exposed to unacceptably high levels of noise over extended periods.
- Excessive reviving of all vehicles shall be avoided.
- Unnecessary dropping of heavy items onto ground surfaces shall be banned.
- The use of an excavator bucket to break up slabs of concrete or tarmacadam shall not be permitted.
- The dragging of materials such as steel covers, plant or excavated materials along ground surfaces shall not be permitted.

- The use of acoustic screens to attenuate noise at source shall be implemented as deemed necessary.

- Plant Reversing Alarms: Where reasonably practicable and deemed safe by risk assessment, taking into account onsite hazards and working environment, the tonal reversing alarms of mobile plant shall be replaced with broadband alarms.

- A nominated person from the Project Management team will be appointed to liase with local residents and businesses regarding noise nuisance events.

- In the event of the requirement for out of hours work to occur which will involve the generation of noise levels that are predicted to exceed out of hours noise limit criteria, Meath County Council shall be immediately notified prior to the works commencing.

- A nominated person from the Project Management team will be appointed to liaise with and inform local residents and Meath County Council regarding out of hours works.

- An independent acoustic consultant shall review the implementation of the recommended mitigation measures on a monthly basis.

The images below describe the use of noise screens for construction activities.

It is recommended that high performing acoustic barriers are utilised such as Echo Barrier products or Ventac products.

Double height acoustic blanket enclosure

Acoustic blankets screening piling and excavations

3 sided Acoustic enclosure for surrounding breaking, cutting works

Construction Phase Vibration Control & Mitigation

The following specific vibration mitigation and control measures shall be considered during the construction phase:

NV CONST 3 Vibration Mitigation Measures

- Breaking out concrete elements using low vibration tools
- Choosing alternative, lower-impact equipment or methods wherever possible
- Scheduling the use of vibration-causing equipment, such as jackhammers, at the least sensitive time of day
- Routing, operating or locating high vibration sources as far away from sensitive areas as possible
- Sequencing operations so that vibration causing activities do not occur simultaneously
- Isolating the equipment causing the vibration on resilient mounts
- Keeping equipment well maintained.
- Confining vibration-generating operations to the least vibration-sensitive part of the day which could be when the background disturbance is highest
- A nominated person from the Project Management team will be appointed to liaise with local residents and businesses regarding vibrational nuisance events.
- An independent acoustic consultant shall review the implementation of the recommended mitigation measures on a monthly basis.

In order to ensure that site construction activities are conducted to minimise the vibration impacts on the receiving environment, structural vibration monitoring shall be conducted during the course of the project works if required.

It is proposed that vibration monitoring will be conducted at properties adjacent to or within 50m of the site as required using calibrated vibration monitors and geophones capable of transmitting live text and email alerts to ensure that if vibration levels approach or exceed specified warning and limit values, site personnel will be alerted to cease at the earliest instance and appropriate mitigation measures may then be implemented to minimise the vibrational impacts of protected structures.

As detailed in Section 8.2.2 the transient vibration guide values for cosmetic damage as specified in British Standard BS 7385:, Evaluation and measurement for vibration in buildings, Part 2 1993 Guide to damage levels arising from ground borne vibration is 15 mm/sec Peak Component Particle Velocity at 4 Hz increasing to 20 mm/sec at 15 Hz.

This limit value rises to 50 mm/sec at frequencies of 40 Hz and greater. The applied conservative limit of 12.5 mm/sec PPV (peak particle velocity) applied for this assessment is significantly lower than these levels.

Having regard to the above we suggest the inclusion of the following mitigation measure for ease of reference:

N V CONST 4

In order to protect the amenities enjoyed by nearby residents, premises and employees a full Construction Management Plan (including traffic management) shall be put in place prior to the commencement of development. This will have regard to the mitigation measures set out in Section 8.7 of this document.

16.9.2 Operational Phase Noise Mitigation

N&V OPERA 1: External noise can enter rooms within dwellings through windows, ventilators, walls, roof and doors. In most cases, however, windows provide the main path.

Acoustic Design requirements for residential buildings

Windows

In order to ensure a sufficient level of sound insulation is provided for all dwellings within the development, the following lists the minimum sound insulation performance of windows and window frame sets in terms of the in-situ weighted sound reduction index (R_W):

30dB R_W for Living rooms & Bedrooms
30dB R_W for Kitchen – Dining Rooms.

The acoustic performance specifications detailed are the minimum requirements which shall apply to the overall glazing system when installed on site. 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. All exterior wall and door frames should be sealed tight to the exterior wall construction.

Ventilation Systems

The ventilation strategy for the development will be in accordance with Part F of the Building Regulations. The apartment units shall include mechanical heat recovery ventilation systems which will negate the requirement for passive wall vents in bedrooms and living spaces which would otherwise allow the transfer of external noise into the building through the air gaps in the passive vents. However, windows may remain openable for rapid or purge ventilation, or at the occupant’s choice. This design feature of the residential units will ensure that the building structure is acoustically insulated from the external environment.

Wall Constructions

The wall construction typically provides the highest level of sound insulation performance to a residential building. The residential dwellings will be built using either masonry or a timber framed construction. The minimum sound insulation performance of the chosen wall construction will be 55dB Rw.

Roof Construction

The insulated roof constructions proposed across the site will provide an adequate level of sound insulation to the properties within the development site. A minimum sound insulation value of 40dB Rw should be used for roof spaces. At the earliest stage during the construction phase, residential test units shall be constructed to their finished level and shall be tested by a suitably qualified independent Acoustic Engineer to ensure that they comply with *Department of the Environment, Building Regulations 2014, Technical Guidance Document E – Sound.* Table 8.14 above provides detail on the recommended sound insulation values that shall be achieved to ensure acoustic privacy between adjoining residential units and to assess compliance with external noise intrusion criteria as defined in *BS 8233: 2014: Guidance on Sound Insulation and Noise Reduction for Buildings.*

The operational phase of the development is predicted not to have an adverse noise impact on the receiving environment or on existing residential developments adjacent to the site during the operational phase of the scheme. Therefore, no mitigation measures additional to those set out above are proposed.

16.9.3 Monitoring

16.9.3.1 Construction Phase

Proposed Noise Monitoring Programme During Site Construction

This section describes the noise and vibration monitoring methodologies that shall be implemented at the site to ensure that construction site activities do not cause excessive nuisance or cause cosmetic or structural damage to properties or structures in the vicinity of the site.

On commencement of the site construction activities, continuous noise monitoring systems shall be installed at site boundary locations to measures and assess the impact that site activities may have on ambient noise levels at local receptors.

The environmental noise measurements will be completed in accordance with the requirements of *ISO 1996-1: 2017*: *Acoustics – Description, measurement and assessment of environmental noise* and with regard to the EPA's 2016 *Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4*). The measurement parameters to be recorded include wind speed, temperature, L_{Aeq}, L_{A90}, L_{A10} and L_{Amax} , 1/3 Octave Frequency analysis and impact noise analysis.

Noise Monitoring Locations

The monitoring locations selected for the noise monitoring survey will be at residential noise sensitive receptors adjacent to the site boundaries and as identified in the baseline noise assessment.

Proposed Vibration Monitoring Programme During Site Construction

In order to ensure that site construction activities are conducted to minimise the vibration impacts on the receiving environment, it is proposed that structural vibration monitoring may be implemented during the course of the construction phase if and as required. It is proposed that vibration monitoring will be conducted at adjacent properties opposite the site boundaries as required using calibrated vibration monitors and geophones with live text and email alert functionality to ensure that if vibration levels approach or exceed specified warning and limit values, site personnel will be alerted to cease at the earliest instance and appropriate mitigation measures may then be implemented to minimise the vibrational impacts of protected structures.

Vibration Monitoring Locations

The monitoring points chosen for locating the geophone of the vibration measuring instrument will be chosen according to the guidelines in British Standard *BS 7385:, Evaluation and measurement for vibration in buildings, Part1 1990 Guide for measurement of vibrations and evaluation of their effects on buildings* and *Part 2 1993 Guide to damage levels arising from groundborne vibration.*

16.10 LANDSCAPE AND VISUAL

16.10.1 Construction Phase

During construction there will be a change to the landscape and there will be negative visual impacts for residents and visitors to the areas adjacent to the site associated with construction activity.

The remedial measures proposed revolve around the implementation of appropriate site management procedures – such as the control of site lighting, storage of materials, placement of compounds, delivery of materials, car parking, etc. Visual impact during the construction phase will be mitigated somewhat through appropriate site management measures and work practices to ensure the site is kept tidy, dust is kept to a minimum, and that public areas are kept free from building material and site rubbish.

Site hoarding will be appropriately scaled, finished and maintained for the period of construction of each section of the works as appropriate. To reduce the potential negative impacts during the construction phase, good site management and housekeeping practices will be adhered to. The visual impact of the site compound and scaffolding visible during the construction phase are of a temporary nature only and therefore require no remedial action other than as stated above.

Existing trees and woodlands to be retained and are shown in the CSR Design Statement and Arboricultural Reports. Existing trees to be retained are particularly sensitive to negative impacts during the construction phase if proper protection measures are not adhered to. With regard to the protection of the retained trees on site during proposed construction works, reference should be made to BS5837: Trees in relation Design, Demolition and Construction – Recommendations (BSI, 2012). Tree protection details will be included with the application to the Board.

Adverse impacts both during construction and at operation phases could be mitigated through undertaking the following site works early on in the construction process in order to soften and screen views as early on as possible.

In areas not subject to the construction of buildings, – Academy Park, the school approach road and around the electrical sub-station, advance planting can take place to build landscape capacity and establish and mature during development and ahead of occupation. Where feasible and sensible, planting larger sized specimen trees (c 18-20 girth) to the north-east of the site.

Reducing the footprint of all construction works wherever feasible and ensuring the remainder of the land is retained as green field will also limit any adverse effects during the construction phase

16.10.2 Operational Phase

The scheme design incorporates significant consideration and mitigation in respect of potential impacts.

The retention of much of the existing landscape structure including the Protected Stand of Trees, most existing hedgerow trees and periphery vegetation around the site boundary. The location of the existing trees and archaeological features have directed the location of pocket parks in the proposed layout.

The architectural layout aims to address visual impacts by proposing variety in scale and massing of buildings. Academy Street has been treated in a more urban way in response to it being a principle road leading to the town. The development on top of the slope has been designed to create neighbourhoods. Towards the river valley, the layout follows the contours to maximise on views and light and to allow trees planted on streets to soften views looking into the development.

The extensive planting of additional trees and shrubs throughout the site where possible will reduce the visual mass of the buildings, soften and partially screen the development over time from various viewpoints, as identified in the assessment, thereby minimising the visual impacts.

Landscape works are proposed to reduce and offset any impacts generated due to the proposed development, where possible. The planting of substantial numbers of new trees and other planting in the open spaces the site boundaries and internal roads, both native and ornamental varieties, will enhance the overall appearance of the new development and compensate for the removal of hedgerows and trees where needed for the construction works and increase the overall landscape capacity of the site to accommodate development.

Native and appropriate planting for biodiversity has been incorporated into the scheme in accordance with the advice of the Project Ecologist.

Public open spaces have been designed as part of an overall design strategy that focuses on creating a '*sense of place'* and individual character for the development area. The quality of the public realm scheme is of a high standard and the quality of materials proposed is similarly high and robust.

Design of public open space that forms part of a network of spaces that includes areas for passive and active recreation, social / community interaction and play facilities catering for all ages.

Application of best practice horticultural methods to ensure that mitigation measures establish and grow appropriately.

16.10.3 Monitoring

16.10.3.1 Construction Phase

Landscape tender drawings and specifications will be produced to ensure that the landscape work is implemented in accordance with best practice. This document will include tree work procedures, soil handling, planting and maintenance. The contract works will be supervised by a suitably qualified landscape architect.

The planting works will be undertaken in the next available planting season after completion of the main civil engineering and building work.

16.10.3.2 Operational Phase

This will consist of weed control, replacement planting, pruning etc. All landscape works will be in an establishment phase for the initial three years from planting. The company responsible for site management of the scheme will be responsible for the ongoing maintenance of the site after this three-year period is complete.

16.11 MATERIAL ASSETS – TRAFFIC

16.11.1 Construction phase

The Construction Management Plan incorporates a range of integrated control measures and associated management initiatives with the objective of mitigating the impact of the proposed developments on-site construction activities.

To minimise disruption to the surrounding environment, the following mitigation measures will be implemented:

- During the pre-construction phase, the site will be securely fenced off from adjacent properties, public footpaths and roads.
- All road works will be adequately signposted and enclosed to ensure the safety of all road users and construction personnel.
- A dedicated 'construction' site access / egress junction will be provided during all construction phases.
- Provision of sufficient on-site parking and compounding to ensure no potential overflow of construction generated traffic onto the local network.
- Site offices and compound will be located within the site boundary. The site will be able to accommodate employee and visitor parking throughout the construction period through the construction of temporary hardstanding areas.
- A material storage zone will also be provided in the compound area. This storage zone will include material recycling areas and facilities.
- A series of 'way finding' signage will be provided to route staff / deliveries into the site and to designated compound / construction areas.
- Dedicated construction haul routes will be identified and agreed with the local authority prior to the commencement of constructions activities on-site.
- Truck wheel washes will be installed at construction entrances if deemed necessary and any specific recommendations with regard to construction traffic management made by the Local Authority will be adhered to.
- On completion of the works all construction materials, debris, temporary hardstands etc. from the site compound will be removed off site and the site compound area reinstated in full on completion of the works.

All construction related parking will be provided on site. Construction traffic will consist of the following two principal categories:

- Private vehicles owned and driven by site construction staff and by full time supervisory staff;
- Excavation plant and dumper trucks involved in site development works and material delivery vehicles for the following: granular fill materials, concrete pipes, manholes, reinforcement steel, ready mix concrete and mortar, concrete blocks, miscellaneous building materials, etc.

It is anticipated that the generation of HGV's during the construction period will be evenly spread throughout the day and as such will not impact significantly during the peak traffic periods.

16.11.2 Operational phase

- The local area provides suitable infrastructure and transport services for travel by sustainable modes. A key barrier to modal shift towards sustainable modes of travel is often a lack of information about potential alternatives to the car. As such, it is proposed that residents and visitors of the proposed development are made aware of potential alternatives including information on walking, cycle routes and public transport.
- A number of walking and cycling connection points are proposed within the development. These connection points will provide access for pedestrians and cyclists onto Academy Street and the R147 Dublin Road, which is proposed to become a public transport gate under the Navan 2030 proposals.
- These facilities will provide attractive, convenient and safe routes for residents. Therefore, there are good links proposed for residents to travel by more sustainable modes.
- As part of the remedial or reductive measures for the site, it is proposed to upgrade the R147 Dublin Road/Academy Street junction to a signal-controlled junction. Introducing a signal control at this location, including measures to provide the maximum degree of safety and convenience for all road users including pedestrians, can enhance efficiency by reducing congestion and conflict between different vehicle movements, within the available road space.
- The introduction of a pedestrian phase at the new signalised junction will enhance pedestrian safety at this location.
- A Mobility Management Plan (MMP) will be prepared for both residents within the apartment units and staff within the creche in order to guide the delivery and management of coordinated initiatives post construction. The MMP ultimately seeks to encourage sustainable travel practices for all journeys to and from the proposed development.
- It is proposed to provide car parking in accordance with the recommendations of the 'Sustainable Urban Housing – Design Standards for New Apartments' published by the Department of Housing, Planning and Local Government (2018). Therefore, the recommended car parking will be less than that required under the Meath Development Plan.
- The number of trips to/from a development is linked to the number of car parking spaces. The restriction of car parking spaces acts as a demand management tool and will reduce the impact on the surrounding road network. It will also encourage a shift away from non-sustainable car ownership models where people who only occasionally use one no longer keep one.
- For occasional car use, it is proposed to introduce a car club to the development. Car Clubs gives you a '*car on call',* whenever you need it. Car clubs have developed as a modern service in many European cities and are a good alternative to high levels of private car use and 'driver only' occupancy rates. The principal of a car club is to ensure that the optimal use of a small number of vehicles to meet the needs of a wide group of people.
- International experience to date shows that healthy car clubs, such as those run by GoCar, operate at a provision of 30 clients per car and every car can replace up to 4 private vehicles thereby significantly reducing the number of traffic movements.
- The introduction of new pedestrian routes, pedestrian phases on the new signalised junction, reduced car parking numbers and Car Clubs will further reinforce the efforts been made towards a modal shift away from car-based trips
- Residents will be encouraged to avail of these facilities for travel to and from work. Provision of this information would be made upon opening of the proposed development , as this represents the best opportunity to secure travel behaviour change. It is anticipated that this measure may help to reduce the level of traffic at the proposed development, thus providing mitigation against the already minimal traffic and transport effects of the development.

16.11.3 Monitoring

During the construction stage, the following monitoring exercises are proposed;

- Compliance with construction vehicle routing practices,
- Compliance with construction vehicle parking practices,
- Internal and External road conditions,
- Timings of construction activities.

A MMP will be prepared for both residents within the apartment units and staff within the creche in order to guide the delivery and management of coordinated initiatives post construction. The MMP ultimately seeks to encourage sustainable travel practices for all journeys to and from the proposed development. In order to minimise the impacts of the development and to encourage sustainable modes of transport the MMP will address the following items in order to achieve this:

- Introduction of appropriate parking management;
- Optimise links with public transport;
- Provide and enhance cyclist and pedestrian facilities;
- Encourage modes of transport other than single than car trips.

Post occupancy surveys are to be carried out in order to determine the success of the measures and initiatives as set out in the proposed MMP document. The information obtained from the monitoring surveys will be used to identify ways in which the MMP measures and initiatives should be taken forward in order to maintain and further encourage sustainable travel characteristics.

16.12 MATERIAL ASSETS – WASTE MANAGEMENT

16.12.1 Construction Phase Waste Management Plan

The Construction Phase Waste Management Plan prepared by Byrne Environmental (included with the SHD application) specifically addresses the following points:

Waste materials generated by construction activities will be managed according to the Department of the Environment, Heritage and Local Government's 2006 Publication - *Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects.*

- Analysis of waste arisings / material surpluses
- Specific Waste Management objectives for the Project including the potential to re-use existing on-site materials for further use in the construction phase.
- Methods proposed for Prevention, Reuse and Recycling
- Waste Handling Procedures
- Waste Storage Procedures
- Waste Disposal Procedures
- Record Keeping
- Record Keeping

Waste minimisation and prevention shall be the primary responsibilities of the Construction Project Manager who shall ensure the following:

Materials will be ordered on an *"as needed"* basis to prevent over supply

Materials shall be correctly stored and handled to minimise the generation of damaged materials

Materials shall be ordered in appropriate sequence to minimise materials stored on site

Sub-contractors will be responsible for similarly managing their wastes

16.12.1.1 Programme of Waste Management for Construction Works

It is proposed that the construction Contractor as part of regular site inspection audits will determine the effectiveness of the waste management statement and will assist the project manager in determining the best methods for waste minimisation, reduction, re-use, recycling and disposal as the construction phase progresses and waste materials are generated.

16.12.1.2 Construction Waste Disposal Management

It is proposed that from the outset of construction activities, a dedicated and secure compound containing bins, and/or skips, and storage areas, into which all waste materials generated by construction site activities, will be established within the active construction phase of the development site.

In order to ensure that the construction contractor correctly segregate waste materials, it is the responsibility of the site construction manager to ensure all staff are informed by means of clear signage and verbal instruction and made responsible for ensuring site housekeeping and the proper segregation of construction waste materials.

It will be the responsibility of the Project Construction Manager to ensure that a written record of all quantities and natures of wastes exported -off site are maintained on-site in a Waste File at the Project office.

It is the responsibility of the Project Construction Manager or his/her delegate that all contracted waste haulage drivers hold an appropriate Waste Collection Permit for the transport of waste loads and that all waste materials are delivered to an appropriately licenced or permitted waste facility in compliance with the following relevant Regulations:

Waste Management (Collection Permit) Regulations 2007 (SI No. 820 of 2007)
Waste Management (Collection Permit) Amendment Regulations 2008 (SI No. 87 of 2008)
Waste Management (Facility Permit and Registration) Regulations S.I.821 of 2007 and the Waste Facility Permit under the Waste Management (Facility Permit and Registration) Amendment Regulations S.I.86 of 2008.

Prior to the commencement of the project, the Project Construction Manager shall identify a permitted Waste Contractor who shall be employed to collect and dispose of all wastes arising from the project works. In addition, the Project Construction Manager shall identify and all waste licensed / permitted facilities that will accept all expected waste exported off-site and will maintain copies of all relevant Waste Permits / Licences as required.

All waste soils prior to being exported off-site, shall be classified as inert, non-hazardous or hazardous in accordance with the *EPA's Waste Classification Guidance – List of Waste & Determining if Waste is Hazardous or Non-Hazardous* document dated 1st June 2015 to ensure that the waste material is transferred by an appropriately permitted waste collection permit holder and brought to an appropriately permitted or licensed waste facility.

16.12.1.3 On-Site Waste Reuse and Recycling Management

Construction waste material such as soils, damaged or broken concrete slabs, blocks, bricks and tiles generated that is deemed by the Project Engineer to be suitable for reuse on the Project site for ground-fill material and landscaping. This initiative shall provide a positive environmental impact to the construction phase as follows:

- Reduction in the requirement for virgin aggregate materials from quarries
- Reduction in energy required to extract, process and transport virgin aggregates
- Reduced HGV movements associated with the delivery of imported aggregates to the site
- Reduced noise levels associated with reduced HGV movements
- Reduction in the amount of landfill space required to accept C&D waste
- Reduction in the volume of soils to be exported off-site

16.12.1.4 Waste Storage Compound

A waste storage compound shall be set up on-site from the commencement of site activities. The compound shall include the following:

Separate waste skips labelled with signage stating the nature of waste materials that can only be placed in the skips

Waste oils / containers shall be placed in dedicated mobile bunds units.

Soils contaminated by accidental on-site spillages of oils / construction hydrocarbons shall be stored in clearly identified hazardous waste storage containers.

Spill kits with instructions shall be located in the waste storage compound.

16.12.1.5 Soils

As the subject development site is currently greenfield and in agricultural use with no evidence of historic dumping or industrial use, it is predicted that the top and subsoils will be characterised as being inert in accordance with *Landfill Directive (2003/33/EC).*

Top and subsoils shall be re-used on-site for landscaping purposes to minimise the volume of soils to be exported off-site

Excess soils shall be exported to an appropriately waste permitted/licenced facility.

The Project Construction Manager shall inform Meath County Council of the volume of excess soils generated and the permitted / licenced waste facility they shall be exported to.

Excess soils shall be removed off-site throughout the duration of the construction phase. Prior to being removed off-site the excess soils shall be characterised as being inert, non-hazardous or hazardous in accordance with *Landfill Directive (2003/33/EC).* The classification of the soils shall be established by WAC testing which shall occur throughout the construction phase.

Excavated excess soils that are required to be exported off-site shall be tested to determine their classification as hazardous or non-hazardous in accordance with EPA *Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous. Non-Hazardous soils may be suitable for re-use in other construction sites and may be declared as a by-product in accordance with Article 27* of the *European Communities (Waste Directive) Regulations 2011*. Article 27 requires that the material classified not a waste but a by-product must meet specific criteria and that that a declaration of a material as a by-product is notified to the EPA.

16.12.1.6 Contaminated Soils

Where contaminated soils/materials are discovered or occur as a result of accidental spillages of oils or fuels during the construction phase, these areas of ground will be isolated and tested in accordance with the *2002 Landfill Directive (2003/33/EC)* for contamination, and pending the results of laboratory WAC testing, will be excavated

16.12.1.7 Record Keeping

It is the responsibility of the Project Construction Manager or his/her delegate that a written record of all quantities and natures of all wastes reused / recycled and exported off-site and Article 27 declarations during the project are maintained in a Waste File at the Project office.

The following information shall be recorded for each load of waste exported off-site:

- Waste Type EWC Code and description
- Volume of waste collected
- Waste collection contractor's Waste Collection Permit Number and collection receipt including vehicle registration number
- Destination of waste load including Waste Permit / Licence number of facility
- Description of how waste at facility shall be treated : disposal / recovery / export
- The waste records shall be issued to Meath County Council as required / requested.

16.12.1.8 Waste Management Auditing

In order to ensure that construction wastes generated during the course of the development are being effectively managed and recorded, a waste management audit shall be conducted on a routine basis by an independent waste management consultant to determine compliance with the Construction Phase Waste Management Plan.

16.12.2 Operational Phase Waste Management Plan

An Operational Phase Waste Management Plan (OWMP) has been prepared as a stand-alone report to accompany this planning application. The OWMP has been prepared to demonstrate how the required infrastructure will be incorporated into the design and operational management of the development to ensure that domestic wastes will be managed and monitored with the objective of maximizing the quantity of waste segregated at source and maximizing the volume of clean recyclable materials generated by the residents of the development.

The Goal of the OWMP is to achieve a compliance with *The Eastern-Midlands Region Waste Management Plan* 2015-2021 which defines the following Waste Targets:

- *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.*
- *Reduce to 0% the direct disposal of unprocessed residual municipal waste to landfill.*

The Operational Waste Management Plan has been prepared in accordance with strategy, policy and objectives of the *Meath County Development Plan 2013 – 2019*.

Key Aspects of the OWMP to achieve Waste Targets:

- All residential units shall be provided with information on the segregation of waste at source and how to reduce the generation of waste by the Facilities Management Company.
- All waste handling and storage activities shall occur in the dedicated communal apartment waste storage areas.
- The development's Facility Management Company shall appoint a dedicated Waste Services Manager to ensure that waste is correctly and efficiently managed throughout the development.

The Operational Phase of the Waste Management Plan is defined by the following stages of waste management for both the residential and commercial aspects of the development:

- Stage 1 Occupier Source Segregation
- Stage 2 Occupier Deposit and Storage
- Stage 3 Bulk Storage and On-Site Management
- Stage 4 On-site treatment and Off-Site Removal
- Stage 5 End Destination of wastes

The OWMP has been prepared with regard to *British Standard BS 5906:2005 Waste Management in Buildings-Code of Practice* which provides guidance on methods of storage, collection, segregation for recycling and recovery for residential building.

The apartments which will include a 3-bin waste segregation at source system together with the communal waste storage areas have been designed with regard to *Section's 4.8 and 4.9 Refuse Storage of The Department of*

Housing, Planning and Local Government – Sustainable Urban Housing : Design Standards for New Apartments – Guidelines for Planning Authorities. 2018.

The proposed residential development at Belmount shall be designed and managed to provide residents with the required waste management infrastructure to minimise the generation of un-segregated domestic waste and maximise the potential for segregating and recycling domestic waste fractions.

The **Objective** of the OWMP is to maximise the quantity of waste recycled by residents by providing sufficient waste recycling infrastructure, waste reduction initiatives and waste collection and waste management information services to the residents of the development.

The **Goal** of this Waste Management Plan is to achieve a residential recycling rate of 50% of managed municipal waste by 2020 (and future targets in subsequent Regional Waste Management Plans).

All apartments, duplex units and houses will have a 3-bin system (non-recyclable, organic and recyclable) in each kitchen to encourage residents to segregate waste at source.
Apartment residents will be provided with waste recycling and waste disposal information by the development's Facility Management Company who will be responsible for providing clean, safe and mobility impaired accessible communal waste storage areas for the apartment blocks.

House residents shall engage private waste collection contractors who provide a 3-bin waste collection service.

The Facility Management Company shall maintain a register of all waste volumes and types collected from the development each year including a break-down of recyclable waste and where necessary, shall introduce initiatives to further encourage residents to maximise waste segregation at source and recycling. They shall also provide an annual bulky waste and WEEE collection service for all residents.

The development shall be designed to provide adequate domestic waste storage areas for each apartment blocks. This will promote the appropriate segregation at source of domestic generated waste from all residential units at the development. Communal waste bin storage areas shall be designed in a manner to ensure that appropriate signage for the correct disposal and recycling of waste is available for residents.

16.12.3 Monitoring

The Facility Management Company shall prepare an annual report for the Local Authority and residents of the development on the quantities of waste generated within the development to demonstrate how waste reduction and recycling targets are being achieved with regard to the targets defined in *The Eastern-Midlands Region Waste Management Plan 2015-2021.*

16.13 MATERIAL ASSETS – UTILITIES

16.13.1 Construction Mitigation

The construction works contractor shall liaise with the relevant utilities provider prior to works commencing, with on-going consultation throughout the proposed development. Where new services would be required, the construction works contractor shall apply to the relevant utility provider and adhere to the requirements outlined in the connection permit / licence.

The Contractor will be obliged to put measures in place to ensure that there are no interruptions to existing services unless this has been agreed in advance with the relevant service provider.

All works in the vicinity of utilities apparatus will be carried out in ongoing consultation with the relevant utility company or local authority and will be in compliance with any requirements or guidelines they may have.

Where new services or diversions to existing services are proposed, the Contractor will apply to the relevant utility company for a connection permit where appropriate, and will adhere to their requirements.

Mitigation measures proposed in relation to the drainage and water infrastructure include the following:

A detailed “Construction Management Plan” will be developed and implemented during the construction phase. Site inductions will include reference to the procedures and best practice as outlined in the “Construction Management Plan”.

Surface water runoff from areas stripped of topsoil and surface water collected in excavations will be directed to on-site settlement ponds where measures will be implemented to capture and treat sediment laden runoff prior to discharge of surface water at a controlled rate.

In the event of groundwater being encountered during the construction phase, mitigation measures will include dewatering by pumping to an appropriate treatment facility prior to discharge. Other measures would include excluding contaminating materials such as fuels and hydrocarbons from sensitive parts of the site i.e. highly vulnerable groundwater areas.

In order to reduce the risk of defective or leaking sewers, all new sewers should be laid in accordance with Irish Water standards, pressure tested and CCTV surveyed to ascertain any possible defects.

The construction compound will include adequate staff welfare facilities including foul drainage and potable water supply. Foul drainage discharge from the construction compound will be removed off site to a licensed facility until a connection to the public foul drainage network has been established.

The construction compound’s potable water supply shall be protected from contamination by any construction activities or materials.

Where possible backup network supply to any services will be provided should the need for relocation or diversion or existing services be required otherwise relocation or diversion works will be planned to incur minimal impact, with users notified in advance of any works.

Connections to the existing gas and telecommunications networks will be coordinated with the relevant utility provider and carried out by approved contractors.

16.13.2 Stormwater Infrastructure

In accordance with the Greater Dublin Regional Code of Practice for Drainage Works, all sites are required to develop a drainage system which separates storm & foul water on site.

In addition to improving overall storm water quality following Meath County Council sustainable urban drainage systems, SuDs protocols, there is also a requirement to reduce storm water runoff rates to pre-development levels. To achieve this the scheme will provide internal stormwater attenuation tanks to provide the storm water required for the predicated 1-in-100 year, increased by 10% for the predicated effects of climate change. The proposed attenuation volume to be provided for the development has been calculated at 4594m3. The proposed development will have three locations where it connects into the public stormwater system, before ultimate disposal into the Boyne River.

The proposed restriction of storm water flows from the site during extreme weather events will increase the capacity of the existing infrastructure to convey storm flows.

16.13.3 Foul Infrastructure

All foul water infrastructure is under the control of Irish Water. The proposed development will be serviced by a new separate internal foul network for the proposed development. The proposed development will have two connection locations from the development to the existing foul drainage infrastructure.

As required by the SHD process, Irish Water are required to review the schemes foul drainage proposal & to issue a letter of Design Acceptance, this has been received by the design team and is included as an appendix in the CS Consulting Engineering Service Report accompanying this submission.

A requirement from the Irish Water review for the development is to up-grade part of the local foul drainage network, as these works are located outside of the subject lands these works will be carried out by Irish Waters regional contractor, and agreement for same will form part of the Applicants connection agreement post planning.

16.13.4 Potable Water Infrastructure

All potable water infrastructure is under the control of Irish Water. The proposed development will be serviced by a new separate internal water network for the proposed development. The proposed development will have two connection locations from the development to the existing 250mm OD watermain located in Academy St.

As required by the SHD process Irish Water are required to review the schemes potable water proposal & to issue a letter of Design Acceptance, this has been received by the design team and is included as an appendix in the CS Consulting Engineering Service Report accompanying this submission.

A requirement from the Irish Water review for the development is to up-grade part of the local potable water network, as these works are located outside of the subject lands these works will be carried out by Irish Waters regional contractor, and agreement for same will form part of the Applicants connection agreement post planning.

16.13.5 Operational Mitigation

Please refer to Chapter 6 of the EIAR – Water for mitigation measures associated with the surface water treatment. All new drainage lines (foul and surface water) will be pressure tested and will be subject to a CCTV survey to identify any possible defects prior to being made operational.

Chapter 6 includes the mitigation measures associated with the surface water system for the development.

Water conservation methods such as the use of low flush toilets and low flow taps should be incorporated into dwellings to reduce water volumes and related treatment and abstraction costs of the development.

Similarly, water conservation methods would reduce the loading on the foul sewer network. As part of the development, a number of different SuDS measures are proposed to minimise the impact on water quality and quantity of the runoff and maximise the amenity and biodiversity opportunities within the site.

The measures detailed below have been designed to take account of potential percolation, but have not been incorporated into any storage calculations. This will result in additional storage being available in extreme events.

The proposed SuDS measures will include a combination of Source Control, Site Control and Regional Control measures as part of a Management Train whereby the surface water is managed locally in small sub-catchments rather than being conveyed to and managed in large systems further down the catchment. The combination of the SuDS measures outlined below will maximise the potential for surface water infiltration to the subsoil, reducing the impact on the existing surface water drainage network. The proposed techniques will offer a high level of treatment processes and nutrient removal of the turnoff, particularly during the “first flush”.

On completion of the construction phase no further mitigation measures are proposed in relation to the electrical, gas and telecommunications infrastructure.

The proposed development is located within an area designated for the type of development proposed. As such the services pertaining to the development are required to facilitate the proposed scheme. It is not possible to not provide the services required. Notwithstanding this, the potable water, foul & stormwater services have all been designed in accordance with the requirements of the various stake holders, notable Irish Water for the foul & potable water utilities and Meath County Council for the surface water services.

16.13.6 ESB Infrastructure

ESB have been engaged at an early stage to ensure an potential issues with utility connections are reviewed and mitigated as early in the process as possible. ESB will not engage with design process until such time as planning has been approved and scheme name and numbering is approved. However, initial discussions and proposal have been positive.

The proximity to the existing ESB sub-station ensures access to MV network which avoids the need for extensive network upgrades and infrastructure.

16.14 RISK MANAGEMENT

The Construction Management Plan and the Health and Safety Plan, as well as good housekeeping practices will limit the risk of accidents during construction. Fire safety will be dealt with under the Fire Safety Code at design and construction stage. The estate management company will have responsibility for fire safety during operations. In relation to falls these have been dealt with during design.

The proposed development will involve the ground works to facilitate the proposed development. Site investigations have been carried out and have not identified any hazardous material. Further testing will be carried out prior to construction to inform the detailed design. In the event that any hazardous material is identified the appropriate measures will be taken in accordance with the requirements of the EPA. The excavation and movement of soil from the site will be undertaken by a registered specialist contractor and removed to a licenced facility. The following are outlined:

- Hazardous materials used during construction will be appropriately stored so as not to give rise to a risk of pollution.
- In the event of storms or snow, construction activity can be halted and the site secured. The construction activity will involve a number of potential risks, as set out below. The risks identified include traffic management, and fire strategy.
- During the construction stage, the risk of accidents associated with the proposed development are not predicted to cause unusual, significant or adverse effects to the existing public road network. The vast majority of the works are away from the public road in a controlled environment. The objective of which is to minimise the short term disruption to local residents, and reduce the potential for accidents.
- Furthermore, is expected that the risk of accidents would be low during the construction of the proposed development considering the standard construction practices which are to be used.
- With reference to natural disasters (e.g. flooding), the proposed development has undergone a Site Specific Flood Risk Assessment, prepared by Cronin & Sutton Consulting Engineers. The main area of the site where development is proposed is not at risk of fluvial, pluvial or groundwater flooding.
- A Health and Safety Plan will be prepared (required by the *Safety, Health and Welfare at Work (Construction) Regulations 2013*) to address health and safety issues from the design stages through to the completion of the construction and maintenance phases. The Health and Safety Plan will comply with the requirements of the Regulations and will be reviewed as the development progresses.
- Safety on site will be of paramount importance. Only contractors with the highest safety standards will be selected. During the selection of the relevant contractor and the respective subcontractors their safety records will be investigated.
- Prior to working on site, each individual will receive a full safety briefing and will be provided with all of the safety equipment relevant to the tasks the individual will be required to perform during employment on site.
- Safety briefings will be held regularly and prior to any onerous or special task. *'Toolbox talks'* will be held to ensure all workers are fully aware of the tasks to be undertaken and the parameters required to ensure the task will be successfully and safely completed.
- All visitors will be required to wear appropriate personal protective equipment prior to going on to the site and will undergo a safety briefing by a member of the site safety team.
- Regular site safety audits will be carried out throughout the construction programme to ensure that the rules and regulations established for the site are complied with at all times.

16.15 ARCHAEOLOGY, ARCHITECTURE AND CULTURAL HERITAGE

16.15.1 Construction Phase

13.1.1.11 **Archaeology**

The geophysical survey and test trenching investigations undertaken as part of this assessment have identified two archaeological enclosures, with associated external features, within the proposed development site. It is proposed these enclosures will be preserved in record by a full systematic archaeological excavation under licence from the National Monuments Service. The extent, phasing and methodology of these excavations, and subsequent post-excavation specialist analyses, will be agreed in advance with the National Monuments Service and will be clearly detailed in a method statement submitted as part of the licence application process. A programme of licensed archaeological monitoring will be undertaken within all other areas of the proposed development site during the construction phase. In the event that any archaeological sites or features are uncovered, ground works will halt in that area, the sites/features will be cordoned off and recorded and the NMS will be consulted to determine appropriate mitigation measures.

There a number of obligatory processes to be undertaken as part of archaeological licence applications for excavation projects and these will allow for monitoring of the successful implementation of the archaeological mitigation measures. All archaeological excavations will be carried out under licence issued by the National Monuments Service following the approval of a submitted detailed method statement outlining all proposed archaeological strategies. A preliminary report presenting a summary of results will be compiled and submitted to the National Monuments Service and National Museum of Ireland within one month of the completion of the excavations. This will include details on all proposed specialist post-excavation analyses. A final detailed report, which will include the results of specialist post-excavation analyses, will be submitted within twelve months of the completion of excavations.

Subject to grant of planning permission, the following is an ***outline/indicative*** schedule for the implementation of the proposed archaeological mitigation measures:

- Appointment of the services of a suitably qualified archaeologist to co-ordinate the mitigation proposals
- Archaeological method statements shall be submitted to the Department of Culture, Heritage and the Gaeltacht for review and agreement
- Subject to approval by the Department of Culture, Heritage and the Gaeltacht, the following archaeological mitigation measures shall be undertaken under licence from the National Monument Service:

D. **Pre-development archaeological test excavations** in the field to the east of the Belmount House (referred to as “Area H” in the geophysical survey);
E. **A programme of archaeological excavation** (“preservation-by-record”) of (a) two archaeological enclosures, with associated external features, identified during archaeological testing conducted in 2018 (Excavation Licence No. 18E0499) and (b) any features of archaeological interest that may be found during the testing of “Area H”, and
F. **Archaeological monitoring of all site development works**. In the event of archaeological features being uncovered they shall, subject to agreement by National Monuments Service, be fully recorded and excavated. A report, containing the results of the archaeological monitoring and any associated excavations shall be submitted to the Department of Culture, Heritage and the Gaeltacht on completion of site development works.

13.1.1.12 **Architectural Heritage**

No architectural heritage mitigation measures are required during the construction phase.

16.15.2 Operational Phase

13.1.1.13 **Archaeology**

Following the successful implementation of the mitigation measures detailed in Section 13.7.1.1 it is envisioned that no further archaeological mitigation measures will be required during the operational phase.

13.1.1.14 **Architectural Heritage**

No architectural heritage mitigation measures are required during the operational phase.

17.0 REFERENCE LIST

17.1 INTRODUCTION

Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, EPA, August 2017

Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment August 2018

Transposition of 2014 EIA Directive (2014/52/EU) in the Land Use Planning and EPA Licensing Systems - Key Issues Consultation Paper, Department of Housing, Planning, Community and Local Government, 2017.

Circular letter PL 1/2017 - Advice on Administrative Provisions in Advance of Transposition (2017).

Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoECLG, March 2013).

Development Management Guidelines (DoEHLG, 2007).

Advice Notes on Current Practice (in preparation of Environmental Impact Statements) (EPA 2003).

Environmental Impact Assessment (EIA), Guidance for Consent Authorities Regarding Sub-Threshold Development (DoEHLG 2003).

Guidelines on Information to be Contained in an Environmental Impact Statement (EPA 2002).

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