A TETRA TECH COMPANY

Letterkenny Regional Sports Activity Hub

Volume I

Environmental Impact Assessment Report (EIAR)
Main Text

rpsgroup.com

ENVIRONMENTAL IMPACT ASSESSMENT REPORT (EIAR)

ABBREVIATIONS

AA	**Appropriate Assessment**
AADT	**Annual Average Daily Traffic**
ABP	**An Bord Pleanála**
AEP	**Annual Exceedance Probability**
AQS	**Air Quality Standard**
ASI	**Archaeological Survey of Ireland**
ASSI	**Area of Special Scientific Interest**
ATC	**Automatic Traffic Count**
ATU	**Atlantic Technological University**
BGL	**Below Ground Level**
CAFE	**Clean Air for Europe**
DCDP	**Donegal County Development Plan**
CDP	**County Development Plan**
CDW	**Construction and Demolition Waste**
CEMP	**Construction Environmental Management Plan**
CFRAM	**Catchment-based Flood Risk Assessment and Management**
CIEEM	**Chartered Institute of Ecology and Environmental Management**
CIHT	**Chartered Institute of Highways and Transportation**
LVIA	**Landscape and Visual Impact Assessment**
CO	**Carbon Monoxide**
CO_2	**Carbon Dioxide**
CRTN	**Calculation of Road Traffic Noise**
cSACs	**Candidate Special Areas of Conservation**
CSO	**Central Statistics Office**
CTMP	**Construction Traffic Management Plan**
CTVIA	**Cumulative Townscape and Visual Impact Assessment**
CUR	**Connacht Ulster Region**

DAU	Department of Culture, Heritage & the Gaeltacht
dB	Decibel
DCC	Donegal County Council
DECC	Geological Survey of Ireland
DHPLG	Department of Housing, Local Government and Heritage
DMP	Dust Management Plan
DMRB	Design Manual for Roads and Bridges
EA	Environment Agency
EC	European Commission
EcIA	Ecological Impact Assessment
ECJ	European Court of Justice
ECoW	Ecological Clerk of Works
EEA	The European Environment Agency
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
ELVs	Emission Limit Values
EM	Environmental Manager
EPA	Environmental Protection Agency
EQS	Environmental Quality Standards
ES	Environmental Statement
ESB	Electricity Supply Board
EU	European Union
EV	Electric Vehicle
EWC	European Waste Catalogue
FRA	Flood Risk Assessment
GAA	Gaelic Athletic Association
GHG	Greenhouse Gas
GI	Ground investigation
GII	Ground investigation Ireland
GLVIA3	Guidelines for Landscape and Visual Impact Assessment, Third Edition
GPP	Guidance for Pollution Prevention series
GSI	Geological Survey of Ireland

HDV Heavy Duty Vehicles

HGV's Heavy Goods Vehicles

HAS Health and Safety Authority

HSE Health Service Executive

IAQM Institute of Air Quality Management

IEMA Institute of Environmental Management and Assessment

ICOMOS International Council on Monuments and Sites

IDA International Dark-Sky Association

IFI Inland Fisheries Ireland

IGI Institute for Geologists Ireland

ILP The Institution of Lighting Professionals

ISMP Invasive Species Management Plan

IUCN International Union for the Conservation of Nature

km/hr Kilometers per Hour

L Locally Important

LAP Local Area Plan

L_{A10} This is the A-weighted sound level that is exceeded for noise for 10% of the sample period

L_{A90} This is the A-weighted sound level that is exceeded for 90% of the sample period

L_{Aeq} The continuous equivalent A-weighted sound pressure level. This is an 'average' of the sound pressure level

L_{Amax} This is the maximum A-weighed sound level measured during the sample period

L_{Amin} This is the minimum A-weighted sound level measured during the sample period

LCA Landscape Character Areas

LCRM Land Contamination Risk Management

LCT Landscape Character Types

LECP Local Economic & Community Plan

LED Light Emitting Diode

LGFA Donegal Ladies Gaelic Football Association

LSSIF Large Scale Sports Infrastructure Fund

LTS Letterkenny Local Transport Strategy

LUTS Land Use and Transport Planning Strategy

LVIA Landscape and Visual Impact Assessment

MCP	Medium Combustion Plant
MDs	Municipal Districts
MF	Maintenance Factor
MIAI	Institute of Archaeologists of Ireland
NAF	National Adaptation Framework
NBDC	National Biodiversity Data Centre
nBAP	National Biodiversity Action Plan
NERT	National Exposure Reduction Target
NHA	Natural Heritage Areas
NIAH	National Inventory of Architectural Heritage
NIS	Natura Impact Statement
NMLs	Noise Monitoring Locations
NMS	National Monuments Service
NO_x	Oxides of Nitrogen
NO_2	Nitrogen Dioxide
NPF	National Planning Framework
NPWS	National Parks & Wildlife Service
NPWSGIS	National Parks & Wildlife Service Geographic Information System
NRA	National Roads Authority
NSP	National Sports Policy
NSR	Noise Sensitive Receptor
NSS	National Spatial Strategy
NTA	National Transport Authority
NTS	Non-Technical Summary
NWRA	North West Research Associates
NWCPO	National Waste Collection Permit Office
NVIA	Noise and Vibration Impact Assessment
O_3	Ozone
oCEMP	Outline Construction Environmental Management Plan
oISMP	Outline Invasive Species Management Plan
OPW	Office of Public Works
OSI	Ordnance Survey Ireland

PACC	Pre-Application Community Consultation
PAHs	Polycyclic Aromatic Hydrocarbon
PCUs	Passenger Car Units
PM_{10}	Particulate Matter
$PM_{2.5}$	Particulate Matter
pNHA	Proposed Natural Heritage Areas
PPGs	Pollution prevention guidelines
PPV	Peak Particle Velocity
PRA	Preliminary Risk Assessment
PRFs	Preliminary Roost Features
PSD	Particle Size Distribution
PSFRM	The Planning System and Flood Risk Management
Q-value	Quality Rating System
R	Regionally Important
RBMP	River Basin Management Plan
RHM	Register of Historic Monuments
RMP	Record of Monuments and Places
RPS	Record of Protected Structures
RSA	Road Safety Authority
RSES	Regional Spatial and Economic Strategy for the Northern and Western Regional Assembly
SAC	Special Area of Conservation
SMR	Sites and Monuments Record
SO_2	Sulphur Dioxide
SPA	Special Protected Areas
SUDS	Sustainable Urban Drainage Systems
SWMP	Site Waste Management Plan
TA	Transport Assessment
TCA	Townscape Character Areas
TII	Transport Infrastructure Ireland
TRL	Transport Research Laboratory
TTA	Traffic and Transportation Assessment
TVIA	Townscape and Visual Impact Assessment

µg	Microns
URDF	Urban Regeneration Development Fund
VOCs	Volatile Organic Compounds
WAC	Waste Acceptance Criteria
WEEE	Waste Electrical and Electronic Equipment
WFD	Water Framework Directive
WFP	Waste Facility Permit
WMP	Waste Management Plan
WHO	World Health Organisation
ZoI	Zone of Influence

1 INTRODUCTION

1.1 The Proposed Development

This Environmental Impact Assessment Report (EIAR) has been prepared by RPS on behalf of Atlantic Technological University (ATU) Donegal in respect of the construction of Letterkenny Sport Activity Hub, Co. Donegal. The proposed development includes the following elements:

a. Outdoor sports pitches as follows:

- **1 artificial grass GAA pitch (Pitch 1). Line markings permit rugby and 2 x cross-play soccer pitches.**
- **1 Grass / Sand GAA competition pitch (Pitch 2). Line markings permit rugby and 2 cross-play soccer pitches.**
- **2 natural grass soccer pitches with Cricket Creases (Pitch 3,4, 5)**
- **4 synthetic 5-a-side soccer pitches (Pitches 6,7, 8, 9)**

b. 1,000m^2 Indoor Sports Dome [Height = 10.8m] suitable for warm up, a range of sports and activities

c. Additional outdoor sports and recreation areas to include Training/Practice Area (25x80m), 5m high Hurling/Handball Wall, 6 Lane Athletic Sprint Track (50x7.5m) with PV panels to roof, walking / running trails / children's playpark and community garden.

d. 1,399m^2 pavilion building [Height = 11.2m] to accommodate changing facilities, office / reception, self-serve catering facility, storage and flexible space for community programmes.

e. Equipment Store and service compound.

f. Hard and soft landscaping to include biodiversity garden.

g. Vehicular and pedestrian access to include new junction from N56, internal access roads / footpath / cycleway and provision of onsite vehicle parking spaces, coach parking spaces and cycle parking spaces.

h. Closure of existing vehicular access from N56 to Knocknamona Crescent.

i. Ancillary infrastructure to include drainage, ESB substation, fencing and entrance gates, signage, retaining walls, floodlighting, netting and culverting watercourse at two locations to accommodate vehicle / pedestrian / cycle crossing.

1.2 Site Location

The site of the proposed development is located in a mixed area of development to the north of Letterkenny Town, Co. Donegal, in northwest Ireland approximately 240 km northwest of Dublin. Letterkenny is the most populated town in Co. Donegal, ca. 19,274 residents (2016 Census). The site is located in the townlands of Knocknamona and Carnamuggagh Lower.

The site is close to the Letterkenny hospital campus, IDA business park and a number of large industrial employers such as Pramerica and Optum. The site is located directly adjacent to the N56. There are three

existing site entrances - two entrances from a local road linking the ESB depot and the DCC Civic Amenity site to the N56, and a third entrance off the local roadway serving the Ashfield residential development[1].

The western perimeter of the site is bound principally by residential estates which are accessed from the Kilmacrenan Road (N56). The southern/eastern boundary of the site adjoins the N56 to the south of the site (recently constructed distributor road), agricultural fields, an IDA premises and the council-run civic amenity centre. The north western boundary bounds a residential development while the northern section perimeter bounds agricultural fields. Figure 1.1 details the site location, for a more detailed figure, please refer to Planning Drawings in Volume II Design Drawings & Figures.

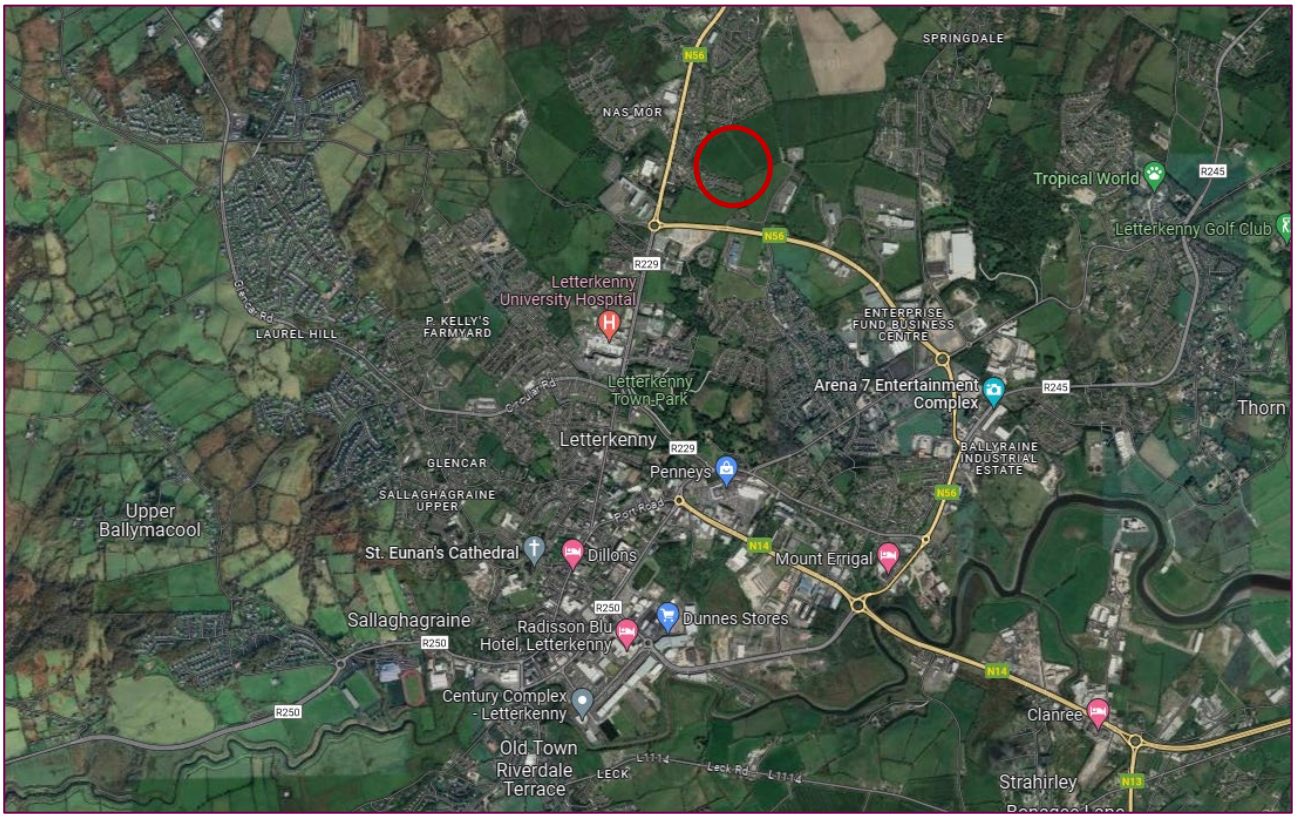

Figure 1.1: Site Location

[1] *Note that Ashfield is an agricultural field entrance / not an existing standard entrance.*

1.3 Environmental Impact Assessment Report (EIAR)

1.3.1 Proposed Structure

The proposed structure of the EIAR and the various environmental topics to be considered are set out in this section. The EIAR comprises:

- a Non-Technical Summary (NTS);
- Volume I Main Report;
- Volume II Design Drawings & Figures; and,
- Volume III Technical Appendices.

1.3.2 Schedule 6 Planning and Development Regulations Required Information

The EIAR will include all information identified in Schedule 6, Planning and Development Regulations 2001 (as amended), including:

- A description of the proposed development comprising information on the site, design, size, and other relevant features of the proposed development;
- A description of the likely significant effects on the environment of the proposed development
- 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;
- a description of the location of the development;
- a description of the physical characteristics of the whole development, including, where relevant, requisite demolition works, and the land–use requirements during the construction and operational phases;
- 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;
- a description of the main characteristics of the operational phase of the development (in particular any production processes), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;
- 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.

The EIAR will also include a description of the reasonable alternatives studied by the applicant, 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.

1.3.3 EIA Amendment Directive (2014/52/EU)

In the April of 2014, the EIA Directive (2014/52/EU) (the EIA Amendment Directive) was adopted by the Council of the European Union (EU) and amended Directive 20111921ELJ on the assessment of the effects of certain public and private projects on the environment. Article 2 of the EIA Amendment Directive required all Member States to bring the Directive into force by 16th May 2017.

The EIA Amendment Directive clarified aspects of the preceding Directive 2011/921ELto bring it into line with intervening European Court of Justice (ECJ) judgments and introduced additional provisions and procedural

options. Therefore, compliance with the EIA Amendment Directive (2014/52/EU) will automatically ensure compliance with Directive 2011/92/EU. In Ireland: the EU (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (SI 296 of 2018), came into effect on the 1st September 2018 and gave effect to Directive 201 1/92/EU as amended by the EIA Amendment Directive.

An EIAR document is produced as the key component of the environmental impact assessment (EIA) process. It provides a description of:

a. The baseline environment

b. Identification of the potential effects (if any - both positive and negative) that are predicted to be incurred as a result of the proposed development; and,

c. A description of any control and mitigation measures required to avoid, reduce or eliminate such potential effects.

The EIA Directive and its implementing Regulations requires that an environmental impact assessment must identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of a project on the following factors and the interaction between those factors:

- population and human health;
- biodiversity, and in particular species and habitats protected under Council Directives 92/43/EEC (the Habitats Directive) and 2009/147/EC (the Wild Birds Directive);
- land, soil, water, air and climate;
- material assets, cultural heritage and the landscape.

1.3.4 Reference Documents

This EIAR has been prepared in accordance with the requirements of the following legislation:

- Planning and Development Act, 2000 (as amended);
- Part 11 of the first Schedule of the European Communities (Environmental Impact Assessment (EIA)) (Amendment) Regulations, 1999 S.I. No. 93 of 1999);
- The Local Government Planning and Development Regulations 2001 — 2018 (S.I. No. 600 of 2001, and subsequent amending legislation); and,
- European Union (EU) (Planning and Development) (Environmental Impact Assessment) Regulations, 2018.

The following existing and draft guidance were also considered in preparing this EIAR:

- EPA Advice notes on current practice in the preparation of Environmental Impact Statements (EPA, 2003);
- EPA Guidelines on the information to be contained in Environmental Impact Statements (EPA, 2022);
- European Commission Interpretation of definitions of project categories of Annex I and II of the EIA Directive (European Commission, 2015);
- European Commission Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017) (European Commission, 2001a):
- EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports (Draft) (EPA, 2022);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning and Local Government, 2017) (Department of Housing. Planning and Local Government , 2014 and
- EPA Guidance on Soil & Stone By-Products in the context of Article 27 of the European Communities (Waste Directive) Regulations 2011 (Environmental protection Agency (EPA), 2011).

1.3.5 Methodology

The methodology employed in the EIAR provides for a staged approach, which can be summarised as follows:

- **Scoping / consultation exercise**: to be undertaken to compile relevant background data and identify issues and constraints.
- **Baseline surveys**: including walk-over visits, detailed specialist surveys and discussions with relevant statutory and other consultees to determine the nature and extent of the existing environment.
- **Identification of potential significant effects**: predicting the likely significant environmental effects of the development during construction and operation of the facility for the range of predicted uses as well as setting the scene for the identifying appropriate mitigation for the development.
- **Mitigation**: on-going development and description of mitigation proposals which will be incorporated into the project design as it evolves, including regular review and evaluation, to mitigate the potential environmental effects.
- **Monitoring**: if considered necessary, monitoring requirements may be identified for both the construction and operational phase of the development.
- **Residual and cumulative effects**: consideration of the residual effects remaining after mitigation.
- **Reporting**: preparation of the EIAR Report, including NTS.

The assessment of whether the proposed development is likely to have significant effects on the environment will be undertaken through a variety of methods:

- Professional judgement and experience based on published guidance criteria
- Assessment of both temporary and permanent effects
- Assessment of cumulative effects
- Assessment of duration, frequency and reversibility of effects
- Assessment against local, regional and national planning policy
- Consultation with statutory and non-statutory consultees

Significance criteria will be based on the type of potential consequences, the probability of the consequence occurring and the magnitude of the consequence. Individual chapters set out the scale that will be used to evaluate significance of effect, thus providing a consistent approach throughout the EIAR. Each topic chapter will identify significant effects relevant to each topic having regard to this scale.

Table 1.1 sets out the chapters contained within Volume I of the EIAR.

Table 1.1: EIAR Structure

Document	Heading/Description
Non-Technical Summary	
Non-Technical Summary (NTS)	The NTS contains an overview of the proposed development and summarises the most salient points and findings of the EIAR in a non-technical language.
EIAR Volume I – Main Report	
Chapter 1	Introduction
Chapter 2	Project Description
Chapter 3	Alternatives
Chapter 4	Consultation and Scoping
Chapter 5	Policies and Plans
Chapter 6	Landscape and Visual
Chapter 7	Cultural Heritage

Document	Heading/Description
Chapter 8	Land Use and Material Assets
Chapter 9	Noise and Vibration
Chapter 10	Air Quality
Chapter 11	Climate and Greenhouse Gases
Chapter 12	Population and Human Health
Chapter 13	Flood Risk and Drainage Assessment
Chapter 14	Biodiversity
Chapter 15	Water Quality
Chapter 16	Contaminated Land, Geology and Soils
Chapter 17	Waste
Chapter 18	Artificial Lighting
Chapter 19	Traffic & Transportation
Chapter 20	Interactions
EIAR Volume II – Design Drawings & Figures	
Drawings, graphics and figures	Contains design drawings, graphics and figures referenced in the EIAR Volume I chapters.
EIAR Volume III – Technical Appendices	
Technical Appendices	Relevant chapter specific technical appendices supporting the EIAR are contained in Volume III

This structure facilitates incorporation into the EIAR of those environmental topics both highlighted by and scoped in by Scoping Opinion and as specified in the EIA Regulations and allows those topics to be comprehensively assessed.

1.4 Cumulative Effects

1.4.1 Definition of Cumulative Effects

This EIAR considers and assesses the potential for cumulative effects arising from the proposed development in association with other developments as detailed below in Table 1.2.

The cumulative effects of a development refer to the way in which an environmental resource may be subject to a particular type of impact from more than one development. The impacts from multiple projects may overlap or act in combination at a particular location or upon a particular resource, thereby leading to more significant environmental impacts than if the impacts were considered in isolation.

The EIA Directive 2014/52/EU specifies at Annex III that:

> *"the likely significant effects of projects on the environment must be considered […] taking into account [inter alia] the cumulation of the impact with the impact of other existing and/or approved projects"; and at Annex IV that "a description of the likely significant effects of the project on the environment resulting from, inter alia […] 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"* is required.

1.4.2 Cumulative and In-Combination Impacts

Cumulative effects are assessed in each chapter in respect of impacts resulting from the accumulation of impacts generated by the proposed development on the same receptors and the impacts potentially arising from adjacent or nearby developments together with those predicted for the proposed development.

The following guidelines and publications were considered when determining the other projects to be considered for their potential to generate cumulative effects with the proposed development:

- European Commission (EC) Guidelines for the Assessment of Indirect and Cumulative Impacts (1999).

The first step in determining cumulative effects comprised the identification of a list of other projects which may have the potential to overlap with the proposed development based on available information.

Other projects for which a development consent application has been submitted or consent granted were included. Potential future projects which have not submitted an application for consent were not included.

Those other projects whose impacts could foreseeably overlap with the construction or operation of the proposed development or where construction impacts may be consecutive but cumulative, were considered. The cut-off date for sourcing information on the other projects considered was May 2023.

Cumulative effects are changes to the environment that are caused by an action in combination with other actions. They can arise from a number of sources, where relevant, including:

- the interaction between all of the different projects in the same area; and
- the interaction between the various impacts within a single project.

The cumulative effects of the Proposed Development, in conjunction with other existing or proposed projects, are considered within each topic chapter. Relevant developments considered within the cumulative assessments include those which are:

- under construction;
- permitted, but not yet implemented;
- submitted, but not yet determined; and
- identified in the Development Plan and land use zonings (recognising that much information on any relevant proposals is limited).

Each topic chapter further considers whether there are significant cumulative effects which are likely to arise as a result of interaction between effects as part of the same project, so as to identify potential secondary, cumulative or synergistic effects.

1.4.2.1 Planning History

A planning history search was carried out to establish the most recent planning applications within and immediately adjacent to the site boundary, for the purposes of cumulative assessment. A number of applications were identified as small scale new development, change of uses, and refurbishments to existing buildings within the immediate area. It is unlikely that any of these will result in any significant cumulative effects on the environment.

Table 1.2 identifies all those projects which have been assessment with regards to cumulative impacts. As part of this review, several other larger planning applications were considered, however discounted due to the distance from the scheme and were highly unlikely to have significant cumulative impacts.

Table 1.2: Projects to be Assessed for Cumulative Impacts

Reference	Address	Description	Type of Application	Planning Status	Decision	Decision Date	Implemented
056104	Carnamuggah Lower Letterkenny Co.Donegal	Erection of 40 no. two-storey houses as phase 1 of housing development which will be accessed through approved housing development under construction and granted under planning ref. no. PL05.124140 (99/5223) known as Thornberry, also to demolish existing dwelling and sheds, and all associated site works including pump station for foul sewer and water attenuation tank for storm water.	Permission	Application Finalised	Conditional	03.02.2006	No
1140077	Carnamuggah Lower Letterkenny Co. Donegal	Construction of 40 no. two-storey houses as phase 1 of housing development which will be accessed through approved housing development under construction and granted under planning ref. no. PL05.124140 (99/5223) known as Thornberry, also to demolish existing dwelling and sheds, and all associated site works including pump station for foul sewer and water attenuation tank for storm water.	Extension of Duration	Application Finalised	Granted	05.04.2011	No
1651477	Knocknamona, Letterkenny PO, Co. Donegal	A circa 4428 square metre single storey special needs school building to provide 20 special needs classrooms, a number of specialist educational, training, recreational and therapeutic rooms, toilets and other ancillary accommodation, and the necessary circulation space. In addition to 60 car parking spaces, a covered set down area and a variety of external hard surfaced play spaces will be provided along with all associated siteworks for the development.	Permission	Application Finalised	Conditional	27.04.2017	Yes (work started)
1751896	Knocknamona, Letterkenny, Co. Donegal	Erection of a single storey extension to the existing hospice building comprising of 4no additional single patient wards, connection to existing public sewer and all associated site works.	Permission	Application Finalised	Conditional	16.02.2018	No
2252002	Knocknamona, Letterkenny, Co.Donegal	Erection of a single storey extension to the existing hospice building comprising of 4no additional single patient wards, connection to existing sewer and all associated site works.	Extension of Duration	Application Finalised	Refused	10.02.2023	No

1.5 Transboundary Effects

Article 5(1) of the EIA Directive, sets out what must be included as a minimum in the EIA Report. Annex IV to the Directive, expands on these requirements. In short, this includes the following:

Effects on the environment: a description of the likely significant effects of the project on the environment.

Such significant effects include direct and indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, and positive and negative, as appropriate.

Effects are also considered, and categorised, in terms of being direct and indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, and positive and negative, and are discussed in relevant Chapters of the EIAR as appropriate. However, in this instance no transboundary effects are predicted.

1.6 Consultation and Scoping

This section sets out an overview of the consultation undertaken as part of the EIA process and the related scope of the assessment undertaken. Full details of scoping and consultation are set out in Chapter 3 of the EIAR.

1.6.1 Formal Scoping Request

RPS issued an EIA Scoping request to Donegal County Council (DCC) under Article 95 Planning & Development Regulations 2001, as amended (for proposed development under S. 173 Planning & Development Act 2000, as amended) on 24th February 2023. A copy of the scoping correspondence from DCC is included in Volume III Appendix 4.A of this EIAR, with a copy of the scoping response from, Irish Water included in Volume III Appendix 4.B. A summary is provided in Section 1.6.2.

1.6.2 Response from Donegal County Council (DCC)

A summary of the response received by the Project Team from DCC is presented in this section and it highlights the main points made in relation to the proposed development. The main points are:

- *Schedule 5 of the Planning & Development Regulations 2001 (as amended) sets out development requiring a mandatory EIA;*
- *Schedule 5, Part 2, 10(b)(iv) lists infrastructure projects consisting of "Urban development which would involve an area greater than 2 hectares in the case of a business district, 10 hectares in the case of other parts of a built-up area and 20 hectares elsewhere as requiring mandatory EIA which include the proposed development and Schedule 6 sets out the contents of an EIAR;*
- *The planning authority is satisfied that the Scoping Report comprehensively deals with the broad heading issues to be contained in an EIAR as set out in Schedule 6 of the Planning & Development Regulations 2001 (as amended);*
- *Following receipt of the Scoping Report the planning authority referred the documentation to relevant prescribed bodies but no comments from the prescribed bodies were received.*
- *As there are flooding issues down gradient from the development site the EIAR should include a Flood Risk Impact Assessment detailing measures to improve drainage including detailed attenuation proposals.*
- *The site is clearly hydrological linked to the Lough Swilly SAC and Lough Swilly SPA and as such a Habitat Regulations assessment is required. An NIS is required to assess the impact and mitigation of the risks to the Qis of the Natura sites during the construction and operational phases of the proposal.*
- *There should also be a Landscape and Visual Impact Assessments given the extent/area of the proposed development site in the urban environment.*

A copy of the scoping correspondence is included in Volume III $.A and 4.B of this EIAR.

1.7 Project Team

The production of the EIAR has been co-ordinated by RPS. The EIAR structure, responsibility and qualified input for each chapter are detailed in Table 1.3.

Table 1.3: EIAR Project Team

Chapter of EIAR	Company	Subject
Chapter 1	RPS	Introduction
Chapter 2	RPS	Project Description
Chapter 3	RPS	Alternatives
Chapter 4	RPS	Consultation and Scoping
Chapter 5	Carlin Planning	Policies and Plans
Chapter 6	RPS	Landscape and Visual
Chapter 7	Gahan & Long	Cultural Heritage
Chapter 8	RPS	Land Use and Material Assets
Chapter 9	RPS	Noise and Vibration
Chapter 10	RPS	Air Quality

Chapter of EIAR	Company	Subject
Chapter 11	RPS	Climate and Greenhouse Gases
Chapter 12	RPS	Population and Human Health
Chapter 13	Tobins	Flood Risk and Drainage Assessment
Chapter 14	RPS	Biodiversity
Chapter 15	RPS	Water Quality
Chapter 16	Tobins	Contaminated Land, Geology and Soils
Chapter 17	RPS	Waste
Chapter 18	RPS	Artificial Lighting
Chapter 19	Systra	Traffic & Transportation
Chapter 20	RPS	Interactions

2 PROJECT DESCRIPTION

2.1 Introduction

This chapter of the EIAR describes the site and its relationship with the surrounding area and provides a description of the proposed development. A full suite of planning application drawings are presented in Volume II Design Drawings and Figures.

2.2 Location of the Proposed Development

The application site is located within Letterkenny Town, Co. Donegal in the townlands of Knocknamona and Carnamogagh Lower. The site boundary is shown below in Figure 2.1.

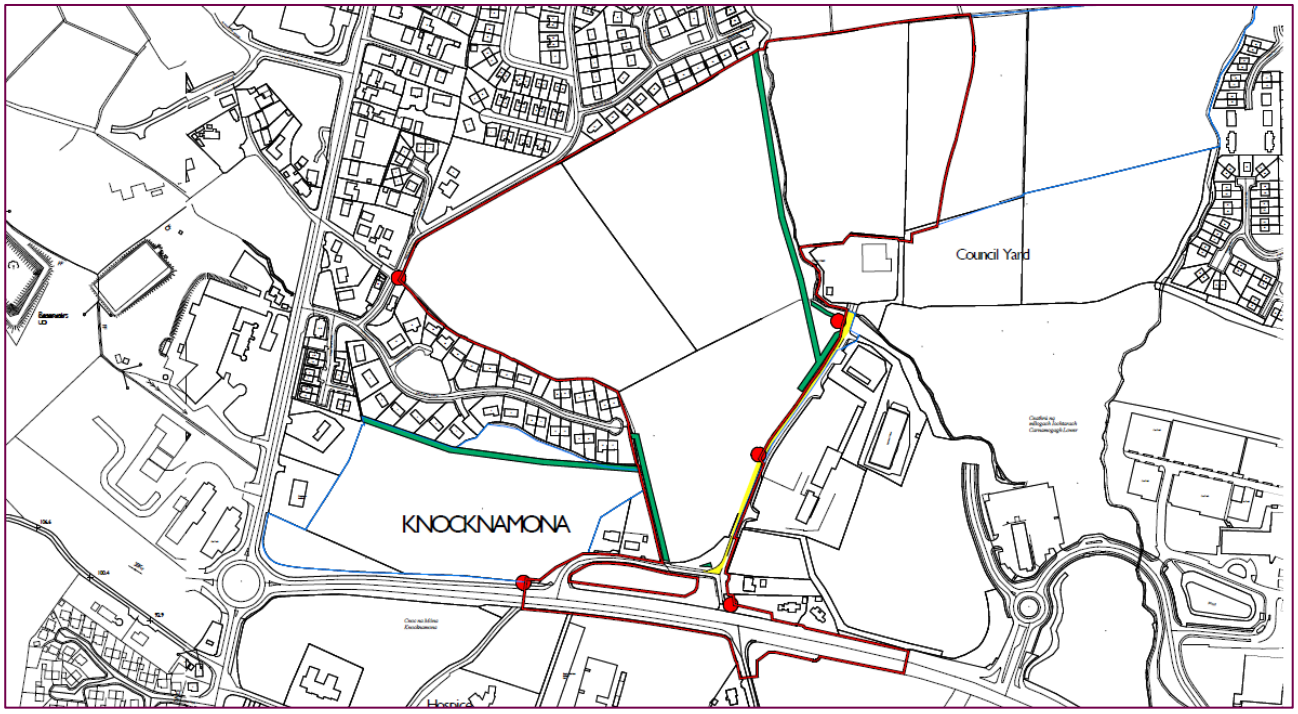

Figure 2.1: Location of the Proposed Development

The site boundary highlighted in red in Figure 2.1, comprise the c. 18 Ha of the greenfield site. A small area of land at Knocknamona Crescent is in 3rd party ownership (letter of consent submitted with planning application). ATU Donegal also own the wider land highlighted in blue in Figure 2.1.

The site of the proposed development is located in a mixed area of development to the north of Letterkenny Town, Co. Donegal.

The lands at Carnamuggagh Lower/Knocknamona have unique characteristics that make it ideal for the proposed development. This includes the size and scale of the site and also its designation as a Strategic Community Opportunity Site in the Donegal County Development Plan. There are also many benefits to locating a community sports facility in a highly accessible urban area, including the potential to encourage active travel and use of public transport as identified in the Development Plan:

The lands are located within reasonable walking distance of key transport corridors and therein are accessible to the Town Bus Service providing valuable opportunities for expansion of services provided through the ATU.

2.3 Need for Development

ATU Donegal and Donegal County Council as lead applicant have been successful in obtaining Stream 1 funding under the Large Scale Sports Infrastructure Fund (LSSIF). Other Joint Applicants include National Governing Bodies, Ladies Gaelic Football Association & Cricket Ireland. A wide range of other local sports clubs, organisations, schools and local industries have supported the project and will share the facilities. The fund is provided by the Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media and aims to further the National Development Plan and the National Sports Policy.

The project will address a current deficit in sport infrastructure provision for the ATU at a local and regional level. It is important to emphasise the regional strategic importance of the LSRAH.

The aim is to build a facility that is appropriate for community and regional sports teams, as well as for use by university students. This facility will be a multipitch community hub with an additional built facility and recreational spaces to support the use of the pitches and to ensure long-term financial sustainability.

Numerous sports clubs and community groups supported the funding bid and continue to support the project. Notably, the Donegal Ladies Gaelic Football Association (LGFA) has expressed a keen interest in the site to use as their training centre and youth academy. The LGFA does not currently have a home ground and consequently struggles to find grounds for training and matches. The organisation therefore currently plays across multiple sites around the County. The NW Cricket Union fully supports the project as it will support their aim of increasing participation in cricket while catering for a growing multi nationality population in the region.

There are three schools in close proximity to the proposed development site, namely; St Eunan's College Boys secondary school, Colaiste Ailigh mixed secondary school, and Little Angels Special School. The last 2 are within a few hundred metres of the site. Schools use of the site will add additional usage during traditionally off-peak hours (i.e. Monday – Friday, 9 – 5pm).

2.4 Description of Proposed Development

The proposed development includes the provision of following facilities and elements:

a. Outdoor sports pitches as follows:

- 1 artificial grass GAA pitch (Pitch 1). Line markings permit rugby and 2 x cross-play soccer pitches.
- 1 Grass / Sand GAA competition pitch (Pitch 2). Line markings permit rugby and 2 cross-play soccer pitches.
- 2 natural grass soccer pitches with Cricket Creases (Pitch 3,4, 5)
- 4 synthetic 5-a-side soccer pitches (Pitches 6,7, 8, 9)

b. 1,000m^2 Indoor Sports Dome [Height = 10.8m] suitable for warm up, a range of sports and activities

c. Additional outdoor sports and recreation areas to include Training/Practice Area (25x80m), 5m high Hurling/Handball Wall, 6 Lane Athletic Sprint Track (50x7.5m) with PV panels to roof, walking / running trails / children's playpark and community garden.

d. 1,399m^2 pavilion building [Height = 11.2m] to accommodate changing facilities, office / reception, self-serve catering facility, storage and flexible space for community programmes.

e. Equipment Store and service compound.

f. Hard and soft landscaping to include biodiversity garden.

g. Vehicular and pedestrian access to include new junction from N56, internal access roads / footpath / cycleway and provision of 205 onsite vehicle parking spaces, 4 coach parking spaces and 120 cycle parking spaces. Additional pedestrian access point from Ashfield.

h. Closure of existing vehicular access from N56 to Knocknamona Crescent.

i. Ancillary infrastructure to include drainage, ESB substation, fencing and entrance gates, signage, retaining walls, floodlighting, netting and culverting watercourse at two locations to accommodate vehicle / pedestrian / cycle crossing.

The scope of the project also includes:

- Drainage
- Floodlighting to Pitches 1, 2, 6-9
- Fencing and netting to pitches 1, 2, 6-9
- Goal posts and ball stop netting.
- Tiered spectator viewing facilities to Pitches 1 and 2
- Site lighting
- Access roads, footpaths and cycleways
- Coach Parking
- Parking including disabled parking
- Creation of new 4 way junction at the N56
- Realignment of part of the site boundary with the adjoining local road to improve visibility
- Site preparation including:
  - cut and fill and soil importation to prepare sloping areas of site
  - ducting for undergrounding of overhead electrical services

2.4.1 Artificial Pitch (Pitch 1)

The 145x90m artificial pitch will be surrounded by 2.0m high paladin fencing beyond the 3.5m run-off area. Ballstop netting is also included at either end. At the western boundary of the pitch, the fencing will be reduced to 1.0m high to improve sightlines for spectators within the pavilion building. The pitch will be formed from artificial grass to current GAA and rugby standards; and have a cross fall of 1:72 to facilitate drainage. Line markings will also permit 2No. (100x65m) cross-play soccer pitches. Floodlighting has been designed for the artificial pitch and is to be of sufficient quality to facilitate the future installation of match analysis equipment.

2.4.2 Pavilion

The pavilion (1,399m^2 pavilion building (Height = 11.2m) has been designed as split level to make best use of the proposed site topography and provide level access to both the artificial and grass GAA pitches.

There will be upper and lower entrances which each provide access to Changing Rooms.

The Upper Level includes a c.200m^2 Flexible Space which can be used as a Gym or Studio space. This will have a glazed façade with doors opening out onto the upper terrace. There are also 2 Meeting Rooms provided and one includes a small Kitchen area for refreshments. These Meeting Rooms can be used by each team for video analysis after a match. Both Meeting Rooms also open out onto the upper terrace.

A large oversailing mono-pitched roof will enclose the building and provide shelter for the spectators in the terraced seating.

Sustainability options include the integration of PV panels on the roof and air source heat pumps.

The lower-level plan of the pavilion is to include the following facilities:

- Changing Rooms
- Referee Changing Rooms
- Toilets, Changing Places & First-aid room
- Stores
- Circulation

The upper-level plan of the pavilion is to include the following facilities:

- Flexible Space
- Meeting Rooms
- Changing Rooms
- Toilets
- Circulation

2.4.3 Grass Pitch (Pitch 2)

The 145x90m grass and sand GAA pitch is located directly across from the pavilion building, affording easy access from the changing rooms on the upper floor plan. Pedestrian access to the pitch will be from the main road, via steps and Part M compliant ramp.

The grass pitch will be surrounded by 2.0m high paladin fencing beyond the 3.5m run-off area. Ballstop netting is also included at either end. The pitch will be formed to current GAA and rugby standards. Line markings will also permit 2No. (100x65m) cross-play soccer pitches.

2.4.4 Soccer Pitches and Cricket Green (Pitch 3,4 & 5)

2No. (100x65m) grass soccer pitches are located to the northeast of the site and the play area has been increased to afford a cricket outfield area. Between the 2 pitches is one synthetic and two turf cricket crease which is orientated in a general north-south direction to facilitate play in the evenings.

2.4.5 5-a-side Pitches (Pitch 6, 7, 8 & 9)

4No. (36.5x27.5m) 5-a-side football pitches are proposed to the southern portion of the site. Each pitch will be enclosed within 1.2m high rebound walls and 2.4m high paladin fencing over same. Floodlighting is proposed to these pitches to maximise use.

2.4.6 Sports Dome

A prefabricated building is proposed to facilitate winter training and various sports. The internal fit-out will include, Toilets, an Office, Plant and Stores.. The main sports arena (30.1x22.7m) will accommodate the following court sizes detailed in Table 2.1.

Table 2.1: Sports Dome Court Sizes (1,000m^2 Indoor Sports Dome (Height 10.8m))

Sport	Standard	Size
Basketball	Community Level	30.1 x 17.1m
Volleyball	Club level	24.0 x 15.0m
3No. Badminton Courts	Premier Level	17.4 x 9.1m each

Sport	Standard	Size
5-a-side Football	Club Level	30.1 x 18.4m
Cricket		31.62 x 3.66m

2.4.7 Hurling Wall and Training Area

A 102x19.7m synthetic training area is to be provided beside the grass GAA pitch. At the western end a 5m high hurling wall will be erected. This will be constructed as a concrete retaining wall and cut into the proposed embankment. Safety fencing will be provided to the top of the wall.

2.4.8 Walking and Running Trails

There are walking and cross-country running trails around the site. The loop trail which includes the road through the site, while a shorter loop starting from the community gardens and passes the open stream (culverted in two places.to enable crossing) and biodiversity garden. It is also proposed to have pedestrian links for adjacent housing developments (Ashfield) directly to these walking trails therefore improving permeability into the site. However, these access points will be controlled with gates and closed at night-time to discourage anti-social behaviour.

2.4.9 Floodlighting and Site Lighting

There is currently no artificial lighting installed on the existing site. The external lighting design and LED pitch floodlighting has been carried out with extensive consideration towards minimising the obtrusive lighting impact on the surrounding area. The complete installation is designed to comply with all relevant standards, guidance criteria, and legislation. Full details of the proposed flood lighted are contained in Chapter 18 of the EIAR.

The lighting should ensure that the full flight of the ball is visible while providing good viewing conditions for players, officials and spectators. The overall lighting design complies with all legislation and will not negatively impact the environmental conditions for both surrounding property and wildlife.

2.4.10 Active Travel

The ATU already has a Mobility Management Plan (MMP) in place, which aims to promote sustainable travel amongst employees and students, and is a signatory to the NTA's 'Smarter Travel Partner' Charter. If consented, the MMP would be extended to include the Sports Hub. The overall aim of the MMP will be to reduce car travel to the site. This will involve:

- Undertaking a separate bi-annual Active Travel Site audit for the Sports Hub site
- Including specific questions on travel to the Sports Hub within the annual travel questionnaire, or specifically targeting Sports Hub users with a separate questionnaire
- Monitoring use of the cycle parking at the Sports Hub, and car park occupancy. This could be done on a 'spot-check' basis at agreed points throughout the year. This would assess whether current provision was sufficient, and help trigger interventions.
- Developing targets and initiatives specifically for the Sports Hub.

2.5 Access to N56

Access from the N56 will be required for the proposed development. A new/ upgraded signalised junction is the optimum option.

2.6 Construction Elements of the Works

2.6.1 Construction Phasing

Construction may require an enabling-works phase to allow access onto and about the site, and to strip and store topsoil for careful stockpiling and preservation for future use on pitch surfaces and landscaped surfaces throughout the project. Following these enabling works, then, is the bulk earthworks exercise which requires that the cuts are carried out to allow the fill of the substantial platforms and roadways to formation level to be achieved. This cut and fill operation should be carried out for the entire site in one single operation to reduce the need of importing or exporting of sub-soil material, i.e. splitting the cut and fill operation into separate phases will not generate a balance of cut and fill within the site.

The suggested phasing sequence for the project is as follows:

- Phase 1 – strip topsoil, cut & fill across whole site to formation levels, artificial Pitch 1, 5-a-side pitches, access roads, parking and temporary changing facilities.
- Phase 2 – Pavilion building.
- Phase 3 – Grass Pitch 2, training ground, hurling wall and community gardens.
- Phase 4 - Soccer pitches and cricket pitch. Walking and running trails developed and bio-diversity garden established.
- Phase 5 – Sports Dome and associated car park.

A full suite of planning application drawings are presented in Volume II Design Drawings and Figures.

2.6.2 Outline Construction Environmental Management Plan (oCEMP)

An OCEMP is a key tool for delivering environmental management during the construction phase. It sets out the mechanisms by which the various construction activities would be managed to comply with the relevant environmental legislation and best practice to minimise the impacts and effects on human receptors and environmental receptors.

It provides the framework for recording environmental risks and also defines the measures required to mitigate and monitor construction effects, including the mitigation measures set out in the associated supporting environmental documents and assessments. It also outlines provisions for auditing and reporting and sets out action to be taken to resolve any corrective actions arising during the course of construction. The purpose of the OCEMP is to:

1. Record environmental risks and identify how they would be managed during the construction period;
2. Provide a means of identifying environmental commitments, objectives and targets;
3. Provide a means of monitoring and reporting performance against the objectives and targets;
4. Provide a framework to ensure that all parties are aware of their responsibilities;
5. Establish a checklist of control procedures which can then be integrated into an overall environmental management protocol;
6. Describe how construction activities would be undertaken and managed in accordance with the obligations of environmental legislation and policy, and the requirements of environmental regulatory authorities;
7. Provide detailed environmental mitigation measures for reducing the potential for environmental impacts during pre-construction and construction;
8. Highlights that some activities may require consents or licences;
9. Act as a link and main document reference for environmental issues between the design, and construction stages; and,

10. Ensure the mitigation requirements of the associated environmental assessments (contained in supporting environmental documents for the planning application) are met.

Volume III Appendix 2.A details an outline CEMP which sets out all mitigation for the construction phase of the project.

3 ALTERNATIVES

3.1 Introduction

As detailed in the EIA Directive – Annex IV, Article 2 of Directive 2014/52/EU the main alternatives to the proposed development considered by the proposer and will be presented in the EIAR. The following is contained in the EIA Directive regarding the consideration of alternatives to be included in the EIAR:

> *"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."*

The presentation and consideration of the various reasonable alternatives investigated by the applicant is an important requirement of the EIA process. These indicate the main reasons for choosing the project that is being submitted for consent describing how environmental considerations were taken into account when selecting between those alternatives.

Alternatives can take various forms, all of which will be examined. At the highest level, alternatives may consider different locations or layouts. At the more detailed level, alternatives tend to merge into mitigation measures where specific design options are taken, or construction methods adopted, to avoid, reduce or offset environmental impacts. Many broad types of alternatives can be considered in the EIAR:

- "do nothing" option;
- alternative locations;
- alternative layouts;
- alternative designs; and,
- alternative mitigation measures.

3.2 Existing Scenario

3.2.1 Current Provision

ATU is a third level, non-residential educational establishment with campuses in Letterkenny and Killybegs, Co. Donegal. The Letterkenny campus located at Port Road accommodates 4,000 students and 500 staff/innovation centre personnel.

The sports facilities on the main campus are very limited, with only a single 'Prunty' sand/ grass pitch and an adjoining Multi-purpose sports/ assembly building An Dánlann. The pitch is marked out for soccer play; however, it is also used for training by Gaelic Football, Ladies Football, Soccer, Hurling and Rugby. Due to the nature of the pitch surface, use of the pitch is limited to 2.5 matches per week and it is closed during the summer months to allow time for maintenance and grass recovery.

The pitch is undersized for GAA competitions and the current facility cannot meet the many demands of the student sporting clubs and societies as well as the needs of local sporting organisations who would like to use the facility. Additional playing fields are necessary in order to meet demand and provide for a more diverse range of sports than currently facilitated.

3.2.2 National Sports Policy 2018 - 2035

The National Sports Policy (NSP) was published in 2018 and presents strategic aims and targets relevant to the project. The list below explains how they will be realised, both within the wider policy and in reference to the proposed development.

- **Increased participation**
- **More excellence**
- **Improved capacity**

3.2.3 National Sports Policy 2018 - 2035

A key policy document to come out of the recently published Healthy Ireland Framework is the National Physical Activity Plan. Action area six of the report is pertinent to this study. There is an emphasis on key stakeholders within the community to work together to increase regular engagement with physical activity across the community as a whole. Developing current and exploring new community-level interventions through improved working arrangements and better local partnerships will open new opportunities for those who experience disadvantage for any reason. Another key feature highlighted was the importance of increasing the sharing of facilities across the community, for schools, sports club and community centres. As has been mentioned, the sharing of the facility between a number of stakeholders, is vital to the success of the project.

3.3 Alternative Design Options

3.3.3 "Do nothing" option

In this scenario, the application site would remain as an existing part of the urban fringe and agricultural land at the edge of Letterkenny Town despite being zoned in the County Donegal Development Plan 2018-2024 as a *"Strategic Community Opportunity"*.

Without the proposal it is possible that the existing invasive species areas would be left untreated. This proposal provides a coordinated opportunity to benefit from future regeneration development potential, to present a key reactional area.

3.3.4 Alternative locations

The proposed development would increase the availability of local pitch supply significantly and provide a multi-pitch hub to growing clubs and community organisations. In addition to this expansion, the proposed development includes plans for 4, 4G 5-aside soccer pitches, and an airdome covered pitch. These pitches would be open to local businesses to rent out for their employees and would in turn increase informal soccer play. There are limited alternative site locations that would be able to accommodate the sports hub development whilst availing of an existing land use designation and access directly of the N56 (a national road). There are no other sites zoned as a Strategic Community Opportunity within Letterkenny, therefore this is the only suitable site for the development.

3.3.5 Alternative layouts

A range of alternative arrangements have been considered for the sports hub. The preferred option evolved through various design stages. Consideration was given to the following:

- Several iterations of the car parking layout were included to ensure maximum design capacity. It was important also to ensure that appropriate locations for electric charging points were included in the proposal, and that parent/baby spaces were provided.

- The original option proposed pitches spanning the entire watercourse. It is considered that this would have had a significant environmental effect. This option was not considered further due to those environmental impacts.
- Use of low, medium and high-quality paving materials for the pedestrian network. The aspiration was to create a high-quality finish to the area, to create an attractive setting for future development, and to encourage people to walk in/around the area more. It was considered that concrete paths is a durable material, which would create a high quality finish, easily maintained, and would weather well.
- Several iterations of the junction deign for the N56 connection
- Various types of lighting columns were considered as part of the consideration of streetscape furniture.
- Various design iteration of pitch orientation and alignment.
- Detailed consideration of the potential visual impacts coupled with the land gradients in this area, it was agreed that the landscape planting plan would consider sensitive landscaping to the northern fringes.
- A variety of walking/running route designs and biodiversity garden considerations.

Environmental

The EIAR team provided environmental constraints maps that determined the optimum design layout for the site taken into consideration the potential environmental impacts. These environmental considerations and constraints are set out in ES Volume I. Among those influencing alternative designs were:

- Ecological including retention of trees and hedgerows (as appropriate);
- Watercourses and hydrological connections to Natura 2000 sites;
- Visual Impact including extensive landscape treatments; retention of trees;
- Flood risk;
- Noise and general disturbance;
- Traffic by inclusion of accesses for traffic and pedestrians and public transport facilities.

3.3.6 Alternative designs

A range of alternative designs have been considered for the sports hub. Numerous iterations of the layout and overall design have been considered throughout the design phase of the proposed development.

3.3.7 Alternative mitigation measures.

A range of alternative mitigation measures have been considered for the sports hub. Where environmental impacts could not be avoided or reduced the EIAR team proposed specific mitigation measures that were built into the design layout. The environmental constraints have therefore led to alternative layouts and alternative quantum and locations of the different land uses within the proposed development.

4 CONSULTATION AND SCOPING

4.1 Introduction

The proposal has been informed through a comprehensive consultation and scoping process, both statutory and non-statutory. This progress has been vital in the progression of the project and has both influenced and assisted in the design outcomes of this project.

Statutory consultation has taken place with Donegal County Council through the Pre-application Scoping process and in conjunction with statutory bodies as set out in further detail below. Non-statutory consultation has taken place through public consultation events and stakeholder engagement including elected members.

The scoping process provides the opportunity to identify which aspects of the environment will be impacted by the proposed development and to what extent. Once the scale of these impacts is identified, mitigation measures can then be developed to ensure that any impact on the environment is as minimal as possible. The consultation process gives relevant stakeholders the prospect to respond to the proposal and express any concerns they may have.

This chapter addresses the consultation and scoping processes undertaken within this project and provides a summary of the issues raised and considered within the EIAR process. This Chapter has been prepared by Carlin Planning Limited.

4.2 EIAR Scoping

On the Council's behalf, RPS submitted a EIAR Scoping Report to Donegal County Council on the 23rd of February 2023 under Section 173 of the Planning & Development Act, 2000 (as amended) in accordance with Article 95 of the Planning & Development Regulations 2001 (as amended).

The purpose and objective of the scoping exercise with Donegal County Council was to:

- Provide a description of the proposed development and inform key stakeholders;
- Identify the potential impacts and issues that are proposed to be the focus of the EIAR;
- Define the scope of the study for each of the EIAR topics and issues to be considered;
- Identify data and information available and additional surveys and investigations required;
- Define the methods and criteria to be used in predicting and evaluating impacts;
- Identify alternatives and mitigation measures to be considered as part of the project, and to,
- Determine the proposed content, structure, and format of the EIAR.

Following the submission of the Pre-application EIAR Scoping Consultation, Donegal County Council provided a response dated the 11th May 2023 (Ref. SR.2302 & PP6591). The Response can be found within the EIAR Volume III Technical Appendices Appendix 4.A., with the response from Irish Water located in Appendix 4.B.

4.2.1 Donegal County Council's Response to EIAR Scoping Report

Following receipt of the Scoping Report the planning authority referred the documentation to the relevant prescribed bodies including:

1. *Department of Communications, Climate Action and Environment*
2. *An Chomhairle Ealaíon*
3. *An Taisce*
4. *Department of Tourism, Culture, Arts, Gaeltacht, Sport and Media*
5. *Department of Culture, Heritage and the Gaeltacht (Development Applications Unit)*

6. *Eastern and Midlands Regional Assembly*
7. *Environmental Protection Agency*
8. *Fáilte Ireland*
9. *The Heritage Council*

No comments from the prescribed bodies were received.

The planning authority in their response confirmed that they were satisfied that the Scoping Report comprehensively dealt with the broad heading issues to be contained in an EIAR as set out in Schedule 6 of the Planning & Development Regulations 2001 (as amended).

The Planning Authority in their response reiterated that they have engaged with ATU in pre-planning discussions on this development with certain fundamental aspects of the proposal not being agreed to date, including:

- Chief amongst the unresolved issues is the preferred access to the proposed Sports-Activity Hub. Currently TII National Policy does not support an access from the N56 (Urban) road between the Kiltoy and Knocknamona Roundabouts and therefore an alternative access from the public road network (potentially from the Lisnenan side) to the development site should be explored with a Traffic and Transport Assessment and Road Safety Audits included within the EIAR with recommendations being made for both the construction and operational phases of the proposed development. Furthermore, the TIA should not be restricted to the specifics of access junction arrangements, layout, and capacity but should provide for safety for all transport modes and consideration should be given to the inclusion of a Live Travel Plan or Mobility Management Plan within the Transport Assessment. Furthermore, the scheme needs to consider and provide for pedestrian and cycle paths to show future connections to the adjoining residential & commercial sites.
- As there are flooding issues down gradient from the development site the EIAR should include a Flood Risk Impact Assessment detailing measures to improve drainage including detailed attenuation proposals.
- The site is clearly hydrological linked to the Lough Swilly SAC and Lough Swilly SPA and as such a Habitat Regulations assessment is required. An NIS is required to assess the impact and mitigation of the risks to the Qis of the Natura sites during the construction and operational phases of the proposal.
- There should also be a Landscape and Visual Impact Assessments given the extent/area of the proposed development site in the urban environment.

These fundamental aspects have been addressed throughout this EIAR. A Transport Assessment and Road Safety Audit accompanies this submission as well as a Flood Risk Assessment to include for detail on the drainage proposals (Chapter 13). A further pre-planning meeting was held on 23rd May 2023, to address the key issues. There was agreement that the only feasible option for site access was to provide a new signalised junction on the N56, with the discussion then focusing on the design and layout of the junction.

An Natura Impact Assessment (NIS) also accompanies this submission setting out proposed mitigation, secured within a Construction Environmental Management Plan removing any likelihood of impact to the Natura 2000 designated sites. An assessment of the proposals visual impact on the landscape is also contained within Chapter 6 of this EIAR.

4.3 Pre-planning consultation

4.3.1 Donegal County Council

ATU Donegal entered pre-planning discussions with Donegal County Council with meetings held on 25th October 2022 and 23rd May 2023. These meetings were very useful to discuss a range of planning and environmental considerations.

Engagement was also undertaken with Donegal County Council to discuss and agree Noise Monitoring Locations.

4.3.2 Irish Water

A Pre-Connection Enquiry was made to Uisce Éireann (UE). A confirmation of feasibility was received on the 18th of October 2022. UE have confirmed that both a water connection and a wastewater connection are feasible without infrastructure upgrades by UE.

UE have confirmed that there is an existing water main running through the site and an existing foul sewer traversing the site. The proposed development should ensure that no works are carried out over or in close proximity to UE infrastructure so not to restrict maintenance or endanger structural of functional integrity of the infrastructure. A diversion agreement may be required.

This confirmation also established that UE cannot guarantee a flow rate to meet the site's flow rate requirement in the event of a fire. To meet Fire Authority requirements, adequate fire storage capacity needs to be included in the proposal.

Consultation with UE has confirmed that there is capacity within the public wastewater network.

4.4 Non-Statutory Public Consultation

In accordance with best practice guidelines, the EIAR has been informed by non-statutory stakeholder and public consultation.

4.4.1 Public Consultation Events

Letters regarding the proposed development were sent out to 343 residential addresses and 24 commercial addresses. Students and Staff of ATU Donegal and 25 project partners and supporting organisations were also sent an email with the same information as the letters. The letter/email gave a general description of the proposed development and included an invitation to the public consultation event on Thursday the 30th of March.

The drawings of the proposal were also posted on ATU's website.

A public consultation event was held on Thursday 30th March 2023 at 7pm. The event was hosted at ATU's Port Road Campus and followed a dedicated drop-in session for staff and students to view the proposals. Feedback was captured through an online survey, accessed via a QR code on the exhibition boards. Several hard copies were also completed on the evening with one substantive response from a local resident's group. Since the event, several additional substantive responses have been received.

From the consultation, a number of concerns were highlighted. These are discussed in section 4.4.2.

On the 15th of May, a follow up public consultation event was hosted at ATU's Port Road Campus. The aim of the event was to address the concerns raised following the previous public consultation and those received from the online questionnaire.

4.4.2 Stakeholder Engagement

The proposal was presented to the Letterkenny Municipal District Elected Members on the 20th of September 2022.

The proposal was presented to the Minister for Sport, the Minister for Agriculture, Food and the Marine and a number of Elected Members on the 21st of October 2022.

4.5 Public Consultation

4.5.1 Public Consultation Response

The online questionnaire received 32 responses, with 82.1% of respondents noting that they were in support of the proposed LRSAH. 96.6% of people who engaged in the online consultation were responding as individuals while 3.4% responded on the behalf of an organisation. Respondents were asked if there was anything they would change about the proposals and if they had any other comments.

The responses from the online consultation raised three main areas of concern. These include the pedestrian link from the sports hub to the residential areas, fencing, and safety. Upon review of the comments submitted, it is evident that these concerns are interconnected.

Pedestrian Links, Fencing and Safety

Residents do not support the pedestrian linkage from the proposed development to Hazelwood Drive with 25% of respondents noting that it should be removed altogether due to the anticipated problems it will bring to the residential area such as anti-social behaviour, noise disturbance and increased parking stress. Residents of Brookfield Heights have expressed similar concerns in relation to the pedestrian links that will lead onto Ashfield.

25% of respondents noted that a high-level security fence with associated planting to provide screening, should surround the boundary of the proposed development. 6.25% of respondents used the term ‘buffer zone’ in their comments. The need for fencing appears to have arisen from concerns about resident’s safety and noise disturbance.

In addition to the above, 25% of respondents raised safety concerns related to the proposed pedestrian links. Respondents noted in their comments that if the links were to be approved, they should be designed with lockable pedestrian gates that have a designated access time. It is considered that this measure could prevent anti-social behaviour along the pathway. Concerns were also highlighted regarding road safety. Residents felt strongly that the proposed pedestrian links would attract people to park in Hazelwood Drive, Ashfield and Brookfield Heights. As a result, residents are concerned that road safety within the surrounding residential areas will be compromised. The increased footfall of people in these areas may also attract littering and other forms of anti-social behaviour.

The comments from the consultation suggested an 8-foot-high close mesh steel plastic coated security fence at least 6 feet from boundary with Hazelwood Drive should be erected for the full length of estate. The residents consider this will help to prevent unauthorised access to gardens and allow for maintenance of boundary fences and hedges. The implementation of fencing has also been suggested by residents of Brookfield Heights.

The local residents have also noted in their comments that a substantial buffer zone should be implemented beyond the high fencing. This should be planted with mature trees to screen and ensure, as far as possible that the privacy of residences is protected.

A substantive submission was provided on the evening of the event by a resident of Hazelwood Drive. This was subsequently supported by further written responses from other residents from Hazelwood Drive and Brookfield Heights. The substance of the objection is similar to the points made to the online questionnaire.

Residential Amenity

Local residents from Hazelwood Drive and Brookfield Heights have expressed concerns regarding the impact the proposed LRSAH will have on their amenity. Respondents were concerned that the location of the proposed pitches and the Sports Dome will result in them experiencing noise disturbance (12.50%), light pollution (9.38%) and loss of privacy (15.63%). Several comments have also noted concerns regarding parking. It appears that it is a common concern of the community that the proposed car park will not be big enough to accommodate additional visitors to the site during events. In this instance, respondents are

concerned that parking will then overspill onto the main road and into the surrounding residential estates which in turn would compromise safety for pedestrians and other road users.

Walking / Running Trails

The residents of Hazelwood Drive, Ashfield and Brookfield Heights. would prefer the walking pathway to be pushed out beyond the buffer zone as mentioned above. The site layout has been amended to accommodate this request.

Noise and Light Pollution

The consultation has established that the two pitches proposed to face the upper part of Hazelwood are excessive and too close to the estate. Noise and flood lighting will be a major issue and materially affect the resident's enjoyment of their homes. This should be reduced to 1 pitch (Eliminate the one nearest Hazelwood). Residents of Brookfield Heights have also expressed concerns regarding the location of the Sports Dome.

If permitted, the flood lighting should be kept to a minimum and located and orientated to minimise disturbance and nuisance. They should also comply with best practice i.e., lights should be directed down onto the playing surface and lanterns should be cowled to prevent nuisance due to light spillage.

Construction Method

The consultation has established that residents are concerned about the proposed construction method for the new Sports Hub. The concern of ground-breaking has been highlighted in the responses as the noise, dust and vibration caused from the works could have a damaging impact on the houses of the surrounding residential areas.

Drainage

It has been established within the responses received that the field at the back of Hazelwood Drive sits at a higher level than some of the gardens within the estate. It has been noted that this level difference already causes run-off into the gardens. There is an existing open drain which runs along the boundary of Hazelwood Drive. It has been reported that this drain has not been maintained and therefore drainage in this area is not as effective as it could be. Residents have expressed that they wish for this drain to be maintained, cleared and possibly upgraded to deal with any increased water run-off that may arise from the implementation of the proposed Sports Hub.

Ecology

Concerns have been raised within the consultation period regarding the impact the proposed floodlighting will have on the local ecology. The responses have noted that there are a variety of flora and wildlife within the area including bats, buzzards, curlews and large flocks of seabirds. Due to the wildlife present within the area, the local residents wish for the proposed lighting to have as little impact as possible.

Community Garden

The comments received on behalf of one local residents association have noted that the location of the proposed community garden may be inappropriate as it is quite a distance from the car parking. In this instance, it would make more sense for people using the plots to park closer to the pedestrian links that connect to the residential areas so that they have less distance to carry their equipment. This is turn could also cause disruption for the residents of Hazelwood Drive and Ashfield.

Other suggestions

The comments from the online consultation include some suggestions that the respondents felt could help improve the scheme. These are listed below:

- Provision of a café/ shop on the site.

- Provision of more badminton courts.
- Creating direct access from Brookfield Heights to the proposed walking routes.
- Ensuring the existing ecology is protected.
- Ensuring residential access and road safety is not compromised through the implementation of traffic lights.

Summary of Concerns

The public consultation has established a number of common concerns among the residents within the surrounding area. These key areas of concern are noted below:

- Pedestrian access from the proposed LRSAH to Hazelwood Drive.
- Need for appropriate security fencing.
- Need for an appropriate buffer zone between the proposed development and adjacent residential properties.
- Potential to locate walking / running trails further from residential properties.
- Distance of community garden from parking areas.
- Potential to create safety issues and anti-social behaviour.
- Privacy and amenity
- Noise disturbance and light pollution.
- Construction methods and noise form rock breaking.
- Poor drainage (existing).
- Potential ecological impacts.

One response was received following the follow up public consultation event on the 15th of May 2023. This has been summarised as follows:

- Serious concern regarding one pitch's proximity to residential properties.

4.5.2 Stakeholder Response

In both engagements with Ministers and Elected members, no objections to the proposal were received. The scheme was greatly supported, and Ministers expressed that they were looking forward to the project advancing.

5 POLICIES AND PLANS

5.1 Introduction

The following sections will set out the relevant national, regional and local level planning policy contexts directly applicable to the proposed development. Each policy is considered in detail within the relevant chapter.

5.2 National Planning Policy Context

5.2.1 Project Ireland 2040: National Planning Framework (NPF)

Project Ireland 2040: National Planning Framework (NPF) is the Government's high-level framework plan for the future development of Ireland, with a particular focus on strategic growth. It is designed to improve the effectiveness of public investment in infrastructure and other relevant services around the country, and to deliver more balanced social, economic and physical development and population growth across Ireland. The NPF contains 10no. National Strategic Outcomes, one of which involves enhancing amenities and heritage. The NPF notes:

'This will ensure that our cities, towns and villages are attractive and can offer a good quality of life. It will require investment in well-designed public realm, which includes public spaces, parks and streets, as well as recreational infrastructure.'

NSO 7 of the National Development Plan 2021-2030 notes that enhancing sports facilities throughout Ireland, including major sporting infrastructure development through the Large-Scale Sport Infrastructure Fund as well as continued investment in the Sports Capital and Equipment Programme is a strategic investment priority.

5.3.1 Regional Spatial and Economic Strategy

The Regional Spatial and Economic Strategy (RSES) is a strategic plan which identifies regional assets, opportunities and pressures and provides appropriate policy responses in the form of Regional Policy Objectives (RPO). It provides a framework for investment to better manage spatial planning and economic development throughout the region. The RSES aims to: 'Plan for compact growth, prioritise strategic infrastructure, and attract, build and retain talent and business capability'.

Within the RSES, the Letterkenny Regional Growth Centre Strategic Plan envisions that Letterkenny will offer a healthy environment with an emphasis on well-being.

Growth Ambition 4: Quality of Life of the RSES acknowledges the importance recreational facilities within urban areas and how they have a direct link to physical and mental wellbeing.

5.4 Local Planning Policy Context

5.4.1 The Donegal County Development Plan 2018-2024

The Donegal County Development Plan 2018-2024 (CDDP) is the principal statutory land use plan for the County, and it sets out a strategic vision for the future growth and development of the County over the 6-year life of the Plan (to 2024) and beyond to a 20-year timeframe (to 2038). This spatially based strategic framework seeks to manage and coordinate change in land use in the County setting out a clear view ahead in development terms together with clear priorities to drive growth.

Part C of the CDDP contains specific objectives and policies for Letterkenny and those relevant are set out below.

The 17ha site is part of a wider site zoned as a 'Strategic Community Opportunity' within Part C of the CDDP (see Figure 5.1). The CDDP defines the objectives of a Strategic Community Opportunity site as:

> *"To achieve an appropriate mix of health and/ or educational and/ or social and/ or community development which may include hospital expansion, educational, recreational, community health, childcare facilities, affordable housing, community support housing, cemetery/burial ground in accordance with LK-SCC-P-1."*

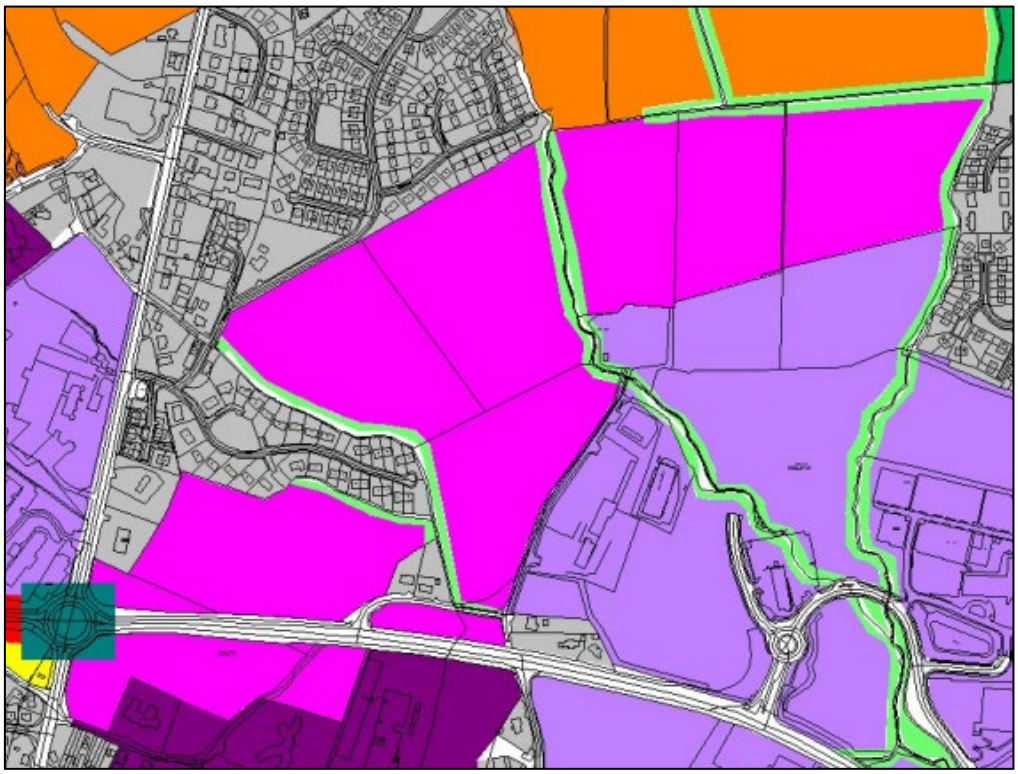

Figure 5.1: Extract from Map 12.1B (As Varied)

Policy LK-SCC-P-1 states that:

> *"On lands identified as 'Strategic Community Opportunity' on Map 12.1B: 'Letterkenny Land Use Zoning Map' that accompanies this part of the Plan, the Council will seek to achieve an appropriate mix of health and/or educational and/or social and/or community development which may include hospital expansion, educational, recreational, community health, childcare facilities, affordable housing, community support housing, cemetery burial ground. Any other use not identified herein will be considered on its own merits provided it does not prejudice the objective and accords with the proper planning and sustainable development of the area and environmental considerations.*
>
> *The identification of lands for the provision of additional community related development and expansion, particularly in the areas of education and health is necessary in ensuring long-term supply of land to meet key strategic needs of these essential services. These lands are located close to the existing service provision at the Letterkenny General Hospital campus where linkages with the existing health uses may be appropriate. Also, the lands are located within reasonable walking distance of key transport corridors and therein are accessible to the Town Bus Service*

providing valuable opportunities for expansion of services provided through the Letterkenny Institute of Technology."

There are also two strands of open space designated. Planning Policy LK-SCC-P-3 provides the context for the Protection of Existing Open Space, it states:

"It is the policy of the Council to protect land of recreation and open space value in order to ensure the provision of sufficient lands and amenities for the use and enjoyment of the public. There will be a presumption against development on open space.

There is a high demand for high quality recreational open space arising in part from increased recognition of the importance of personal health and increased opportunities from additional leisure time. As a result, existing open spaces are considered to be valuable. The clustering of community and social activities around and adjoining open spaces will result in the integration of the types of facilities and amenities required to serve a neighbourhood and the open space component can provide for appropriate pedestrian and cycle routes and a quality environment. Therefore, there may be cases where the loss of existing open space for purposes other than recreational or community uses may be acceptable subject to the adequate integration of the new uses with the surrounding open space."

5.4.1.1 Sports and Recreation

Objective CCG-O-4 of the County Plan seeks to "facilitate a coordinated approach to the delivery of social, community, and cultural infrastructure and provision of services through the work of the various Council directorates, as well as inter-agency liaison and co-operation with statutory and other relevant organisations including cross border initiatives".

Policy CCG-P-1 states that development proposals for new social and community infrastructure (including sports/recreational facilities & playgrounds), will be considered in accordance with the following locational criteria:

a. *At locations within the defined boundaries of settlement framework/urban areas which are within safe walking distance (i.e. via an existing or proposed footpath) of local services and residential areas and which would otherwise promote social inclusion.*

b. *At alternative locations within settlement framework/urban areas where it is demonstrated that there are no suitable sites available which meet the abovementioned locational criteria in point a) above.*

c. *In rural locations in close proximity to existing rural infrastructure (e.g. rural schools, sports facilities, churches etc), excluding areas of Especially High Scenic Amenity, where it is demonstrated that; the development is intended to serve an exclusively rural need, the development is functionally dependent on a specific rural location, or where there are no sites available which meet the abovementioned locational criteria in points a) and b) above.*

d. *At other rural locations excluding areas of Especially High Scenic Amenity where it is demonstrated that; the development is intended to serve an exclusively rural need, the development is functionally dependent on a specific rural location, or where there are no sites available to meet the abovementioned locational criteria in points (a), (b) and (c) above.*

The proposed site meets Criterion (a) due to its location within the settlement framework for Letterkenny with its accessibility being noted as a key reason for zoning the site as a Strategic Community Opportunity.

Policy CCG-P-4 sets out a range of criteria which need to be met for new community development stating that it is the policy of the Council that any development proposal for social, community or cultural use (e.g sports

and recreational facilities, playgrounds, educational facilities etc), in addition to any other policy provisions of this Plan, shall be required to meet the criteria set out in Table 5.1 below:

Table 5.1: Policy CCG-P-4 Criteria

Policy CCG-P-4 Criteria
a) It is compatible with surrounding land uses existing or approved.
b) It will not have a significant impact on adjacent residential amenities.
c) There is existing or imminent programmed capacity in the public water waste infrastructure for developments within urban areas or suitable on-site effluent treatment facilities to EPA standards can be provided in rural areas.
d) It does not cause a traffic hazard and the existing road network can safely handle any extra vehicular traffic generated by the proposed development.
e) Adequate parking provision, access arrangements, manoeuvring and servicing areas are provided in line with technical standards and policies of this Plan.
f) The layout of the development provides for a high level of, and prioritises, pedestrian permeability and access.
g) It does not create a noise nuisance and will not cause any significant environmental emissions.
h) The location, siting, and design of the development including associated infrastructure and landscaping arrangements is of a high quality and does not have an adverse impact on the host landscape, rural character, or visual amenities of the area (for developments in rural areas), does not have an adverse impact on/successfully integrates with the streetscape, vernacular character or built environment of the area (for developments in urban areas).
i) Appropriate boundary treatment and means of enclosure are provided and any
j) It does not have an adverse impact on the built, scenic, or natural heritage of the area including structures on the RPS/NIAH and Natura 2000 sites.
k) It is not located in an area at flood risk and/or will not cause or exacerbate flooding.
l) It does not compromise the water quality of water bodies with River Basin Districts designed under the Water Framework Directive or hinder the programme of measures contained within any associated River Basin Management Plan.

In addition to the above, Policy CCG-P-12 also seeks to ensure that relevant development proposals have appropriate regard for walking and cycling which will promote physical activity and reduce car use.

5.4.1.2 Other Relevant Policies

A number of other relevant planning policies have also influenced the proposed development (see Table 5.2).

Table 5.2: Other Relevant Policies

Transportation
Policy T-P-4
It is a policy of the Council not to permit developments requiring new accesses or which would result in the adverse intensification of existing access points onto National Roads where the speed limit is greater than 60 kph or roads treated to National Roads Standards namely (Map 5.1.3 refers).
Policy T-P-6
It is a policy of the Council to require that all new development proposed adjacent to existing and planned National Roads is set back 50m from the outside edge of the running carriageway unless existing buildings have formed an established building line in which case the new buildings may follow the established building line.
Policy T-P-8
It is a policy of the Council to require a Traffic and Transport Assessment and Road Safety Audit for any development proposing access to the Strategic Road Network.

Policy T-P-12
It is a policy of the Council to seek provision, improvement and extension of footpaths and lighting at appropriate locations subject to environmental, safety and amenity considerations.
Policy T-P-14
It is a policy of the Council to require that adequate cycle lanes, stands and ancillary facilities be provided in appropriate development proposals having regard to the standards set out in Appendix 3 Development and Technical Standards.
Policy T-P-15
It is a policy of the Council to require that all development proposals comply with the Development and Technical Standards set out in Appendix 3 to promote road safety.
Built Heritage
Policy BH-P-1
It is a Policy of the Council to conserve and protect all structures (or parts of structures) and sites contained in the Record of Protected Structures that are of special architectural, historic, archaeological, artistic, cultural, scientific, social or technical interest.
Policy BH-P11
It is a policy of the Council to ensure proposals on the Islands will conserve and/or enhance the intrinsic character, scale and visual amenity of the architectural heritage respecting the character of existing buildings, important views and spaces and the historic settlement pattern in terms of scale, height, grouping, density, design, materials, traditional building techniques and workmanship.
Archaeological Heritage
AH-P-4:
It is the policy of the Council to protect where appropriate, the character and setting of any unrecorded archaeological object or site.
Natural Heritage
Policy NH-P-1
It is a policy of the Council to ensure that development proposals do not damage or destroy any sites of international or national importance, designated for their wildlife/habitat significance in accordance with European and National legislation including SACs, Special SPAs, NHAs, Ramsar Sites and Statutory Nature Reserves.
Policy NH-P-2
It is the policy of the Council to protect the habitats of species listed for protection through the prevention and management of the spread of invasive plant and animal species in the County in accordance with European and National legislation.
Policy NH-P-5
It is a policy of the Council to require consideration of the impact of potential development on habitats of natural value that are key features of the County's ecological network and to incorporate appropriate mitigating biodiversity measures into development proposals.
Policy NH-P-7

Within areas of 'High Scenic Amenity' (HSC) and 'Moderate Scenic Amenity' (MSC) as identified on Map 7.1.1: 'Scenic Amenity', and subject to the other objectives and policies of this Plan, it is the policy of the Council to facilitate development of a nature, location and scale that allows the development to integrate within and reflect the character and amenity designation of the landscape.

Policy NH-P-9

It is the policy of the Council to manage the local landscape and natural environment, including the seascape, by ensuring any new developments do not detrimentally impact on the character, integrity, distinctiveness or scenic value of the area.

Policy NH-P-10

It is a policy of the Council to retain and protect significant stands of existing trees/hedgerows/woodlands and seek increased planting of native trees where appropriate in new developments.

Policy NH-P-13

It is a policy of the Council to protect, conserve and manage landscapes having regard to the nature of the proposed development and the degree to which it can be accommodated into the receiving landscape. In this regard the proposal must be considered in the context of the landscape classifications, and views and prospects contained within this Plan and as illustrated on Map 7.1.1: 'Scenic Amenity'.

Policy NH-P-15

It is a policy of the Council to safeguard prominent skylines and ridgelines from inappropriate development.

Policy NH-P-16

It is a policy of the Council to protect and enhance the landscape character, culture and heritage of the Islands whilst facilitating appropriate development. All development must be considered in the context of the landscape classification contained within this Plan and as illustrated on Map 7.1.1: Scenic Amenity.

Marine Resource and Coastal Management

MRCM-P-10:

It is a policy of the Council to ensure that development proposals do not adversely compromise the recreational amenity and environmental quality of coastal areas including Flag Beaches, Natura 2000 sites and areas of Especially High Scenic Amenity.

Flooding

Policy F-P-1

It is a policy of the Council to ensure that all development proposals comply with 'The Planning System and Flood Risk Management - Guidelines for Planning Authorities', November 2009, DoEHLG

Policy F-P-2

It is a policy of the Council to require applicants/developers to submit, where appropriate, an independent 'Flood Risk Assessment' in accordance with the Flood Risk Management Guidelines,

DEHLG, 2009 or any subsequent related publication and/or 'Surface Water Drainage Calculations', from suitably qualified persons.
Policy F-P-3
It is a policy of the Council to require applicants/developers to submit, where appropriate, evidence of compliance with the Justification test set out in S5.15 of The Planning System and Flood Risk Management - Guidelines for Planning Authorities' (DoEHLG 2009) or any subsequent related publication.
Policy F-P-4
It is a policy of the Council not to permit development where flood or surface water management issues have not been, or cannot be, addressed successfully and/or where the presence of unacceptable residual flood risks remain for the development, its occupants and/or property or public infrastructure elsewhere including, inter alia, up or downstream.
Policy F-P-5
It is a policy of the Council to promote the use of Sustainable Urban Drainage Systems (SUDs), flood attenuation areas, the controlled release of surface waters and use of open spaces and semi permeable hard surfaces for appropriate development proposals.
Policy F-P-7
It is a policy of the Council not to permit developments which would hinder the maintenance of river or drainage channels.

5.4.2 Draft Letterkenny Plan and Local Transport Plan 2023-2029

The Draft Letterkenny Plan and Local Transport Plan 2023 – 2029 (hereinafter referred to as 'the Draft Plan') has been prepared in accordance with the requirements of Sections 18-20 of the Planning and Development Act, 2000 (as amended) (the Act). The Draft Plan sets out an overall strategy for the proper planning and sustainable development of Letterkenny in the context of the National Planning Framework (NPF), the Regional Spatial and Economic Strategy for the Northern and Western Regional Assembly area (the RSES) and the Donegal County Development Plan 2018- 2024 (As Varied) (the CDDP). The Draft Plan has been drafted having regard to Ministerial Guidelines issued pursuant to Section 28 of the Act, and in accordance with EU requirements regarding Strategic Environmental Assessment (SEA) and Appropriate Assessment (AA). Arising from these obligations, the Draft Plan is accompanied by supporting documents including a Natura Impact Report (in respect of Appropriate Assessment); an Environmental Report (in respect of Strategic Environmental Assessment); a Strategic Flood Risk Assessment; and an Infrastructural Assessment.

The Letterkenny Plan 2023-2029, once adopted, will replace Chapter 12, Part C of the CDDP. said the Draft Plan notes that Chapter 12 of the CDDP will be deleted by way of a Variation to the CDDP.

The Draft Plan is comprised of two parts. Part A contains the policies and plans of a 'conventional' land use plan, whilst the Local Transport Plan is contained in Part B. Together, these two parts constitute the Written Statement of the Plan. The Plan also contains a Zoning Map and other maps. The Written Statement shall take precedence over the Zoning Map and other maps should any discrepancy arise between them.

The Letterkenny Plan, once adopted, must be read in tandem with the CDDP, as general policies and standards contained with the CDDP are also applicable within the Letterkenny Plan area. All proposals for development that are put forward in accordance with the provisions of this Local Area Plan (LAP) must also comply with relevant objectives and policies of the CDDP.

The Draft Plan does not envisage any fundamental changes to the land use zoning for the proposed LRSAH site.

6 LANDSCAPE AND VISUAL

6.1 Introduction

The purpose of this Landscape and Visual Impact Assessment (LVIA) is to identify and determine the effects on landscape character, landscape features, visual receptors and visual amenity as a result of the works associated with the construction of the proposed development. This Chapter is supported by EIAR Volume II Design Drawings & Figures – Photomontages;

- 22018-HAM-XX-XX-DR-A-0603 - View Reference Map
- 22018-HAM-XX-XX-DR-A-0604 - View 1 – Hazelwood Drive
- 22018-HAM-XX-XX-DR-A-0605 - View 2 – Ashfield
- 22018-HAM-XX-XX-DR-A-0606 - View 3 – Brookfield Heights
- 22018-HAM-XX-XX-DR-A-0607 - View 4 - Mountain Lane
- 22018-HAM-XX-XX-DR-A-0608 - View 5 – N56 R229 Roundabout
- 22018-HAM-XX-XX-DR-A-0609 -View 6 - N56 L1164 Junction
- 22018-HAM-XX-XX-DR-A-1001_Proposed Planning Master Plan

Volume III Technical Appendix 6.A also contains the Landscape Maintenance Management and Specification report and Appendix 6.B presents the Landscape Report June 2023.

This assessment has been prepared and reviewed by Chartered Landscape Architects at RPS.

6.2 Methodology

6.2.1 General Approach

The methodology and approach to the assessment contained within this chapter has been carried out in accordance with best practice guidance described in the following documents;

- Guidelines for Landscape and Visual Impact Assessment, Third Edition (The Landscape Institute and Institute of Environmental Management & Assessment, 2013) (GLVIA3);
- Technical Guidance Note 06/19 Visual Representation of Development Proposals (The Landscape Institute, 2019).

GLVIA3 recommends that an LVIA '*concentrates on principles and process*' and '*does not provide a detailed or formulaic 'recipe"* to assess effects, it being the '*responsibility of the professional to ensure that the approach and methodology adopted are appropriate to the task in hand*' (preface to the third edition).

The effects on the landscape resources and visual receptors (people) have been assessed by considering the proposed change in the baseline conditions (the impact of the development) against the type of landscape resource or visual receptor (including the importance and sensitivity of that resource or receptor). These factors are determined through a combination of quantitative (objective) and qualitative (subjective) assessment using professional judgement. The assessment methodology is summarised in Figure 6.1 below.

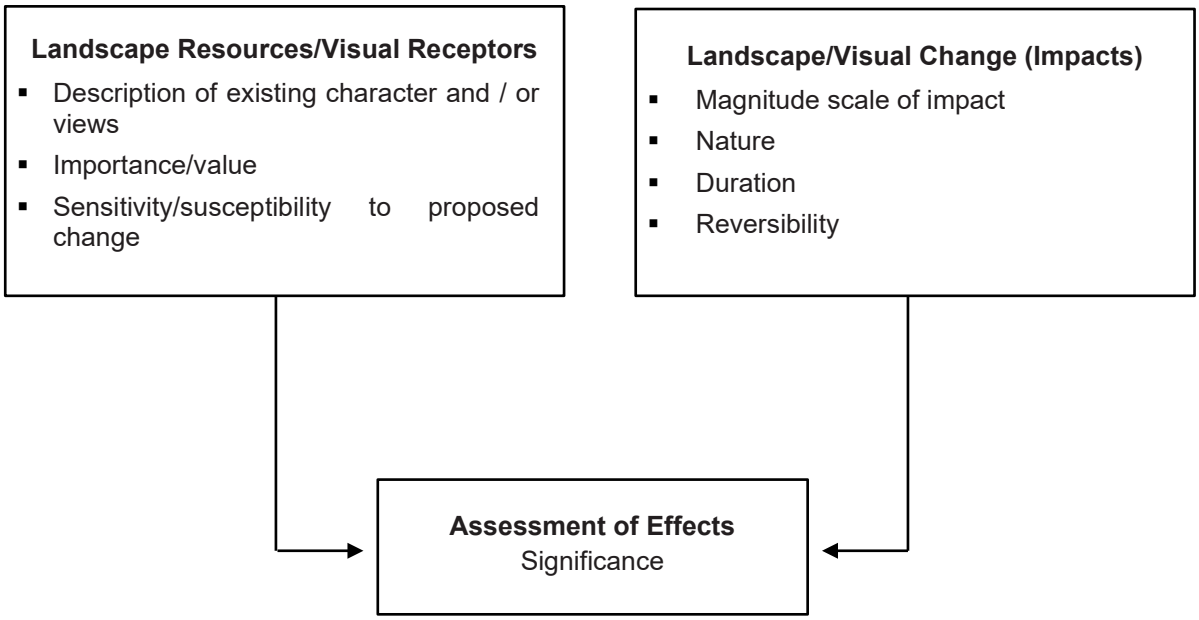

Figure 6.1: Assessment Methodology Summary

The LVIA considers the potential effects of a project upon:

- Individual landscape features and elements;
- Landscape character; and
- Visual amenity and the people who view the landscape.

6.2.2 Identification of Baseline Conditions

Baseline conditions have been identified and assessed through analysis of;

- Up to date digital copies of OSI maps;
- Aerial photography;
- County Donegal Development Plan 2018-2024; and,
- Drawings of the proposed development.

Site visits were undertaken to assess the existing environment, to establish the existing visual resource and to identify sensitive receptors, i.e. residential properties, scenic viewpoints. Site visits were also used to consider the potential effects on landscape character and visual impacts arising as a result of the proposed development.

6.2.3 Identifying Effects

Assessing the significance of an effect is a key component of the LVIA and is an evidence-based process combining professional judgment on the nature of a landscape or visual receptor's sensitivity, its susceptibility or ability to accommodate change and the value attached to the receptor. It is important to note that judgements in this LVIA are impartial and based on professional experience and opinion informed by best practice guidance.

The effects of a proposed development are considered to be of variable duration and are assessed as being ~~of~~ either short-term, medium-term or long-term duration, and permanent or reversible. Effects are considered to be long-term during the operational phase of the development, whilst operations and infrastructure works apparent during the construction and initial operating period are considered to be temporary, short-term effects.

The reversibility of an effect is also variable. The effects on the landscape and visual resource that occurs during the construction period such as the use of construction machinery are considered to be reversible.

Where effects arise during the construction period, these are most likely to be as a result of: movement of construction machinery within the landscape; construction of new structures and construction activities within the site boundary all of which are considered to be short term in duration.

To avoid repetition, the duration and reversibility of effects are not reiterated throughout the assessment.

6.2.4 Assessment Criteria

The objective of the assessment process is to identify and evaluate the predicted significant effects arising from a proposed development. Significance is a function of the:

- Sensitivity of the affected landscape or visual receptors, determined through consideration of the susceptibility of the receptor to the type of change arising from the specific proposals and the value attached to the receptor; and
- Secondly its scale or magnitude, derived from a consideration of the size/ scale, geographical extent, duration and reversibility of the proposed development.

These definitions recognise that landscapes vary in their capacity to accommodate different forms of development according to the nature of the receiving landscape and the type of change being proposed.

As with any new development, it is acknowledged that, the introduction of a proposed development into the existing landscape or visual context could cause either a deterioration, improvement or neutral impact on the existing landscape or visual resource.

6.2.5 Landscape Impact Assessment

The LVIA firstly assesses how a proposed development would impact directly on any landscape features and resources. This category of effect relates to specific landscape elements and features (e.g. woods, trees, walls, hedgerows, watercourses) that are components of the landscape that may be physically affected by the proposed development, such as the removal or addition of trees and alteration to ground cover.

The LVIA then considers impacts on landscape character at two levels. Firstly, consideration is given to how the landscape/ landscape character is affected by the removal or alteration of existing features and the introduction of new features. This is considered to be a direct impact on landscape character.

Secondly, the indirect impacts of a proposed development on the wider landscape are considered. The assessment of impacts on the wider landscape is discussed using the surrounding character areas identified in the relevant landscape/ landscape character assessments. It is acknowledged there is an overlap between perception of change to landscape character and visual amenity, but it should be remembered that landscape character in its own right is generally derived from the combination and pattern of landscape elements within the view.

The significance of effects on landscape features and character is determined by considering both the sensitivity of the feature or landscape character and the magnitude of impact.

Consideration of the sensitivity of the landscape resource against the magnitude of impact caused by the proposed development is fundamental to landscape and visual assessment and these two criteria are defined in more detail below.

6.2.6 Landscape Sensitivity

The determination of the sensitivity of the landscape receptor is based upon an evaluation of the elements or characteristics of the landscape likely to be affected. The evaluation reflects such factors as its quality, value, contribution to landscape character and the degree to which the particular element or characteristic can be replaced or substituted.

GLVIA 3 at paragraph 5.39 states that '*landscape receptors need to be assessed firstly in terms of their sensitivity, combining judgments of their susceptibility to the type of change or development proposed and the value attached to the landscape.*

Susceptibility is defined by GLVIA 3 at paragraph 5.40 as *'the ability of the landscape receptor (whether it be the overall character or quality/ condition of a particular landscape type or area, or an individual element and/ or feature, or a particular aesthetic and perceptual aspect) to accommodate the proposed development without due consequences for the maintenance of the baseline situation and/or the achievement of landscape planning policies and strategies'*.

The value of a landscape receptor is determined with reference to the presence of relevant landscape designations, such as Areas of Outstanding Natural Beauty (AONB) and their level of importance. For the purpose of this assessment, landscape value is categorised as:

- Very High: Areas of landscape acknowledged through designation such as Areas of Outstanding Natural Beauty (AONB) or other landscape based sensitive areas. These are of landscape significance within the wider region or nationally;
- High: Areas that have a very strong positive character with valued and consistent distinctive features that gives the landscape unity, richness and harmony. These are of landscape significance within the district;
- Medium: Areas that exhibit positive character but which may have evidence of alteration/degradation or erosion of features resulting in a less distinctive landscape. These may be of some local landscape significance with some positive recognisable structure; and
- Low: Areas that are generally negative in character, degraded and in poor condition. No distinctive positive characteristics and with little or no structure. Scope for positive enhancement.

As previously discussed, landscape sensitivity is influenced by a number of factors including susceptibility to change, value and condition. In order to assist with bringing these factors together judgements regarding susceptibility and value have been used which define the landscape resource as being either, negligible, low, medium, high or very high. Table 6.1 defines the criteria that have guided the judgement as to the overall sensitivity of the landscape resource.

Assessments of susceptibility and value of a particular landscape resource may be different and professional judgement will always be used to conclude on the judgement of sensitivity. For example, value may be high and susceptibility may be low, and a professional judgement will be made to determine whether sensitivity is high, low or in between, supported by a narrative explanation.

Table 6.1: Landscape Sensitivity

Definition Landscape resource susceptibility	Landscape resource value	Sensitivity
Exceptional landscape quality, no or limited potential for substitution. Key elements / features well known to the wider public. Little or no tolerance to change	Nationally / internationally designated/ valued landscape, or key elements or features of national/ internationally designated landscapes. Little or no tolerance to change	Very High
Strong/ distinctive landscape character; absence of landscape detractors. Low tolerance to change.	Regionally/ nationally designated/ valued countryside and landscape features. Low tolerance to change.	High
Some distinctive landscape characteristics; few landscape detractors. Medium tolerance to change.	Locally' regionally designated/ valued countryside and landscape features. Medium tolerance to change.	Medium
Absence of distinctive landscape characteristics; presence of landscape detractors. High tolerance to change	Undesignated countryside and landscape features. High tolerance to change	Low
Absence of positive landscape characteristics. Significant presence of landscape detractors. High tolerance to change	Undesignated countryside and landscape features. High tolerance to change	Negligible

6.2.7 Magnitude of Landscape Effect

The effect on Landscape receptors and the overall judgement of the magnitude of Landscape effect is based on combining judgements on '*size or scale, the geographic extent of the area influenced, and its duration and reversibility*' (GLVIA3, paragraph 5.48).

Direct resource changes on the Landscape character in the study area are brought about by the introduction of the proposed development and its impact on the key landscape characteristics. Judgements regarding the magnitude of Landscape/ landscape impact are indicated in Table 6.2 below.

Table 6.1: Magnitude of Landscape Impact

Definition	Magnitude of Impact
Total loss or addition or/ very substantial loss or addition of key elements / features / patterns of the baseline, i.e., pre-development Landscape and/ or introduction of dominant, uncharacteristic elements with the attributes of the receiving Landscape	Large
Partial loss or addition of or moderate alteration to one or more key elements / features / patterns of the baseline, i.e., pre-development Landscape and / or introduction of elements that may be prominent but may not necessarily be substantially uncharacteristic with the attributes of the receiving Landscape.	Medium
Minor loss or addition of or alteration to one or more key elements / features / patterns of the baseline, i.e., pre-development Landscape and or introduction of elements that may not be uncharacteristic with the surrounding Landscape.	Small
Very minor loss or addition of or alteration to one or more key elements / features / patterns of the baseline, i.e., pre-development Landscape and/or introduction of elements that are not uncharacteristic with the surrounding Landscape approximating to a 'no-change' situation.	Negligible
No loss, alteration or addition to the receiving Landscape resource	No change

6.2.8 Visual Impact Assessment

As outlined in GLVIA 3 (Paragraph 6.1) '*an assessment of visual effects deals with the effects of change and development on the views available to people and their visual amenity'.* The assessment of effects on views is an assessment of how the introduction of a proposed development will affect views within the study area. The assessment of visual effects therefore needs to consider:

- Direct impacts of a proposed development upon views of the landscape through intrusion or obstruction;
- The reaction of viewers who may be affected, e. g. residents, walkers, road users; and
- The overall impact on visual amenity.

6.2.9 Sensitivity of Visual Receptors

For visual receptors, judgements of susceptibility and value are closely interlinked. For example the most valued views are likely to be those which people go and visit because of the available view. The value attributed to visual receptors also relates to the value of the view – for example a National Trail is nationally valued for its access, not necessarily for its views.

Paragraph 6.32 of the GLVIA refers to the susceptibility of different visual receptors to changes in views and states that susceptibility is mainly a function of "*the occupation or activity of different people experiencing the view at particular locations*" and "*the extent to which their attention or interest may therefore be focused on the views and the visual amenity they experience at particular locations*."

Other factors affecting visual sensitivity include:

- The location and context of the viewpoint;
- The expectations and occupation or activity of the receptor; and
- The importance of the view.

Judgements on the overall visual sensitivity/susceptibility are provided in Table 6.3 below and overall sensitivity of the visual resource is based on combining judgements on the sensitivity of the human receptor (for example resident, commuter, tourist, walker, recreationist or worker, and the numbers of viewers affected) and judgements on the visual resource value (for example views experienced from residential properties, workplace, leisure venue, local beauty spot, scenic viewpoint, commuter route, tourist route or walkers' route).

Table 6.2: Visual Resource Sensitivity

Definition		Sensitivity
Visual resource Susceptibility	**Visual resource value**	
Views of remarkable scenic quality, of and within internationally designated Landscapes or key features or elements of nationally designated landscapes that are well known to the wider public. Little or no tolerance to change.	Observers, drawn to a particular view, including those who have travelled to experience the views. Little or no tolerance to change	Very High
Views from residential property. Public rights of way, National Trails, Long distance walking routes and nationally designated countryside/ landscape features with public access. Low tolerance to change.	Observers enjoying the countryside from their homes or pursuing quiet outdoor recreation are more sensitive to visual change. Little tolerance to change	High
Views from local roads and routes crossing designated countryside / landscape features and 'access land' as well as promoted paths. Medium Tolerance to change.	Observers enjoying the countryside from vehicles on quiet/ promoted routes are moderately sensitive to visual change. Medium tolerance to change	Medium
Views from workplaces, main roads and undesignated countryside / landscape features. High tolerance to change.	Observers in vehicles or people involved in frequent or infrequent repeated activities are less sensitive to visual change. High tolerance to change	Low
Views from within and of undesignated landscapes with significant presence of landscape detractors. High tolerance to change.	Observers in vehicles or people involved in frequent or frequently repeated activities are less sensitive to visual change. High tolerance to change	Negligible

6.2.10 Photomontages/Visualisations

All of the information recorded at the time the site photos were taken. Careful consideration is given to the direction of sunlight, time of day, weather conditions and distance of viewer, so that photomontages will match reality in terms of lighting, sharpness, density of colour etc.

At this stage the rendered image of the proposed development is superimposed onto its matching photograph. The mathematical accuracy is then double checked and verified by ensuring that existing prominent features which are also modelled line up exactly in the photo. Next, the photomontage specialist establishes, which existing features, such as buildings and trees are in the foreground of the proposed development and those that are in the background, i.e. which features will mask the development and which ones will appear behind the development. When it is found that the development is not visible due to foreground features, its outline is indicated with a red line.

The resulting photomontage, having gone through this extensive procedure, is an accurate and verifiable representation of the proposed development as viewed from the viewpoint positions.

The existing views, indicating the current view available from each of the viewpoint locations are suffixed with the number ‘01’ (e.g. Viewpoint 01 (Existing) within EIAR Volume II Design Drawings & Figures.

The predicted view, indicating the proposed development in the context of the existing view is suffixed with the number '01' (e.g. Viewpoint 01 (Proposed)) within EIAR Volume II Design Drawings & Figures.

6.2.11 Magnitude of Visual Effects

The magnitude of impact on the visual resource results from the scale of change in the view, with respect to the loss or addition of features in the view, and changes in the view composition. Important factors to be considered include: proportion of the view occupied by the proposed development, distance and duration of the view. Other vertical features in the landscape and the backdrop to the proposed development will all influence resource change. Judgements regarding the magnitude of visual impact are provided in Table 6.4 below.

Table 6.3: Magnitude of Visual Impact

Definition	Magnitude
Complete or very substantial change in view dominant involving complete or very substantial obstruction of existing view or complete change in character and composition of baseline, e.g., through removal of key elements	Large
Moderate change in view: which may involve partial obstruction of existing view or partial change in character and composition of baseline, i.e., pre-development view through the introduction of new elements or removal of existing elements. Change may be prominent but would not substantially alter scale and character of the surroundings and the wider setting. Composition of the view would alter. View character may be partially changed through the introduction of features which, though uncharacteristic, may not necessarily be visually discordant	Medium
Minor change in baseline, i.e. pre-development view - change would be distinguishable from the surroundings whilst composition and character would be similar to the pre change circumstances.	Small
Very slight change in baseline, i.e. pre-development view - change barely distinguishable from the surroundings. Composition and character of view substantially unaltered.	Negligible
No alteration to the existing view	No change

6.2.12 Significance of Effects

The purpose of this LVIA is to determine, in a transparent way, the likely significant landscape and visual effects of the proposed development. It is accepted that, due to the nature and scale of development, the proposed development could potentially give rise to some notable landscape and visual effects.

GLVIA3 identifies that '…… *a final judgment is made about whether or not each effect is likely to be significant. There are no hard and fast rules about what effects should be deemed 'significant' but LVIAs should always distinguish clearly between what are considered to be significant and non-significant effects'*.

Significance can only be defined in relation to each particular development and its specific location. The relationship between receptors and effects is not typically a linear one. It is for each LVIA to determine how judgements about receptors and effects should be combined to derive significance and to explain how this conclusion has been arrived at.

The identification of significant effects would not necessarily mean that the effect is unacceptable in planning terms. What is important is that the likely effects on the landscape and visibility are transparently assessed and understood in order that the determining authority can bring a balanced, well-informed judgement to bear when making the planning decision.

The significance of effects on landscape, views and visual amenity have been judged according to a six-point scale: Substantial, Major, Moderate, Minor, Negligible or None as presented in Table 6.5 below, which contains a description of the significance of effect criteria.

Table 6.4: Significance of Effect Criteria

Significance of Effect	Landscape Resource	Visual Resource
None	Where the project would not alter the Landscape character of the area.	Where the project would retain existing views.
Negligible	Where proposed changes would have an indiscernible effect on the character of an area.	Where proposed changes would have a barely noticeable effect on views/visual amenity.
Minor	Where proposed changes would be at slight variance with the character of an area.	Where proposed changes to views, although discernible, would only be at slight variance with the existing view.
Moderate	Where proposed changes would be noticeably out of scale or at odds with the character of an area.	Where proposed changes to views would be noticeably out of scale or at odds with the existing view.
Major	Where proposed changes would be uncharacteristic and/or would significantly alter a valued aspect of (or a high quality) Landscape.	Where proposed changes would be uncharacteristic and/or would significantly alter a valued view or a view of high scenic quality.
Substantial	Where proposed changes would be uncharacteristic and/or would significantly alter a Landscape of exceptional Landscape quality (e.g., internationally designated Landscapes), or key elements known to the wider public of nationally designated landscapes (where there is no or limited potential for substitution nationally).	Where proposed changes would be uncharacteristic and/or would significantly alter a view of remarkable scenic quality, within internationally designated landscapes or key features or elements of nationally designated landscapes that are well known to the wider public.

For the purposes of this assessment those effects indicated, in Table 6.6 below, as being Substantial or Major to Substantial are regarded as being significant. Effects of 'Minor to Moderate' and lesser significance have been identified within the assessment, though are not considered significant. For those effects indicated as being of 'Moderate' or 'Moderate to Major' the assessor has exercised professional judgement in determining if the effect is considered to be significant, taking account of site specific or location specific variables which are given different weighting in each instance according to location.

Table 6.5: Significance of effects matrix

Magnitude of Impact	Sensitivity				
	Negligible	Low	Medium	High	Very High
No Change	No Change	No Change	No Change	No Change	No Change
Negligible	Negligible	Negligible to Minor	Negligible to Minor	Minor	Minor
Small	Negligible to Minor	Negligible to Minor	Minor	Minor to Moderate	Moderate to Major
Medium	Negligible to Minor	Minor	Moderate	Moderate to Major	Major to Substantial
Large	Minor	Minor to Moderate	Moderate to Major	Major to Substantial	Substantial

A conclusion that an effect is 'significant' should not be taken to imply that the proposed development is unacceptable. Significance of effect needs to be considered with regard to the scale over which it is experienced and whether it is beneficial or adverse.

6.2.13 Cumulative Effects

The methodology for assessment of cumulative impacts has been derived from Guidelines for Landscape and Visual Impact Assessment, Third Edition (The Landscape Institute and Institute of Environmental Management & Assessment, 2013) (GLVIA3).

The purpose of the Cumulative Landscape and Visual Impact Assessment (CLVIA) is to consider the landscape and visual impacts of the proposed development when viewed in context with other similar development.

Cumulative effects consist of direct effects on the physical character of the site containing the development, and indirect, perceived effects on the character of areas from which the developments would be visible. GLVIA3 identifies effects as follows:

- Cumulative effects as *'the additional changes caused by a proposed development in conjunction with other similar developments or as the combined effect of a set of developments, taken together'* (SNH, 2012:4);
- Cumulative landscape effects as effects that *'can impact on either the physical fabric or character of the landscape, or any special value attached to it'* (SNH, 2012:10);
- Cumulative visual effects as effects that can be caused by combined visibility, which *'occurs when the observer is able to see two or more developments from one viewpoint'* and/or sequential effects which *'occur when the observer has to move to another viewpoint to see different developments'* (SNH, 2012:11).

The significance of any identified cumulative landscape and visual effect has been assessed as per the main LVIA methodology. These categories have been based on the same combination of receptor sensitivity and predicted magnitude of impact in order to identify the residual significance of effects.

6.3 Receiving Environment

6.3.1 General Overview

The proposed development subject lands are approximately 18ha in extent and are located adjacent to the N56, served by local road L-11644-1. It is close to the Letterkenny University Hospital campus, the IDA business park and a number of large industrial employers such as Pramerica, Optum Zeus, Sita, Philips Medisize and A&M Belting, as well as three schools and residential developments.

Land cover associated with the proposed development site is predominantly comprised of pastoral and arable agricultural land use to the north and northeast, whilst the urban fringe of Letterkenny dominates the south, west and southwestern areas. Further urban influence is experienced along the existing N56 corridor that runs along the southern boundary of the site.

Fields are generally well defined by mixed species hedgerows of varying quality. In many places these hedgerows have become degraded, have developed gaps, become overgrown or over-mature, so that only lines of trees remain without hedgerow species to connect them. Tree cover, particularly adjacent to the existing N56 corridor, often limits views north across Lough Swilly. Coniferous plantations are scattered and largely restricted to poorer quality, higher elevation land within the study area.

The urban form of Letterkenny dominates the character within the south and southwestern portion of the study area and views north-west from within this predominantly estuarine landscape are often filtered or obscured by roadside vegetation and close built form, such that the urban fabric associated with eastern fringes of Letterkenny is obscured.

With regards to views from the proposed development site, it is considered that due to the lack of extensive tree cover generally, panoramic expansive views are available from properties and road networks at higher elevation particularly to the southwest. Views from the existing N56 corridor, set at lower elevation, are

restricted by mixed species screen planting adjacent, though where gaps in vegetation permit, views north are expansive and panoramic in nature. Residential properties directly adjacent to the N56 are generally well screened by garden hedgerows, and vegetation along the north-eastern boundary of the proposed site.

Zoning

A review of County Donegal Development Plan (CDDP) identified that the proposed development site has been zoned as an area of Strategic Community Opportunity. The objective of this is to "…*achieve an appropriate mix of health and/ or educational and/ or social and/ or community development….*" As the proposed development is for a sports hub, this meets the objective set out in the CDDP.

6.3.2 Donegal Landscape Character Assessment

A review of the LCA accompanying the CDDP identified that the proposed development site is entirely contained within a single LCA Letterkenny Estuary and Farmland (LCA 15).

The CDDP LCA notes that the Letterkenny Estuary and Farmland LCA is characterised by a wide, fertile valley of the River Swilly flowing through heath and bog covered uplands east towards Lough Swilly. Lough Swilly forms a large intertidal estuary encircled by higher hills and mountains to the north and south and rolling arable lands in the east. Letterkenny is the largest town in the county and dominates much of this LCA. Letterkenny sprawls out from its historic core in the centre of this LCA in all directions, only somewhat curtailed by the floodplains of the River Swilly and steep rugged land to the north and west of the town.

This LVIA has completed a Landscape Character Assessment for the purpose of this impact assessment and the findings are set out below in section 6.3.3.

Letterkenny Estuary and Farmland – LCA 15

The key characteristics identified in the CDDP landscape character assessment, under a variety of headings, are as follows:

- Large primarily agricultural floodplains extend inland along the river Swilly through Letterkenny town and beyond into Newmills. Some of the floodplains within the town area have been developed for commercial and retail use.
- The agricultural lands within this LCA are of varying quality ranging from good quality arable land along the shores of Lough Swilly, river valleys and arable land to the east, to upland grazing and pasture on peripheral uplands.
- There is a substantial amount of residential sprawl radiating from Letterkenny and a considerable amount of one-off rural dwellings and linear development along the local road networks.
- Letterkenny is the largest town in the county with a population of 19,588 (Letterkenny urban boundary CSO 2011) and part of the linked Letterkenny Derry Gateway as identified in the National Spatial Strategy, 2020. The town is located west of the Swilly estuary on the banks of the Swilly River in recent times the town has expanded south across the river whereas the historic town fabric is located on higher lands just north of the river.
- Historic landscape characterisation identifies that Letterkenny, like many towns, is located at the first significant river crossing inland of an estuary (Lough Swilly), and thereby over time became a travel node, with roads converging on the river crossing.
- Hedge and deciduous tree bound fields are a predominant feature in this landscape providing biodiversity corridors throughout.
- Dispersed clumps of deciduous woodland, demesne woodland and important historic woodlands in this LCA.

- Lands on and around the estuary at Big Isle are an important wintering feeding ground for internally important species of Geese, and much of this tidal estuary is designated as Special Protection Area (SPA).

It is noted that the landscape assessment accompanying the CDDP does not provide any categorisation of the Letterkenny Estuary and Farmlands LCA with regards to sensitivity or condition, though does identify forces for change which include:

- Degree of pressure in the rural area of this LCA for urban generated housing development from Letterkenny.
- Linear development along the rural road network.
- Renewable energy development (windfarms).
- Telecommunications and infrastructure development.
- Development and consolidation of Letterkenny urban area.

6.3.3 Scenic Amenity Designations

Following a review of Map 7.1.1 (Scenic Amenity Designations) which accompanies the CDDP it has been established that lands associated with the proposed development site have been categorised as being of 'High Scenic Amenity'.

The CDDP states that *"Areas of High Scenic Amenity are landscapes of significant aesthetic, cultural, heritage and environmental quality that are unique to their locality and are a fundamental element of the landscape and identity of County Donegal. These areas have the capacity to absorb sensitively located development of scale, design and use that will enable assimilation into the receiving landscape and which does not detract from the quality of the landscape, subject to compliance with all other objectives and policies of the plan."*

6.4 Landscape Designations

This section reviews Landscape designations in Donegal. The relevant Plan is Donegal County Development Plan 2018-2024.

6.4.1 Donegal County Development Plan 2018 - 2024

A review has taken place of the Donegal County Development Plan and all zonings and designations that are relevant to this LVIA have been outlined below.

6.4.2 Areas of High Amenity

The CDDP has identified several areas in Letterkenny that are defined as areas of high amenity as they are seen as special landscape areas. These closest ones to the proposed development site are:

- Lough Swilly SPA – This SPA is a long sea inlet cut through a variety of metamorphic rocks, situated on the west side of the Inishowen Peninsula in north Co. Donegal. Also forming part of the site is a series of improved pasture and arable fields on the south side of Lough Swilly between Farsetmore and Inch Levels – these are of importance to geese and swans. Lough Swilly is approximately 18km northeast from the proposed development site.
- Lough Fern SPA - Lough Fern is a relatively small lake with a maximum length of 2.5 km. The lake lies on the Leannan River in Co. Donegal and is underlain by metamorphic rocks (schist, gneiss and quartzite). It is a shallow system, with a maximum depth of 2.5 m. The water is soft though it is not markedly coloured; the lake is classified as mesotrophic. The shoreline is often stony though swamp vegetation is found both in the northern and southern parts. The protected, Red Data Book plant species Globeflower occurs on shores within the site. There are two small islands in the lake, both of which are covered with deciduous woodland. Lough Fern is approximately 9.km north of the proposed development site.

Development in these areas will only be permitted where the integrity and natural beauty of the landscape is not threatened. The proposed development will have no impact on these areas due to the separation distances between the site and these areas.

There are no Natural Heritage Areas in close proximity to the proposed development site.

6.4.3 Special Areas of Conservation

In addition to the Areas of Primary Amenity above, the County Development Plan also identifies several Special Areas of Conservation (SAC) that require protection from inappropriate and insensitive development. Two of them are in close proximity to the proposed development site. These are:

- Ballyarr Wood - The Ballyarr Woods form one of the best and largest examples of a semi-natural deciduous woodland in the north-west of Ireland. These woods have a good diversity of species, and as well as containing old oak woodland, they include open heath areas, scrub and wet grassland. There are also areas of old coppices and old field systems. This SAC is approximately 8.2km north of the proposed development site.
- Leannan River SAC - Situated in north Co. Donegal, this site comprises the River Leannan and its main tributaries and lakes, including Loughs Fern, Gartan and Akibbon. The river from source to sea measures 46 km and drains a catchment area of 282 km^2. The Bullaba River drains off the Glendowan Mountains and flows into Lough Gartan. The Leannan River flows from Lough Gartan in a north-easterly direction, passes through Lough Fern, and then onwards in an easterly direction through the town of Rathmelton and into Lough Swilly. The river has good water quality, and its banks are fringed more or less continuously by deciduous woodland. The adjacent habitat is mainly wet grassland which has been improved to varying degrees for grazing. There is also a good scattering of woodland, mostly deciduous, in the surrounding area. This SAC is approximately 11km northwest of the proposed development site.

It is a policy of the council to protect these areas from inappropriate development and reinforce their character, distinctiveness, and sense of place. However, the proposed development will have no impact on these areas due to the separation distances and the intervening topography between the site and these areas.

6.4.4 Architectural Conservation Areas

There are two Architectural Conservation Areas (ACA) that are identified in the Donegal County Development Plan. While the proposed development site is not located within an ACA, the site is approximately 1.8km southwest from the Ecclesiastical Quarter ACA. The County Development Plan notes that "*It is the policy of the Council to ensure that any development, modification, alteration or extension affecting a protected structure, adjoining structure or structure within an Architectural Conservation Area, are sited and designed appropriately and are in no way detrimental to the character or setting of the structure or surrounding area."* In addition to this, a recorded monument is located within an adjacent field to the east of the proposed site: recorded monument Ref. no. DG053-053, classified as a standing stone. Furthermore, the CDDP also states that *"It is the policy of the Council to protect structures recorded on the RPS and features that contribute to the character of the ACA."* The proposed development will not have an adverse impact on the Ecclesiastical Quarter ACA or the recorded monument, but the development design should be sensitive to the area. Further details are provided in Chapter 15 of the EIAR.

6.4.5 Scenic Routes/Views

Following a review of the CDDP and available information in relation to Protected Views and Prospects, it has been established that the following Protected Views and Prospects are located within the study area:

- Designated view on N13 Views north-east from the N13 at Listellan, north-west of Glenmaquin.
- Designated view on N13 to the north of the Pluck roundabout Views looking north-west from Maghera Beg, north of Manorcunningham).

However, given the separation distances and intervening topography, the proposed development will not have a detrimental impact upon these views.

6.5 Proposed Development

A full description of the proposed development has been provided in EIAR Chapter 2 and comprises of playing fields, ancillary facilities and extensive landscape works.

6.6 Landscape Effects

The assessment of Landscape effects follows the methodology previously described in Section 6.2 and considers those effects which are predicted to occur during the construction and operational phases of the proposed development.

The construction phase of the proposed development will result in additional built elements being introduced into the landscape. The operational phase of the proposed development will result in vertical elements (buildings) being visible within the surrounding landscape.

In order to avoid repetition, an assessment of construction phase impacts and predicted operational phase impacts is included within the following landscape assessments.

6.6.1 Landscape Character Effects

The proposed development is located within the Donegal County Council area, and the predicted landscape effect of the proposed development is set out in Table 6.7 below.

Table 6.6: Landscape Character Effects

Letterkenny Estuary and Farmland - LCA 15	
Sensitivity	Key characteristics which, together with field works, have informed an understanding of the susceptibility of this landscape to the development proposed are described in the CDDP as: • Large primarily agricultural floodplains extend inland along the river Swilly through Letterkenny town and beyond into Newmills. Some of the floodplains within the town area have been developed for commercial and retail use. • The agricultural lands within this LCA are of varying quality ranging from good quality arable land along the shores of Lough Swilly, river valleys and arable land to the east, to upland grazing and pasture on peripheral uplands. • There is a substantial amount of residential sprawl radiating from Letterkenny and a considerable amount of one-off rural dwellings and linear development along the local road networks. • Historic landscape characterisation identifies that Letterkenny, like many towns, is located at the first significant river crossing inland of an estuary (Lough Swilly), and thereby over time became a travel node, with roads converging on the river crossing. • Hedge and deciduous tree bound fields are a predominant feature in this landscape providing biodiversity corridors throughout. • Dispersed clumps of deciduous woodland, demesne woodland and important historic woodlands in this LCA. Given the influences of the urban form of Letterkenny and the existing road corridors the overall value of the LCA within the study area is judged to be medium.

Letterkenny Estuary and Farmland - LCA 15	
	Overall, taking into account the susceptibility and value attached to the LCA, the sensitivity of this LCA is judged to be medium.
Magnitude of Change	Direct impacts on this LCA will arise from the physical construction of new elements associated with the proposed development (i.e. playing fields, ancillary facilities). It is also considered that construction activities will have a localised effect on the urban form of Letterkenny, though visibility of such activities will be largely screened within the wider LCA by surrounding, retained built form. Localised portions of the LCA adjacent to, but beyond the site boundary of the proposed development are predicted to experience indirect effects as a consequence of the formation of the new features, though the predicted impacts are often screened by retained vegetation and localised changes in topography within the wider landscape. The proposal has also been designed to respect the scale of built form in this landscape albeit with newer elements to reflect and respect surrounding built form. The predicted magnitude of impact during the construction phase is considered to be medium, temporary and direct, limited to the immediate site boundaries and those limited portions of the LCA with unobstructed views towards the proposed development site. The predicted magnitude of impact during the operational phase is considered to be direct and medium, limited to the immediate boundaries and those portions of the LCA with unobstructed views towards the proposed development site. The wider landscape resource has the ability to absorb a development of this scale and it is considered that the magnitude of landscape impact during the construction and operational phases is minor for remaining portions of the LCA.
Significance of Effect	Localised Minor to Moderate, short duration, assessed as significant effects are predicted to be experienced during the construction phase as existing busy roads will be used for access to the site. Effects on road users and residential developments will be temporary during construction. During operation, landscape effects will be moderate as the proposed development will be well screened, is consistent with the existing urban fringe green and open space at the site and any visible parts of the development will be able to integrate into the surrounding landscape and will not be detrimental to the character of the area. Remaining portions of the LCA outside of the proposed development boundary are predicted to experience no significant effects.

6.6.2 Landscape Designation Impacts

With regards to Areas of High Amenity identified in the CDDP the proposed development is not located in proximity to this designation. No significant effects are predicted on the Areas of High Amenity designation due to separation distance.

The proposed development is not located within an ACA; however, the site is located 1.8km southwest from the Ecclesiastical Quarter ACA. Despite the proposed development not being located within the ACA, the proposal has been designed to respect the scale of built form in this landscape albeit with newer elements to

reflect and respect surrounding built form. Additionally, the proposed Sports Activity Hub at this site accords with the local land use zoning objective set out in the Donegal County Development Plan 2018 - 2024 which has identified this location as an area of Strategic Community Opportunity.

In addition to the Areas of High Amenity identified in the CDDP, the draft Letterkenny and Local Transport Plan 2023-2039 sets out a Land Use Zoning Matrix which illustrates a range of land uses together with an indication of their broad acceptability in each of the use zones. As mentioned previously, the proposed development site is zoned as an Area of Strategic Community Opportunity and the Zoning Matrix in the draft Letterkenny Plan details that recreational / sports and playing fields are acceptable uses in this zone.

There are two views within the study area of the proposed development site, however, due to intervening topography and built form it is not possible to view the proposed development from these viewpoint locations.

A summary of the predicted landscape and visual effect on landscape designations is provided in the summary Table 6.8.

Table 6.7: Summary of Predicted Landscape Effects

Landscape Character / Designation	Predicted Landscape & Visual Effects (Construction Stage)	Predicted Landscape & Visual Effects (Operational Stage)
Areas of High Amenity	No change	No change
Special Areas of Conservation	No change	No change
Architectural Conservation Areas	No change	No change
Scenic Routes/Views	No change	No change
Letterkenny Estuary and Farmland - LCA 15	Minor to moderate	Moderate

6.7 Visual Effects

A series of 6 representative viewpoints have been selected to illustrate the existing visual context of the proposed development and as an aid to the visual impact assessment. All of the viewpoints have been located on publicly accessible roads, footways, verges and within site boundaries (Please refer to EIAR Volume II Design Drawings & Figures).

Viewpoints selected as part of the visual effects assessment were selected to meet the following criteria;

- A balance of viewpoints from where the main direction of view is towards the proposed development;
- A range of views towards the proposed development from within the study area. Selected viewpoints are all located within the study area associated with the proposed development; and
- Locations of interest e.g. local access roads and settlement.

Views available from each of the selected viewpoint locations are presented in EIAR Volume II Design Drawings & Figures Viewpoint which should be read in conjunction with the following viewpoint assessments below.

The assessment of the existing environment and the impact of the proposed development on visual receptors has established that there will be no protected views or scenic views significantly affected by the proposed development.

Further, there will be no important views from visitor amenity areas or tourist sites significantly affected by the proposed development due intervening topography, vegetation and distance of potential views.

6.7.1 Viewpoint 1: Hazelwood Drive

6.7.1.1 Viewpoint Description and Sensitivity

This view is predominantly available to pedestrians and local residents. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be high.

6.7.1.2 Existing View

The viewpoint is located in Hazelwood Drive housing development, looking north into the proposed development site. The viewpoint is dominated by a large, flat agricultural field with hedgerows along the boundary of the site to the east and west. Ashfield housing development can be seen in the background of the view. Mature trees are interspersed across the urban fringe landscape.

6.7.1.3 Predicted Effects

The ground level of the proposed development site is visible in views from this location. Temporary construction phase activities associated with site clearance will be directly visible but construction activities in this urban settling are a common feature. It is considered that any machines associated with the development will form a temporary addition to the view during the construction phase.

At the operational stage the proposed development will be directly visible within the view. The proposed Sports Dome will be partially visible to the right with the majority of the remaining visible parts of the proposed development consisting of green areas and pitches. The proposed development will see the enhancement of the current fields and the creation of the new sports activity hub that will be seen as a positive development through the provision of new open space with green areas that is similar to the existing visual character.

The proposed development will be viewed as a positive contribution to the landscape, with built form and materials reflecting the surrounding urban and natural context.

Floodlights will be directional, located away from the viewpoint and only used while the facility is in use as required and in the context of existing urban lights. While the new lighting will draw attention to the proposed development in hours of darkness in this context no significant lighting effects are predicted from this viewpoint.

6.7.1.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the proposed development is considered to be medium and adverse.

The magnitude of visual impact during the operational phase is considered to be large and positive.

6.7.1.5 Significance of Effect

Moderate to major, adverse, temporary effect during the construction phase of the proposed development and not significant.

Major to substantial significant, positive effect during the operational phase of the proposed development.

6.7.2 Viewpoint 2: Ashfield

6.7.2.1 Viewpoint Description and Sensitivity

This view is predominantly available to pedestrians and local residents. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be high.

6.7.2.2 Existing View

This viewpoint is located in Ashfield housing development, looking south into the proposed development site. The viewpoint is dominated by a largely, flat agricultural field with hedgerows along the boundary of the site to the east and west. Hazelwood Drive housing development can be seen in the background of the view along with large commercial buildings. The urban form of Letterkenny town can be seen on the horizon beyond.

6.7.2.3 Predicted Effects

The ground level of the proposed development site is visible in views from this location. Temporary construction phase activities associated with site clearance will be directly visible but construction activities in this urban settling are a common feature. It is considered that any machines associated with the development will form a temporary addition to the view during the construction phase.

At the operational stage the proposed development will be directly visible within the view. The majority of the visible parts of the proposed development consists of greenspaces and pitches with middle distance views to buildings and floodlights. The proposed development will see the enhancement of the existing area and the creation of the new sports activity hub will be seen as a positive development consistent with the existing visual context.

The proposed development will be viewed as a positive contribution to the landscape, with built form and materials reflecting and blending with the surrounding urban and natural context.

Floodlights will be directional, located away from the viewpoint and only used while the facility is in use as required and in the context of existing urban lights. While the new lighting will draw attention to the proposed development in hours of darkness in this context no significant lighting effects are predicted from this viewpoint.

6.7.2.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the proposed development is considered to be medium and adverse.

The magnitude of visual impact during the operational phase is considered to be large and positive.

6.7.2.5 Significance of Effect

Moderate to major, adverse, temporary effect during the construction phase of the proposed development and not significant.

Major to substantial significant, positive effect during the operational phase of the proposed development.

6.7.3 Viewpoint 3: Brookfield Heights

6.7.3.1 Viewpoint Description and Sensitivity

This view is predominantly available to pedestrians. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

6.7.3.2 Existing View

This viewpoint is located in Brookfield Heights housing development, looking south into the proposed development site. The viewpoint is dominated by a largely, flat agricultural field with hedgerows along the boundary of the site to the east and west. Hazelwood Drive and Ashfield housing developments can be seen in the background of the view. Letterkenny Recycling Centre can be seen to the left of this view. The urban form of Letterkenny town can be seen in the horizon.

6.7.3.3 Predicted Effects

The ground level of the proposed development site is visible in views from this location. Temporary construction phase activities associated with site clearance will be directly visible but construction activities in this urban settling are a common feature. It is considered that any machines associated with the development will form a temporary addition to the view during the construction phase.

At the operational stage the proposed development will be directly visible within the view. The proposed Sports Dome will be directly visible in the centre of the view in the middle distance with parking to the left. The majority of the view is however made up of green areas and pitches. The proposed development will see the enhancement of the currently unused field and the creation of the new sports activity hub that will be seen as a positive development.

The proposed development will be viewed as a positive contribution to the landscape, with built form and materials reflecting the surrounding urban and natural context.

Floodlights will be directional, located away from the viewpoint and only used while the facility is in use as required and in the context of existing urban lights. While the new lighting will draw attention to the proposed development in hours of darkness in this context no significant lighting effects are predicted from this viewpoint.

6.7.3.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the proposed development is considered to be medium and adverse.

The magnitude of visual impact during the operational phase is considered to be large and positive.

6.7.3.5 Significance of Effect

Moderate to major, adverse, temporary effect during the construction phase of the proposed development and not significant.

Major to substantial significant, positive effect during the operational phase of the proposed development.

6.7.4 Viewpoint 4: Mountain Lane

6.7.4.1 Viewpoint Description and Sensitivity

This view is predominantly available to pedestrians and local residents. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be high.

6.7.4.2 Existing View

This viewpoint is located at Mountain Lane, which is a local road, looking south towards the proposed development site. The foreground of this viewpoint is dominated by a residential property to the left of the view and mature vegetation to the right which runs down a small path. The middle ground of the view consists of agricultural land and housing developments, while the urban form of Letterkenny town can be seen in the horizon with mountains further in the landscape.

6.7.4.3 Predicted Effects

A small portion of the proposed development site is visible in views from this location. Temporary construction phase activities associated with site clearance will not be directly visible and it is considered that any machines associated with the development that are visible will form a temporary addition to the view during the construction phase.

At the operational stage the proposed development will only be partially visible within the view. The proposed Sports Dome is partly visible along with open space and pitches. The proposed landscape works will be visible providing additional greenery and screening in the view. Furthermore, separation distances and the existing landscape in the foreground provide good screening of the proposed site. The proposed development will see the enhancement of the currently unused field and the creation of the new sports activity hub will be seen as a positive development.

The proposed development will be viewed as a positive contribution to the landscape, with built form and materials reflecting the surrounding urban and natural context and due to the proposed landscape works will seamlessly blend into the surrounding urban fringe landscape character.

Floodlights will be directional, located away from the viewpoint and only used while the facility is in use as required and in the context of existing urban lights within this view. While the new lighting will draw attention to the proposed development in hours of darkness in this context no significant lighting effects are predicted from this viewpoint.

6.7.4.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the proposed development is considered to be small and temporary.

The magnitude of visual impact during the operational phase is considered to be small and positive.

6.7.4.5 Significance of Effect

Minor to moderate, adverse, temporary effect during the construction phase of the proposed development and not significant.

Minor to moderate, positive effect during the operational phase of the proposed development and not significant.

6.7.5 Viewpoint 5: N56 R229 Roundabout

6.7.5.1 Viewpoint Description and Sensitivity

This view is predominantly available to pedestrians and vehicles. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

6.7.5.2 Existing View

This viewpoint is located at roundabout on the N56, looking east towards the proposed development site. The main characteristic of this viewpoint is the N56 on the right of the view which then transitions to mature hedgerows and agricultural fields. Electricity poles and overhead cables are visible from this viewpoint. The middle ground of the view consists of housing developments, while the urban form of Letterkenny town can be seen in the horizon with mountains further in the landscape.

6.7.5.3 Predicted Effects

A small portion of the proposed development site is visible in views from this location. Temporary construction phase activities associated with site clearance will not be directly visible and it is considered that any machines associated with the development that are visible will form a temporary addition to the view during the construction phase.

At the operational stage the proposed development will not be directly visible within the view. Largely the landscape treatments at the site will be visible. The proposed development will be designed to seamlessly blend into the surrounding environment from this view. Intervening urban development and vegetation provide good screening of the proposed site. The proposed development will see the enhancement the landscape from this viewpoint that will be seen as a positive development.

The proposed development will be viewed as a positive contribution to the landscape, with built form and materials reflecting the surrounding urban and natural context.

Floodlights will be directional, located away from the viewpoint and only used while the facility is in use as required and in the context of existing urban lights. While the new lighting will draw attention to the proposed development in hours of darkness in this context no significant effects are predicted from this viewpoint.

6.7.5.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the proposed development is considered to be negligible and temporary.

The magnitude of visual impact during the operational phase is considered to be negligible and positive.

6.7.5.5 Significance of Effect

Negligible to minor, adverse, temporary effect during the construction phase of the proposed development and not significant.

Negligible to minor, positive effect during the operational phase of the proposed development and not significant.

6.7.6 Viewpoint 6: N56 / L1164 Junction

6.7.6.1 Viewpoint Description and Sensitivity

This view is predominantly available to pedestrians and vehicles. Overall, taking into account the receptor susceptibility, and the value of the view, the sensitivity is judged to be medium.

6.7.6.2 Existing View

This view is located at the junction between the N56 and L1164 looking towards the proposed development site. Overhead cables, electricity poles and streetlights are the defining feature from this viewpoint. Mature hedgerows run along the footpath adjacent to the N56, while a residential property is visible to the right of this view and housing developments can be seen in the horizon.

6.7.6.3 Predicted Effects

A small portion of the proposed development site is visible in views from this location. Temporary construction phase activities associated with site clearance will not be directly visible and it is considered that any machines associated with the development that are visible will form a temporary addition to the view during the construction phase.

At the operational stage the proposed development will be partially visible within the view. The majority of the proposed development will be well screened, but a glimpse view will be available to pitches and floodlights. The separation distances and the existing landscape provide good screening from the site. The floodlights which are proposed as part of the development will not seem out of place in the landscape as there are existing streetlights in the surrounding area which can be seen in this viewpoint. The proposed development will see the enhancement of the currently unused field and the creation of the new sports activity hub will be seen as a positive development.

The proposed development will be viewed as a positive contribution to the landscape, with built form and materials reflecting the surrounding urban and natural context.

Floodlights will be directional, located away from the viewpoint and only used while the facility is in use as required and in the context of existing urban lights. While the new lighting will draw attention to the proposed development in hours of darkness in this context no significant effects are predicted from this viewpoint.

6.7.6.4 Magnitude of Impact

The magnitude of visual impact during the construction phase of the proposed development is considered to be small and temporary.

The magnitude of visual impact during the operational phase is considered to be small and positive.

6.7.6.5 Significance of Effect

Minor, adverse, temporary effect during the construction phase of the proposed development not significant.

Minor, positive effect during the operational phase of the proposed development not significant.

Table 6.9 below summarises the predicted significance of visual effect for each of the previously assessed viewpoints.

Table 6.9: Summary of Predicted Visual Effect

	Viewpoint	Predicted Visual Impacts (Construction Stage)	Predicted Visual Impacts (Operational Stage)
1	Hazelwood Drive	Moderate to major not significant	Major to substantial significant, positive
2	Ashfield	Moderate to major not significant	Major to substantial significant, positive
3	Brookfield Heights	Moderate to major not significant	Major to substantial significant, positive
4	Mountain View Lane	Minor to moderate not significant	Minor to moderate not significant, positive
5	N56 R229 Roundabout	Negligible to minor not significant	Negligible to minor not significant, positive

	Viewpoint	Predicted Visual Impacts (Construction Stage)	Predicted Visual Impacts (Operational Stage)
6	N56 L1164 Junction	Minor not significant	Minor not significant, positive

6.8 Mitigation Measures

Mitigation measures are those taken to help reduce or remedy landscape and visual impacts or compensate for the loss of landscape value created by the development.

6.8.1 Mitigation of Construction Impacts

The clearance of the existing site and subsequent construction works will be restricted to land within the site boundary. A site compound, including site accommodation, together with hoarding, scaffolding, cranes and other associated temporary works will be required during the construction phase. These features will be visible during the construction phase from areas immediately adjacent to the proposed development site. Cranes and scaffolding may be visible at a greater distance, though this will be dependent upon view direction and intervening built form. These temporary features will be viewed as a feature of construction in the urban setting. All construction impacts are limited to the construction period and therefore of temporary duration.

6.8.2 Mitigation of Operational Impacts

Please refer to the Landscape Plan that accompanies the planning application for details on the proposed hard and soft landscape plans for the proposed development, which are also described in Chapter 2 of the EIAR.

Only those trees which require removal to facilitate the development will be replaced. All other trees which can be maintained within the scheme shall be retained and protected from damage in accordance with BS 5837:2012 (Trees in relation to design, demolition, and construction).

The Landscape Plan details the proposed planting that will be used for the proposed development. for the first 1-3 years, shrub and woodland areas will be maintained in a weed free condition. Minor damage will be pruned back to healthy wood and checked for and treat disease. Any protective fencing will be checked and maintained in good condition.

In the first year, most of the sown meadow species will be slow to germinate and grow and will not usually flower in the first growing season. But there will often be a flush of annual weeds from the soil in the first growing season. However, this is easily controlled by topping or mowing. Cutting will be avoided in the spring and early summer if the mixture is autumn sown and contains Yellow Rattle, or if the mixture has been sown with a nurse of cornfield annuals. These sown annuals should be allowed to flower, then in mid-summer cut and remove the vegetation.

In the subsequent years, sown areas can be managed in a number of ways which will determine the character of the land. On poor shallow soils, one or two cuts at the end of the summer, or occasional light grazing, may be all that is required to maintain diversity and interest. On deeper soils best results are usually obtained by traditional meadow management based around a main summer hay cut in combination with autumn and possibly spring mowing or grazing.

6.9 Conclusion

A review of the Donegal County Development Plan 2018-2024 has established that the proposed development is not located in proximity to any landscape or scenic designations and as such there are no predicted effects on any primary or secondary amenity area and/or scenic views.

Analysis of the landscape character within the immediate environs of the proposed development site displays a substantial amount of residential sprawl radiating from Letterkenny and a considerable amount of one-off

rural dwellings and linear development along the local road networks. In addition, large primarily agricultural floodplains extend inland along the river Swilly through Letterkenny town and beyond into Newmills and some of the floodplains within the town area have been developed for commercial and retail use. The LCA is considered to have the scope and capacity for positive enhancement, and to have a high tolerance to change. During operation, landscape effects will be moderate as the proposed development will be well screened, is consistent with the existing urban fringe green and open space at the site and any visible parts of the development will be able to integrate into the surrounding landscape and will not be detrimental to the character of the area. Remaining portions of the LCA outside of the proposed development boundary are predicted to experience no significant effects.

Of the six viewpoints assessed for impacts during the operational phase, each viewpoint is considered to experience positive visual effects as underused urban fringe land is replaced with a new sports activity hub with extensive landscape treatment that will provide development and employment opportunities along with high quality recreational activities for the surrounding housing developments as well as Letterkenny town.

Additionally, the proposed development is consistent with CDDP zonings that demonstrates that the development will not be out of character with the surrounding environment.

Overall, the wider landscape and visual resources of the development's surroundings have the capacity to accommodate a development of this type and scale.

7 CULTURAL HERITAGE

7.1 Introduction

This purpose of this chapter is to provide a summary of the Archaeological and Cultural Heritage Impact Assessment of the proposed development that was undertaken by Gahan and Long Archaeological Services. It is supported by a report detailing the findings of the archaeological monitoring of a series of geotechnical test pits and soak away pits excavated across the development area to assess ground conditions. Refer to Volume III Technical Appendices:

- Appendix 7.A: Archaeological & Cultural Heritage Impact Assessment
- Appendix 7.B: 22E0872 Archaeological monitoring of geotechnical pits, Knocknamara, Letterkenny

7.2 Archaeological and Cultural Heritage Impact Assessment

7.2.1 Introduction

This Report describes the surveys and assessments conducted as part of the impact assessment for the proposed development. It describes the archaeological baseline (monuments and historic buildings) of the site and the surrounding area; and presents an assessment of the impact of the proposed development on said monuments and historic buildings. This Report also contains a detailed mitigation strategy outlining steps that should be taken prior to and during construction to minimise any potential impact.

7.2.2 Archaeological and Cultural heritage baseline

A desk top survey was carried out for the area of the proposed development extending to a wider study area of a radius of up to 1km from the development area. Please refer to Appendix 7.A for details.

7.2.3 Archaeological potential of the development area

The desk top survey identified no known cultural heritage assets within the development area, although a mill pond is recorded on the 1st edition OS map. In addition, a number of assets were identified within the wider study area, some of which were subsequently excavated, which indicates that the proposed development is located within an area of archaeological significance. As such it is possible therefore that previously unknown archaeological remains could exist subsurface within the development area, for which there are now no surface expressions. Archaeological monitoring of geotechnical investigations under licence 22E0872 identified nothing of archaeological significance although it should be noted that the investigations represent only a very small percentage of the development area.

7.2.4 Impact Assessment

7.2.4.1 Construction

The proposed development site does not contain any upstanding archaeological or cultural heritage remains although an assessment of the wider area concluded that the proposed development is located within an area of some archaeological significance. Should subsurface remains survive, for which there are now no surface expressions, then these would be negatively impacted upon by the proposed development during construction. Any potential impact would be ameliorated through the implementation of the recommended mitigation strategy.

7.2.4.2 Operational

As noted above the proposed development is located within an area of some archaeological significance. Through the implementation of the recommended mitigation strategy during the construction phase, there will

be no impact during the operation phase. While the proposed development has been assessed as being within an area of archaeological potential with a number of cultural heritage assets in the wider study area, none of the adjacent assets have upstanding remains. Given this it is assessed that there will be no impact from the development on the visual aspect of any archaeological monument. In addition, 4 historic buildings are located to the south of the development area at the limit of the study area. Any potential development will be masked by the current built form and as a result there will also be no visual impact on any upstanding buildings.

7.2.5 Proposed Mitigation Strategy

7.2.5.1 Construction

Prior to construction commencing it is recommended that the following mitigation strategy be implemented, subject to the approval of the statutory bodies.

Statutory Requirements

Archaeological excavation licence to be obtained from National Monuments Service.

Methodology

- A geophysical survey of the development is recommended to identify, non-intrusively any potential anomalies which could indicate the presence of archaeological remains within the development area.
- A series of targeted archaeological test trenches should be excavated across the development area to ascertain the presence or absence of archaeological remains. The location of the trenches will be based on the results of the geophysical survey. The test trenches will be excavated using a back acting machine fitted with a toothless bucket under strict archaeological supervision. They will be excavated to the upper levels of archaeological strata or naturally occurring subsoil, whichever is highest. The trenches will be a minimum of 1.8-2m wide and no more than 10-12m apart.
- Should archaeological deposits or features be identified then the area surrounding the uncovered remains will be extended to a distance of 10m beyond the limit of the identified archaeology. This will ensure that all associated remains and features are uncovered.
- Should archaeological deposits be identified then the area of archaeological activity will be cordoned off, and work in that area will be stopped until such time as an appropriate mitigation strategy has been established, in agreement with all stakeholders. This mitigation strategy may include extending the area to reveal the full extent of the deposits uncovered.
- Should archaeological deposits be exposed their nature and extent will be assessed by the archaeologist present. This will entail the manual excavation of a small area of the material exposed.
- Any identified deposits or features will be recorded with pro forma recording sheets. A drawn and photographic record of all archaeological features will also be made. Archaeological plans will be drawn at 1:20 and sections at 1:10 or 1:20 (as appropriate).
- All finds recovered from this site will be cleaned/ washed, labelled accordingly, bagged and boxed immediately by an appointed member of staff. The location of the finds and the context from which they were obtained will also be recorded. Any items recovered which will require urgent conservation, will be treated immediately by a professional conservator. A comprehensive finds list will subsequently be compiled. All finds will be removed from the site office to the Gahan and Long Ltd office where they will be drawn (if necessary), catalogued and stored until they are transferred to the museum at Collins Barracks. Any items recovered during excavation requiring urgent conservation will be treated immediately by a professional conservator on contract in consultation with the National Museum of Ireland. Where appropriate a conservator will be contracted to assist with the excavation of vulnerable finds. The National Museum of Ireland will be notified immediately of any significant or vulnerable finds.
- Upon completion of the on-site works a preliminary report will be submitted to the National Monuments Service and National Museum of Ireland within four weeks. This will be presented as one digital copy in pdf format and two hard copies. The preliminary report will be in the recommended format set out in the

Guidelines for Authors of Reports on Archaeological Excavations (2006) issued by the National Monuments Service.

- An appendix within the preliminary report will contain a 'Monument Report Form' for every previously-unrecorded monument discovered in the course of the excavation. The monument classification used on the form must accord with that operated by the National Monuments Service.
- Unless it has been otherwise agreed, a final report will be submitted to the National Monuments Service and National Museum of Ireland within 12 months of completion of the on-site works. This will be submitted as one pdf copy and two hard copies. The final report will be in the recommended format set out in the Guidelines for Authors of Reports on Archaeological Excavations (2006) issued by the National Monuments Service. This report must be to publication standard and include a full account, suitably illustrated, of all archaeological features, finds and stratigraphy along with a discussion and specialist reports. In addition a concise report to the standard accepted for publication on the www.excavations.ie website for the year in which the licence is valid.
- A copy of any publication where the results of the excavation have been published will be lodged with the National Monuments Service.

7.2.5.2 Operational

The operational phase of the proposed development will not significantly impact upon the setting of any identified monuments. As such there will be no requirement for any archaeological mitigation during the operational phase of this development.

7.2.6 Inter-relationships and Cumulative Impacts

Cultural heritage is intrinsically linked to the landscape within which it set. This may be a direct link to the natural environment within which a monument is located or may reflect the inter-relationship with other monuments within the wider landscape. The proposed development will introduce a new type of development within the local area. The introduction of the proposed development will not however impact upon any inter-relationships between monuments located within the local landscape. The nature of the landscape is such that it can absorb the introduction of the proposed development.

7.2.7 Statement of significance of Residual Impacts

Following the implementation of the proposed mitigation strategy, the operation of the proposed development will have no residual impact on cultural heritage within the application site of the local landscape.

7.2.8 Conclusion

This cultural heritage impact assessment has been commissioned to assess the cultural heritage potential of the proposed works. The desk top survey identified no known cultural heritage assets within the development area, although the 1st edition OS map does indicate a mill pond within the red line boundary. In addition, a number of assets were identified within the wider study area, which indicates that the proposed development is located within an area of archaeological significance. It was assessed that it was possible therefore that previously unknown archaeological remains could exist subsurface within the development area, for which there are now no surface expressions. An impact assessment identified that should such remains exist they could be negatively impacted upon by development during the construction phase. No other impacts on known or potential cultural heritage assets was identified. However, to ameliorate any potential impact during construction, a mitigation strategy has been proposed. All recommendations are made subject to the approval of the statutory bodies.

8 LAND USE AND MATERIAL ASSETS

8.1 Introduction

This chapter of the EIAR reports the findings of the assessment on existing land use and material assets which could be impacted by the proposed development.

The assessment of potential impacts on land use considers if there will be severance, loss of rights of way or amenities, conflicts, or other changes likely, which may alter the character and use of the surroundings. It has regard to the character and type of land use activities within the proposed site, and the location of any sensitive neighbouring occupied premises likely to be directly affected by the proposed development.

The assessment of potential impacts on material assets focuses on resources that are valued and are intrinsic to a place - these may be of either human or natural origin, and the value may arise for either economic or cultural reasons. In this context, this assessment focuses on buildings, built services and existing infrastructure within and directly adjoining the indicative study area.

The matters assessed within this section focus on the environmental effects on the following resources:

- Existing Land Use (e.g. Education / community / recreation);
- Land with Development Potential and adjoining Land Use; and,
- Utilities and Infrastructure.

Material assets in the form of cultural heritage sites have been considered within Chapter 7 of this statement. Consideration of potential impacts upon surrounding land use in terms of visual amenity and noise and vibration, has been given within Chapters 6 and 9 respectively. Aspects relating to soil, geology, and hydrogeology are considered in Chapter 16. Consideration of impacts on water resources are considered in depth in Chapter 13. Consideration of transportation matters associated with the proposed development, are given in Chapter 19.

This chapter is supported by the following, located in Volume III Technical Appendices:

- Appendix 4.A: Consultation Responses
- Appendix 6.A LRSH Landscape Maintenance Management and Specification
- Appendix 6.B LRSH Landscape Report June 2023

This chapter is supported by the suite of planning drawings, located in Volume II Design Drawings and Figures.

8.2 Methodology

8.2.1 Baseline

The baseline environment is defined as the existing environment against which future changes can be measured. This section outlines the methodology used in assessing the baseline land use environment. The scope for the assessment has been informed by desktop analysis, consultation with statutory consultees, bodies with environmental responsibility and other interested parties at scoping stage and during the pre-application community consultation.

With regards to existing land uses, consideration has been given to existing character and type of land use, and the location of any sensitive neighbouring occupied premises likely to be directly affected by the proposed development. This includes educational, community, recreational, health care and those uses related to religious groups / activities. The assessment will focus on direct land take which would occur

through the implementation of the proposed development, including demolition of property. This will be undertaken following a desktop study, review of aerial photography, and review of OS base mapping.

With respect to land with development potential, future planned changes to land use following the grant of planning permission are relevant to the assessment. A planning history search was carried out to establish planning applications within and directly adjacent to the study area.

In relation to utilities and infrastructure, Ordnance Survey mapping and site survey work was used in conjunction with services data to identify the location of utilities and infrastructure that maybe affected by the proposed development. Written consultation was undertaken with several government bodies and organisations as part of the pre-application consultation with Donegal County Council. A review of the electricity network was also undertaken to identify if any existing apparatus / infrastructure was located within and adjacent to the proposed development site.

8.2.2 Relevant Guidance

The following guidance documents are relevant to the land use and material assets assessment:

- European Union (EU) (Planning and Development) (Environmental Impact Assessment) Regulations, 2018.
- EPA Advice notes on current practice in the preparation of Environmental Impact Statements (EPA, 2003);
- EPA Guidelines on the information to be contained in Environmental Impact Statements (EPA, 2002);

A desk-based study to identify baseline conditions has been undertaken to establish the existing provision of land use resources within the study area. This has utilised the following data sources:

- Donegal County Council: https://donegalcoco.ie/
- National Cycling Network and Irish Cycling Advocacy Network
- The Heritage Council
- Liaison with utility companies
- Environmental Protection Agency (EPA)
- Geological Survey of Ireland (DECC)
- National Parks & Wildlife Service (NPWS)

8.2.3 Study Area

The indicative site boundary for the proposed development is outlined in Chapter 2, Figure 2.1, and described in detail within the Project Description, in Chapter 2 Indirect secondary impacts are analysed within the area which directly adjoining the study area

8.2.4 Assessment Criteria and Assignment of Significance

A qualitative assessment of impacts on land use and material assets, based on professional judgement has been undertaken to indicate the significance of effects on identified receptors, based on the value or sensitivity of the receptor and the magnitude of the predicted impact.

The significance of an effect on these assets is a function of the value or sensitivity of the resource or receptor, and the magnitude of the impact (taking into account the timescale involved - permanent or temporary). The criteria for assessing the significance of environmental effects on these assets are outlined in Tables 8.1 and 8.2.

Table 8.1: Example Definitions of Sensitivity or Value

Sensitivity	Example Descriptor
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Table 8.2: Example Definitions of Magnitude

Magnitude	Example Descriptor
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

8.2.5 Significance of Effects

The sensitivity of the receptor and the magnitude of impact have been identified separately and contribute to the evaluation of the likely significance of the effect, which has been assessed in accordance with the approach outlined in Table 8.3.

Table 8.3: Assessment of Significance for land use and material assets

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very high	No change	Minor	Moderate or Major	Major or Substantial	Substantial

The levels of significance apply to both adverse and beneficial effects during the construction period and arising from the operation of the proposed development and take account of the guidance set out in the Table 8.4 below.

Table 8.4: Assessment of Significance Matrix

Significance Category	Typical Descriptor of Effect
Very Large	Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
Large	These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
Moderate	These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
Slight	These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project
Neutral	No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

8.3 Baseline Environment

8.3.1 Overview

This section describes the baseline environment for land use and material assets, to establish those factors which may be directly affected by the proposed development. A brief sectoral analysis of the lands directly adjoining the study area is also included.

8.3.2 Existing Land Use

The proposed development is in a mixed area of development to the north of Letterkenny Town and the proposed development site extents over approximately 17.62 hectares. The existing site is currently a green field (undeveloped) which is currently used for agricultural purposes.

The N56 provides the main vehicular and pedestrian access into the site and provides connections into Letterkenny Town. The N56 is bounded by pedestrian footpaths and amenity planting/grass on either side of the carriageway, along with a number of residential and industrial developments.

8.3.3 Adjoining Land Use

The site is located north Letterkenny Town Centre, on the N56 National Secondary road, which provides a vital transport corridor for the residents and businesses of the area, and also aligns significantly with the Wild Atlantic Way tourism route.

A planning history search was carried out of the most recent planning applications immediately adjacent to the site boundary. A number of applications were identified as small-scale new development, housing extensions, and refurbishments to existing buildings within the immediate area. It is unlikely that any of these will result in any significant cumulative effects on the environment. These are presented in Chapter 1 – Introduction of the EIAR.

8.3.3.1 Residential Land Use

There is a large residential development to the north (known as Ashfield, Brookfield Heights) and Hazelwood Drive to the west, adjoining the site boundary with another residential development (known as Amalfi Court and Cashel Park) approximately 325m from the eastern boundary of the site.

8.3.3.2 Industrial / Commercial / Retail

Given the sites location, the wider context is dominated by peripheral town uses, including retail, business and commercial. The Letterkenny Recycling Centre and ESB Networks Letterkenny define the southeast boundary and there is another industrial area approximately 452m west of the site, just off the Knocknamona Roundabout. Letterkenny town centre is approximately 2km south of the proposed development site. An IDA development is also located to the south east of the site.

8.3.3.3 Community / Recreational Facilities

There are no community or recreational facilities directly adjoining the site. There are extensive areas of green space located in and around the town centre surrounding the site, like Letterkenny Town Park, However, these areas are mostly associated with institutions such as schools such as Coláiste Ailigh and healthcare facilities at Donegal Hospice, St. Conal's Hospital and Letterkenny University Hospital.

There are no National Cycle Network routes within or directly adjoining the proposed development site. In addition, there are no walking routes within or adjacent to the site.

8.3.3.4 Walking Routes

There are no designated walking routes within or adjacent to the proposed development site. Furthermore, there are no walking routes in close proximity to the site which would be impacted by the proposed development.

8.3.3.5 Education/Religious Facilities

There are no churches adjacent to the site with the closest being the Church of the Irish Martyrs approximately 1.2km southeast of the proposed development site.

8.3.4 Land with Development Potential

The proposed development site is located adjacent to an existing, large residential development and the proposal will not have an impact upon any future development potential within the residential area.

The adjoining lands to the east of the site have been zoned as 'General Employment'. The proposed development will attract employment itself and will promote investment and development in the surrounding area. Furthermore, the proposal will not detract from any future development in these areas.

8.3.5 Material Assets

A number of the main utilities providers have provided indicative information to the applicant in relation to their existing services within or adjacent to the proposed development site. Please refer to Volume II Design Drawings & Figures for details of utilities.

8.3.5.1 Surface Water

The nearest watercourses to the proposed site are known as Knocknamona Stream, Unnamed Tributary and Watercourse 2. Of these three, all of which are mapped on the CFRAM study, only Watercourse 2

features on the CFRAM strategic flood maps as having potential to exceed its channel capacity under 1 in 1,000-year flood events. Chapter 13 of the EIAR details flood risk and drainage. Chapter 15 of the EIAR details Water Quality.

Please refer to Volume II Design Drawings & Figures, Proposed Drainage Layout for details on the new surface water networks proposed. The drainage design has been segregated into distinct networks to accommodate both phased development of the site and integration of the entire design. To this end, each pitch is to be drained and attenuated to ensure both playability of the pitch surface and controlled discharge of its runoff. The design approach is similar for both the artificial pitches and the natural turf pitches, with the build-up of the latter being sensitive to the need for permeability.

While the design of the synthetic pitch remains to be finalised, it is expected that the proposed synthetic pitch build-up will comprise of a drained sub soil base, layer of terram 1000 geotextile, 250mm of porous 63mm to dust stone and 50mm of porous 6mm to dust blinding. This will be the same for both of the synthetic pitches. There is a possibility that the porous macadam layer may be omitted from the final design. However, it is included here to demonstrate how drainage is achieved in the event that it is deemed necessary or desirable in the final design.

The design of the natural grass pitches will comprise of a drained sub soil base, 150mm of onsite suitable topsoil, secondary stone drainage at 1m centres, 50mm of approved sand ameliorated into the top 50mm of the topsoil layer and 50mm of approved sand and seeded out.

The proposed development will produce no increase in impermeable area over the area of the pitches (both synthetic and natural turf). Indeed, the proposal will improve the permeability of the pitch surfaces such that surface water will not accumulate on the pitch for either 30-year or the 100-year return period storm events. Instead, stormwater will penetrate the surface to be collected in underground French drains.

The storm drainage for the project has been designed using the Innovyze MicroDrainage Design Software. It is noted that this software considers both a 10% and 20% increase in flows to account for climate change for the 30-year and 100-year return periods, respectively.

The pitch build-up is drained by means of transverse 150mm diameter French drains laid at 1:200 (or greater depending on the gradient of the pitch surfaces) gradient at 10m centres falling to a collector drain laid along one length of the pitch at falls.

The French drains are modelled as receiving infiltration along their lengths with a notional attenuation tank attached to the node comprising the junction of the French drain and the collector drain. This ‘attenuation tank’ is equivalent to the holding capacity of the subsoil build-up between the invert of the French drain and, in the case of the synthetic pitch, the underside of the carpet and in the case of the natural turf pitches, the underside of the topsoil. In this way, the attenuation occurs at source rather than at a centralised tank, which is consistent with the SuDS design philosophy. The holding capacity/porosity of these ‘tanks’ is conservatively set at 30%. The accumulated flow from these French drains is then discharged at a controlled rate into the main drainage system at a rate equal to or lower than the greenfields rate.

The outlet from the synthetic pitch is to pass through a granulate trap to contain any granulate infill that may have made its way along the flow path, before being discharged into the main drainage system.

The main drainage system will receive the discharge from the pitches at controlled rates and will receive runoff from the hardened areas.

Runoff from hardened surfaces will, where possible, pass-through point-of-entry SuDS features before being picked up by the main drainage system. Where SuDS measures are employed at point-of-entry, exceedance measures are also provided to allow for seasonal variations in capacity or outright failure of individual SuDS features. Roads will be serviced by gulleys at a rate of no more than 200 sqm per gulley, with double gullies at critical points.

Collected surface water will then pass-through petrol interceptors to remove hydrocarbons lifted from the carparks and roads before passing into attenuation tanks located upstream of discharge points. The attenuation tanks will be sized to achieve the desire 2 l/s/ha. greenfields runoff rate.

8.3.5.2 Foul Water

Please refer to Volume II Design Drawings & Figures for details of a new proposed foul water sewer network to service the proposed development. Foul water will be separated from storm water and discharged into an existing foul sewer network on the N56. The foul water will then be treated at Letterkenny Waste Water Treatment Plant (WWTP) prior to discharge to the Swilly Estuary.

8.3.5.3 Earthworks

The proposed construction is envisaged to consist of conventional foundations and pavement make up with some local excavations for services and plant. An earthworks programme to cut and fill cross the site is proposed. Earthworks are planned as part of the scheme including foundations (and associated excavation of soils and materials), creation of trenches and stockpiling. With respect to earthworks, the following will be implemented:

- Disturbance of the ground will be kept to a minimum wherever possible;
- Soil handling will be restricted during adverse weather conditions such as high winds or exceptionally dry spells;
- Minimise drop heights from loading or handling equipment/materials and use fine water sprays on such equipment wherever appropriate;
- Dampening methods will be used where necessary; and,
- Methods and equipment will be in place for immediate clean-up of spillages of dusty or potentially dusty materials.

8.3.5.6 Utilities

To date, a number of the main utilities providers have provided indicative information regarding their existing services within or adjacent to the proposed development site. Continuous liaison with utility providers will be carried out during the detailed design and construction phases of this project.

8.3.5.7 ESB

The current ESB networks consist of both High voltage (HV) and Medium Voltage (MV) overhead lines passing through the proposed site. The proposal is to divert these overhead lines to underground via existing and new ducting around the perimeter of the site boundary.

There are two options for the diversion of the MV overhead lines at the proposed development site. The first option is ESB have provisionally agreed that jointing of the MV cable along Carnamuggagh Lower Road, Recycling Plant location, and associated works with same. Ducting shall be provided to the ATU substation located centrally on site and the existing ducting networks as seen on the drawings. Please refer to Volume II Design Drawings & Figures. The second option is ESB have agreed an alternative route on the lower end of the Carnamuggagh Lower Road, and associated works with same. Details of alternative route can be seen on the MV drawing.

Similarly, there are two options for the diversion of the HV overhead lines that pass though the proposed development site. The first option is subject to existing ESB ducts inspection, ESB have agreed to divert the overhead HV lines underground to precast joint pit located on the southern end of the site. The second option is a new triple pole structure shall be constructed within the future phase development and divert cables underground and duct through to the precast joint pit as detailed on the drawings.

8.3.5.8 Eircom

There is minimal amount of existing Eircom ducting and cabling recorded in the works area. A significant network of new ducting will be installed throughout the scheme to facilitate potential future developments without the need from carrying out excavations in the new footpaths or roads. Please refer to Volume II Design Drawings & Figures, for details of all proposed Eircom works.

8.3.5.8 Watermains

There are several existing watermains which will be required to be diverted to facilitate this development and potential future developments. These watermains will be diverted throughout the scheme by Irish Water to facilitate potential future developments without the need from carrying out excavations in the new footpaths or roads. Please refer to Volume II Design Drawings & Figures, for details of all proposed watermains works.

8.3.5.9 Gas Infrastructure

There is no gas network in the proposed development site area.

8.4 Impact Assessment

8.4.1 Assessment of Construction Effects

This section sets out effects that would occur during the construction phase of the proposed development, with respect to land use and material assets.

8.4.1.1 Existing Land Use

It is estimated that the proposed work will take between 24 - 60 months to complete on site depending on phasing. During the construction of the proposed development, the majority of the existing land use will be removed through clearance / resurfacing and therefore directly and permanently impacted.

The majority of the impacts during the construction will come from the construction traffic, as the access to the site is along the N56. However, the proposal includes improved access from the N56 and the realignment of part of the site boundary with the adjoining N56 which will improve visibility.

Impacts to the adjoining residential developments to the west and northwest will be temporary and the predicted magnitude of impact is low during the construction period.

Overall, the pre-mitigation predicted magnitude of impact will be low and the significance of the effect is considered minor adverse.

8.4.1.2 Adjoining Land Uses

The existing land uses directly adjoining the proposed development site, or in close proximity will be affected by the construction of the proposed development. As set out within section 8.5, mitigation measures will be embedded into the construction phase such good site management practices including the provision of high-quality hoarding / signage and proactive communications landowners, regarding phasing, timing, and duration of works

There will be changes to how the surrounding buildings may operate during the construction period, including additional health and safety procedures, changes to access, parking, and access to amenity space, however the use can remain operational. As such, the pre-mitigation predicted magnitude of impact will be low and the significance of the effect is considered minor adverse.

8.4.1.3 Land with Development Potential

The proposed development does not impact on the implementation and delivery of the development potential of the site. Therefore, the magnitude of impact is predicted to be no change, and the significance of effect is no change.

8.4.1.4 Water & Sewage Infrastructure

There are several existing watermains which will be required to be diverted to facilitate this development and potential future developments. However, the magnitude of impact is predicted to be slight, and the significance of effect is no change.

8.4.1.5 Gas Infrastructure

There is no gas network in the site area meaning that there will be no impact from the proposed development.

8.4.2 Assessment of Operational Effects

This section sets out effects that would occur during the operational phase of the proposed development, with respect to land use and material assets.

8.4.2.1 Existing Land Use

During the operation of the proposed development, the land use will be redeveloped complementing the surrounding land uses. This brings this area, into active use, delivering multiple sports activity areas, walking trails and community areas (park, community garden). Furthermore, the proposed development would successfully meet the requirements of the Donegal County Development Plan 2018-2024 as the proposed development site has been zoned as a Strategic Community Opportunity.

The proposed development includes improved access from the N56, as well as new open spaces, pedestrian footpaths, cycle paths, high quality landscaping and lighting. The proposal therefore will improve the quality of the resource directly and permanently, in terms of its functionality, attractiveness and integration with its surroundings.

8.4.2.2 Adjacent Land Uses

The existing land uses directly adjoining the study area, or in close proximity will be positively affected by the operation of the proposed development. The proposed development would complement the existing residential developments. It is anticipated that the development would create a popular “destination facility” within the area.

8.4.2.3 Land with Development Potential

The proposed development does not impact on the implementation and delivery of the development potential of the site. It does not directly or indirectly effect the implementation of any recent / extant planning approvals within the vicinity of the proposed development site. Therefore, the predicted magnitude of impact is predicted to be no change, and the significance of effect is no change.

8.4.3 Assessment of Cumulative Effects

Consideration has been given to a number of other cumulative developments, which are outlined in Chapter 1. These have been considered in detail in respect of a cumulative assessment. No significant cumulative effects on land use resources or material assets are anticipated.

8.5 Mitigation

8.5.1 Land Use

During the construction phase for the proposed development, good site management practices and procedures will be carried out, including the provision of high-quality hoarding / signage and proactive communications landowners, regarding phasing, timing, and duration of works.

Safe and appropriate access to the residential developments and the adjoining industrial area will be maintained throughout the construction process, and signage will be provided where necessary. This will ensure that no negative effects arise during the construction process

8.5.2 Adjoining Land Uses

Safe and appropriate access to adjacent buildings will be maintained throughout the construction process, and signage will be provided where necessary. This will ensure that no negative effects arise during the construction process.

8.5.3 Water & Sewage Infrastructure

Both the surface water and foul system are to be entirely separate systems. Foul water will be separated from storm water and discharged into an existing foul sewer network on the N56. The foul water will then be treated at Letterkenny WWTP prior to discharge to the Swilly Estuary. Consultation with Irish Water will be undertaken to ensure the sewer and WWTP have capacity to accept any additional hydraulic and organic loading.[1]

Where mitigation measures are employed, the potential impact to the receiving water environment will be reduced to low adverse thus reducing the significance of environmental effect will be reduced to negligible.

The proposed drainage design improves on the current calculated greenfield runoff rate by approximately 42% and provides measures to filter out contaminants within the flow path. Where mitigation measures are employed, the potential impact to the receiving water environment will be reduced to low adverse thus reducing the significance of environmental effect will be reduced to negligible.

8.6 Summary of Effects & Conclusion

The summary of effects from the proposed development during both the construction and operation of the proposed development are outlined in Table 8.5 below. The majority of impacts are temporary, short-term impacts during the construction process which can be adequately mitigated through a range of procedures, good practices on site, and early consultation with statutory consultees and the adjacent landowners.

[1] Irish Water confirmed water and wastewater feasibility in a letter dated 18 October 2022, letter reference: CDS22007030 Pre-Connection Enquiry Carnamogagh Lower, Letterkenny, Co. Donegal.

Table 8.5: Summary of Likely Environmental Effects on Land Use and Material Assets

Receptor	Sensitivity of receptor	Description of Effect	Duration	Magnitude	Significance	Significant Not significant
Construction phase						
Existing Land Use	Low	Clearance /Disturbance	Long Term	Low	Minor (Adverse)	Not Significant
Adjoining Land Use	Low	Disturbance	Short Term	No Change	No change	Not Significant
Land with Development Potential	Low	Disturbance	Long Term	No Change	No change	Not Significant
Water & Sewerage	Low	Removal / Disturbance	Short Term	No Change	No change	Not Significant
Electrical Infrastructure	Medium	Removal / Disturbance	Short Term	Medium	Moderate (Adverse)	Not Significant
Operational phase						
Existing Land Use	Low	Active Use	Long Term	High	Moderate (Beneficial)	Not Significant
Adjoining Land Use	Low	Active Use	Long Term	No Change	No change	Not Significant
Land with Development Potential	Medium	Active Use	Long Term	Medium	Moderate (Beneficial)	Not Significant
Water & Sewerage	Low	Active Use	Long Term	No Change	No change	Not Significant
Electrical Infrastructure	High	Active Use	Long Term	No Change	No change	Not Significant

9 NOISE AND VIBRATION

9.1 Introduction

This chapter outlines the noise and vibration impact assessment for the proposed development and assesses the potential impacts and likely significant effects of noise and vibration associated with the construction and operation of the proposed development.

During the construction phase, there is potential for noise and vibration impacts at the nearest noise-sensitive properties from the use of associated construction plant and equipment. The operation of the proposed development has the potential to impact nearby noise-sensitive receptors due to noise sources such as plant and equipment, sports activities, traffic movements and car parking.

The effect of construction and operational noise have been assessed in full within this noise and vibration chapter. The construction noise targets are set out along with the assessment methodology and results of the construction noise predictions. Construction noise mitigation measures are detailed such that noise targets are met throughout the construction phases. Operational noise has been assessed, and noise mitigation recommendations made where appropriate.

The specific objectives of the noise and vibration assessment are to:

- Describe the existing noise baseline;
- Define the assessment methodology and significance criteria used in completing the noise and vibration impact assessment;
- Describe the potential effects, including direct, indirect and cumulative effects;
- Describe the mitigation measures proposed to address the likely significant effects; and
- Assess the residual effects remaining following the implementation of mitigation.

This chapter is supported by the following Volume II Design Drawings and Figures:

- Figure 9.4 Noise Receptors Map (Overall Extent)
- Figure 9.5 Construction Phasing Area and Noise Receptors Map
- Figure 9.6 Daytime Plant and Equipment Normal Ops
- Figure 9.7 Night-time Plant and Equipment Emergency Ops Noise Contour
- Figure 9.8 Daytime Plant and Equipment Emergency Ops
- Figure 9.9 Daytime Sports Pitches Contour
- Figure 9.10 Proposed Acoustic Barrier
- Figure 9.11 Noise Receptors Map (Extent A Receptors 1 to 49)
- Figure 9.12 Noise Receptors Map (Extent B Receptors 50 to 259)
- Figure 9.13 Noise Receptors Map (Extent C Receptors 260 to 325)
- Figure 9.14 Noise Receptors Map (Extent D Receptors 326 to 349)

This chapter is supported by the following Volume III Technical Appendices:

- Appendix 9.A: Baseline Noise Monitoring Survey;
- Appendix 9.B: Construction and Operational Noise-Sensitive Receptors; and
- Appendix 9.C: Construction Noise Assessment.
- Appendix 9.D: Operational Noise Modelling Inputs and Results

Operational vibration affecting receptors has been scoped out as there are no known significant vibration sources associated with the proposed development. Baseline vibration monitoring was not undertaken within the proposed development site and there are no anticipated significant operational vibration impacts.

9.2 Methodology

9.2.1 Relevant Guidance

The noise and vibration impact assessment has followed the methodology set out in Chapter 1: Introduction. Specific to the noise and vibration impact assessment, the following guidance documents have also been considered:

- Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014);
- World Health Organisation (WHO) – Guidelines for Community Noise (1999);
- British Standard BS4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound;
- Design Manual for Roads and Bridges Volume 11, Section 3, Part 7, LA 111 Noise and Vibration;
- Calculation of Road Traffic Noise (CRTN) - Department of Transport Welsh Office 1988;
- British Standard BS 8233:2014 Sound Insulation and Noise Reduction for Buildings – Code of Practice;
- Sport England Artificial Grass Pitch (AGP) Acoustics –Planning Implications (New Guidance for 2015)
- British Standard BS5228: 2009+A1:2014, Code of Practice of Noise and Vibration Control on Construction and Open Sites; and
- Environmental Protection Agency (EPA) Office of Environmental Enforcement (OEE) - Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (2016);
- British Standards BS 7445-1:2003 Description and Measurement of Environmental Noise – Part 1: Guide to Quantities and Procedures (BS, 7445-1);
- ISO9613: Attenuation of Sound during Propagation Outdoors Part 2 General Method of Calculation

9.2.1.1 Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014)

IEMA noise impact assessment guidelines address the key principles of noise impact assessment and are applicable to all development proposals where noise effects are likely to occur.

The guidelines provide specific support on how noise impact assessment fits within the Environmental Impact Assessment (EIA) process. They cover:

- How to scope a noise assessment;
- Issues to be considered when defining the baseline noise environment;
- Prediction of changes in noise levels as a result of implementing development proposals; and
- Definition and evaluation of the significance of the effect of changes in noise levels (for use only where the assessment is undertaken within an EIA).

The guidelines define core methods and techniques, used within the noise impact assessment process, and endeavour to highlight their limitations, where relevant. They can be applicable to all stages of a project, from construction through operation to restoration and decommissioning.

9.2.1.2 World Health Organisation (WHO) Guidelines for Community Noise

In the World Health Organisation (WHO) Guidelines for Community Noise (1999), a L_{Aeq} threshold daytime noise limit of 55 dB is suggested for outdoor living areas in order to protect the majority of people from being seriously annoyed. A second daytime limit of 50 dB is also given as a threshold limit for moderate annoyance.

The guidelines suggest that an internal L_{Aeq} not greater than 30 dB for continuous noise is needed to prevent negative effects on sleep. This is equivalent to a façade level of 45 dB L_{Aeq}, assuming open windows or a free-field level of about 42 dB L_{Aeq}. If the noise is not continuous, then the internal level required to prevent negative effects on sleep is a $L_{Amax,fast}$ of 45 dB. Therefore, for sleep disturbance, the continuous level as well as the number of noisy events should be considered.

The WHO Night Noise Guidelines for Europe was published in 2009 on the back of extensive research completed by a WHO working group. Considering the scientific evidence on the threshold of night noise exposure indicated by $L_{night,outside}$ as defined in the Environmental Noise Directive [2002/49/EC], a $L_{night,outside}$ of 40dB should be the target of the night noise guideline (NNG) to protect public, including the most vulnerable groups such as children, the chronically ill and the elderly. An interim target of 55dB is recommended where the NNG cannot be achieved. These guidelines are applicable to Member States of the European Region and may be considered as an extension to the previous WHO Guidelines for Community Noise (1999).

In 2011, the WHO published the *Methodological Guidance for Estimating the Burden of Disease from Environmental Noise*. This document outlines the principles of quantitative assessment of the burden of disease from environmental noise, describes the status in terms of the implementation of the European Noise Directive and reviews evidence on exposure-response relationships between noise and cardiovascular diseases.

In 2018, the WHO Regional Office for Europe has developed guidelines, based on the growing understanding of health impacts of exposure to environmental noise. The main purpose of these guidelines is to provide recommendations for protecting human health from exposure to environmental noise originating from various sources: transportation (road traffic, railway and aircraft) noise, wind turbine noise and leisure noise. Leisure noise in this context refers to all noise sources that people are exposed to due to leisure activities, such as attending nightclubs, pubs, fitness classes, live sporting events, concerts or live music venues and listening to loud music through personal listening devices.

The 2018 guidelines are published by the WHO Regional Office for Europe. In terms of their health implications, the recommended exposure levels can be considered applicable in other regions and suitable for a global audience.

9.2.1.3 British Standard BS4142:2014 Methods for Rating Sound and Assessing Industrial and Commercial Sound

BS4142:2014 describes methods for rating and assessing sound of an industrial and/or commercial nature at residential noise-sensitive receptors, which includes:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

BS 4142 also provides procedures in determining if the noise in question is likely to give rise to complaints from residents in the vicinity.

BS 4142 states that one should '*obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level and consider the following:*

a. Typically, the greater this difference, the greater the magnitude of the impact.

b. A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

c. A difference of around + 5 dB is likely to be an indication of an adverse impact, depending on the context.

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

The aforementioned rating level is based upon the specific noise level of the noise source in question. A correction should be applied to the specific noise level to obtain an increased rating level if 'a tone, impulse or other characteristic occurs, or is expected to be present, for new or modified sound sources.

To summarise, BS4142 section 9.2 advises the following in regards to corrections for acoustic characteristics:

- Tonality – for sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible.
- Impulsivity – A correction of up to +9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level., Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.
- Other sound characteristics – Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.
- Intermittency – When the specific sound has identifiable on/off conditions, if the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

9.2.1.4 Design Manual for Roads and Bridges Volume 11, Section 3, Part 7, LA 111 Noise and Vibration

This assessment is based on the guidance given in the Design Manual for Roads and Bridges (DMRB), Volume 11, Section 3, Part 7, LA 111. This document sets out the requirements for noise and vibration assessments from road projects, applying a proportionate and consistent approach using best practice and ensuring compliance with relevant legislation.

The Design Manual for Road and Bridges (DMRB), Volume 11, Part 3 Section 7 HD213/11 Revision 1, Noise and Vibration, gives advice on the appraisal of noise and vibration impacts due to changes in road traffic noise and vibration for trunk roads. The DMRB identifies various stages of assessment, with each stage becoming increasingly detailed. The objective of the DMRB noise assessment is to establish the magnitude of the significance of noise changes for areas where existing traffic is likely to at least increase by 25% or reduce by 20%. The DMRB advises that these changes are equivalent to a change in noise level of 1 dB(A), which is the minimum change that can be detected by the human ear in the short term (e.g. on opening of a development or scheme).

The DMRB assessment methodology dictates that all properties experiencing changes in noise greater than 1 dB(A) should be assessed. Properties experiencing a change in noise of less than 1 dB(A) do not need to be considered, the inference being that such a slight change in the level of noise is so small as to be negligible. A doubling or halving of the total flow of traffic would cause the noise level to change by 3 dB(A) which is considered the minimum perceptible change under normal conditions. A change in the noise level of 1 dB(A) is generally only perceptible under controlled conditions. However, the DMRB indicates that those subjected to a sudden change in noise level as low as 1 dB(A), such as that which accompanies the opening of a road scheme, may just perceive the change and experience either a benefit or disbenefit.

9.2.1.5 UK Department of Transport (Welsh Office) – Calculation of Road Traffic Noise (CRTN)

This Calculation of Road Traffic Noise (CRTN) guidance document outlines the procedures to be applied for calculating noise from road traffic. The document consists of three different sections, covering a general method for predicting noise levels at a distance from a highway, additional procedures for more specific

situations and a measurement method for situations where the prediction method is not suitable. The prediction method constitutes the preferred calculation technique but in a small number of cases, traffic conditions may fall outside the scope of the prediction method, and it will then be necessary to resort to measurement. The prediction method has been used in this instance to determine the likely noise impact from traffic flow increases as a result of the proposed development.

This guidance document has been referenced as it provides the prediction methods for determining road traffic noise.

British Standard 8233:2014 Sound Insulation and Noise Reduction for Buildings – Code of Practice

BS8233:2014 provides guidance values for a range of ambient noise levels within residential and commercial/industrial properties as shown in Table 9.1: Internal Ambient Noise Levels for Living Spaces.

Table 9.1: Internal Ambient Noise Levels for Living Spaces

Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living Room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,\ 8hr}$

The standard allows for a further relaxation in standards of up to 5dB where "development is considered necessary or desirable". In relation to external amenity areas such as gardens and patios, the standard states that it is desirable that external noise does not exceed 50 dB $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$.

This guidance document has been used as reference for the internal standard ambient noise levels to be achieved inside residential properties.

9.2.1.6 Sport England Artificial Grass Pitch (AGP) Acoustics –Planning Implications (New Guidance for 2015)

Sport England Design Guidance note aims to promote the general understanding in relation to noise from the design concepts, planning technical issues, and provides details of acoustic implications associated with artificial grass pitch facilities.

Appropriate noise criteria and assessment methods are detailed within the guidance, based on WHO daytime noise criteria:

"Based on a 15 decibel sound reduction of a partially open window, the noise level outside a residential property during the daytime about 1 metre from façades of living spaces should not exceed 50 dB LAeq. The WHO document also provides guidance for outdoor living areas. It states that to avoid 'moderate annoyance' during the daytime and evening the noise level should not exceed 50 dB LAeq(T)."

The guidance also details noise reduction measures that can be applied in particular for noise-sensitive locations.

9.2.1.7 British Standard BS5228:2009+A1:2014 Noise and Vibration Control on Construction and Open Sites

This British standard consists of two parts and covers the need for protection against noise and vibration of persons living and working in the vicinity of construction and open sites. The standard recommends procedures for noise and vibration control during construction operations and aims to assist architects, contractors and site operatives, designers, developers, engineers, local authority environmental health officers and planners.

9.2.1.7.1 British Standard BS5228: 2009+A1:2014, Code of Practice of Noise and Vibration Control on Construction and Open Sites Part 1: Noise

Part 1 of the standard provides a method of calculating noise from construction plant, including:

- Tables of source noise levels;
- Methods for summing up contributions from intermittently operating plant;
- A procedure for calculating noise propagation;
- A method for calculating noise screening effects; and
- A way of predicting noise from mobile plant, such as haul roads.

The standard also provides guidance on legislative background, community relations, training, nuisance, project supervision and control of noise and vibration.

The ABC method outlined in Section E3.2 has been used for the purposes of determining whether the predicted noise levels from the construction activities will result in any significant noise impact at the nearest noise-sensitive properties.

Table 9.2 outlines the applicable noise threshold limits that apply at the nearest noise-sensitive receptors. The determination of what category to apply is dependent on the existing baseline ambient (LAeq) noise level (rounded to the nearest 5dB) at the nearest noise-sensitive property. For weekday daytime, if the ambient noise level is less than the Category A threshold limit, the Category A threshold limit (i.e. 65dB) applies. If the ambient noise level is the same as the Category A threshold limit, the Category B threshold limit (i.e., 70dB) applies. If the ambient noise level is more than the Category A threshold limit, the Category C threshold limit (i.e., 75dB) applies. The applicable limits that apply at each of the sensitive receptors included in the construction phase noise model are presented and discussed in Section 4.4.

Table 9.2: Noise Threshold Limits at Nearest Sensitive Receptors

	Threshold Limits [dB(A)]		
	Category A	Category B	Category C
Night-time (23:00 - 07:00)	45	50	55
Evening and Weekends (19:00 - 23:00 Weekdays, 13:00-23:00 Saturdays, 07:00-23:00 Sundays)	55	60	65
Weekday daytime (07:00-19:00) and Saturdays (07:00-13:00)	65	70	75

9.2.1.7.2 British Standard BS5228: 2009+A1:2014, Code of Practice of Noise and Vibration Control on Construction and Open Sites Part 2: Vibration

Part 2 of the standard gives recommendations for basic methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration levels, including industry-specific guidance.

Human beings are known to be very sensitive to vibration, the threshold of perception being typically in the Peak Particle Velocity (PPV) range of 0.14 $mm \cdot s^{-1}$ to 0.3 $mm \cdot s^{-1}$. Vibrations above these values can disturb, startle, cause annoyance or interfere with work activities. At higher levels they can be described as unpleasant or even painful. In residential accommodation, vibrations can promote anxiety lest some structural mishap might occur. Guidance of effects of vibration levels are illustrated in Table 9.3 below.

Table 9.3: Guidance on Effects of Vibration Levels

Vibration Level	Effect
0.14 mm·s^{-1}	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.
0.3 mm·s^{-1}	Vibration might be just perceptible in residential environments.
1.0 mm·s^{-1}	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10 mm·s^{-1}	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

Limits of transient vibration, above which cosmetic damage could occur, are given numerically in Table 9.4 (Ref: BS5228-2:2009+A1:2014). Minor damage is possible at vibration magnitudes which are greater than twice those given in Table 9.4, and major damage to a building structure can occur at values greater than four times the tabulated values.

Table 9.4: Transient Vibration Guide Values for Cosmetic Damage

Type of Building	Peak Particle Velocity (PPV) (mm/s) in Frequency Range of Predominant Pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures. Industrial and heavy commercial buildings.	50 mm/s at 4 Hz and above	50 mm/s at 4 Hz and above
Unreinforced or light framed structures. Residential or light commercial buildings.	15 mm/s at 4 Hz increasing to 20 mm/S at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above.

This guidance document may be used for the assessment of construction vibration levels.

9.2.1.8 EPA Office of Environmental Enforcement (OEE) Guidance Note for Noise: License Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (2016)

NG4 is the most recent Irish guidance document in relation to noise survey and assessment and therefore the most relevant Irish guidance document for the purposes of this assessment. The document relates primarily to noise surveys, assessment and management of noise emissions for EPA licensed facilities but in the absence of any other directly applicable guidance documents, it provides reference material appropriate and relevant to the noise assessment for the proposed development.

NG4 provides detailed consideration of a range of noise related issues including basic background noise criteria, various noise assessment criteria and procedures, noise reduction measures, Best Available Techniques (BAT) and the detailed requirements for noise surveys.

This guidance sets out typical limit values for noise from licensed sites, namely:

- Daytime (07:00 – 19:00) – 55 dB $L_{Ar,T}$;
- Evening (19:00 – 23:00) – 50 dB $L_{Ar,T}$; and
- Night-time (23:00 – 07:00) – 45 dB $L_{Aeq,T}$

Where a proposed development occurs in a low background noise area, the above limits can be reduced by 10 dB (A). Low background noise levels are defined in the document as one where the existing background

noise levels measured during an environmental noise survey are ≤40 dB L_{AF90} during daytime, ≤35 dB L_{AF90} during evening and ≤30 dB L_{AF90} during night-time.

This guidance document has been used in particular for the assessment of operational phase noise from the proposed development. The use of a fixed limit noise criteria can result in increased noise levels above background. Where such increases are significant lower noise limits will be considered.

9.2.1.9 British Standards BS 7445-1:2003 Description and Measurement of Environmental Noise – Part 1: Guide to Quantities and Procedures (BS, 7445-1)

British Standard BS7445 provides the framework within which environmental noise should be quantified. BS 7445: Part 1 provides guidance to quantities and procedures in relation to environmental noise monitoring. BS7445-1 states that sound level meters that are used should conform to specifications of Class or Type 1 (or Class or Type 2 as a minimum) as given in BESN 61672.

The Class of a noise level meter describes its accuracy as defined by the relevant international standards. Sound level meters are defined by International Standards such as IEC 61672-1:2013 (or BS EN61672-1:2003). These standards define a wide range of complex accuracy, performance and calibration criteria that instruments must meet to be fit for purpose. Within the Standard, there are two allowable levels of tolerance and these are known as Class 1 and Class 2. Class 1 is more accurate than Class 2.

These Class 1 and Class 2 tolerances are necessary as a way of dealing with variations in the instruments. The variations are caused by the different electronic components used inside the sound level meters and because of the way different meters have been designed and verified. Even the test equipment used to check the sound level meters during manufacture will introduce some variation.

All equipment shall be calibrated and the configuration for calibration shall be in accordance with the manufacturer's instructions. A comprehensive recalibration at certain time intervals (for example annually) may be prescribed by authorities responsible for the use of the measurement results. A field check shall be made by the user at least before and after each series of measurements, preferably including an acoustic check of the microphone

Meteorological conditions are not prescribed but it is recommended that wind speed should not exceed 5 m /s at height of 3-11m above ground, any temperature inversions near ground, or heavy precipitation.

9.2.1.10 ISO 9613 Attenuation of Sound during Propagation Outdoors Part 2 General Method of Calculation

ISO9613 (Part 2) specifies a methodology for calculating the attenuation of sound during propagation outdoors under meteorological conditions favourable to sound propagation. The standard applies to light downwind conditions and takes into account attenuation due to the following:

- Geometrical divergence;
- Atmospheric absorption;
- Ground effects:
- Reflection from surfaces;
- Screening by obstacles.

The methodology is used to predict equivalent continuous A-weighted sound pressure level (L_{Aeq}), including algorithms for octave-band source data from 63 Hz to 8 kHz.

9.2.2 Study Area

The location of the proposed development is shown in Figure 9.1, which highlights the study area.

The proposed development is located in a mixed area of development to the north of Letterkenny Town, Co. Donegal. The western perimeter of the site is bound principally by residential estates which are accessed from the Kilmacrenan Road (N56). The southern/eastern boundary of the site adjoins the N56 to the south of the site (recently constructed distributor road), agricultural fields, an IDA premises, and the council-run civic amenity centre. An existing water course runs through the site, broadly north to southeast. The north-western boundary bounds a residential development while the northernmost section perimeter bounds agricultural fields.

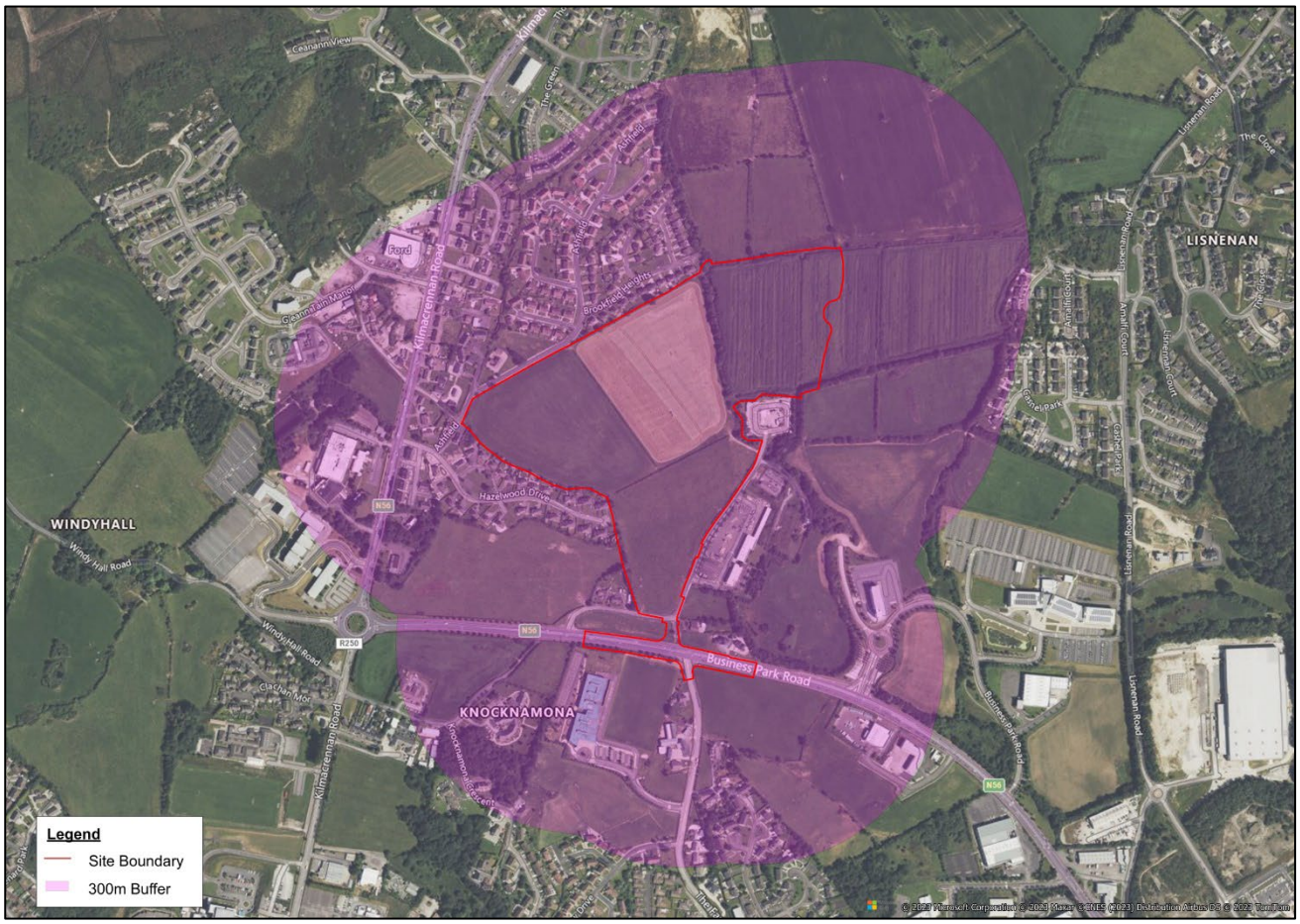

Figure 9.1: Study Area and 300m Buffer

The construction and operational noise assessments have considered noise-sensitive receptors within 300m of the proposed development site boundary. All receptors located at a greater distance from the site boundary will experience lower effect due to noise.

9.2.3 Baseline

The potential noise and vibration impacts have been assessed at identified key sensitive receptors including residential, industrial and commercial. Sensitive receptors were categorised based on their distance from the activity proposed during construction and operation phases. Distances were taken from the closest point to the construction areas and operational facilities.

The existing baseline noise environment was determined through the baseline noise monitoring surveys, both daytime and night-time, at three representative noise-sensitive receptor locations, which were agreed in advance with the Donegal County Council. Details of the baseline noise monitoring survey can be found in Volume III Appendix 9.A.

9.2.4 Noise Propagation Modelling

9.2.4.1 CadnaA Noise Propagation Software

CadnaA (Computer Aided Noise Abatement) is a leading proprietary software for environmental noise propagation calculation, presentation and assessment. The CadnaA noise modelling software package was set up to use ISO9613 "Attenuation of Sound during Propagation Outdoors Part 2 General Method of Calculation" prediction methodology along with a range of topographical and ordnance data collected on the surrounding area to build up a picture of the noise environment in the vicinity of noise sources.

The software was used to build a 3-dimensional model of all features which may affect the generation and propagation of noise in the vicinity of the proposed development and to predict the specific sound levels due to the proposed development at nearby residential properties (receptors).

The propagation model takes account of sound attenuation due to geometric spreading and atmospheric absorption. The assumed temperature and relative humidity are 10 ˚C and 70 % respectively. Ground effects are also taken into account by the propagation model, with ground effects surrounding noise sources and receptors being of particular significance. CadnaA allows definition of ground absorption across a whole site or with a map of ground absorption. Hard ground is represented by Ground Absorption G=0, G=1 for soft ground and G=0.5 is typically adopted to reflect a mix of hard and porous ground.

Where buildings have been included in the model, reflections have been included, with a reflection loss of 0 dB.

Unless otherwise stated, noise sources have been assumed to have a 100% 'on-time'.

Noise-sensitive receptors have been included in the model at a height of 1.5m above ground level for daytime predictions and 4m above ground level for night-time predictions.

ISO 9613-2 is a downwind propagation model. Where conditions less favourable to sound propagation occur, such as when the assessment locations are crosswind or upwind of the proposed development, the sound levels would be expected to be lower and the downwind predictions presented would be regarded as conservative i.e. greater than those experienced in practice.

ISO9613 and other sound propagation methodologies are built into sound propagation software packages, such as CadnaA. For this project, ISO9613 has been selected as the sound propagation modelling algorithm within CadnaA.

9.2.5 Assessment Criteria and Assignment of Significance

9.2.5.1 Likelihood of Impacts

In keeping with the typical scope of an Environmental Impact Assessment (EIA), the emphasis of this noise and vibration chapter is on the assessment of the potential effects of the proposed development upon the surrounding environment (nearest noise-sensitive receptors) during the construction phase.

As detailed in IEMA Guidelines for Environmental Noise Impact Assessment the following terminology and definitions are detailed as:

1. Noise Impact -The difference in the acoustic environment before and after the implementation of the proposals (also known as the magnitude of change). This includes any change in noise level and in other characteristics/features, and the relationship of the resulting noise level to any standard benchmarks.
2. Noise Effect -The consequence of the noise impact. This may be in the form of a change in the annoyance caused, a change in the degree of intrusion or disturbance caused by the acoustic environment, or the potential for the change to alter the character of an area such that there is a perceived change in quality of life. This will be dependent on the receptor and its sensitivity.
3. Significance of Effect -The evaluation of the noise effect and, particularly if the noise impact assessment is part of a formal EIA, deciding whether or not that impact is significant.

9.2.5.2 Receptor Sensitivity / Value

Sensitive receptors, in the context of noise and vibration, are typically residential premises but can also include schools, places of worship and noise-sensitive commercial premises. This is taken from the Scottish Government's Technical Advice Note (TAN) on Assessment of Noise, Table 2.1 Level of sensitivity associated with various examples of noise-sensitive receptors. Section 2.21 of TAN States

> "*There are three levels of sensitivity "high" "medium" and "low". The ranking is primarily based on the relationship between the amenity associated with a NSR and its susceptibility to noise*."

TAN Chapter 2, Table 2.1 Level of Sensitivity Associated with Various Examples of Noise-sensitive Receptors provides sensitivity, description and examples of noise-sensitive receptors. Therefore, sensitivity of receptors, as defined in TAN has been used as reference criteria for sensitivity of receptors within this chapter.

Table 9.5 contains the general significance criteria that have been used for determining the level of impact associated with a particular aspect of the proposed development. Different aspects of noise from the proposed development (e.g. construction, plant/equipment, traffic etc.) are assessed using the different methodologies as described in the relevant guidance document. Where feasible, the significance criteria have been used in the various assessments included in this chapter having regard to the sensitivity of receptors.

Table 9.5: Receptor Sensitivity (Ref: TAN Assessment of Noise)

Sensitivity	Description	Examples of NSR
High	Receptors where people or operations are particularly susceptible to noise	Residential, including private gardens where appropriate. Quiet outdoor areas used for recreation Conference facilities Theatres/Auditoria/Studios Schools during the daytime Hospitals/residential care homes Places of worship
Medium	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance	Offices Bars/Cafes/Restaurants where external noise may be intrusive. Sports grounds when spectator noise is not a normal part of the event and where quiet conditions are necessary (e.g. tennis, golf, bowls)
Low	Receptors where distraction or disturbance from noise is minimal	Buildings not occupied during working hours Factories and working environments with existing high noise levels Sports grounds when spectator noise is a normal part of the event Night Clubs

Receptors expected to be affected by noise and vibration impacts from the proposed development include residential receptors and local schools, who are deemed to be highly sensitive.. The significance of the effect is determined as a function of the sensitivity of the receptor and the magnitude of impact it is exposed to. The significance of the effect is determined as a function of the sensitivity of the receptor and the magnitude of impact it is exposed to as summarised below in Table 9.6.

9.2.5.3 Magnitude of Impact

The magnitude of impact will be determined for of each element of the noise and vibration assessment. Descriptions of each magnitude of impact are shown in Table 9.6.

Table 9.6: Definitions of Magnitude

Sensitivity	Descriptor
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).

Details of how each noise assessment methodology relates for the magnitude of impact are shown in the sections below.

9.2.5.3.1 Construction Noise

Construction noise comprises both plant noise and site traffic noise. The construction noise 'of effect' for this assessment is based on the '5dB change' method in BS5228-1:2009 2014 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise' which is summarised in Table 9.7 below.

BS 5228:2009+A1:2014 does not contain any significance criteria equivalent to what is presented in Table 9.7, although examples of how limits of acceptability have been applied historically and some examples of assessing significance are presented. In this case Example Method 2, which refers to change of 5dBA in the ambient noise level, has been used to assess the effects at residential receptors.

The magnitude of construction noise Impacts has been determined in accordance with Annex E of BS 5228-1:2009+A1:2014. The significance criteria for assessing noise impact from construction works have been based on example Method 2 contained within Annex E.3.3 of BS 5228-1:2009+A1:2014, as referred

indicates that:

"Noise levels generated by site activities are deemed to be potentially significant if the total noise (preconstruction ambient plus site noise) exceeds the pre-construction ambient noise by 5dB or more, subject to lower cut off values of 65dB, 55dB and 45dB L_{Aeq} period, from site noise alone, for the daytime, evening, and night-time periods, respectively, and a duration of one months or more, unless works of a shorter duration are likely to result in a significant effect. "

Noise levels generated by construction activities are deemed to be significant if the total noise (pre-construction baseline plus construction noise) exceeds the pre-construction baseline by more than 5dBA subject to the lower cut-off value of 65dBA noise from construction activities alone.

For the majority of noise-sensitive receptors, pre-construction ambient noise levels are relatively low, resulting in the criteria set within the lower cut-off levels given in Table 9.7 below applying the most stringent limits. As such the lower cut-off levels are used throughout the construction assessment to all noise-sensitive receptors.

This classifies the magnitude of effect based on the sound level difference between the ambient noise level with and without construction. This is calculated by finding the difference between the baseline ambient level and the total level (construction noise plus baseline ambient level) at each location.

Table 9.7: Magnitude of Impact: Construction Noise Daytime (Ref: BS 5228 Part 1)

Sound Level Difference between Ambient Noise and Total Noise (dB, L_{Aeq})	Total Daytime Noise Level (dB $L_{Aeq, 12h}$) (Ambient and Construction Noise)	Magnitude of Impact
< 0 dB	< 65 dB (lower cut-off level)	Negligible
0 - 5 dB	65 - 70 dB	Low
5 – 10 dB	70 –75 dB	Medium
> 10 dB	> 75 dB	High

On account of the temporary nature of construction activities, higher noise threshold limits apply to construction phase activities as compared to permanent operational phase activities.

9.2.5.3.2 Operational Noise

Magnitude of impact can be determined with reference to the outcome of the operational noise assessments, which are categorised based on the type of noise source. Each assessment methodology implemented in this chapter and their associated assignments of magnitude of impact are shown below.

Plant and Equipment Noise

In the case of noise from plant and equipment, BS4142 offers an indication of magnitude of impact based on the predicted rating level relative to the existing background L_{90} sound pressure level. These should be taken in context and consider factors such as the receiving sound environment, the nature of the noise source and the noise-sensitive receptors.

BS4142 advises to obtain an initial estimate of impact of the specific sound by subtracting the measured background sound level from the rating level.

a. Typically, the greater this difference, the greater the magnitude of the impact.
b. A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
c. A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
d. The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact.

Where the rating level does not exceed the background sound level, this is an indication of the sound source having a low impact, depending on the context.

How these BS4142 classifications align with the EIA magnitudes of impact requires professional judgment. The assignment of the magnitude of impact should take in to account all pertinent factors, including absolute sound level, character and level of residual sound compared to that of the specific sound and the sensitivity of the receptors.

Operational Traffic Noise

When considering operational traffic, 'magnitude of effect' is quantified by the long-term change in traffic noise level based on the guidance in the 'Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3, Part 7, LA 111, Noise and Vibration'.

It is generally accepted that changes in noise levels of 1 dBA or less are imperceptible, and changes of 1 to 3dBA are not widely perceptible.

The operational traffic magnitudes of effect are given in Table 9.8.

Table 9.8: Magnitude of Impact: Operational Traffic

Change in Traffic Basic Noise Level (dB $L_{A10,18h}$ or L_{night})	DMRB Classification	Magnitude of Impact
Less than 3.0	Negligible	Negligible
3.0 - 4.9 dB	Minor	Low
5.0 - 9.9 dB	Moderate	Medium
10+ dB	Major	High

Noise From Activities Within the Proposed Development

Expected noise sources from within the proposed development include:

- Noise from match play on external pitches;
- Ball/Sliotar Strike noise on pitches and hurling wall;
- Whistles;
- Spectators;
- Traffic movements within the proposed development;
- Car parking.

Although no specific criteria apply to noise from sports facilities, absolute noise levels may be assessed using guidance provided in other relevant standards and guidance documents. The WHO Guidelines for Community Noise and BS8233 offer criteria for annoyance, which is reiterated in the Sport England Artificial Grass Pitch (AGP) Acoustics.

In the WHO guidelines, an L_{Aeq} threshold daytime noise limit of 55 dB is suggested for outdoor living areas in order to protect the majority of people from being seriously annoyed. A second daytime limit of 50 dB is also given as a threshold limit for moderate annoyance. The averaging time period suggested in the Sport England guidance is 1 hour, to represent the typical duration of a community sports event.

The WHO guidance is reflected in the BS8233 guidance values for a range of ambient noise levels within residential and commercial/industrial properties as shown in Table 9.9 The BS8233 values, assuming an open window providing 10-15 dB attenuation, are broadly in line with the WHO external guidance values.

Magnitude of Impact has been determined based on the WHO external L_{Aeq} criteria, as shown in Table 9.9.

Table 9.9: Magnitude of Impact: External Noise Levels

External $L_{Aeq, 1hr}$, dB (Daytime)	WHO Classification	Magnitude of Impact
<50	Few People Moderately Annoyed	Low
50 – 55	Few People Seriously Annoyed	Medium
55 +	-	High

The impact of L_{AMax} sound pressure levels due to impulsive noises, such as whistles, ball/sliotar strikes and car doors slamming will take into account the relevant criteria within WHO guidance and BS8233. These criteria primarily apply to the night-time period, therefore defined criteria levels and equivalent magnitude of impact have not been presented for daytime L_{AMax} assessment. Consideration of predicted daytime L_{AMax} will be taken in context, with professional judgment applied.

9.2.6 Significance of Effects

Following the identification of receptor importance and magnitude of the effect, it is possible to determine the significance of the impact.

The significance of effect is determined as a function of the sensitivity of the receptor and the magnitude of impact the receptor is exposed. The significance of effects for receptors of high sensitivity are summarised below in Table 9.10.

Table 9.10: Assessment of Significance Matrix

Sensitivity	Magnitude of Impact			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible or minor	Negligible or minor	Minor
Low	Negligible or minor	Negligible or minor	Minor	Minor or moderate
Medium	Negligible or minor	Minor	Moderate	Moderate or major
High	Minor	Minor or moderate	Moderate or major	Major

Definitions are shown below in relation to the Matrix in Table 9.10.

- ***Substantial***: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
- ***Major***: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.
- ***Moderate:*** These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
- ***Minor***: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.

- ***Negligible***: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Following initial assessment, if the impact does not require additional mitigation (or none is possible) the residual impact will remain the same. If, however, additional mitigation is proposed there will be an assessment of the post-mitigation residual impact.

9.3 Baseline Environment

A detailed description of the proposed development is presented in Chapter 2. The proposed development is located 2km to the north of Letterkenny town centre, north of the N56 National Road situated on 66-acre greenfield site at Carnamoggagh / Knocknamona. Please refer to Volume II: Design Drawings & Figures for the site location and proposed development Masterplan.

9.3.1 Baseline Noise Monitoring Survey

A baseline noise monitoring survey consisting of attended and unattended noise measurements was conducted within the vicinity of the proposed development site.

The noise monitoring locations (NMLs) were chosen to be representative of the nearest construction noise receptors near the proposed development site. The purpose of the noise monitoring survey was to determine the baseline noise levels at the nearest noise-sensitive receptors and to use these levels in accordance with the relevant guidance to determine the following:

- The applicable BS 5228 construction noise threshold limit in accordance with British Standard BS5228, Code of Practice of Noise Control on Construction and Open sites; and
- The BS4142 target rating level.

The NML and respective dates of monitoring and equipment used are summarised below in Table 9.11.

Table 9.11 Summary of Baseline Noise Monitoring Survey

Noise Monitoring Location	Description of Noise Monitoring Location	Start Date and Time	End Date and Time	Sound Level Meter
NML 1	Located at southern boundary of site adjacent to Knocknamona Crescent	24/03/2023 15:00hrs	31/03/2023 12:15hrs	Rion NL52
NML 2	Located at western corner of site, adjacent to Hazelwood Drive	24/03/2023 14:30hrs	31/03/2023 13:15hrs	Norsonic 140 (blue kit)
NML 3	Located at northern boundary of site, adjacent to Brookfield Heights	24/03/2023 14:45hrs	31/03/2023 13:00hrs	Norsonic 140 (red kit)

A summary of the noise monitoring methodology, instrumentation, photographs, calibration certificates and results are illustrated in Volume III, Appendix 9.A.

Measurements were made at a height of 1.2 – 1.5 m above ground level over 15-minute measurement periods. The weather conditions were in accordance with the requirements of ISO 1996: *Acoustics - Description, Measurement and Assessment of Environmental Noise*.

The following parameters were recorded during each monitoring period:

L_{Aeq} The continuous equivalent A-weighted sound pressure level. This is an 'average' of the sound pressure level

L_{Amax} This is the maximum A-weighed sound level measured during the sample period

L_{Amin} This is the minimum A-weighted sound level measured during the sample period

L_{A10} This is the A-weighted sound level that is exceeded for noise for 10% of the sample period

L_{A90} This is the A-weighted sound level that is exceeded for 90% of the sample period

The 'A' suffix for the noise parameters denotes the fact that the sound levels have been 'A-weighted' in order to account for the non-linear nature of human hearing. All sound levels in this report are expressed in terms of decibels (dB) relative to $2x10^{-5}$ Pa.

The typical measured ambient (L_{Aeq}) noise level has been used as the baseline for the construction noise assessment. These values are summarised in Table 9.12.

Table 9.12: BS4142 Assessment Background Sound Level Summary

Datasets	L_{A90} Analysis	
	Daytime dB	Night-time dB
NML1	55	38
NML2	55	38
NML3	49	34

9.3.2 Background Vibration Monitoring Survey

Background vibration monitoring was not undertaken as there are currently no vibration sources on site.

9.3.3 Noise-Sensitive Receptors

The primary study area for noise has considered all receptors within 300m of the proposed development site boundary. The 300m is based upon guidance detailed in DMRB LA111 Noise and Vibration:

"A construction noise study area shall be defined, where the need for further assessment has been established to include all noise-sensitive receptors: 1) that are potentially affected by construction noise; in areas where there is a reasonable stakeholder expectation that a construction noise assessment will be undertaken."

DMRB LA111 Noise and Vibration guidance 2019 suggests that "*a study area of 300m from the closest construction activity is normally sufficient to encompass noise-sensitive receptors*."

Although DMRB LA111 study are refers to highway construction noise, a review of all noise-sensitive receptors within 300m was carried out for the operational and construction noise impact assessments.

Noise-sensitive receptor locations were obtained from mapping including Google and Bing aerial maps

The noise-sensitive receptor locations[1] in relation to construction and operation are shown on Volume III, Appendix 9.B, with a list of their identification references (ID's), and location coordinates.

The majority of noise-sensitive receptors identified within the noise and vibration study area are residential properties.

349 noise-sensitive receptors were identified within 300m of the site boundary; the Irish Grid co-ordinates for each have been tabulated within Appendix 9.B. For the purposes of the noise impact assessment, 34 noise-sensitive receptor locations have been selected to be representative, with all other receptors within the 300m site boundary and beyond expected to experience a noise impact of lower or equal magnitude to those assessed.

[1] (N. B. Addresses of the construction noise receptors have not been included due to General Data Protection Regulations (GDPR) and publication of personal data).

9.4 Impact Assessment

9.4.1 Assessment of Construction Effects

Based on the information presented in Chapter 2, the likely significant noise impacts are considered for the construction activities. The predicted construction noise impacts are assessed in accordance with BS 5228: Noise and Vibration Control on Construction and Open Sites Noise threshold limits. The proposed construction works will include construction activities which have the potential to impact the noise environment such as piling and excavation.

It is anticipated that the construction of the proposed development will take place over a period of approximately four years. Noise impacts identified in the construction noise assessment have considered worst-case construction scenarios. The noise impacts will not be continuous and will vary by phase and by construction activity or combination of activities taking place.

9.4.1.1 Construction Phasing Summary

The activities associated with each construction phase are summarised in Table 9.13.

Table 9.13: Construction Phases

Phase	Construction Activities
Phase 1	Strip topsoil, cut & fill across whole site to formation levels (including rock breaking) Pitch 1,6,7,8 and 9, access roads, parking and temporary changing facilities.
Phase 2	Construct Pavilion Building
Phase 3	Construct Grass Pitch 2, Training Ground, Hurling Wall and Community Gardens
Phase 4	Construct Pitches 3,4 and 5. Walking and Running Trails Developed and Bio-Diversity Garden Established
Phase 5	Air-dome Structure and Associated Carpark

An overview of the construction phases, including the elements to be constructed in each phase, is shown in Appendix Volume III, Appendix 9.C. Also detailed are predicted worst-case construction noise levels together with applicable BS 5228 noise limits for noise receptors.

9.4.1.1 Construction Traffic

Construction traffic volumes have been based on the predictions within Chapter 19: Traffic and Transport. The busiest construction period in traffic terms will be during Phase 1, when the bulk earthworks exercise is undertaken. This will involve a cut and fill operation across the entire site, to reduce the need for future import or export of sub-soil material.

Vehicles on-site during this period will include:

- 3no. 360 degree tracked / wheeled hydraulic excavators;
- 1no. skip lorry;
- 1no. bulldozer;
- 5no. tipper lorries; and
- 1no. digger.

In addition to the above, it is anticipated that there could be up to 30 two-way HGV trips per day to and from the site and approximately 30 two-way trips on the road network as workers travel to and from the site. These additional 60 vehicle movements are shown in context in Table 9.14. It is expected that construction will be limited to the daytime period only, however as workers may arrive for a 07:00 hrs shift prior 07:00 hrs, the 24 hour impact has been considered.

Table 9.14: Construction Traffic Flow Data Including % Increase in 24hr AADT Flows for 2028 and 2043

Road Link	24hr AADT (5-day, veh)				
	Base 2028	Base 2043	Development Traffic	2028 Dev Impact	2043 Dev Impact
N56 north of Knocknamona Rbt	20,706	22,466	60	0.3%	0.3%
R229 south of Knocknamona Rbt	18,158	19,701	60	0.3%	0.3%
N56 west of Knocknamona Crescent	13,904	15,086	60	0.4%	0.4%
N56 east of Carnamuggagh Lower	12,853	13,946	60	0.5%	0.4%
Knocknamona Crescent	389	421	60	15.4%	14.2%
Carnamuggagh Lower	2,082	2,255	60	2.9%	2.7%

The TII guidelines state that it takes a 25% increase or a 20% decrease in traffic flows in order to get a 1 dBA change in traffic noise levels. On this basis, the change in traffic noise levels on all road links during the construction phase of the proposed development will be less than 1dB(A).

It is generally accepted that it takes an approximate 3 dB(A) increase in noise levels to be perceptible to the average person, therefore the likely effect of traffic noise increases on all other roads local road network will be imperceptible.

The magnitude of impact due to traffic noise associated with the proposed development is ‘Low’.

9.4.1.2 Construction Durations and Hours

It is envisaged that the total time to complete construction works will be four years.

BS 5228 defines the day-time period is defined as 07:00 to 19:00 hrs; the evening period as 19:00 to 23:00 hrs and the night-time period as 23:00 to 07:00 hrs.

Precise timings and phasing of the proposed works are not known at this stage as this will be dependent upon the completion of the planning process and the subsequent appointment of a contractor.

Working hours outside of this regime will only occur in exceptional circumstances; if these are known in advance (i.e. not under emergency conditions), discussions will be held with representatives of the Donegal County Council environment and planning team to ensure that the works can be completed with minimal impact on sensitive receptors.

9.4.1.3 Construction Activities

The areas associated with each construction phase and associated construction activities are detailed in Volume III Appendix 9.C: Construction Noise Assessment. Typical noise levels for each activity have been identified with reference to BS5228 Appendices C and D.

9.4.1.4 Predicted Effects of Construction Noise

Construction noise levels at each noise-sensitive receptor have been calculated. The precise construction strategy to be adopted will be a matter for the contractor, but it is likely that construction noise levels experienced during the construction phase will be similar to the typical construction noise levels indicated in Volume III Appendix 9.C.

The noise levels associated with the various items of construction plant have been identified with reference to BS5228 Appendices C and D. Noise levels are generally stated within BS5228 as a sound pressure level at a distance of 10m, unless otherwise stated. Distances from the construction phase boundaries for each of the construction activities were measured to each of the construction noise receptors as detailed within Volume III Appendix 9.C.

The attenuation calculation assumes attenuation due to distance with a direct line of sight from the noise source to the receiver and without a barrier being considered, which is a worst-case scenario. Construction noise predictions were calculated for each construction activity as detailed in Volume III Appendix 9.C.

Construction noise criteria has been derived from the BS5228 ABC method. The typical daytime noise level is less than the Category A threshold limit, therefore the Category A threshold limit (i.e. 65dB) applies.

Volume III Appendix 9.C illustrates that there is potential for significant construction noise impacts at the nearest noise sensitive receptors if worst-case construction activities take place without mitigation measures in place. While BS 5228:2009+A1:2014 does not contain significance criteria the exceedance of the daytime noise threshold limit of 65dB(A) by 15 dB(A) would equate to a temporary major adverse impact during the time that such activities are carried out simultaneously at the site boundary.

While construction works will extend over a period of years, the duration over which noise will be produced in the vicinity of any individual receptor or group of receptors will be for shorter periods. Work generating peak levels of noise will be carried out intermittently over this time and will not be constant for those periods. Nevertheless, on the basis of the predicted worst-case construction noise levels from the proposed development, it is clear that there will be a requirement for mitigation measures to be put in place in order to ensure that construction noise levels are reduced as much as practicable. The target for mitigation measures is a reduction in daytime construction noise to achieve the daytime noise threshold limit of 65dB(A) as outlined in Table 9.7.

Noise mitigation measures for construction activities are outlined in section 9.5.1.

9.4.2 Assessment of Operational Effects

9.4.2.1 Proposed Development

Details of the proposed development are outlined in Chapter 2. The aspects of the proposed development which have potential to generate noise and have therefore been considered in the noise impact assessment are:

- Outdoor sports pitches, including:
  - 1 artificial grass GAA pitch (Pitch 1). Line markings permit rugby and 2 x cross-play soccer pitches.
  - 1 Grass / Sand GAA competition pitch (Pitch 2). Line markings permit rugby and 2 cross-play soccer pitches.
  - 2 natural grass soccer pitches with Cricket Creases (Pitch 3,4, 5)
  - 4 synthetic 5-a-side soccer pitches (Pitches 6,7 8, 9)
- 1,000m^2 Indoor Sports Dome (height = 10.8m) suitable for warm up, a range of sports and activities
- Training/Practice Area (25x80m),
- 5m high Hurling/Handball Wall;
- 6 Lane Athletic Sprint Track (50x7.5m) with PV panels to roof;
- Walking / running trails / children's playpark and community garden
- 1,399m^2 pavilion building (height 11.2m) to accommodate changing facilities, office / reception, self-serve catering facility, storage and flexible space for community programmes;
- Equipment Store and Service compound;
- New junction from N56, internal access roads and provision of 205 onsite vehicle parking spaces, 4 coach parking spaces and 120 cycle parking spaces;
- Additional pedestrian access point from Ashfield;
- Closure of existing vehicular access from N56 to Knocknamona Crescent;
- Ancillary infrastructure to include drainage, ESB substation, fencing and entrance gates, signage, retaining walls, floodlighting, netting and culverting watercourse at two locations to accommodate vehicle / pedestrian / cycle crossing..

The sources of noise associated with these aspects of the proposed development have been assessed in accordance with the appropriate guidance and standards outlined in section 9.2. The operational noise sources which have been considered and the relevant assessment methodologies are listed below:

- Plant and Equipment (BS4142);
- External Sports Facilities (Sport England Artificial Grass Pitch (AGP) Acoustics –Planning Implications);
- Operational Traffic (DMRB LA11 and CRTN);
- Car Parking (WHO and BS8233).

Noise modelling inputs and assumptions are presented in Volume III Appendix 9.D.

9.4.2.2 Plant and Equipment Noise Impact Assessment

An assessment has been conducted of relative sound levels due to operational noise from the plant and equipment associated with the proposed development compared with the existing sound environment. This assessment has been carried out as per BS4142:2014.

Sound pressure levels during operation of plant and equipment have been predicted at the 34 representative noise-sensitive receptors, as shown in Appendix 9.B. The model inputs and full noise propagation modelling results at all noise sensitive receptors are detailed in Appendix 9.D.

The following operational scenarios have been modelled:

- Normal operation – ASHPs and substation (daytime and night-time);
- Emergency operation – ASHPs, substation and emergency generator (daytime only).

It is understood that ASHP systems require 24/7 operation for maximum effectiveness and efficiency. As such, a night-time plant and equipment scenario has been modelled which includes the ASHPs and substation only.

It is extremely unlikely that the emergency generator will be in operation during the night. As such, the assessment below considers normal operation during daytime and night-time, and use of the emergency generator during the daytime period

9.4.2.2.1 Internal Plant and Equipment

These scenarios do not include details of internal plant and equipment, such as the air handling unit (AHU), which will be located within the air-dome plant room. Details of internal plant and equipment are not available at this stage, however when sourcing and installing the internal plant and associated external components (i.e. air intake louvres), a subject to a target level should be applied, whereby the rating level at any receptor does not exceed 10 dB below the lowest existing daytime background sound level. This will ensure that there is no increase in noise impact following installation of the internal plant and equipment. It is anticipated that the internal plant and equipment will be required to operate during the daytime period only, and therefore would be subject to a target rating level of 39 dB $L_{Aeq,\,T}$ at all receptors.

9.4.2.2.2 Specific Sound Level

Specific sound level is the sound pressure level due to an industrial or commercial source at a noise-sensitive receptor. For the purposes of the BS4142 assessment it can be either measured or predicted. The specific sound level of the external plant and equipment associated with the proposed development has been predicted based on the available acoustic data, as in Volume III Appendix D. Please also refer to Appendix D for predicted receptor sound pressure levels for each operational scenario and to Volume II Figures 9.6 – 9.9 for noise propagation contour maps.

The specific sound levels which have been assessed are the maximum predicted sound pressure levels. Sound levels at all other receptors would be expected to be lower than the maximum levels which have been assessed below, therefore any noise impact at other receptors will be equal to or lower than the outcome of the following assessment.

9.4.2.2.3 Normal Operation

The maximum predicted sound pressure level at any noise-sensitive receptor has been assessed for the daytime and night-time periods, during normal operation of plant and equipment.

- The daytime specific sound level is 31.5 dB $L_{Aeq,\,1hr}$ as predicted at receptor 155;
- The night-time specific sound level is 33.4 dB $L_{Aeq,15min}$ as predicted at receptor 155.

Emergency Operation

It is understood that the standby generator will only operate as needed during periods of power loss. Should the standby generator be required to operate, the highest predicted sound pressure level due to all plant and equipment is 49 dB $L_{Aeq,\,T}$ (receptor 155) during the daytime period.

9.4.2.2.4 Acoustic Feature Correction

Tonality

With regards to tonality, BS4142:2014 states: "*For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible*."

The substation has been considered as a potentially tonal noise source, however the contribution of substation noise to predicted sound pressure levels in negligible, therefore any tonality would not be audible or distinguishable at receptors. Furthermore, the manufacturer data supplied for the ASHPs does not show any evidence of tonality. Therefore no penalty for tonality has been applied.

Impulsivity

With regards to impulsivity, BS4142:2014 states: "*A correction of up to +9dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively this can be converted to a penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it is clearly perceptible, and 9dB where it is highly perceptible*."

Impulsivity is not considered to be a relevant sound characteristic of the proposed development noise sources.

Intermittency

The intermittency of the sound source needs to be considered when it has identifiable on/off conditions with regards to intermittency, BS4142:2014 states: "*If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied*."

Although the plant and equipment associated with the proposed development may operate 'on-demand', it is not anticipated that the on/off conditions will be identifiable at the receptor locations. As such, no intermittency correction has been applied.

Overall Acoustic Feature Correction

No additional acoustic characteristics have been identified as relevant for the proposed noise sources. Therefore, the overall acoustic feature correction is 0 dB.

9.4.2.2.5 Calculation of Rating Level

No acoustic feature corrections apply to the proposed development; therefore the rating level is equal to the specific sound level.

9.4.2.2.6 Background Sound Level

The background sound level has been derived from the results of the baseline noise monitoring survey, as described in Volume III Appendix 9.A, and as summarised in Table 9.12.

The lowest representative background sound pressure level has been selected for daytime (49 dB L_{A90}) and night-time (34 dB L_{A90}), which was measured at noise monitoring location 3 (NML3).

9.4.2.2.7 Daytime BS4142 Assessment

The specific sound level has been assessed against the background sound level at each of the three Noise Monitoring Locations (NML), as determined in the baseline noise monitoring survey (detailed in Section 9.3.1).

The results of the BS4142 assessment of daytime noise due to operation of the proposed development are summarised in Table 9.15 for normal operation and Table 9.16 for emergency operation.

Table 9.15: Daytime BS4142 Assessment (Normal Operation)

Receptor Location	NML1	NML2	NML3
Representative Background Sound Level (Daytime) L90, 1hr, dB	55	55	49
Specific Sound Level, LAeq, T dB	31.5	31.5	31.5
Acoustic Feature Correction, dB	0	0	0
Rating Level, dB	31.5	31.5	31.5
Excess Over Background, dB	-23.5	-23.5	-17.5
Magnitude of Impact	Negligible	Negligible	Negligible

Table 9.16: Daytime BS4142 Assessment (Emergency Operation)

Receptor Location	NML1	NML2	NML3
Representative Background Sound Level (Daytime) L90, 1hr, dB	55	55	49
Specific Sound Level, LAeq, T dB	49	49	49
Acoustic Feature Correction, dB	0	0	0
Rating Level, dB	49	49	49
Excess Over Background, dB	-6	-6	0
Magnitude of Impact	Negligible	Negligible	Low

9.4.2.2.8 Night-Time BS4142 Assessment

The results of the BS4142 assessment of night-time noise due to operation of the proposed development are summarised in Table 9.17.

Table 9.17: Night-Time BS4142 Assessment (Normal Operation)

Receptor Location	NML1	NML2	NML3
Representative Background Sound Level (Night-time) L90, 15min, dB	38	38	34
Specific Sound Level, LAeq, T dB	33.4	33.4	33.4
Acoustic Feature Correction, dB	0	0	0
Rating Level, dB	33.4	33.4	33.4
Excess Over Background, dB	-4.6	-4.6	-0.6
Magnitude of Impact	Negligible	Negligible	Negligible

For noise propagation contour maps, please refer to Volume II: Design Drawings & Figures.

9.4.2.2.9 Plant and Equipment Noise Assessment Summary

A relative noise impact assessment has been carried out, comparing predicted daytime and night-time L_{Aeq} sound pressure levels against measured background L_{A90} sound pressure levels as per BS4142:2014.

BS 4142 daytime and night-time assessments have been undertaken as detailed above. BS 4142 states that difference of +10 dB or more would be likely to be an indication of a significant adverse impact, depending on the context. A difference of around + 5 dB is likely to be an indication of an adverse impact, depending on the context. The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

The impact of the plant and equipment associated with the Proposed Development was found to be either negligible or low for both the daytime and night-time periods.

9.4.2.3 External Sports Facilities Noise Impact Assessment

9.4.2.3.1 Sports Pitches L_{Aeq} Assessment

Sport England Artificial Grass Pitch (AGP) Acoustics –Planning Implications guidance includes a summary of noise levels measured during nine sports sessions on three separate AGPs, which were undertaken to determine a 'typical' noise level generated from a 'typical' AGP sports session.

From the measurement data, a typical free-field noise level of 58 dB $L_{Aeq,\ 1hr}$ at a distance of 10m from the sideline halfway marking has been determined as representative for noise from an AGP.

A noise propagation model was developed which used this sound pressure level to derive a sound power level per m^2 for AGPs of 60.4 dB which has been assigned to an area source with a height of 1.5m above ground level. This assumes that the noise source is uniform across the pitch, as a worst case. The sound power level for the AGP has been assumed to apply to all types of outdoor sports pitch within the proposed development.

The Sport England Artificial Grass Pitch Acoustics Guidance indicates assessment criteria for noise from AGPs, which is based on WHO guidance:

"Based on a 15 decibel sound reduction of a partially open window, the noise level outside a residential property during the daytime about 1 metre from façades of living spaces should not exceed 50 dB LAeq. The WHO document also provides guidance for outdoor living areas. It states that to avoid 'moderate annoyance' during the daytime and evening the noise level should not exceed 50 dB LAeq(T)."

This criteria is considered to be relevant to and has been applied to noise from all outdoor sports pitches within the proposed development. The Sport England guidance suggests a 1-hour averaging period for sound pressure level calculations, as this is typically the time period for a community sports session on an AGP.

The noise propagation model assumes that all pitches are in use simultaneously. The natural grass/cricket pitch has been assumed to be in use as 2 natural grass pitches, as a worst-case, with the edge of the pitches closer to the nearest receptor than the cricket ground configuration.

Full results of the acoustic modelling for the sports pitches are included in Volume III Appendix D. For noise propagation contour maps, please refer to Volume II: Design Drawings & Figures.

A summary of the 10 highest predicted L_{Aeq} sound pressure levels at representative receptors is shown in Table 9.18 within each noise modelling scenario. The sports pitches will not operate at night, therefore results are shown for daytime only. Predicted sound pressure levels at all other noise-sensitive receptors do not exceed the values shown in Table 9.18.

Table 9.18: Sports Pitches Daytime Noise Modelling Results, 1.5 m Receptor Height

Receptor Location	Predicted Daytime Sound Pressure Level, dB $L_{Aeq,\ T}$
50	44.3
51	44.3
2	44.2
1	44.1
3	43.4
90	43.3
88	43
85	42.8
92	42.7
159	42.4

The highest predicted sound pressure level at noise-sensitive receptors due to noise from all sports pitches is not expected to exceed the criteria level of 50 dB $L_{Aeq,1hr}$. This is a worst-case and typical sound pressure levels at receptors may be to be lower if all pitches are not in use simultaneously.

As such, the magnitude of impact due to noise from the sports pitches is expected to be Low.

9.4.2.3.2 Sliotar/Ball Strike Noise L_{AMax} Assessment

The sports activities associated with the proposed development have the potential to be a source of peaks of noise, in particular due to ball strikes or impacts. The impact of ball/sliotar strike noise has been assessed, with a focus on the sound pressure levels arising from the use of the hurling wall and the grass pitches which will be used for hurley, cricket, football, soccer and rugby.

With the impulsive, high intensity nature of ball strikes, any noise impact would most likely arise from the L_{AMax} values at receptors. WHO and BS8233 guidance do not include daytime L_{AMax} criteria, however the internal night-time L_{AMax} criterion value is 15 dB higher than the internal night-time L_{Aeq} criterion value. The BS8233 daytime external target for amenity areas such as gardens and patios is 50 dB $L_{Aeq,T}$. Applying the same correction factor between night-time L_{AMax} and $L_{Aeq,}$ criteria, the daytime $L_{Aeq,}$ criterion value could be extrapolated to give an indicative daytime external L_{AMax} criterion value of 65 dB.

It should be noted that the WHO and BS8233 L_{AMax} criteria is not an upper limit, but a limit to the number of exceedances of the L_{AMax} criterion level within the night-time period. As such, it can be surmised that a number of L_{AMax} events exceeding 65 dB could be tolerated. In the absence of such criteria, however, 65 dB has been adopted as an indicative L_{AMax} upper limit.

Hurling

The proposed hurling wall and hurling pitch have the potential for noise impact on receptors, as noise from hurleys striking sliotars, and from sliotars striking a hurling wall or fencing, is impulsive and potentially of high intensity.

In the absence of available noise data relating to noise from hurley practice or match play, hockey match noise measurement data has been used as a substitute. Measurements from a survey of noise events during a hockey match were presented at the Institute of Acoustics “Acoustics 2021” Conference, as shown in Figure 9.2, which is a table of results taken from the conference proceedings (Volume 43 Pt.1).

Noise event in a real hockey match	Maximum sound power level, dB L_{AFmax}		
	Highest	Logarithmic average	Lowest
Hockey ball hitting perimeter board without mitigation	119	116	111
Stick hitting hockey ball	105	103	86
Whistle	102	100	92
Shouting	102	98	83

Figure 9.2: Sound Power Level of the Maximum Noise Events During a Hockey Match (IOA ‘Acoustics 2021’ Proceedings (Table 1)

As shown in Figure 9.2, the range of L_{AMax} during ball impacts was 86 dB to 119 dB. The highest sound power level derived from the measurements was 119 dB L_{Amax}, attributed to hockey balls hitting the perimeter board with no mitigation. Assuming hemispherical propagation, this sound power level is equivalent to a sound pressure level of 111 dB L_{AMax} at 1m. This L_{AMax} is expected to be associated with the low level perimeter board, as the study showed reduced levels when ‘padding’ was added to the board.

The closest residential property to the hurling wall is receptor 153, located at a distance of 50 m from the wall. The 5 m high concrete hurling wall will be cut into the proposed embankment, and will face to the southeast, away from the closest receptors. This orientation will ensure a significant barrier effect from the hurling wall itself and the embankment.

The barrier attenuation provided by the embankment was predicted using CadnaA noise propagation software and was found to reduce the sound pressure level by 22 dB. The expected distance attenuation to receptor 153 is 34 dB. The prediction of sound pressure levels at the closest receptors is summarised in Table 9.19.

Table 9.19: Prediction of L_{AMax} Sound Pressure Levels at Receptors Due to Sliotar/ Ball Strikes

	Receptor 153	Receptor 93	Receptor 161
Ball Impact L_{AMax} Sound Pressure Level at 1m	111 dB	97 - 111 dB	111 dB
Distance to Receptor	50 m	50 m	55 m
Distance Attenuation to Receptor	34 dB	34 dB	35 dB
Embankment Attenuation	22 dB	0	5
Estimated L_{AMax} Sound Pressure Level at Receptor	55 dB	63 - 77	71.2

The impact noise associated with sliotars striking the hurling wall is expected to be lower than that of fencing or boarding, as was measured in the values above, due to the mass of the concrete wall. As such, these values are considered to be a worst-case representation of impact noise associated with the hurley wall.

It is noted that the grass/sand competition Pitch 2 will be surrounded by 2 m high paladin fencing beyond the 3.5 m run-off area, with ballstop netting at either end. The L_{AMax} of a hurley hitting a sliotar is likely to be similar to the stick hitting the hockey ball (105 L_{Amax} L_W or 97 dB L_{AMax} at 1m). The hockey ball hitting the 'perimeter board without mitigation' (111 dB at 1m) is a conservative representation of a sliotar hitting the paladin fencing.

The location of the grass pitch is such that the closest receptor is located approximately 55m from the edge of the pitch. As such, attenuation due to distance will be greater than those values shown in Table 9.19 for all receptors. The embankment will surround the grass pitch along the northwestern extent, western corner and partially to the southern extent of the pitch. The embankment is expected to provide a similar barrier effect as presented in Table 9.19 for many receptors to the west and southwest of the pitch. It is therefore expected that the L_{Amax} levels due to sliotar impact noise on the grass pitch will be 41 dB or lower at the majority of receptors. This is a minimum of 24 dB below the derived daytime L_{AMax} criterion level.

Receptors on Hazelwood Drive will not benefit from the barrier effect of the embankment. With a 2 m high paladin fence surrounding the grass pitch, there will some impact noise associated with striking sliotars and, less frequently, sliotars hitting the fence. Sliotar impacts on the fence are not expected to be a frequent occurrence as with the hurley wall, which will be used specifically for that purpose.

The received L_{AMax} sound pressure level at the closest Hazelwood Drive receptor (receptor 93) has been predicted. Levels of between 97 dB and 111 dB L_{AMax} at 1m would be expected on the pitch, representing noise from hurley strikes and sliotars hitting the fence respectively. Distance attenuation of 34 dB has been assumed from the paladin fence to receptor 93, which are a distance of approximately 50 m from one another. The predicted L_{AMax} at receptor 93 due during a hurley match would be expected to be between 63 – 77 Db L_{AMax}.

This is a worst-case prediction, as the noise arising from a paladin fence strike would be expected to be lower than that of the hockey perimeter board. Furthermore, the prediction is based on the impact noise occurring at the closest point to the receptors on Hazelwood Lane. During a hurley match, the impact noises will be dispersed across the pitch. Typical L_{AMax} sound pressure levels at receptors will not typically exceed 65 dB, however, occasionally levels above 65 dB L_{AMax} may occur when play is towards the southern extent of the pitch and sliotars impact on the fence.

L_{AMax} sound levels due to sliotar strikes are likely to be lower when hitting fencing compared with hockey backboard. Considering this, along with the low frequency of occurrence of ball strikes at the closest point of the pitch, the overall noise impact of the sliotar strikes is 'Low' at the majority of receptors. The closest properties on Hazelwood Drive may experience occasional elevated L_{AMax} levels, when game play if close to the southwestern extent of the GAA pitch. These events are expected to be infrequent, however a conservative view has been taken and, without mitigation, the impact is considered to be 'Low/Medium'.

Cricket

The northern extent of the cricket pitch/soccer pitches (Pitches 3,4 and 5) are surrounded by an embankment, which would be expected to provide some noise reduction for the activities on these pitches. It should be noted, however that due to the natural topography to the north of the site, the closest properties to the cricket pitch, on Brookfield Heights, are elevated relative to the proposed development. Therefore, the barrier effect of the embankment to the north of the cricket pitch will be limited. It is estimated (based on the Cadna noise model) that the embankment will provide up to 5 dB attenuation from the northwestern corner of the cricket pitch to the properties on Brookfield Heights.

With no fencing proposed around Pitches 3, 4 and 5, it is anticipated that ball strike noise from cricket bats/balls will take place at the cricket crease only, which is located approximately 150 m from the closest receptor (receptor 161). The predicted L_{AMax} sound pressure level due to bat/ball strike at the cricket for receptor 161 is predicted to be 53.5 dB. This assumes a sound pressure level of 97 dB L_{AMax} at 1m. The received L_{AMax} level at receptor 161 is predicted to be 53.5 dB.

The predicted L_{AMax} sound pressure levels at the closest receptors is below the indicative L_{AMax} upper limit of 65 dB, indicating a Low noise impact.

Football, Soccer and Rugby

It is anticipated that received L_{AMax} noise from ball strikes will be lower for all other pitches. Impact noise due to footballs, rugby balls and soccer balls is inherently lower than the worst-case sliotar strikes already considered. Therefore, the impact of strike noise from these activities is considered to be Low.

9.4.2.3.3 Whistles

As shown in Figure 9.2, the sound power level associated with whistles is lower than any of the ball strike noise sources that have been considered. As such, the noise impact of noise from whistles is likely to be lower than the levels already assessed Section 9.4.2.2.2. The worst-case locations of ball strikes (low level fencing for example) are also worst-case locations where whistles may be blown. It is appropriate to consider the L_{AMax} level for whistles, as a high-intensity and impulsive noise source.

The predicted L_{AMax} sound pressure levels at receptors 153, 93 and 161 have been assessed as worst-case scenarios. The predicted levels include the attenuation provided by embankments. The maximum predicted levels do not exceed the indicative 65 dB L_{AMax} criterion level. Received sound pressure levels due to whistles are expected to be lower at all other receptors, due to the increased distance between pitches and residential properties.

Table 9.20: Assessment of Whistle L_{AMax} Sound Pressure Levels

	Receptor 153	Receptor 93	Receptor 161
Whistle L_{AMax} Sound Pressure Level at 1m	94 dB	94 dB	94 dB
Distance to Receptor	50 m	50 m	55 m
Distance Attenuation to Receptor	34 dB	34 dB	35 dB
Embankment Attenuation	22 dB	0 dB	5 dB
Estimated L_{AMax} Sound Pressure Level at Receptor	38 dB	60 dB	54 dB

The noise impact of the use of whistles on the sports pitches is considered to be ‘Low’ at all noise-sensitive receptors.

9.4.2.3.4 Spectators

At present there is no clearly defined assessment methodologies for the assessment of noise from spectators at sporting events. Acoustics of Schools: A Design Guide (Novemember 2015) published by Institute of Acoustics (IoA) and Acosutics Noise Consultants (ANC) reference normal voice as 60 dB at 1m, raised voice at 1m as 70 dB and shouting as 80 dB at 1m, as displayed in Figure 9.3. These indicative levels have been used to predict the sound pressure level at the closest receptor. In the scenario below, one person shouting

has been assessed to represent L_{AMax} levels, with normal to raised voices used to assess typical noise from the external area.

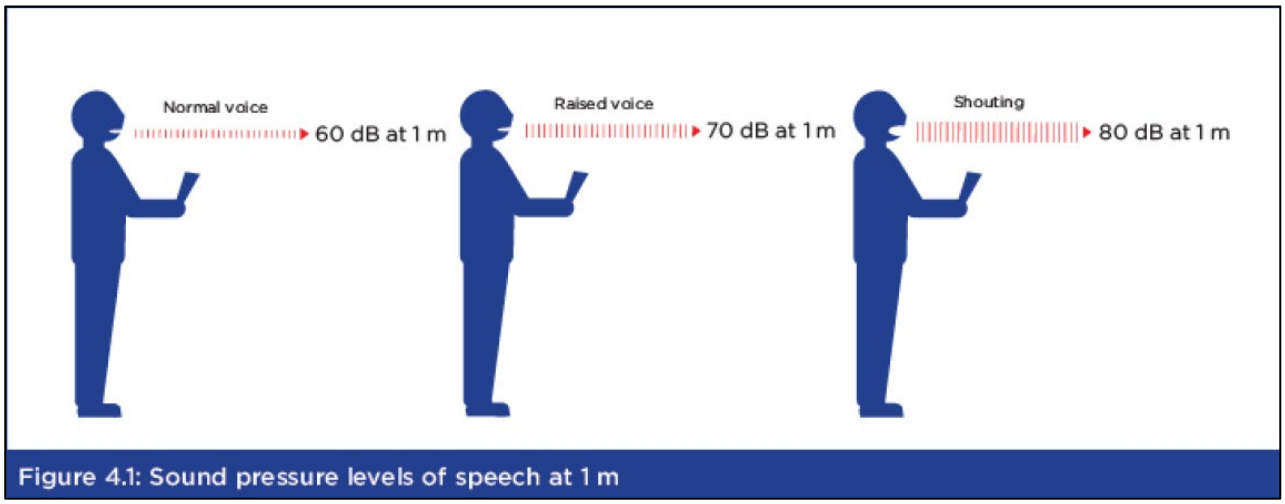

Figure 9.3: Acoustics of Schools: A Design Guide (Figure 4.1)

The distances from each external facility to the closest receptor are shown in Table 9.21.

Table 9.21: Distance to Closest Receptor for Each External Facility

Pitch	Closest Receptor	Distance, m
Pitches 6,7,8 and 9	2	45
Pitch 2	93	55
Pitch 1	93	64
Pitches 3,4 and 5	161	66

Pitch 1 is located next to the pavilion, which has a spectator stand for up to 312 people. Although the edge of the Pitch 1 is located at a distance of 64 m from the closest receptor (93), the pavilion spectator stand is approximately 100 m from the receptor.

The closest outdoor facility to any receptor are the five-aside pitches (Pitches 6,7,8 and 9). Although there is no designated spectator area associated with these pitches, there may be some spectators around the pitches.

Pavilion Spectator Stand

The sound pressure levels above were converted to a sound power level per m^2. Raised voices and shouting have been considered as L_{AMax} noise sources, while voices in conversation have been considered as L_{Aeq} sources and included in the noise propagation modelling associated with the sports pitches.

The actual noise propagating from the pavilion seating area will be variable. There is capacity in the pavilion spectator stand for 312 spectators.

Sound pressure levels were calculated at the closest noise-sensitive receptor (receptor 93) using a distance attenuation of 40 dB for a distance of 100m. The predicted levels, shown in Table 9.22, do not take into account the barrier effect of any building or obstacles between the stands and the receptors, although there will be some sound reduction due to barrier effects, not least due to the pavilion building itself. The predictions assume that all spectators are located at the edge of the pavilion spectator stand which is closest to the residential properties on Hazelwood Drive.

Table 9.22: Predicted Noise Levels from Spectators at Pavilion

	Shouting L_{AMax} (1 person)	Conversation with mixed normal and raised voices L_{Aeq} (1 person)	Conversation with mixed normal and raised voices L_{Aeq} (10 people)	Conversation with mixed normal and raised voices L_{Aeq} (312 people)
SPL @ 1m	80 dB	65 dB	75 dB	90 dB
Distance to nearest residential receptor 93	100 m	100 m	100m	100m
Distance attenuation	40 dB	40 dB	40 dB	40 dB
Predicted external noise level at nearest residential facade	***40 dB***	***25 dB***	***35 dB***	***50 dB***
Closed window attenuation	33 dB	33 dB	33 dB	33 dB
Open window attenuation	15 dB	15 dB	15 dB	15 dB
Predicted Internal noise Level (closed window)	3 dB	*-8 dB*	*2 dB*	*17 dB*
Predicted Internal noise Level (open window)	***25 dB***	***10 dB***	***20 dB***	***35 dB***

Table 9.22 shows that the predicted external level at the closest noise-sensitive receptor from one person shouting is 40 dB. If this is taken as an L_{AFMax} sound pressure level, then the equivalent internal level would be 3 dB with the window closed.

The maximum predicted internal L_{Aeq} levels resulted from continuous conversations with a full pavilion spectator stand was 35 dB when considering a mixture of normal and raised voices and an open window at the noise-sensitive receptor. This worst-case scenario does not exceed the daytime BS8233 criteria levels for daytime rest and sleep.

The highest predicted external sound pressure level at receptor 93 was 50 dB. This does not exceed the BS8233 L_{Aeq} criteria level for external amenity areas such as gardens and patios of 50 – 55 dBA.

Other Spectators

Pitch 1 is the only external pitch with dedicated spectator seating. The remaining pitches are anticipated to have relatively low spectator numbers.

The closest of the other sports pitches to any noise-sensitive receptor are the five-aside pitches (Pitches 6,7,8 and 9), with the closest pitch located a distance of approximately 45 m from receptor 2. There are no stands or dug outs associated with the five-aside pitches, which are enclosed with paladin fencing and have no run-off. The design and layout indicate that minimal spectators would be expected for these pitches. If there are spectators at the five-aside pitches, they are most likely to congregate outside the paladin fencing on the paved areas between the pitches and the car park; between 45 m and 115 m from receptor 2.

The sound pressure levels at receptor 2 have been estimated considering the following spectator scenarios at the five-aside pitches:

- 1 person with mixed normal/raised voice at closest spectator location;
- 10 people with mixed normal/raised voices at closest spectator location;
- 10 people with mixed normal/raised voices at furthest spectator location;
- 20 people with mixed normal/raised voices (10 at closest spectator location and 10 at furthest spectator location).

Table 9.23: Predicted Noise Levels from Spectators at Five-Aside Pitches

	Conversation with mixed normal and raised voice L_{Aeq} (1 person)	Conversation with mixed normal and raised voices L_{Aeq} (10 people)	Conversation with mixed normal and raised voices L_{Aeq} (10 people)	Conversation with mixed normal and raised voices L_{Aeq} (10 people @45m + 10 people @115)
SPL @ 1m	65 dB	75 dB	75 dB	-
Distance to nearest residential receptor 2	45 m	45 m	115 m	-
Distance attenuation	33 dB	33 dB	41 dB	-
Predicted external noise level at nearest residential facade	***32 dB***	***42 dB***	***34 dB***	***43 dB***
Closed window attenuation	33 dB	33 dB	33 dB	-
Open window attenuation	15 dB	15 dB	15 dB	-
Predicted Internal noise Level (closed window)	***-1 dB***	***9 dB***	***1 dB***	***10 dB***
Predicted Internal noise Level (open window)	***17 dB***	***27 dB***	***19 dB***	***28 dB***

Of the scenarios under consideration, the highest predicted external spectator noise level at receptor 2 is 43 dB L_{Aeq}, assuming 20 spectators at the five-aside pitches; 10 at the location closest to receptor 2 and 10 at 115m from receptor 2. The equivalent internal sound pressure level, assuming an open window is 28 dB L_{Aeq}. The five-aside pitches will not be in use during the night-time, therefore the daytime BS8233 criteria from have been applied. The external and internal predictions do not exceed the daytime criteria of 50 – 55 dB L_{Aeq} (external) and 35 dB L_{Aeq} (internal).

This is a worst-case which assumes that 10 spectators are located at the closest possible location to receptor 2. It is likely that spectators at the five-aside pitches would be dispersed along the boundaries of all four pitches.

As all other outdoor facilities are further from residential receptors, with no specific provision for spectators, the impact of spectator noise from other pitches on receptors is likely to be lower than that considered for the pavilion and five-aside pitches.

The magnitude of impact of spectator noise from the proposed development is 'Low'.

9.4.2.4 Operational Traffic Noise Impact Assessment

Operational traffic noise was assessed using the criteria and guidance contained within the DMRB LA 111 and CRTN.

Traffic data was provided in the form of Annual Average Daily Traffic (AADT) for the existing scenario and a series of future scenario years accounting for growth, as found in EIAR Chapter 19 Traffic and Transportation.

The scenarios considered within the traffic impact assessment, for the weekday morning and evening peak periods were:

• 2023 Existing Scenario;

• Base 2028 Scenario;

• Base 2028 Proposed Scenario + Generated Traffic;

• Base 2043 Scenario;

• Base 2043 Proposed Scenario + Generated Traffic.

The percentage increase in traffic flow levels on each road link are shown in Table 9.24.

Table 9.24: Operational Traffic Flow Data Including % Increase in 18hr AADT Flows for 2028 and 2043

Road Link	18hr AADT (5-day, veh)				
	Base 2028	Base 2043	Development Traffic	2028 Dev Impact	2043 Dev Impact
N56 north of Knocknamona Rbt	20,345	22,075	68	0.3 %	0.3 %
R229 south of Knocknamona Rbt	17,857	19,376	375	2.1 %	1.9 %
N56 west of Knocknamona Crescent	13,688	14,852	443	3.2 %	3.0 %
N56 east of Carnamuggagh Lower	12,651	13,727	157	1.2 %	1.1 %
Knocknamona Crescent	383	415	711	185.6 %	171.3 %
Carnamuggagh Lower	2,048	2,218	111	5.4 %	5.0 %

The highest increase of AADT 18hr is associated with Knocknamona Crescent; an expected increase of approximately 186 % compared to the 2028 baseline and approximately 171 % compared with the 2043 baseline. Although the three residential properties on Knocknamona Crescent will be accessible from the new junction, it is expected that the existing N56/Knocknamona Crescent junction will be closed. Therefore, the predicted traffic flows will not directly pass the residential properties on Knocknamona Crescent.

The Basic Noise Level (BNL) due to road traffic noise on Knocknamona Crescent has been predicted using CadnaA noise prediction software. The BNL for the baseline only and the combined baseline and development scenarios have been modelled for the 2028 and 2043 traffic flows shown in Table 9.24.

The results of the BNL modelling are shown for the properties closest to the Knocknamona Crescent junction (receptors 1-8) are shown in Table 9.25, with the BNL modelling results for all 34 representative receptors presented in Appendix 9.D.

Table 9.25: Predicted Knocknamona Crescent Traffic Noise Levels

Receptor	Base 2028	Base 2028+ Development	Base 2043	Base 2043+ Development	Change in L_{10}, dB 2028	Change in L_{10}, dB 2043
	Predicted L_{10} dBA					
1	47	35.5	47.4	35.5	-11.5	-11.9
2	49.6	36.5	50	36.6	-13.1	-13.4
3	45.4	50	45.8	50.3	4.6	4.5
4	38	40.5	38.3	40.7	2.5	2.4
5	35	36.8	35.4	37	1.8	1.6
6	32.8	36.6	33.2	37.2	3.8	4
7	31.3	37.2	31.7	37.1	5.9	5.4
8	29.4	33.4	29.8	33.5	4	3.7

The proposed development includes reconfiguration of the N56/Knocknamona junction, as shown in the Masterplan, which can be found in Volume II: Design Drawings & Figures. The changes to the junction will reduce the number of vehicles passing Receptors 1 and 2.

The 2028 and 2043 baseline scenarios do not include the reconfiguration of the junction, with all traffic continuing to pass Receptors 1 and 2 on Knocknamona Crescent. The scenarios which include the traffic associated with the proposed development assume the N56/Knocknamona Crescent junction has been reconfigured. Therefore, the combined baseline and operational traffic BNL is predicted to be lower than the 2028 and 2043 baseline at receptors 1 and 2.

The sound pressure levels due to the projected Knocknamona Crescent traffic flows indicate that Receptors 3, 6,7 and 8 are predicted to experience an increase in L_{10} greater than 3 dB. Receptor 7 is predicted to experience the highest increase in L_{10}, with 2028 base and development traffic 5.9 dB higher than the predicted 2028 base and 2043 base and development traffic 5.4 dB higher than the predicted 2043 base.

It is generally accepted that it takes an approximate 3 dB(A) increase in noise levels to be perceptible to the average person, therefore the likely effect of traffic noise increases on all other roads local road network will be imperceptible.

All other road links considered in the traffic assessment are predicted to experience an AADT 18hr increase of 5.4 % or less. The TII guidelines state that it takes a 25% increase or a 20% decrease in traffic flows in order to get a 1 dBA change in traffic noise levels. On this basis, the change in traffic noise levels associated with all other road links during the operational phase of the proposed development will be significantly less than 1dB(A).

The magnitude of impact due to operational traffic noise associated with the proposed development is 'Low' at all receptors, with the exception of receptors 3, 6, 7 and 8 where the noise impact is 'Medium'.

9.4.2.5 Car Parking Noise Impact Assessment

The proposed development has 205 car parking space capacity. Cars manoeuvring at slow speeds within car parks do not generate significant levels of noise, but higher noise levels are produced, albeit briefly, by closing of car doors and car engines starting up and vehicles initially pulling off.

There is no specific guidance in relation to car parking noise. Operational car park noise is not covered in the scope of BS 4142:2014+2019. The L_{Aeq} and L_{AMax} due to car parking events has been estimated below and assessed against the absolute criteria in BS8233/WHO, with reference to the existing background sound pressure level as per BS4142.

The closest car parking to a residential property is the main pavilion car park which has 92 spaces + 1 layby adjacent the upper entrance for disabled people; receptor 93 located approximately 20m from the closest car parking space.

The car park adjacent to the five aside pitches has 26 spaces, with receptor 2 the closest residence at approximately 45m from the closest parking space.

The air-dome car park has 86 parking spaces, with the closest receptor at a distance of some 200m from any parking space.

9.4.2.5.1 Car Park L_{Aeq} Predictions

Using a measured LAE value of 59 dB @ 10m for car doors being closed (free-field) and 57 dB(A) @ 10m for a car engine being started and driving off (free-field), which combined is 61 dB(A) @ 10m, the calculation formula is as follows:

$L_{Aeq,1\ hour}$ = LAE -10log(T)+10log(N)

Where N is the number of events over the 1-hour period and T is the number of seconds in an hour.

Distances of 20m and 45m from the nearest car parking spaces to the dwellings have been assumed. Distance attenuation is calculated by using the calculation 10 Log (distance).

The maximum number of parking events is based on the number of spaces in the pavilion car park (93) and assumes that there are 2 car parking events in a one hour period for each space, but that all spaces are at the closest point to a receptor (20m and 45m). This is very much a worst-case scenario. It is highly unlikely that

the nearest car parking spaces to the dwellings would be the ones used for all parking events and of course this could not happen simultaneously for the different existing noise-sensitive properties.

Predicted noise levels have been calculated for 20m and 45m distances based on the following assumptions:

- Scenario 1: 50 car park events over a one-hour period;
- Scenario 2:100 car park events over a one-hour period;
- Scenario 3: 186 car park events over a one-hour period (very worst case).

These calculations assume that a car park event includes a car door being closed and a car engine being started and driving off at the closest parking space to receptor 2 (45m from car park) and receptor 93 (20m from car park). The predicted external car parking L_{Aeq} noise levels are shown in Table 9.26.

Table 9.26: Predicted External Car Parking Noise Levels (dB L_{Aeq}) at Nearest Existing Noise-Sensitive Receptors

Distance (m)	Scenario 1	Scenario 2	Scenario 3
20m	39.4	42.4	45.4
45m	35.9	38.9	41.9

Predicted car park noise levels are less than existing daytime (Lowest recorded L_{A90} measurement) of 49 dB for scenarios 1- 3.

Although the proposed development will operate during the daytime only, it is possible that the car park may be used prior to 07:00hrs or after 23:00hrs, for example by staff arriving for or leaving after a work shift. As such, the noise impact of car park use at night have been assessed.

At night, it is the internal BS8233 and WHO night-time criteria of 30 dBA applies. Assuming an open window providing 10-15 dB attenuation, internal sound pressure levels in the closest bedrooms are predicted to be between 20.9 – 29.4 dBA (scenario 1) 23.9 – 32.4 dBA (scenario 2) and 26.9 – 35.4 dBA (scenario 3) due to car events in the car park at receptors 2 and 93. With the exception of the worst-case scenario 3, the predicted levels are not expected to exceed the internal criteria.

It is unlikely that the worst-case scenario considering all car parking spaces in use will be applicable, particularly at night. The highest predictions shown in Table 9.26 assume that all car events take place at the closest parking space to receptor 93. If the car park is used during the night-time period, there is likely to be a lower volume of car movements than has been assumed for this assessment and a distribution of any car movements across the site. Therefore, actual sound pressure levels at receptors are likely to be lower than those predicted.

9.4.2.5.2 Car Park L_{AMax} Predictions

Peaks of noise measured in terms of L_{Amax}, could have an effect depending on the levels at the dwellings and the number of events. Noise levels from closing car doors and people talking could range from 60 – 70 dB L_{Amax} resulting in 34-44 externally at 20m distance.

A distance of 20m and m have been used for prediction purposes. Distance attenuation is calculated by using the calculation 20 Log (distance).

Table 9.27 below summarises the predicted car park noise levels (L_{Max}) at the nearest existing noise-sensitive receptors.

Table 9.27: Predicted Car Park Noise Levels (L_{Max}) at Nearest Existing Noise-Sensitive Receptors

Distance (m)	Distance Attenuation	Predicted External Receptor Noise Level (Based on car doors closing /people talking 60 dB $L_{Amax\ at}$ 1m)	Predicted External Receptor Noise Level (based on car doors closing /people talking 70 dB $L_{Amax\ at}$ 1m)
20	26	34	44
45	33	27	37

Taking into account the sound reduction of a partially open window (10-15dB); the range of predicted L_{Amax} noise levels would be 19 - 34 dB and 12 - 27 dB internally, based on the car park activity events taking place at the proposed parking bays assuming 20m and 45m distance from existing residential properties respectively.

Although there is no daytime L_{Amax} criteria within WHO guidance, an equivalent daytime L_{Amax} level can be surmised by applying the night-time L_{Aeq} to L_{AMax} correction factor of 15 dB. The WHO/BS8233 daytime external L_{Aeq} criterion level is 50-55 dB LAeq. Therefore, an indicative L_{AMax} equivalent would be 65 dB. The maximum predicted L_{AMax} due to car parking is a minimum of 21 dB below this level.

The car parking facilities within the proposed development will be in use primarily during the day. As it is possible that night-time use may be required by staff, night-time scenarios have also been considered, however these are very much worst-case.

Suitable targets for controlling peak noise events inside dwellings are generally accepted to be controlling and for this level to be exceeded typically no more than 10 - 15 times per night. This is based in WHO 'Guidelines for community noise' (1999) research. On this basis, any peak noise events at the nearest residential properties would be below 45 dB L_{Amax}.

The results of the assessment of car parking noise indicate that the magnitude of impact will be Low for all receptors.

9.4.2.6 Significance of Effects

The significance of effects has been determined based on the Magnitude of Impact for each aspect of operational noise which has been assessed and the receptor sensitivity. A summary is shown in Table 9.28

Table 9.28: Determination of Significance of Effects

Noise Source	Magnitude of Impact	Significance of Effect
Plant and Equipment	Negligible/Low	Minor
External Sports Facilities	Low/Medium	Minor
Operational Traffic	Low/Medium	Minor/Moderate
Car Parking	Low	Minor

The impact assessment of noise from external sports facilities found a 'Low' impact at the majority of receptors but indicated a potential 'Low/Medium' magnitude of impact at several receptors due to elevated L_{AMax} sound levels. The overall significance of effect was found to be 'Minor', due to the likely infrequency of these elevated levels at the affected properties.

The impact of operational traffic was found to be 'Low' at all receptors, with the exception of receptor 3. This receptor is located adjacent to the entrance to the proposed development and will experience a notable increase in daytime sound pressure levels due to operational traffic arriving and leaving the facility. As such, the significance of effect was found to be 'Moderate' at receptor 3 and 'Minor' at all other receptors.

The significance of effect for both plant and equipment noise and car parking is expected to be 'Minor'.

9.4.3 Assessment of Cumulative Effects

A planning history search identified planning applications in the vicinity of the proposed development with the potential for cumulative effects; these are detailed in Chapter 1. The results of the search identified several developments which would include additional noise-sensitive receptors within the vicinity of the proposed development. None of the noise-sensitive receptors associated with the planning applications identified in the planning history search would be located closer to the proposed development boundary of, or any noise sources associated with the proposed development. As such, the effects of the proposed development on these proposed additional receptors would be lower than those considered within this noise and vibration chapter. As such, no additional assessment of cumulative noise and vibration effects is required.

9.4.4 Inter-relationships

The assessment of noise due to construction and operational traffic has been informed by Chapter 19: Traffic and Transport.

Where noise mitigation recommendations include installation of acoustic barriers close to noise-sensitive receptors, there is a potential relationship with Chapter 6: Landscape and Visual, as the visual impact of acoustic barriers bears consideration.

9.5 Mitigation

9.5.1 Construction Phase

Worst-case construction noise predictions can be reduced through use of appropriate mitigations as detailed below in Section Construction Mitigation.

BS 5228-1 states that:

> "…*if the site noise level exceeds the appropriate category value, then a potential significant effect is indicated. The assessor then needs to consider other project specific factors, such as the number of receptors affected and the duration and character of the impact, to determine if there is a significant effect*."

These factors have therefore been considered to determine the effect significance.

As a summary of proposed construction works:

1. Construction works will be temporary and limited in duration;
2. Construction plant and machinery has been assessed as operating for the full working period of the day, i.e. 100% duty cycle. Due to natural pauses in activity and rest breaks equipment will not be fully operational during the working day; and
3. Construction works are not proposed to occur during night-time or on Sundays, unless for emergency works. Therefore, there will be no associated construction noise impact during these times at construction noise receptors.
4. Temporary construction noise barriers will be used to achieve attenuation of noise levels between ground based construction plant and the nearest noise sensitive properties.

Construction Environmental Management Plan

The Outline Construction Method Statement (OCMS) and Outline Construction Environmental Management Plan (OCEMP) appends this EIAR and includes recommended construction noise mitigation. A final Construction Environmental Management Plan (CEMP) will be prepared by the successful Contractor after Contract Award and provided by Donegal County Council.

The Planning Schedule of Conditions should include any requirement for a CEMP and other relevant documentation such as a Traffic & Navigation Management Plan (TNMP) and Noise Management Plan, if required, prior to construction commencing, as agreed with Donegal County Council.

During the construction phase, the methods of working will comply with all relevant legislation and best practice in reducing the environmental impacts of the proposed works. By their nature, construction phase impacts will be short-term and localised. These impacts will be reduced as far as practicable through compliance with the mitigation measures identified within this EIAR and the relevant industry standards and guidelines.

A detailed Construction Environmental Management Plan, including specific Noise Management Plan will be undertaken by final appointed contractor of the Proposed Scheme. The CEMP and subsequent noise management plan will set out the mitigation measures that will be employed to reduce the noise and vibration impacts of the development during the construction phase.

Specific Construction Noise Mitigation

Construction mitigation measures will be put in place to ensure construction noise levels are attenuated and reduced where necessary.

Best practice measures will be employed to ensure that construction phase noise levels are reduced to the lowest possible levels.

BS5228:2009+A1:2014 – Noise and vibration control on construction and open sites outlines a range of measures that can be used to reduce the impact of construction phase noise on the nearest noise-sensitive

receptors. These measures will be applied by the contractor where appropriate during the construction phase of the proposed development. Construction best practice measures which will be implemented included below:

1. Ensuring that mechanical plant and equipment used for the purpose of the works are fitted with effective exhaust silencers and are maintained in good working order;
2. Careful selection of quiet plant and machinery to undertake the required work where available;
3. Machines in intermittent use will be shut down in the intervening periods between work;
4. Ancillary plant such as generators, compressors and pumps will be placed behind existing physical barriers, and the direction of noise emissions from plant including exhausts or engines will be placed away from sensitive locations, in order to cause minimum noise disturbance. Where possible, in potentially sensitive areas, temporary construction barriers or enclosures will be utilised around noisy plant and equipment;
5. Handling of all materials will take place in a manner which minimises noise emissions; and
6. Audible warning systems will be switched to the minimum setting required by the Health & Safety Executive.

In addition to the general mitigation measures above, the following specific mitigation measures are recommended for rock breaking activities:

7. Pneumatic concretebreaker, rock drills and tools should be fitted with suitably designed muffler or sound reduction equipment to reduce noise without impairing machine efficiency;
8. Ensure all leaks in air line are sealed
9. Where applicable, use damped bits/damping pads to eliminate ringing;

The use of the proposed construction noise mitigation measures will ensure that construction noise levels are controlled to the lowest levels practicable.

9.5.2 Operational Phase

9.5.2.1 Plant and Equipment

Specification is not yet available for the Air Handling Unit (AHU) for the pavilion and the air-dome. It is understood that the AHU for each facility will be housed within an internal plant room. As the element of the AHU system most likely to impact noise-sensitive receptors, it is recommended that the AHU air intakes are fitted with silencers.

Although the diesel generator will be used as a standby for emergencies situations only, it is recommended , as good practice, that the exhaust is fitted with a silencer to reduce potential noise impact.

Use of the emergency generator during the evening and night-time period should be avoided and any operation that may be required for testing or for maintenance purposes should be undertaken during the daytime period only.

9.5.2.2 Spectator Noise

Although there is no dedicated spectator area at the five-aside pitches, the car park and walkway adjacent to these pitches is in close proximity to receptor 2. As such, it is recommended that an acoustic barrier with height of 2.5 m is constructed along the boundary of the proposed development to the west of the five-aside pitches. The indicative extent of all recommended acoustic barriers, which will mitigate the impact of various aspects of operational noise, is shown in Volume II Figure 9.10.

The Sport England AGP Acoustics guidance suggests some additional general mitigation measures which may be considered for the proposed development. The guidance suggests that:

"Some users may act in an unreasonable manner resulting in higher noise levels and a management/monitoring plan could be developed to effectively respond to specific incidents.

Similarly, the restriction of use to authorised groups could be appropriate in many situations."

9.5.2.3 Car Parking and On-Site Traffic

The main pavilion and 4G pitch parking is located approximately 25 m from receptor 93 and the five-aside car park is in close proximity to receptor 2. Erection of an acoustic barrier with a height of 2.5 m is recommended to reduce noise impact due to car events within the main car park and five-aside pitches car park on the closest receptors. The recommended location and extent of the acoustic barrier is shown in Volume II Figure 9.10

With the recommended mitigation, the impact of noise from car parking and on-site traffic would reduce to 'Low'.

The impact of noise operational traffic is predicted to have the highest impact at receptor 3. As such, it is recommended that an acoustic barrier is provided, as shown in Volume II Figure 9.10.

9.5.2.4 Sports Pitches and Hurling Wall

It is recommended that, where fencing surrounds pitches for the purpose of containing balls/sliotars etc, that materials are selected to minimise radiating noise when struck. For example, where weldmesh fencing is used, panels should be securely clamped with resilient fixings to avoid vibrations.

Sheet metal signage should be avoided in favour of soft vinyl signs, to reduce impact noise. Similar consideration should be given to the selection of materials and design of 'dug out' shelters etc.

Assessment of noise from hurley matches identified a potential for elevated L_{AMax} sound pressure levels at some receptor 93 and other receptors on Hazelwood Drive. Such elevated levels are unlikely to occur frequently, however, due to the proximity of receptors to the pitch, it is recommended that an acoustic barrier is erected with height of 2.5 m to preserve the enjoyment of outdoor amenity spaces. The recommended location and extent of the acoustic barrier is shown in Volume II Figure 9.10.

Implementation of the above recommendations will reduce the magnitude of impact of noise from sports pitches and the hurling wall from 'Low/Medium' to 'Low'.

9.6 Residual Impact

9.6.1 Construction Phase

Pre-mitigation, the predicted construction noise impacts are anticipated to result in effects ranging from negligible to major at construction noise receptors. The final Construction Environmental Management Plan (CEMP) will include specific noise and vibration control measures and construction noise monitoring may be requested by Donegal County Council, if deemed necessary. Mitigation by careful scheduling of the works, timing of activities and using best practicable will be implemented such that no significant effects arise, and levels are as low as possible.

Residents will be informed of the timing and duration of activities that may produce high noise. Elevated levels can be tolerated if prior notification and explanation is given. Temporary slight adverse impacts due to construction noise have been identified at the closest receptors to proposed construction works. No permanent residual noise and vibration impacts are predicted during construction of the proposed development. With construction mitigation measures in place the noise impact of construction activities is predicted to be reduced to temporary minor / moderate.

9.6.2 Operational Phase

The proposed mitigation measures, including the installation of acoustic barriers are expected reduce the received sound pressure levels at receptors sufficiently to equate to a 'Low' magnitude of impact.

9.7 Summary of Effects & Conclusion

The residual effects have been reassessed following implementation of the recommended mitigation measures. The resultant significance of effects is summarised in Table 9.9

Table 9.29: Determination of Significance of Effects

Noise Source	Magnitude of Impact	Significance of Effect
Plant and Equipment	Low	Minor
External Sports Facilities	Low	Minor
Operational Traffic	Low	Minor
Car Parking	Low	Minor

Using the significance criteria adopted for this assessment together with professional judgement, the noise and vibration effects are considered to be 'low' overall, with a minor significance of effect.

9.8 Limitations of the Assessment

The assessments carried out in this noise and vibration chapter have been based on the latest information made available to RPS. In the absence of available data and where appropriate, assumptions have stated and relied upon in the calculation of noise impacts.

9.9 References

- Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014);
- World Health Organisation (WHO) – Guidelines for Community Noise (1999);
- British Standard BS4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound;
- Design Manual for Roads and Bridges Volume 11, Section 3, Part 7, LA 111 Noise and Vibration;
- Calculation of Road Traffic Noise (CRTN) - Department of Transport Welsh Office 1988;
- British Standard BS 8233:2014 Sound Insulation and Noise Reduction for Buildings – Code of Practice;
- Sport England Artificial Grass Pitch (AGP) Acoustics –Planning Implications (New Guidance for 2015)
- British Standard BS5228: 2009+A1:2014, Code of Practice of Noise and Vibration Control on Construction and Open Sites; and
- Environmental Protection Agency (EPA) Office of Environmental Enforcement (OEE) - Guidance Note for Noise: Licence Applications, Surveys and Assessments in Relation to Scheduled Activities (NG4) (2016);
- British Standards BS 7445-1:2003 Description and Measurement of Environmental Noise – Part 1: Guide to Quantities and Procedures (BS, 7445-1);
- ISO9613: Attenuation of Sound during Propagation Outdoors Part 2 General Method of Calculation

10 AIR QUALITY

10.1 Introduction

This chapter of the EIAR sets out the proposed methodology for assessing the impact on air quality from the construction and operation of the proposed Letterkenny Sports Hub Scheme. It considers air quality within the proposed development and provides information on the key receptors that have the potential to be subject to likely significant effects resulting from the proposed development, and how that assessment is to be conducted. Air Quality relates to pollutants with potential to affect human health and ecosystems at a local level (this includes a construction phase dust and emissions assessment).

Potential effects to air quality may arise during the construction phase, such as from the generation of dusts and from traffic. The construction activities have been examined to identify those that have the potential for air emissions. Each of these potential sources has been identified and emissions have been evaluated using standard procedures.

Please refer to Volume III Technical Appendices - Appendix 10.A for operational dispersion modelling, inputs, outputs and technical details.

10.2 Methodology

10.2.1 Relevant Guidance

Assessment of the significance of emissions to air is made with reference to limit values established in the latest EU legislation, the Clean Air for Europe (CAFE) Directive (2008/50/EC) (European Parliament, 2008) which was transposed into Irish law in 2011 (S.I. No. 180 of 2011).

To establish baseline conditions, the following key sources of information were referred to as part of the assessment on air quality:

- Air Quality Standards Regulations 2011 (S.I No. 180/2011);
- Clean Air for Europe (CAFE) Directive (2008/50/EC) (European Parliament, 2008);
- World Health Organisation Air Quality Guidelines 2005 (WHO, 2005);
- Environmental Protection Agency - Air Quality in Ireland 2021 (EPA, 2022); and,
- Donegal County Development Plan 2018-2024 (DCC, 2018).

10.2.1.1 Air Quality Standards Regulations 2011 (S.I. 180 of 2011)

The Air Quality Standards (AQS) set out in Air Quality Directive (2008/50/EC) and S.I. No. 180 of 2011 are shown in Table 10.1. The AQS are based on the effects of pollutants on human health, although other factors such as effects on vegetation and ecosystems are also considered.

Table 10.1: Limits as Specified in Air Quality Standards Regulations 2011 (S.I. 180 of 2011)

Pollutant	Criteria	Value
Nitrogen Dioxide	Hourly limit for protection of human health – not to be exceeded more than 18 times/year	200 µg/m^3
	Annual protection of human health	40 µg/m^3
	Annual limit for protection of vegetation	30 µg/m^3
Benzene	Annual limit for protection of human health	5 µg/m^3
Carbon Monoxide	Minimum daily 8-hour running system	10 µg/m^3
Lead	Annual limit for protection of human health	0.5 µg/m^3
Sulphur Dioxide	Hourly limit for protection of human health – not to be exceeded more than 24 times/year	350 µg/m^3

Pollutant	Criteria	Value
	Daily limit for protection – not to be exceeded more than 3 times/year	125 µg/m3
	Annual limit for protection of vegetation	20 µg/m^3
Particulate Matter PM_{10}	Hourly limit for protection of human health – not to be exceeded more than 35 times/year	50 µg/m^3
	Annual limit for protection of human health	40 µg/m^3
Particulate Matter $PM_{2.5}$	Annual target value for the protection of human health	20 µg/m^3

10.2.1.2 World Health Organisation Air Quality Guidelines

In addition to the statutory limits for the protection of human health listed in Air Quality Standards Regulations (S.I. 180 of 2011), the World Health Organisation (WHO) has published a set of air quality guidelines for the protection of human health.

The key publication is the "WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulphur dioxide, Global update 2005 Summary of risk assessment". The WHO guidelines are based on reducing the risk to human health and in some cases the levels differ from the EU statutory limits as these limits are based on balancing health risks with technological feasibility, economic considerations and various other political and social factors in the EU.

The 2005 WHO guidelines are presented in Table 10.2 and illustrate that while the NO_2 levels are analogous to those in S.I. 180 of 2011 (excluding the tolerance levels for the 1-hour averages), the annual average PM_{10} and $PM_{2.5}$ levels specified by the WHO are half those specified in the legislation. The WHO note that these are the lowest levels at which total, cardiopulmonary and lung cancer mortality have been shown to increase with more than 95% confidence in response to long-term exposure to $PM_{2.5}$. The EPA has called for movement towards the adoption of these stricter WHO guidelines as the legal standards across Europe and in Ireland.

Table 10.2: WHO 2005 Air Quality Guidelines

Pollutant	Criteria	Value
Nitrogen Dioxide (NO_2)	Hourly limit for protection of human health	200 µg/m^3
	Annual protection of human health	40 µg/m^3
Sulphur Dioxide (SO_2)	10-minute level for protection of human health	500 µg/m^3
	Daily level for protection of human health	20 µg/m^3
Particulate Matter (PM_{10})	24-hour level for protection of human health	50 µg/m^3
	Annual level for protection of human health	20 µg/m^3
Particulate Matter ($PM_{2.5}$)	24-hour level for protection of human health	25 µg/m^3
	Annual level for protection of human health	10 µg/m^3

10.2.1.3 Air Quality in Ireland 2020

Particulate Matter

Particulate matter levels in 2020 continue to be a concern in villages, towns and cities. All solid fuels (e.g., coal, peat and wood) produce fine particulate matter emissions when burned in open fires or stoves. Fine particulate matter in our air greatly impacts respiratory and cardiovascular health. This is particularly problematic in or near villages, towns and cities because of the cumulative effects of multiple sources of the pollutant and the large numbers of people exposed.

Monitored levels of particulate matter were above WHO air quality guideline values at 38 of the 67 monitoring stations, across Ireland. (Table 10.3 outlines the overall compliance for all pollutants). Most of these were as a result of pollution from the burning of solid fuel for home heating.

Nitrogen dioxide

Monitored nitrogen dioxide levels were much reduced in 2020 when compared to previous years. Reductions of up to 50% compared to 2019 were observed at many traffic-oriented monitoring stations. Recent figures from the Central Statistics Office (CSO) show that traffic volumes have not yet returned to pre-Covid-19 levels,

but 2021 traffic levels are not significantly less than 2019 levels. If there is a return to these pre-COVID traffic levels in 2022 some locations could face exceedances of the nitrogen dioxide EU limit value in Ireland's cities.

Table 10.3: Pollutants Measured in 2020 and their Adherence to EU Legal Limit Values and WHO Air Quality Guideline Values

Pollutant	Number of stations where parameter monitored 2020	EU legal limit values	WHO Air Quality Guideline (AQG) level or EEA reference level
PM_{10}	67	No Exceedances	Above annual WHO AQG value at 1 station. Above daily WHO AQG value at 14 stations
$PM_{2.5}$[1]	64	No Exceedances	Above annual WHO AQG value at 9 stations. Above daily WHO AQG value at 34 stations
NO_2	27	No Exceedances	Below WHO AQG values
Ozone	18	No Exceedances	Above WHO AQG value at 17 stations
Sulphur Dioxide (SO_2)	14	No Exceedances	Above WHO AQG value at 3 stations
PAHs	5	No Exceedances	Above EEA reference level at 4 stations
Heavy Metals	5	No Exceedances	N/A
Dioxins[2]	22	No Exceedances	N/A
All other Pollutants		No Exceedances	

Sources of Pollution

Domestic use of solid fuel, such as coal, peat and wood, is having a negative impact on air quality.

The use of solid fuels, such as coal, peat and wood, for home heating has been identified by EPA-funded Irish research as the leading contributor to $PM_{2.5}$ concentrations in Irelands cities, towns and villages. This pollutant is the most problematic in Ireland from an air quality point of view and it has the most health-impacts. Especially problematic is the use of so-called smoky fuels such as smoky coal, wet wood and peat.

Although pollution from transport was dramatically reduced in 2020 because of changes adopted and imposed during the COVID-19 pandemic, it is expected that once again exceedances of EU limit values for NO_2 if traffic numbers return to pre-2020 levels. Monitoring and modelling by the EPA indicate that exceedances will occur at more locations in the future if a return to typical transport patterns and modes of transport is made.

In terms of ambient air quality, the main source of NO_2 in towns and cities is road transport. Diesel engine vehicles produce more NO_2 than petrol vehicles. Other sources of NO_2 in Ireland include:

- off-road machinery (for example, earth movers and lawnmowers);
- industrial and construction activities; and
- electricity and heat production equipment such as central heating boilers and generators.

[1] *Ireland successfully achieved its 10% National Exposure Reduction Target (NERT) for $PM_{2.5}$ in 2020. The NERT is a requirement under EU ambient air quality legislation.*

[2] *Dioxins monitoring is not carried out at 'monitoring stations' but taken as samples in milk from selected creameries across Ireland*

Conclusions and Proposed Actions

Particulate Matter

Figure 10.1 shows the average concentrations of $PM_{2.5}$ by hour of day, at selected monitoring stations in Ireland for 2020. This graph clearly shows that the times of high concentrations of $PM_{2.5}$ coincide with times that people typically light fires and burn solid fuel to heat their homes (16:00 – 23:00).

Figure 10.2 shows the average concentrations of $PM_{2.5}$ by month of the year, at selected EU-level monitoring stations for 2020. This graph shows the impact of the 'winter heating season' on concentrations of fine particulate matter. The winter heating season is considered to run from October to March and is the period of the year when solid fuel burning for home-heating is more common.

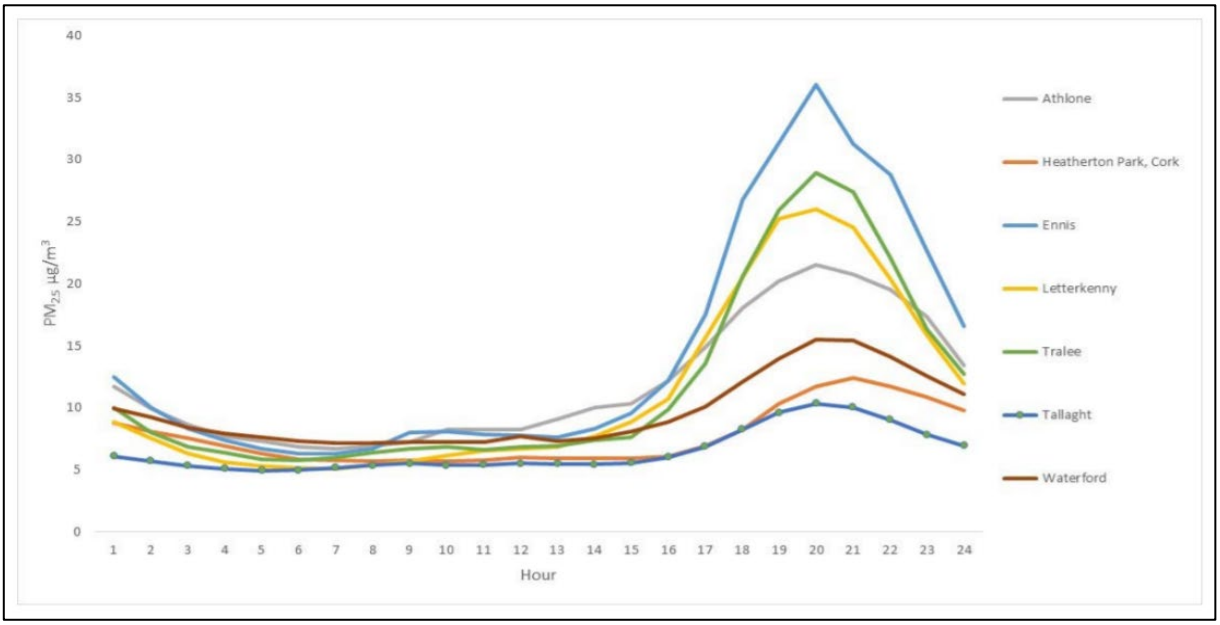

Figure 10.1: Average Concentrations of $PM_{2.5}$ by Time of Day at Selected Monitoring Stations in Ireland in 2020 *(Source: Air Quality in Ireland 2020)*

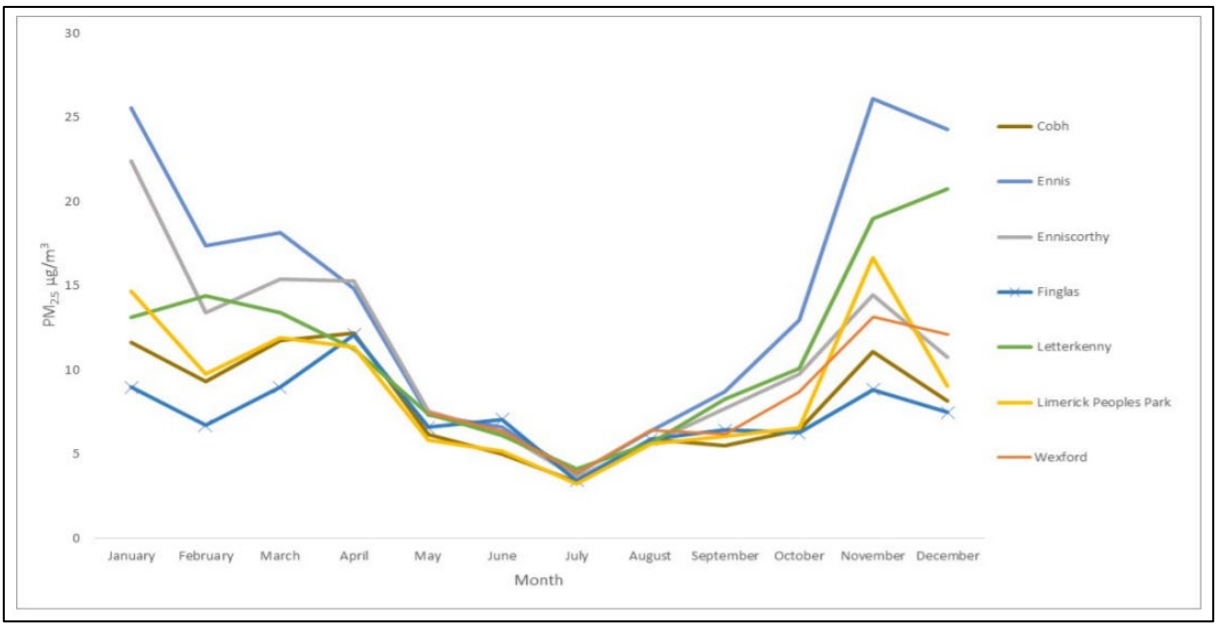

Figure 10.2: Average Concentrations of $PM_{2.5}$ by Month of Year at Selected Monitoring Stations in Ireland in 2020 *(Source: Air Quality in Ireland 2020)*

The Government has announced that new regulations on the use of solid fuels will come into force in 2022 – all coal products sold will be required to be low-smoke and all wood sold for immediate use must have a moisture content of 25 per cent or less. This is a positive step for air quality, which will need to be supported by clear communications to ensure public engagement and the best outcome for air quality and health. The 'ABC for Cleaner Air' campaign, launched by the Department of Environment, Climate and Communications, highlights some simple steps people can all make and help reduce pollution from solid fuels. Air quality considerations also need to be integrated into planning decisions at national and local levels. This includes considering healthier home heating options at the design stage for new homes and large-scale home renovations.

Nitrogen Dioxide

NO_2 was measured at 27 monitoring stations in Ireland in 2020. All concentrations observed were below the annual limit values. The year 2020 was a very unusual one from the point of view of traffic levels and associated pollution from vehicles. Restrictions associated with COVID-19 significantly reduced transport across the country. Reductions of up to 50% in NO_2 concentrations in comparison to previous years were observed at many traffic-oriented monitoring stations.

Key to reducing transport pollution and improving air quality in Ireland is decreasing traffic volumes on roads. Monitoring in 2020 has shown that reduced traffic volumes result in improved air quality. Policy interventions which increase the usage of clean public transport along with the continued efforts to implement a modal-shift to cycling and walking by upgrading infrastructure could play a significant role. The Government's plans to improve electric vehicle (EV) infrastructure and increase the share of EVs in transport fleets, as indicated in the Climate Action Plan, would lead to reductions in NO_2 emissions with associated health benefits. The joint Departmental working group on Urban Transport Related Air Pollution (UTRAP) together with the Department of Transports Cities Demand Management study will identify solutions for Dublin and major urban centres.

10.2.2 Study Area

The study area for this assessment is the full extent of the development site and considered Letterkenny in the wider context. The site is located in a mixed area of development to the north of Letterkenny Town, Co. Donegal. The western perimeter of the site is bound principally by residential estates which are accessed from the Kilmacrenan Road (N56). The southern/eastern boundary of the site adjoins the N56 to the south of the site (recently constructed distributor road), agricultural fields, an IDA premises and the council-run civic amenity centre. A water course runs along the easternmost section of the site. The north-western boundary bounds a residential development while the northernmost section perimeter bounds agricultural fields.

10.2.3 Baseline

Atmospheric pollution in the vicinity of the proposed development is largely dominated by road traffic exhaust fumes and commercial and residential emissions. Changes in road traffic associated with any development have the potential to impact on concentrations of air pollution during construction and operational phases. Vehicular transport sources account for a large proportion of the emissions of several air pollutants, although most of the pollutants emitted by road vehicles are also produced by a wide range of industrial, commercial and domestic processes.

The current state of the environment in terms of baseline air quality has been determined from the data from the EPA monitoring Zone C (Other cities and large towns) network to determine compliance with relevant ambient air legislation, as detailed further in Section 10.3 below.

10.2.4 Assessment Criteria and Assignment of Significance

Table 10.4 describes sensitivity of receptor and may be used in an EIAR to ensure a standardised approach. In this instance the construction phase assessment presented in this chapter employs standards and criteria set out in the IAQM guidance document (IAQM Guidance on the Assessment of Dust from Demolition and Construction, 2014). The standard approach in Table 10.4 and Table 10.5 are presented for completeness.

Table 10.4: Definitions of Sensitivity or Value

Sensitivity	Example Descriptor
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Table 10.5: Definitions of Magnitude

Sensitivity	Example Descriptor
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse).

	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

Both sensitivity/value and magnitude are considered in determining the significance of effect. The points below define significance based on:

- Reference to IAQM Guidance on the Assessment of Dust from Demolition and Construction, 2014;
- Reference to TII Air Quality Assessment of Proposed National Roads – Standard, December 2022; and,
- Professional judgement based on extensive air quality assessment.

10.2.5 Significance of Effects

To describe the air quality effects of the proposed scheme at sensitive receptors, the following shall be considered in the Air Quality Assessment as defined in the EPA's Guidelines on the information to be contained in Environmental Impact Assessment Reports' (EPA, 2022) including:

- Quality of Effects;
- Describing the Extent and Context of Effects;
- Describing the Probability of Effects;
- Describing the Duration and Frequency of Effects; and
- Describing the significance of Effects.

Factors to consider when determining the overall significance of the proposed scheme are detailed below, according to TII Guidelines:

- Number of people affected by increases and/or decreases in concentrations and a judgement on the overall balance;
- The number of people exposed to levels above the standard;
- Whether or not the exceedance of a standard is predicted to arise in the study area where none existed before, or if the size of an exceedance area is substantially increased;
- Whether or not the study area exceeds a standard and this exceedance is removed, or the size of the exceedance area is reduced;
- Uncertainty, including the extent to which worse-case assumptions have been made; and
- The extent to which a standard is exceeded e.g. an annual mean NO_2 of 41 µg/m^3 shall attract less weight in the determination of significance than an annual mean of 51 µg/m^3.

The assessment of significance will be based on the matrix in Table 10.6.

Table 10.6: Assessment of Significance Matrix

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major

High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very high	No change	Minor	Moderate or Major	Major or Substantial	Substantial

The broad definitions of the terms used within the assessment significance are defined as follows:

- ***Substantial***: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
- ***Major***: These beneficial or adverse effects are very important considerations and are likely to be material in the decision-making process.
- ***Moderate***: These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
- ***Minor***: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.
- ***Negligible***: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

10.3 Baseline Environment

10.3.1 Primary Atmospheric Pollutants

Atmospheric pollution in the vicinity of the proposed development is largely dominated by road traffic exhaust fumes and commercial and residential emissions. Therefore, the primary contaminants of concern identified were Nitrogen Oxides (NO_X) and Particulate Matter (PM_{10} and $PM_{2.5}$). NO_X is primarily produced during combustion at high temperatures with contributions from traffic, residential heating, and industry. PM_{10} are particles in air with diameters of 10µm (microns) or less. These particles can consist of direct emission from combustion engines and burning solid fuels, while natural sources can be windblown salt, plant spores, and pollens. $PM_{2.5}$ or fine particulate matter is composed of varying components depending on its source but can include nitrates, sulphates, volatile organic compounds (VOCs), metals and soil or dust particles.

10.3.2 EPA Air Quality Zone

Air quality legislation in Ireland deals with air quality by means of "zones" based on population. For Ireland, four zones are defined, and the main areas defined in each zone are:

- Zone A: Dublin Conurbation.
- Zone B: Cork Conurbation.
- Zone C: Other cities and large towns comprising Galway, Limerick, Waterford, Clonmel, Kilkenny, Sligo, Drogheda, Wexford, Athlone, Ennis, Bray, Naas, Carlow, Tralee, Dundalk, Navan, **Letterkenny**, Celbridge, Newbridge, Mullingar, Balbriggan, Greystones, Leixlip and Portlaoise.
- Zone D: Rural Ireland, i.e., the remainder of the State excluding Zones A, B and C.

The proposed development is in Zone C.

10.3.3 EPA Air Quality Monitoring

The following monitoring location is relevant to the proposed development site:

- National Air Monitoring Site – Letterkenny

The locations of the monitoring sites are shown in Figure 10.3.

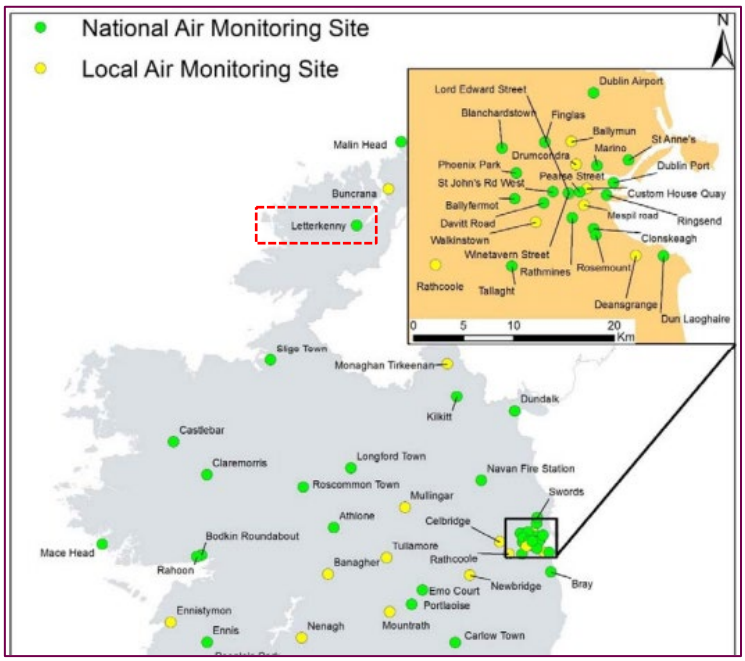

Figure 10.3: EPA Monitoring Sites (EPA, 2020)

The EPA reports real-time results of localised monitoring, providing the public with indicative data on current ambient air quality throughout the country.

Figure 10.4 outlines the ambient SO_2, PM_{10} and $PM_{2.5}$ concentrations recorded between the 1st June of and 19th June 2023 recorded at the Letterkenny monitoring station.

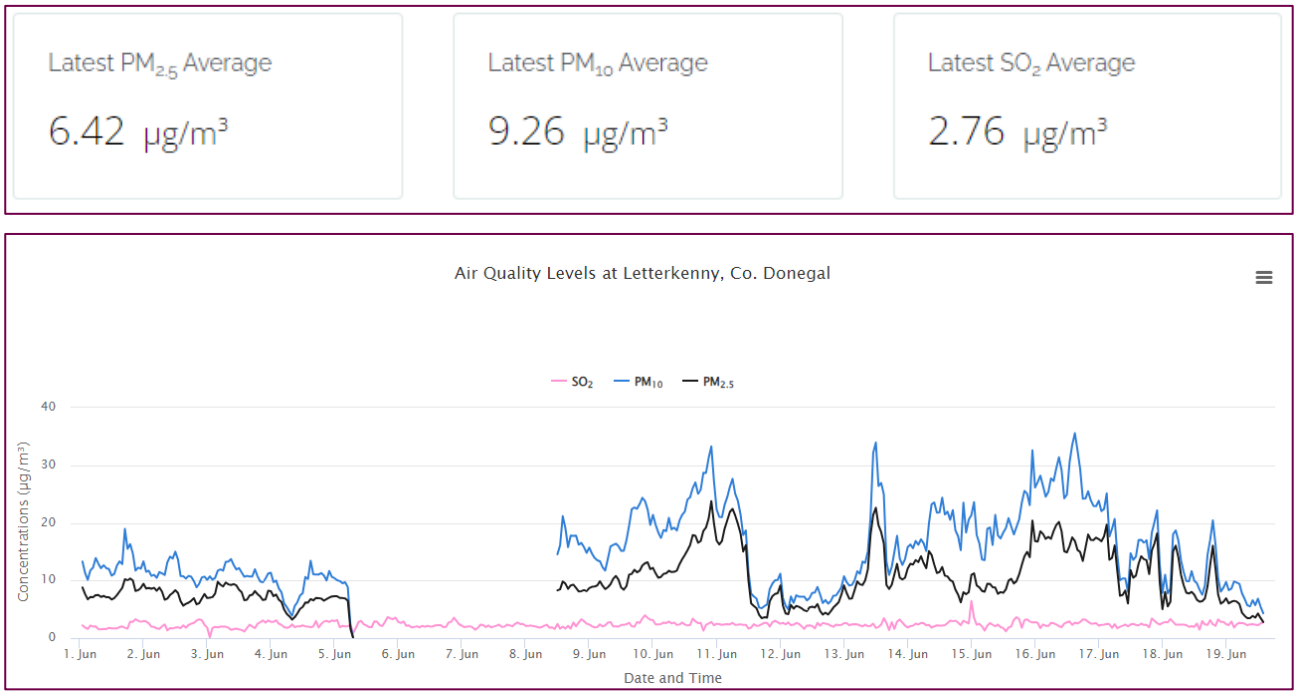

Figure 10.4: Air Quality Levels at Letterkenny, Co. Donegal

10.4 Impact Assessment

10.4.1 Assessment of Construction Effects

The proposed construction phase is fully described in Chapter 2 of this EIAR and includes details of the main tasks.

10.4.1.1 Construction Traffic

Potential air quality effects during the construction phase can occur due to dust emissions and from construction traffic movements. A semi-quantitative approach is recommended to determine the likelihood of a significant impact from dust (nuisance), PM_{10} and $PM_{2.5}$ on human health and on vegetation. The approach should be combined with an assessment of the proposed mitigation measures. The pollutants of most concern in relation to emissions from construction road traffic are nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$) and NO_X and ammonia on sensitive designated habitats.

According to the TII Guidance, where the potential for likely significant air quality effects have been identified, construction phase traffic data shall be screened against the following criteria:

- Road alignment will change by 5 m or more; or
- Annual average daily traffic (AADT) flows will change by 1,000 or more; or
- Heavy duty vehicle (HDV) (vehicles greater than 3.5 tonnes, including buses and coaches) flows will change by 200 AADT or more; or
- Daily average speed change by 10 kph or more; or
- Peak hour speed will change by 20 kph or more.

Due to the nature and scale of the works, as described above, the construction traffic is deemed to be minimal and does not meet the criteria detailed above. In this regard, employing the TII criteria the construction traffic volumes will not be significant and the resultant air quality impact from construction traffic is **negligible.** However, a qualitative assessment is still included for the construction phase of the proposed development and mitigation measures are detailed in this Chapter.

10.4.1.2 Construction Dust

In accordance with the TII Guidelines, where there are construction activities at a development site, there is a risk that dust may cause an impact at sensitive receptors in close proximity to the source of the dust generated. These distances are presented in Table 10.7, as outlined in TII Guidelines.

Table 10.7 TII Assessment Criteria for the Impact of Dust Emissions from Construction Activities (with standard mitigation in place)

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 Construction sites, with moderate use of haul routes.	50m	15m	15m
Minor	Minor Construction sites, with minor use of haul routes.	25m	10m	10m

Source: Appendix 8: Assessment of Construction Impacts taken from "Guidelines for the treatment of Air Quality During the Planning & Construction of National Road Schemes" (TII, 2011)

The proposed development can be considered major in scale and therefore there is the potential for significant dust soiling 100m from the source, as detailed in Table 10.7. There are a number of high sensitivity residential receptors bordering the site working area boundary, some of which are within 100m as can be seen in Figure 10.5 below.

In the absence of mitigation there is the potential for significant, negative, short-term impacts to nearby sensitive receptors as a result of dust emissions from the proposed development.

Figure 10.5: Air Quality Sensitive Receptors

10.4.2 Assessment of Operational Effects

In summary, the following are the operational phase activities with relevance to air quality impact:

- Operational traffic
- Heating Systems
- Emergency Generators

10.4.2.1 Traffic

For the operational phase of the proposed scheme, this chapter focuses on the worse-case year of operation, which is the opening year. Thereafter, as air quality improves, effects are considered to reduce over time. Air quality is anticipated to improve over the next 15 years (long-term) with improvements in vehicle technology and increased penetration of electric vehicles into the vehicle fleet. Further improvements beyond to 60 years, albeit at reduced rates of improvement, will further reduce air quality effects (permanent effects) with reduced numbers of combustion vehicles and further increases in electric vehicles.

There are no significant changes in air quality due to the proposed development. All changes are insignificant. All levels of pollution are within the relevant Irish and European thresholds. Please refer to Appendix 10.A for operational dispersion modelling.

10.4.2.2 Heating System

The heating systems proposed will employ a range of heat pumps and electrical heating systems. There is no intention at this stage to use gas or oil fired combustion heating systems. An Ecodan Air Source Heat Pump is an example of a commercial heating system for the provision of hot water and space heating.

10.4.2.3 Emergency Generators (Proposed P605-3 Generator)

The European Union (Medium Combustion Plant) Regulations 2017 were signed into law in December 2017. Their purpose is to limit emissions to the atmosphere from boilers and other stationary combustion plants in the 1-50 MWTH (thermal input) range. It covers all fuel types. The Regulations transpose the Medium Combustion Plant (MCP) Directive (EU 2015/2193) which was adopted in 2015.

The regulations limit the level of emissions allowable from Medium Combustion Plants (MCP). New MCP are required to comply with specified Emission Limit Values (ELVs) or limits on annual hours of operation, from 20th December 2018, while operators of existing MCPs will not be required to comply with these limits until 2025 at the earliest. This will assist in limiting the impact on human health, vegetation and biodiversity which can be caused by air pollution. The regulations also specify additional requirements such as monitoring and reporting of emissions to the EPA.

Any emergency generators on site will be governed by the appropriate regulations and the assessment of emissions will be included as part of the relevant licensing process.

10.4.3 Assessment of Cumulative Effects

Cumulative effects have been considered in respect of impacts resulting from the accumulation of impacts generated by the proposed development on the same receptors and the impacts potentially arising from adjacent or nearby developments together with those predicted for the proposed development. Cumulative projects are stated in Chapter 1 and are not repeated here.

10.4.4 Inter-relationships

All environmental factors are inter-related to some extent. Interactions within the study area can be one-way interactions, two-way interactions and multiple-phase interactions may be influenced by the proposed development.

An assessment of the interaction between environmental factors are required under Article 3(1)(e) of the EIA Directive –1. The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

- *Population and human health;*
- *Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;*
- *Land, soil, water, air and climate;*
- *Material assets, cultural heritage and the landscape;*
- *The interaction between the factors referred to in points (a) to (d).*

The interactions between impacts on different environmental factors will be considered, addressed and outlined as relevant throughout the EIAR. Air quality is most likely to have an inter relationship with traffic, climate and soils and geology. Chapter 20 is this EIAR details interrelationships between environmental topics.

10.5 Mitigation

10.5.1 Construction Phase

Mitigation measures are divided into general measures applicable to the entire and measures applicable specifically to the defined construction activities (i.e. demolition, earthworks, construction and track-out). As the risk of dust impact on receptors from soiling has been identified to range from medium to high during the demolition stage specifically, the highest risk category should be applied when considering general mitigation measures (IAQM, 2016).

A Dust Management Plan (DMP)[3] will be prepared by the appointed contractor for the site and submitted to the DCC for written agreement prior to commencement of construction. The DMP will at a minimum include the following mitigation measures listed below to minimise and manage potential dust emissions:

10.5.1.1 Communications

With respect to communications, the following will be implemented:

- Develop and implement a stakeholder communications plan that includes community engagement;
- Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the Site Manager;
- Appropriate training will be provided to all staff to ensure that they are aware of and understand the dust control and other environmental control measures; and,
- Display the head or regional office contact information.

To be implemented before works commence on site and training given as appropriate by the appointed contractor.

10.5.1.2 Site Management

With respect to site management, the following will be implemented:

- Daily visual inspections of the site and site boundary for evidence of dust depositions will be made. A dust inspection of the site will be undertaken by a suitable person, trained and nominated by the site manager. Increase frequency of site inspections will be undertaken when activities with a high potential to produce dust are being carried out, such as earthworks activities, power tool use and during prolonged windy or dry condition;
- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner, and record the measures taken;
- Make the complaints record available to the relevant regulatory authorities when asked;
- Record any exceptional incidents that cause dust and/or air emissions, either on or offsite, and the action taken to resolve the situation in an environmental log book;
- Avoid site runoff of water or mud;
- Use covered skips;
- No bonfires and burning of waste materials on site;
- It is recommended that passive monitoring at three - site boundary locations should be completed for the duration of the demolition & earthworks (Bergerhoff method);

[3] These mitigation measures are included as part of the oCEMP for the proposed development. Please refer to Volume III Appendix 2.A.

- Keep surfaces such as site fencing and barriers clean using wet methods.

To be implemented during works as required by the appointed contractor.

10.5.1.3 Earthworks

Earthworks are planned as part of the proposed development including foundations (and associated excavation of soils and materials), creation of stockpiling and cut and fill areas. With respect to earthworks, the following will be implemented:

- Disturbance of the ground will be kept to a minimum wherever possible;
- Soil handling should be restricted during adverse weather conditions such as high winds or exceptionally dry spells – depending on outcome of walk over survey identifying any potential issues;
- Minimise drop heights from loading or handling equipment/materials and use fine water sprays on such equipment wherever appropriate;
- Dampening methods will be used where necessary; and,
- Methods and equipment will be in place for immediate clean-up of spillages of dusty or potentially dusty materials.

To be implemented during earthworks by the appointed contractor.

10.5.1.4 Construction

With respect to construction, the following will be implemented:

- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place;
- Ensure bulk cement and other fine powder materials are delivered in enclosed;
- For smaller supplies of fine power materials ensure bags are sealed after use and stored appropriately to prevent dust;
- Only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. suitable local exhaust ventilation systems; and,
- Cleaning of hard stand areas by personnel only or if required mechanical road sweepers (with water suppressant fitted) to clean any site hard stand area.

To be implemented during construction period by the appointed contractor.

10.5.1.5 Vehicle Movement and Vehicle Emissions

As with any construction site, there are associated vehicle movement, emissions and plant use. With respect to vehicle movement and vehicle emissions, the following will be implemented:

- Implement a wheel washing system until earthworks are completed. Wheel wash system should have an adequate amount of hard surface between it and the site exit;
- Transportation of dusty/fine materials will be conducted in enclosed or sheeted vehicles;
- An onsite speed limit (to be displayed) will be implemented by the main contractor that will be appropriate to the types of construction plant utilised;
- Regular cleaning and maintenance of site roads as appropriate. Hard surface roads should be swept to remove mud and aggregate materials from their surface while any un-surfaced roads will be restricted to essential site traffic only;
- Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary;

- Ensure all vehicles switch off engines when stationary and not in immediate use - no idling vehicles (emissions to air controlled);
- All plant utilised should be regularly inspected (emissions to air controlled);
- Visual monitoring of plant will include: Ensuring no black smoke is emitted other than during ignition (emissions to air controlled);
- Ensuring exhaust emissions are maintained to comply with the appropriate manufacturers limits (emissions to air controlled); and,
- Vehicle exhausts will be directed away from the ground and other surfaces and preferably upwards to avoid road dust being re-suspended to the air.
- Avoid the use of diesel or petrol powered generators where possible, using mains electricity or battery powered items where practicable;
- Impose and signpost a speed limit of 20 km/hr on sealed surfaces and 15 km/hr on unsealed surfaces.

To be implemented throughout by the appointed contractor.

10.5.2 Future Monitoring

Due to the nature and scale of the scheme, no future monitoring beyond the construction phase is required in relation to air quality.

10.6 Residual Impacts

Construction stage impacts will be short duration, and upon completion, will have no further impact on the local environment. Mitigation measures have been outlined to control dust during the construction stage, to minimise the potential for impact. Following implementation of these measures, a short term, and localised minor impact is likely. Having considered the characteristics of the proposed development, the predicted impact from the operational phase on air quality and climate will be positive, slight, long term impact.

10.7 Cumulative and In-combination Impacts

This chapter further considers whether there are significant cumulative effects[4] which are likely to arise as a result of interaction between effects as part of the same project, so as to identify potential secondary, cumulative or synergistic effects. Chapter 1 details the cumulative projects considered in the EIAR.

10.8 Summary of Effects & Conclusion

In relation to air quality, for the construction phase, an important consideration is dust. In the absence of mitigation there is the potential for significant, negative, short-term impacts to nearby sensitive receptors as a result of dust emissions from the proposed development. The mitigation measures provided within this assessment will ensure that the risk of adverse dust effects is reduced to a level categorised as “negligible”. Another important issue during the construction phase is construction traffic but due to the nature and scale of the project the construction traffic volumes will not be significant and the resultant air quality impact from construction traffic is “negligible.”

Pollutant concentrations are predicted to be within the relevant health-based air quality objectives. Therefore, air quality is acceptable at the receptors surrounding the development site, making it suitable for its proposed uses. The operational impact of the proposed development on existing receptors is predicted to be ‘negligible’

[4] Regarding the operational phase, the junction capacity analysis undertaken within the Traffic and Transport Assessment takes into account future cumulative traffic from the wider CLK Masterplan.

taking into account the changes in pollutant concentrations and absolute levels. Using the significance criteria adopted for this assessment together with professional judgement, the operational air quality effects are considered to be 'not significant' overall.

10.9 Limitations of the Assessment

There were no limitations within the air quality assessment.

10.10 References

- Air Quality Standards Regulations 2011 (S.I No. 180/2011);
- Clean Air for Europe (CAFE) Directive (2008/50/EC) (European Parliament, 2008);
- County Donegal Development Plan 2018-2024 (DCC, 2018);
- Environmental Protection Agency - Air Quality in Ireland 2021 (EPA, 2022);
- Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance;
- Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation;
- Met Eireann National Meteorological Service Climate Data;
- Traffic infrastructure Ireland (TII) Air Quality Assessment of Proposed National Roads – Standard, December 2022; and,
- World Health Organisation Air Quality Guidelines 2005 (WHO, 2005).

11 CLIMATE AND GREENHOUSE GASES

11.1 Introduction

This chapter of the EIAR identifies, describes and assesses the impact on climate from the construction and operation of the proposed Letterkenny Sports Hub Scheme. It considers climate features within the proposed development and provides information on the key receptors that have the potential to be subject to likely significant effects resulting from the proposed development, and how that assessment is to be conducted.

Climate relates to emissions of greenhouse gases (GHGs). Climate change will continue to cause impacts on the environment. In this regard, it is appropriate to assess the impact of projects on climate (for example greenhouse gas emissions) and their vulnerability to climate change.

Potential effects to climate may arise during the construction phase, such as from the generation of dusts and from traffic. Each of these potential sources has been identified and emissions have been evaluated using standard procedures.

This chapter has also considered the requirements of the EIA Directive in relation to climate change and has provided:

- A description of the factors in relation to climate (for example greenhouse gas emissions, impacts relevant to adaptation) likely to be significantly affected by the project;
- A description of the likely significant effects of the project on the environment resulting from, inter alia, 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.

Annex IV to the 2014 EIA Directive includes direct reference to climate and climate change in two provisions. The emphasis is placed on two distinct aspects of the climate change issue:

- **Climate change mitigation:** this considers the impact the Project will have on climate change, through greenhouse gas emissions primarily; and
- **Climate change adaptation:** this considers the vulnerability of the Project to future changes in the climate, and its capacity to adapt to the impacts of climate change, which may be uncertain.

11.2 Methodology

11.2.1 Relevant Guidance

The climate assessment will follow the guidance for assessment set out in the following documents:

- Climate Action Plan (2023);
- Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance; and
- Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation.

11.2.1.1 Climate Action Plan 2023

The Climate Action Plan (CAP) 2023 sets out the Government of Ireland's ongoing, urgent response to the climate crisis. The impacts and risks of climate change are becoming more complex and harder to manage. These impacts will be felt by all, but they won't affect everyone equally. In Ireland, these impacts have been experienced, particularly through floods and storms, and the damage they have caused. The Government of Ireland are making steady progress on their climate goals, but events like these, and their expected increase in frequency and intensity, highlight that they must work even harder to ensure the country can cope with the ongoing effects of climate change.

The CAP details the following six vital high impact sectors and their aims to reduce emissions:

- Powering renewables: 75% reduction in emissions by 2030;
- Building better: 45% reduction in commercial/public and 40% reduction in residential emissions by 2030;
- Transforming how we travel: 50% reduction in emissions by 2030;
- Making family farms more sustainable: 25% reduction in emissions by 2030;
- Greening business and enterprise: 35% reduction in emissions by 2030; and
- Changing our land use: exact reduction targets for this sector is yet to be determined.

11.2.1.2 Environmental Impact Assessment Guide to Assessing Greenhouse Gas Emissions and Evaluating their Significance, IEMA

IEMA guidance, Environmental Impact Assessment Guide to: Assessing Greenhouse Gas Emissions and Evaluating their Significance states that *"in the absence of any significance criteria or a defined threshold, it might be considered that all GHG emissions are significant and an EIA should ensure the project addresses their occurrence by taking mitigating action".* As a result, we do not intend to assign a significance threshold to the proposed development.

The guidance has been prepared by IEMA with the intention of assisting EIA practitioners to make informed choices relating to GHG emission treatment within an EIA, *"The aim of this guidance is to assist practitioners with addressing greenhouse gas (GHG) emissions assessment and mitigation in statutory and non- statutory Environmental Impact Assessment (EIA)."*

It provides options for the treatment of GHG emissions within each stage of the assessment process by highlighting key issues. The effects of GHG emissions are included in the decision-making process as each project will influence climate change relative to the GHG emissions produced. Ireland have GHG reduction targets, therefore it is important to limit the amount of GHG emissions from each project (including this project) to stay within this target. Early stakeholder engagement maximises the mitigation measures put in place from project inception, through each stage of the process. This is underpinned by four key principles:

- Early, effective and ongoing interaction;
- Appropriate stakeholder engagement;

- Consenting risk is managed; and
- A clear narrative.

The guidance sets out there are a number of different assessment methods available for measuring and quantifying the GHG emissions associated with the built environment, ranging from general guidance to form standards for the use of an EIA. The Guidance recognising that:

'Qualitative assessments are acceptable, for example: where data is unavailable or where mitigation measures are agreed early on in the design phase with design and engineering teams.'

The assessment in this Chapter presents a qualitative assessments and discussion in terms of GHG emissions.

11.2.1.3 Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation, IEMA

The Guide to Climate Change Resilience and Adaptation (June 2020) provides an updated framework for the effective consideration of climate change resilience and adaption in the EIA process). This document is a revision of the 2015 IEMA guidance on Climate Change Resilience and Adaption in EIA and reflects lessons learnt from emerging practice.

A step-by-step method presented within this guidance is set out below and has been given due cognizant within this Chapter:

- Step 0 – Building climate resilience into the project by considering incorporating resilience during the designs stage and by identifying appropriate mitigation measures;
- Step 1 – Scoping for the EIA; e.g. identify the climate change projections for use in the assessment and identify key climatic variables relevant to the project;
- Step 2 – Defining the future (climate) baseline; define future conditions using selected climate change projections (i.e. increase in rainfall, increase in mean summer temperature and wind strength);
- Step 3 – Identifying and determining sensitivity of receptors;
- Step 4 – Reviewing and determining magnitude of the effect; consider probability and consequence to determine the magnitude of the effect;
- Step 5 – Determination of significance;
- Step 6 – Developing additional adaptation / EIA mitigation measures;
- Step 7 (Development permitted) – Monitoring and adaptive management by implementing mitigation measures.

EIA Reports produced in line with this guidance are to be proportionate in their approach and not include superfluous assessment that does not address likely material issues.

In lieu of a prescribed methodology, IEMA guidance on Climate Change Resilience and Adaptation (2020) has been prepared to assist practitioners with the effective consideration *"of both climate change resilience and adaptation in the EIA process"*.

The guidance stresses that climate change should be an integrated consideration within the EIA, by undertaking an assessment that is *"proportional to the evidence base available to support any assessment"* and focusses on impacts *"specific to project".*

11.2.2 Study Area

The preferred scheme for the proposed development is shown in Figure 11.1, which highlights the study area.

The site is located in a mixed area of development to the north of Letterkenny Town, Co. Donegal. The western perimeter of the site is bound principally by residential estates which are accessed from the Kilmacrenan Road

(N56). The southern/eastern boundary of the site adjoins the N56 to the south of the site (recently constructed distributor road), agricultural fields, an IDA premises and the council-run civic amenity centre. A water course runs along the easternmost section of the site. The north-western boundary bounds a residential development while the northernmost section perimeter bounds agricultural fields.

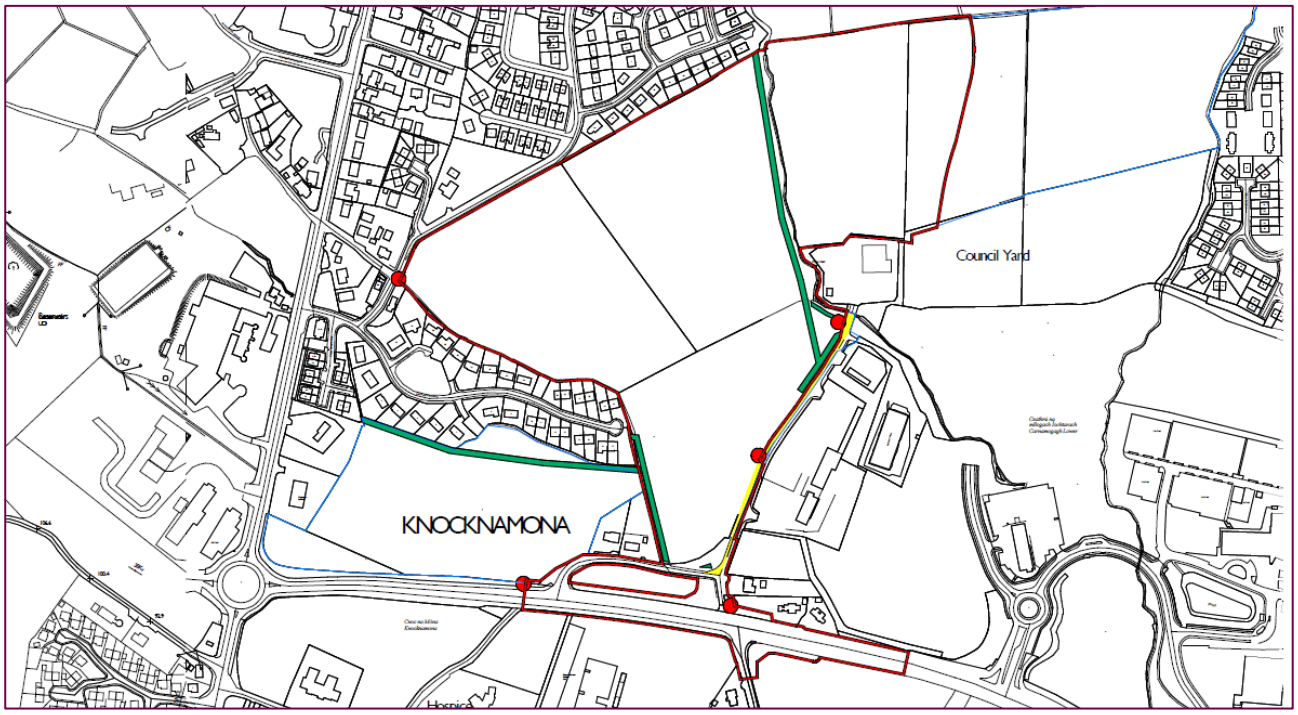

Figure 11.1: Study Area

11.2.3 Baseline

To establish baseline conditions, the following key sources of information were referred to as part of the assessment on climate:

- Donegal County Council's Climate Change Adaptation Strategy (2019-2024);
- Ireland's Greenhouse Gas Emissions Projections, Environmental Protection Agency (EPA) (2022);
- National Adaptation Framework; Planning for a Climate Resilient Ireland (DoCCAE, 2018); and
- Met Eireann National Meteorological Service Climate Data.

11.2.4 Assessment Criteria and Assignment of Significance

Table 11.1 describes sensitivity of receptor and may be used in an EIAR to ensure a standardised approach. The standard approach in Table 11.1 and Table 11.2 are presented for completeness.

Table 11.1: Definitions of Sensitivity or Value

Sensitivity	Example Descriptor
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Table 11.2: Definitions of Magnitude

Sensitivity	Example Descriptor
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

11.2.5 Significance of Effects

To describe the climate effects of the proposed scheme at sensitive receptors, the following shall be considered in the climate assessment as defined in the EPA's Guidelines on the information to be contained in Environmental Impact Assessment Reports' (EPA, 2022) including:

- Quality of Effects;
- Describing the Extent and Context of Effects;
- Describing the Probability of Effects;
- Describing the Duration and Frequency of Effects; and
- Describing the significance of Effects.

The assessment of significance will be based on the matrix in Table 11.3.

Table 11.3: Assessment of Significance Matrix

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very high	No change	Minor	Moderate or Major	Major or Substantial	Substantial

The broad definitions of the terms used within the assessment significance are defined as follows:

- ***Substantial***: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
- ***Major***: These beneficial or adverse effects are very important considerations and are likely to be material in the decision-making process.
- ***Moderate***: These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
- ***Minor***: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.
- ***Negligible***: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

In the absence of any significance criteria or a defined threshold, it might be considered that all carbon emissions are significant and beneficial effects only arise if there is a net loss in carbon and emissions. As per the IEMA Guidelines, when evaluating significance, all new GHG emissions contribute to a significant negative environmental effect.

The significance of a project's emissions should be based on its net impact, which may be positive or negative, EIAR should ensure an assessment addresses the occurrence of GHGs by taking mitigating action. Whilst there is no single preferred method to evaluate significance of effects given this topic is emerging within EIAR,

the approach to determining the significance of effects has applied available guidance, standard industry practice and professional judgement.

There is currently no industry–wide agreed threshold of carbon emissions which, if exceeded, can be defined as significant or potentially significant. The 2017 IEMA Guidance acknowledges that all emissions could lead to cumulatively significant effects. The IEMA Guidance (2017) notes that the cumulative impact of carbon emissions arising from global human activity is considered major however, the contribution from individual developments, such as the Development in this EIAR, could be considered negligible / low in the context of the Ireland's emissions since, in isolation, the quantity of carbon emissions from an individual development is likely to have limited potential to significantly increase atmospheric carbon emissions towards global environmental targets.

11.3 Baseline Environment

Climate is described as the average weather prevailing in an area over a period of time. The weather in Ireland is influenced by the Atlantic Ocean, resulting in mild, moist weather dominated by maritime air masses. The prevailing wind direction is from a quadrant centred on west-southwest. These are relatively warm winds from the Atlantic and frequently bring rain.

Climate Change is recognised as one of the most serious global environmental problems. The Paris Agreement 2015 (United Nations, 2016), an international effort to limit the global increase in temperature to below 2°C above pre-industrial levels, recognises the necessity to mitigate against climate change.

The EU Climate Change and Energy Framework (European Commission, 2014) has set ambitious targets for 2030, which include;

- At least a 40% reduction in domestic greenhouse gas (GHG) emissions compared to 1990; and,
- A reduction in the Emissions Trading Scheme (ETS) and non-ETS sectors amounting to 43% and 30% by 2030, compared to 2005, respectively.

Ireland's 2030 target under the EU's Effort Sharing Regulation (ESR) is to deliver a 30% reduction of emissions compared to 2005 levels by 2030. There are also annual binding emission allocations over the 2021-2030 period to meet that target. (Environmental Protection Agency, 2022).

To counteract the effects of climate change, climate adaptation has been identified as a vital strategy. The Intergovernmental Panel on Climate Change (IPCC) defined climate adaptation as “the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects.”

To address the forthcoming challenges associated with climate change, Ireland’s first National Adaptation Framework (NAF) was published in January 2018[1]. The NAF sets out the national strategy to reduce the vulnerability of the country to the potential negative effects of climate change and to avail of positive impacts. Under the NAF, all local authorities were required to prepare and adopt a five-year Climate Adaptation Strategy.

While Ireland has experienced colder than normal periods since 1900 there is an upwards trend in national temperature with higher temperatures experienced in the middle of the 20th century and from the 1980’s to the present day. While an increase in average annual rainfall has been observed, precise changes in spatial patterns of precipitation cannot by determined with further research required. The mean annual sea surface temperature has increased by one degree compared to the long-term average over the end of the 20th century. An increase in annual mean rivers flows has also been observed including mean flow increases for both the summer and winter periods.

Figure 11.2 taken from the National Adaptation Framework highlights the main observations in Irelands changing climate.

Flooding is a natural process, but is a significant risk to people, the economy and our environment and cultural heritage. It is likely that climate change will have a significant impact on flood risk in Ireland.

Accelerated sea level rise is being observed and is projected to continue to rise into the future, increasing risk to our coastal communities and assets. It is projected that the number of heavy rainfall days per year will increase, which would lead to an increase in both fluvial and pluvial (urban storm water) flood risk.

[1] https://www.gov.ie/en/publication/fbe331-national-adaptation-framework/ (accessed 28th March 2023)

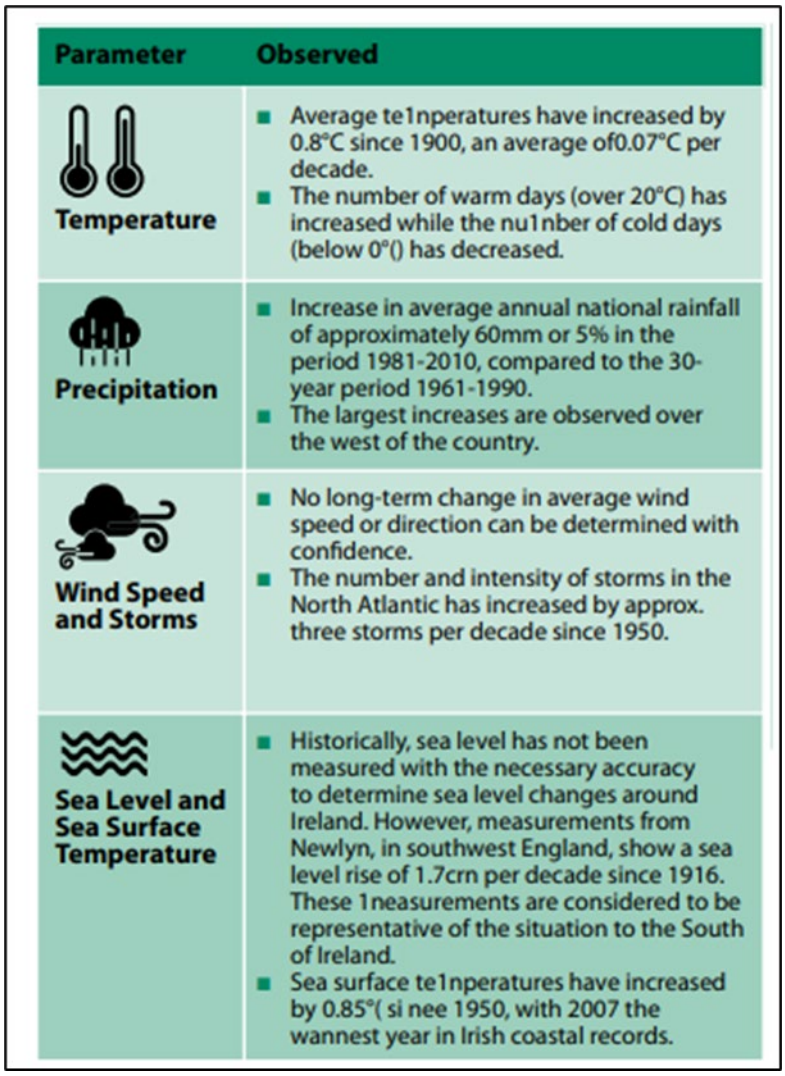

Figure 11.2: Observed changes in Irelands Climate

11.3.1 Donegal County Council's Climate Change Adaptation Strategy (2019-2024)

The Climate Change Adaptation Strategy[2] represents a proactive step by Donegal County Council in the process of adaptation planning to build resilience and respond effectively to the threats posed by climate change.

Donegal has a temperate maritime climate with an abundance of rain and no extreme temperature variations, much like the rest of Ireland. Over the past century, rainfall patterns, sea level rise, warmer temperatures and more extreme weather events have been observed in the county and these changes have been measured and documented. There has been a notable increase in the frequency of extreme weather events in recent years that have brought strong winds, low temperatures and high rainfall and at other times high temperatures and low rainfall. Each of these events creates specific impacts and risks for the county. The occurrence of simultaneous and or consecutive extreme weather events has had unprecedented consequences for the

[2] https://www.donegalcoco.ie/media/donegalcountyc/environment/FINAL_Climate%20Change%20Adaptation%20Strategy%202019%20-2024.pdf

county. Evidence shows that the increased frequency and intensity of such events can be attributed to a climate change.

Two simultaneous approaches, mitigation and adaptation, are required to address climate change. Mitigation is focused on reducing carbon pollution and greenhouse gas emissions in order to limit the extent to which our climate changes in the future. This approach includes actions such as improving the energy efficiency of our homes and buildings, switching to more sustainable energy sources and trapping and storing carbon in vegetation and soils. A National Mitigation Plan will set out strategies that must be embraced by individuals, businesses and the public sector alike.

Donegal County Council's Climate Change Adaptation Strategy sets out a framework of actions and measures that Donegal County Council proposes to undertake to further embed climate adaptation into all local authority areas of responsibility and to assist communities in adapting to climate change. This is the first step to ensure Donegal and its citizens develop a sustainable future that is resilient to the impacts of climate change.

11.3.1.1 Observed Climate Change

Overview of 2018 Global Temperatures

Data released by the Copernicus Climate Change Service (C3S) show that 2018 was the fourth in a series of exceptionally warm years and together with the Copernicus Atmosphere Monitoring Service (CAMS), C3S reports that atmospheric CO_2 concentrations have continued to rise. The Copernicus C3S data show that 2018 surface temperatures were more than 0.4°C higher than the long-term average recorded over the period 1981-2010. The most pronounced warming compared to the long-term average occurred in the Arctic. Most land areas were warmer than average, especially Europe, the Middle East and the western USA. Apart from a relatively cold February and March 2018, Europe saw above average temperatures during all months of the year. Starting at the end of spring and continuing well into autumn and even winter, northern and central Europe experienced weather conditions that were persistently warmer and drier than average.

Observed Global Climate Change

Warming of the global climate system has been observed via global average air and ocean temperatures, the widespread melting of snow and ice, the rising sea level and the more frequent occurrence of extreme weather events, as summarised in

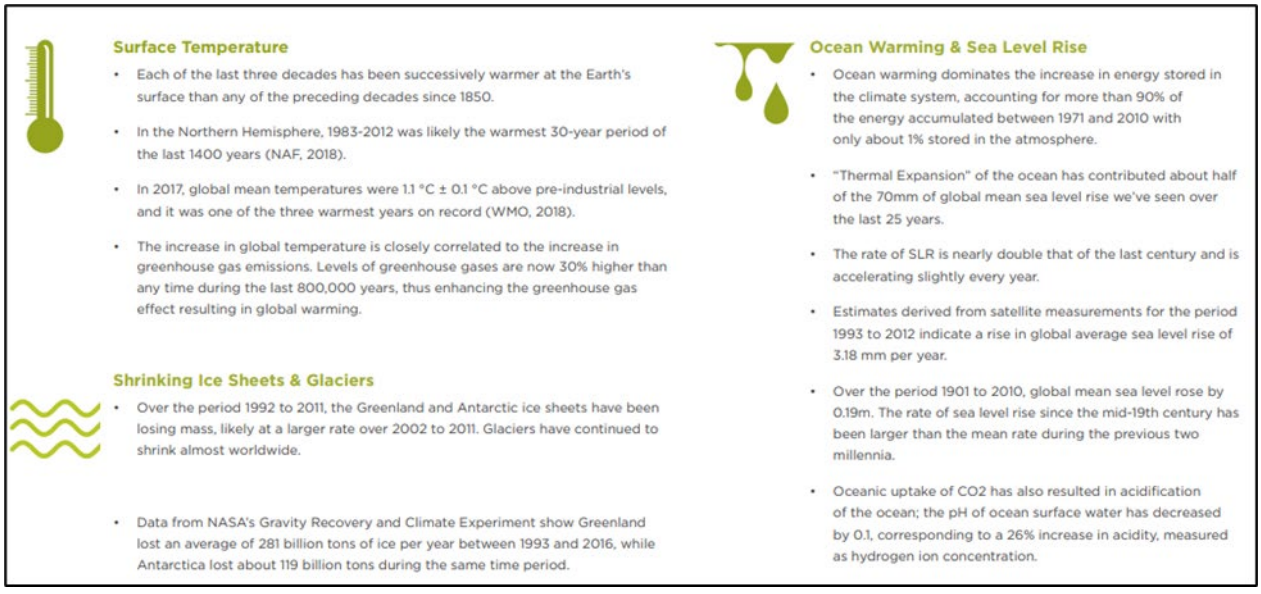

Figure 11.3: Summary of Observed Global Climate Change

(Source: IPCCAR5 Summary)

Ireland's climate is changing in line with global patterns:

- Temperatures are rising across all seasons;
- The timing and spatial distributions of precipitation is changing;
- Sea levels are rising;
- The frequency and intensity of extreme weather events are changing.

These changes are expected to continue and intensify into the future with a wide range of economic, environmental and social impacts.

11.3.1.2 Climate Adaptation Approach

The approach to the development of the Climate Adaptation Strategy for Donegal County Council follows a five-step process provided for within the Local Authority Adaptation Strategy Development Guidelines (DCCAE, 2018), which are summarised in Figure 11.4.

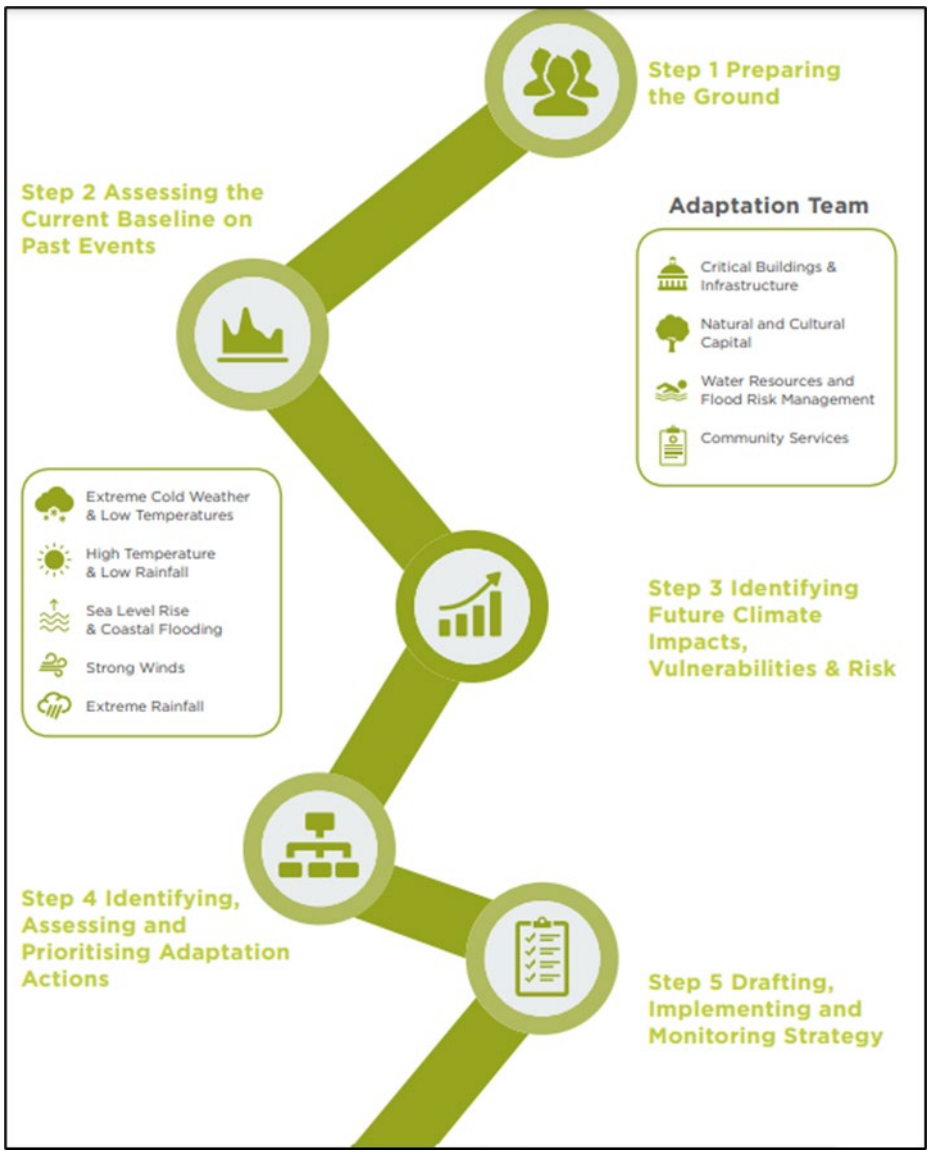

Figure 11.4: Climate Adaptation Approach

Understanding how Donegal County Council has been impacted by climate hazards in the past is a crucial first step in the development of an Adaptation Strategy for the future. Past climate events and trends are detailed in Figure 11.5.

Event Type / Name	Year	Climate Hazards	Outline Description
Storm Ali	2018	Strong Winds	Orange Wind Warning - gale-force winds of up to 120km/h, stormy conditions
High Temperatures, Heatwave & drought	2018	High Temperature	High Temperatures, Heatwave and drought
Storm Hector	2018	Strong Winds	Heavy rain and gales
Storm Emma & Beast from the East	2018	Snowfall	Snowfall Blizzard / Heavy Snowfall
Storm Doris	2018	Strong Winds	Gale force winds, heavy rainfall, sleet and snow
Storm Elanor	2018	Strong Winds	Orange Warning - Westerly gale to storm winds together with high tides and exceptionally high seas - coastal damage and flooding.
Storm Dylan	2017	Strong Winds	Orange warning of "violent gusts" and coastal flooding from high seas. Strong Winds Winds recorded at Mace Head in Co Galway (119 km/h) and Newport, Co Mayo (111 km/h)
Storm Ophelia (Ex-Hurricane Ophelia)	2017	Strong Winds	Red warning - gale force winds, heavy rain and storm surges along Strong Winds some coasts (flooding).
Heavy Rain	2017	Extreme Rainfall	Cloud Burst in Donegal Inishowen Flooding
Storm Jake	2016	Strong Winds	Orange wind warning and yellow snow-ice warning
Storm Frank	2015	Strong Winds	Red warning - gale force winds, heavy rain and storm surges along Strong Winds some coasts (flooding).
Storm Eva	2015	Strong Winds	Orange WW, strong winds
Storm Desmond	2015	Flooding	Extratropical cyclone with heavy rain, flooding, Flooding in Flooding Crossmolina / Teresa Mannion-Salthill
Storm Darwin	2015	High Temperature	Orange Warning for strong winds
Winter Storms	2013/4	Strong Winds	Winter storms - serious coastal damage and widespread, persistent Extreme Rainfall flooding.
Tropical Storm Katia	2011	Strong Winds	Met Eireann issued an extreme weather warning after predicting that storm gusts would reach up to 80mph, attacking mostly the west and northwest coasts. Sea Flooding. Strong Winds Trains and bus routes were cancelled as power lines were damaged and fallen trees blocked roads, which caused car crashes and road build-up
Winter Cold Spell	2010	Cold Snaps / Frost	Severe Cold Spell
Winter Cold Spell	2009 /10	Cold Snaps / Frost	Coldest winter in almost 50 years (Met Eireann)
Severe flooding	2009	Flooding	CS 6: Severe flooding
Heavy Rain & Flooding	2008	Extreme Rainfall	Heavy Rain & Flooding
High Temperature/ Heatwave	2006	High Temperature	Warmest summer since record breaking 1996
Heavy Rainfall / Cloud Burst	2003	Extreme Rainfall	Pollatomish Landslide
Hurricane force winds over north & northeast	1998	Strong Winds	Hurricane force winds over north and northeast
Windstorm	1997	Stong Winds	Windstorm
Hurricane Charley	1986	Strong Winds	Strong Winds and Rain

Figure 11.5: Past Climate Events and Trends

11.3.1.3 Rainfall and Temperature

Ireland has a wet temperate oceanic climate. Met Eireann provides annual temperature and rainfall data which can be accessed on their website[3]. The nearest weather station which records both annual temperatures and precipitation amounts is located at Finner Camp approx. 51.6km south of the proposed development. The annual temperatures and precipitation amounts (up to 28/03/2023) are set out in Table 11.4 and Table 11.5.

Table 11.4: Total Rainfall data in mm for Finner Camp

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2023	11.4	47.9	81.8	/	/	/	/	/	/	/	/	/	244.1
2022	70.2	180.2	53.7	77.0	77.4	94.8	73.6	54.1	75.9	176.4	97.7	93.0	1124.0
2021	132.5	96.1	111.9	33.8	83.2	58.9	91.7	123.6	69.2	112.1	74.8	105.8	1093.6
2020	91.0	263.2	101.3	16.3	30.7	170.3	153.4	100.1	94.8	159.2	164.9	146.2	1491.4
LTA*	130.4	95.4	103.8	75.9	77.2	72.3	91.0	105.7	102.4	136.8	128.6	130.6	1249.9

**** Long-Term-Average***

Table 11.5: Mean temperature in degrees Celsius for Finner Camp

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
2023	6.3	7.8	6.7	/	/	/	/	/	/	/	/	/	6.9
2022	7.0	7.0	7.4	8.9	12.3	13.4	15.3	15.5	13.8	12.0	9.0	4.4	10.5
2021	4.2	5.9	7.6	7.3	9.7	13.1	16.8	15.3	14.8	11.6	9.2	7.5	10.3
2020	7.0	5.7	6.2	9.8	12.0	13.2	13.6	15.4	13.1	10.1	8.8	5.7	10.1
LTA*	5.1	5.3	6.8	8.3	10.9	13.3	15.1	14.8	13.1	10.3	7.6	5.5	9.7

**** Long-Term-Average***

[3] https://www.met.ie/climate/available-data/monthly-data accessed 29th March 2023

11.4 Impact Assessment

GHG emissions should be assessed and reported as part of a good practice approach to EIAR. This aligns with IEMA's overarching-principles[4]; that all GHG emissions will contribute to climate change and thus might be considered significant, irrespective of whether this is an increase or decrease in emissions

11.4.1 Assessment of Construction Effects

The characteristics of the proposed development during the construction phase which have the potential to impact on climate include:

- Use of fossil fuels by on-site plant; and
- Carbon embedded in the materials used for construction of the proposed development.

The on-site plant, which will be powered by diesel engines or potential generators (if required) and proposed works, will emit carbon dioxide. However, due to the low numbers of on-site plant for a limited amount of time during the construction phase and coupled with the low background concentrations of pollutants potential impact of on-site plant on climate is not quantitatively assessed further.

11.4.1.1 Construction Greenhouse Gases

Emissions of construction generated GHG will arise from embodied emissions in site materials, direct emissions from plant machinery/equipment as well as emissions vehicles delivering material and personnel to the construction site.

The below definitions set out the descriptions of the terms effect and impact:

- **Impact:** Change that is caused by an action; for example, land clearing (action) during construction which results in habitat loss (impact);
- **Effect:** Term used to express the consequence of an impact (expressed as the 'significance of effect'), which is determined by correlating the magnitude of the impact to the importance, or sensitivity, of the receptor or resource in accordance with defined significance criteria. For example, land clearing during construction results in habitat loss (impact), the effect of which is the significance of the habitat loss on the ecological resource.

The term impact is used when discussing impact magnitude – the original impact on a receptor. The term effect is used when talking about significance (as this is the result of the impact and the sensitivity of the receptor). The following are set out:

- Magnitude of impact;
- Sensitivity of receptor;
- Significance of effect.

In terms of the proposed development the following key aspects are summarised:

- Increased frequency of extreme weather - Damage, delay, health and safety impact, increased costs. The sensitivity of construction phase human receptors is considered to be high. The magnitude of change is considered to be negligible. Therefore, there is likely to be a direct, temporary, short-term, adverse effect which is considered to be minor.
- Increased temperatures, prolonged periods of hot weather - Warm and dry conditions exacerbate dust generation and dispersions, health risks to construction workers. Appropriate dust control measures, which will be outlined in the oCEMP, will be put in place during the construction phase of the proposed

[4] . *IEMA (2010), IEMA Principles Series: Climate Change Mitigation & EIA*

development to aid in protection from fugitive dust dispersion and potential health impact on construction workers.

- Increased precipitation, and intense periods of rainfall. 1) Flooding of works and soil erosion; 2) Increased risk of contamination of waterbodies; 3) Disruption to supply of materials and goods; 4) Landslides. Appropriate assessment has been undertaken in relation to future flooding. Please refer to Chapter 13 for full assessment details of future flood risk.

The sensitivity of construction phase receptors is considered to be high. The magnitude of change is considered to be negligible. Therefore, there is likely to be a direct, temporary, short-term, adverse effect which is considered to be negligible.

11.4.1.2 Climate Change Resilience

During the construction process, receptors may be vulnerable to a range of climate risks. Potential impacts during the construction phase could include:

- Inaccessible construction site due to severe weather events (flooding, snow and ice, storms) restricting working hours and delaying construction;
- Health and safety risks to the workforce during severe weather events;
- Unsuitable conditions (due to very hot weather or very wet weather, for example) for certain construction activities; and,
- Damage to construction materials, plant and equipment, including damage, material storage areas and worksites, for example from stormy weather.

With regard to climate change risks to the proposed development during the construction period, it is considered reasonable that construction contractors would be able to adapt working methods if necessary.

For example, warmer winter conditions may extend the time certain construction activities such as concrete pouring can be carried out, while a greater chance of summer heatwave conditions may require adaptations such as shading work areas or increased attention to construction dust control measures. Effects are considered to be negligible and not significant. A flood risk assessment is presented in Chapter 13.

11.4.2 Assessment of Operational Effects

Following construction, the area will be utilised as a public space, car parking, with occasional limited access for service vehicles and delivery vehicles. Therefore, emissions to air from traffic within the proposed development will be negligible once operational, and these will not be assessed any further. Due to the nature of the proposed development, i.e., a public social space with a park, it will have likely positive impact on air quality and climate due to the following characteristics:

- Planting of trees and shrubbery and the inclusion of a biodiversity garden in an urban environment will reduce dust levels and absorb carbon
- Use of PV solar panels on the roof
- Sustainable and active modes of transport will be encouraged
- Old Farm Road has been identified as the main route that pedestrians and cyclists will use to travel between the ATU Campus and the site, and is earmarked as an Active Travel Route within DCC's 'Draft Letterkenny Plan and Local Transport Plan 2023-2029'.Provision of safe pedestrian and cycle access across the N56 is a key aspect of the access strategy
- The development will integrate into the surrounding transport network and with the aid of cycleways, walking and running trails
- Safe bicycle storage facilities are proposed, and the project will link into a future town bike scheme
- Designated parking spaces will be provided for electric charging and rental car share.

11.4.3 Assessment of Cumulative Effects

As stated by IEMA (IEMA, 2017), all GHG emissions are considered significant and therefore will contribute to climate change. However, the predicted GHG emissions of cumulative schemes, as listed in Chapter 1 – Introduction of this EIAR are not known. Furthermore, the cumulative GHG emissions would not just be limited to the cumulative schemes listed, as the receptor of the GHG emissions assessment is the global climate, with the UK National Carbon Budget used as a proxy. Consequentially, whilst any GHG emissions across the UK could be considered to have cumulative effects with the GHG emissions of the proposed development, the assessment methodology has by default already covered this wider perspective.

The cumulative impact of carbon emissions arising from global human activity is "High". This is true to the nature of climate change as a global, cumulative problem. As committed developments have been assessed throughout this ES and particularly through the cumulative vehicular transport scenarios, the potential inter-scheme cumulative effects during the operational phase of the Development have already been considered.

It is assumed that all committed developments will be required to meet relevant standards for emissions reduction and to comply with related planning policy. On this basis, it is considered appropriate to assume that any applications that are consented include 'reasonable' measures to avoid, reduce and /or offset the generation of greenhouse gas emissions and therefore that no significant cumulative effects are anticipated.

11.4.4 Inter-relationships

All environmental factors are inter-related to some extent. Interactions within the study area can be one-way interactions, two-way interactions and multiple-phase interactions may be influenced by the proposed development. An assessment of the interaction between environmental factors are required under Article 3(1)(e) of the EIA Directive –1. The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

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

The interactions between impacts on different environmental factors will be considered, addressed and outlined as relevant throughout the EIAR.

Climate is most likely to have an inter relationship with the following chapters:

- Chapter 10 Air Quality – interaction between climate change and air quality emissions. Air Quality assessments are presented in Chapter 10.
- Chapter 13 Flood Risk Assessment and Drainage Assessment – interaction between climate change and flooding. Flood risk assessments are presented in Chapter 13.
- Chapter 19 Traffic & Transportation – emissions from vehicles during construction and operational phases. Traffic data details are presented in Chapter 19.

11.4.5 Transboundary

Climate change is a globally occurring phenomenon with impacts on the global climate related largely to atmospheric carbon dioxide levels and other greenhouse gas levels and emissions. An Imperceptible negative impact on transboundary climate will arise during the construction of the proposed development with the level of impact being reduced by the implementation of the mitigation measures outlined in the EIAR. The significance of the transboundary impact of the proposed development located in Republic of Ireland to GHGs in Northern Ireland is considered to be negligible and not significant.

11.5 Mitigation

11.5.1 Construction Phase

11.5.1.1 Greenhouse Gases

As with any construction site, there are associated vehicle movement, emissions and reuse of materials. With respect to vehicle emissions and materials, the following can help in reducing the GHGs emission to the atmosphere such that impacts will be negligible and not significant:

- Consultation with a wider variety of internal and external stakeholders to ensure all relevant information is included in the development of the plans.
- Implementation of a Traffic Management Plan, as detailed in Chapter 19 of this EIAR, which will be prepared in advance of the construction works and which will form part of the specification for the construction works. This will outline measures to minimise congestion and queuing, reduce distances of deliveries and eliminate unnecessary loads;
- Visual monitoring of plant by operatives to ensure no black smoke is emitted other than during ignition (emissions to air controlled); and
- Ensuring exhaust emissions are maintained to comply with the appropriate manufacturer's limits (emissions to air controlled); and
- Reducing the idle times by providing an efficient material handling plan that minimizes the waiting time for loads and unloads. Reducing idle times could save up to 10% of total emissions during construction phase;
- Turning off vehicular engines when not in use for more than five minutes. This restriction will be enforced strictly unless the idle function is necessary for security or functionality reasons; and
- Regular maintenance of plant and equipment. Technical inspection of vehicles to ensure they will perform the most efficiently.

11.5.1.2 Climate Change Resilience

With the design and mitigation measures proposed, the Development is considered to be resilient to projected climate change. The resilience of the Development to climate change impacts is qualitatively assessed, based on professional expertise and judgement.

11.5.2 Operational Phase

As the emissions to air of both pollutants and greenhouse gases during the operational phase will be minimal, there is no requirement for mitigation measures. Nonetheless, design mitigation measures include:

- Recycling of construction materials as appropriate;
- LED lighting, which is proven to use 75% less energy when compared to traditional incandescent bulbs will contribute to further reduce already minimal indirect emissions due to electricity use; and,
- Planting of trees contribute to carbon sequestration and improved air quality, through the inclusion of a biodiversity garden and landscape planting.

11.5.3 Future Monitoring

Due to the nature and scale of the scheme, no future monitoring is required in relation to climate.

11.6 Summary of Effects & Conclusion

11.6.1 Construction and Operational

Construction and operation of the Development is likely to result in emissions of GHGs from direct sources and indirect sources. It is not anticipated that the scale of projected climate change identified will fundamentally alter baseline conditions or the effects included in this EIAR.

11.6.2 Decommissioning

No significant effect on or due to climate change during decommissioning is predicted. The decommissioning phase is not considered due to the long design life of the assets and given that emissions with the end of the life of this type of asset are relatively small and therefore unlikely to be significant.

11.6.3 Summary

Table 11.6: Summary of Likely Environmental Effects on Climate

Receptor	Sensitivity of receptor	Description of Effect	Duration	Magnitude	Significance	Significant / Not significant
Construction phase						
Construction Workers	High	Increased temperatures, prolonged periods of hot weather - Warm and dry conditions exacerbate dust generation and dispersions, health risks to construction workers.	Short term	Low	Negligible	Not Significant
Atmosphere	High	Emissions of Greenhouse Gases (GHGs)	Short term	Low	Negligible	Not Significant
Operational phase						
Atmosphere	High	Emissions of Greenhouse Gases (GHGs)	Long term	Low	Negligible	Not Significant

No significant effect on or due to climate change during **decommissioning** is predicted.

11.7 Limitations

By its very nature, climate change is associated with a range of assumptions and limitations. To overcome these issues, leading climate change data and science has been incorporated into the assessment and proven effective approaches undertaken for similar project types have been replicated. Changes in energy consumption impacts and the use of resources in the production, transportation, and final supply and use of

energy are very complex. Future energy market modelling is complex and beyond the scope of this assessment.

11.8 References

- County Donegal Development Plan 2018-2024 (DCC, 2018);
- Donegal County Council's Climate Change Adaptation Strategy (2019-2024);
- Institute of Environmental Management and Assessment (IEMA) Environmental Impact Assessment Guide to Climate Change Resilience and Adaptation;
- Climate Action Plan 2023.

12 POPULATION AND HUMAN HEALTH

12.1 Introduction

This Chapter of the EIAR provides a description and assessment of the likely impacts of the proposed development of Letterkenny Regional Sports Hub Scheme on population and human health on the local/receiving population. Human health can be influenced (both adversely and beneficially) by a number of environmental and socio-economic determinants which can vary on a project-by-project basis and are further modified by local community circumstance and existing health burden.

It is important to emphasise that the founding principle and purpose of EIA is to investigate potential environmental effects that may pose a risk to the environment and health at a development planning stage. Due to the multidisciplinary nature of health, planning separates health determinants (i.e., activities and hazards with the potential to influence health) into individual technical disciplines and EIAR topic chapters (e.g., air quality, noise, transport).

The purpose of the Chapter is to draw from and build upon the key outputs provided within each relevant EIAR topic chapter to further test potential risk to local communities, and where appropriate, to set such risk into context.

In particular, this EIAR chapter:

- Presents the existing environmental baseline established from desk-based studies and consultation to date;
- Identifies any assumptions and limitations encountered in compiling the environmental information; and,
- Highlights any necessary monitoring and/or mitigation measures that could prevent, minimise, reduce or offset the possible health effects identified in the EIA process.

The effects of any development on the environment may impose on humans directly and indirectly, positively, and negatively. Any significant impact on the status of population and human health that may be potentially caused by a development proposal must, be addressed as in much detail as possible. Direct effects include impacts on air quality, noise, traffic and socio-economic. Indirect effects may be associated with landscape, flora, fauna, heritage and archaeology. Interactions are referred to in this chapter as appropriate.

12.2 Methodology

12.2.1 Relevant Guidance

12.2.1.1 Environmental Protection Agency Draft Guidelines on the Information to be contained in EIAR (EPA Ireland, 2017)

The Environmental Protection Agency's (EPA) Draft Guidelines on the Information to be contained in EIAR (EPA Ireland, 2017), highlights the amendments to Article 3(1) of amended European Union (EU) Environmental Impact Assessment (EIA) Directive which states that:

"The environmental impact assessment shall identify, describe and assess in an appropriate manner, in light of each individual case, the direct and indirect significant effects of a project on the following factors: a) population and human health; […]"

Moreover, Annex IV, paragraph 5(d) requires an EIAR to contain:

"A description of the likely significant effects of the project on the environment resulting from, inter alia, 'the risks to human health'".

When outlining the scope of environmental factors covered by the EIA Directive within the European Commission's guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017), "population and human health" is defined as follows:

"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 the 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. In addition, these would concern the commissioning, operation, and decommissioning of a Project in relation to workers on the Project and surrounding population."

Additionally, when describing the likely significant effects of a project, the European Commission's guidance poses the following questions to consider:

"Have the primary and secondary effects on human health and welfare described and, where appropriate, been quantified? (e.g., 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)."

It is important to ensure that methods employed in a particular population and health assessment are proportionate and tailored to meet the assessment requirements of the project in question, which can differ considerably depending on the scale and nature of a proposal and are further influenced by local context and varying community circumstance and sensitivity.

There is a large body of guidance on Health Impact Assessment (HIA) generally and in the context of development planning (WMPHO, 2007; Chadderton, et al., 2012; The NHS Centre for Equality and Human Rights, n.d.; Ross & Chang, 2012), drawing from expert evidence and government policy regarding the importance of integrating public health into the planning system (Marmot, et al., 2010; Department of Health, 2010; DCLG, 2018). Such guidance has been applied to inform the development of a bespoke population and health EIAR chapter, where the scope, focus and assessment protocols are tailored to what is proposed; to local circumstance and the specific decision-making process in which it is intended to inform.

The assessment methodology follows a source-pathway-receptor model to identify and assess population and health effects that are plausible and directly attributable to the Proposed Development. A hazard source itself does not constitute a health risk. It is only when there is a hazard source, a receptor and a pathway of exposure that there is any potential risk to human health. The same is true for potential health benefits where a positive influence must be present alongside a pathway of exposure and a receptor for there to be a potential health improvement.

Where a source-pathway-receptor linkage exists, it is then the nature of the specific hazard source or positive influence; the magnitude of impact via the pathway of exposure; and the sensitivity of the receptor that will determine what level of health risk or benefit is predicted, if any.

12.2.1.2 Policy Context

The National Planning Policy Statement (DoECLG, 2015) outlines a number of important principles that planning authorities and public bodies are expected to engage with during the planning process. The following key standards have been identified as relevant to the proposed development and its potential impact of population and human health:

- Planning must proactively drive and support sustainable development, integrating consideration of its economic, social and environmental aspects at the earliest stage to deliver the homes, business, and employment space; infrastructure and thriving urban and rural locations in an economically viable manner that will sustain recovery and our future prosperity.
- Planning must proactively drive and support sustainable development, integrating consideration of its economic, social and environmental aspects at the earliest stage to deliver the homes, business, and

employment space; infrastructure and thriving urban and rural locations in an economically viable manner that will sustain recovery and our future prosperity.

- Planning must ensure that development facilities and encourages greater use of public transport as well as making walking and cycling more attractive for people in support of active and healthy lifestyles by focusing development, whenever possible, at locations with more sustainable travel options.
- Planning will encourage the most efficient and effective use of previously developed brownfield land over the use of greenfield land to ensure the most efficient use of existing infrastructure, enhancing, and strengthening the continues vitality of existing communities through regeneration.

12.2.1.3 National Healthy Ireland Framework 2013

The National Healthy Ireland Framework was published in 2013 as a "Health in all Policies" approach to enhancing the health of all communities (Healthy Ireland, 2013). The vision of this Framework is "A healthy Ireland, where everyone can enjoy physical and mental health and wellbeing to their full potential, where well-being is valued and supported at every level of society and is everyone's responsibility."

The goals of Healthy Ireland outlined in the framework are as follows;

- Goal 1. Increase the portion of people who are healthy at all stages of life;
- Goal 2. Reduce health inequalities;
- Goal 3. Protect the public from Threats & Wellbeing; and,
- Goal 4. Create an environment where every individual and sector of society can play their pad in achieving a healthy Ireland.

12.2.1.4 Development Plan

The County Donegal Development Plan 2018-2024 outlines a number of objectives, many of which relate to Population (Demographics) and Human Health:

- S-O-1: To plan for population growth to 173,000 people by 2024 and subsequently to plan for further population uplift to upwards of 200,000 people by 2038 so as to secure critical mass in the County and thereafter to contribute to the critical mass of: (i) the North West City Region with Letterkenny, Strabane and the city of Derry-Londonderry as its key urban settlements and; (ii) the area of the NWRA in particular Counties Sligo, Leitrim, Letterkenny and Cavan as well as partners in Fermanagh and Omagh District Council.
- S-O-2: To support growth of the County through an 'All of County Strategy' in order to ensure effective development and to harness particular strengths and opportunities that exist within the different areas of the County.
- S-O-3: To support the role of Letterkenny as a linked urban area in the Northwest City Region in order to drive investment and produce consequential benefits throughout the entire County and to support regional growth in the context of the Northern and Western Regional Assembly.
- S-O-4: To support the development and implementation of a sustainable economic model for County Donegal embracing growth in areas such as innovation, research and development, rural diversification, tourism initiatives, energy advances and the promotion of sustainable start up enterprises and as an integral component of accelerating the socio-economic growth in the Northwest.
- S-O-5: To prioritise regeneration and renewal of the County's towns, villages and rural areas in order to support vibrant and strengthened communities and drivers of economic growth.
- S-O-6: To protect, enhance and appropriately harness the unique quality and diversity of the environment in the County, through a wide range of measures, supported by proper planning and sustainable development.

- S-O-7: To prioritise key infrastructural investment required throughout the County, such as in transportation networks, water services, waste disposal, energy and communications networks, the provision of education, healthcare, retail, and a wide range of community-based facilities and to collaborate on delivery, including in the regional context.
- S-O-8: To facilitate appropriate, sustainable development, innovation, research and technological advances in business, communications and energy development throughout the County and in a Regional, Cross Border and National context.
- S-O-9: To implement the policies of the Development Plan.
- S-O-10: To provide the strategic spatial framework to guide collaboration, investment, community development and sustainable growth.

12.2.2 Study Area

The study area for this assessment is the full extent of the development site and considered Letterkenny in the wider context. The site is located in a mixed area of development to the north of Letterkenny Town, Co. Donegal. The western perimeter of the site is bound principally by residential estates which are accessed from the Kilmacrenan Road (N56). The southern/eastern boundary of the Site adjoins the N56 to the south of the site (recently constructed distributor road), agricultural fields, an IDA premises and the council-run civic amenity centre. A water course runs along the easternmost section of the site. The north-western boundary bounds a residential development while the northernmost section perimeter bounds agricultural fields.

12.2.3 Baseline

To establish baseline conditions, the *County Donegal Development Plan 2018-2024* and the Department of Public Health document, *Health Profile 2015 Donegal* was referred to as part of the assessment on population and human health.

12.2.4 Assessment Criteria and Assignment of Significance

12.2.4.1 Guidance

'Health' is commonly defined as *"a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity"* (the definition used by the World Health Organisation (WHO) since 1948) (WHO, 1948).

There is a large body of guidance on health assessment generally and in the context of development planning, drawing from expert evidence and national government policy regarding the importance of integrating public health into the planning system.

The basis of this assessment is to apply a broad socio-economic model of health that encompasses conventional health impacts such as disease, accidents and risk, along with wider health determinants vital to achieving good health and wellbeing such as employment and local amenity. It considers both physical and mental health, and also addresses equality and social impacts where possible. The assessment is therefore based on both 'social' and 'ecological' (environmental) determinants of health, illustrated in Figure 12.1, which are affected through relevant health pathways.

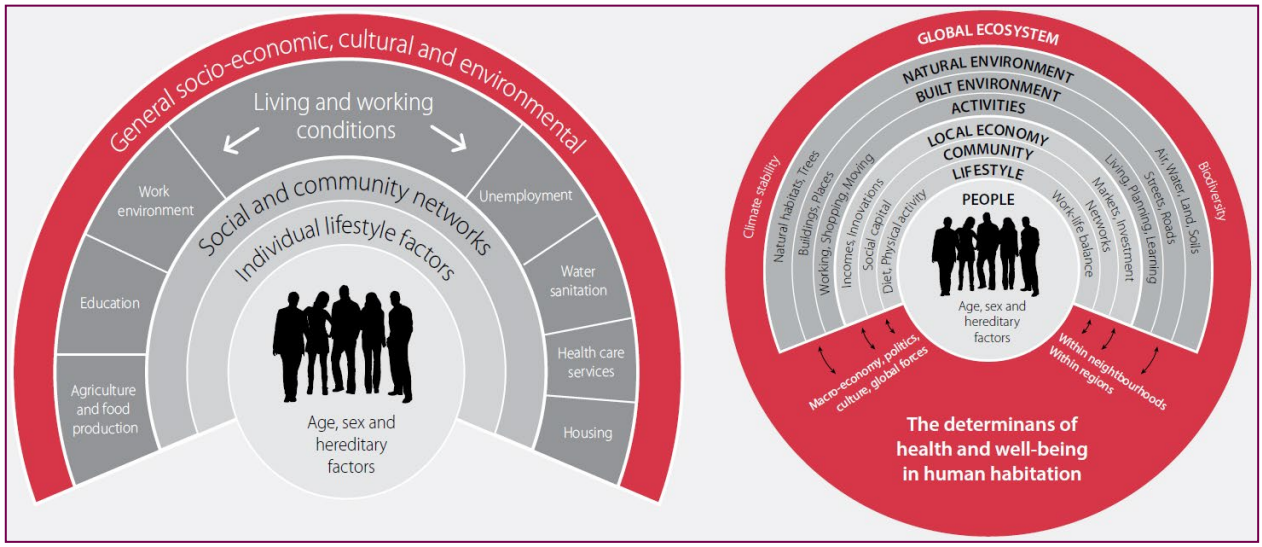

Figure 12.1: Social and Ecological Determinants of Health

When defining potential health determinants for a development project, it is also useful to consider three broad domains of public health practice:

- Health protection (i.e. environmental pollution and standards set to protect health);
- Health promotion (i.e. healthy lifestyles, socio-economic status and inequalities); and,
- Health care (i.e. provision, effectiveness and equality of access to healthcare services).

12.2.4.2 Assessment Methodology

The assessment follows a source-pathway-receptor approach to identify and assess health impacts that are plausible, and directly attributable to the proposed development. A hazard source itself is not necessarily a health risk: it is only when there is a hazard source, a sensitive receptor and a pathway of exposure where there is any potential for risk to health. Where a source-pathway-receptor linkage exists, then the nature of the

specific hazard source, the magnitude of impact via the pathway and the sensitivity of the receptor determine what level of health risk is predicted. The assessment presented in this chapter draws from and builds upon the key outputs provided within each relevant EIAR topic chapter.

Identification of a potentially relevant health pathway at this stage does not necessarily indicate that there would be a significant impact through that pathway. A significant impact would depend on the magnitude of change, the sensitivity of receptors and the degree to which they are affected. Table 12.1 details the potential health determinants summary.

Table 12.1: Environmental Sensitivity and Descriptions

Potential health determinant	Potential for Impact	Impact Type
Construction		
Exposure to air pollution (including nuisance dust, PM_{10}, $PM_{2.5}$ and NO_2)	Adverse	Temporary, direct, local
Changes in noise exposure	Adverse	Temporary, direct, local
Construction traffic (safety, amenity, severance)	Adverse	Temporary, direct, local and regional
Construction income and employment opportunities	Beneficial	Temporary, direct, indirect and induced, local and regional
Access to and use of open space for recreation and physical activity	Adverse	Temporary, direct, local
Operation		
Exposure to air pollution (including PM_{10}, $PM_{2.5}$ and NO_2)	Adverse	Permanent, direct, local
Changes in noise exposure	Adverse	Permanent, direct, local
Operational traffic (safety, amenity, severance)	Adverse	Permanent, direct, local and regional
Operation income and employment opportunities	Beneficial	Permanent, direct, indirect and induced, local
Access to and use of open space for recreation and physical activity	Beneficial	Permanent, direct, local

12.2.4.3 Impact Assessment Criteria

The significance of an effect is determined based on the magnitude of an impact and the sensitivity of the receptor, affected by the impact of that magnitude. This section describes the criteria applied in this chapter to characterise the magnitude of potential impacts and sensitivity of receptors.

The criteria for defining magnitude in this chapter is informed through the assessment process, tailored to the individual health pathways, hazard characteristics and end health points to inform a professional judgement on magnitude.

Table 12.2 describes sensitivity of receptor and may be used in an EIAR to ensure a standardised approach. The standard approach in Table 12.2 and Table 12.3 are presented for completeness.

Table 12.2: Definitions of Sensitivity or Value

Sensitivity	Example Descriptor
Very High	Very high importance and rarity, international scale and very limited potential for substitution.
High	High importance and rarity, national scale, and limited potential for substitution.
Medium	High or medium importance and rarity, regional scale, limited potential for substitution.
Low	Low or medium importance and rarity, local scale.
Negligible	Very low importance and rarity, local scale.

Table 12.3: Definitions of Magnitude

Sensitivity	Example Descriptor
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse). Large scale or major improvement of resource quality; extensive restoration or enhancement; major improvement of attribute quality (Beneficial).
Medium	Loss of resource, but not adversely affecting the integrity; partial loss of/damage to key characteristics, features or elements (Adverse). Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial).
Low	Some measurable change in attributes, quality or vulnerability; minor loss of, or alteration to, one (maybe more) key characteristics, features or elements (Adverse). Minor benefit to, or addition of, one (maybe more) key characteristics, features or elements; some beneficial impact on attribute or a reduced risk of negative impact occurring (Beneficial).
Negligible	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse). Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial).
No change	No loss or alteration of characteristics, features or elements; no observable impact in either direction.

12.2.5 Significance of Effects

To describe the climate effects of the proposed scheme at sensitive receptors, the following shall be considered in the climate assessment as defined in the EPA's Guidelines on the information to be contained in Environmental Impact Assessment Reports' (EPA, 2022) including:

- Quality of Effects;
- Describing the Extent and Context of Effects;
- Describing the Probability of Effects;
- Describing the Duration and Frequency of Effects; and
- Describing the significance of Effects.

The assessment of significance will be based on the matrix in Table 12.4.

Table 12.4: Assessment of Significance Matrix

Sensitivity	Magnitude of Impact				
	No Change	Negligible	Low	Medium	High
Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or Major
High	No change	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very high	No change	Minor	Moderate or Major	Major or Substantial	Substantial

The broad definitions of the terms used within the assessment significance are defined as follows:

- ***Substantial***: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.
- ***Major***: These beneficial or adverse effects are very important considerations and are likely to be material in the decision-making process.
- ***Moderate***: These beneficial or adverse effects may be important but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.
- ***Minor***: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process but are important in enhancing the subsequent design of the project.
- ***Negligible***: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Within a defined population, existing burdens of health and sensitivity to changes in environmental and socio-economic conditions can vary significantly due to individual socio-economic circumstance, genetic predisposition and stage of life.

A precautionary approach has been applied by assuming that the entire population of Letterkenny are of a uniformly high sensitivity to changes in environmental (air quality, noise, etc.) and socio-economic conditions.

The significance of the effect upon human health is determined by correlating the magnitude of the impact and the sensitivity of the receptor. The particular method employed for this assessment is presented in Table 12.3. Where a range of significance of effect is presented in Table 12.4, the final assessment for each effect is based upon expert judgement.

For the purpose of this assessment, any effects with a significance level of minor or less are considered to be not significant in EIAR terms.

12.3 Baseline Environment

12.3.1 County Level Setting

Letterkenny and Derry were designated as a joint Gateway in the National Spatial Strategy in 2002. Letterkenny is the largest urban centre in Donegal with a population of 19,588 having grown by 28% from 2002-2011[1].

The population of the Letterkenny Derry joint Gateway has increased from 105,894 to 113,099 persons from the period 2001/2002 to 2008/2011[2]. The Gateway region is evidenced as geographically larger than the settlements of Letterkenny and Derry, with distinct impacts and opportunities for economic collaboration along the border including opportunities flowing from the A5 /N14/ N15 interconnectivity at Lifford- Strabane.

Donegal had a population of 161,137 persons in 2011, which is broken down into the 5 Municipal Districts (MD's). The population is almost evenly distributed between Letterkenny MD (41,697 persons or 25.9%) and Inishowen (MD 41,127 persons or 25.5%), as shown in Figure 12.2.

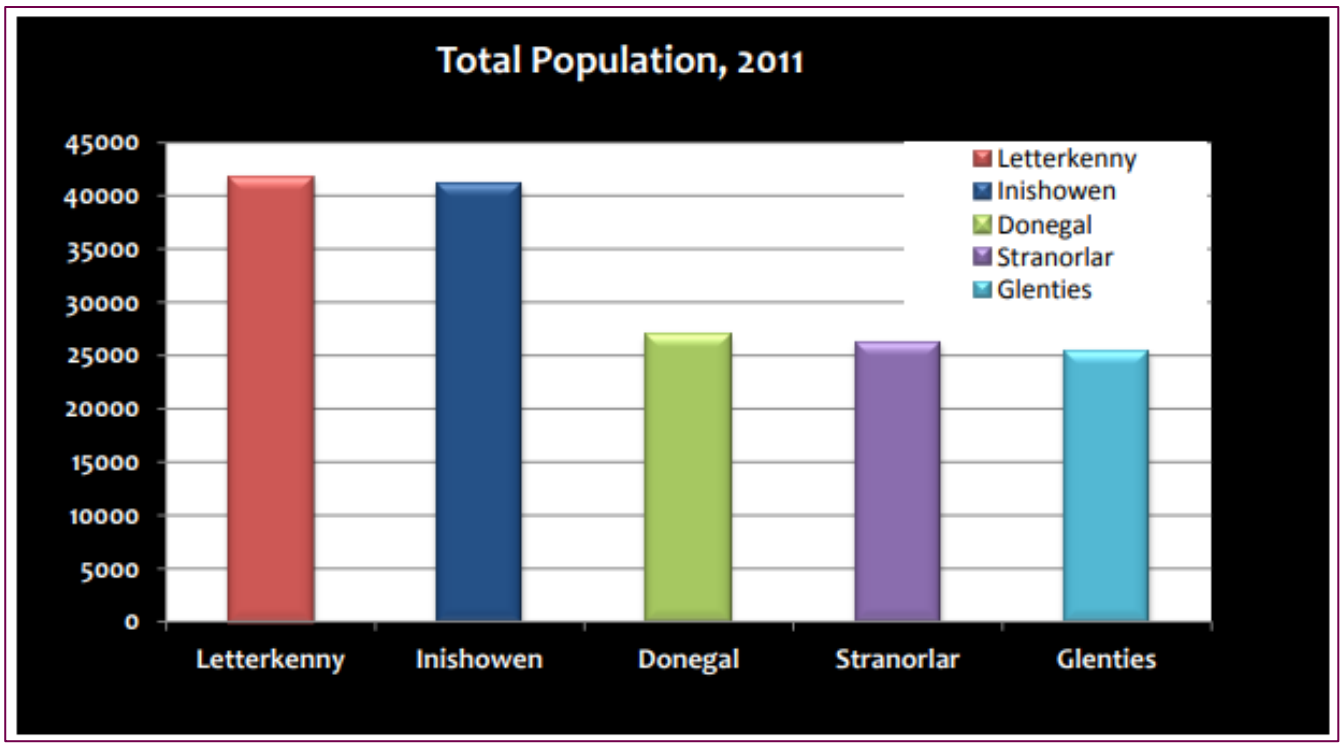

Figure 12.1: Total Population by Municipal District Co. Donegal, 2011

[1]Source: https://www.donegalcoco.ie/media/donegalcountyc/community/lcdc/App%201%20to%20LECP%20%20The%20Profile%20of%20the%20County%20February%202016.pdf

[2] This includes the wider Derry Urban Area of Culmore, Strathfoyle and Newbuildings

12.3.2 Economic Context

Letterkenny is a key economic engine of the northwest region. It is an ideal location for locating a business and it possesses many important strengths including its natural environment, location, entrepreneurial culture and a well-educated and adaptable workforce.

The County Donegal Development Plan 2018-2024 outlines the following economic objective specific to Letterkenny:

- LK-ED-O-1: To build and strengthen Letterkenny as a centre for economic growth across the sectors, in particular through the promotion of the existing business park and through consolidation of the town centre, including the prioritising of improvements to public realm.

12.3.3 Health Profile 2015 Donegal (HSE)

12.3.3.1 Key Facts

The following key facts are presented in the Department of Public Health document, *Health Profile 2015 Donegal*:

- Has the second highest dependency ratio i.e., the number of those aged 0-14 and 65 and over as a percentage of the number of persons aged 15-64 of 56.9% (national of 49.3%).
- Is the second most disadvantaged local authority area in Ireland, 94% of its population is below average levels of affluence or disadvantaged.
- Has the largest proportion of population with no formal or primary education only at 24.9% - (national rate 15.2%).
- Has low birth rate of 13.1 (national 15.8) and one of the lowest breast-feeding rates of 33.3% (national rate 46.6%).
- For males and females, the incidence of malignant melanoma is lower than the national average. It has the lowest national rate for male colorectal cancer but the rate for female colorectal cancer is above the national rate.
- Has the lowest rate of mortality for deaths due to injuries and poisoning for all ages.

12.4 Impact Assessment

12.4.1 Assessment of Construction Effects

12.4.1.1 Human Health Effects from Changes to Air Quality

12.4.1.1.1 Magnitude of Impact

Construction of the proposed development has the potential to influence human health from nuisance dust and from changes to local air quality associated with construction traffic. Chapter 10 Air Quality and Chapter 11 Climate and GHGs assesses the magnitude of impact at human receptors.

Prior to mitigation, the impacts from dust resulting from general on-site construction activities and/or through the movement of vehicles are limited to annoyance. However, following implementation of control measures, it is anticipated that construction dust emissions would not be significant.

The increase in local particulate matter (PM_{10} and $PM_{2.5}$) levels directly attributable to construction traffic associated with the proposed development is predicted be negligible at all receptors and would remain below air quality objective thresholds set to be protective of the environment and health.

The increase in local NO_2 levels is predicted to remain below air quality objective thresholds set to be protective of the environment and health at all of the receptors analysed. The contribution to local NO_2 concentrations directly attributable to construction traffic associated with the proposed development is minimal.

Therefore, the human health effects from changes to air quality are predicted to be of local spatial extent, short term duration and intermittent. It is predicted that the impact is not of a concentration or exposure sufficient to quantify any change in baseline health. The magnitude is therefore considered to be negligible.

12.4.1.1.2 Sensitivity of the Receptor

It is not possible to allocate a fair or accurate sensitivity classification to a population. On this basis, a precautionary approach has been taken, where the sensitivity of residential receptors to human health effects from changes to air quality is considered to be uniformly *high*.

12.4.1.1.3 Significance of effect

Overall, it is predicted that negligible magnitude of impact on the high sensitivity receptor would result in a minor adverse effect, which is not significant in EIAR terms.

12.4.1.1.4 Further mitigation or enhancement

No significant adverse effects have been predicted and no further mitigation is considered to be required.

12.4.1.1.5 Residual effect

The residual effect following no mitigation or enhancement is predicted to remain minor adverse, which is not significant in EIAR terms.

12.4.1.2 Human Health Effects from Changes in Noise Exposure

12.4.1.2.1 Magnitude of Impact

As detailed within Chapter 2: Project Description, normal construction working hours will be Monday to Friday 08:00–18:00 and Saturday 08:00–13:00. However, non-noisy activities which would not cause disturbance off-site, or construction activities that cannot be interrupted (such as a continuous concrete pour) may be required outside these hours.

Based on this information, potential human health effects from changes in noise exposure would be limited to increased annoyance from a reduction in local amenity during the daytime. This would be a direct and local

impact resulting from on-site construction activities and associated transport movements. Due to the nature of the construction period, the impact would be short term and intermittent.

Chapter 9 Noise and Vibration assesses the magnitude of impact at human receptors where it is predicted that noise levels from on-site construction activity associated with the proposed development will be below the lower cut-off value during the day of 65 dB L_{Aeq} and therefore not significant in noise terms. While certain construction activities have the potential to overlap, resulting in a cumulative noise impact upon receptors, it is not anticipated that this would result in an exceedance of the daytime cut-off value for more than one month. Regarding noise impacts associated with construction traffic is also not considered significant in noise terms.

Overall, the human health effects from changes in noise exposure are predicted to be of local spatial extent, short term duration and intermittent. It is predicted that the impact will affect the receptor directly, but is not of a magnitude, exposure, duration or timing to quantify any change in baseline health. The magnitude is therefore considered to be negligible.

12.4.1.2.2 Sensitivity of the Receptor

A precautionary approach has been taken, where the sensitivity of residential receptors to human health effects from changes in noise exposure is considered to be uniformly *high*.

12.4.1.2.3 Significance of effect

Overall, it is predicted that negligible magnitude of impact on the high sensitivity receptor would result in a minor adverse effect, which is not significant in EIAR terms.

12.4.1.2.4 Further mitigation or enhancement

No significant adverse effects have been predicted and no further mitigation is considered to be required.

12.4.1.2.5 Residual effect

The residual effect following no mitigation or enhancement is predicted to remain minor adverse, which is not significant in EIAR terms.

12.4.1.3 Human Health Effects from Changes to Transport Nature and Flow Rate

12.4.1.3.1 Magnitude of Impact

An increase in HGVs and vehicle movements has the potential to change the transport nature (composition and flow rate on local roads). Depending on the magnitude of change, there is the potential for an increased risk of accident and injury; feelings of isolation from increased severance; and loss of amenity from increased severance or transport disruption. Any change to transport nature and flow rate would be a direct and local impact where due to the nature of the construction period, the impact would be short term and intermittent.

The human health effects from changes in transport nature and flow rate are predicted to be of local spatial extent, short term duration and intermittent. It is predicted that the impact will affect the receptor directly but is not of an order of magnitude sufficient to quantify any change in baseline health outcome. The magnitude is therefore considered to be negligible.

12.4.1.3.2 Sensitivity of the Receptor

A precautionary approach has been applied, where the sensitivity of residential receptors to human health effects from changes to transport nature and flows is considered to be uniformly *high*.

12.4.1.3.3 Significance of effect

Overall, it is predicted that negligible magnitude of impact on the high sensitivity receptor would result in a minor adverse effect, which is not significant in EIAR terms.

12.4.1.3.4 Further mitigation or enhancement

No significant adverse effects have been predicted and no further mitigation is considered to be required.

12.4.1.3.5 Residual effect

The residual effect following no mitigation or enhancement is predicted to remain minor adverse, which is not significant in EIAR terms.

12.4.1.4 Human Health Effects from Income and Employment Generation

12.4.1.4.1 Magnitude of Impact

Having a consistent income and being in long-term employment are two of the most important wider determinants of health. The construction phase of the proposed development would offer a number of job opportunities; while job opportunities would vary in type, the majority of jobs available would be for construction workers. This would be an indirect impact which, dependent on procurement, has the potential to benefit some construction workers in and around Letterkenny.

However, it should be noted that due to the highly mobile nature of the construction industry and as construction companies tend to bring much of their labour force with them to undertake developments, it is unlikely that all of the construction companies and contractors commissioned on the proposed development would be based in and around Letterkenny.

The human health effects from income and employment generation are predicted to be primarily of regional spatial extent and short term duration. It is predicted that the impact will affect the receptor directly through employment and indirectly via indirect and induced income and employment opportunities important to health. However, the magnitude of direct, indirect and induced income and employment opportunities are not sufficient to quantify any change in baseline health. The magnitude is therefore considered to be negligible.

12.4.1.4.2 Sensitivity of the Receptor

A precautionary approach has been applied, where the sensitivity of residential receptors to human health effects from income and employment generation is considered to be uniformly *high.*

12.4.1.4.3 Significance of effect

Overall, it is predicted that negligible magnitude of impact on the high sensitivity receptor would result in a minor beneficial effect, which is not significant in EIAR terms.

12.4.1.4.4 Further mitigation or enhancement

No further mitigation or enhancement measures are recommended.

12.4.1.4.5 Residual effect

The residual effect following no mitigation or enhancement is predicted to remain minor adverse, which is not significant in EIAR terms.

12.4.2 Assessment of Operational Effects

12.4.2.1 Human Health Effects from Changes to Air Quality

12.4.2.1.1 Magnitude of Impact

It can be concluded that the change in concentration and exposure directly attributable to the proposed development are not of a level to quantify any change in baseline health. The magnitude of impact on human health is therefore considered to be negligible.

12.4.2.1.2 Sensitivity of the Receptor

A precautionary approach has been applied, where the sensitivity of residential receptors to human health effects from changes to air quality is considered to be high.

12.4.2.1.3 Significance of effect

Overall, it is predicted that negligible magnitude of impact on the high sensitivity receptor would result in a minor adverse effect, which is not significant in EIAR terms.

12.4.2.1.4 Further mitigation or enhancement

No significant adverse effects have been predicted and no further mitigation is considered to be required.

12.4.2.1.5 Residual effect

The residual effect following no mitigation or enhancement is predicted to remain minor adverse, which is not significant in EIAR terms.

12.4.2.2 Human Health Effects from Changes in Noise Exposure

12.4.2.2.1 Magnitude of Impact

The human health effects from changes in noise exposure are predicted to be of local spatial extent, short term duration and intermittent (i.e. during peak demand). It is predicted that the impact will affect the receptor directly, and will not be of a magnitude, timing, duration or exposure sufficient to quantify any change in health baseline. The magnitude of impact on human health is therefore considered to be negligible.

12.4.2.2.2 Sensitivity of the Receptor

A precautionary approach has been applied, where the sensitivity of residential receptors to human health effects from changes in noise exposure is considered to be uniformly high.

12.4.2.2.3 Significance of effect

Overall, it is predicted that negligible magnitude of impact on the high sensitivity receptor would result in a minor adverse effect, which is not significant in EIAR terms.

12.4.2.2.4 Further mitigation or enhancement

No significant adverse effects have been predicted and no further mitigation is considered to be required.

12.4.2.2.5 Residual effect

The residual effect following no mitigation or enhancement is predicted to remain minor adverse, which is not significant in EIAR terms.

12.4.2.3 Human Health Effects from Changes to Transport Nature and Flow Rate

12.4.2.3.1 Magnitude of Impact

Sustainable and active modes of transport will be encouraged in relation to the proposed development which will have a positive impact on operational phase road traffic. Old Farm Road has been identified as the main route that pedestrians and cyclists will use to travel between the ATU Campus and the site and is earmarked as an Active Travel Route within DCC's 'Draft Letterkenny Plan and Local Transport Plan 2023-2029'. Provision of safe pedestrian and cycle access across the N56 is a key aspect of the access strategy. The development will integrate into the surrounding transport network and with the aid of cycleways, walking and running trails. Furthermore, safe bicycle storage facilities are proposed, and the project will link into a future town bike scheme. Through the provision of designated parking spaces for electric charging and rental car share, sustainable active travel is encouraged with regards to the operational traffic aspect of the proposed development.

Therefore, the human health effects from changes to transport nature and flow rate are predicted to be of local spatial extent, short term duration and intermittent. It is predicted that the impact is not of a concentration or exposure sufficient to quantify any change in baseline health. The magnitude is therefore considered to be negligible.

12.4.2.3.2 Sensitivity of the Receptor

A precautionary approach has been applied, where the sensitivity of residential receptors to human health effects from changes to transport nature and flows is considered to be uniformly high.

12.4.2.3.3 Significance of effect

Overall, it is predicted that negligible magnitude of impact on the high sensitivity receptor would result in a minor adverse effect, which is not significant in EIAR terms.

12.4.2.3.4 Further mitigation or enhancement

No significant adverse effects have been predicted and no further mitigation is considered to be required.

12.4.2.3.5 Residual effect

The residual effect following no mitigation or enhancement is predicted to remain minor adverse, which is not significant in EIAR terms.

12.4.2.4 Human Health Effects from Income and Employment Generation

12.4.2.4.1 Magnitude of Impact

The human health effects from income and employment generation are predicted to be primarily of local spatial extent and short term duration. It is predicted that the impact will affect the receptor indirectly, but will not be of level sufficient to quantify any change in health baseline. The magnitude is therefore considered to be negligible.

12.4.2.4.2 Sensitivity of the Receptor

A precautionary approach has been applied, where the sensitivity of residential receptors to human health effects from income and employment generation is considered to be high.

12.4.2.4.3 Significance of effect

Overall, it is predicted that negligible magnitude of impact on the high sensitivity receptor would result in a minor beneficial effect, which is not significant in EIAR terms.

12.4.2.4.4 Further mitigation or enhancement

No further mitigation or enhancement measures are recommended.

12.4.2.4.5 Residual effect

The residual effect following no mitigation or enhancement is predicted to remain minor beneficial, which is not significant in EIAR terms.

12.4.3 Assessment of Cumulative Effects

Cumulative effects have been considered in respect of impacts resulting from the accumulation of impacts generated by the proposed development on the same receptors and the impacts potentially arising from adjacent or nearby developments together with those predicted for the proposed development. Cumulative projects are stated in Chapter 1 and are not repeated here.

12.4.4 Inter-relationships

All environmental factors are inter-related to some extent. Interactions within the study area can be one-way interactions, two-way interactions and multiple-phase interactions may be influenced by the proposed development.

An assessment of the interaction between environmental factors are required under Article 3(1)(e) of the EIA Directive –1. The environmental impact assessment shall identify, describe and assess in an appropriate manner, in the light of each individual case, the direct and indirect significant effects of a project on the following factors:

- *Population and human health;*
- *Biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC;*
- *Land, soil, water, air and climate;*
- *Material assets, cultural heritage and the landscape;*
- *The interaction between the factors referred to in points (a) to (d).*

The interactions between impacts on different environmental factors will be considered, addressed and outlined as relevant throughout the EIAR. The following assessments have been made and a description of the likely inter-related effects on human health is provided in Chapter 20 Interactions.

12.5 Mitigation

12.5.1 Construction Phase

As no significant effects as a result of the construction phase have been predicted, no mitigation measures are proposed for population and human health.

12.5.2 Operational Phase

As no significant effects as a result of the operational phase have been predicted, no mitigation measures are proposed for population and human health.

12.5.3 Future Monitoring

Due to the nature and scale of the scheme, no future monitoring is required in relation to population and human health.

12.6 Summary of Effects & Conclusion

It is not anticipated that there would be any significant human health effects resulting from the construction, or operation of the proposed development. This has been concluded on the basis that any change in health determinant would not be sufficient to quantify any change in baseline health outcomes within the surrounding community.

12.7 Limitations of the Assessment

Human health assessment draws from and builds upon the technical outputs from the EIAR (most notably the air quality, noise, transport assessment chapters), to investigate changes in environmental and socio-economic conditions directly attributable to the proposed development. As a consequence, the limitations of the supporting assessments, and the conservative assumptions applied to address them, are inherent to the assessment of health.

Baseline data limitations are managed through the triangulation of national statistics to establish local health circumstance and relative sensitivity to the individual health pathways assessed. It is considered that the information available provides a suitable basis for a robust assessment of human health for EIAR purposes.

12.8 References

- HSE. (2015a). Health Profile 2015 Donegal
- HSE. (2019b, November). Healthy Ireland: Summary Report 2019.

13 FLOOD RISK AND DRAINAGE ASSESSMENT

13.1 Introduction

A Flood Risk Assessment (FRA) and Drainage Assessment of the proposed development was undertaken by TOBIN Consulting Engineers. This purpose of this chapter is to provide a summary of the findings of the assessments, copies of which are included in Volume III Technical Appendices:

- Appendix 13.A Flood Risk Assessment
- Appendix 13.B Drainage Assessment

13.2 Flood Risk Assessment

TOBIN Consulting Engineers were appointed by Atlantic Technological University Donegal (ATU Donegal) in September 2022 to undertake a Flood Risk Assessment (FRA) of the proposed development at Letterkenny, Co. Donegal. The purpose of this report ('Stage 2' Flood Risk Assessment report as defined by The Planning System and Flood Risk Management Guidelines) is to identify, quantify, and communicate the risks of flooding, if any.

The Planning System and Flood Risk Management (PSFRM) Guidelines (OPW/DoEHLG, 2009) classify playing pitches as "water-compatible" in terms of sensitivity to flooding. As such, the proposed development is appropriate in any flood zone. Most of the subject site is located in Flood Zone C with a small portion of the subject site located in Flood Zone B.

13.2.1 Pluvial Flooding

Based on the indicative pluvial flood mapping presented in the Office of Public Works (OPW) Preliminary Flood Risk Assessment, it is estimated that the subject site is not at risk from pluvial flooding during an extreme 0.1% AEP pluvial flood event.

Surface water arising at the site will be managed by a dedicated stormwater drainage system designed in accordance with Sustainable Drainage Systems (SuDS) principles, limiting discharge from the site to greenfield runoff rates.

The landscaping and topography of the developed site will provide safe exceedance flow paths and prevent surface water ponding to minimise residual risks associated with an extreme flood event or a scenario where the stormwater drainage system becomes blocked.

13.2.2 Groundwater Flooding

There is no evidence to suggest groundwater as a potential source of flood risk to the proposed development site.

13.2.3 Coastal/Tidal Flooding

Based on previous flood studies in the area by the OPW and the location of the subject site, the proposed development is not at risk of coastal flooding.

13.2.4 Fluvial Flooding

The Catchment Flood Risk Assessment and Management Study (CFRAM) mapping of existing fluvial flood extents, indicates portions of the subject site may be at risk of flooding during a 0.1% AEP fluvial flood event. Accordingly, vulnerable portions of the subject site are located within Flood Zones B, while the majority is within Flood Zone C.

CFRAM mapping suggests that the exit culvert of WC2 is under capacity during the 0.1% AEP event, leading to flood waters propagating upstream. To mitigate this risk, ground levels for a section of elevated ground between the flood zone and the pitch embankment have been reduced to levels below the floodwaters, creating a 39m3 net gain of flood storage.

To assess the risk of fluvial flooding from the watercourses located on the subject site that weren't modelled as part of the CFRAM study a channel capacity calculation was undertaken. Based on the geometry of the channel and estimated flow rates, the Knocknamona stream (WC 4) and WC 3 have sufficient capacity to convey the 1 in 1,000-year flood event without bursting their banks. Both watercourses had wide beds with steep side slopes. The banks are well defined. There was very little vegetation within the watercourse. They are both steep and fast flowing. This suggests there may have been channel maintenance in the past.

3 No. proposed crossing will be appropriately designed through the Section 50 application process ensuring appropriate sizing and that there will be no impact to flood risk elsewhere.

There are no statutory records of any past flood events within the subject site. In addition to this, from the anecdotal evidence collect by TOBIN during the site survey, there is no anecdotal evidence of any flooding in the vicinity of the subject site.

Therefore, it is estimated that risk of fluvial flooding associated with the proposed development is minimal.

13.2.5 Flood Risk Elsewhere

Existing culverts and channels will not be modified, to maintain the capacity of the watercourses within the subject site and minimise the risk of flooding downstream of the subject site. 3 No. proposed watercourse crossing will be appropriately designed through the Section 50 application process ensuring appropriate sizing and that there will be no impact to flood risk elsewhere. Proposed ground levels for a section of elevated ground between the flood zone and the pitch embankment have been reduced to levels below the floodwaters, creating a 39m^3 net gain of flood storage.

13.3 Drainage Assessment

TOBIN Consulting Engineers were appointed by ATU Donegal in September 2022 to undertake a Drainage Assessment of the proposed development at Letterkenny, Co. Donegal. This report outlines the design approach taken in dealing with surface water drainage and is to be read in conjunction with the Flood Risk Assessment also produced by TOBIN Consulting Engineers.

13.3.1 Hydrology

Of the three watercourses in close proximity to the proposed development, all of which are mapped on the CFRAM study, only one features on the CFRAM strategic flood maps as having potential to exceed its channel capacity under 1 in 1,000-year flood events. However, it is noteworthy that the extent of floodwaters is limited to the immediate vicinity of the channel and increases in width in inverse proportion to the gradient of the streambed. In addition, this mapping is expressly for use in identifying 'general areas prone to flooding as opposed to the hazard to individual properties'.

13.3.2 Site Runoff

13.3.2.1 Current Site Runoff

On-site percolation tests yielded extremely low permeability rates which is characteristic of the clay subsoil. It is surmised that greenfields runoff rates are achieved by virtue of the vegetation coverage on the site, in that interception storage is provided in the surface area of pasturage with run-off making its way to the lower lying ground to the south-east of the site where it enters the existing water courses. In order to determine the existing site run-off, IoH124 has been used from the HR Wallingford/www.uksuds.com online Greenfields Runoff Tool to calculate the green field runoff, and the Modified Rational Method has been used to calculate run-off from the entire site. The predicted existing site run-off during a Q100 rainfall event is 114.61 l/s for the catchment

area of 17ha. (which equates to a run-off rate of 6.74 l/s/ha.) However, for the sake of the design, a more conservative hypothetical greenfields runoff threshold rate of 2 l/s/ha. has been chosen which will ensure that flood risk generated from the proposed development will be lower than that of the 'do nothing' option.

13.3.2.2 Post Development Site Runoff

13.3.2.2.1 Site Drainage Proposals

The drainage design has been segregated into distinct networks to accommodate both phased development of the site and integration of the entire design. To this end, each pitch is to be drained and attenuated to ensure both playability of the pitch surface and controlled discharge of its runoff. The design approach is similar for both the artificial pitches and the natural turf pitches, with the build-up of the latter being sensitive to the need for permeability.

While the design of the synthetic pitch remains to be finalised, it is expected that the proposed synthetic pitch build-up will comprise of a 60mm synthetic carpet atop a permeable shock pad (12 – 20mm), followed by 40mm porous macadam (optional) over a 150mm clean crushed stone base. There is a possibility that the porous macadam layer may be omitted from the final design. However, it is included here to demonstrate how drainage is achieved in the event that it is deemed necessary or desirable in the final design. The subbase, making up varying depths between the base and the existing subgrade also comprises clean crushed stone separated from the in-situ material by means of a geotextile separation membrane.

The proposed development will produce no increase in impermeable area over the area of the pitches (both synthetic and natural turf). Indeed, the proposal will improve the permeability of the pitch surfaces such that surface water will not accumulate on the pitch for either 30- year or the 100-year return period storm events. Instead, stormwater will penetrate the surface to be collected in underground French drains.

The storm drainage for the project has been designed using the Innovyze MicroDrainage Design Software. It is noted that this software considers both a 10% and 20% increase in flows to account for climate change for the 30-year and 100-year return periods, respectively.

The pitch build-up is drained by means of transverse 150mm diameter French drains laid at 1:200 (or greater depending on the gradient of the pitch surfaces) gradient at 10m centres falling to a collector drain laid along one length of the pitch at falls.

The French drains are modelled as receiving infiltration along their lengths with a notional attenuation tank attached to the node comprising the junction of the French drain and the collector drain. This 'attenuation tank' is equivalent to the holding capacity of the subsoil build-up between the invert of the French drain and, in the case of the synthetic pitch, the underside of the carpet and in the case of the natural turf pitches, the underside of the topsoil. In this way, the attenuation occurs at source rather than at a centralised tank, which is consistent with the SuDS design philosophy. The holding capacity/porosity of these 'tanks' is conservatively set at 30%. The accumulated flow from these French drains is then discharged at a controlled rate into the main drainage system at a rate equal to or lower than the greenfields rate.

The outlet from the synthetic pitch is to pass through a granulate trap to contain any granulate infill that may have made its way along the flow path, before being discharged into the main drainage system.

The main drainage system will receive the discharge from the pitches at controlled rates and will receive runoff from the hardened areas.

Runoff from hardened surfaces will, where possible, pass through point-of-entry SuDS features before being picked up by the main drainage system. Where SuDS measures are employed at point-of-entry, exceedance measures are also provided to allow for seasonal variations in capacity or outright failure of individual SuDS features. Roads will be serviced by gulleys at a rate of no more than 200 sqm per gulley, with double gullies at critical points.

Collected surface water will then pass through petrol interceptors to remove hydrocarbons lifted from the carparks and roads before passing into attenuation tanks located upstream of discharge points. The attenuation tanks will be sized to achieve the desire 2 l/s/ha greenfields runoff rate.

13.3.2.2.2 Attenuation Calculations

The storm events and coefficients applied to the MicroDrainage calculations will be provided in the Stage 2 Civil Design Report. Critical storm events are identified and simulated. It is noted that where surcharge/flood risk conditions are noted at critical nodes within the network, this refers to the elevation of water levels within the notional structures as opposed to surface flooding; an acceptable condition. No surface flooding is generated under the simulated critical rainfall events. However, it is worth pointing out that temporary flooding of playing surfaces and even car parks is considered a legitimate SuDS approach, since these conditions would occur under extreme storm events at locations that are not considered critical to human safety and in a manner which would prevent damage to infrastructure.

Non-attenuated post-development runoff calculations for the proposed development indicate that the site discharge will be 114.61l/s during a Q100 storm event. It is proposed that the site is limited to a maximum surface water discharge of 34l/s which equates to the threshold run-off rate of 2l/s/ha.

In order to achieve this discharge rate during a Q100 storm event, attenuation will be required to ensure the proposed discharge rate (34l/s) is not exceeded and, ideally, surface water flooding does not occur.

In order to achieve the proposed runoff rate (34l/s) during a Q100 rainfall event for the application area, a 'chain' of SuDS techniques will be employed, including holding capacity in the French drain bedding, optimally-sized piping and manhole junctions, a 30% void stone attenuation tank within the subbase, and a hydrobrake outlet before the outfall.

It must be appreciated that while the greenfields runoff rate will be achieved by employing an attenuation-only design, the attenuation 'beds' in the build-up of the pitches and the attenuation tank(s) used in the main drainage upstream of discharge points will not be lined so as to prevent infiltration into subsoils. Indeed, every opportunity for infiltration will be taken by ensuring that the tanks are permeably lined. However, the design will no depend on any infiltration capacity of the existing subsoils.

13.3.2.2.3 Discharge Options

Discharge from the tanks passes through hydrobrake manholes to control discharge to 34 litres/second over the entire site. The outfall of the main drainage system is to the existing water courses along the lower reaches of the site. In addition, a factor of safety of 2.0 is applied to all elements of this design, thereby providing a high level of service even under the conditions of localised failure within the network.

13.4 Conclusion

Based on the results of Flood Risk Assessment and Drainage Assessments, it is estimated that the risk of flooding to the proposed development will be minimal, and that the development will not increase the risk of flooding elsewhere.

14 BIODIVERSITY

14.1 Introduction

An Ecological Impact Assessment (EcIA) has been undertaken on lands to the north of the N56 Road in Letterkenny, in respect of the proposals for proposed flood relief works at this site, as described within Chapter 2 Project Description of this Environmental Impact Assessment Report (EIAR). The scope of this Ecological Impact Assessment (EcIA) is to identify ecological constraints within the study area in Letterkenny, Donegal by means of the following:

- Identifying the Zone of Influence (ZoI) of the proposed development on the natural environment;
- Establishing the baseline regarding terrestrial and aquatic habitats, ecotopes, flora and fauna (volant and non-volant mammals, invertebrates, avifauna etc.) within the zone of influence of the proposed regeneration scheme;
- Ascertaining the potential impacts upon all ecological receptors within the development footprint and zone of influence to include, but not be limited to, species protected under the European and National Legislation, including the EU Habitats and Birds Directives and Irish Wildlife Acts (1976 to 2012, as amended); and,
- Presenting measures to avoid or minimise potential damage to any sensitive ecological receptors supported within the receiving environment.

The author, Samuel O'Hara, is an Associate Ecologist with RPS and holds a BSc (Hons) in Ecology and has over eight years of experience in the field of ecology. Samuel has extensive experience of ecological field survey including habitat, mammal and bird survey and is a protected species license holder. Samuel is a full member of the Chartered Institute of Ecology and Environmental Management (CIEEM).

The professional judgement expressed herein is the true and bona fide opinion of the professional ecologist. The information prepared and provided is accurate at the time of issue of this report and has been prepared and provided in accordance with the CIEEM Code of Professional Conduct (CIEEM 2019).

This Chapter is supported by Volume II Design Drawings and Figures:

- Figure 14.1: Ecological Study Area
- Figure 14.2: Designated Sites and Features of Natural Heritage Importance
- Figure 14.3: Extended Phase 1 Habitat Survey
- Figure 14.4: Protected and Invasive Species

This Chapter is supported by Volume III Technical Appendices:

- Appendix 14.A: Data gathered from National Biodiversity Data Centre (NBDC); and
- Appendix 14.B: Outline Invasive Species Management Plan.

14.2 Assessment Methodology

14.2.1 Legislation and Guidance

The EcIA presented in this EIAR Chapter has been undertaken in accordance with guidelines produced by the CIEEM (CIEEM 2018); experience of 'best practice' in ecological assessment; and criteria set out within this sub-section.

14.2.1.1 International Directives

Council Directive on the Conservation of Natural Habitats of Wild Fauna and Flora (92/43/EEC) (The Habitats Directive)

The main aim of the Directive is to promote the maintenance of biodiversity through the conservation of natural habitats and wild species listed on the Annexes of the Directive. Member States are required to take measures to maintain or restore, at favourable conservation status, biodiversity whilst taking account of economic, social, cultural requirements and regional and local characteristics.

It gives effect to site and species protection measures through establishment of the Natura 2000 network and designation of European Sites including Special Areas of Conservation (SAC) and Special Protected Areas (SPA). It also establishes a list of species (other than birds) whose habitats must be protected to secure their survival. These priority species and habitats are subject to a higher level of protection.

The Directive also requires appropriate assessment of any plan or project not directly connected with or necessary to the management of a European site, but likely to have significant effects upon a European site, either individually or in combination with other plans or projects.

Council Directive on the Conservation of Wild Birds (2009/147/EC) (The Birds Directive)

The Directive provides a framework for the conservation and management of, and human interactions with, wild birds in Europe. It makes provisions for the maintenance of the wild bird populations across their natural range; conserves the habitats for rare or vulnerable species listed in Annex I and of migratory species through the classification of SPAs and provides protection for all wild birds.

14.2.1.2 Irish Legislation

S.I. No. 355 of 2015 provides that the following shall be construed together as one:

- Wildlife Act 1976;
- Wildlife (Amendment) Acts of 2000, 2010 and 2012;
- European Communities (Birds and Natural Habitats) (Restrictions of the Use of Poison Bait) Regulations 2010;
- European Communities (Birds and Natural Habitats) Regulations 2011;
- European Communities (Birds and Natural Habitats) (Amendment) Regulations of 2013, 2015; and
- Wildlife Amendment Bill 2016.

European Communities (Birds and Natural Habitats) Regulations 2011 to 2015

The Regulations give effect to requirements relating to the designation of protected sites under the Birds Directive and Habitats Directive. The Regulations provide for the protection and management of European Sites and place obligations on all public authorities to have regard to the requirements of the Habitats Directive beyond the realms of planning related consents issued under the Planning and Development Act 2000, as amended. The Regulations also provide for the protection of species of European importance.

Wildlife Acts 1976 to 2012

The Acts provide for inter alia the protection of wildlife. The Acts prohibit the intentional killing, taking or injuring of certain wild birds or wild animals; or the intentional destruction, uprooting or picking of certain wild plants.

Wildlife Amendment Bill 2016

The purpose of the Bill is to provide for the implementation of a reconfiguration of the Raised Bog Natural Heritage Area Network arising from (i) the proposals from the Review of Raised Bog Natural Heritage Area Network published in January 2014; (ii) an assessment of the effects on the environment of the proposals arising from the Review and, if required, any other screening for an assessment or as the case may be, assessment, including public consultation undertaken and (iii) observations or submissions received during the course of public consultation.

The Wildlife Amendment Bill is currently at Committee Stage.

Taken as a whole, nature conservation legislation is of key importance in undertaking EcIA for proposed development as it shapes planning policy.

14.2.1.3 Planning Policy

Donegal County Development Plan 2018-2024

An overarching theme of the Donegal County Development Plan 2018-2024 (CDP) in relation to natural heritage and biodiversity is to promote and encourage the conservation of the natural environment , cultural heritage and amenities of the county in accordance with legislation, plans and policies to ensure a rich landscape and range of ecosystems.

Policies set out in Chapter 7 in respect of natural heritage and biodiversity and heritage, conservation and landscape, include a range of provisions to protect and conserve Natura 2000 sites, Natural Heritage Areas (NHAs) and proposed NHAs. In addition, the CDP contains policies to provide for the implementation of other plans including the National Biodiversity Action Plan (nBAP) Landscape Character Assessment plan and the National Peatlands Strategy. Chapter 7 of the CDP also sets out policies to control the spread of invasive species.

14.2.2 Study Area

The study area, which encompasses the proposed development boundary (Site area is 17.68 Ha) and is located within the northern part of Letterkenny, County Donegal. The ecological study area and extent is illustrated in Figure 14.1. Site Location.

The proposed development site is largely comprised of improved grassland, short rotation willow coppice and small areas of scrub, plantation woodland, recolonising bare ground and hardstanding in addition hedgerows, treelines and watercourses. Limited stands of Himalayan Balsam and relatively extensive areas of Salmonberry are also supported.

The majority of the proposed development, being located within a semi-urban area, is largely isolated from semi-natural habitats in the wider area. On a precautionary basis the assessed Zone of Influence (ZoI) extends beyond the study area (Application Site) to include European and Nationally designated sites within proximity of the study area, or which are hydrologically linked to the proposals. The designated sites and ecological receptors within the ZoI of the proposed works are presented and discussed below.

The terrestrial ecology study area is inclusive of all aspects of the proposed works. A thirty-metre buffer was applied to all areas proposed for works to address potential impacts to Badgers, with watercourses also searched for signs of otter within 150m of the proposed works.

14.2.3 Baseline

14.2.3.1 Desk Study

The National Biodiversity Data Centre (NBDC) is a national organisation that collates, manages, analyses and disseminates data on Ireland's biodiversity. It is funded by the Heritage Council. The NBDC provides access to all validated biodiversity data through Biodiversity Maps, the on-line biodiversity data portal.

Biodiversity records and full species accounts can be viewed and scrutinised through an interactive biodiversity maps portal (http://maps.biodiversityireland.ie/#/Home). This is a tool that can be used to help make a preliminary assessment of biodiversity issues when considering the site-specific proposed development.

The chosen search area using the NBDC search tool was customised in order to capture all records within a minimum 1km distance of the proposed development site and are included at Appendix 14.A. The principal purpose of this task is to capture any records of protected species or species of natural heritage importance in close proximity to the site boundary. The zone of influence of the proposed development for protected species, does not extend further than this.

NPWS habitat data files were used to determine the presence of features of ecological significance within and in proximity to, the site boundary.

14.2.3.2 Habitat Survey

An extended Phase 1 Habitat Survey was conducted of the site in May 2022 and covered the entirety of the study area. The surveys were undertaken in line with the Heritage Council's Best Practice Guidance for Habitat Survey and Mapping (Heritage Council, 2011). Ecological value is based upon CIEEM and National Road Authority (NRA) guidelines (CIEEM, 2018; NRA, 2009).

The survey was extended to include further information on the potential of the habitats identified to support species protected by law or of natural heritage importance. All habitats were mapped and categorised in accordance with the Heritage Council Guide to Habitats in Ireland (Fossitt, 2000). A search was undertaken for protected and invasive flora species. Aerial photographs were used to assist the mapping of habitats. The results of this survey are presented below.

It should be noted that whilst every effort has been made to provide a comprehensive description of the site of the proposed development, no survey can consist of a complete characterisation and prediction of the ecological environment.

The extended phase 1 habitat survey also incorporated a detailed survey for invasive non-native species.

14.2.3.3 Ecological Survey for Bats

Ecological surveys for bats have been undertaken of the study area. This included a preliminary ecological appraisal for bats (PEAB), in addition to an assessment of trees with potential for roosting bats.

A PEAB has been completed for the proposed project. The aim of the PEAB is to observe, assess and record the potential suitability of the habitats along the route of the proposed project to support bat roosting habitat, commuting habitat and/or foraging habitat. Habitat features were classified as negligible, low, moderate or high in accordance with Bat Conservation Trust (BCT) Good Practice Guidelines (Collins 2016).

Preliminary Roost Assessment (PRA) of trees potentially affected by the project was carried out during daylight hours in January 2023. An external inspection of trees was carried out from ground level to identify Potential Roost Features (PRFs) that could be used by roosting bats.

Bats rely on the presence of disease and decay; damage; and associations in trees to provide suitable roosting habitat in trees. These three PRF forms result in the development of a variety of different features that can provide preferred roost sites for bat species (Andrews 2018 and Collins 2016):

- Disease and decay PRFs include woodpecker holes, squirrel holes, knot holes, pruning cuts, tear outs, wounds, cankers, compression forks and butt rots.
- Damage PRFs include lighting strikes, hazard beams, subsidence cracks, shearing cracks, transverse snaps, welds, lifting bark, desiccation fissures and frost cracks.
- Association PRFs include fluting and ivy with stem diameters in excess of 50 mm.

Trees were classified as having negligible, low, moderate or high suitability for roosting bats in accordance with the Bat Conservation Trust, Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Edition) (Collins 2016). The aim of the PRA is to determine if further Tree Climbing PRF Inspection Surveys or emergence/re-entry surveys are required.

14.2.3.4 Badger Survey

A badger survey was carried in May 2022 in accordance with the NRA survey specification, in order to establish the presence of badger setts and/or badger foraging areas. The site was surveyed for the presence of badger setts and badger activity including paths, snuffle holes, latrines, badger hair and bedding material.

The survey area was searched for the following diagnostic field evidence:

- Setts (underground structures displaying signs of current or recent use and occupation or disused holes made by badgers);
- Paths & Trails (networks of paths linking setts with foraging habitat);
- Paw prints & Tracks;
- Guard hairs;
- Snuffle holes & Feeding scrapes (vegetation or soft soil turned over during foraging);
- Scratching posts (claw marks on tree trunks, fallen trees etc.);
- Breach points (gaps in fences and hedges or crossing points over roads);
- Dung pits (single faeces deposits placed in a small excavation); and
- Latrines (collection of faecal deposits used to mark territorial boundaries).

All tracks, trails and paths identified were followed to locate setts and other field signs; the immediate vicinity of all latrines were also searched for further signs of territorial evidence.

In areas of restricted access due to the presence of dense impenetrable scrub, an assessment of the likely importance of the area to badger was made based on the known local ecology of the species, the presence or absence of badger trails entering the area, identified field signs in the vicinity and local habitat suitability and quality.

14.2.3.5 Otter Survey

An otter survey was carried in May 2022 in order to establish the presence of otter dens and/or otter foraging areas. The site, and a buffer of at least 150m, was surveyed for the presence of otter activity including

- Holts
- Couches
- Spraints
- Otter paths
- Slides
- Paw prints

In areas of restricted access due to the presence of dense impenetrable scrub, an assessment of the likely importance of the area to otter was made based on the known local ecology of the species, the presence or absence of trails entering the area, identified field signs in the vicinity and local habitat suitability and quality.

14.2.4 Assessment Criteria and Assignment of Significance

The information gathered from the desk study and the suite of ecological surveys conducted was used to prepare an EcIA for the proposed development. The EcIA has been undertaken in accordance with the guidelines set out below, which were used to derive valuation and assessment criteria as set out in Tables 14.1 and 14.2.

The EcIA has been undertaken following the methodology set out in Guidelines for Ecological Impact Assessment in the UK and Ireland: Terrestrial, Freshwater, Coastal and Marine (CIEEM, 2018); and with reference to the National Roads Authority 'Guidelines for Assessment of Ecological Impacts of National Road Schemes' (NRA, 2009); Section 4.3 'Biodiversity' of the draft EPA Advice Notes for Preparing Environmental Impact Statements (EPA, 2015); and BS 42020:2013 Biodiversity: Code of practice for planning and development (BSI, 2013).

Section 3.7 of the EPA 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022) note that "where more specific definitions of degrees of impact exist within a specialised topic e.g. ecology, these should be used in preference to these generalised definitions".

EcIA is based upon a source-pathway-receptor model, where the source is defined as the individual elements of the proposed development that have the potential to affect identified ecological features. The pathway is defined as the means or route by which a source can affect the ecological features. An ecological receptor is the feature of interest, being a species, habitat or ecologically functioning unit of natural heritage importance. Each element can exist independently however an effect is created where there is a linkage between the source, pathway and feature. A significant effect is defined in CIEEM (2018) as:

> "*an effect that either supports or undermines biodiversity conservation objectives for 'important ecological features' [...] or for biodiversity in general. Conservation objectives may be specific (e.g. for a designated site) or broad (e.g. national/local nature conservation policy) or more wide-ranging (enhancement of biodiversity). Effects can be considered significant at a wide range of scales from international to local*".
>
> and
>
> "*an effect that is sufficiently important to require assessment and reporting so that the decision maker is adequately informed of the environmental consequences of permitting a project. A significant effect is a positive or negative ecological effect that should be given weight in judging whether to authorise a project: it can influence whether permission is given or refused and, if given, whether the effect is important enough to warrant conditions, restrictions or further requirements such as monitoring*".

BS 42020:2013 states that if an effect is sufficiently important to be given weight in the planning balance or to warrant the imposition of a planning condition, e.g. to provide or guarantee necessary mitigation measures, it is likely to be "significant" in that context at the level under consideration. The converse is also true: insignificant effects would not warrant a refusal of permission or the imposition of conditions.

Likely significant effects are predicted for the proposed development as described in Chapter 2 of the EIAR. Table 14.1 includes a geographic frame of reference and criteria for valuing ecological features. Table 14.2 sets out criteria for predicting magnitudes of effect. These tables have been prepared with due regard to CIEEM, EPA and NRA guidelines.

Significant impacts are moderate or major effects which require counterbalancing mitigation measures to offset their adverse effects. Beneficial effects do not require mitigation measures as their effects are welcomed.

Table 14.1: Ecological Valuation Criteria for Ecological Features

Value	Criteria
International	• 'European Sites' including Special Areas of Conservation (SAC) & Special Protection Areas (SPA) • Sites that satisfy the criteria for designation as a 'European Site' (see Annex III of the Habitats Directive) • Features essential to maintaining the coherence of the Natura 2000 Network • Sites containing 'best examples' of the habitat types listed in Annex I of the Habitats Directive • Resident or regularly occurring populations (assessed to be important at the international level) of the following: • Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or • Species of animal and plants listed in Annex II and/or IV of the Habitats Directive • Ramsar Sites • World Heritage Sites • Sites hosting significant populations of species under the Bonn Convention • Sites hosting significant populations of species under the Berne Convention
National	• Wildlife Refuge for species protected under the Wildlife Acts • Resident or regularly occurring populations (assessed to be important at the national level) of the following: • Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive; and/or • Species of animal and plants listed in Annex II and/or IV of the Habitats Directive • Natural Heritage Areas (NHA) or proposed NHA • National Nature Reserves (NNR) • Marine Nature Reserve (MNR)
County	• Sites listed as part of the Ecological Network in the County Development Plan (CDP) • Areas subject to a Tree Preservation Order in a CDP • Resident or regularly occurring populations (assessed to be important at the County level) of the following • Species of bird, listed in Annex I and/or referred to in Article 4(2) of the Birds Directive • Species of animal and plants listed in Annex II and/or IV of the Habitats Directive • Species protected under the Wildlife Acts (1976-2018) and/or • Species listed on the relevant Red Data list • Sites containing areas of the habitat types listed in Annex I of the Habitats Directive that occur outside of designated International (SAC/SPA/Ramsar) or National (NHA/pNHA) sites • Regionally important populations of species or viable areas of semi-natural habitats or natural heritage features identified in a Biodiversity Action Plan (BAP) prepared for an administrative area, if this have been prepared • Sites containing natural habitat types with high biodiversity in a regional context and a high degree of naturalness, or populations of species that are uncommon within the County
Local	• Locally important populations of a priority or protected species; or habitats or features of natural heritage importance identified in a BAP, if this has been prepared • Sites containing semi-natural habitat types with high biodiversity in a local 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
Site	• Sites containing small areas of semi-natural habitat that are of limited local importance for wildlife

Table 14.2: Magnitudes of Effect upon Ecological Features

Impact Significance	Magnitude of Effect	Criteria
Significant negative effect	Major adverse	• Loss of, permanent damage to or adverse impact on any part of a site of international or national importance; • Loss of a substantial part or key feature of a site of regional importance; • Loss of favourable conservation status (FCS) of a legally protected species; • Loss of or moderate damage to a population of nationally rare or scarce species.
	Moderate adverse	• Temporary disturbance to a site of international or national importance, but no permanent damage; • Loss of or permanent damage to any part of a site of regional importance; • Loss of a key feature of local importance; • A substantial reduction in the numbers of legally protected species such that there is no loss of FCS but the population is significantly more vulnerable; • Reduction in the amount of habitat available for a nationally rare or scarce species, or species that are notable at a regional or county level.
	Minor adverse	• Temporary disturbance to a site of regional value, but no permanent damage; • Loss of, or permanent damage to, a feature with some ecological value in a local context but that has no nature conservation designation; • A minor impact on legally protected species but no significant habitat loss or reduction in FCS; • A minor impact on populations of nationally rare or scarce species or species that are notable at a regional or county level.
No Significant Effect	Negligible	• No impacts on sites of international, national or county importance; • Temporary disturbance or damage to a small part of a feature of local importance; • Loss of or damage to land of negligible nature conservation value; • No reduction in the population of legally protected, nationally rare, nationally scarce or notable (regional level) species on the site or its immediate vicinity. • Beneficial and adverse impacts balance such that resulting impact has no overall affect upon feature.

Impact Significance	Magnitude of Effect	Criteria
Significant positive effect	Minor beneficial	• A small but clear and measurable gain in general wildlife interest, e.g. small-scale new habitats of wildlife value created where none existed before or where the new habitats exceeds in area that habitats lost.
	Moderate beneficial	• Larger new scale habitats (e.g. net gains over 1 ha in area) created leading to significant measurable gains in relation to the objectives of biodiversity action plans.
	Major beneficial	• Major gains in new habitats (net gains of at least 10 ha) of high significance for biodiversity being those habitats, or habitats supporting viable species populations, of national or international importance cited in Annexes I and II of the habitats Directive or Annex I of the Birds Directive.

14.2.5 Habitats Directive Appraisals

A Screening for Appropriate Assessment and a Natura Impact Statement (NIS) have been prepared by RPS on behalf of the applicant to assist the competent authority in fulfilling its duties in accordance with Part XAB of the Planning and Development Acts 2000 to 2015 (the PDA) which transposes certain aspects of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC. These documents accompany the EIAR.

14.3 Baseline Environment

14.3.1 Designated Sites and Features of Natural Heritage Importance

The site of the proposed project is not located within the boundary of statutory or non-statutory designated sites of international, national or local nature conservation importance. There are however a number of designated sites within the Zone of Influence (ZoI) of the proposed project.

Table 14.3 below provides descriptive details of designated sites and features of natural heritage importance located within the site of the project; within immediate proximity to the site of the proposed project; or outside the site of the proposed project but connected it through an identifiable impact pathway. The boundary of each of these designated sites in relation the proposed project is illustrated in **Figure 14.2 Designated Sites & Features of Natural Heritage Importance**.

Table 14.3: Designated Sites and Features of Natural Heritage Importance

Designated Site/Feature	Distance from Site (km)	Description
River Swilly Valley Woods pNHA	0.36	Semi-natural woodlands, associated ground flora and adjacent heath and wet grassland habitats.
Lough Swilly SAC	1.8	Estuaries [1130] Coastal lagoons [1150] Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] Molinia meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] *Lutra lutra* (Otter) [1355]
Lough Swilly SPA	1.8	Great Crested Grebe (*Podiceps cristatus*) [A005] Grey Heron (*Ardea cinerea*) [A028] Whooper Swan (*Cygnus cygnus*) [A038] Greylag Goose (*Anser anser*) [A043] Shelduck (*Tadorna tadorna*) [A048]

Designated Site/Feature	Distance from Site (km)	Description
		Wigeon (*Anas penelope*) [A050] Teal (*Anas crecca*) [A052] Mallard (*Anas platyrhynchos*) [A053] Shoveler (*Anas clypeata*) [A056] Scaup (*Aythya marila*) [A062] Goldeneye (*Bucephala clangula*) [A067] Red-breasted Merganser (*Mergus serrator*) [A069] Coot (*Fulica atra*) [A125] Oystercatcher (*Haematopus ostralegus*) [A130] Knot (*Calidris canutus*) [A143] Dunlin (*Calidris alpina*) [A149] Curlew (*Numenius arquata*) [A160] Redshank (*Tringa totanus*) [A162] Greenshank (*Tringa nebularia*) [A164] Black-headed Gull (*Chroicocephalus ridibundus*) [A179] Common Gull (*Larus canus*) [A182] Sandwich Tern (*Sterna sandvicensis*) [A191] Common Tern (*Sterna hirundo*) [A193] Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] Wetland and Waterbirds [A999]
Lough Swilly Including Big Isle, Blanket Nook & Inch Lake pNHA	1.8	As above.

14.3.2 Biological Records

14.3.2.1 National Biodiversity Data Centre (NBDC)

A search of the existing records held by NBDC was undertaken. The search area was customised i.e. a 'user-defined' polygon was drawn capturing all records within circa (but no less than) 1km of each site. The output data (species list) was refined to include those afforded protection under national and international legislation. Also presented are species which have been assessed following International Union for the Conservation of Nature (IUCN) categories and criteria, and guidelines for their application. The customised search area in this instance measured 1km from the site boundary.

This user-defined polygon and refined output species list are presented in Appendix 14.A of the EIAR.

Records include that of a wide range of bird species including barn owl *Tyto alba,* common kestrel *Falco tinnunculus,* long-eared owl *Asio otus,* yellowhammer *Emberiza citrinella* and a range of waders and waterfowl associated with the nearby Lugh Swilly SPA, in addition to records of a range of common and widespread species.

No records of bats were returned within the search area. Other mammal records were limited to a small number of records of badger *Meles meles,* hedgehog *Erinaceus europaeus,* and otter, in addition to records of rabbits, fox and, red deer and grey squirrel.

A range of records of higher plants, mosses, liverworts, insects, molluscs and other invertebrates were also returned.

14.3.3 Habitats

The proposed development site was subject to extended phase 1 habitat survey in May 2022.

A map illustrating the study area and the recorded habitats can be found at **Figure 14.3 Extended Phase 1 Habitat Survey**.

Descriptions of the recorded habitats are set out below along with an evaluation of the relative value of these habitats, as per Table 14.1 of this EIAR Chapter.

14.3.3.1 Improved Grassland

The majority of the study area is comprised of improved grassland which has been subject to re-seeding and nutrient enrichment and is managed primarily through grazing.

Species present within this habitat include dominant perennial rye-grass *Lolium perenne,* occasional meadow foxtail *Alopecurus pratensis,* marsh foxtail *Alopecurus geniculatus,* annual meadow-grass *Poa annua,* smooth meadow-grass *Poa pratensis,* Yorkshire fog *Holcus lanatus,* creeping bent *Agrostis stolonifera,* sweet vernal-grass *Anthoxanthum odoratum,* common nettle *Urtica dioica,* creeping thistle *Cirsium arvense,* spear thistle *Cirsium vulgare,* broad-leaved dock *Rumex obtusifolius,* common sorrel *Rumex acetosa,* bush vetch *Vicia sepium,* creeping buttercup *Ranunculus repens,* meadow buttercup *Ranunculus acris,* common mouse-ear *Cerastium fontanum,* common chickweed *Stellaria media,* dandelion *Taraxacum officinale agg.,* soft rush *Juncus effusus,* hard rush *Juncus inflexus,* white clover *Trifolium repens,* thyme-leaved speedwell *Veronica serpyllifolia*, germander speedwell *Veronica chamaedrys,* daisy *Bellis perennis,* short-fruited willowherb *Epilobium parviflorum,* broadleaved willowherb *Epilobium montanum,* field bindweed *Convolvulus arvensis,* greater plantain *Plantago major,* common hemp-nettle *Galeopsis tetrahit* and hairy bittercress *Cardamine hirsuta.*

This habitat is considered to be of extremely limited intrinsic ecological value, supporting a range of common and widespread species typical of agricultural grasslands in the wider area.

This habitat is assessed as being of ecological value at the site level.

14.3.3.2 Short Rotation Coppice

A large proportion of the study area, inclusive of a number of small fields in the north-east, is comprised of single species willow plantation *Salix x viminalis*. This habitat is managed for biomass production and as such is subject to harvesting on an approximate coppice rotation of two years.

The ground flora under the willow is generally similar to that of the improved grasslands within the site with further supported species including herb Robert *Geranium robertianum,* wood avens *Geum urbanum,* birds-foot trefoil *Lotus corniculatus,* male fern *Dryopteris filix-mas,* rosebay willowherb *Chamaerion angustifolium* and angelica *Angelica sylvestris*. There are significant levels of scrub encroachment including bramble *Rubus fruticosus,* dogwood *Cornus sanguinea* and gorse *Ulex europaeus* with scattered salmonberry *Rubus spectabilis* throughout. Scattered immature broadleaved trees are also present throughout the margins of the plantation including alder *Alnus glutinosa* and downy birch *Betula pubescens*.

The plantation is broken up by former agricultural hedgerows which have not been subject to recent management and are encroaching into adjacent areas.

This habitat is considered to be of relatively limited ecological value given its limited species diversity in addition to its regular harvesting for biomass. On this basis the habitat is assessed as being of ecological value at the site level.

14.3.3.3 Broadleaved Plantation Woodland

A narrow strip of young broadleaved plantation woodland considered to be approximately twelve years old is present along the southern boundary of the willow plantation in the west of the study area. This area occupies what was previously an agricultural lane.

Species present include ash *Fraxinus excelsior,* oak *Quercus robur,* alder, cherry *Prunus avium,* holly *Ilex aquifolium,* goat willow *Salix caprea,* rowan *Sorbus aucuparia,* elder *Sambucus nigra,* silver birch *Betula pendula,* downy birch *Betula pubescens,* blackthorn *Prunus spinosa,* hawthorn *Crategus monogyna* and Scot's pine *Pinus sylvestris*.

Salmonberry and bramble are common at the ground layer with other ground floral species limited to those found within improved grassland within the remainder of the site.

This habitat is considered to be of somewhat higher ecological value in the context of the site. On this basis the habitat is assessed as being of ecological value at the local level.

14.3.3.4 Scrub

Several small areas of unmanaged scrub are present adjacent to the recycling centre, at the margins of the central watercourse and short rotation coppice. These are characterised by the presence of dense salmonberry, bramble and alder, willow and birch saplings and are considered to be of ecological value at the site level.

14.3.3.5 Watercourses

A number of minor watercourses are present within the study area, the largest being the narrow central stream, which runs north to south along the western boundary of the willow plantation and to the west of the recycling centre which lies adjacent to the site.

Further minor watercourses including a stream along the eastern boundary of the willow plantation in addition to several flowing wet ditches which are present along agricultural field boundaries.

These features were not noted to support aquatic vegetation and are generally associated with adjacent hedgerows and stands of salmonberry.

These features are nonetheless of some ecological value and are considered to be of significance at the local level.

14.3.3.6 Hedgerows

The site supports a number of hedgerows, the vast majority of which are managed, through regular cutting, to a height of around 1.8m. Several hedgerows however, such as those within areas of willow plantation, are not subject to management. Standard mature trees are present within a number of the hedgerows which are individually labelled on **Figure 14.3** and described below.

H1 is an unmanaged hedgerow which lies along the western edge of the central stream to the west of the willow plantation and recycling centre. This is a variable hedgerow with a large number of middle-age and mature standard trees. Species present include sycamore *Acer pseudoplatanus,* goat willow, hawthorn, salmonberry and snowberry *Symphoricarpos alba*.

H2 is an unmanaged 5m tall hedgerow separating areas of willow plantation. This feature supports an underlying stone dyke and an associated flowing wet ditch. The hedgerow is primarily comprised of hawthorn with holly, ivy *hedera helix* and salmonberry also present. Ground flora below the hedgerow includes opposite-leaved golden saxifrage *Chrysosplenium oppositifolium,* hart's-tongue fern *Asplenium scolopendrium* and meadow vetchling *Lathyrus pratensis*.

H3 is an unmanaged hedgerow along the northern edge of the willow plantation which is comprised primarily of gorse with occasional hawthorn, hazel *Corylus avellana,* alder and ash in addition to salmonberry. There is an associated dry ditch.

H4 is a sparse and gappy hedgerow which backs onto residential gardens adjacent to the site. It is of variable composition with areas entirely comprised of salmonberry, in addition to hawthorn, hawthorn, bramble, gorse, Leyland cypress *Cupressus leylandii,* ornamental elder *Sambucus nigra* "black lace", and occasional mature ash. There is an associated flowing wet ditch.

H5 is a managed hedgerow, approximately 1.8m tall adjacent to the Ashfield public road. It is comprised of gorse, salmonberry, honeysuckle *Lonicera periclymenum,* bramble and goat willow with occasional mature ash and sycamore.

H6 is a highly variable and gappy hedgerow which backs onto residential gardens to the south-west of the site and has an associated flowing wet ditch for much of its length. Species present include hazel, goat willow, blackthorn, hawthorn, salmonberry, barberry *Berberis darwinii,* cherry, beech *Fagus sylvativca,* copper beech, holly, New Zealand broadleaf *Griselinia littoralis,* sycamore, alder and Norway spruce.

H7 is a managed hedgerow, approximately 1.8m tall, comprised largely of hawthorn, with some salmonberry and an associated wet ditch with great willowherb *Epilobium hirsutum*.

H8 is a managed hedgerow approximately 1.8m tall, with an associated flowing wet ditch. Species present include predominately hawthorn with gorse, salmonberry, honeysuckle, holly, goat willow, blackthorn and ash.

H9 is a managed gappy hedgerow along the field boundary adjacent to the Carnamuggagh Lower Road. It is comprised largely of hawthorn in addition to salmonberry and bramble.

H10 is a variable hedgerow which backs onto adjacent residential gardens and is comprised of Norway spruce, gorse, rowan, holly and salmonberry and supports an associated wet ditch.

H14 is again a highly variable hedgerow which backs onto adjacent residential gardens. It is subject to variable management with species present including Leyland cypress, hawthorn, sycamore, alder, blackthorn, bramble, ash and salmonberry.

Hedgerows within the site are considered to be of relatively higher ecological value in the context of the site and of ecological importance at the local level. However many of these hedgerows are in poor condition, having been improperly managed or subject to significant encroachment by invasive species.

14.3.3.7 Recolonising Bare Ground

The site supports a small area of bare ground to the west of the central watercourse and adjacent to the recently created hardstanding access track. This area is largely bare and unvegetated with a limited range of recolonising vegetation including Himalayan Balsam *Impatiens glandulifera,* broad-leaved willowherb, annual meadow-grass and a number of further ephemeral short perennial species.

14.3.3.8 Artificial Surfaces: Hardstanding

The site supports an existing road, the Carnamuggagh Lower Road and Knocknamona Crescent, in addition to an associated pavement and a gravel access track linking said road with the area of short rotation coppice, to facilitate harvesting of the crop. An area of the N56 road to the south of the development site is also included within the site boundary. These areas are characterised by a lack of vegetation and are of negligible ecological value.

14.3.3.9 Invasive Plant Species

The site supports several areas of scattered Himlayan balsam, a species included at the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011, including adjacent to the access track in addition to along the western boundary of the short rotation coppice. Himalayan balsam plants within these areas are relatively sparse, either being recently established or in competition with existing grassland vegetation.

Salmonberry, another invasive species included within the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011, is present throughout hedgerows within the site, in addition to being scattered across areas of short rotation coppice.

The extent of the areas where these species are found are illustrated on **Figure 14.4 Protected and Invasive Species**.

14.3.4 Protected Species

14.3.4.1 Badger

No evidence indicating the presence of badger was recorded within the site or its surrounds. It is therefore considered that the species is unlikely to be reliant on the site and may be present on an occasional basis but not resident.

It is therefore considered that the proposed development does not have potential to give rise to any significant impacts upon badger and the species is given no further consideration within this report.

14.3.4.2 Otter

No evidence indicating the presence of otter was recorded along watercourses within the site. While these watercourses may have potential to support commuting individuals it is considered unlikely that they would be utilised by otter on more than an occasional basis, given their relative size and the likely low populations of fish which such minor watercourses could support.

It is therefore considered that the proposed development is unlikely to give rise to any significant direct effects upon otter associated with the loss of foraging habitat.

14.3.4.3 Bats

A single tree, situated along the northern boundary of the development site was considered to offer potential opportunities for roosting bats. This mature ash supports a number of knot holes and split branches, largely on the southern aspect of the tree at heights between 3.5 and 7m.

The tree is not well linked by hedgerows to the wider area and is likely to be subject to artificial lighting associated with the adjacent residential properties.

This tree is considered to offer low potential to support roosting bats.

Habitats within the site including hedgerows, short rotation coppice and broadleaved plantation woodland offer some potential value for a range of foraging and commuting bat species. Improved grasslands comprising the remainder of the site also offer fairly limited foraging opportunities for generalist species including Leislers bat *Nyctalus leisleri* and pipistrelle *Pipistrellus* sp..

It is noted that the site is largely surrounded by existing development and as such is unlikely to represent an important commuting corridor for the species.

14.3.4.4 Birds

The site was recorded to support a range of common and widespread bird species including starling *Sturna vulgaris,* wren *Troglodytes troglodytes,* robin *Erithacus rubecula,* dunnock *Prunella modularis,* blackbird *Turdus merula,* song thrush *Turdus philomelos,* collared dove *Streptopelia decaocto,* woodpigeon *Columba palumbus,* rook *Corvus frugilegus,* hooded crow *Corvus cornix,* jackdaw *Corvus monedula* and magpie *Pica pica*.

A number of active nests were noted within hedgerows within the site including those of woodpigeon and wren.

While the site has potential to support other species including wintering waders, gull populations and occasional foraging raptors, this potential is limited given the nature of the habitats and the semi-urban nature of the site. No such species were recorded within the site during the surveys and no historical records are held for such species on the NBDC database from within the site boundary.

It is considered that the site is likely to be of fairly limited value for bird populations, inclusive of a range of common and widespread species.

14.3.4.5 Other Protected Species

No other evidence was recorded which indicated the presence of any further terrestrial protected species within the study area.

14.4 Description of Likely Significant Effects

14.4.1 Assessment of Construction Effects

14.4.1.1 Designated Sites

The proposed development will not take place within any sites designated on account of their natural heritage interests.

The proposed development is hydrologically linked to the Lough Swilly SAC and Lough Swilly SPA via a number of minor watercourses which flow through the site. Both of these Natura 2000 sites lie within relative proximity to the proposals (within 2km) and are underpinned by the Lough Swilly including Big Isle, Blanket Nook & Inch Lake proposed Natural Heritage Area (pNHA).

Given the separation of the site from any further designated sites of natural heritage importance it is not considered that impacts to any further sites will occur as a result of the proposed development.

The proposed development will therefore be subject to Article 6 (3) of the Habitats Directive and its associated domestic legislation. The proposals would give rise to the risk of likely significant effects upon both of these European sites through indirect impacts associated with water borne sedimentation and pollution of freshwater habitats and associated effects to qualifying species populations. In addition there is potential for the proposed development to give rise to the inadvertent spread of invasive non-native species into the downstream designated sites via the supported hydrological links.

On the basis that such potential effects are limited to that associated with pollution, sedimentation and impacts associated with the spread of invasive species it is considered that mitigation measures are likely to be limited to those associated with any large construction project within proximity to watercourses, including a range of best practice measures as set out within the accompanying outline Construction Environmental Management Plan (oCEMP), in addition to the production of an Invasive Species Management Plan (ISMP), discussed further below.

It is noted that Lough Swilly SAC is designated on account of several supported Annex I Habitats which are entirely terrestrial, namely Molinia meadows and old sessile oak woods, such habitats are not vulnerable to the effects of freshwater pollution and do not lie downstream of the proposed development.

A further annex I habitat qualifying interest of the SAC is Atlantic salt meadows. This habitat is not subject to regular inundation by tides, with the lower limit of the habitats being the upper limit of normal high tide levels, as such it can be assumed that this habitat interacts directly with waterborne substrates on an occasional basis only. It is concluded therefore that any minor inputs of sediments and pollutants or invasive species material that may arise as a result of the proposed development would have extremely limited potential to give rise to adverse effects upon Atlantic salt meadow habitat within the Lough Swilly SAC.

The remaining Annex I habitats for which the Lough Swilly SAC is designated are estuaries and coastal lagoons, both of which are present within areas of Lough Swilly SAC which lie in relative proximity to the proposed development. It is noted that the Lough Swilly catchment comprises an area of approximately 507km^2 and supports relatively large tidal flows and significant tidal mixing. It is envisaged that the potential for the proposals to give rise to sediments or pollutants will be fairly minimal even in a worst-case scenario and that such inputs, subject to significant tidal mixing within the estuarine waters of Lough Swilly, would be quickly dispersed to background levels.

Within the Lough Swilly SAC Conservation Objectives (NPWS 2011) water quality is listed as an attribute of coastal lagoon habitats for which improvements are targeted, particularly in regard to the waters around Blanket Nook. No specific attributes or targets relevant to water quality have been set in relation to qualifying estuary habitat within the SAC however the distribution of the habitat is an attribute for which targets apply and it is considered likely that a factor in this distribution is water quality.

The SAC, as discussed above, also supports important populations of the Annex II species qualifying interest, otter. This species is likely to be present throughout Lough Swilly. Small-scale and temporary impacts to water quality would have potential to give rise to adverse impacts upon otter populations within the SAC due to impacts to fish prey species.

Intertidal wetland habitats within the Lough Swilly SPA would also be potentially affected by temporary water quality and habitat deterioration effects resulting from upstream release of sediments of pollutants into the freshwater environment with subsequent impacts upon the SPA bird populations which utilise them.

Potential construction phase effects upon water quality potentially affecting designated sites are considered to be **Major Adverse** and **Significant** in the absence of mitigation measures.

14.4.1.2 Habitats

Habitats recorded within the proposed development areas are generally of low ecological value and comprise areas of species-poor agricultural grassland, short rotation coppice, areas of scrub and other habitats of limited ecological interest.

Habitats of relatively greater ecological value within the context of the study area include areas of broadleaved plantation woodland, watercourses and hedgerows.

The proposed development will give rise to the loss of the majority of habitats within the site boundary mostly comprising improved grasslands and short rotation coppice of low ecological value. The proposed development will also give rise to the loss of lengths of hedgerow which divide the fields internally. Boundary hedgerows will largely be retained within the proposed scheme.

The loss of these lengths of hedgerow is considered to represent an ecological effect which is **Minor Adverse** and **Significant** in the absence of mitigation measures.

The proposed development will retain areas of broadleaved plantation woodland within the study area.

The central watercourse which currently divides the areas of grassland from adjacent short-rotation coppice, will be retained as an open watercourse within the proposed development. Some alterations will be undertaken to this feature however including the installation of a vehicular bridge and a separate pedestrian bridge to facilitate access to proposed development areas in the east of the site. Associated effects to the ecological status of this watercourse are considered to be **Negligible** and N**ot Significant**.

The construction phase of the proposed development has potential to give rise to indirect impacts upon freshwater habitat, through the inadvertent release of pollutants and sediments into the aquatic environment. Such impacts would be considered to be **Minor Adverse** and **Significant**.

No further adverse impacts to habitats within the study area are predicted to arise as a result of the construction phase of the proposed development.

14.4.1.3 Otter

The proposed development will retain all watercourses within the site with only minor works proposed to the central watercourse proposed to deliver the required bridge/culvert structures. No evidence indicating the presence of otter along this watercourse which has already been subject to culverting at two locations within the site, or other watercourses within the study area, was recorded.

It is not considered that the proposed development would have potential to give rise to any significant direct impacts to otter at construction phase. Any potential disturbance effects being *de minimis*.

As set out above the proposed development will involve significant works within proximity to watercourses which lie upstream of the Lough Swilly SAC which is in part designated on account of the supported populations of otter. Accidental release of sediments or pollutants into the freshwater environment have potential to indirectly affect otters within Lough Swilly through impacts to prey abundance within these downstream aquatic environments. Such impacts, given that they would impact upon qualifying populations associated with the Lough Swilly SAC are considered to be **Major Adverse** and **Significant**.

14.4.1.4 Bats

The proposed development will give rise to the loss of a range of habitats including scrub, short rotation coppice, improved grassland and hedgerows which are likely to support relatively low levels of foraging bat activity.

It is noted that the site falls within an area which is largely surrounded by areas of existing development and as such it is considered that habitats within the site are unlikely to form particularly important corridors for movement of the group within the wider area.

The site was recorded to support a single tree which was assessed as offering low potential to support roosting bats. This tree is to be retained within the proposed development.

Impacts to bats are considered to be **Minor Adverse** and **Significant** at construction stage, in the absence of mitigation.

14.4.1.5 Birds

The proposed development will give rise to the loss of a range of habitats including scrub, short rotation coppice and hedgerows with potential to support nesting birds, including a range of common and widespread species.

It is not considered that the loss of habitats required in order to facilitate the proposed development would have potential to give rise to significant effects upon the local populations of bird species of conservation concern.

In the absence of mitigation, the construction stage of the proposed development has potential to impact upon nesting bird species, through the destruction of nests or disturbance caused during the proposed clearance of scrub, hedgerows, short-rotation coppice and other vegetation.

Such impacts are considered to be **Moderate Adverse** and **Significant** in the absence of mitigation.

14.4.2 Assessment of Operational Effects

14.4.2.1 Designated Sites

The proposed development at operational phase will involve the ongoing functioning of the proposed development as a sports facility. This will have no potential to give rise to any potential impacts to nearby designated sites.

14.4.2.2 Habitats

The proposed development at operational phase will have no potential to give rise to any significant impacts to habitats.

14.4.2.3 Otter

The only potential pathway for potential impacts to otter associated with the operational phase of the proposed development is considered to be disturbance to otter utilising watercourses within the study area through proposed artificial lighting and other sources or aerial noise or visual disturbance associated with the completed development.

As set out above in respect of construction phase impacts, it is considered that the watercourses supported on site are unlikely to be of importance to the species. On this basis it is considered that the proposed development would not give rise to any potentially significant impacts to the species at operational phase.

14.4.2.4 Bats

The proposed development at operational phase is considered to have potential to impact upon bats through the proposed lighting regime, which given the nature of the development is fairly extensive.

The proposed lighting regime will give rise to light levels greater than 1 lux upon all areas of retained habitat within the site and in addition all areas of proposed landscape planting. It is noted that the vast majority of proposed lighting, which is intended to illuminate the various proposed sports fields, will be intermittent in nature and is likely be used more in seasonal period when evenings are darker which also tend to be the periods during which bat activity levels are lower.

Furthermore it is noted that the site is already subject to significant artificial lighting associated with street lighting along the N56, industrial lighting around the adjacent recycling centre and domestic lighting associated with adjacent residential properties, in addition to lighting associated with the movement of vehicles along adjacent roads.

The site was assessed as likely to have relatively limited importance for local foraging and commuting bat populations given the habitats supported, the semi-urban nature of the site and the existing light levels. Bats likely to be utilising the site include pipistrelle species and Leisler's bat, both of which are generalist species known to be fairly tolerant to the artificial light.

On this basis it is considered that impacts to bats arising as a result of the proposed lighting regime at the operational phase would be **Minor Adverse** and **Significant**.

14.4.2.5 Birds

The proposed development at operational phase will have no potential to give rise to any significant impacts to bird populations.

14.5 Inter-relationships

Issues potentially arising in respect of water quality and associated effects on designated sites and protected species as set out above are also addressed within Chapter 15 of the EIAR: Water Quality which incorporates the implementation of a range of proposed mitigation measures to protect water quality within the freshwater environment.

Further consideration of lighting and the associated potential impacts on environmental receptors are also considered in Chapter 18 of the EIAR: Artificial Lighting.

14.6 Mitigation Measures and Monitoring

14.6.1 Mitigation

14.6.1.1 Designated Sites

Water Quality and Habitat Deterioration

The Proposed development has limited potential to give rise to significant effects upon the Lough Swilly SAC, Lough Swilly SPA, and Lough Swilly including Blanket Nook and Inch Lake pNHA through water quality and habitat deterioration effects via the supported hydrological links to the site.

A range of mitigation measures are proposed to mitigate the identified potential effects upon designated sites and will include the requirements for best practice and adherence to the following relevant Irish guidelines and recognised international guidelines:

- Good practice guidelines on the control of water pollution from construction sites developed by the Construction Industry Research and Information Association (CIRIA, 2001);
  - Existing surface water drainage infrastructure (e.g. gullies) will be 'plugged' to prevent contaminated surface water entering the relevant watercourses, via drainage;

- Stockpiling of construction materials shall be strictly prohibited within 15 m of any existing surface water drainage, ditch or water-laden channel;
- Excavations shall be left open for minimal periods to avoid acting as a conduit for surface water flows;
- All ready-mixed concrete shall be brought to site by truck. A suitable risk assessment for wet concreting will be completed prior to works being carried out which will include measures to prevent discharge of alkaline waste waters or contaminated storm water to the underlying subsoil. Wash down and washout of concrete transporting vehicles will take place at an appropriate location within the site;
- Concrete shall be contained and managed appropriately to prevent pollution of watercourses.
- Concrete pouring will be prevented during periods of heavy rainfall, and quick setting mixes will be used;
- Waste materials shall be stored in designated areas that are isolated from surface water drains.
- Skips will be closed or covered to prevent materials being blown or washed away and to reduce the likelihood of contaminated water leakage;
- No harmful materials shall be deposited into nearby watercourses, including drainage ditches/pipes, on or adjacent to the site;
- Protection measures shall be put in place to ensure that all hydrocarbons used during the Construction are appropriately handled, stored and disposed of in accordance with recognised standards. These measures will include:
    - Hazardous materials including diesel, fuel oils, solvents, paints and/or lubricants stored on site will be stored within suitably designed bunded areas with a bund volume of 110% of the capacity of the largest tank/container.
    - Re-fuelling of plant will not occur within 50 m of any watercourse or surface water/groundwater feature. Drip trays will be used and spill kits will be kept available;
    - Machinery used on site will be regularly inspected to ensure there is no leakage from them and to ensure the machinery will not cause contamination of watercourses;
    - Where required, fuel will be transported in a mobile, double skinned tank and a spill tray will be used when refuelling (if taking place outside a compound area);
    - Waste oils and hydraulic fluids will be collected in leak-proof containers and removed from the site for disposal or re-cycling;
    - Only emergency breakdown maintenance will be carried out on site. Emergency procedures and spillage kits will be readily available at strategic site locations and construction staff will be familiar with emergency procedures; and
    - Any spillage of fuels, lubricants of hydraulic oils will be immediately contained, with an appropriate emergent response put in place. Any contaminated soil will be removed from the site and properly disposed of.

- Fisheries Guidelines for Local Authority Works. Department of Communications, Marine & Natural Resources, Dublin, (Anonymous, 1998);
- Guidelines on protection of fisheries habitats during construction projects (Eastern Regional Fisheries Board, 2006); and
- Control of Substances Hazardous to Health (COSHH) Handling of Hazardous Materials.

The use of oils and chemicals on-site will receive significant care and attention. The following procedures will be followed to reduce the potential risk from oils and chemicals:

- Fuel, oil and chemical storage will be sited on an impervious base within a bund and secured. The base and bund walls must be impermeable to the material stored and of adequate capacity. The control measures in GPP2: Above Ground Oil Storage Tanks and PPG 26 "Safe storage – drums and intermediate bulk containers" (Environment Agency, 2011) shall be implemented to ensure safe storage of oils and chemicals;
- The safe operation of refuelling activities shall be in accordance with PPG 7 "Safe Storage – The safe operation of refuelling facilities" (Environment Agency, 2011).

Where works are required within 15 m of the watercourse, an ecologist shall assess and verify that appropriate demarcation and signage is in place before works commence. Demarcation shall be physically marked out using post and rail/post and rope/bunting, or equivalent, and be signposted to identify an ecological sensitivity;

The following mitigation will be applies in respect of proposed bridging structures, including any required culvert installation:

- The culvert must be designed in accordance with Transport Infrastructure Ireland's Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes and Inland Fisheries Ireland's (2016) Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters;

1. It is recommended that a bottomless culverts or bridging structures are used wherever possible. This type of design is less likely to result in any future fish or macroinvertebrate passage problems (notwithstanding that the existing structures along the watercourse may already present such issues);

- If an embedded box or pipe culvert is required, the following, as specified in IFI (2016), must be adhered to:
  - The culvert must maintain the natural channel gradient, width and substrate configuration;
  - The culvert should be buried to a minimum of 500mm below the stream bed at the natural gradient;
  - The culvert must be sized to maintain the natural stream channel width;
  - The gradient should not exceed 3% - note , however, that according to TII guidelines the effective slope of the culvert should generally not exceed 1.0% for a culvert less than 24m in length, unless baffles are added;
  - The culvert should be positioned such that both the upstream and downstream invert shall be 500mm below the upstream and downstream river bed invert levels respectively.
- While the stream is highly unlikely to support salmonids or lamprey, the potential for some individuals to occur within the stream exists. Therefore, as per fisheries restrictions stipulated by IFI, any instream works shall be carried out during the period July 1st to September 30th of any year;
- The finalised stream crossing method statement must be agreed with IFI well in advance and IFI must be given sufficient notice before consented in-stream works commence;
- Silt fencing shall be installed for all work within 15m of the stream on site. Silt fencing shall consist of a maintainable geotextile membrane. Installation, maintenance, and removal shall follow the manufacturers' specifications. The geotextile membrane will be inspected at least once a week and following any period of heavy rainfall (i.e. Met Éireann Orange and Red rain warning).
- The Contractor will monitor weather forecasts for heavy rain and where required, certain works and in particular excavations/earthworks will cease in order to minimise exposed soil entering surface water run-off; and
- Soil excavation will not be completed during periods of prolonged or heavy rain (i.e. Met Éireann Orange and Red rain warning).

For the protection of watercourses associated with the use of concrete, the following measures shall be employed:

- All ready-mixed concrete shall be brought to site by truck. A suitable risk assessment for wet concreting shall be completed prior to works being carried out which will include measures to prevent discharge of

alkaline waste waters to the underlying subsoil. Wash down and washout of concrete transporting vehicles shall take place at an appropriate facility offsite;

- Concrete shall be contained and managed appropriately to prevent pollution of watercourses. Concrete pouring will be prevented during periods of heavy rainfall, and quick setting mixes shall be used; and
- Waste materials shall be stored in designated areas that are isolated from surface water drains. Skips shall be closed or covered to prevent materials being blown or washed away.

Subject to implementation of these mitigation measures it is considered that any potential effects associated with water quality, including pollutants and sediments, will be fully mitigated.

Spread of Invasive Species

In respect of the potential of the proposed development to give rise to the inadvertent spread of invasive species into the Lough Swilly SAC, Lough Swilly SPA and Lough Swilly including Inch Lough and Blanket Nook pNHA, via the supported hydrological pathway, it is noted that the proposed development will be undertaken in line with the appended Outline Invasive Species Management Plan (oISMP) (Please refer to Volume III Technical Appendices, Appendix 14.B for details). This document sets out the various approaches which may be utilised in order to control or eradicate Himalayan balsam and salmonberry recorded within the site, depending upon the context of these stands.

Subject to the appropriate implementation of this oISMP it is envisaged that any potential effects associated with the inadvertent spread of invasive species, will be fully mitigated.

14.6.1.2 Habitats

Mitigation measures are proposed in respect of watercourses and associated water quality and habitat deterioration effects as discussed above in respect of downstream designated sites and within Chapter 15 of the EIAR.

In order to mitigate for potential impacts associated with the loss of lengths of hedgerow scrub and other habitats within the site, it is proposed that a range of landscape planting will be undertaken. Various areas around the margins of the site, in addition to areas of unused or open space within the scheme design will be subject to planting with a range of native tree species.

14.6.1.3 Otter

Proposed measures to safeguard water quality within the freshwater environment, as discussed above in respect of designated sites and within Chapter 15 of the EIAR will fully mitigate any predicted impacts upon otter.

14.6.1.4 Birds

The proposed development has potential to give rise to significant effects upon nesting bird's species which are likely to utilise habitats including scrub, scattered trees, hedgerows, amenity planting and buildings within the Application Site.

In order to avoid any significant impacts upon birds all site clearance, in addition to demolition of buildings, will take place during the period 1st September to 28th February which is outside the breeding season for those bird species that are likely to breed on the site.

It is recommended that the scheme provide ecological enhancement for this group through the provision of nest boxes within the scheme design which will provide nesting opportunities for birds post development.

14.7 Potential Cumulative Effects

It is considered that the proposed development will effectively mitigate many of the potential significant effects identified as arising as a result of the project. As such it is considered that there is limited potential for the project to act cumulatively or in-combination with any other proposed developments in the area.

Donegal County Council Planning Portal was reviewed to assess recent nearby applications with potential to act cumulatively with the proposals. Recent applications include a number of applications for extensions to dwellings, a range of applications for dwellings in addition to a range of commercial developments within the nearby business park.

It is also noted that the proposed development forms a part of a wider area which is zoned for development within the County Development Plan, and it is envisaged that these areas which include areas of agricultural land to the east and north-east of the site, will be developed in the near future.

Given that residual impacts associated with the proposed development are fairly limited, associated with potential lighting impacts upon foraging and commuting bats and minor losses to habitats including hedgerows and scrub it is considered that such developments have extremely limited potential to act in-combination with the proposed project. Furthermore no applications for such projects have been submitted to Donegal County Council and as such it is considered unlikely that such developments would occur concurrently with the proposed development.

14.8 Residual Impacts

Subject to the implementation of mitigation measures, as set out above, the vast majority of significant effects predicted as a result of the proposed development will be fully mitigated.

Residual impacts are limited to operational phase impacts to foraging and commuting bats associated with the proposed lighting regime, in addition to construction phase impacts to habitats associated with the loss of habitats of low ecological value including hedgerows, scrub, short rotation coppice and improved agricultural grassland.

All predicted residual effects are considered to be **Minor Adverse**.

14.9 Summary of Effects

The proposed development has limited potential to give rise to significant impacts upon natural heritage and biodiversity receptors.

Predicted significant impacts are limited to potential water quality and habitats deterioration effects arising as a result of proposed works to and in close proximity of watercourses; the loss of habitats of low ecological value at construction phase, the potential for spread of invasive non-native species, potential for disturbance to nesting birds and lighting impacts upon foraging and commuting bats at operational phase.

A summary of the predicted effects and proposed mitigation is set out below at Table 14.4.

No residual effects on natural heritage and biodiversity are predicted as a result of the proposed development.

Residual impacts are limited to operational phase impacts to foraging and commuting bats associated with the proposed lighting regime, in addition to construction phase impacts to habitats associated with the loss of habitats of low ecological value including hedgerows, scrub, short rotation coppice and improved agricultural grassland.

All predicted residual effects are considered to be **Minor Adverse.**

Table 14.4: Summary Table of Likely Environmental Effects on Natural Heritage and Biodiversity Pre and Post Mitigation

Receptor	Sensitivity of receptor	Description of Effect	Duration	Magnitude	Magnitude of Effect	Significant Not significant	Significant or Not significant Post Mitigation
Construction phase							
Designated Sites of Natural Heritage Importance	High	Water quality and habitat deterioration: release of sediments or pollutants into the freshwater environment.	Short term	Medium	Major adverse	Significant	Not significant
Designated Sites of Natural Heritage Importance	High	Invasive species: inadvertent spread of invasive species to hydrologically linked sites.	Short term	Medium	Moderate adverse	Significant	Not significant
Terrestrial Habitats	Low	Habitat loss	Short term	Medium	Minor adverse	Significant	Significant
Birds	Medium	Destruction of bird nests or disturbance to nesting birds.	Short term	Medium	Moderate adverse	Significant	Not significant
Operational phase							
Bats	Medium	Disturbance to foraging and commuting habitats through artificial lighting.	Long term	Medium	Minor adverse	Significant	Not Significant

14.10 Limitations of Assessment

The above EcIA has been undertaken on the basis of findings reached through a range of surveys undertaken in line with relevant industry guidelines. It is not considered that there were any particular limitations to the assessment which took account of the findings of these surveys, which are likely to have significantly affected the outcome of the assessment.

14.11 References

- BSI (2013) BS 42020:2013 Biodiversity: Code of practice for planning and development.
- CIEEM (2015) Guidelines for Ecological Report Writing, Chartered Institute of Ecology and Environmental Management, Winchester.
- CIEEM (2018) Guidelines for Ecological Impact Assessment in the UK and Ireland, Terrestrial, Freshwater and Coastal and Marine, Technical Guidance Series, Version 1.1, Chartered Institute of Ecology and Environmental Management, Winchester
- CIEEM (2019) Code of Professional Conduct, Chartered Institute of Ecology and Environmental Management, Winchester.
- EPA (2022) Guidelines on the information to be contained in Environmental Assessment Reports– May 2022.
- Fossitt, J. (2000) A Guide to Habitats in Ireland. Heritage Council, Kilkenny.
- Heritage Council (2011) Best Practice for Habitat Survey and Mapping, The Heritage Council. best_practice_guidance_habitat_survey_mapping_onscreen_version_2011_8mb.pdf (heritagecouncil.ie)
- NPWS (2011) Conservation Objectives: Lough Swilly SAC and Lough Swilly SPA. Version 1.0. Site_specific_cons_obj (npws.ie).
- NRA (2009) Guidelines for Assessment of Ecological Impacts of National Road Schemes, revision 2, National Roads Authority, Dublin.
- NRA (2009) Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes, National Roads Authority, Dublin.

15 WATER QUALITY

15.1 Introduction

This chapter assesses the potential impact of the proposed development in Letterkenny, County Donegal on the receiving water quality environment and Water Framework Directive (WFD) compliance. Existing water quality in the vicinity of the project is established based on available water quality information and WFD monitoring programmes. The likely significant effects on water quality of the proposed development are assessed and measures to reduce, avoid and prevent these likely significant effects are proposed, where they are necessary.

This assessment is based on the project description detailed in Chapter 2.0 and identifies potential significant effects on water quality that may arise from the proposed development and presents mitigation measures that will be implemented to address the potential significant effects.

15.2 Methodology

Baseline water quality within the receiving environment has been established through a review of national monitoring data used to establish water quality status in the context of the EU Water Framework Directive (WFD) and supporting environmental quality standards as published in the European Communities (Surface Waters) Regulations 2009, as amended.

The proposed development will also be assessed with respect to the requirements of the WFD to ascertain if the proposal will have a detrimental impact on the status of water bodies associated with that site and their environmental objectives.

15.2.1 Relevant Guidance

The WFD (Council Directive 2000/60/EC establishing a framework for community action in the field of water policy) was adopted by the European Commission in December 2000. The WFD requires that all European Union Member States prevent deterioration and protect, enhance and restore all bodies of water. This means that Member States must ensure that new developments do not adversely impact upon the status of aquatic ecosystems, and that they must address historical modifications that are already impacting a water body.

The WFD was transposed into Irish law through the European Communities (Water Policy) Regulations 2003 (S.I. 733/2003) in respect of the duties on all public authorities to exercise their functions in a manner consistent with achieving the objectives of the WFD. European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. 272/2009) and the European Communities Environmental Objectives (Groundwater) Regulations 2010 (S.I. 9/2010) give further effect to the WFD in Ireland. Article 5 of both these regulations provide that public authorities must not undertake their functions in a manner that knowingly causes or allows deterioration in the status of water body.

The WFD is given general effect in planning legislation in Section 1A of the Planning and Development Act 2000 (S.I. 30/2000), as amended; and specifically through amendments made in 2010 which sought to improve how water management and the planning system are integrated.

The EPA consider any development that compromises the achievement of the environmental objectives for a water body, established under the Water Framework Directive (WFD), to represent a significant environmental impact.

The following relevant legislation and guidance relating to water quality will be considered during the preparation of the Water Quality chapter of the EIAR:

- The Water Framework Directive (WFD) (2000/60/EC); the WFD is the European legislation which was developed to establish systems to manage Europe's water environment - rivers, lakes, estuaries, coastal waters and groundwater;

- The European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (SI No.272 of 2009), as amended; this transposes the requirement of the WFD into Irish law and provides Environmental Quality Standards (EQSs) for classifying surface water status; and

Other important pieces of EU and national legislation pertaining to the hydrological environment include:

- European Communities (Water Policy) Regulations, as amended (S.I. 722 of 2003);
- European Union (Water Policy) Regulations 2014 (S.I. 350 of 2014);
- The EU Floods Directive 2007/60/EC;
- European Communities (Assessment and Management of Flood Risks) Regulations (S.I. 122 of 2010), and
- European Community Environmental (Quality of Surface Water Intended for Human Consumption) Regulations 1984 as amended (S.I. 81 of 1988).

15.2.2 Study Area

The proposed development is within the Swilly (Donegal)_010 river water body, while the Swilly Estuary transitional waterbody lies downstream. The Lough Swilly groundwater body underlies the proposed development area. The river water body is within the Swilly (Donegal)_SC_010 sub-catchment (39_6) which is part of the Lough Swilly Catchment (HA39).

15.2.3 Baseline

The baseline conditions at the Swilly (Donegal)_010, the Swilly Estuary and Outer Swilly Estuary waterbodies have been reviewed to identify all potential impacts relating to water quality.

Baseline data has been gathered from existing sources such as water quality monitoring stations included in the Environmental Protection Agency (EPA) WFD monitoring programme, as part of their River Basin Management Plan (RBMP) reporting.

The current WFD environmental objectives for the water bodies that could potentially be impacted by the proposed development have been collated from the EPA's Catchments.ie Portal to ensure the potential impact from the proposed development does not compromise the achievement of the WFD objectives.

A fundamental requirement of the WFD and the environmental objectives for a water body is to attain good ecological and chemical water quality status and ensure that any deterioration in the status of waters is prevented. Any new development therefore must ensure that these two fundamental objectives of the Directive are not compromised, nor are there any detrimental impacts to the objectives of water dependent protected areas, as define in Article 3 of the WFD, that are hydrologically or hydrogeologically linked to the proposed development.

A desk-based assessment of surface water quality in the vicinity of the proposed development area was conducted. The sources of the water quality information include:

- Water Framework Directive water body status information arising from the Water Framework Directive monitoring programme. Water Quality in Ireland Report 2016-2021 (EPA, 2022) supported by water quality information available on the EPAs online catchments webGIS (www.catchments.ie);
- Protected areas datasets including:
  - information on Nutrient Sensitive Areas as outlined in the EPA's most recent Urban Waste Water Treatment Report (2021); and
  - the existing Register of Protected Areas (under Article 6 of the Water Framework Directive) for water dependent habitats and species in the SAC and SPA networks held by the EPA.
- Water Quality in Ireland – An Indicators Report in 2020 (EPA, 2021);

For the purposes of monitoring and assessing the quality of surface waters, all rivers, lakes, coastal inter-basins, estuaries, and coastal waters (within 1 nautical mile of the shoreline) have been divided into management units called “water bodies”. Under the Water Framework Directive (WFD) condition of each water body must be reported to the European Commission in the form of ecological status and chemical status. Ground water bodies are similarly delineated with status identified.

Surface water bodies are grouped into sub-catchments for the purposes of water management, of which there are 583 nationally, which are further grouped into catchment management units of which there are 46 based on the hydrometric areas used by public authorities.

15.2.4 Assessment Criteria and Assignment of Significance

An assessment has been made of the components of the proposed development that have the potential to have a significant impact on water quality using criteria for rating significance and magnitude set out in the National Roads Authority (NRA) publication “Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes” (NRA, 2008).

The significance of impact on surface water quality likely to occur during the construction and operational phases of the proposed development are determined using a predominantly qualitative methodology. The approach to assigning significance of impact relies on reasoned argument, professional judgment and taking on board the advice and views of appropriate organisations. The assessment is a consideration of a combination of receptor sensitivity (Table 15.1) and the potential magnitude of the impact on the water environment (Table 15.2), in order to determine significance (Table 15.3). The approach to assessing the significance of impacts comprises assigning each impact to one of the categories of magnitude as outlined in Table 15.3 enables different components to be assessed based upon the same scale.

15.2.4.1 Receptor Sensitivity / Value

The significance of effects on water quality likely to occur during the proposed development are determined using the predominantly qualitative process described below. The criteria for determining the significance of effects is a two-stage process. The first step in the process is to determine the sensitivity of the receiving environment and then to define the magnitude of the potential impact This section describes the criteria applied in this chapter to assign values to the receptor to assist in defining sensitivity of receptors (Table 15.1).

Table 15.1: Criteria for Rating Receptor Sensitivity (NRA, 2008)

Value (Sensitivity)	Typical Descriptors
Extremely High	***Attribute has a high quality or value on an international scale.*** Examples: River, Wetland or surface water body ecosystem protected by EU legislation. i.e. designated under the Habitats, Birds, Shellfish, Bathing Water or Freshwater Fish, Drinking Water or Nitrate Directives.
Very High	***Attribute has a high quality or value on a regional or national scale.*** Examples: River, Wetland or surface water body ecosystem protected by national legislation (NHA status), Regional important potable water source supplying >2,500 homes, nationally important amenity site for wide range of leisure activities, Quality Class A (Biotic Index Q4, Q5), Flood plain protecting more than 50 residential or commercial properties from flooding.
High	***Attribute has a high quality or value on a local scale.*** Examples: Salmon fishery, locally important potable water source supplying >1000 homes, Quality Class B (Biotic Index Q3-4), Flood plain protecting 5 to 50 residential or commercial properties from flooding, Locally important amenity site for wide range of leisure activities.

Value (Sensitivity)	Typical Descriptors
Medium	***Attribute has a medium quality or value on a local scale.*** Examples: Coarse fishery, Local potable water source supplying >50 homes, Quality Class C (Biotic Index Q3, Q2-3), Flood plain protecting between 1 and 5 residential or commercial properties from flooding.
Low	***Attribute has a low quality or value on a local scale.*** Examples: Locally important amenity site for small range of leisure activities, Local potable water source supplying <50 homes, Quality Class D (Biotic Index Q2, Q1), Flood plain protecting 1 residential or commercial property from flooding. Amenity site used by small numbers of local people.

15.2.4.2 Magnitude of Impact

The magnitude of the impact has also been adapted from the generic methodology for environmental assessment outlined in the NRA publication (Table 15.2). Impacts may be considered to have no affect or be negligible to high and their magnitude has necessarily been assessed on a qualitative basis.

Table 15.2: Criteria for Rating the Magnitude of Impact (NRA, 2008)

Magnitude of Impact	Criteria	Typical Examples
Large Adverse	Results in loss of attribute and /or quality and integrity of attribute	Loss or extensive change to a water body or water dependent habitat.
		Increase in predicted peak flood level >100mm.
		Extensive loss of fishery
		Extensive reduction in amenity value
		Potential high risk of pollution to water body from routine run-off
Moderate Adverse	Results in impact on integrity of attribute or loss of part of attribute	Increase in predicted peak flood level >50mm
		Partial loss of fishery
		Potential medium risk of pollution to water body from routine run-off
		Partial reduction in amenity value
Minor Adverse	Results in minor impact on integrity of attribute or loss of small part of attribute	Increase in predicted peak flood level >10mm
		Minor loss of fishery
		Potential low risk of pollution to water body from routine run-off
		Slight reduction in amenity value
Negligible	Results in an impact on attribute but of insufficient magnitude to affect either use or integrity	Negligible change in predicted peak flood level Negligible loss of amenity value Negligible loss of fishery

15.2.5 Significance of Effects

Applying the formula, the greater the environmental sensitivity or value of the receptor or resource, and the greater the magnitude of impact, the more significant the effect. The consequences of a highly valued environmental resource suffering a major detrimental impact would be a very significant adverse effect. Table 15.3 illustrates how the sensitivity of attributes was considered against the magnitude of impacts to determine the significance of potential impacts.

To conclude the assessment, mitigation measures are proposed to reduce, avoid and prevent these likely significant effects, where appropriate. This enables a "with mitigation" assessment to be made of any residual impact as a result of the construction and operational phases of the project and/or in combination with other existing or approved projects in the vicinity of the proposed development.

Table 15.3: Criteria for Rating the Significance of Environmental Impacts (NRA 2008)

Importance of Attribute	Magnitude of Impact			
	Negligible	Minor	Moderate	Large
Extremely High	Imperceptible	Significant	Profound	Profound
Very High	Imperceptible	Significant / Moderate	Profound / Significant	Profound
High	Imperceptible	Moderate / Slight	Significant / Moderate	Significant
Medium	Imperceptible	Slight	Moderate	Significant
Low	Imperceptible	Imperceptible	Slight	Slight / Moderate

The significance determination and assessment of the potential likely environmental effects of each component of the proposed development has been made based on the matrix presented in Table 15.3 and defined in Table 15.4.

Table 15.4 Defining Impact Significance (NRA, 2008)

Impact Level	Attribute Importance				
	Extremely High	Very High	High	Medium	Low
Profound	Any permanent impact on attribute	Permanent impact on significant proportion of attribute			
Significant	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute		
Moderate	Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute	
Slight		Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute	Permanent impact on significant proportion of attribute
Imperceptible			Temporary impact on small proportion of attribute	Temporary impact on significant proportion of attribute	Permanent impact on small proportion of attribute

15.3 Baseline Environment

The fundamental objectives of the WFD are to maintain “high status” of surface waters where it exists, prevent deterioration in the existing status of waters, and achieve at least “good status” in relation to all waters by the end of the current river basin management cycle unless a water body is subject to an extended deadline under Article 4(7) of the Directive. A water body must achieve both good ‘ecological status’ and good ‘chemical status’ before it can be considered to be at good overall status. An assessment of the risks to the achievement of these objectives for water bodies has been undertaken by the EPA through the extensive characterisation of water bodies and the key pressures acting upon them. This characterisation process allows the development of a programme of measures to aid the achievement of the WFD objectives.

A Programme of Measures (POMs) outlines the steps that will be taken to meet WFD objectives applicable to each water body. This Programme is contained within an overarching River Basin Management Plan (RBMP). These measures will require implementation at strategic level but also at regional and local level through the establishment of Regional Integrated Catchment Management Programmes. The river and transitional waterbodies within the proposed development area are not included amongst those 527 prioritised areas for action in the current Draft River Basin Management Plan for Ireland 2022 - 2027 (DHPLG, 2022).

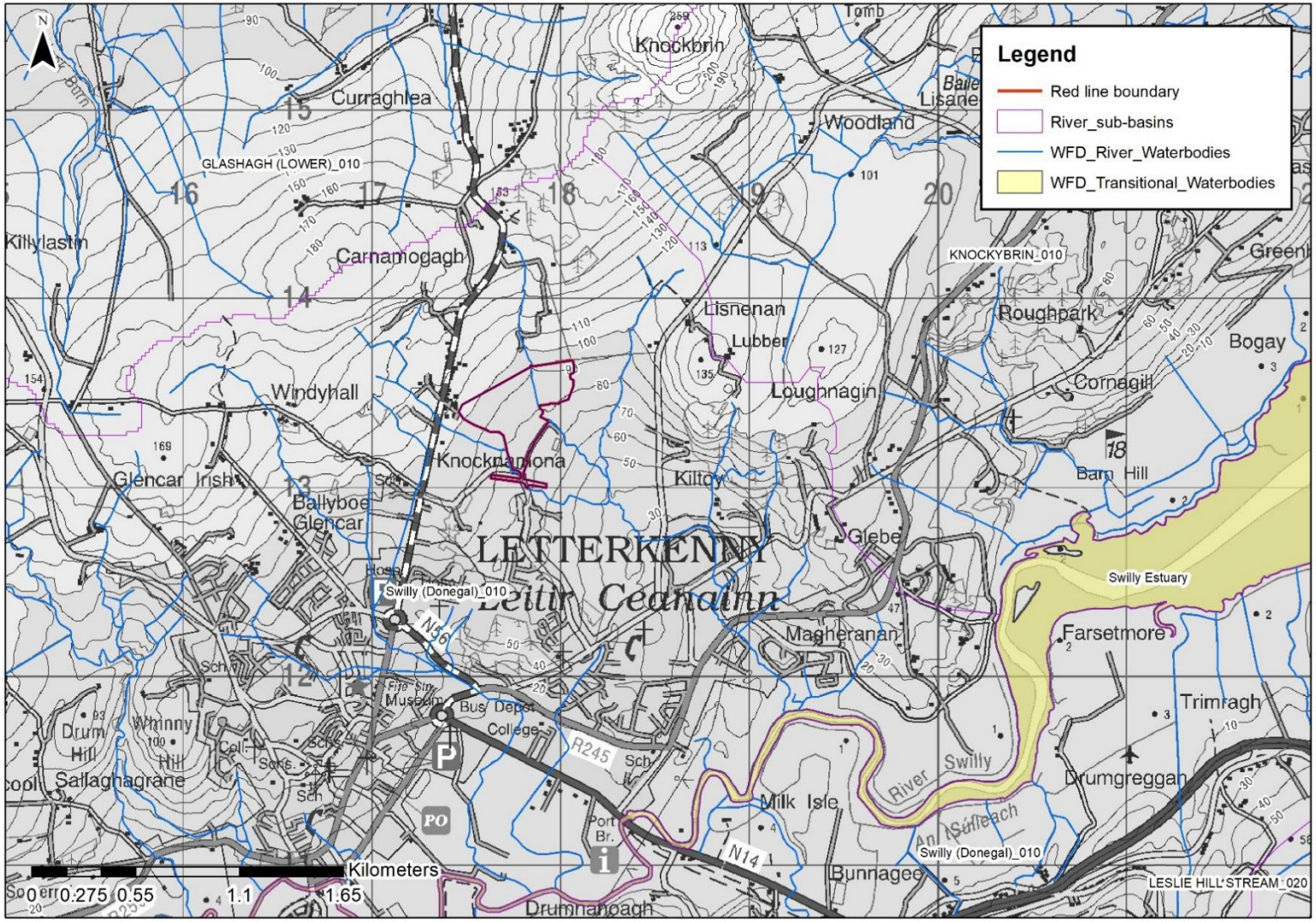

Figure 15.1: Site Location in the Context of the Water Framework Directive River Sub Basins

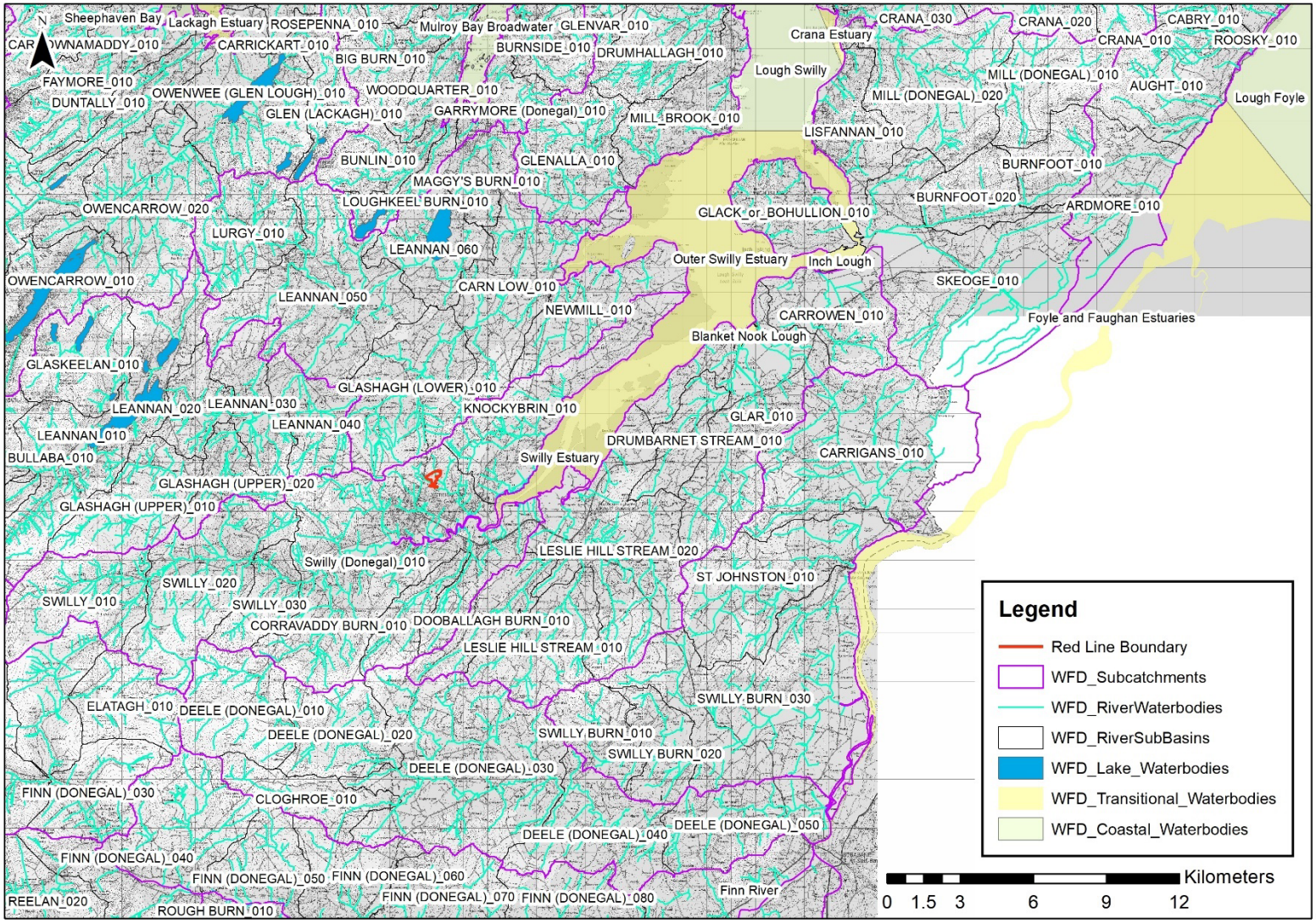

Figure 15.2: Site Location in the Context of the Wider Surface Water Environment

Environmental Quality Standards (EQSs) for classifying surface water status are established in the European Communities Environmental Objectives (Surface Waters) Regulations, 2009 (SI No. 272 of 2009), as amended. These regulations set standards for biological quality elements, physico-chemical conditions supporting biological elements (including general conditions and specific pollutants), priority substances and priority hazardous substances.

As shown in Figure 15.3 the 'ecological status' of a water body is established according to compliance with the EQSs for biological quality elements, physico-chemical conditions supporting biological elements and relevant pollutants and hydromorphological quality elements. The 'chemical status' of a water body is established according to compliance with the EQSs for priority substances and priority hazardous substances.

In addition to achieving good ecological and chemical status, a water body must achieve compliance with standards and objectives specified for protected areas, which include areas designated by the Bathing Water Directive; the Urban Waste Water Treatment Directive; the Shellfish Waters Directive; the Habitats Directive and the Birds Directive. Waters bodies that are compliant with WFD standards, but that contain protected areas that are non-compliant with protected area standards are downgraded to 'less than good' status.

Based on monitoring information and data from 2016 to 2021, the current WFD status classification of river water bodies potentially affected by the proposed development is illustrated in Figure 15.4.

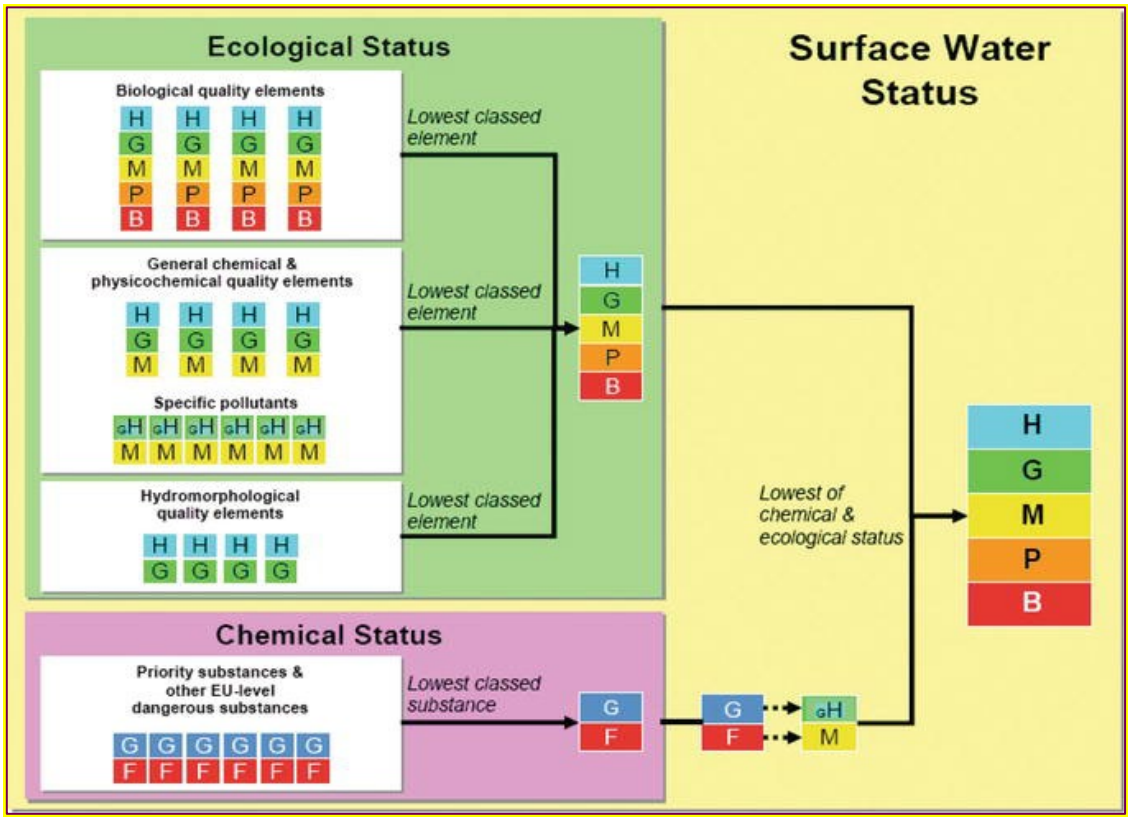

Figure 15.3: Elements of the Water Framework Directive Status

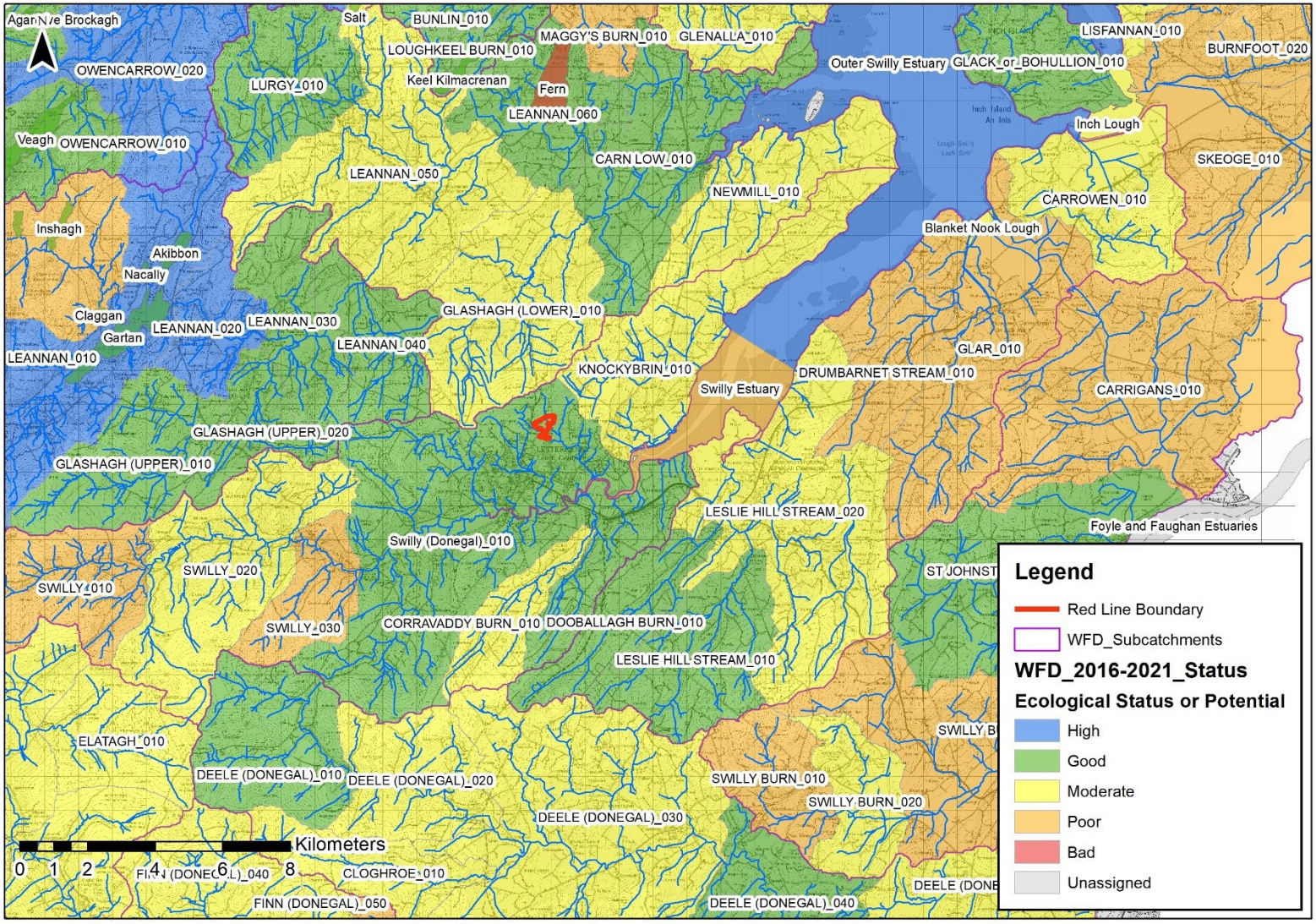

Figure 15.4: Water Framework Directive Water Body Status

The WFD status classification between 2007 and 2021 is shown in

Table 15.5 for each of these water bodies. In summary, the downstream Swilly Estuary and Outer Swilly Estuary were classified as “poor” and “high” ecological status respectively, while the Swilly (Donegal)_010 has been assigned “good” ecological status.

Table 15.5: WFD Status (2007-2021)

WFD Status 2007-2021	Swilly (Donegal)_010	Swilly Estuary	Outer Swilly Estuary
	NW_39S020300	NW_220_0100	NW_220_0500
Overall WFD Water Quality Status (2007-2009)	Unassigned	Moderate	Outer Swilly Estuary and Swilly Estuary transitional waterbodies considered as one waterbody.
Overall WFD Water Quality Status (2010-2012 - Interim)	Unassigned	Poor	
Overall WFD Water Quality Status (2010-2015)	Unassigned	Moderate	
Overall WFD Water Quality Status (2013-2018)	Poor	Moderate	Unassigned
Overall WFD Water Quality Status (2016-2021)	Good	Poor	High

Table 15.6 details the impacting features identified in the most recent WFD reporting data which are driving the status of the waterbodies.

Table 15.6: Most recent available WFD reporting data (2016-2021) iteration

Waterbody Name	Waterbody Code	Waterbody Type	WFD Status	WFD Risk (3rd Cycle)	Status Driver	High Status Objective (Y/N)
Swilly (Donegal)_010	IE_NW_39S020300	River	Good	Review	Not available	N
Swilly Estuary	NW_220_0100	Transitional	Poor	At Risk	Phytoplankton. Failing to achieve good chemical status	N
Outer Swilly Estuary	NW_220_0500	Transitional	High	Not at Risk	Biological and general conditions both high	N
Lough Swilly	IEGBNI_NW_G_059	Ground	Good	Not at Risk	-	-

The ecological status for the Swilly (Donegal)_010 is assigned based on a modelling approach adopted by the EPA. As there is no biological monitoring data available for this water body the EPA assign the status based on a modelling technique that uses monitoring information from similar water bodies with similar pressures to assign a status. A breakdown of the ecological and chemical elements for The Swilly Estuary and the Outer Swilly Estuary for the 2016-2021 WFD cycle is shown in Table 15.7.

The assessment of likely significant effects on water quality has been undertaken having regard to the necessity to comply with the WFD and in doing so ensuring that the project does not prevent the achievement of the WFD objectives for these water bodies in subsequent RBMP cycles.

Table 15.7: Transitional water body WFD status breakdown

WFD Status 2016-2021			Swilly Estuary	Outer Swilly Estuary
			NW_220_0100	NW_220_0500
Ecological Status	Biological Status	Phytoplankton Status	Poor	High
		Other aquatic flora status	Moderate	
		Invertebrate Status	Good	
	Supporting Chemistry Conditions	Oxygenation Conditions	Moderate	High
		Nutrients Condition	High	
		Phosphorus conditions	High	
	Hydromorphological Quality Element	Hydrology, Morphology, Continuity	Not available	Moderate
	Ecological Status (2016 – 2021)		**Poor**	**High**
Chemical Status	Specific Pollutant Conditions		Pass	Not available
	Chemical Status (2016 – 2021)		Failing to achieve good	Not available
Overall WFD Quality Status 2016 - 2021			**Poor**	**High**

Table 15.8 shows the status breakdown of the Lough Swilly Groundwater body, which have been consistently assigned Good groundwater status since 2007. The groundwater body is classified as good for both chemical and quantitative status. Therefore, the waterbody is meeting its WFD objective.

Table 15.8: Groundwater body WFD status breakdown

WFD Status 2016-2021			Lough Swilly
			IEGBNI_NW_G_059
Overall Groundwater Status	Quantitative Groundwater Status	Saline (or Other) Intrusions Test	Good
		Impact of Groundwater on Surface Water Ecological / Quantitative Status Test	Good
		Groundwater Dependent Ecosystems (GWDTE) – Quantitative Assessment Test	Good
		Water Balance Test	Good
		Saline (or Other) Intrusions Test	Good

	Chemical Groundwater Status	*Impact of Groundwater on Surface Water Ecological / Quantitative Status Test*	*Good*
		Groundwater Dependent Ecosystems (GWDTE) – Quantitative Assessment Test	*Good*
		Drinking Water Protected Area Test	*Good*
		General Chemical Assessment Test	*Good*

15.3.1 Protected Areas

A significant proportion of the area of the Lough Swilly catchment is protected under existing EU legislation requiring special protection due to the sensitivity to pollution or particular environmental importance. All of the areas requiring special protection in the Irish River Basin District have been identified by EPA, mapped and listed in a national register of protected areas (required under Article 6 of the WFD Directive). The register of protected areas includes:

- Areas designated for the abstraction of water for human consumption (Drinking Water Protected Areas);
- Areas designated for the protection of economically significant aquatic species, i.e. Freshwater Fish and Shellfish;
- Bodies of water designated as recreational waters, including areas designated as bathing waters;
- Nutrient-sensitive areas, including areas identified as Nitrate Vulnerable Zones under the Nitrates Directive or areas designated as sensitive under Urban Waste Water Treatment Directive; as well as
- Areas designated for the protection of habitats or species where the maintenance or improvement of the status of water is an important factor in their protection including relevant Natura 2000 sites (Special Protection Areas (SPAs); and candidate Special Areas of Conservation (cSACs).

These protected areas have their own monitoring and assessment requirements to determine their condition. They are often assessed for additional pollutants or requirements relevant to their designation.

15.3.2 Nutrient Sensitive Waters

The Urban Waste Water Treatment Regulations 2001, as amended (which transpose the Urban Wastewater Treatment Directive (91/271/EEC) into Irish law and update the Environmental Protection Agency Act, 1992 (Urban Waste Water Treatment) Regulations 1994, as amended) list nutrient sensitive waters in the Third Schedule. There are no nutrient sensitive areas in the Lough Swilly sub catchment.

15.3.3 Natura 2000 Protected Areas

Natura 2000 is a European network of important ecological sites. The EU Habitats Directive (92/43/EEC) places an obligation on Member States of the EU to establish the Natura 2000 network. The network is made up of Special Protection Areas (SPAs), established under the EU Birds Directive (79/409/EEC), and cSACs, established under the Habitats Directive itself.

As illustrated in Figure 15.5 the project activities within the proposed development area is upstream of a Natura 2000 site (i.e. SPA or cSAC). The proposed development may therefore have an indirect impact on the Natura 2000 site, in the absence of mitigation. One of the main purposes of the water quality assessment is to ascertain whether the proposed development will cause significant effects on the ecological status of the water bodies affected having regard to the environmental objectives for the

water bodies, including conservation objectives for qualifying features of the downstream Natura 2000 network. It should also be noted that potential effects on Natura 2000 or “European” sites will be considered extensively in the appropriate assessment process.

The proposed development is upstream of the Lough Swilly SAC and SPA.

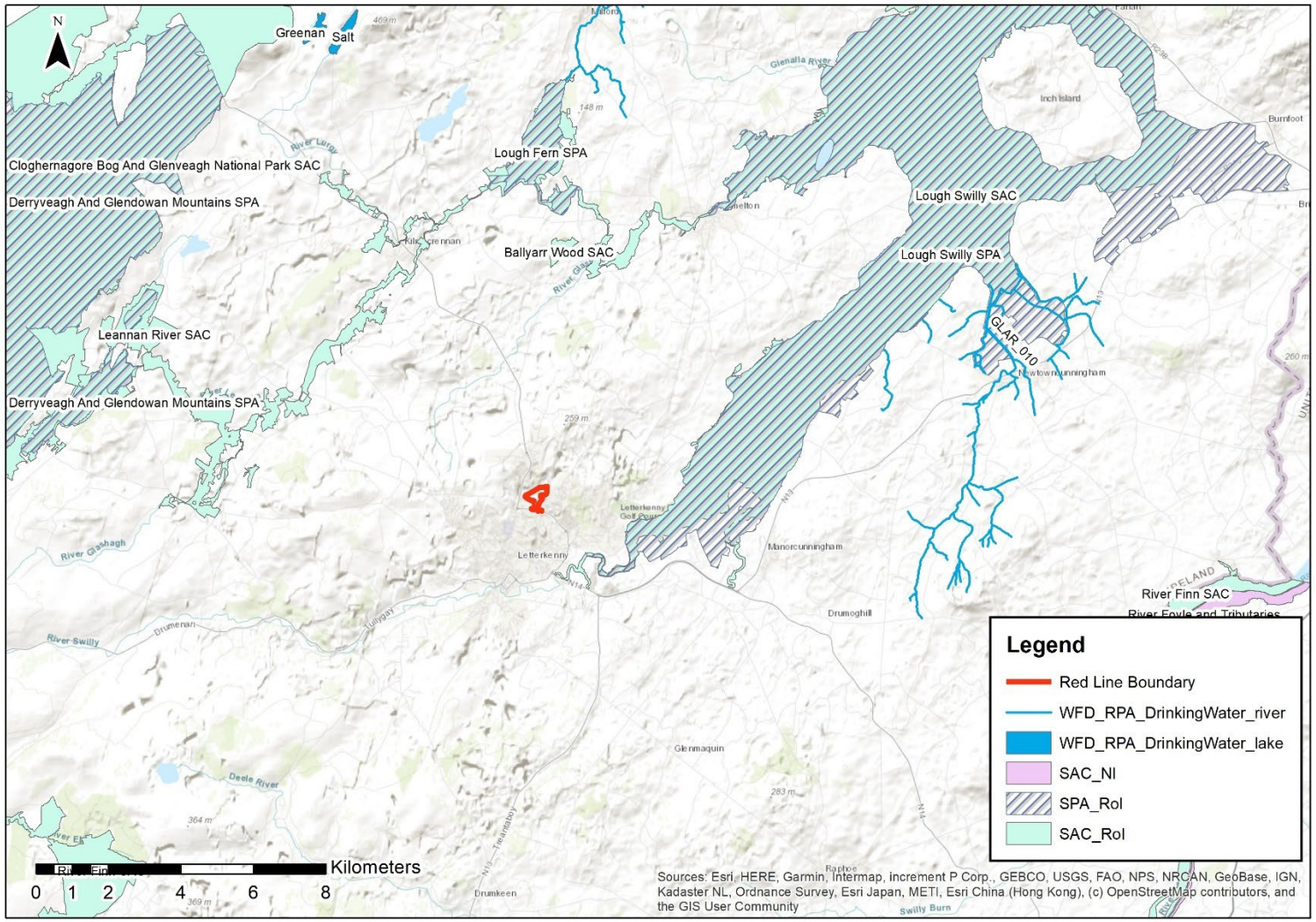

Figure 15.5: Natura 2000 Designated Sites

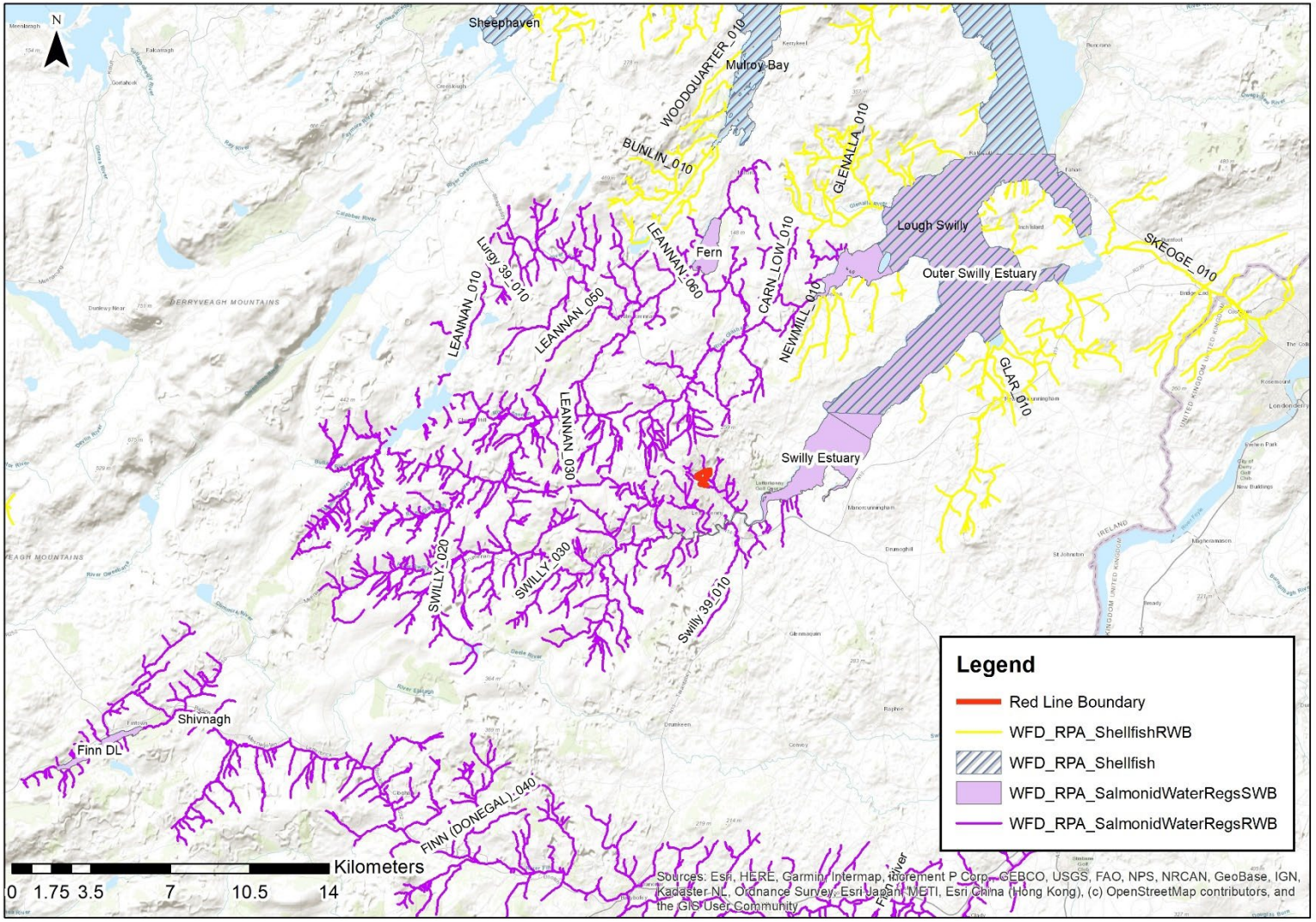

Figure 15.6: WFD protected areas within the proximity of the Proposed Development

15.3.4 Bathing Waters

The Bathing Water Directive (2006/7/EC) came into force in March 2006, and was transposed into Irish law by the Bathing Water Quality Regulations, 2008, as amended. The previous 1976 Directive was repealed with effect from 31 December 2014. Since 2014, the annual water quality classification (rating) of a beach or lake has been based on water quality results covering a four-year period rather than a single previous season's data. Water quality at beaches and lakes is classified as Excellent; Good, Sufficient or Poor (Table 15.9). This approach is common across all EU Member States and there is a requirement to ensure that bathing waters are of 'Sufficient' standard or better. Any 'Poor' bathing water requires a programme of adequate management measures to be implemented. A minimum of 16 samples are required for formal annual assessment.

Table 15.9: Annual Assessment Criteria for Bathing Waters

Parameter	Excellent	Good	Sufficient
E. coli (Freshwater) cfu/100 ml	500*	1000*	900**
E. coli (Coastal) cfu/100 ml	250*	500*	500**
Intestinal enterococci (freshwater) cfu/100 ml	200*	400*	330**
Intestinal enterococci (Coastal) cfu/100 ml	100*	200*	185**

**based on 95-percentile value* ***based on 90-percentile value*

There are no designated bathing waters within close proximity downstream of the proposed development. The closest bathing water is over 25km downstream, the Rathmullan and Lisfannan bathing waters, which both have good bathing water status.

15.3.5 Shellfish Waters

Shellfish waters are designated under the Water Framework Directive (2006/113/EC) and all shellfish protected waters will be assigned an objective under this directive. The directive is transposed into Irish law under the European Communities (Quality of Shellfish Water) Regulations 2006 (SI No 268 of 2006), which was further amended in 2009. It is essential that 'good' water quality is maintained within these areas to ensure the production of high quality shellfish.

The proposed development within 10km of the Lough Swilly designated shellfish waters.

15.3.6 Designated Salmonid Waters

The Swilly (Donegal)_010 is classified as a salmonid water under the WFD Register of Protected Areas, established under Article 6 of the WFD, as the river is designated for Atlantic Salmon.

15.3.7 EPA Water Quality in 2020: An indicators Report

In 2021 the EPA published the Water Quality in 2020, An Indicators Report. The intention of the report is to keep decision makers and the public informed by providing timely, scientifically sound information on water quality using a series of water quality indicators. There is no water quality monitoring along this river waterbody section, therefore the closest downstream monitoring has been used for the assessment. The downstream monitoring location is within the Swilly Estuary transitional waterbody.

Of the sixteen indicators two relate to transitional and coastal water bodies;

- Indicator 7 – Nitrogen in Estuaries and Coastal Waters,
- Indicator 8 – Phosphate in Estuaries and Coastal Waters.

In this water quality assessment consideration has been given to potential effects of the proposed development on these environmental indicators.

15.3.7.1 Indicator – Nitrogen in Estuaries and Coastal Waters

In terms of coastal systems, nitrogen is primarily considered the limiting nutrient and therefore controls plant and algae growth. Nitrogen in the form of dissolved inorganic nitrogen in winter months is generally at its highest as a result of the absence of abundant algal or plant growth.

Environmental Quality Standards (EQS) have been determined for dissolved inorganic nitrogen in coastal and transitional water bodies for specific salinities. Human pollution sources are responsible for elevated nitrogen levels observed from levels of dissolved inorganic nitrogen above the thresholds.

The Indicators Report showed that the Swilly Estuary was in exceedance the Environmental Quality Standard (EQS) levels for dissolved inorganic nitrogen less than -50%% of the time during the 2018-2020 monitoring. The trends in DIN concentrations indicated that levels were stable and neither increasing nor decreasing during the monitoring. During the 2013-2018 monitoring period, an upwards trend was recorded in the winter and a downwards trend in summer, however, neither were environmentally significant.

The development will produce foul water, a potential source of additional N loading to the estuary. However, the foul water will be directed to the Letterkenny Waste Water Treatment Plant (WWTP). The WWTP has adequate capacity to ensure that the existing emission limit values from the WWTP will not be exceeded.

Table 15.10: Summary of Dissolved Inorganic Nitrogen (as N) mg/l concentrations at Swilly Estuary section during 2018-2021 against the 2.6mg/l EQS for DIN.

Dissolved Inorganic Nitrogen (as N) mg/l	Swilly Estuary
Min	0.01
Max	0.96
Mean	0.11
5%ile	0.01
95%ile	0.38

The EPA Water Quality in Ireland Report 2016-2021 (EPA, 2022), noted that there has been an increased in the proportion of river sites with increasing nitrate concentration when compared with the 2013-2018 sampling period. This has risen from 26.8% in 2013-2018, to 39.4% in 2016-2021.

15.3.7.2 Indicator – Phosphate in Estuaries and Coastal Waters

In terms of lower salinity estuarine systems, phosphate is the limiting nutrient. Excessive concentrations can cause eutrophication of the water body. Due to the absence of algal or plant growth during winter months, phosphate concentrations are generally at their highest.

Coastal waters have defined thresholds for specific salinities and estuarine waters have an environmental quality standard for phosphorus levels. Levels above these thresholds can be an indication of anthropogenic pollution.

The Indicators Report shows Swilly Estuary to be in exceedance of phosphorus levels less than -50% of the time, with stable trends associated with the water body. The 2013-2018 data shows upwards trends associated with summer and downwards with winter in the water body, although neither are environmentally significant.

The proposed development will produce foul water, a potential source of additional P loading to the estuary, however the foul water will be directed via the Letterkenny WWTP, which has adequate capacity to ensure that the existing emission limit values from the WWTP will not be exceeded.

Table 15.11: Summary of Total Phosphorus (as P) mg/l concentrations at the Swilly Estuary section during 2018-21.

Total Phosphorus (as P) mg/l	Swilly Estuary
Min	0.00
Max	0.12
Mean	0.02
5%ile	0.00
95%ile	0.06

15.3.8 Site Characterisation

The Pollutant Impact Potential (PIP) mapping produced by the EPA ranks areas within water bodies from 1 (highest) to 7 (lowest) in respect to the potential impact from pollutants. In terms of PIP, the site was rated a PIP category of largely 5 for nitrate pollution to groundwater and surface waters. However, the PIP for phosphate to surface waters the site is ranked 1 (highest).

15.3.9 Summary of Existing Water Quality

A review of available national monitoring information for the water bodies in the immediate vicinity of the proposed development has concluded:

The overall WFD Surface Water Quality status between 2016-2021 is:

- Swilly (Donegal)_010 – Good Status
- Swilly Estuary – Poor Status
- Outer Swilly Estuary – High Status
- Lough Swilly groundwater body – Good Status

Downstream of the proposed development area, there are a number of protected areas under Article 6 of the WFD Directive, i.e., Natura 2000 sites and shellfish waters;

Nutrient levels in the receiving water bodies are the main driver for the unsatisfactory water quality.

The ground conditions at the site mean that the main pathway for contamination is via surface water pathways which are particularly important for phosphate export.

15.4 Impact Assessment

A review of the baseline data suggests that the groundwater body underlying the site is at good chemical and quantitative status. Of the remaining waterbodies, only one is not meeting it's objectives by achieving good ecological status, the Swilly Estuary. In terms of the risk assessment for the achievement of the water body objectives undertaken by the EPA the Swilly Estuary transitional waterbody is considered 'At Risk' of failing to achieve it's environmental objectives, while the Swilly (Donegal)_010 river waterbody is considered under 'Review'.

The WFD environmental objectives require that there should be no deterioration in the status of a water body, i.e. the status of the respective river and transitional water bodies, and the groundwater body must not be compromised and as such the proposed development must not cause deterioration in status. It is also an objective of the WFD to ensure that water bodies achieve at least 'good' status so it will be necessary to demonstrate that the proposed development will not cause any impediments to the attainment of good status in all the surface waters that are currently at less than 'good' status.

Therefore, as part of the impact assessment, it will be necessary to identify the key parameters contributing to the ecological and chemical status of the water bodies affected to ensure that the proposed development is not likely to cause a significant impact on water quality that could compromise the environmental objectives under the WFD.

The proposed development has the potential to affect the downstream protected sites by sedimentation and pollution risk.

The impact assessment below adopts the source-pathway-receptor framework and therefore considers hydraulic connectivity and potential water quality impact on any other water bodies and designated sites located within this area. This includes the protected area sites.

The proposed development has the potential to directly impact upon the Swilly (Donegal)_010 water body given the location of the works. The potential to indirectly impact upon sensitive areas further downstream has also been considered.

The significance of any environmental effect is rated based on the magnitude of the impact and the importance of the attribute. Based on these criteria, the receiving environment is considered to be of high importance due to the fact that the water bodies are within the Lough Swilly catchment and provide a hydrological link to the important downstream protected areas, particularly the Natura 2000 sites.

15.4.1 Assessment of Construction Effects

Based on the nature of the components of works proposed, temporary impacts on water quality have the potential to occur during the construction phase of the works. The following have been considered in this assessment:

Increased suspended sediment levels due to the accidental release of sediment to the water column during construction of the recreational facilities and ancillary works, particularly the associated earthworks;

Suspended sediment, including all soils, sands and rubble is the single main pollutant to the aquatic environment generated at construction sites and largely arises from the erosion of exposed soils and sediments by surface water runoff. Both temporary and permanent impacts on surface waters may occur during construction. Pollution from mobilised suspended solids (silt) is the prime concern. Suspended sediment due to run off from stripped construction areas, stockpiled earth and the dewatering of excavations can have a severe negative impact on water quality. Once suspended sediment load enters a river it can result in long-term changes that cause chronic harm. Sediment can cause river hydromorphological changes, which in turn change the dynamics of the river in the future and can negatively impact on the supporting hydromorphological conditions and ecological status resulting in an increased risk to the environmental objectives of a water body.

Accidental release of highly alkaline contaminants from concrete and cement during the construction of pavilion building and equipment storage, etc. The construction works associated with the proposed development will involve the use of cement and concrete for construction of structures. During the construction phases, there is the potential for impact on the water quality and a toxic effect on the biological elements resulting in a possible further deterioration in the ecological status or compromise the improvement in ecological status through the implementation of the programme of measures included in the River Basin Management Plan; and

General water quality impacts associated with works machinery, infrastructure and on-land operations including the temporary storage of construction materials, oils, fuels and chemicals.

15.4.1.1 Sediment Loading

The works associated with the proposed development involve extensive earth works throughout with the construction of pitches, associated landscaping and biodiversity gardens. Suspended sediment, including all soils, sands and rubble is the single main pollutant to the aquatic environment generated at construction sites and largely arises from the erosion of exposed soils and sediments by surface water runoff. Both temporary and permanent impacts on surface waters may occur during construction. Pollution from mobilised suspended solids (silt) is the prime concern. Suspended sediment due to run off from stripped construction areas, stockpiled earth and the dewatering of excavations can have a severe negative impact on water quality. This

is particularly true in sloping areas with underlying clay following topsoil stripping. In areas of moderate to high rainfall, the potential problems are clearly exacerbated. If allowed to enter surface watercourses this run off can give rise to high suspended solids and detrimental impacts, in particular to fisheries and aquatic invertebrates which can impact the ecological status of a water body. Suspended solids may have an effect on:

- Sediment movement through rivers and its settlement onto the river bed causing formerly clean gravels to become clogged with fine sediment;
- The survival of fish eggs in gravel beds or spawning grounds as a result of deoxygenation caused by silt deposition;
- The survival of plants and algae by smothering;
- The survival of young fish and aquatic invertebrates such as mayfly larvae (Calopteryz sp.) through gill damage from sediment particles and;
- Amenity value through impaired visual appearance.

Once suspended sediment load enters a river it can result in long-term changes that cause chronic harm. Sediment can cause river hydromorphological changes, which in turn change the dynamics of the river in the future and can negatively impact on the supporting hydromorphological conditions of the water bodies ecological status resulting in an increased risk of deterioration in status.

Both bed and suspended materials, and subsequent changes in channel form associated with changes in sediment supply, may affect benthic invertebrates in many ways at various stages in their life cycle. The direct kill is only the first stage in the damage that silt causes to a benthic invertebrate population. Sediment that infiltrates the river bed decreases oxygen supply in interstitial areas, and destroys habitat for juvenile stages of the many benthic invertebrate life cycles. This can impact on the ecological status of a water body by changing the nature of the invertebrate community to more tolerant species that would not be indicative of the reference conditions expected for an Irish water body typology.

The sediment subsequently provides a medium for macrophyte growth. Macrophytes can smother the river substrate and habitat further. It can trap more sediment which exacerbates the problem in the long term. Silt infiltration of river bed gravels can also have a negative effect on fish species which can further impact on the biological elements of the WFD ecological status classification and could prevent the achievement of the environmental objectives for the water body.

Given the scale and nature of the works, the magnitude of the impact associated with sediment loading is considered to be Large Adverse. The significance of the environmental effect is therefore Profound in the absence of mitigation based on the very high sensitivity of the receiving environment.

15.4.1.2 Concrete and Cement Pollution

The construction works associated with the proposed development will include the use of concrete for proposed buildings. During the construction phase, there is the potential for accidental spillage of cement materials or during the setting of concrete which could have a significant adverse impact on water quality and a toxic effect on the biological elements resulting in a possible further deterioration in the ecological status or compromise the improvement in ecological status through the implementation of the programme of measures included in the River Basin Management Plan.

Given the scale and nature of the works, the magnitude of the impact associated with concrete and cement pollution is considered to be Large Adverse. The significance of the environmental effect is therefore Profound in the absence of mitigation based on the very high sensitivity of the receiving environment.

15.4.1.3 General Construction Works

The construction works will involve the use of plant and machinery, as well as the associated temporary storage of construction materials, oils, fuels and chemicals. During the construction phase, there is the potential for accidental spillage or release of construction materials (e.g. diesel, oil, chemicals) which could have a

significant adverse impact on water quality and a toxic effect on the biological elements resulting in a possible further deterioration in the ecological status or compromise the improvement in ecological status through the implementation of the programme of measures included in the River Basin Management Plan.

The construction works requires in stream works during the construction of three stream crossings, two of which are along WC2 and one on WC4 which will facilitate the proposed N56 / Cresent Junction. Guidelines for fisheries protection during construction works have been published by both Inland Fisheries Ireland in the Republic of Ireland (Inland Fisheries Ireland, 2016) recommends that any in-stream river works should be avoided during the main salmonid spawning season and egg incubation phases, 1 October – 30 April.

Additionally, there is potential for the spreading of invasive species during the construction phase if mitigation measures are not adhered to, particularly surrounding WC2 where Himalayan balsam is scattered.

Given the scale and nature of the works, the magnitude of the impact associated with general construction is considered to be **Large Adverse**. The significance of the environmental effect is therefore **significant** in the absence of mitigation based on the **high sensitivity** of the receiving environment.

15.4.2 Assessment of Operational Effects

The key issues surrounding the operational phase relating to water quality are listed below in Sections **Error! Reference source not found.** to 15.4.2.2. Those identified have the potential to negatively affect water quality or the biodiversity of the waters thus potentially impacting the WFD objectives of the waterbodies. As detailed in previous sections, it is imperative that the objectives of the WFD and the protected areas objectives are not impacted by the proposed development.

There is potential water quality impacts associated with the operational phase of the proposed development which can be exacerbated due to poor design and implementation of these measures. There is potential direct impacts to the Swilly (Donegal)_010 water body that could result in significant changes to the water quality. It is therefore important to ensure that mitigation proposed during the operational phase of the proposed development in relation to drainage impacts are adhered to.

15.4.2.1 Foul Water

Inadequate or inappropriate urban wastewater infrastructure can result in significant pressures to surface water bodies particularly where misconnections (piping of sewerage directly to a storm water network or surface water body), can result in significant impacts to the biology and chemistry of the aquatic environment. It is also important to ensure the existing sewer network within an agglomeration has the capacity to accept the additional hydraulic and pollutant loading from the development and that adequate treatment is provided at the wastewater treatment system so as to minimise impacts on the receiving environment and downstream sensitive areas, particularly given that the existing nutrient pressures in the receiving water bodies is the cause of key driver for the less than good ecological status.

Given the scale of the proposed development, the magnitude of the impact is considered to be moderate adverse and the water bodies are considered to be of high importance and based on the rating of the environmental impact presented in **Table 15.3** the impact is potentially significant in the absence of mitigation.

15.4.2.2 Storm Water Run-off

The operational phase will involve the use of vehicles moving within and around the site. Therefore, there is potential for fuel or oil spillages and contaminants from vehicle engines. Run-off from these parking areas and roadways may be impacted with residual hydrocarbon contaminants from fuel emission and tyres, sediment and trace contaminants like metals and organics and therefore represent a potential source of contamination that could have a pathway to surface waters through the storm water drainage system. The nature of these contaminants could have a toxic effect on the biology of the receiving waters affecting the ecological status and chemical status of the water body and thereby potentially impacting on the ability of the water body to achieve it environmental objectives and downstream conservation management objectives for the Natura 2000 sites.

Given the scale and nature of the work, the magnitude of the impact associated with surface run-off contamination is considered to be moderate adverse. The significance of the environmental effect is therefore significant in the absence of mitigation based on the high sensitivity of the receiving environment.

15.4.3 Impact Matrix (Absence of Mitigation)

The potential impacts outlined in Sections 15.4.1 and 15.4.2 above are rated based on the impact level criteria in Section 15.2.4 to indicate their potential severity (profound, significant, moderate, slight and imperceptible) in the absence of any mitigation. The assessment reflects the activities and pollutants listed above and the different considerations for construction and operational phases of the project.

Table 15.12: Potential Impact Rating Matrix (in the absence of mitigation)

Significance of Environmental Impact	
CONSTRUCTION PHASE	
Suspended sediments / sedimentation	Significant
Concrete and cement pollution	Significant
Impacts associated with general construction works	Significant
OPERATIONAL PHASE	
Foul water	Significant
Storm water run-off	Significant

15.4.4 Assessment of Cumulative Effects

Potential cumulative impacts may arise from the project when combined with other existing and/or approved projects. In accordance with the European Commission (2017) and EPA Guidelines (2022), existing and/or approved projects with the potential for cumulative impacts have been identified. Cumulative impact assessments have been undertaken in this section for relevant pressures that could potentially give rise to cumulative impact. Each development with the potential to impact on the water environment has been considered through a review of the environmental supporting information (where available) for the existing or approved developments.

As outlined in section 15.5 with the implementation of the proposed mitigation there are no likely significant effects from the proposed development during the construction or operational phases, which would result in either positive or negative cumulative effects with other proposed developments on the existing water resource for the area within which the proposed development is located. There will be no discernible change to the existing baseline water quality environment as a result of the proposed development and therefore no likely significant cumulative effects with other projects outlined above.

15.4.5 Inter-relationships

The impact assessment also considers the inter-relationship of impacts on individual receptors. Inter-relationships are considered to be the impacts and associated effects of different aspects of the proposal on the same receptor.

The inter-relationship between Biodiversity, Contaminated Land, Geology and Soils or Flood Risk and the potential for impact on water quality has been assessed. Given that the proposed mitigation there is unlikely to be any significant inter-related impact to water quality.

15.5 Mitigation

In the absence of mitigation, the construction and operation of the proposed development has the potential to have Large Adverse impacts on the aquatic environment with the potential for significant effects.

With these considerations in mind, the risk to water quality posed by this project during construction and operation will be dependent on the good practice construction measures to ensure contaminants do not enter the watercourse and design consideration that ensures drainage does not impact water quality. Therefore, it is pertinent to ensure that procedures are put in place for the control and minimisation of surface water and suspended solids movement, it is also important that measures are taken to ensure existing drainage pathways are kept free from construction sediment and pollutants through the use of effective barriers to pollutant export and best practice techniques to control these pressures at source. Section 15.5.1 and Section 15.5.2 details the mitigation measure that will be employed on site during the project construction and operational phases.

15.5.1 Construction Phase Mitigation Measures

15.5.1.1 Construction Phase Best Practice Measures

Mitigation measures will be implemented by the contractors who will construct the proposed development in accordance with the requirements listed within the Construction Environmental Management Plan which will be submitted as part of the planning applications for the proposed development. Furthermore, once appointed, the contractors will submit a detailed Construction Management Plan based on the requirements of these submitted planning documents for approval by the Planning Authority. The mitigation measures implemented by the contractor will refer to the construction management procedures for best practice regarding the following recognised international guidelines:

- Good practice guidelines on the control of water pollution from construction sites developed by the Construction Industry Research and Information Association (CIRIA, 2001);
- Control of Water Pollution from construction sites, Guidance for consultants and contractors (C532);
- Environmental Good Practice on Site (3rd edition) (C692); and
- Guidelines on Protection of Fisheries During Construction Works and Adjacent to Waters (2016).

15.5.1.2 Suspended Sediment and Sedimentation

Preventing run-off is an effective method of preventing sediment pollution in the water environment. Therefore, adoption of appropriate erosion and sediment controls to manage run-off during construction is essential to prevent sediment pollution.

Mitigation measures to address the potential impact from suspended solids will be carried out in accordance with a site specific CEMP[1]. The measures will be employed prior to the commencement and during construction and will include such measures as:

- Drainage and measures to control run-off will be employed to manage sediments prior to any works to be undertaken at the site, i.e., arrangements for the treatment of dirty groundwater ingress from any excavations will be in place in advance of the dewatering to ensure it can be adequately managed on site;
- If possible, earthworks operations should be limited to the summer months;
- The site shall be surveyed to identify all existing drainage features and waterbodies;
- Silt fencing will be installed around the perimeter of the site. The location of the silt fencing will be determined in the construction stage CEMP and will be subject to a detailed assessment of the area or

[1] An Outline CEMP is included in Volume III of this EIAR.

phase to be developed. The purpose of the silt fencing is to prevent silt laden water leaving the site and entering neighbouring land with the potential to impact nearby watercourses. The Outline CEMP in Volume III contains details of the proposed silt fencing;

- Drainage ditches may be cut to intercept surface water where there is a risk of significant water flow into excavations or on to adjoining lands. There will also be a requirement to periodically pump water from excavations. All collected and pumped water will have to be treated prior to discharge. The run-off will be directed through appropriately sized settlement ponds to remove suspended solids;
- Emergency contact numbers for the Local Authority Environmental Section, Inland Fisheries Ireland, the Environmental Protection Agency and the National Parks and Wildlife Service will be displayed in a prominent position within the site compound. These agencies will be notified immediately in the event of a pollution incident;
- Site personnel will be trained in the importance of preventing pollution and the mitigation measures described here to ensure same;
- The site manager will be responsible for the implementation of these measures. They will be inspected on at least a daily basis for the duration of the works, and a record of these inspections will be maintained;
- Any temporary storage of soil, hardcore, crushed concrete or similar material will be stored as far as possible from any surface water drains. There can be no direct pumping of silty water from the works directly to any watercourse. All water from excavations must be treated by infiltration over lands or via settlement areas, silt busters etc;
- There is a possibility that flooding could occur during the construction period, emergency measures are therefore required. The following control measures will be required:
    - Silt fencing shall be placed above the 10-year flood level, and where that is not possible at the highest level possible within the site. Trapped silt shall be removed from silt fencing at regular intervals.
    - Settlement ponds shall be placed above the 10-year flood level.
    - Stockpiles of soil shall be kept out of the 10-year flood plain. This will not be possible at the northern extent of the site, additional measures will be incorporated at this location.
- Earthworks shall be exposed for the minimum time possible. Earthworks formations shall be protected by a layer of imported granular left fill.
- Landscaping and seeding of the perimeter embankments and retaining structures shall be carried out as early as possible.
- An Emergency Response plan (this is included in the Outline CEMP in Volume III) shall be developed for the site to mitigate against stockpiles or exposed earth that are at risk from flood waters.
- Spillage and blow-off of debris, aggregates and fine material onto public roads will be reduced to a minimum by employing the following measures:
- Vehicles delivering material with potential for dust emissions to an off-site location shall be enclosed or covered at all times to restrict the escape of dust;
    - Any hard surface site roads will be swept to remove mud and aggregate materials from their surface while any unsurfaced roads shall be restricted to essential site traffic only;
    - A power washing facility or wheel cleaning facility will be installed near to the site compound for use by vehicles exiting the site when appropriate;
    - Road sweepers will be employed to clean the site access route as required.

The incorporation of these mitigation measures during the construction phase means the potential impact to receiving water environment will be reduced to negligible thus reducing the significance of the environmental effect to imperceptible, based on the very high sensitivity of the receiving environment.

15.5.1.3 Concrete and Cement Pollution

The impacts in relation to cement and concrete for the proposed development are, for the most part (but not limited to) the construction of the buildings. The principal risks are:

The use of concrete in close proximity to water bodies requires a great deal of care. Fresh concrete and cement are very alkaline and corrosive and can cause serious pollution in water bodies. It is essential to ensure that the use of wet concrete and cement in or close to any water course is carefully controlled so as to minimise the risk of any material entering the water, particularly from shuttered structures or the washing of equipment. The following measures will be undertaken to mitigate against possible pollution:

- A concrete washdown area will be provided on site for trucks to use after delivery of concrete or on return to the batching plant. This area will be adequately bunded to mitigate the risk of contaminated runoff discharge to the water bodies. Concrete trucks are to be washed down within the concrete truck washdown area after delivery of concrete, prior to exiting the site. Washdown runoff will be appropriately treated prior to discharge;
- Wash-out areas on site will be properly designed with an impermeable line to contain all cement laden water. No wash-out of ready-mix concrete vehicles shall be located within 10 metres of any temporary or permanent drainage features. Signage shall be erected to clearly identify the wash-out areas. Sufficient wash-out areas shall be provided to cater for all vehicles at peak delivery times;

In circumstances where the mitigation measures are employed during construction operations, the potential impact to receiving water environment will be reduced to negligible thus reducing the significance of environmental effect to imperceptible.

15.5.1.4 General Construction Works

The risk of water quality impacts associated with works machinery, infrastructure and operations (for example leakages/spillages of fuels, oils, other chemicals and waste water) will be controlled through good site management and the adherence to codes and practices which limit the risk to within acceptable levels. The following measures will be implemented during construction:

- A detailed works specific Construction Environmental Management Plan will be prepared during the planning submission and will be developed and implemented by the contractor and will include detail in respect of every aspect of the works in order to minimise potential impacts and maximise potential benefits associated with the works;
- Management and auditing procedures, including tool box talks to personnel, will be put in place to ensure that any works which have the potential to impact on the aquatic environment are being carried out in accordance with the contactors environmental controls, which will be consistent with an approved CEMP and any planning conditions;
- Existing surface water drainage and discharge points will be mapped on the Drainage layout. These will be noted on construction site plans and protected accordingly to ensure water bodies are not impacted from sediment and other pollutants using measures to intercept the pathway for such pollutants;
- Welfare facilities (canteens, toilets etc.) will be available within the construction compound and this will remain in place for the construction of the proposed development. The offices and site amenities will be required to have their own foul water collection.

The use of oils and chemicals on-site requires significant care and attention. The following procedures will be followed to reduce the potential risk from oils and chemicals:

- New metal gerry cans with proper pouring nozzles will be used to move fuel around the site for the purposes of refuelling items of small plant on site. Metal gerry cans and any other items of fuel containers will be stored in certified metal bunded cabinets.
- Drip trays will be used under items of small plant at all times. Any waste oils etc. contained in the drip trays or the bunded area will be emptied into a waste oil drum, which will be stored within the bund.
- Any gas bottles will be stored in a caged area at a secure location on the site. All will be properly secured at point of work.
- No bulk chemicals will be stored within the active construction areas. Temporary oil and fuel storage tanks may be kept in the material storage area in suitable containers and will be stored on appropriately bunded spill pallets as required. Any fuel and oil stored onsite shall be stored on bunded spill pallets approved under BS EN 1992-3:2006). All bunds will be impermeable and capable of retaining a volume of equal to or greater than 1.1 times (>10%) capacity of the containers stored on them. In the event of a filling spillage excess oil or fuel will be collected in the bund;
- Refuelling of vehicles and the addition of hydraulic oils or lubricants to vehicles will be undertaken offsite where possible. Where this is not possible, filling and maintenance will take place in a designated material storage compound, which is located at least 10 metres from any temporary or permanent drainage features. Spill protection equipment such as absorbent mats, socks and sand will be available to be used in the event of an accidental release. Training will be given to appropriate site workers in how to manage a spill event. A certified double skinned metal fuel tank will be situated in this secure bunded area on the construction site if applicable. This tank will be certified for lifting when full.
- Spill protection equipment such as absorbent mats, socks and sand will be available to be used in the event of an accidental release during refuelling. Training will be given to appropriate site workers in how to manage a spill event. A hazardous bin will also be available to contain any spent sand or soak pads.
- Contingency Planning: A project specific Pollution Incident Response Plan will be prepared by the contractor and will refer to PPG 21 Pollution Incident Response Planning. The contractor's Environmental Manager will be notified in a timely manner of all incidents where there has been a breach in agreed environmental management procedures. Suitable training will be provided by the contractor to relevant personnel detailed within the Pollution Incident Response Plan to ensure that appropriate and timely actions is taken.

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

- Refuelling will be undertaken off site where possible;
- Where mobile fuel bowsers are used the following measures will be taken:
    - Any flexible pipe, tap or valve will be fitted with a lock and will be secured when not in use;
    - The pump 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.

The design and siting within the channel should follow the UK's CIRIA guidelines for maintaining passage at culverts (see Balkham et al. 2010) and IFI guidance for fisheries protection during development works (IFI, 2016); the following key points are relevant to maintaining fish passage;

- The avoidance of a significant drop in water level at the inlet or outlet;
- Provision of adequate flow depth for fish passage;
- Provision of a natural bed;
- The avoidance of a local increase in flow velocities.

Therefore, any temporary structure should be installed so that gradient, water depth and flow velocities are as similar as possible to the original channel, as agreed with the relevant fisheries jurisdiction (i.e. IFI).

Provided these mitigation measures are employed during construction operations, the potential impact to receiving water environment will be reduced to negligible thus reducing the significance of environmental effect will be reduced to imperceptible.

15.5.2 Operational Phase Mitigation Measures

The operational phase impacts associated with the project represent general water quality issues associated with foul water and storm water run-off impacts. It is therefore imperative that operational impacts do not prevent the water bodies from achieving their WFD objectives. Additionally, consideration must be taken to ensure that mitigation proposed during the operational phase of the proposed development in relation to maintenance is adhered to.

15.5.2.1 Foul Water

Both the surface water and foul system are to be entirely separate systems. Please refer to Volume II Design Drawings & Figures for details of a new proposed foul water sewer network to service the proposed development. Foul water will be separated from storm water and discharged into an existing foul sewer network on the N56. The foul water will then be treated at Letterkenny WWTP prior to discharge to the Swilly Estuary. Consultation with Irish Water will be undertaken to ensure the sewer and WWTP have capacity to accept any additional hydraulic and organic loading. Consultation has been undertaken and details are contained in Chapter 4 of this EIAR.

Where the mitigation measures listed above are employed, the potential impact to the receiving water environment will be reduced to low adverse thus reducing the significance of environmental effect will be reduced to negligible.

15.5.2.2 Storm Water Run-off

During the operational phase, there is potential for storm water run-off to be impacted by pollutants arising within the car parking areas and roadways. This runoff has the potential to provide pathways for a wide range of contaminants arising from general operations to the aquatic environment. The main potential pollutants from surface water drainage or direct run-off are sediment, hydrocarbons, and trace contaminants including metals and organics.

Surface water arising at the site will be managed by a dedicated stormwater drainage system designed in accordance with Sustainable Drainage Systems (SuDS) principles, limiting discharge from the site to greenfield runoff rates.

The use of permeable surfaces for the synthetic and natural turf pitches will improve the permeability of the pitch surfaces such that surface water will not accumulate on the pitch for either 30 or 100 year return period storm events. The French drains below will collect the storm water that filters through the surface layer with a notional attenuation tank attached to the node compromising the junction of the French drain and the collector drain. The storm drainage was designed with climate change considered through the inclusion of a 10% and 20% increase in flows. The discharge from the pitches will be collected at controlled rates.

Run-off from hard surfaces, where possible, will pass through point-of-entry SuDS prior to discharge to the main drainage system. Collected surface water will then pass through petrol interceptors to remove hydrocarbons lifted from the carparks and roads before passing into attenuation located upstream of the discharge points. The attenuation tanks will be sized to achieve 2 l/s/ha greenfield runoff rate. To achieve this runoff rate a variety of holding capacity techniques will be employed in the French drain bedding, optimally-sized piping and manhole junctions, a 30% void stone attenuation tank within the subbase, and a hydrobrake outlet before the outfall. With attenuation calculations applied, no surface water flooding is generated under the simulated critical rainfall events. However, it is noted that temporary flooding of the playing surfaces and even car parks is considered legitimate SuDS approach as these conditions would occur under extreme storm events in locations not considered critical to human safety and where damage to infrastructure would not occur.

The outfall of the main drainage system is to the Swill (Donegal)_010 water body along the lower reaches of the site. The proposed elements are shown in the Drainage Layout (Drawing 11438-2002).

The proposed drainage design improves on the current calculated greenfield runoff rate by approximately 42% and provides measures to filter out contaminants within the flow path. Where the mitigation measures listed above are employed, the potential impact to the receiving water environment will be reduced to low adverse thus reducing the significance of environmental effect will be reduced to negligible.

15.5.3 RESIDUAL IMPACTS

Where the appropriate mitigation measures are fully implemented during the construction and operational phases of the proposed development as outlined in the previous section, the impact of the project on the water quality in the area will be imperceptible as indicated in Table 15.13.

Accordingly, the proposed development will not have a significant effect on the water quality of the receiving waters.

It can therefore be concluded that the proposed works are compliant with the requirements and environmental objectives of the EU Water Framework Directive and the other relevant water quality objectives for these water bodies.

Table 15.13: Residual Impacts (with mitigation)

Significance of Environmental Impact	
CONSTRUCTION PHASE	
Suspended sediments / sedimentation	Imperceptible
Concrete and cement pollution	Imperceptible
Impacts associated with general construction works	Imperceptible
OPERATIONAL PHASE	
Foul water	Imperceptible
Storm water run-off	Imperceptible

15.5.4 Future Monitoring

15.5.4.1 Construction Phase

The Outline CEMP (Please refer to Volume III) includes emergency response procedures to mitigate against contamination to water systems, in particular in relation to oil spillage, uncontrolled silt discharge and sewage spill. The CEMP will also have procedures for monitoring the performance and effectiveness of mitigation measures employed during construction to ensure they are operating as intended and are providing the necessary protection to the receiving environment.

Weekly checks will be carried out to ensure surface water drains are not blocked by silt, or other items, and that all storage is located at least 10m from surface water receptors. A regular log of inspections will be maintained, and any significant blockage or spill incidents will be recorded for root cause investigation purposes and updating procedures to ensure incidents do not reoccur.

15.5.4.2 Operational Phase

During the operational phase of the works, it is not anticipated that monitoring will be required.

15.6 Summary of Effects & Conclusion

The key issues in relation to water quality throughout the construction phase is associated with the physical disturbance in the aquatic environment in respect to instream works during culvert construction. These works have the potential to impact the waterbodies through increased sedimentation, concrete/cement pollution and thus impact on the sensitive receptors within the water bodies. Additional pressures with regards to the potential for oil/ fuel spillages both during the construction and operation phases of the proposed development have been assessed. The use of oils and chemicals on-site requires significant care and attention and will adhere to the requirements of the Water Environment (Controlled Activities) (Scotland) Regulations 2011 and GPP2, Above Ground Oil Storage Tanks.

There are no key issues in relation to the water environment throughout the operational phase of the proposed development provided mitigation measures are employed.

The proposed development is therefore not expected to have a significant effect on water quality or the ability of the waterbody to continue to achieve its WFD objectives.

15.7 Limitation of the Assessment

The assessment currently assumes that the high standard of construction phase mitigation will ensure that potential impact will be reduced to negligible.

Based on this assumption there are no other limitations that would affect the robustness of the assessment for EIAR purposes.

15.8 References

- European Commission (2000) EU Water Framework Directive 2000/60/EC, Official Journal of the European Communities. Available at https://eur-lex.europa.eu/resource.html?uri=cellar:5c835afb-2ec6-4577-bdf8-756d3d694eeb.0004.02/DOC_1&format=PDF
- NRA (2008) "Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes". National Roads Authority, Dublin.
- Environment Agency (2012). *Working at construction and demolition sites: PPG6 Pollution Prevention Guidelines.* Available at: http://www.environment-agency.gov.uk/static/documents/Business/EA-PPG6_-_03_2012_Final.pdf
- Environmental Protection Agency (2021). *Water Quality in 2020. An Indicators Report.* Wexford: EPA. Available at: https://www.epa.ie/publications/monitoring--assessment/freshwater--marine/EPA_Water_Quality_2020_indicators-report.pdf (Accessed: 15.09.2022)
- CIRIA (2001) *Control of water pollution from construction sites: guidance for consultants and contractors.* CIRIA, London.
- Balkham, M., Fosbeary, C., Kitchen, A., and Rickard, C. (2010). Culvert Design and Operation Guide. CIRIA, London, pp. 342.

16 CONTAMINTED LAND, GEOLOGY & SOILS

16.1 Introduction

This chapter summarises the ground investigations (GI) undertaken by Ground Investigations Ireland (GII) Ltd., between November 2022 and January 2023 at the site of the proposed development in Letterkenny. This assessment is based on the project description detailed in Chapter 2 and identifies potential significant effects on geology and soils quality that may arise from the proposed development and presents mitigation measures that will be implemented to address the potential significant effects.

This chapter should be read in conjunction with:

Volume III Technical Appendix 16.A Geological Investigation Report

16.2 Methodology

The purpose of the site investigation was to investigate subsurface conditions utilising a variety of investigative methods in accordance with the project specification. The scope of the work undertaken for this project included the following:

- Visit project site to observe existing conditions
- Carry out 12 No. Trial Pits to a maximum depth of 3.0m BGL
- Carry out 7 No. Soakaways to determine a soil infiltration value to BRE digest 365
- Carry out 10 No. Percussion Boreholes to recover soil samples
- Carry out 10 No. Rotary Core Boreholes to a maximum depth of 16m BGL
- Installation of 5 No. Groundwater monitoring wells
- Geotechnical & Environmental Laboratory testing
- Report with recommendations

16.2.1 Relevant Guidance

The procedures used in the site investigation are in accordance with Eurocode 7 Part 2: Ground Investigation and testing (ISEN 1997 – 2:2007) and B.S. 5930:2015.

16.2.2 Study Area

It is proposed to construct a new sports campus with associated services, access roads and car parking at the proposed site. The site is currently greenfield and is situated in the north eastern portion of Letterkenny Town. The proposed construction is envisaged to consist of conventional foundations and pavement make up with some local excavations for services and plant. An earthworks programme to cut and fill cross the site is proposed.

16.2.3 Assessment Criteria and Assignment of Significance

An assessment has been made of the components of the proposed development that have the potential to have a significant impact on geology and soils using criteria for rating significance and magnitude set out in the National Roads Authority (NRA) publication “Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes” (NRA, 2008).

The significance of impact on geology and soils likely to occur during the construction and operational phases of the proposed development are determined using a predominantly qualitative methodology. The approach to assigning significance of impact relies on reasoned argument, professional judgment and taking on board

the advice and views of appropriate organisations. The assessment is a consideration of a combination of receptor sensitivity (Table 16.1) and the potential magnitude of the impact on the environment (Table 16.2), in order to determine significance (Table 16.3). The approach to assessing the significance of impacts comprises assigning each impact to one of the categories of magnitude as outlined in Table 16.1 enables different components to be assessed based upon the same scale.

16.2.3.1 Receptor Sensitivity / Value

The significance of effects on geology and soils likely to occur during the proposed development are determined using the predominantly qualitative process described below. The criteria for determining the significance of effects is a two-stage process. The first step in the process is to determine the sensitivity of the receiving environment and then to define the magnitude of the potential impact This section describes the criteria applied in this chapter to assign values to the receptor to assist in defining sensitivity of receptors (Table 16.1).

Table 16.1: Sensitivity of Receptor (Amended from NRA Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes)

Sensitivity	Criteria	Typical examples
Very High	Attribute has a high quality and rarity on regional or national scale.	Geology: World Heritage Sites; sites protected under EU wildlife legislation (SAC, SPA, SSSI, Ramsar site) or geological features that are rare on a regional or national scale. Surface waters: River, wetland or surface water body ecosystem protected by EU legislation.
High	Attribute has a high quality and rarity on local scale.	Geology: Regionally Important Geological Sites. Soils: Well drained and/or high fertility soils. Surface water: Ecosystem protected by national legislation. Groundwater: Regionally important potable water source supplying >2500 homes, groundwater vulnerability is classified as high; principal aquifer providing a regionally or locally important resource or supporting site protected under wildlife legislation.
Medium	Attribute has a medium quality and rarity on local scale.	Soils: Moderately drained and/or moderate fertility soils. Groundwater: Local potable water source supplying >50 homes, moderate classification of groundwater vulnerability; secondary aquifer providing water for agricultural or industrial use with limited connection to surface water.
Low	Attribute has a low quality and rarity on local scale.	Soils: Poorly drained and/or low fertility soils. Groundwater: Local potable water source supplying <50 homes, deep secondary aquifer with poor water quality not providing baseflow to rivers.
Neutral	Very low importance and rarity on local scale.	Geology: No rock exposures. Soils: Urban classified soils. Groundwater: Non-aquifer/Unproductive Strata.

The magnitude of a potential effect is independent of the sensitivity of the feature. The magnitude considers the scale of the predicted change to the baseline condition taking into account its duration (i.e. the magnitude may be moderated by the effects being temporary rather than permanent, short term rather than long term) and whether the effect is direct or indirect. Definitions for impact magnitude are described in Table 16.2.

Table 16.2: Sensitivity of Receptor (Amended from NRA Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes)

Magnitude	Criteria	Typical examples
Major adverse	Total loss or major alteration to key features of the baseline conditions such that post development character/composition of baseline condition will be fundamentally changed.	Irreversible loss of high proportion of local high fertility soils. Changes to aquifer or unsaturated zone resulting in extensive change to existing water supply springs and wells, river baseflow or ecosystems. Loss of, or extensive change, to nationally important geological features.
Moderate adverse	Loss or alteration to one or more key features of the baseline conditions such that post development character/composition of baseline condition will be materially changed.	Irreversible loss of moderate proportion of local high fertility soils Changes to aquifer or unsaturated zone resulting in moderate change to existing water supply springs and wells, river baseflow or ecosystems Permanent loss of, regionally important geological features, or substantial changes to nationally important geological features.
Minor adverse	Results in some measurable change in attributes quality or vulnerability compared to baseline conditions. Changes arising from the alteration will be detectable but not material; the underlying character/composition of baseline condition will be similar to the pre-development situation.	Irreversible loss of small proportion of local high fertility soils and/or high proportion of local low fertility soils Changes to aquifer or unsaturated zone resulting in minor change to water supply springs and wells, river baseflow or ecosystems Loss of, or extensive change, to locally important geological features
Neutral	Very little change from baseline conditions. Change is barely distinguishable approximately to a “no change” situation.	No measurable impact upon surface waters or groundwater. No measurable impact on geological features. No measurable impact on soils.
Beneficial	Benefit to, or addition of, key characteristics, features or elements compared to baseline conditions.	Treatment or removal of contaminated soils from site Improvement to geological features

The significance of a specific potential effect is derived from both the sensitivity of the feature and the magnitude of the effect, and can be then determined using the matrix presented in Table 16.3. Effects can be beneficial, adverse or neutral and their significance Very Large, Large, Moderate, Slight or Neutral or an intermediary designation as cases dictate based on professional judgement. The significance of an impact should also be qualified based on the likelihood of an effect occurring (using a scale of certain, likely or unlikely) and the confidence in the accuracy of the assessment. Professional judgement can be used to vary the category where specific circumstances dictate, for example due to the vulnerability or condition of the receptor.

Table 16.3: Assessment of significance matrix

		Magnitude of effect			
		Major	Moderate	Minor	Neutral
Sensitivity of attribute	High	Large/very large	Moderate/large	Slight/moderate	Neutral
	Medium	Large	Moderate	Slight	Neutral
	Low	Slight/moderate	Slight	Neutral	Neutral
	Neutral	Neutral	Neutral	Neutral	Neutral

The significance of effects for soils, geology and hydrogeology will be assessed initially without taking mitigation measures into account. Residual effects (effects that remain once mitigation measures are taken into consideration) are then identified. Temporary effects will be considered in the construction period whilst permanent effects will be discussed in the operational phase, albeit that the effect may first occur during construction

16.3 Baseline Environment

16.3.1 Geology & Hydrogeology

A review of the Geological Survey of Ireland (GSI) web viewer indicates that the site is dominated by Precambrian metamorphic rocks - quartzites, gneisses and schists (Dalradian). It is likely that the underlying bedrock at the site comprises more specifically the Termon Formation or the Lower Crana Quartzite Formation. The Termon Formation comprises banded semi-pellitic and psammite schist. The Lower Crana Quartzite Formation comprises psammitic schist. This is observed from the Geological Survey of Ireland (GSI), 1:100,000 mapping (Figure 16.1). Review of the quaternary sediments map for the area shows that the site mainly consists of till derived from Metamorphic rocks and partly made up from bedrock outcrop or subcrop.

The EPA and GSI interactive databases indicate that the overburden soils (topsoil and subsoil) at the site are likely to comprise the following:

- Surface water gleys/groundwater (acidic);
- Lithosols/Regosols (acidic); and
- Metamorphic till.

In addition to the soils listed above, it is likely that bedrock is either close to ground surface or outcropping at a number of locations across the site.

Groundwater vulnerability at the site has been designated by the GSI as ‘Extreme Vulnerability and Extreme with karst or rock near surface’. Given that the underlying bedrock geology is likely to be Precambrian metamorphic rocks, it is likely that bedrock is shallow or outcropping at the site. This is observed from the Geological Survey of Ireland (GSI), Groundwater Vulnerability mapping (Figure 16.2).

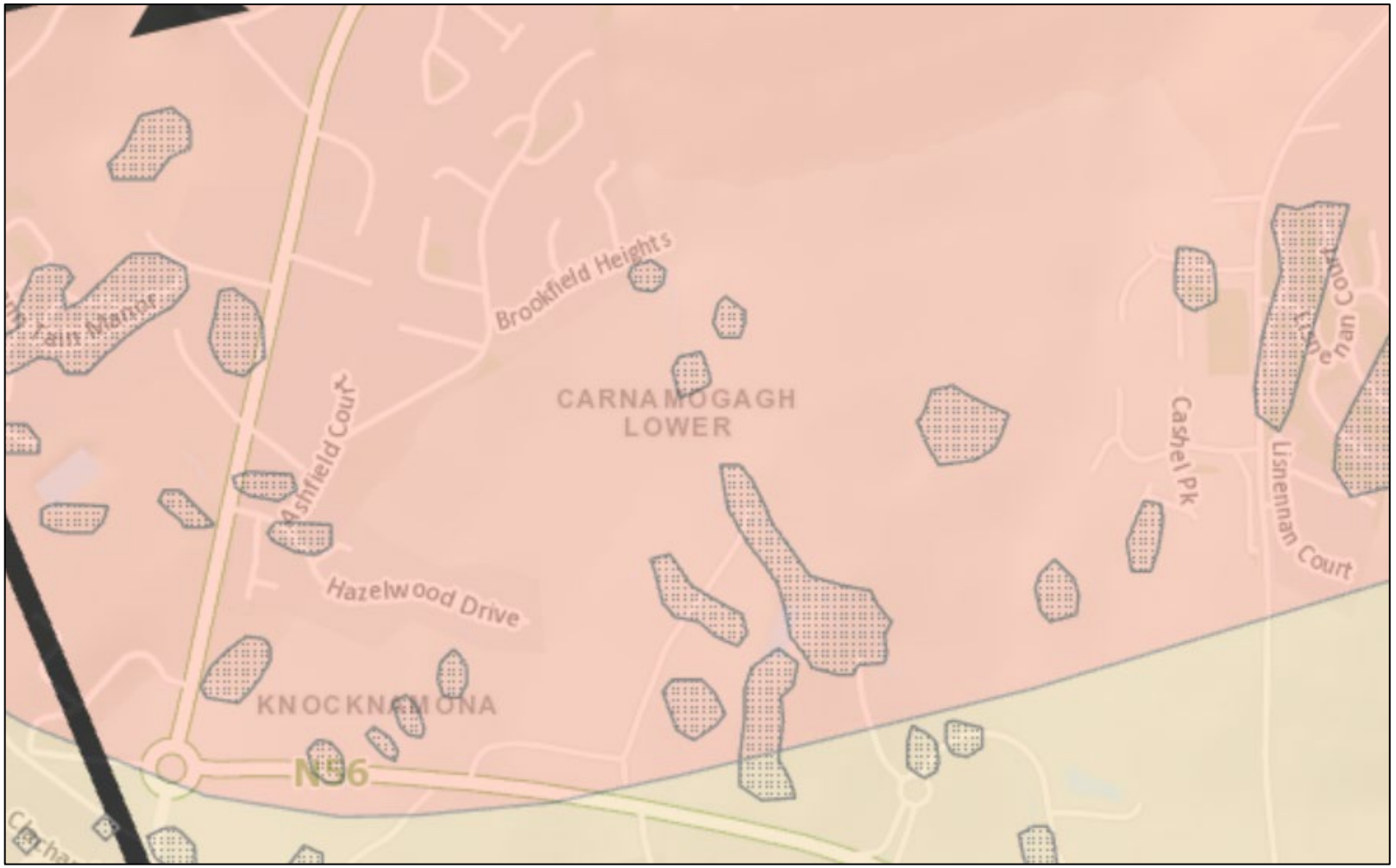

Figure 16.1: Solid Geology (Source: GSI)

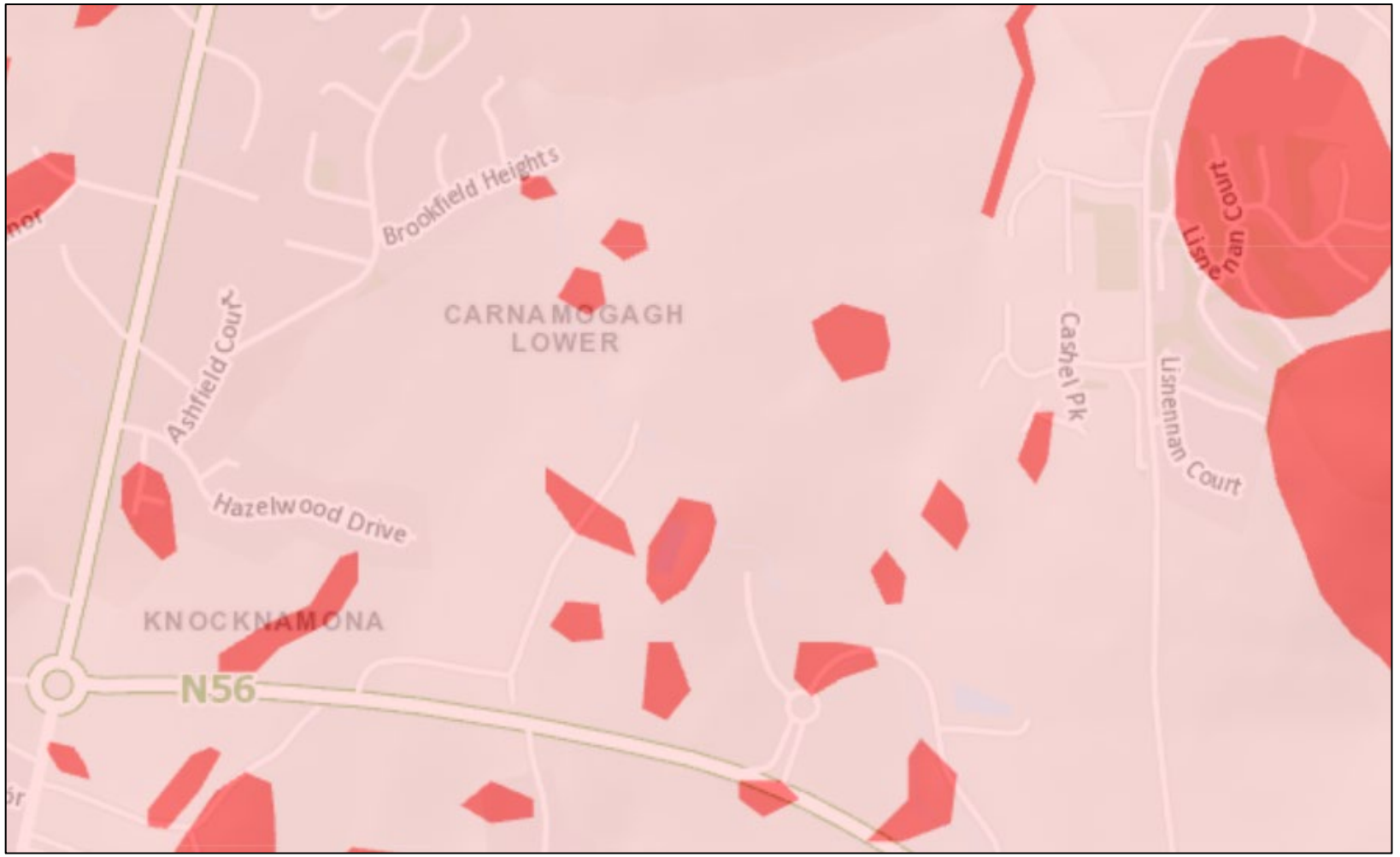

Figure 16.2: Groundwater Vulnerability (Source: GSI)

16.3.2 Subsurface Exploration

16.3.2.1 General

During the ground investigation a programme of intrusive investigation specified by the Consulting Engineer was undertaken to determine the sub surface conditions at the proposed site. Regular sampling and in-situ testing was undertaken in the exploratory holes to facilitate the geotechnical descriptions and to enable laboratory testing to be carried out on the soil samples recovered during excavation and drilling.

16.3.2.2 Trail Pits

The trial pits were excavated using a 8T tracked excavator. The locations were checked using a CAT scan to minimise the potential for encountering services during the excavation. The trial pits were sampled, logged and photographed by a Geotechnical Engineer/Engineering Geologist prior to backfilling with arisings. Notes were made of any services, inclusions, pit stability, groundwater encountered and the characteristics of the strata encountered and are presented on the trial pit logs which are provided in Appendix 16.A of this EIAR.

16.3.2.3 Soakaway Test

The soakaway testing was carried out in selected trial pits at the locations shown in the exploratory hole location plan in Appendix 16.A. These pits were carefully excavated and filled with water to assess the infiltration characteristics of the proposed site. The pits were allowed to drain and the drop in water level was recorded over time as required by BRE Digest 365. The pits were logged prior to completing the soakaway test and were backfilled with arising's upon completion. The soakaway test results are provided in Appendix 16.A of this EIAR.

16.3.2.4 Percussion Boreholes

The percussion boreholes were carried out at the locations shown in the location plan in Appendix 16.A using a Tecopsa SPT Tec 10 percussion drilling rig. The percussion sampling consists of a 1m long steel tube with a cutting edge and an internal plastic liner which is mechanically driven into the ground utilising a 63.5kg weight falling a height of 760mm. Upon completion of the 1m sample, the tube is withdrawn and the plastic liner removed and sealed for logging and sub sampling by a Geotechnical Engineer/Engineering Geologist. The tube is replaced in the borehole and a subsequent 1m sample can be recovered. Occasionally outer casing or a reduced diameter tube is utilised to enable the window sample to progress in difficult drilling conditions. Geotechnical or environmental soil samples can be recovered from each of the liners following logging.

Standard Penetration Tests were carried out in the boreholes. The results of these tests, together with the depths at which the tests were taken are shown on the accompanying borehole records. The test consists of a thick wall sampler tube, 50mm external diameter, being driven into the soil by a weight of 63.5kg and with a free drop of 760mm. For gravels and glacial till the driving shoe was replaced by a solid 60º cone. The Standard Penetration Test number referred to as the 'N' value is the number of blows required to drive the tube 300mm, after an initial penetration of 150mm. The number gives a guide to the consistency of the soil and can also be used to estimate the relative strength/density at the depth of the test and also to estimate the bearing capacity and compressibility of the soil. The percussion borehole records are provided in Appendix 16.A of this EIAR.

16.3.2.5 Rotary Boreholes

The rotary coring was carried out by a track mounted T44 Beretta rig at the locations shown on the location plan in Appendix 16.A. The rotary boreholes were completed from the ground surface or alternatively, where noted on the individual borehole log, from the base of the cable percussion borehole where a temporary liner was installed to facilitate follow-on rotary coring.

The T44 Beretta is equipped with rubber tracks which allow for short travel on pavement surfaces avoiding any damage to the surface. The T44 Beretta utilises a triple tube core barrel system operated using a wireline drilling process. The outer barrel is rotated by the drill rods and at its lower end, carries the coring bit. The inner barrel is mounted on a swivel so that it does not rotate during the process. The third barrel or liner is

placed within the second one to retain the core intact and to preserve as much as possible the fabric of the drilling stratum. The core is cut by the coring bit and passes to the inner liner. The core is brought up to the surface within the inner barrel on a small diameter wire rope or line attached to the “overshoot” recovery tool which is then placed into a core box in order of recovery. A drilling fluid, typically air mist or water flush is passed from the surface through hollow drill rods to the drill bit and is used to cool the drill bit. Temporary casing is used in some situations to support unstable ground or to seal off fissures or voids.

It should be noted that the rotary coring can only achieve limited recovery in overburden, particularly granular or weakly cemented strata due to the flushing medium washing away the cohesive fraction during coring. The recovery achieved, where required is noted on the borehole logs and core photographs are provided to allow assessment of the core recovered. The rotary borehole logs are provided in Appendix 16.A of this EIAR.

16.3.2.6 Groundwater/Gas Monitoring Installations

Groundwater and or Gas Monitoring Installation were installed upon the completion of the boreholes to enable sampling and the determination of the equilibrium groundwater level. The typical groundwater monitoring installation consists of a 50mm uPVC/HDPE slotted pipe with a pea gravel response zone and bentonite seal installed to the Engineers specification. Where required the standpipe is sealed with a gas tap and finished with a durable steel cover fixed in place with a concrete surround. The installation details are provided on the exploratory hole logs in the Appendix 16.A of this EIAR.

16.3.2.7 Laboratory Testing

Samples were selected from the exploratory holes for a range of geotechnical and environmental testing to assist in the classification of soils and to provide information for the proposed design. Environmental & Chemical testing as required by the specification, including the Rilta Suite/Engineers Ireland Suite E, H, I pH and sulphate testing was carried out by Element Materials Technology Laboratory in the UK. The Rilta suite testing includes both Solid Waste and Leachate Waste Acceptance Criteria.

Geotechnical testing consisting of moisture content, Atterberg limits, Particle Size Distribution (PSD), hydrometer, California Bearing Ratio (CBR), Moisture Condition Value (MCV) tests were carried out in NMTL’s Geotechnical Laboratory in Carlow. The results of the laboratory testing are included in Appendix 16.A of this EIAR.

16.4 Impact Assessment

16.4.1 Assessment of Construction Effects

The following potential effects arising from the construction phase of the proposed development have been considered:

- Unstable embankments and soil conditions to the surrounding environment during the works causing slippages and ground movement.
- Unstable excavations and retention systems during the ground works causing soil slippages and ground movement resulting in damage to nearby buildings and surrounding environment.
- Unforeseen ground conditions or obstructions within the ground that have not been identified in the geotechnical investigations.
- Ground borne vibration as a result of the works to the surrounding environment could cause damage to nearby buildings.
- During excavation surface water runoff from the surface of the excavated areas may result in silt discharges to waterbodies.
- Excavations for basements, foundations, roadworks, and services will result in a surplus of subsoil. Surplus subsoil will be used in fill areas where applicable.

- Accidental oil or diesel spillages from construction plant and equipment, in particular at refuelling areas, may result in oil contamination of the soils and underlying geological structures.

16.4.2 Assessment of Operational Effects

During the operational stage of the proposed development there will be no likely significant ongoing impacts on the underlying soil and geology. Any hydro-geological impacts are temporary and associated with the construction of the proposed development.

16.4.3 Impact Matrix (Absence of Mitigation)

The potential impacts outlined in Sections 16.4.1 and 16.4.2 above are rated based on the impact level criteria in Section 16.2.3 to indicate their potential severity (profound, significant, moderate, slight and imperceptible) in the absence of any mitigation. The assessment reflects the activities and pollutants listed above and the different considerations for construction and operational phases of the project.

Table 16.4: Potential Impact Rating Matrix (in the absence of mitigation)

Significance of Environmental Impact	
CONSTRUCTION PHASE	
Suspended sediments / sedimentation	Significant
Concrete and cement pollution	Significant
Impacts associated with general construction works	Moderate
OPERATIONAL PHASE	
Storm water run-off / sedimentation	Significant

16.4.4 Assessment of Cumulative Effects

Potential cumulative impacts may arise from the project when combined with other existing and/or approved projects. In accordance with the European Commission (2017) and EPA Guidelines (2022), existing and/or approved projects with the potential for cumulative impacts have been identified. Cumulative impact assessments have been undertaken in this section for relevant pressures that could potentially give rise to cumulative impact. Each development with the potential to impact on the soils (including contaminated land) environment has been considered through a review of the environmental supporting information (where available) for the existing or approved developments.

As outlined in section 16.5 with the implementation of the proposed mitigation there are no likely significant effects from the proposed development during the construction or operational phases, which would result in either positive or negative cumulative effects with other proposed developments on the existing geology and soils resource for the area within which the proposed development is located. There will be no discernible change to the existing baseline soils environment as a result of the proposed development and therefore no likely significant cumulative effects with other projects outlined above.

16.4.5 Inter-relationships

The impact assessment also considers the inter-relationship of impacts on individual receptors. Inter-relationships are considered to be the impacts and associated effects of different aspects of the proposal on the same receptor. The inter-relationship between Biodiversity, Water Quality or Flood Risk and the potential for impact on geology and soils quality has been assessed. Given that the proposed mitigation there is unlikely to be any significant inter-related impact to soils.

16.5 Mitigation

In the absence of mitigation, the construction and operation of the proposed development has the potential to have Large Adverse impacts on the aquatic environment with the potential for significant effects.

With these considerations in mind, the risk in relation to soils and contaminated land posed by this project during construction and operation will be dependent on the good practice construction measures to ensure contaminants do not enter the watercourse and design consideration that ensures drainage does not impact any areas of unknown contaminated land. Therefore, it is pertinent to ensure that procedures are put in place for the control and minimisation of suspended solids movement, it is also important that measures are taken to ensure existing drainage pathways are kept free from construction sediment and pollutants through the use of effective barriers to pollutant export and best practice techniques to control these pressures at source. Section 16.5.1 and Section 16.5.2 details the mitigation measure that will be employed on site during the project construction and operational phases.

16.5.1 Construction Phase Mitigation Measures

16.5.1.1 Construction Phase Best Practice Measures

Mitigation measures will be implemented by the contractors who will construct the proposed development in accordance with the requirements listed within the Construction Environmental Management Plan (CEMP) (Please refer to Appendix 2.A for an outline CEMP) which is submitted as part of this EIAR. Furthermore, once appointed, the contractors will submit a detailed Construction Management Plan based on the requirements of the oCEMP for approval by the Planning Authority. The mitigation measures implemented by the contractor will refer to the construction management procedures for best practice regarding the following recognised international guidelines:

- Records of topsoil storage, movements and transfer from site will be kept by the C&D Waste Manager;
- Soil samples taken from the site during the site investigations showed no evidence of contamination. However, any contaminated soil that may be uncovered on the site will be identified and disposed of to an appropriate waste disposal facility.
- Surplus subsoil will be stockpiled on site, in such a manner as to avoid contamination with builders' waste materials, etc., and so as to preserve the materials for future use as clean fill.
- Good practice guidelines on the control of water pollution from construction sites developed by the Construction Industry Research and Information Association (CIRIA, 2001);
- Control of Water Pollution from construction sites, Guidance for consultants and contractors (C532);
- Environmental Good Practice on Site (3rd edition) (C692); and
- Guidelines on Protection of Fisheries During Construction Works and Adjacent to Waters (2016).

16.5.2 Operational Phase Mitigation Measures

On completion of the construction phase and following replacement of topsoil, a planting programme will commence to prevent soil erosion. SuDS and filtration devices are proposed to be provided as part of the development. These will help to remove pollutants from rainwater runoff. The SuDS proposals will also encourage infiltration of surface water to the ground. Part of the SuDS proposal for this site is also to encourage infiltration of surface water to the ground. This infiltration will assist with natural ground water replenishment which is currently occurring on the lands.

16.5.3 Risks to 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.

16.5.4 Residual Impacts

16.5.4.1 Construction Phase

With the protective measures noted above in place during excavation works, any potential impacts on soils and geology in the area will not have significant adverse impacts, and no significant adverse impacts on the soils and geology of the subject lands are envisaged. The proposed development will result in a surplus of excavated material, which may contain contaminants. Any contaminated material will be exported to an approved licensed waste facility.

16.5.4.2 Operational Phase

On completion of the construction phase and following replacement of topsoil and implementation of a planting programme, no further impacts on the soil are envisaged. SuDS measures, including permeable paving, bioretention tree pits and open areas with low level planting, will assist with treating surface water runoff while replenishing the natural ground water table. No significant adverse impacts are predicted on soils or geology.

Where the appropriate mitigation measures are fully implemented during the construction and operational phases of the proposed development as outlined in the previous section, the impact of the project on the water quality in the area will be imperceptible as indicated in Table 16.5.

The proposed development will not have a significant effect on the geology and soils.

Table 16.5: Residual Impacts (with mitigation)

Significance of Environmental Impact	
CONSTRUCTION PHASE	
Suspended sediments / sedimentation	Imperceptible
Uncovering Unknown Contaminated Land	Imperceptible
Impacts associated with general construction works	Imperceptible
OPERATIONAL PHASE	
Storm water run-off & Sedimentation	Imperceptible

16.5.5 Future Monitoring

16.5.5.1 Construction Phase

Monitoring during the construction phase will be carried out, in particular in relation to the following:

- Adequate protection of topsoil stockpiled for reuse.
- Adequate protection from contamination of soils for removal.
- Monitoring of surface water discharging to any existing watercourses.
- Monitoring cleanliness of the adjoining road network.
- Monitoring measures for prevention of oil and petrol spillages.

- Dust control by dampening down measures close to the boundaries of the site, when required due to unusually dry weather conditions.

The CEMP includes emergency response procedures to mitigate against contamination to water systems, in particular in relation to oil spillage, uncontrolled silt discharge and sewage spill. The CEMP will also have procedures for monitoring the performance and effectiveness of mitigation measures employed during construction to ensure they are operating as intended and are providing the necessary protection to the receiving environment.

Weekly checks will be carried out to ensure surface water drains are not blocked by silt, or other items, and that all storage is located at least 10m from surface water receptors. A regular log of inspections will be maintained, and any significant blockage or spill incidents will be recorded for root cause investigation purposes and updating procedures to ensure incidents do not reoccur.

16.5.5.2 Operational Phase

During the operational phase of the works, it is not anticipated that monitoring will be required.

16.6 Summary of Effects & Conclusion

There are no key issues in relation to geology and soils environment throughout the operational phase of the proposed development provided mitigation measures are employed. The proposed development is therefore not expected to have a significant effect on geology and soils.

16.7 Limitation of the Assessment

The assessment currently assumes that the high standard of construction phase mitigation will ensure that potential impact will be reduced to negligible. Based on this assumption there are no other limitations that would affect the robustness of the assessment for EIAR purposes.

16.8 References

- NRA (2008) "Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes". National Roads Authority, Dublin.
- Environment Agency (2012). *Working at construction and demolition sites: PPG6 Pollution Prevention Guidelines.* Available at: http://www.environment-agency.gov.uk/static/documents/Business/EA-PPG6_-_03_2012_Final.pdf

17 WASTE

17.1 Introduction

This Chapter assesses the waste management aspect of the proposed development. It discusses the potential waste streams that will be generated during the construction and operational phases of the proposed development. The potential effects from the forecast waste generation are assessed in the context of the effects on waste management infrastructure and legislation, policy and strategy targets. Mitigation measures are proposed where the potential for significant effects have been identified.

This chapter is supported by the following, located in Volume III Technical Appendices:

- Appendix 17.A Waste Classification Report

17.2 Methodology

A quantitative assessment of potential effects in relation to waste have been undertaken. The assessment comprised the following stages:

- A review of applicable legislation and guidance;
- A review of the proposed development design to estimate the waste generation during the various phases of construction;
- Determining waste arisings during construction and from the regeneration scheme once operational;
- Consideration of potential interactions between proposals and the current site conditions;
- Identification of possible significant effects;
- Assessment of effects;
- Identification of measures and solutions to avoid, reduce or remedy potential impacts; and,
- Assessment of residual impacts, taking account of mitigation measures.

17.2.1 Relevant Guidance

An extensive document review was completed to assist in identifying current and future requirements for waste management which included applicable waste and environmental European Directives, National Regulations, National Policies and Strategies.

17.2.1.1 Definition of Waste

Waste is legally defined in EU and Irish law as “any substance or object which the holder discards or intends or is required to discard” under the Waste Framework Directive (European Directive 2006/12/EC as amended by Directive 2008/98/EC). Once a substance has become waste it will remain waste until it has been fully recovered and no longer poses a potential risk to the environment or human health.

From that moment onwards, the material ceases to be waste and it is no longer subject to the controls of the Waste Framework Directive. The principal objective of sustainable resource and waste management is to use material resources more efficiently, where the value of products, materials and resources are maintained in the economy for as long as possible and the generation of waste is minimised. To achieve resource efficiency there is a need to move from a traditional linear economy to a circular economy, Figure 17.1.

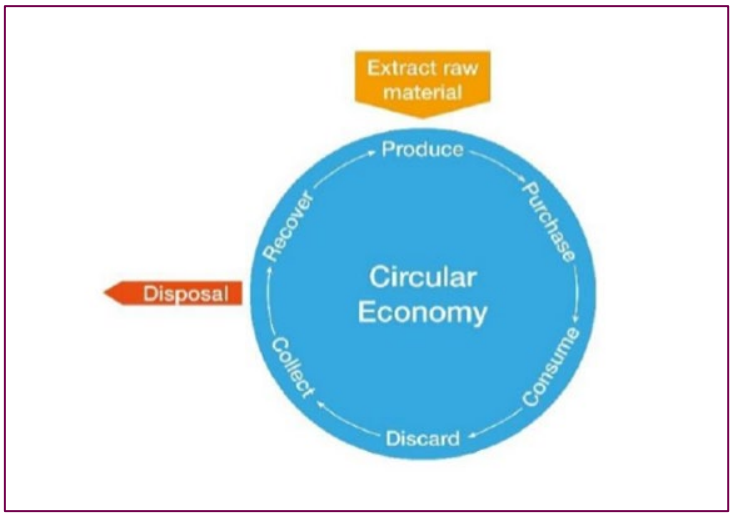

Figure 17.1 Circular Economy Approach

Most of the waste generated from the proposed development works will be classified as construction and demolition waste (CDW). CDW is not clearly defined in Irish legislation, however a number of official documents provide a definition for CDW as follows:

The Department of the Environment, Community and Local Government in 2006 defined CDW as waste which arises from construction, renovation and demolition activities, together with all waste categories mentioned in Chapter 17 of the European Waste Catalogue (EWC). Also included within the definition are surplus and damaged products and materials arising in the course of construction work or used temporarily during the course of on-site activities.

The Environmental Protection Agency (EPA) adopted a broad definition of CDW (in line with the opening part of the definition of CDW as set out in Article 1(4) of Commission Decision 2011/753/EU12) as all waste that arises from construction and demolition activities (including excavated soil from contaminated sites). These wastes are listed in Chapter 17 of the European Waste Catalogue (EWC).

The definitions in Ireland for CDW do not provide any clear distinction between waste originating from construction or demolition.

The EU and Irish definitions of re-use, recycling and recovery may be stated as follows:

- Reuse is defined as *"any operation by which products or components that are not waste are used again for the same purpose for which they were conceived."*
- Recycling is defined *"as any recovery operation by which waste materials are reprocessed into products, materials or substances whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations."*
- Recovery is defined as:

  "(a) any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfil a particular function, or waste being prepared to fulfil that function, in the plant or in the wider economy, and

  (b) without prejudice to the generality of paragraph (a), includes the recovery operations listed in the Fourth Schedule,"

  Ireland follows the definition provided in the European Commission Decision of 18 November 2011 and Eurostat guidance on backfilling. Backfilling was defined by the European Commission Decision of 18 November 2011 as:

"…a recovery operation where suitable waste is used for reclamation purposes in excavated areas or for engineering purposes in landscaping and where the waste is a substitute for non-waste materials".

This definition applies in Ireland but there has been no official translation into Irish law.

17.2.1.2 European Union Legislative Review

The EU influences the implementation and delivery of waste management and legislation in Ireland.

- *Directive (EU) 2018/851 of the European Parliament and of the Council of 30 May 2018 amending Directive 2008/98/EC on waste* - the basic concepts related to waste management, such as definitions of waste, recycling and recovery. The Directive explains when waste ceases to be waste and becomes a secondary raw material, and how to distinguish between waste and by-products. The Directive outlines the requirement that waste be managed without endangering human health and harming the environment. The Directive introduces the "polluter pays principle" and the "extended producer responsibility". It incorporates provisions on hazardous waste and includes recycling and recovery targets to be achieved by 2020. Article 4 sets out the waste hierarchy which prioritises waste management options to reduce and manage waste ranking from waste avoidance, as the preferred option, followed by resource recovery and as a final option, safe disposal of waste.
- *2000/532/EC: Commission Decision of 3 May 2000 replacing Decision 94/3/EC establishing a list of wastes pursuant to Article 1(a) of Council Directive 75/442/EEC on waste and Council Decision 94/904/EC establishing a list of hazardous waste pursuant to Article 1(4) of Council Directive 91/689/EEC on hazardous waste* - the Directive seeks to provide a clear and concise definition of hazardous waste while also setting out the requirements for the management and permitting of hazardous waste recovery and disposal facilities.
- *Directive (EU) 2018/850 of the European Parliament and of the Council of 30 May 2018 amending Directive 1999/31/EC on the landfill of waste* - sets out the technical standards that all landfill disposal sites must meet in the future in terms of improved and consistent operation and ensuring environmental protection. It is intended to prevent or reduce the adverse effects of the landfilling of waste on the environment, in particular on surface water, groundwater, soil, air and human health.
- *Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE)* - aims to increase recovery rates for waste/scrap items, and to reduce the quantities of this waste stream consigned to landfill. Producers of WEEE are responsible for the recovery of End of life equipment deemed a priority waste by the EU.
- *Directive 2004/35/CE of the European Parliament and of the Council of 21 April 2004 on environmental liability with regard to the prevention and remedying of environmental damage)* - The purpose of the Directive is to establish a framework of environmental liability based on the 'polluter-pays' principle, to prevent and remedy environmental damage. It is aimed at preventing environmental damage by forcing industrial polluters to pay prevention and remediation costs.
- *Circular Economy Package* - The European Commission adopted an ambitious Circular Economy Package consisting of an EU Action Plan for the Circular Economy. The package covers the full economic cycle, not just waste reduction targets. It includes revised legislative proposals on waste, and indicators and incentives to business and consumers to help stimulate Europe's transition towards a circular economy. These include:
    - A common EU target for recycling 65% of municipal waste by 2035;
    - A common EU target for recycling 70% of packaging waste by 2030;
    - A binding landfill target to reduce landfill to maximum of 10% of municipal waste by 2035.

EU Technical Guidance on Climate Proofing of Infrastructure for the period 2021-2027 - Provides technical guidance on climate proofing of infrastructure from 2021 to 2027 based on lessons learnt from major projects over the period from 2014 to 2020 and incorporates project cycle management (PCM), EIA and Strategic Environmental Assessment processes. Climate proofing integrates climate change mitigation and

adaptation measures into the development of infrastructure projects and enables institutional and private investors to make informed decisions on projects that qualify as compatible with the Paris Agreement. The process is divided into two pillars (mitigation, adaptation) and two phases (screening, detailed analysis). The guidance includes an updated carbon footprint methodology and assessment of the shadow cost of carbon.

17.2.1.3 National Legislative Review

The overarching legislative instruments governing waste management in Ireland are as follows:

- Waste Management Act 1996 (S. I. No. 10 of 1996) as amended by the Waste Management (Amendment) Act 2001.

Sub-ordinate legislation includes:

- European Communities (Waste Directive) Regulations 2011 (S. I. 126 of 2011) as amended 2011 (S. I. No. 323 of 2011);
- EC Commission Decision (2014/955/EC) and associated Commission Regulation No. 1357/2014 as detailed in the EPA document List of Waste & Determining if Waste is Hazardous or Non-Hazardous;
- European Union (Properties of Waste which render it Hazardous) Regulations 2015;
- EC Classification, Labelling & Packaging Regulations (No. 1272/2008)
- Waste Management (Collection Permit) Regulations S. I. No. 820 of 2007 as amended 2008 (S. I. No. 87 of 2008);
- Waste Management (Facility Permit and Registration) Regulations 2007, (S.I No. 821 of 2007) as amended
- Waste Management (Landfill Levy) Regulations 2015 (S.I. No. 189 of 2015)
- Waste Management (Facility Permit and Registration) Regulations, S.I No. 821 of 2007 as amended 2008 (S.I No.86 of 2008) as amended 2014 (S.I No. 320 and No. 546 of 2014) and as amended 2015 (S. I. No. 198 of 2015)
- Waste Management (Licensing) Regulations 2000 (S. I. No. 185 of 2000) as amended 2004 (S. I. No. 395 of 2004), 2010 and (S. I. No. 350 of 2010);
- Waste Management (Packaging) Regulations 2003 (S. I. No. 61 of 2003) as amended 2004 (S. I. No. 871 of 2004), 2006 (S. I. No. 308 of 2006) and 2007 (S. I. No. 798 of 2007);
- Waste Management (Planning) Regulations 1997 (S. I. No. 137 of 1997);
- Waste Management (Hazardous Waste) Regulations, 1998 (S.I. No. 163 of 1998) as amended;
- Waste Management (Shipments of Waste) Regulations, 2007 (S.I. No. 419 of 2007) as amended;
- Waste Management (Movement of Hazardous Waste) Regulations, 1998 (S.I. No. 147 of 1998);
- Environmental Protection Act 1992 (No. 7 of 1992) as amended;
- Litter Pollution Act 1997 (No. 12 of 1997) as amended;
- Planning and Development Act 2000 (No. 30 of 2000) as amended.

17.2.1.4 Waste Management Policy

An extensive document review was completed to assist in identifying current and future requirements for waste management which included:

National and Regional Policies and Strategies such as:

- Waste Management Act 1996 (as amended);

- Changing Our Ways; A Policy Statement on Waste Management, Department of Environment, Heritage and Local Government, 1998;
- Preventing and Recycling Waste – Delivering Change, Department of Environment, Heritage and Local Government, 2002;
- Taking Stock and Moving Forward, Department of Environment, Heritage and Local Government, 2004;
- National Strategy on Biodegradable Waste, Department of Environment, Heritage and Local Government, 2006;
- A Resource Opportunity – Waste Management Policy in Ireland, Department of the Environment, Community and Local Government (DoECLG), 2012;
- National Hazardous Waste Management Plan 2021-2027, EPA, 2021;
- Planning guidelines for future developments published by the DECLG;
- Connacht-Ulster Region Waste Management Plan 2015-2021;
- A Waste Action Plan for a Circular Economy – Ireland's National Waste Policy 2020 – 2025;
- Green Public Procurement – Guidance for the Public Sector, EPA, 2021.

17.2.1.5 Irish Legislation that impacts CDW Management

CDW is subject to a number of legislative requirements including the movement of waste, and management via authorised waste facilities.

Movement of Waste: Subject to minor exceptions, Section 34 of the Waste Management Act requires all bodies involved in the collection of waste to have this activity authorised by a waste collection permit. Besides the legal obligation to be in possession of a permit, the holder has to abide by its conditions. For example, these may limit collection activities to certain types of waste or require the permit holders to use specified tiers of the Waste Hierarchy. The details of the waste collection permit system are set down in the Waste Management (Collection Permit) Regulations S.I. No. 820 of 2007 27, S.I. No. 87 of 2008 28 and S.I. No. 197 of 201529. Offaly County Council has been appointed as the National Waste Collection Permit Office (NWCPO).

Authorisation of Waste Facilities: The Waste Management Act contains a hierarchy of control systems, with the most stringent of these being licensed by the EPA. Local authorities are generally required for the regulation of non-disposal waste sites below specified thresholds (small scale and with a low degree of environmental significance). Because local authorities operate their own infrastructure, the EPA is mandated to oversee such activities. The following type of authorisations apply to waste management facilities in Ireland:

a. **Industrial Emissions Licences:** Directive 2010/75/EC of the European Parliament and of the Council of 24 November 2010 on industrial emissions (integrated pollution prevention and control) was transposed in Ireland by the European Union (Industrial Emissions) Regulations 2013, S.I. 138 of 2013 and Environmental Protection Agency (Industrial Emissions) (Licensing) Regulations 2013, S.I. 137 of 2013. These regulations place a number of additional waste activities under the EPA licensing regime for the first time such as biological or thermal treatment facilities above a certain threshold. These regulations have limited impact on CDW treatment.

b. **Waste Licences:** The waste licensing system is operated by the EPA and is the main waste authorisation issued for major facilities in Ireland. This system provides for high environmental standards to apply for the development, operation, closure and aftercare of such sites. The Waste Management Act and the Waste Management (Licensing) Regulations 2004 govern the process under which the licences are applied for and maintained. CDW facilities that are managed by this regime include: landfills and materials reclamation facilities that handle more than 50,000 tonnes of non-hazardous waste.

c. **Waste facility permits and Certificates of Registration** are issued by local authorities under the under the Waste Management (Facility Permit and Registration) Regulations, S.I. No. 821 of 2007 (as amended)

3132. CDW facilities falling under the permit regime include places where concrete and brick crushers are being operated to recover up-to 50,000 tonnes per year of inert CDW and materials reclamation facilities (e.g. processing pre-treatment activity or backfilling activity) that handle less than 50,000 tonnes of non-hazardous waste. Certificates of registration are used for small scale CDW recovery activities processing less than 10,000 tonnes and generating less than 15% of residual waste. The revised facility permit and certificate of registration regulations introduced clear classes of activity, for the pre-treatment and backfilling of CDW, enabling operators to apply for an appropriate waste authorisation with more certainty. The previous regulations did not specify the type of and scale of recovery activities requiring a permit and were open to interpretation, particularly for CDW recovery activities. This uncertainty has been addressed with more CDW activities receiving a facility permit or certificate of registration, rather than a waste license. In this regard, Article 11 of S.I. No. 821 of 2007 introduced a process whereby the Environmental Protection Agency is designated as the responsible body for determining whether a particular activity requires a waste licence, a waste facility permit, a Certificate of Registration or none of these. Such determinations may be made by the Environmental Protection Agency (EPA) having regard to the following:

- Following a request made by a prospective applicant for a waste authorisation for a decision on the type of waste authorisation that applies to the proposed facility/ activity;
- Following a request made by a local authority to whom an application for a waste facility permit or a Certificate of Registration has been made; and
- On its own initiative in relation to an existing facility.

17.2.1.6 National Waste Policy in Ireland

The statutory basis for waste management policy in Ireland comes from the Waste Management Act 1996. This Act provided the framework for the then Government's 1998 Policy Statement entitled "Waste Management: Changing Our Ways". This document outlined national targets and plans to modernise waste management practice over a 15-year period. A key concept of the Policy Statement was the Hierarchy of Waste Management, whereby waste prevention and re-use is preferable to non-sustainable practices such as disposal to landfill.

In Ireland, the Department of the Environment, Climate and Communications has divided the responsibility for waste regulation between the EPA and the local authorities. With respect to waste management planning, the EPA manages hazardous waste nationally while the responsibility for non-hazardous waste facilities lies with the local authorities.

Since the 1996 Waste Management Act, waste management planning of non-hazardous waste has been the responsibility of the local authorities. Section 22 of the Act allowed local authorities to amalgamate their waste management planning duties at their discretion. As a result, prior to 2013, there were 10 groupings of local authorities nationally. Subsequent reform of local Government structures in 2014 reduced the number of groupings further from ten to three, which are as follows; Eastern & Midlands, Southern and Connacht & Ulster.

The Waste Action Plan for a Circular Economy 2020 – 2025 presents a roadmap to embrace the circular economy for the next decade. It promotes the focus on the following objectives: avoiding waste disposal; producer responsibility; sustainable economic models; a collaborative approach with other sectors & regulatory bodies and a strengthened role for Local Authorities).

Key focus of CDW is the prevention of soil arisings by placing value on the used material where possible, focus on end-of-waste decision making process (Article 47), incentivisation of the use of recycled construction, national end-of-waste decisions for specific construction and demolition waste streams and the revision of the 2006 Best Practice Guidelines for construction and demolition waste.

The Department of the Environment, Climate and Communications (DoCCAE) published the 'Climate Action Plan 2021' in 2021 which provides a detailed plan to achieve a 51% reduction in overall greenhouse gas emission by 2030 and sets a path to achieve net-zero emissions by 2050. The Department of Public Expenditure and Reform (DPER) and NewERA are key stakeholders in the delivery of Action 55 'Develop

Framework for commercial semi-State sector to address climate action objectives' with the DoCCAE as the assigned lead. The commercial semi-Stage sector refers to a group of 22 companies who have set out a series of five commitments in relation to climate action objectives. Commitment 4 focuses on promoting 'Circular Economy and Green Procurement'.

The Circular Economy legislative package came into force from July 2018. This legislation provided amendments to The Waste Framework Directive (2008/98/EC) - Directive (EU) 2018/851; to improve the efficiency of Member States waste management systems, with focus on ensuring the efficiency of resource use and the value of waste as a resource. The Landfilling Directive (1993/31/EC) amendment Directive (EU) 2018/850 requires Member States to reduce waste disposal by landfilling; waste suitable for recycling or other recovery will not be permitted for landfill disposal.

The 'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition Projects' was updated in 2021 by the EPA. The Guidance is a practical approach for preparing Resource and Waste Management Plans (RWMPs) and focuses on designing out waste, green procurement, circular design and construction principles in line with the EU Circular Economy Action Plan under the EU Green Deal.

17.2.1.7 Regional Level Policy

The proposed development is located in the Local Authority area of Donegal County Council.

Connacht Ulster Regional Waste Management Plan 2015-2021

Under Article 28 of the Waste Framework Directive, Member States are required to produce regional or local waste management plans. Letterkenny is located within the Connaught-Ulster region and is therefore subject to the requirements of the Connacht Ulster Regional Waste Management Plan 2015-2021. The plan set long term targets to:

- 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 (from 2016 onwards) in favour of higher value pre-treatment processes and indigenous recovery practices; and,
- The Connacht Ulster Regional Waste Management Plan 2015-2021 provided an update to the EC (Waste Directive) regulations 2011 target of 70% for the reuse, recycling and recovery of man-made CDW in Ireland by December 2020. Ireland has surpassed that target, with a recovery rate of 97% (National Waste Report 2012, EPA (2014).

The Connacht Ulster Regional Waste Management Plan 2015-2021 has not been updated as the three Regional Waste Management Planning Lead Authorities in Ireland (Eastern/Midlands, Southern and Connacht Ulster) are in the process of preparing a replacement combined National Waste Management Plan for a Circular Economy. This Plan should translate policy measures set out in the Government's Waste Action Plan for a Circular Economy published in September 2020 which focuses on circular economy, municipal waste, plastics and packaging, construction and demolition, green public procurement and waste enforcement.

County Donegal Development Plan 2018-2024

County Donegal Development Plan 2018-2024 came into effect on the 5th of June 2018. It sets out a number of policies for Donegal County Council area, in line with the regional waste management plan:

- WES-P-5: It is a policy of the Council to prevent and minimise waste, to encourage and support material sorting and recycling, and to ensure that waste is managed and treated without causing environmental pollution.
- WES-P-6: It is the policy of the Council to manage and maintain a high level of service at Recycling Centres and to ensure this is provided in the most cost-effective manner.
- WES-P-7: It is the policy of the Council to ensure that all commercial materials recovery facilities within the County are appropriately licensed/permitted and are operating within the terms of their licences/permits.

17.2.2 Study Area

The study area comprises the proposed development location which is served by local road L-11644-1 and adjacent to the N56 in Letterkenny, Co. Donegal in the Republic of Ireland as outlined in Chapter 1 of the EIAR. The desk study considered the impact on waste management capacities in the Connacht-Ulster region and the Republic of Ireland.

17.2.3 Baseline

Baseline studies comprised a review of current waste management capacity in the Connacht Ulster Region using the Construction and Demolition Waste Soil and Stone Recovery / Disposal Capacity (2020) and EPA non-hazardous landfill sites permits.

17.2.4 Assessment Criteria and Assignment of Significance

The Institute of Environmental Management and Assessment (IEMA) published guidance in March 2020 which sets out criteria for determining the value (sensitivity) of material resources and waste (including waste infrastructure).

The determination of significance, in most cases, will be the product of professional judgement of the Waste Topic Lead and EIAR Co-ordinator, with specific regard to: the sensitivity or importance (value) of receptors and the magnitude of impact on these receptors; and the extent to which primary, secondary and tertiary measures are expected to minimise impacts and effects.

Table 17.1 Importance or Sensitivity Matrix Definitions[1]

Importance / Sensitivity of Resource or Receptor				
Across construction and or/operation phases, the baseline/future baseline (i.e. without development) or regional inert and non-hazardous landfill void capacity is expected to…				
Negligible	**Low**	**Medium**	**High**	**Very High**
Remain unchanged or is expected to increase through a committed change in capacity.	Reduce minimally: by <1% as a result of wastes forecast.	Reduce noticeable: by 1-5% as a result of wastes forecast.	Reduce considerably: by 6-10% as a result of wastes forecast.	Reduce very considerably (by >10%); end during construction or operations; is already known to be unavailable; or would require new capacity or infrastructure to be put in place to meet forecast demand.

Where the construction phase is being assessed, the magnitude of impact is considered from the point at which the site access is gained, through site remediation, enabling works, and construction, to development commissioning.

Where the operational phase is being assessed, the magnitude of impact is assessed over the course of any one full and justifiably representative year within the first three years of commissioning.

[1]Assessing sensitivity of waste (Section 10.2.2) IEMA Guide to Materials and Waste Environmental Impact Assessment, March 2020.

Table 17.2 Magnitude of Impact Definitions

Assessment of Magnitude				
Inert and Non-Hazardous Void Capacity				
No change	**Negligible**	**Minor**	**Moderate**	**Major**
Zero waste generation and disposal from the development	Waste generated by the development will reduce regional landfill void capacity baseline by <1%	Waste generated by development will reduce regional landfill void capacity baseline by 1-5%	Waste generated by the development will reduce regional landfill void capacity baseline by 6-10%.	Waste generated by the development will reduce landfill void capacity baseline by >10%.
Hazardous Void Capacity				
No change	**Negligible**	**Minor**	**Moderate**	**Major**
Zero waste generation and disposal from the development	Waste generated by the development will reduce national landfill void capacity baseline by <0.1%	Waste generated by development will reduce national landfill void capacity baseline by <0.1-0.5%	Waste generated by the development will reduce national landfill void capacity baseline by >0.5-1%	Waste generated by the development will reduce national landfill void capacity baseline by >1%.

17.2.5 Significance of Effects

The assessment of significance will be based on the matrix outlined in Table 17.3 below.

Table 17.3 Assessment of Significance Matrix

		Magnitude of Impact				
		No Change	**Negligible**	**Low**	**Medium**	**High**
Sensitivity	Very high	No change	Minor	Moderate or major	Major or substantial	Substantial
	High	No change	Minor	Minor or moderate	Moderate or major	Major or substantial
	Medium	No change	Negligible or Minor	Minor	Moderate	Moderate or major
	Low	No change	Negligible or Minor	Negligible or Minor	Minor	Minor or moderate
	Negligible	No change	Negligible	Negligible or Minor	Negligible or Minor	Minor

Once the effect threshold has been determined, Table 17.4 provides how the Waste Topic Leads may determine whether environmental effects are potentially significant, or not.

Where a threshold is 'slight of moderate', i.e., transcends the significant – or not- effect boundary, professional judgement is used in combination with documented justification, to determine a final outcome. The cautious significant boundary applied responds to the need to developers and EIAR practitioners to – in unison – continue to take an increasing responsibility for managing materials and wastes sustainably, with a view to incentivising sustainable resource management and (ultimately) a circular economy.

Table 17.4 Overall Significance of Effect[2]

Effect	Waste
Negligible	Not significant
Minor	
Moderate	Significant
Major	
Substantial	

[2] IEMA Guide to Materials and Waste Environmental Impact Assessment, March 2020.

17.3 Baseline Environment

17.3.1 Current Operational Overview

The current operational overview of the proposed development in Letterkenny comprises agricultural land. The N56 road is located to the south and west of the site. A residential development is located to the north, west and south of the site. The site is close to Letterkenny University Hospital campus, IDA business park and a number of large industrial employers such as Pramerica, Optum Zeus, Sita, Philips Medisize and A&M Belting, as well as three schools and residential developments.

17.3.2 Characteristics of Current Wastes

The site is currently a green field site and is used for agricultural purposes. Therefore, there is no current wastes arising at the site.

17.3.3 Current Method of Management / Receiving Environment

17.3.3.1 Pre-treatment and Recovery Infrastructure

Pre-treatment infrastructure covers a wide variety of facilities, but is mainly mechanical sorting, separation and processing plants which can vary in scale and sophistication.

Recovery infrastructure covers a wide range of activities which fall within the treatment tiers of preparing for reuse, recycling and other recovery. Pre-treatment and recovery facilities can be authorised either by the EPA, under a waste licence, or by the local authorities, under a Waste Facility Permit (WFP) or Certificate of Registration (CoR).

In accordance with Construction & Demolition Waste Soil and Stone Recovery / Disposal Capacity – Update Report 2020, there were 71 authorised facilities in the Connacht Ulster Region (CUR) for soil and stone acceptance at year end 2018 as follows:

- One licenced soil recovery facility;
- Seventeen permitted facilities;
- Fifty-three registered facilities with CORs;
- No inert landfills.

Tables 17.5 to 17.8 summarise the soil recovery facility capacities in the CUR in 2018 as per the Construction and Demolition Waste Soil and Stone Recovery / Disposal Capacity 2020 Report.

Table 17.5 Licenced Soil Recovery Facility Capacities in the CUR 2018[3]

County	No. of Facilities*	Annual Capacity (Application Stage) Tonnes	Annual Capacity (Licenced Un- commenced) Tonnes	Annual Capacity (Active and Available) Tonnes
Mayo	1	-	0	90,000

*This includes closed facilities and facilities at application stage.

[3] Construction and Demolition Waste Soil and Stone Recovery / Disposal Capacity (2020)

Table 17.6 Inert Landfill Capacities in the CUR 2018[3]

Region	No. of Facilities	Permitted Capacity Tonnes (Lifetime)	Remaining Capacity Tonnes (Lifetime)
Connacht-Ulster	0	-	-

Table 17.7 Permitted Soil Recovery Facility Capacities in the CUR 2018[3]

Region	No. of Facilities	Permitted Capacity Tonnes (Lifetime)	Remaining Capacity Tonnes (Lifetime)
Connacht-Ulster	17	685,325	377,170

Table 17.8 Registered Soil Recovery Facility Capacities in the CUR 2018[3]

Region	No. of Facilities	Permitted Capacity Tonnes (Lifetime)	Remaining Capacity Tonnes (Lifetime)
Connacht-Ulster	53	1,174,458	1,005,242

The 2020 Soil and Stone Recovery and Disposal Capacity Report suggests that there is sufficient capacity in the CUR as a whole but it is concentrated in Mayo and Galway. There are no inert landfills in the CUR but there is a large quantity of registered sites however they offer limited long-term capacity.

Figure 17.2 shows the location of licenced soil recovery facilities across Ireland.

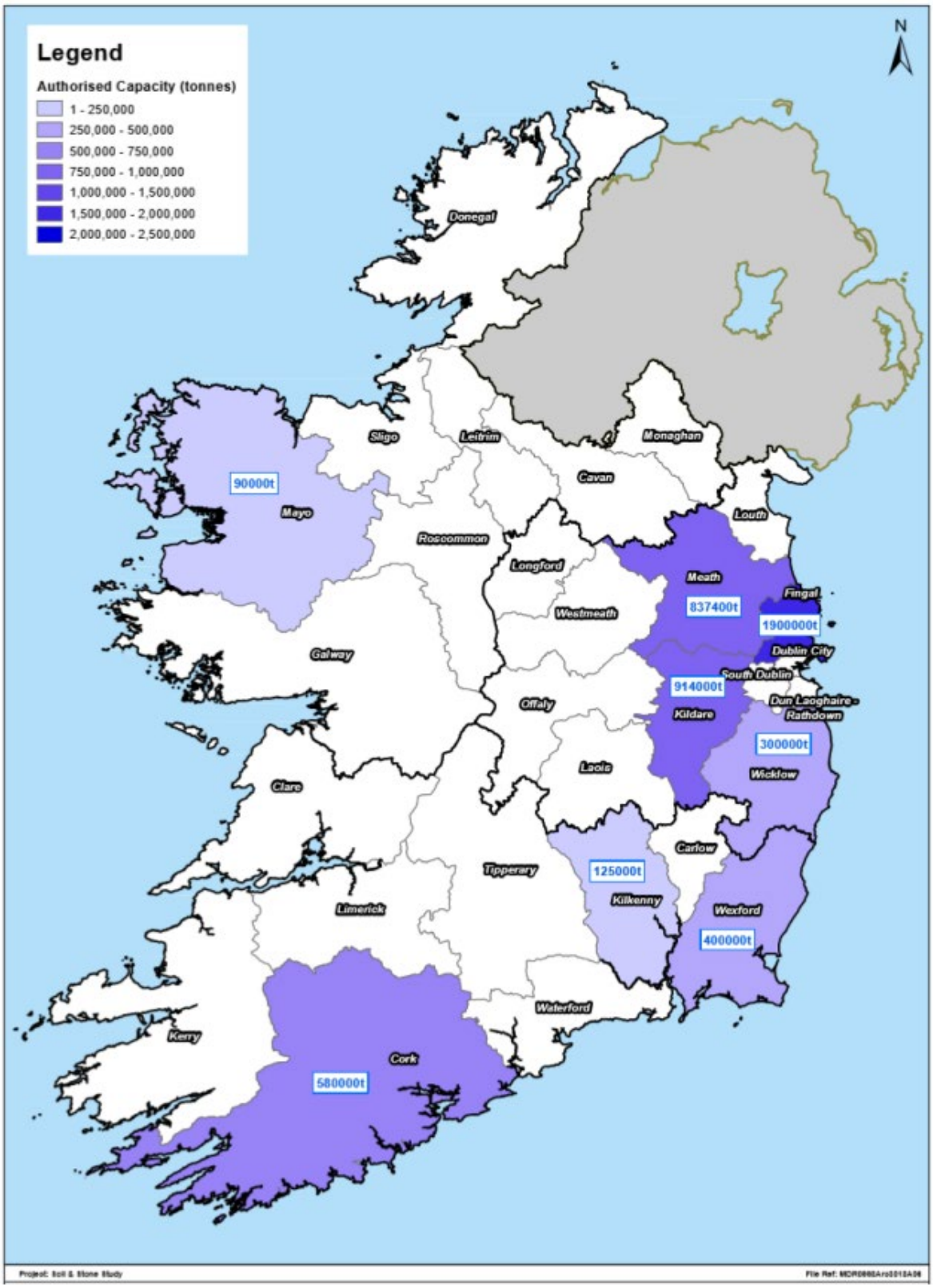

Figure 17.2 Location of Licenced Soil Recovery Capacity (included un-commenced)[4]

[4] Construction and Demolition Waste Soil and Stone Recovery / Disposal Capacity (2020)

17.3.3.2 Disposal Infrastructure

The EPA authorise non-hazardous landfill facilities, which can accept municipal waste as well as CDW, where permitted. Currently permitted non-hazardous landfill sites with available capacity are presented in Table 17.9. Two of the four operational landfills will approach their maximum lifetime consented capacity by 2027.

Table 17.9 Permitted non-hazardous landfill sites with available capacity[5]

Licensee	Landfill Site Name	EPA Licence Reg. No	Remaining Consented Disposal Capacity B(T)	Non-Hazardous Remaining Built Capacity	Expect To Have Used Up Full Consented Capacity	Operational Status
Bord na Móna plc / Drehid Waste Management Facility	Drehid	W0201-03	475,694	180,865	2027	Open
Knockharley Landfill Limited	Knockharley	W0146-02	3,797,80224	978,000	2042	Open
Ballynagran Landfill Limited	Ballynagran	W0165-02	782,748	359,673	2026	Open
Ballaghveny Landfill	Ballaghveny	W0078-03	-	-	-	Open. Resumption of waste acceptance at Ballaghveny Landfill commenced on 22/09/2021

17.3.3.3 Hazardous Soil and Stone

There is no dedicated hazardous waste to energy or landfill treatment capacity in Ireland. Specialised indigenous facilities treat and stabilise hazardous soil materials which can change the classification of soil wastes from hazardous to non-hazardous where the soil can then be managed at a non-hazardous facility. There is a reliance on overseas facilities for the final treatment of hazardous soils due to a lack of national capacity in Ireland.

17.4 Impact Assessment

17.4.1 Assessment of Construction Effects

CDW will arise from the construction phase. Typical waste materials arise from site management practices during the construction phase, for example; excess materials and packaging, over-ordering materials, off-cuts, damaged materials and poor storage during the construction phase.

Construction waste can also include waste materials generated as a result of excavations, typically consisting of materials, for example, soil and made ground removed as a function of design. Depending upon the previous use of the site, this may, or may not be contaminated. Excavated material that has been excavated and is deemed suitable will be stored for reuse and any unsuitable material will need to disposed of to landfill.

[5] EPA, 2023.

Topsoil will be stripped and stored onsite for reuse as reinstatement on completion of the works. A Topsoil Investigation Report was undertaken by CRL in November 2022 which recommended that topsoil is stripped and screened to salvage as much of the soil as possible to be reused for landscape works and optimises the reuse of certain soils within specific areas of the proposed development e.g. grass pitch areas depending on the soil qualities. Table 17.10 below provides a breakdown of the proposed topsoil stripping and cut and fill requirements.

Table 17.10 Cut and Fill Quantities

	Volume m^3
Total Cut	116,450
Total fill	242,330
Cut-to-fill	116,450
Imported fill	125,880 (of which 54,890m^3 is rock cut)
Topsoil stripping (200mm depth)	41,666

There is the potential for excess volumes of materials to be managed off-site. Poor management of excavated waste could lead to the required disposal to landfill of waste deemed unsuitable for reuse or recycling.

The European Waste Codes (EWC) for typical waste materials that may possibly be generated during the construction phase are outlined in Table 17.11.

Table 17.11 Applicable List of Waste (LoW) Summary

Waste Material	LoW
Packaging	15 01
Concrete, bricks, tiles and ceramics	17 01
Wood, glass, plastic	17 02
Bituminous mixtures, coal tar and tarred products	17 03
Metals	17 04
Soil, stone and dredge spoil	17 05
Insulation materials and asbestos-containing materials	17 06
Gypsum-based construction materials	17 06
Separately collected fractions	20 01
Waste hydraulic oils *	13 01
Wastes of liquid fuels *	13 07

* Denotes hazardous materials

Correct segregation, storage, handling and transport of all waste will be required to ensure there are no adverse effects on human health and that litter is not generated. The use of non-permitted waste contractors or unlicensed facilities could give rise to inappropriate management of waste and result in environmental impacts/pollution. It is essential that all waste materials are dealt with in accordance with regional policies and national legislation and that time and resources are dedicated to ensuring efficient waste management practices.

Fuels and hydraulic oils/lubricants that will be used during the construction phase are classed as hazardous. There will be fuels stored on site for machinery and construction vehicles along with oils and lubricants. Should any spillages, waste or surplus liquids be disposed of incorrectly it could cause serious harm to the surrounding

environment. There is the potential for significant quantities of materials to be deposited in landfill sites unless proper management plans are implemented.

Further breakdown of potential waste streams that may arise during the construction phases of the development and the proposed management routes are set out in Table 17.12.

Table 17.12 Potential Materials Management during the Construction Phase

Material Type	LoW	Management Option	Management Destination
Concrete	17 01 01	Recycled or reused off site	Off site to specialist contractor
Bricks	17 01 02	Recycled or reused off site	Off site to specialist contractor
Tiles and ceramics	17 01 03	Recycled or reused off site	Off site to specialist contractor
Wood	17 02 01	Recycled or reused off site	Off site to specialist contractor
Glass	17 02 02	Recycled or reused off site	Off site to specialist contractor
Plastics	17 02 03	Recycled or reused off site	Off site to specialist contractor
Bitumen macadam	17 03 02	Recycled or reused off site	Off site to specialist contractor
Metals	17 04 07	Recycled or reused off site	Off site to specialist contractor
Stone and soil	17 05 04	Materials deemed unsuitable or not required for reuse on site and require management offsite	Off site to specialist contractor
Gypsum based construction materials	17 08 02	Materials deemed unsuitable for reuse or recycling and require disposal to suitably licensed landfill	Disposal at licensed landfill
Plastic packaging	15 01 02	Recycled or reused offsite	Offsite to specialist contractor
Discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35	20 01 36	Recycled or reused offsite	Offsite to specialist contractor
Iron and steel	17 04 05	Recycled or reused off site	Offsite to specialist contractor

17.4.1.1 Waste Classification & Waste Acceptance Criteria (WAC)

Ground Investigations Ireland (GII) produced a report 'Waste Classification Report March 2023' which provides a summary on a waste classification they undertook on ten soil samples collected during their ground investigation between November 2022 and January 2023. The waste classification was undertaken using the HazWasteOnline toll and all ten samples were classified at non-hazardous. Asbestos was not detected in the soil samples.

WAC analysis has been undertaken on the ten soil samples which assesses the material against a set of established guidelines to determine if the material is acceptable for disposal at a particular type of landfill. Reference should be made to Table 2 of the report which summarises the waste category for soil samples analysed from the ground investigation.

The report concluded that any excavated non-hazardous material that is not suitable for reuse should be removed from site to an appropriate facility under LoW codes 17 05 04 or 17 09 04. Where it is noted that excavated soils are in excess of 2% anthropogenic material, the LoW code 17 09 04 should be applied.

17.4.1.2 Summary of Construction Effects

A summary of the significance of environmental impacts during the construction and decommissioning phases is provided in Table 17.13 below.

Table 17.13 Significance of Environmental Impact from the Construction Phase

Impact	Significance of Effect
Construction Phase	
Excavated soils to be disposed offsite This will be further refined at detailed design with contractor input.	**Negligible or Minor** - Potential to require disposal to landfill if reuse options onsite cannot be utilised.
Construction related waste generated from the construction works Surplus construction/excavation materials including: metals, waste packaging, wrapping, waste cabling, pipework, ductwork etc	**Negligible or Minor** - Likely to require disposal to landfill if segregation and recycling initiatives not put in place on site during construction.

17.4.2 Assessment of Operational Effects

Waste arisings from the site are expected to increase during the operational phase of the proposed development as the site is currently generating no waste as it is a greenfield site. This waste will arise from the pavilion building and footfall associated with the outdoor facilities. This waste classed as municipal waste, is anticipated to be of a similar composition to household waste and will include, but not be limited to food wastes, paper, packaging, cardboard and plastics. An increased quantity of dog fouling is also to be factored in and provided for.

A summary of the anticipated operation and maintenance phase impacts is provided in Table 17.14.

Table 17.14 Significance of Environmental Impact from the Operational Phase

Impact	Significance of Effect
Operational Phase	
Moderate increase in waste quantities currently produced during operation and increased public footfall capacity. Mainly general waste, non-hazardous	**Minor** - Moderate increase in quantities of general waste which are managed for disposal using recycling methods for recyclable materials followed by methods lower down the waste hierarchy for non-recyclable materials such as landfill and incineration with energy recovery

17.4.3 Assessment of Cumulative Effects

Chapter 20 'Interactions' identifies all those projects which have been considered and assessed with regards to cumulative impacts. As part of this review, several other larger planning applications were considered, however deemed unlikely to have significant cumulative impacts. There will therefore be no cumulative impacts on waste as a result of neighbouring developments.

17.4.4 Inter-relationships

There are several anticipated interactions between waste and other EIAR chapters, namely: Chapter 8 Land Use and Material Assets, Chapter 11 Climate and Greenhouse Gases, Chapter 15 Water Quality and Chapter 16 Contaminated Land, Geology and Soils.

17.5 Mitigation

17.5.1 Construction Phase Mitigation Measures

The storage and reuse of excavation material on site may be subject to a number of waste licensing requirements. If these wastes are to be stored on site, prior to potential reuse or recovery during construction, this activity will be subject to a Waste Management Licence Exemption with a limited tonnage of material

permitted to be stored on site. Storage will take place in a secure area on-site and the appointed contractor will monitor the amount of waste stored to ensure that the permitted limits of the Exemption are not exceeded. The appointed contractor (with oversight from Donegal County Council) will consult with the EPA prior to construction to ensure that the appropriate licences, permits and exemptions are in place prior to initiation.

Contractors working on site during the works will be responsible for the collection, control and disposal of all wastes generated by the works. The appointed contractor (with oversight from Donegal County Council) will ensure that all waste materials leaving the site are transported via a licensed carrier and disposed or recovered through licenced operators in accordance with National waste legislation. This duty implies, at the very least, checking to see that the required authorisation is in place, has not expired and is appropriate for the waste types that are to be handled. Monitoring and updating of records will be implemented.

Project design will incorporate adequate dedicated space to cater for the segregation and storage of all various waste streams during construction. Separate compounds will be used for different phases of the works. Site compounds are located in or immediately adjacent to the relevant works phase, such as to cause minimal interference to the local community. Adequate security measures should be put in place around the site and waste storage areas.

Construction waste will be managed as part of the Site Waste Management Plan (SWMP) contained in the Construction Environmental Management Plan (CEMP), which will be implemented by the appointed contractor for the duration of the construction works. As demonstrated in the outline CEMP, the CEMP will contain procedures for the management of waste and related pollution control measures. The CEMP will be a live document and will be subject to revision throughout the course of the construction phase but will contain all measures outlined in the outline CEMP appended to the EIAR (Please refer to Volume III). The appointed contractor will also be required to develop a detailed resource and waste management plan in advance of works commencing on site. This will be prepared in line with EPA 'Best Practice Guidelines for the Preparation of Resource & Waste Management Plans for Construction & Demolition projects' Published in 2021.

Specific waste management requirements include:

- Identify how the waste will be dealt with (i.e. disposal, re-use on/off site etc.).
- Building materials should be chosen with an aim to 'design out waste.'
- Identify potential end markets e.g. reuse, recycling facilities, waste treatment facilities and disposal sites.
- All waste leaving site will be recycled, recovered or reused where possible, with the exception of those waste streams for which appropriate facilities are currently not available.
- Segregation of waste at source where practical. On-site segregation of non-hazardous waste materials into appropriate categories, where possible, including any excavated soils, concrete, bricks, metals and timber.
- On-site segregation of all hazardous waste materials into appropriate categories including contaminated soils, waste oil and fuels and paints, glues, adhesives and other known hazardous substances.
- Control measures and attention to materials quantity requirements to avoid over-ordering and generation of waste materials.
- Agreements with materials suppliers to reduce the amount of packaging or to participate in a packaging take-back Scheme.
- Implement a 'just in time' materials delivery systems to avoid materials being stockpiled, which increases the risk of the damage and disposal as waste.
- All waste materials will be stored in skips or other suitable receptacles in designated areas of the site. The waste storage area(s) will be assigned and all construction staff provided with training regarding the waste management procedures on commencement of the project.
- Measures to ensure appropriate staff training and levels of awareness in relation to waste management.

- Waste streams will be collected by an appropriately licensed and permitted private waste contractor, appointed by the contractor for recycling, recovery or disposal at suitably licensed facilities.
- Calculate the difference between expected waste quantities prior to commencement of the project and actual waste quantities after the project is complete.

The SWMP will be implemented from the outset of the project and throughout the duration of the project taking into consideration the waste management hierarchy to encourage sustainable development, circular economy, environmental protection and optimum use of resources. The appointed contractors for the site preparation, earthworks and construction phases of the works will be contractually obliged to follow the SWMP and all relevant legislation.

17.5.2 Operational Phase Mitigation Measures

ATU should encourage the responsible management of waste, including minimisation and recycling, at the point of generation throughout the development and amenity areas. This will include the disposal of wastes responsibly in facilities provided as well as continued extensive scheduled waste collection throughout.

It is important that waste arisings throughout the proposed development are managed appropriately in line with the waste management hierarchy in order to achieve good recycling performance and high landfill diversion.

Appropriate separation of waste needs to occur in public areas. In addition to recyclable items such as paper and drinks bottles, separation of food and food contaminated packaging and consumable items for composting will be considered.

Appropriate receptacles and recycling bins will be clearly labelled for the collection and segregation of each of these waste materials and will be provided throughout the proposed development, as appropriate. Wastes will be stored in these receptacles in a designated, easily accessible area of the site until collection by an appropriately licensed waste management contractor.

All wastes generated will be managed in accordance with appropriate waste management legislation and policy, and will be transported and recovered / disposed of by licensed waste management contractors.

17.5.3 Future Monitoring

17.5.3.1 Construction Phase Monitoring

All waste types and amounts generated will be recorded and reviewed at regular intervals, to allow for continuous analysis and review of procedures that will be made to reduce waste to landfill, increase the percentage of recycling and reduce waste overall as much as possible.

Waste storage will take place in a secure area on-site and the appointed contractor will monitor the amount of waste stored to ensure that the permitted limits of any Exemption are not exceeded. The CEMP will set out measures and procedures to monitor waste flows on site and update records.

The appointed contractor will be required to appoint an Environmental Co-ordinator throughout the construction stage of the proposed Scheme. The Environmental Co-ordinator will be trained in how to set up and maintain a record keeping system, how to perform, audit and how to establish targets for waste management on site. They will also be trained in the best method for segregation and storage of recyclable materials, have information on the materials that can be reused on-site and implement the Project CDW Management Plan.

Training of staff on site will be coordinated by the Environmental Co-ordinator and as such, a waste training programme will be organised. A basic awareness course will be held for all contractor site personnel to outline the CWMP and to detail the segregation of waste at source. This may be incorporated with other training needs (e.g. general site induction, safety training etc.). This basic course will describe the materials to be segregated, the storage methods and the location of waste storage areas. A subsection on hazardous wastes will be incorporated if required and the particular dangers of each hazardous waste will be explained.

Records will be kept for each waste material which leaves the site, whether for reuse on another site, recovery, recycling or disposal.

A system will be put in place to record the waste arising on site during demolition and construction phases. The Environmental Co-ordinator will have responsibility to record the following:

- Waste taken off-site for reuse;
- Waste taken off-site for recovery;
- Waste taken off-site for recycling;
- Waste taken off-site for disposal.

For each movement of waste off-site a signed waste collection docket will be obtained by the Environmental Co-ordinator from the licensed waste contractor. This will be carried out for each material type. This system will also be linked with the delivery records. A signed waste acceptance docket will be issued for each movement of waste on-site.

If waste movements are not accounted for, the reasons for this should be established in order to see if and why the record keeping system has not been maintained. Each material type will be examined in order to see where the largest percentage waste generation is occurring. The waste management methods for each material type will be reviewed in order to highlight how waste can be minimized.

The appointed Environmental Co-ordinator will be responsible for conducting a waste audit at the site during the construction and demolition phase of the development. A review of all records for waste generated and transported off-site, should be undertaken mid-way through the construction and demolition phase.

Upon completion of the construction and demolition phase a final report will be prepared summarising the outcomes of waste management processes adopted and the total recycling / reuse / recovery figures for the proposed Scheme.

17.5.3.2 Operational Phase Monitoring

17.6 Summary of Effects & Conclusion

The summary of effect is outlined in Table 17.15.

Table 17.15 Summary of Effects

Receptor	Sensitivity of Receptor	Assessment of Magnitude	Predicted Effect	Adverse/ Beneficial	Permanent/ Temporary	Mitigation Measures	Significant / Not Significant
Construction Phase							
Non – Hazardous and Inert Landfill Void Capacity	Medium	Negligible	Negligible or Minor	Adverse	Temporary	See section 17.5.1	Not significant
Operational Phase							
Non – Hazardous and Inert Landfill Void Capacity	Medium	Minor	Minor	Adverse	Permanent	See section 17.5.2	Not significant

17.7 Limitations of Assessment

There are no known limitations to the assessment presented in the EIAR.

17.8 References

IEMA guide to: Materials and Waste in Environmental Impact Assessment Guidance for a proportionate approach, March 2020.

Eastern Midlands Region, Connacht Ulster Region, Southern Region Waste Management Plans 2015-2021, 'Construction & Demolition Waste Soil and Stone Recovery / Disposal Capacity - Update Report 2020' (2020), in http://southernwasteregion.ie/sites/default/files/National%20C%20%20D%20Report%20Dec%202020%20for%20Publication.pdf

18 ARTIFICIAL LIGHTING

18.1 Introduction

The following chapter summarises the proposed LED pitch floodlighting installation for the planned Letterkenny Regional Sports Hub.

The proposed floodlighting layout, and design light levels (illuminance) based on lighting calculation results, are outlined for each pitch.

Design parameters include:

- Design light level (lux)
- CIBSE minimum guidance light level (lux) to be exceeded
- Light fitting (luminaire) quantity
- Electrical loading
- Control strategy
- Plan drawings showing column positions incl. sub-pitches

Additionally, due to the high-powered floodlights, an obtrusive lighting analysis is included to assess the degree of spill lighting that would manifest from the proposed floodlighting installation. Obtrusive properties of the installation that are assessed include:

- Obtrusive light level (lux)
- Upward light ratio

The potential impact of obtrusive lighting is outlined, and mitigating measures are discussed.

Note: Lighting calculations are based on latest masterplan issues of the site (as of 12/05/2023). Any revisions to any of the pitch layouts or sports facilities on the site masterplan may invalidate the results contained within this chapter, necessitating a revision.

This Chapter is supported by the following Volume II Design Drawings and Figures:

- Figure 18.1 Lighting Layout – Overall

This Chapter is supported by the following Volume III Technical Appendices:

- Appendix 18.A: Photographic Survey
- Appendix 18.B: Car Park/Amenity Area Lighting

18.2 Sports Facilities

The sports hub shall consist of a variety of sports facilities with ancillary buildings and pathways. In terms of marked pitches, the proposed site consists of:

1. 1No. 4G Synthetic Pitch (Pitch 1)
2. 1No. Grass/Sand Competition Pitch (Pitch 2)
3. 2No. Natural Grass Pitches with Cricket Crease (Pitches 3, 4, and 5)
4. 4No. Synthetic 5 Aside Soccer (Pitches 6, 7, 8, 9)
5. 1No. Athletics Sprint Track

Note: The larger pitches are proposed to be subdivided. Hence, the lighting installation for these pitches has been designed to accommodate these sub-areas independently.

The surrounding area is important to consider in regard to obtrusive lighting calculations. The sports hub is located on the outskirts of Letterkenny (54.96758798, -7.72469072), and near a main road (N56). The site is adjacent a residential area with multiple houses along the site boundary. There are commercial properties present on the eastern side of the site including an ESB Networks building.

18.3 Methodology

18.3.1 Relevant Guidance

18.3.1.1 Clean Neighbourhoods and Environment Act (NI) 2011 (Part 7)

The Clean Neighbourhoods and Environment Act (Northern Ireland) 2011 came into operation on 1st April 2012; it contains laws which cover many of the problems which can detract from the quality of the day-to-day lives of people. The Act makes reference to artificial lighting as follows:

- *Part 7 Statutory nuisances 63. – (1) (h) artificial light emitted from premises so as to be prejudicial to health or a nuisance.*

The Act extends the duty on local authorities to ensure their areas are checked periodically for existing and potential sources of statutory nuisances including nuisances arising from artificial lighting. Local authorities must take reasonable steps to investigate complaints of such nuisances from artificial light. Once satisfied that a statutory nuisance exists or may occur or recur, local authorities must issue an abatement notice, requiring that the nuisance cease or be abated within a set timescale.

In general terms, the following artificial lighting sources generate the most complaints from members of the public.

- Domestic security lights.
- Commercial security lights.
- Healthy living and sports facilities e.g., floodlit sports facilities.
- Domestic decorative lighting.
- Exterior lighting of buildings and decorative lighting of landscapes; and,
- Laser shows / sky beams / light art.

Since the introduction of the Act, exterior lighting impact assessments are becoming more commonly requested for planning applications. Although light was described within the Act as having the potential to cause statutory nuisance, no prescriptive limits or rules were set for assessment. The Guidance notes (GN01:2020) for the reduction of obtrusive light produced by the Institute of Lighting Professionals (ILP) are commonly adopted in the UK as being appropriate lighting assessment criteria.

18.3.1.2 Guidance Notes for the Reduction of Obtrusive Light – The Institute of Lighting Professionals (ILP)

Artificial light has done much to enhance the night-time environment but if not properly controlled, obtrusive light can present physiological and ecological problems. Obtrusive light is a form of pollution and can be substantially reduced without detriment to the required lighting task. Obtrusive light can be in four key forms:

- Sky glow (direct upward light) - the brightening of the night sky above towns, cities and countryside.
- Nuisance Glare - the uncomfortable brightness of a light source when viewed against a dark background.
- Light Trespass (spill light/light intrusion) - the spilling of light beyond the boundary of the property or area being lit; and,
- Building luminance - is applicable to buildings directly illuminated as a night-time feature as against the illumination of a building caused by spill light from adjacent luminaires or luminaires fixed to the building but used to light an adjacent area. Figure 18.1 illustrates these examples.

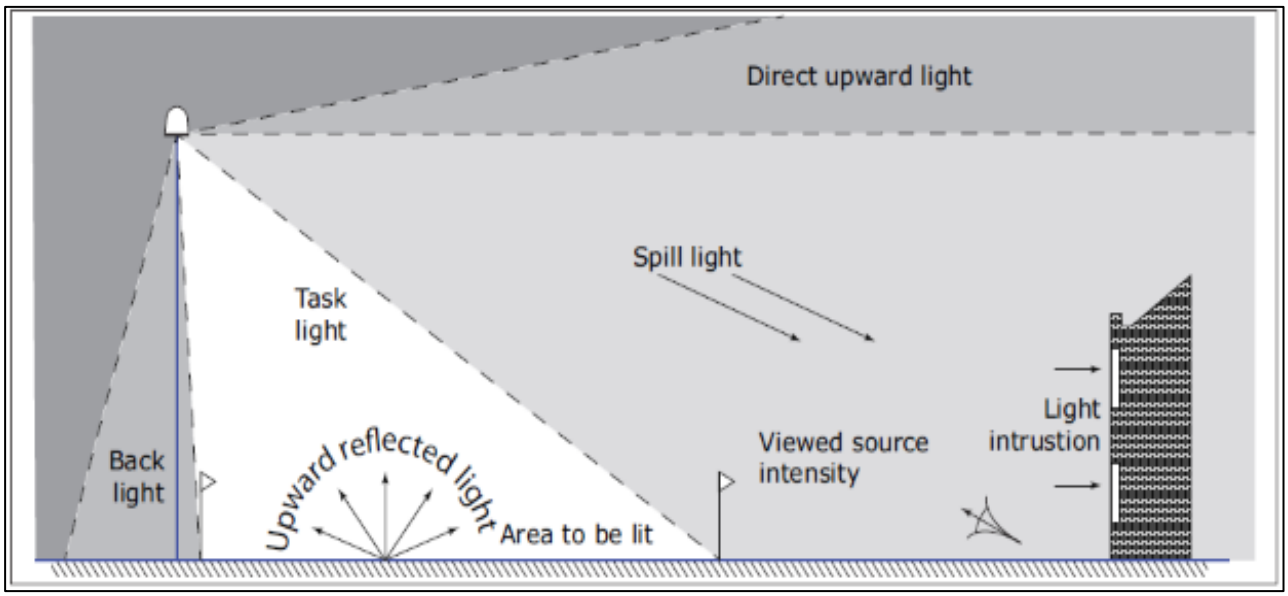

Figure 18.1: Types of Intrusive Light. An Extract from Page 3: The Institution of Lighting Professionals (ILP) – Guidance Notes for the Reduction of Obtrusive Light (GN01:2020)

Assessment Criteria – Sky Glow: Upward Light Ratio or ULR is the maximum permitted percentage of the luminaires flux that emits directly into the sky; the general term for ULR over a large area such as a city or town is referred to as Sky Glow. ULR is not subject to differing limits dependant on time and hence there are no pre- and post-curfew readings, as they are not required.

Assessment Criteria – Nuisance Glare: Nuisance glare is a subjective criterion for the assessment of a new development and as such, there are no standard methods, or quantified levels of impact set out to assess it. A qualitative assessment is therefore made in respect to nuisance glare from the proposed development.

Assessment Criteria - Light Trespass: Light trespass or intrusion is the spilling of light beyond the boundary of the property or area being lit. The ILP document provides quantified design guidance on minimising over-lighting and light trespass from a proposed site.

18.3.1.3 Environmental Considerations for Exterior Lighting – Chartered Institute of Building Services Engineers (CIBSE)

When designing the lighting for a particular usage it is most appropriate to consider the purpose of the lighting, the advantages and potential detriment that may arise as a result of the implementation of the lighting. Further consideration should be given to the poles, columns, brackets, and luminaires which all remain visible during the day and, without careful design, may be unsightly.

Various environmental considerations need to be considered when contemplating the implementation of exterior lighting; energy usage, visual impact of the lighting equipment in terms of the surrounding landscape, the light obtrusion and spill onto surrounding properties, and the ecological impacts that can arise from artificial lighting. The effects artificial lighting can have upon all the above considerations vary in relation to the characteristics of the lighting being proposed and the characteristics of surrounding areas i.e., urban or rural.

Safety should take prominence above economic or other such considerations; and design of the scheme should be weighed in the balance. At the initial design stage, a series of issues should be addressed in order to ensure that the most appropriate and responsible artificial lighting scheme is being proposed. These considerations include:

- lighting requirements,
- source of artificial lighting,

- power requirements, and.
- length of time lighting is required.

There is a large overlap with the guidance note in 11.2.1.2 however, this CIBSE document also considers road lighting, signs and advertisements, car parking and sports facilities. This assessment utilises the guidance given by the ILP. The CIBSE document is included for completeness as this document also informs the lighting design process used by the lighting engineers for the proposed development.

18.3.1.4 BS EN 12464-2:2014 - Light and Lighting, Lighting of Workplaces, Outdoor Workplaces.

This European Standard specifies lighting requirements for outdoor workplaces, which meet the needs for visual comfort and performance. All usual visual tasks are considered.

It is not applicable for emergency lighting; see EN 1838 and EN 13032-3.

It does not specify lighting requirements with respect to the safety and health of workers at work and has not been prepared in the field of application of Article 153 of the European Community (EC) Treaty, although the lighting requirements, as specified in this standard, usually fulfil safety needs.

Lighting requirements with respect to the safety and health of workers at work may be contained in Directives based on Article 153 of the EC Treaty, in national legislation of member states implementing these directives or in other national legislation of member states.

18.3.2 Study Area

The extent of the study area (determined after desk top studies of mapping and site visits) includes the roads surrounding the proposed development site that include receptors (residential, commercial and industrial) which may be subject to a change in existing lighting conditions.

The study area consists of the proposed development site, residential properties to the north and northwest (Ashfield, Brookfield Heights), residential properties to the west (Ashfield, Hazelwood Drive), residential properties to the south (Knocknamona Crescent), residential and industrial receptors to the south-east and east (Carnamuggagh Lower, ESB Networks Letterkenny, Letterkenny Recycling Centre). Appendix 18.A details existing artificial lighting sources within the study area, in the form of site survey photographs. Figure 18.2 below illustrates the site location and study area.

Figure 18.2: Site Location and Study Area

18.3.3 Baseline Photographic Survey

A baseline photographic survey was undertaken on the 31st of March 2023 within the proposed development site and immediate local area.

Appendix 18.A Photographic Survey details the results of the photographic survey and the existing artificial lighting sources close to the proposed development site. Figure 18.3 illustrates the photographic lighting survey locations.

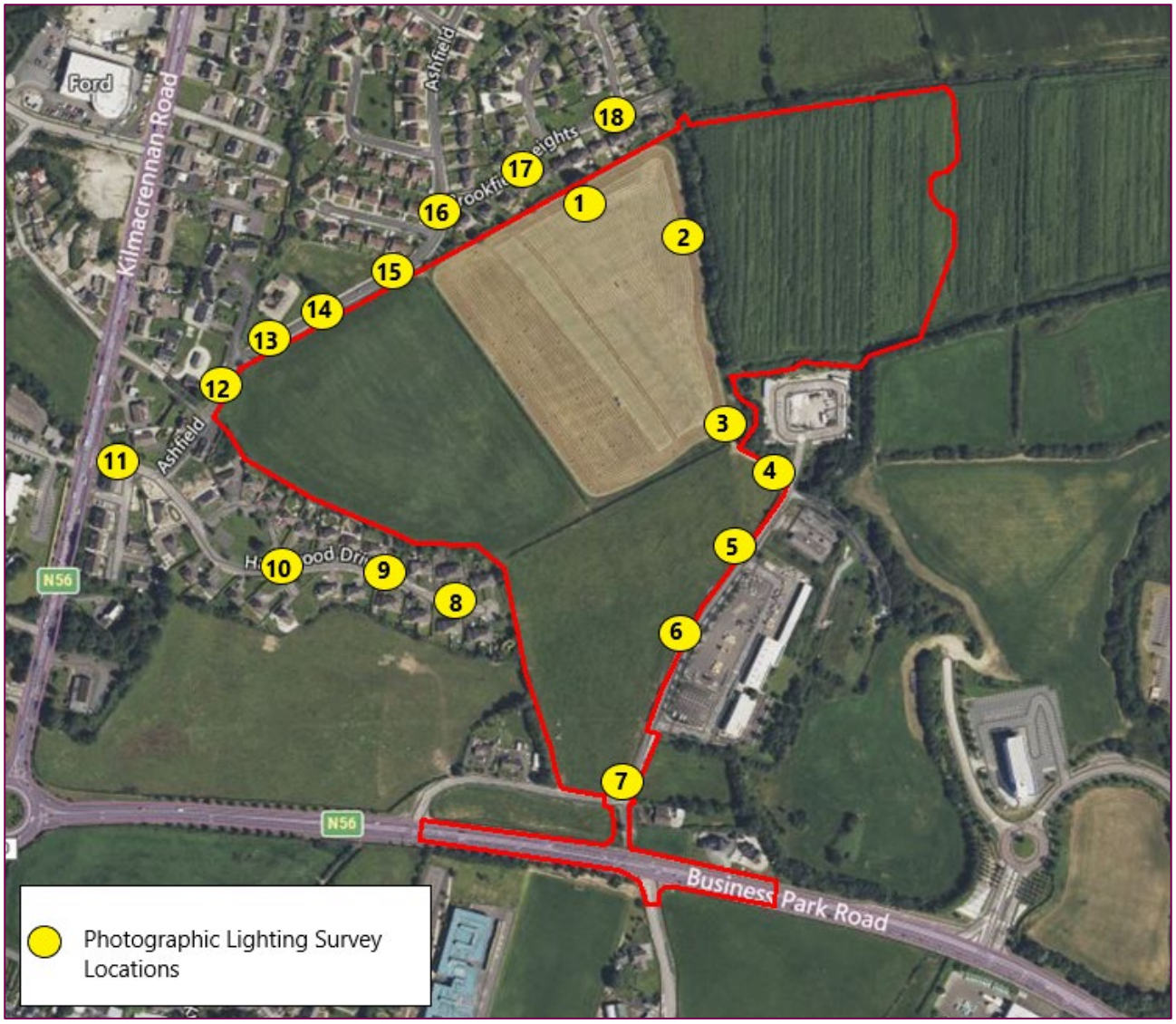

Figure 18.3: Photographic Lighting Survey Locations

18.3.4 Assessment Criteria and Assignment of Significance

The following stages have been undertaken to assess existing and proposed artificial lighting at the proposed development site:

- Site visit and photograph survey (Please refer to Volume III Appendix 18.A).
- Determining the environmental setting (environmental zone).
- Identification of sensitive receptors.
- Discussion on temporary/construction impacts on sensitive receptors; and,
- Detailing mitigation measures (for construction phase and operational phase) to be incorporated into the proposed lighting design.

The lighting assessment can be categorised into two types of criteria.

- Construction Phase (short term/temporary); and
- Operational Phase (long term/permanent).

18.3.4.5 Construction Phase

Construction phase (short term/temporary) effects if not adequately mitigated may result in the following:

- Increase in light spill and glare to existing receptors.

The construction phase, or short-term effects, primarily consider the initial phases of the development where construction tasks begin on site. The short-term construction effects regarding the proposed development will include the temporary lighting required for any construction activities. It will also include any security lighting that is required during the construction phase.

18.3.4.6 Operational Phase

For the operational phase (long term permanent) when the proposed development is completed, potential sources of light pollution are:

- Increase in light spill and glare to existing local receptors.
- Increase in glare to road users; and
- Change in the night-time scene as viewed by local receptors and road users.

The long-term effects will consider all of the proposed lighting sources for the proposed development when operational.

18.3.5 Significance of Effects

The proposed artificial lighting will have varying levels of effect, and these have been assessed based on the scale of change experienced by each identified key receptor (magnitude) and their ability to absorb such change (sensitivity).

To determine the scale of the change in lighting levels at each key receptor, the following criteria have been utilised:

- Environmental Zone – Please refer to Table 18.5.
- Type of lighting that will be in use during the construction and operational phase.
- The anticipated duration of artificial lighting during the hours of darkness.
- The distance between the proposed lighting installation and the key receptor; and,
- Type of view (e.g., direct, intermittent or constrained).

The level of change evaluated from the criteria above is assessed using the criteria detailed in Table 18.1.

Table 18.1: Criteria for Assessing Light Impact

Magnitude of Impact	Criteria for Assessing Impact
Major Beneficial	Significant Improvement in night environment and/or reductions in glare, spill light and sky glow
Moderate Beneficial	Noticeable improvement in night environment and/or reductions in glare, spill light and sky glow etc.
Minor Beneficial	Slight improvement in night environment and/or reductions in glare, spill light and sky glow etc.
None/negligible	No significant effect or overall effects balancing out.
Minor Adverse	Slight increase in visibility of site, glare and sky glow etc.
Moderate Adverse	Noticeable increase in visibility of site, glare and sky glow etc.
Major Adverse	Significant problems with increase in visibility of site, glare and sky glow etc.

The details in Table 18.2 sets out the measure of the sensitivity of the receptors.

Table 18.2: Description of Light Sensitivity Levels

Sensitivity	Description (Source: ILP - Professional Lighting Guide)

High	The receptor has little ability to absorb change without fundamentally altering its present character, or is of international or national importance
Medium	The receptor has moderate capacity to absorb change without significantly altering its present character, or is of high importance
Low	The receptor is tolerant of change without detriment to its character or is of low importance

Key sensitive receptors within the study area are residential properties (*high sensitivity*) located on the northern boundary (Brookfield Heights), western boundary (Ashfield, Hazelwood Drive) and southern boundary (Knocknamona Crescent).

Proposed vegetation around the boundaries of the proposed development site and the minor watercourse on the eastern boundary are considered ecological areas of *high sensitivity*.

Commercial/industrial/ premises located on Carnamuggagh Lower to the east of the proposed development site are considered to be of *low sensitivity.*

Table 18.3: Assessment of Significance Effects Matrix

Sensitivity	Magnitude of Impact			
	Negligible	Low	Medium	High
Negligible	Negligible	Negligible / minor	Negligible / minor	Minor
Low	Negligible / minor	Negligible / minor	Minor	Minor/ moderate
Medium	Negligible/ minor	Minor	Moderate	Moderate / major
High	Minor	Minor/ moderate	Moderate/major	Major

Magnitudes that are either moderate or above are considered to be a significant effect. Note that significant effects can be either beneficial or adverse. The term "significant effect" is an effect that (either in isolation or combination with others) would, in the opinion of a lighting specialist, having regard to relevant criteria, be taken into account in the decision-making process.

18.4 Baseline Environment

18.4.6 Photographic Survey and Existing Lighting

Street lighting is in place on all the main roads and residential roads near the proposed development site, these include Brookfield Heights and Ashfield to the north and west, Hazelwood Drive to the south-west, N56 and Knocknamona Drive to the south and Carnamuggagh Lower to the east and south-east.

Table 18.4 below provides details on the existing artificial lighting in the area, lighting type and location. Photographic plates of the existing lighting are available in Volume III, Appendix 18.A.

Table 18.4: Showing plate numbers and description of existing lighting onsite

Photographic Plate	Direction	Description
Plate 1	Facing north	Northern boundary of proposed development site, no lighting columns are in this area.
Plate 2	Facing east	Plate 2 is overlooking the eastern boundary of proposed development site, again no lighting columns are located in this area.
Plate 3	Facing east	Lighting columns and spotlights within the Letterkenny Recycling Centre compound– directional and angled downwards. These lighting columns are located on the eastern boundary of the proposed development site.
Plate 4	Facing east	Lighting columns and spotlights within the Letterkenny Recycling Centre compound– directional and angled downwards. These lighting columns are located on the eastern boundary of the proposed development site.
Plate 5	Facing south	Lighting columns along Carnamuggagh Lower adjacent to ESB Networks Letterkenny. Directional and angled downwards. These lighting columns are located along the eastern boundary of the proposed development site.
Plate 6	Facing South	Lighting columns along Carnamuggagh Lower adjacent to ESB Networks Letterkenny. Directional and angled downwards. These lighting columns are located along the eastern boundary of the proposed development site.
Plate 7	Facing south-east	Lighting column along Knocknamona Crescent/Carnamuggagh Lower, adjacent to residential property. Directional and angled downwards. These lighting columns are located along the south-eastern boundary of the proposed development site.
Plate 8	Facing west	Lighting columns along Hazelwood Drive. Directional and angled downwards. These lighting columns are located along the south-western boundary of the proposed development site.
Plate 9	Facing west	Lighting columns along Hazelwood Drive. Directional and angled downwards. These lighting columns are located along the south-western boundary of the proposed development site.
Plate 10	Facing west	Lighting columns along Hazelwood Drive. Directional and angled downwards. These lighting columns are located along the south-western boundary of the proposed development site.
Plate 11	Facing west	Lighting columns at junction of Kilmacrennan Road and Ashfield. Directional and angled downwards. These lighting columns are located west of the proposed development site
Plate 12	Facing north	Lighting columns at junction of Ashfield Crescent and Ashfield. Directional and angled downwards. These lighting columns are located west of the proposed development site.
Plate 13	Facing north-east	Lighting columns at Ashfield. Directional and angled downwards. These lighting columns are located on the north-western boundary of the proposed development site.
Plate 14	Facing south-east	View of proposed development site, facing south-east from Ashfield.
Plate 15	Facing north	Lighting columns at Ashfield. Directional and angled downwards. These lighting columns are located on the north-western boundary of the proposed development site.
Plate 16	Facing west	Lighting columns at junction of Brookfield Heights and Ashfield. Directional and angled downwards. These lighting columns are located north-west of the proposed development site
Plate 17	Facing north-east	Lighting columns at Brookfield Heights. Directional and angled downwards. These lighting columns are located north of the proposed development site
Plate 18	Facing west	Lighting columns at Brookfield Heights. Directional and angled downwards. These lighting columns are located north of the proposed development site

Please refer to Volume III Appendix 18.A Lighting Survey (Photographic Plates).

18.4.7 ILP Environmental Zone

While local authorities are recommended to assign environmental zones for exterior lighting it does not appear that Donegal County Council have assigned an environmental zone to the area of the proposed development. The ILP identifies the following environmental zones, as shown in Table 18.5 below.

Table 18.5: ILP Environmental Zones

Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc.
E2	Rural	Low District Brightness (SQM 15 to 20)	Sparsely inhabited rural areas, village or relatively dark outer suburban locations
E3	Suburban	Medium district brightness	Well inhabited rural and urban settlements. Small town centres of suburban locations
E4	Urban	High district brightness	Town/city centres with high levels of night-time activity

Notes:

1. Where an area to be lit lies on the boundary of two zones the obtrusive light limitation values used should be those applicable to the most rigorous zone.

2. Rural zones under protected designations should use a higher standard of policy.

3. Zone E0 must always be surrounded by an E1 Zone.

4. Zoning should be agreed with the local planning authority and due to local requirements a more stringent zone classification may be applied to protect special/specific areas.

5. SQM (Sky Quality Measurements) referenced by the International Dark-Sky Association (IDA), the criteria for E0 being revised in mid-2019 but not retrospective.

6. Astronomical observable dark skies will offer clearer views of the Milky Way and of other objects such as the Andromeda galaxy and the Orion Nebula.

7. Although values of SQM 20 to 20.5 may not offer clear views of astronomical dark sky objects such as the Milky Way, these skies will have their own relative intrinsic value in the UK.

The area already experiences sources of artificial lighting emitting from residential street lighting to the north and west, residential street lighting and National Road Network lighting to the south, and residential street lighting and industrial lighting to the south-east.

The location of the proposed development is most appropriately placed in a **Category E3 – Suburban (Medium district brightness)**.

Table 18.6 below indicates obtrusive light limitations for exterior lighting installations.

Table 18.6: Limits for the Luminous Intensity of Bright Luminaires (ILP, 2020)

Light Technical Parameter	Application Conditions	Luminaire Group (Projected Area A_p in m^2)					
		$0<A_p \leq 0.002$	$0.002<A_p \leq 0.01$	$0.01<A_p \leq 0.03$	$0.03<A_p \leq 0.13$	$0.13<A_p \leq 0.50$	$A_p \geq 0.5$
Maximum luminous intensity emitted by luminaire (*I* in cd)	E0 Pre-curfew Post-curfew	 0 0	 0 0	 0 0	 0 0	 0 0	 0 0
	E1 Pre-curfew Post-curfew	 0.29 *d* 0	 0.63 *d* 0	 1.3 *d* 0	 2.5 *d* 0	 5.1 *d* 0	 2,500 0
	E2 Pre-curfew Post-curfew	 0.57 *d* 0.29 *d*	 1.3 *d* 0.63 *d*	 2.5 *d* 1.3 *d*	 5.0 *d* 2.5 *d*	 10 *d* 5.1 *d*	 7,500 500
	E3 Pre-curfew Post-curfew	 **0.86 *d*** **0.29 *d***	 **1.9 *d*** **0.63 *d***	 **3.8 *d*** **1.3 *d***	 **7.5 *d*** **2.5 *d***	 **15 *d*** **5.1 *d***	 **10,000** **1000**
	E4 Pre-curfew Post-curfew	 1.4 *d* 0.29 *d*	 3.1 *d* 0.63 *d*	 6.3 *d* 1.3 *d*	 13 *d* 2.5 *d*	 26 *d* 5.1 *d*	 25,000 2,500
Aid to gauging A_p		2 to 5cm	5 to 10cm	10 to 20cm	20 to 40cm	40 to 80cm	>80cm
Geometric mean of diameter (cm)		3.2	7.1	14.1	26.3	56.6	>80
Corresponding A_p representative area (m^2)		0.0008	0.004	0.016	0.063	0.251	>0.5

Notes to Table:

1. d is the distance between the observer and the glare source in metres.
2. A luminous intensity of 0 cd can only be realised by a luminaire with a complete cut-off in the designated directions.
3. A_p is the apparent surface of the light source seen from the observer position
4. For further information refer to Annex C of CIE 150
5. Upper limits for each zone shall be taken as those with column Ap>0.5

18.5 Impact Assessment

18.5.6 Construction Lighting

The fundamental considerations for temporary lighting schemes during construction are:

- To satisfy Health and Safety requirements; and
- To minimise the potential effect of lighting upon the surrounding area by minimising sky glow, glare and light spillage.

The construction phase lighting will be provided in accordance with the lighting design standards and guidance documents for a temporary lighting installation. Lighting will comply with the relevant regulations, standards and guidance documents.

Artificial lighting during the construction phase will only be used during the hours of darkness, during low levels of natural light or during specific construction methods or tasks. This will assist the health, safety and welfare of the construction staff and visitors to the proposed development.

Given the above, the worst-case lighting scenario is likely to occur during winter months where daylight hours are reduced. Climatic conditions, such as a cloudy overcast day during winter, may also require the construction lighting to be active at various times during daytime hours due to reduced levels of natural daylight.

The construction lighting, whilst temporary by nature, will be installed and controlled by the contractors in such a way that it meets fully with the statutory obligations for the health, safety and welfare of the staff during the construction phase and the satisfy required illumination levels, whilst minimising the effects on the surrounding environment.

18.5.6.5 Further Considerations

Construction Phase Floodlighting during the construction phase could potentially have an impact on surrounding area if not controlled. It would be necessary to take some consideration for obtrusive lighting during this phase.

18.5.7 Pitch Floodlighting Design

The floodlighting design for each pitch is summarised in the following section.

The following lighting calculations illustrated below use the surface illuminance (z = 0).

A performance maintenance factor (MF) of 0.94 is assumed to model the expected loss of light from the fittings overtime. Based on 6-year cleaning intervals within an E3/4 environmental zone. Luminaire failures are assumed to be on a spot replacement.

For pitches that include sub-divisions, switching modes are used by the floodlighting, enabling each individual sub-pitch to operate independently.

Note: The proposed floodlighting layout will be subject to design coordination.

18.5.7.5 Sports Hub

Information associated with project luminaires are outlined in Table 18.7 below. The locations of the proposed project luminaires are illustrated in Volume II Design Drawings and Figures: Figure 18.1 Lighting Layout – Overall.

18.5.7.5.4 Project Luminaires

Table 18.7: Proposed Project Luminaires

Code	Quantity	Power (W)	Flux (lm)
A	71	1505.9	1*259000
B	26	1505.9	1*259000
G	2	1505.9	1*259000
I	16	1505.9	1*259000
K	16	1505.9	1*259000
M	9	1505.9	1*259000
N	38	1505.9	1*259000
O	12	1505.9	1*259000

18.5.7.5.5 Electrical Loading

The total installed power associated with the proposed project luminaires is 286.12 kW.

18.5.7.5.6 Controls

Controls for site floodlighting to be wired to control panel, located centrally.

18.5.7.5.7 Target Light Level

CIBSE lighting guidance is referenced from LG 04: Sports lighting (CIBSE/SLL). This document provides the average light levels (Eav) and uniformity values (Emin/Eav) required for different sport types at different levels of competition.

The level of competition has an effect on the minimum illuminance required due to the longer viewing distance of the spectators. Standards of competition are categorised into classes.

- Lighting class I
  - High-level competition
- Lighting class II
  - Mid-level competition
  - Supervised training
- Lighting class III
  - Low-level competition
  - General training

See below table for a summary of the targeted lux levels.

Table 18.8: Summary of target guidance lux for each pitch type

Pitch	Sport	Eav (lux) Required Light Levels at Ground Level		
		I	II	III
1x 4G Synthetic Pitch (Pitch 1)	Gaelic Football	500	200	-
1x Grass/Sand Competition Pitch (Pitch 2)	Gaelic Football	500	200	-
2x Natural Grass Pitches with Cricket Crease (Pitch 3)	Cricket (Infield)	**750**	**500**	**-**
	Cricket (Outfield)	**500**	**300**	**-**
4x Synthetic 5 Aside Soccer	5-aside Football	-	350*	-
1x Athletics Sprint Track	Athletics (Outdoors)	-	-	200

**Assumed light level required for outdoor 5-aside soccer.*

18.5.7.5.8 Lighting Column Positions – Sports Hub

Figures 18.4 and 18.5 below illustrate the proposed site floodlighting plan view and perspective view.

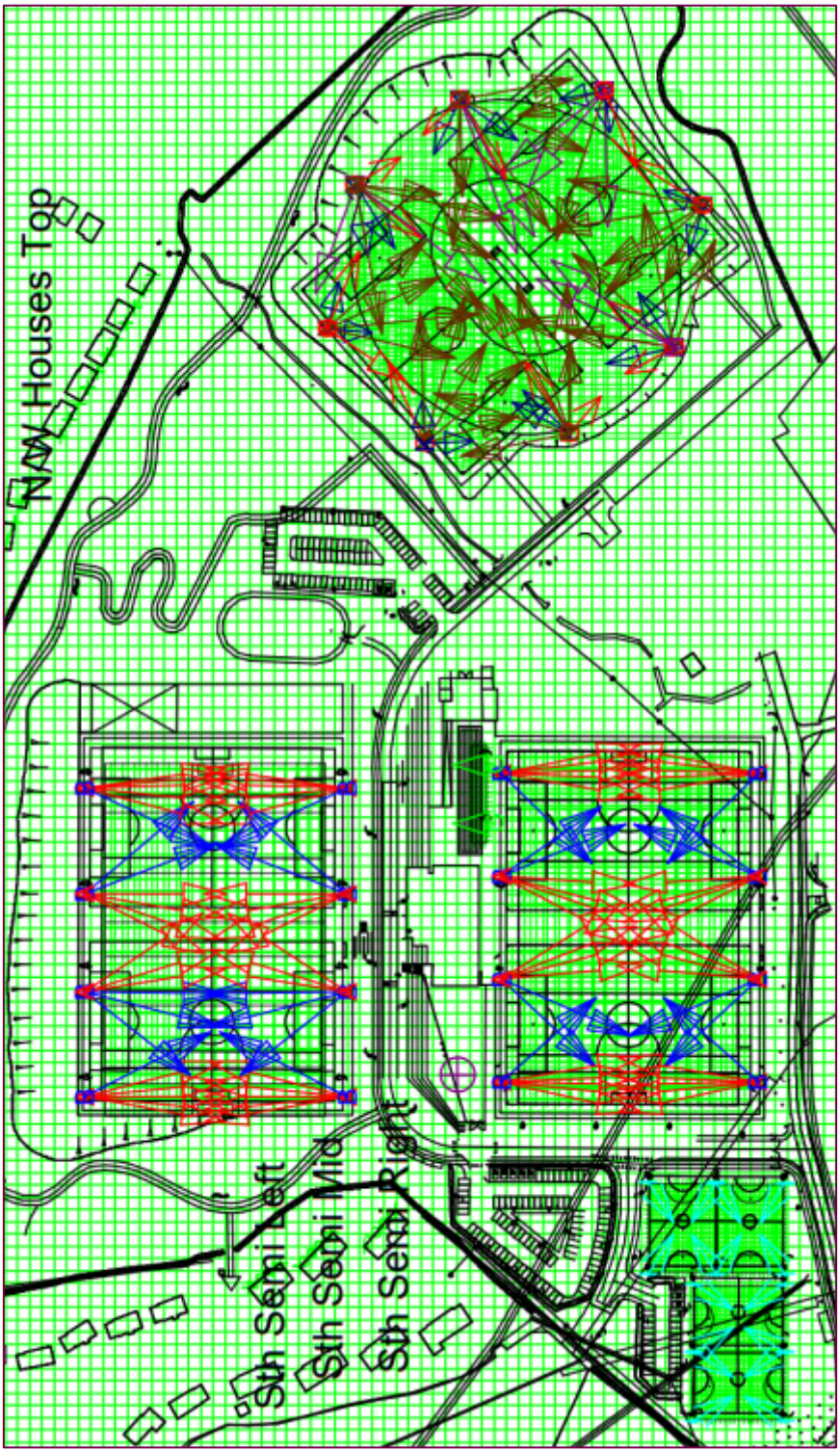

Figure 18.4: Site Floodlighting, plan view

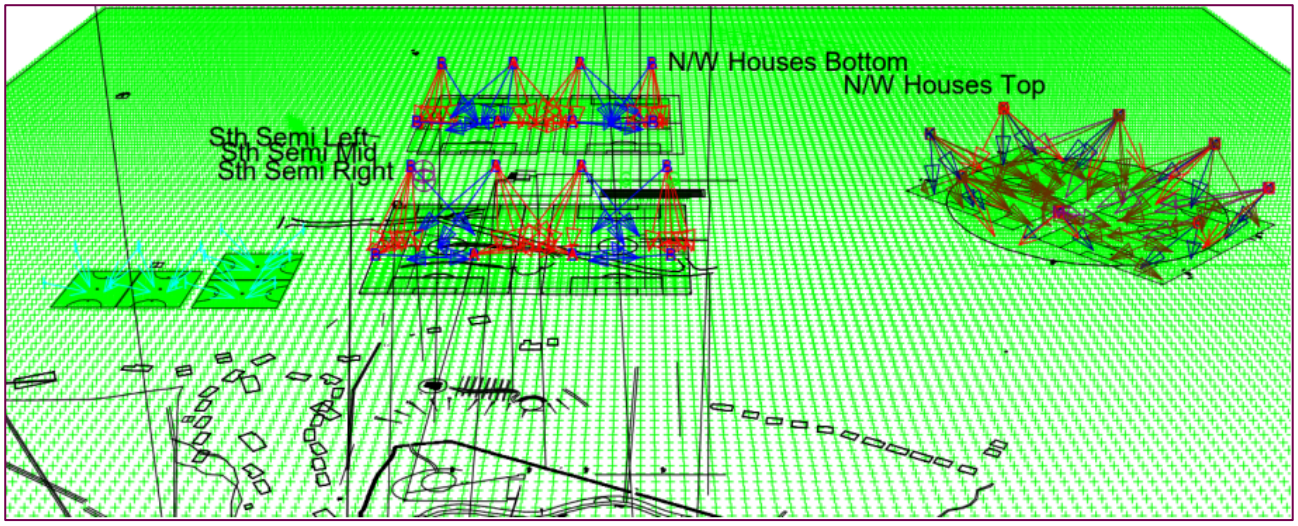

Figure 18.5: Site Floodlighting, perspective view

18.5.7.6 Natural Grass Pitches with Cricket Crease

18.5.7.6.4 Design Illuminance

Table 18.9 summarises the light levels for the natural grass pitches and cricket crease.

Table 18.9: Summary of light levels for the entitled pitch(es)

	Inner Field	Outer Field	Pitch A	Pitch B
Eav (lux)	757	522	504	499
Emin (lux)	601	324	373	358
Emax (lux)	**1085**	**1036**	**745**	**772**
Emin/Eav	0.79	0.62	0.74	0.72
Emin/Emax	0.55	0.31	0.50	0.46

18.5.7.6.5 CIBSE Lighting Guidance

Table 18.10 summarises the relevant CIBSE light levels for cricket and GAA.

Table 18.10: Summary of relevant CIBSE light levels for entitled sport type

	Cricket		GAA
	Inner Field	Outer Field	
Class	I	I	II
Eav (lux)	750	500	200
Emin/Eav	0.7		0.6

18.5.7.6.6 Light Fitting Quantity

For the natural grass pitches and cricket crease there will be a total of 76No. fittings.

18.5.7.6.7 Electrical Loading

The total installed power associated with the natural grass pitches and cricket crease luminaires is 114.45kW.

18.5.7.6.8 Controls

Control via DALI. Dimmable DALI cable for each column, CAT6 Local control cabinets for each pitch. Linked to central site control panel.

18.5.7.6.9 Lighting Column Positions – Cricket Inner Field

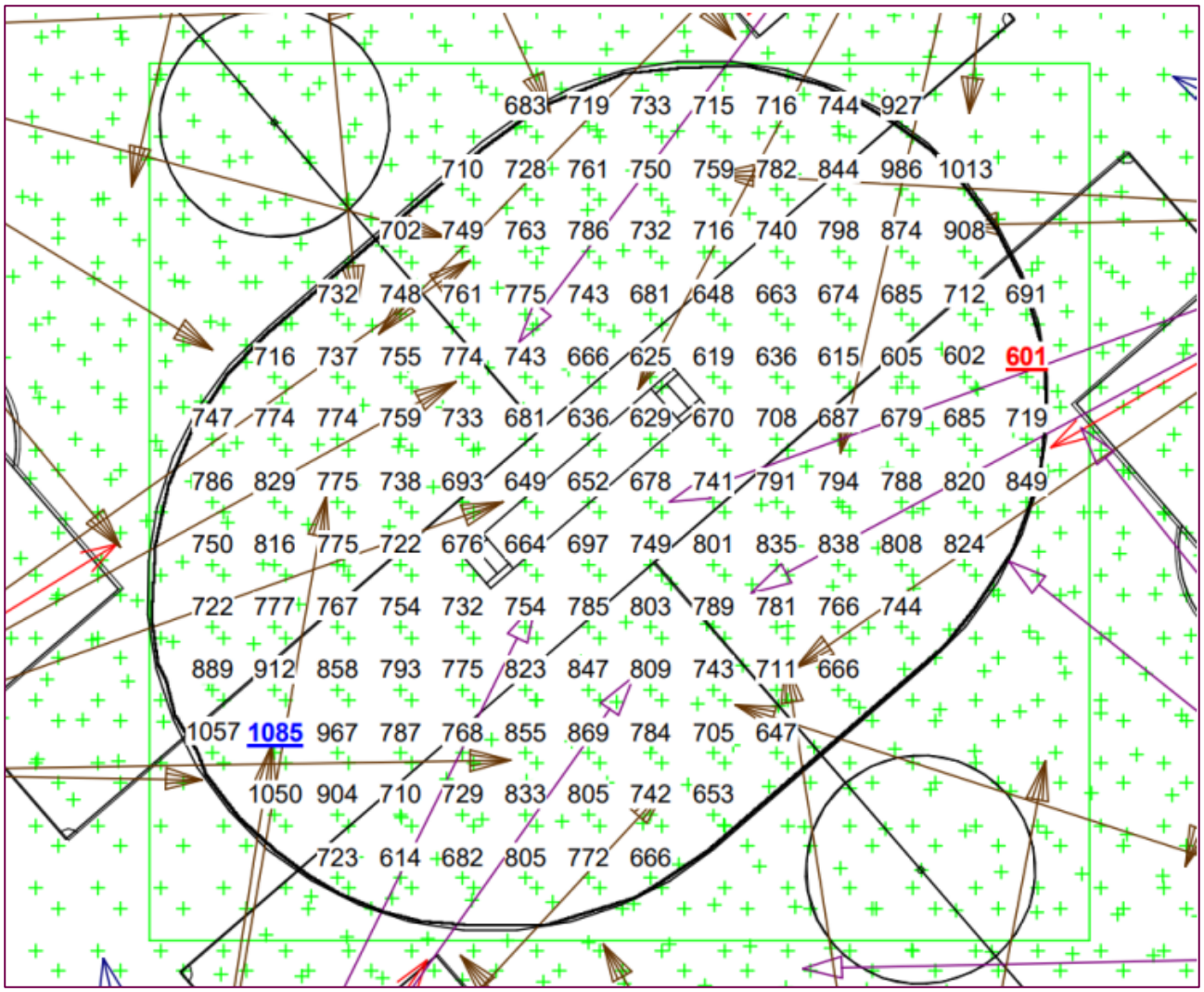

Figure 18.6: Natural Grass Pitches with Cricket Crease – Cricket Inner Field

18.5.7.6.10 Lighting Column Positions – Cricket Outer Field

There will be a total of 8No. (approx. 25m) column for the cricket outer field, as illustrated in Figure18.7 below.

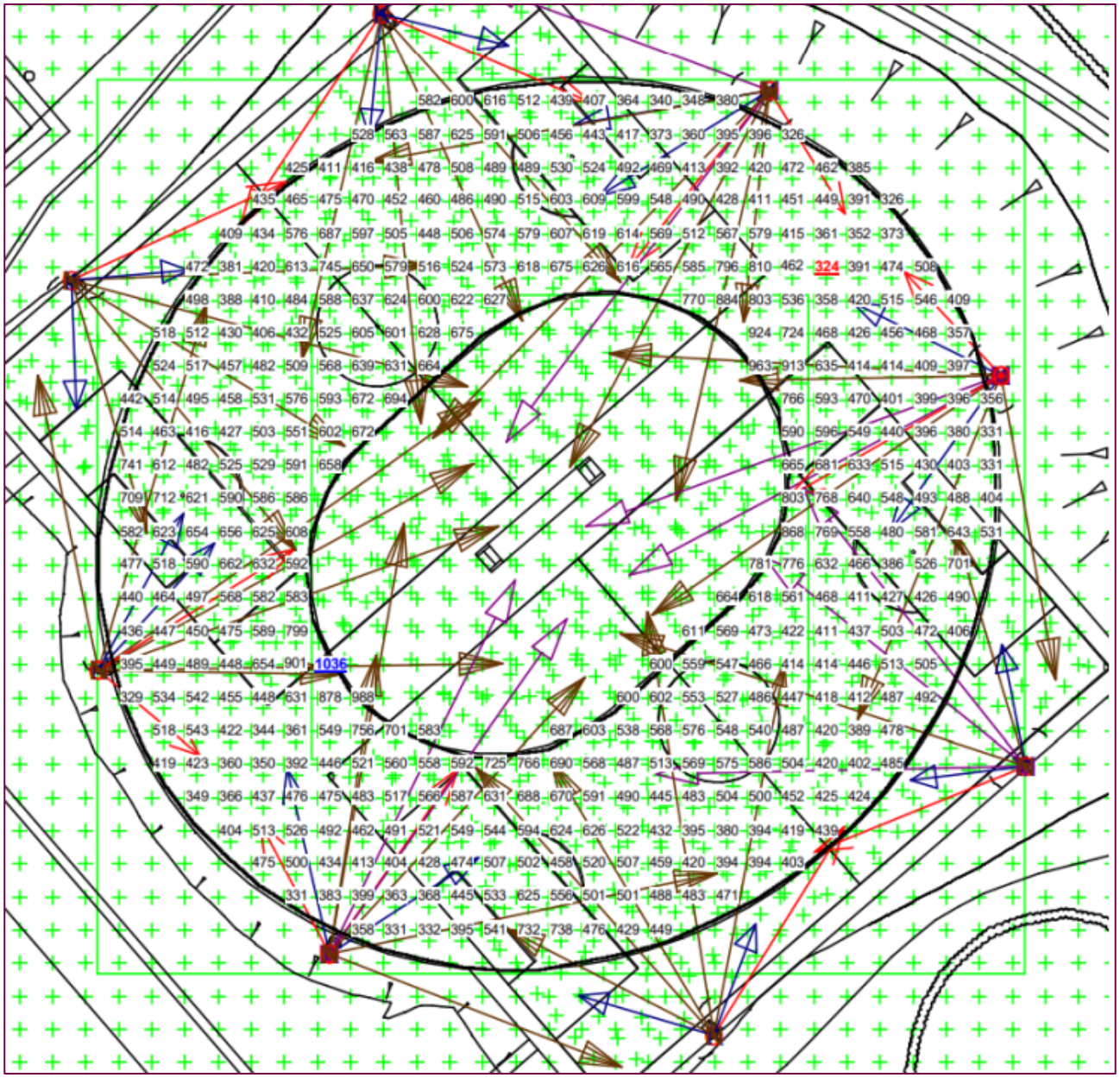

Figure 18.7: Natural Grass Pitches with Cricket Crease – Cricket Outer Field

18.5.7.6.11 Lighting Column Positions – Cricket Pitch A

Lighting columns for cricket pitch A are illustrated in Figure 18.8 below.

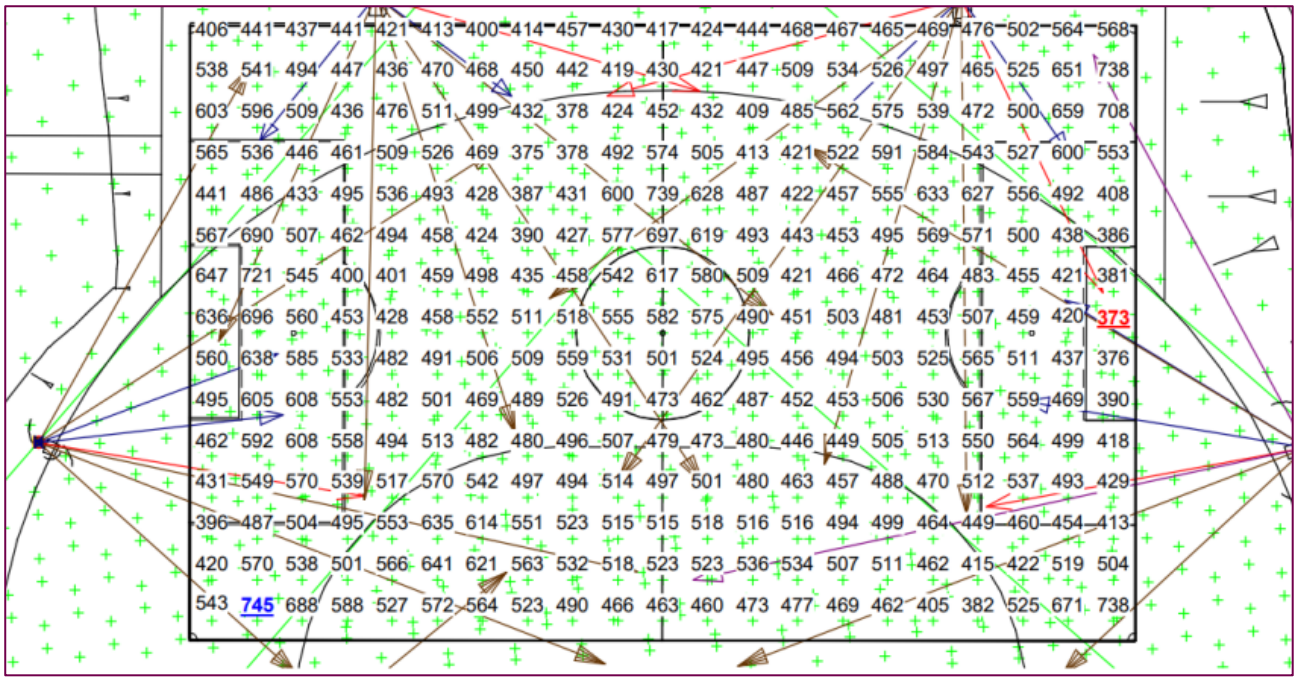

Figure 18.8: Natural Grass Pitches with Cricket Crease – Cricket Pitch A

18.5.7.6.12 Lighting Column Positions – Cricket Pitch B

Lighting columns for cricket pitch B are illustrated in Figure 18.9 below.

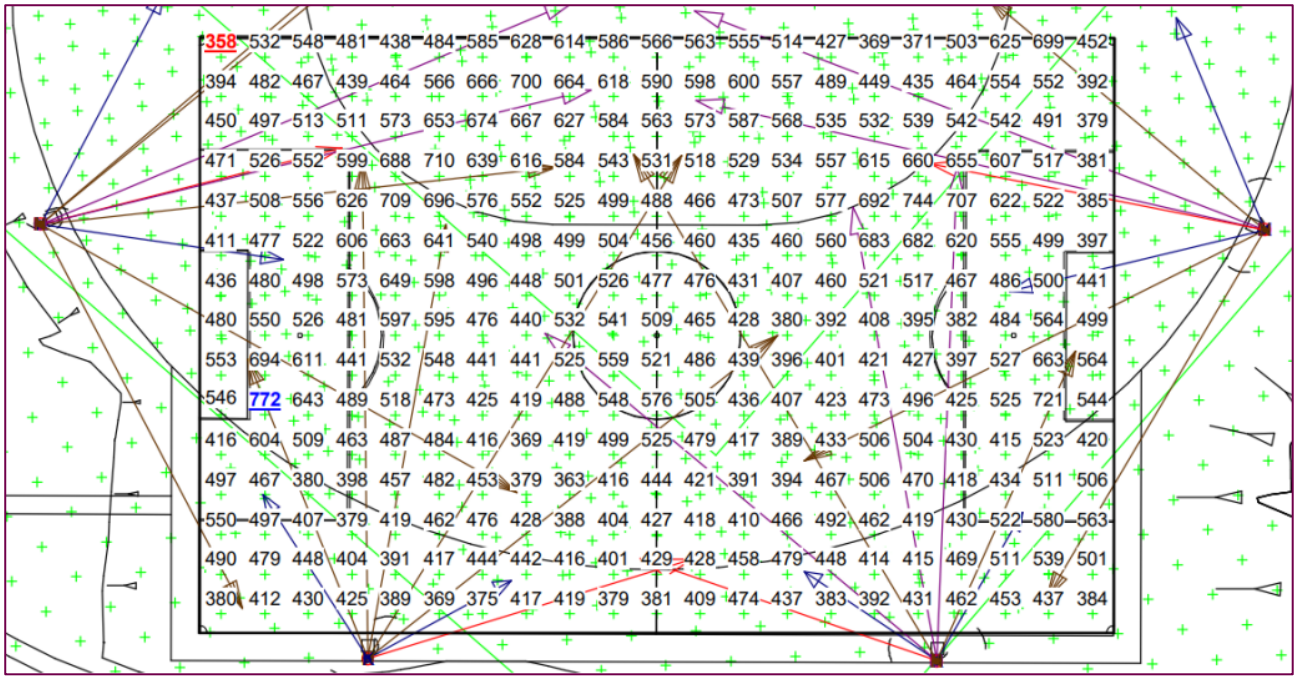

Figure 18.9: Natural Grass Pitches with Cricket Crease – Cricket Pitch B

18.5.7.7 Main 4G Synthetic Pitch

18.5.7.7.4 Design Illuminance

Table 18.11 summarises the light levels for the main 4G synthetic pitch.

Table 18.11: Summary of light levels for the entitled pitch(es)

	Main	Pitch A	Pitch B
Eav (lux)	550	507	500
Emin (lux)	394	322	318
Emax (lux)	**720**	**685**	**684**
Emin/Eav	0.72	0.64	0.64
Emin/Emax	0.55	0.47	0.47

18.5.7.7.5 CIBSE Lighting Guidance

Table 18.12 summarises the relevant CIBSE light levels for main 4G synthetic pitch.

Table 18.12: Summary of relevant CIBSE light levels for entitled sport type

	GAA	GAA
Class	I	II
Eav (lux)	500	200
Emin/Eav	0.7	0.6

Lighting should provide uniform illumination over the pitch, appropriate for the proposed grade of competition. The lighting should ensure that the full flight of the ball is visible while providing good viewing conditions for players, officials and spectators.

18.5.7.7.6 Light Fitting Quantity

For the main 4G synthetic pitch there will be a total of 48No. fittings.

18.5.7.7.7 Electrical Loading

The total installed power associated with the main 4G synthetic pitch luminaires is 72.28kW.

18.5.7.7.8 Controls

Control via DALI. Dimmable DALI cable for each column, CAT6 Local control cabinets for each pitch. Linked to central site control pane.

18.5.7.7.9 Lighting Column Positions – Main 4G

There will be a total of 8No. (approx. 20m) columns for the main 4G synthetic pitch. Columns are 4-5m back from goal line.

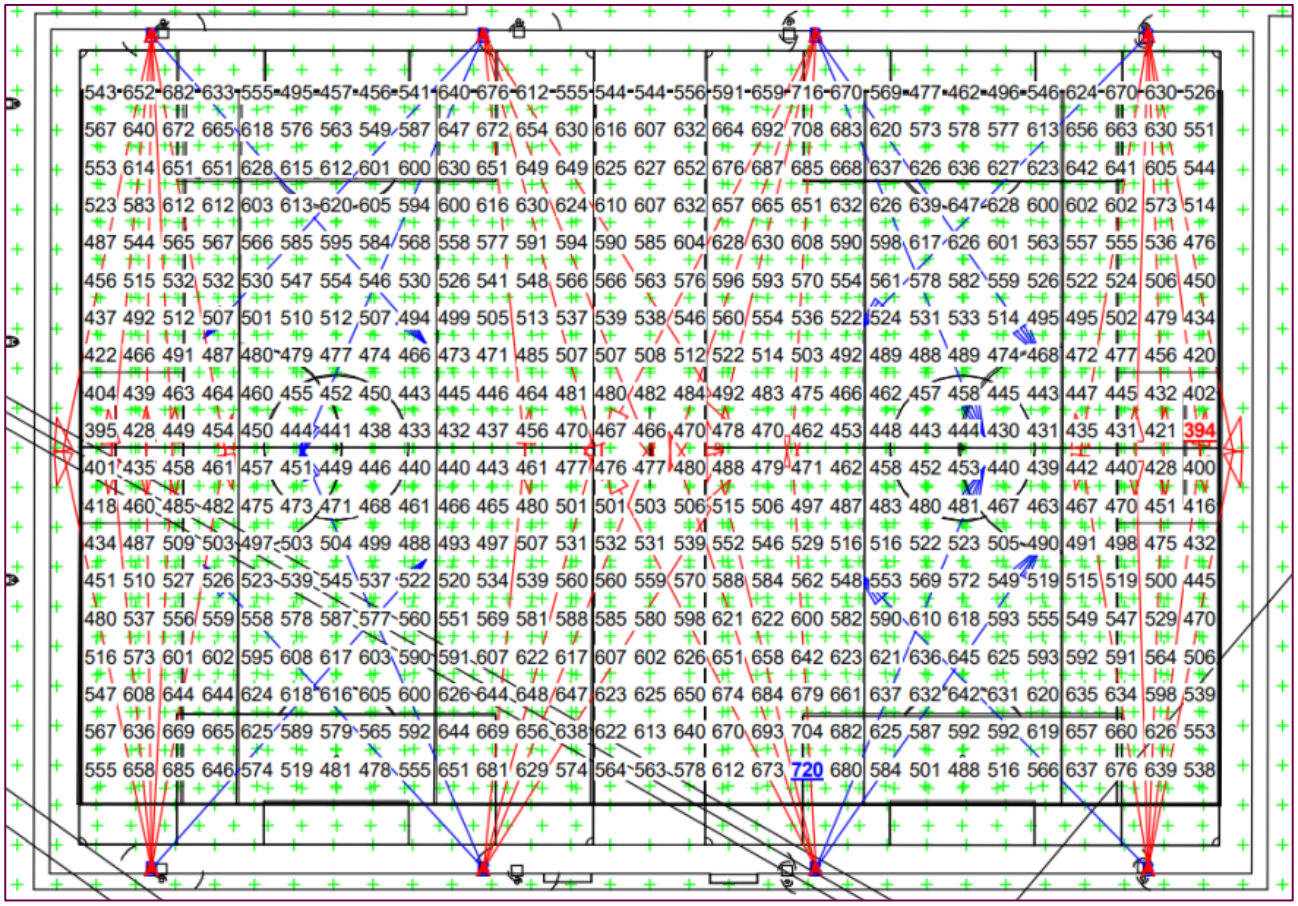

Figure 18.10: Main 4G Synthetic Pitch

18.5.7.7.10 Lighting Column Positions – Main 4G Pitch A

Lighting columns for the main 4G pitch A are illustrated in Figure 18.11 below.

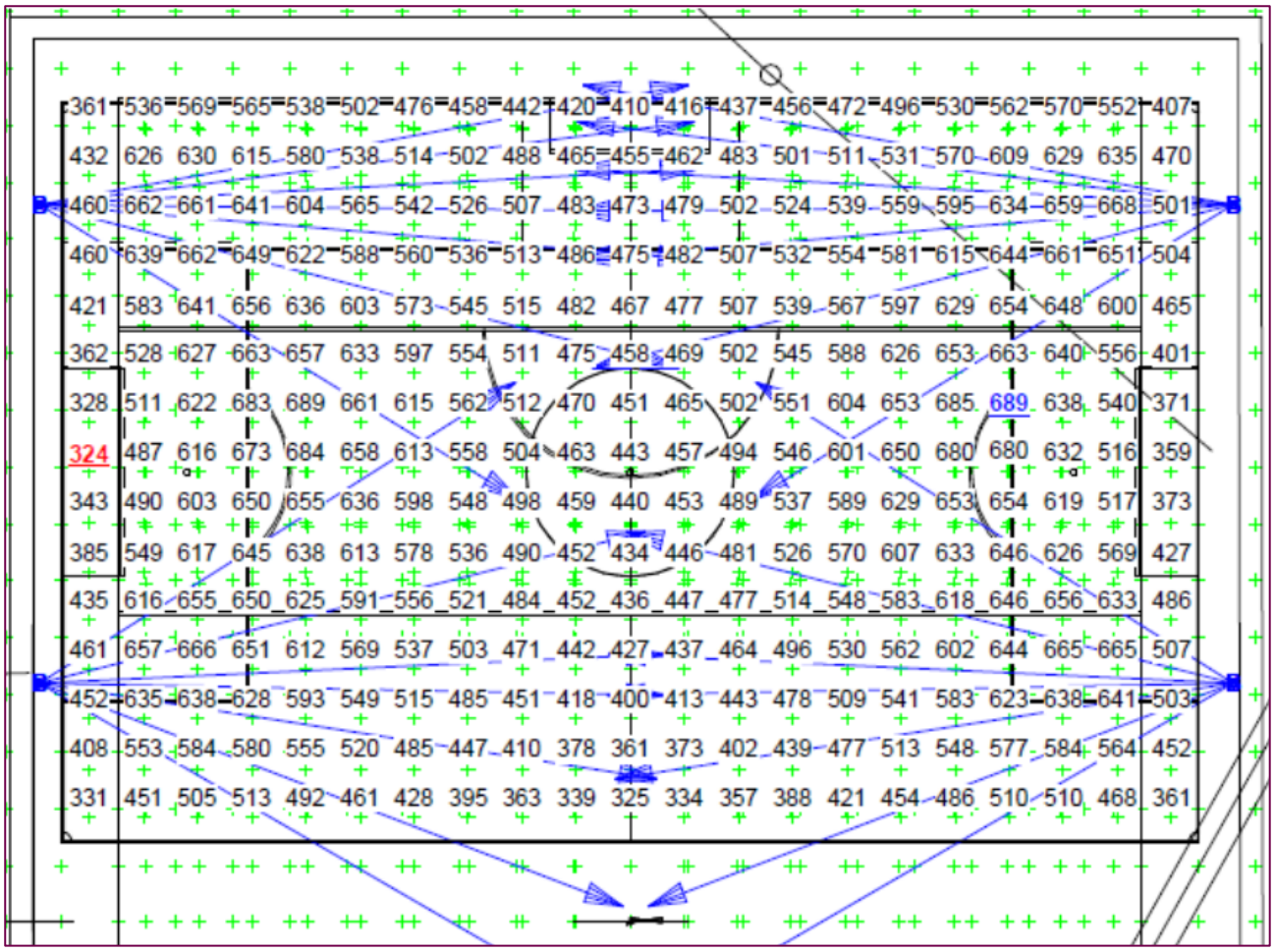

Figure 18.11: Main 4G Synthetic Pitch A

18.5.7.7.10.1 Lighting Column Positions – Main 4G Pitch B

Lighting columns for the main 4G pitch B are illustrated in Figure 18.12 below.

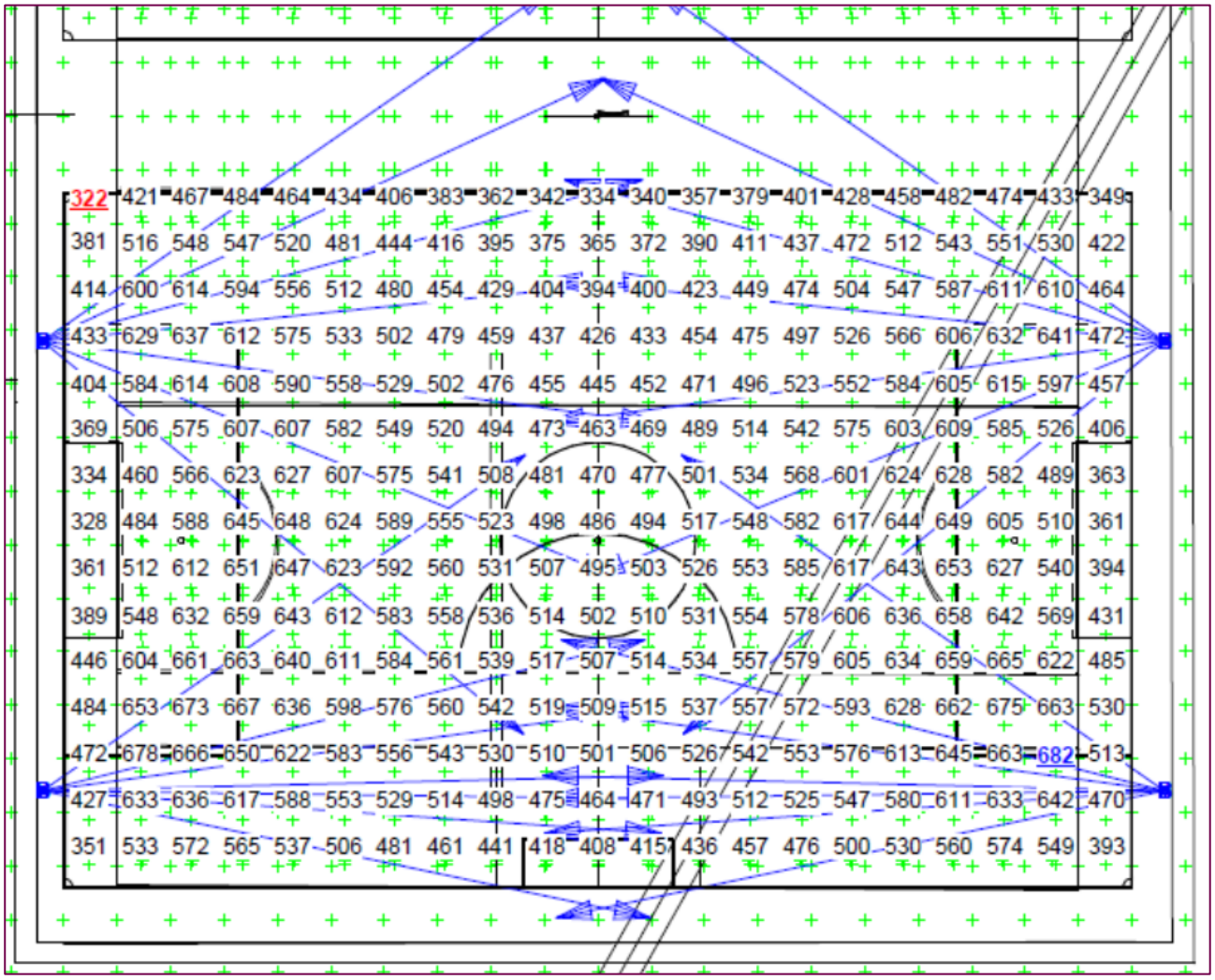

Figure 18.12: Main 4G Synthetic Pitch B

18.5.7.8 Grass/Sand Competition Pitch

18.5.7.8.4 Design Illuminance

Table 18.13 summarises the light levels for the grass/sand competition pitch.

Table 18.13: Summary of light levels for the entitled pitch(es)

	Main	Pitch A	Pitch B
Eav (lux)	547	-	-
Emin (lux)	393	-	-
Emax (lux)	**684**	**-**	**-**
Emin/Eav	0.72	-	-
Emin/Emax	0.57	-	-

18.5.7.8.5 CIBSE Lighting Guidance

Table 18.14 summarises the relevant CIBSE light levels for the grass/sand competition pitch.

Table 18.14: Summary of relevant CIBSE light levels for entitled sport type

	GAA	GAA
Class	I	II
Eav (lux)	500	200
Emin/Eav	0.7	0.6

Lighting should provide uniform illumination over the pitch, appropriate for the proposed grade of competition. The lighting should ensure that the full flight of the ball is visible while providing good viewing conditions for players, officials and spectators.

18.5.7.8.6 Light Fitting Quantity

For the grass/sand competition pitch there will be a total of 48No. fittings.

18.5.7.8.7 Electrical Loading

The total installed power associated with the grass/sand competition pitch luminaires is 72.28kW

18.5.7.8.8 Controls

Control via DALI. Dimmable DALI cable for each column, CAT6 Local control cabinets for each pitch. Linked to central site control panel.

18.5.7.8.9 Lighting Column Positions – Grass

There will be a total of 8No. (approx. 20m) columns for the grass/sand competition pitch. Columns are 4-5m back from goal line.

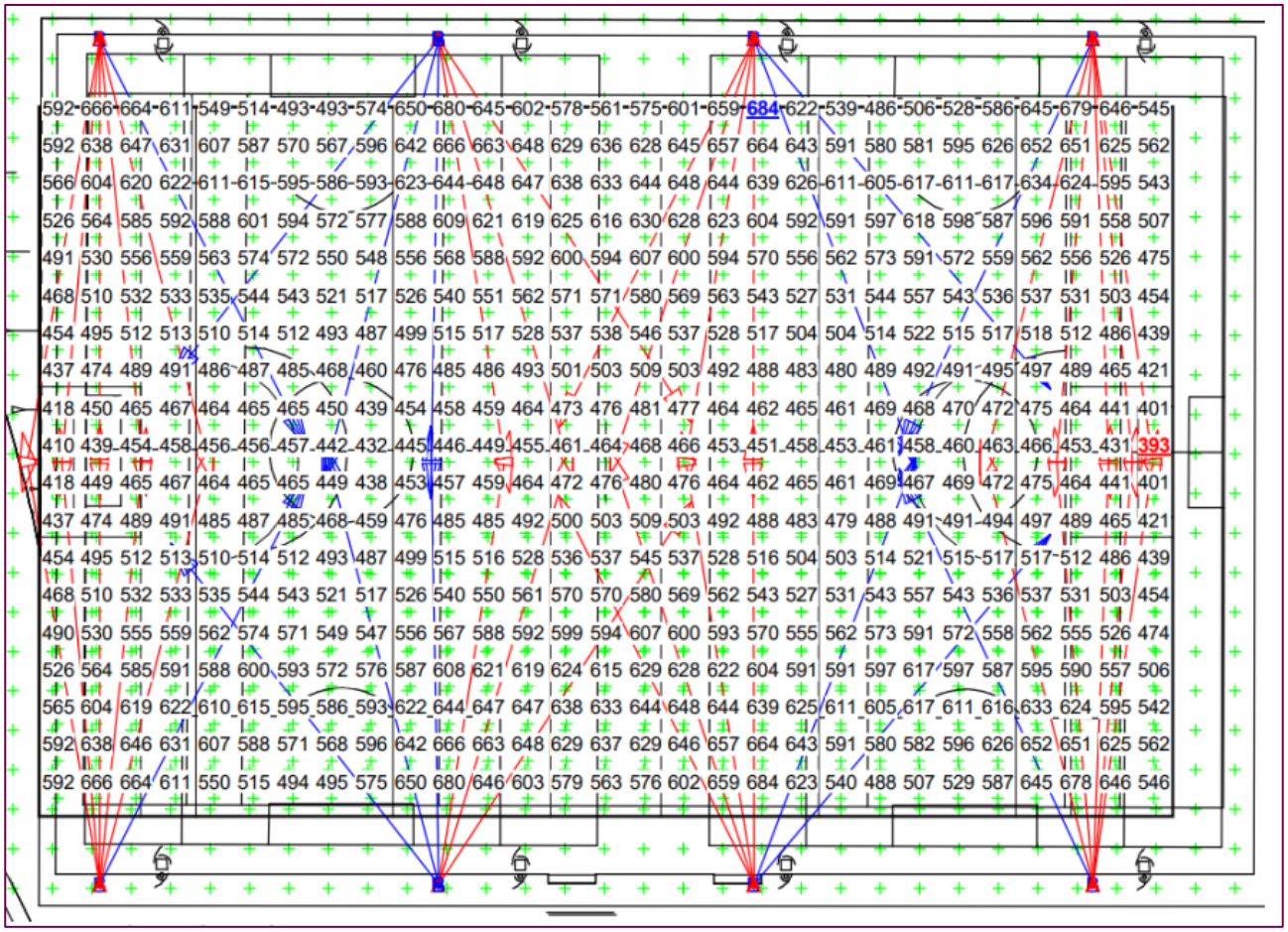

Figure 18.13: Grass/Sand Competition Pitch

18.5.7.9 Synthetic 5 Aside Soccer MUGA

18.5.7.9.4 Design Illuminance

Table 18.15 summarises the light levels for the synthetic 5 aside soccer MUGA.

Table 18.15: Summary of light levels for the entitled pitch(es)

	MUGA 1	MUGA 2	MUGA 3	MUGA 4
Eav (lux)	436	433	438	433
Emin (lux)	328	339	330	344
Emax (lux)	507	497	509	497
Emin/Eav	0.75	0.78	0.75	0.80
Emin/Emax	0.65	0.68	0.65	0.69

18.5.7.9.5 Light Fitting Quantity

For the synthetic 5 aside soccer MUGA there will be a total of 4x4No. fittings.

18.5.7.9.6 Electrical Loading

The total installed power associated with the grass/sand competition pitch luminaires is 24.08kW.

18.5.7.9.7 Controls

Control via DALI. Dimmable DALI cable for each column, CAT6 Local control cabinets for each pitch. Linked to central site control panel.

18.5.7.9.8 Lighting Column Positions – MUGA 1

There will be a total of 6No. (approx. 12m) columns for each pair of MUGA pitches.

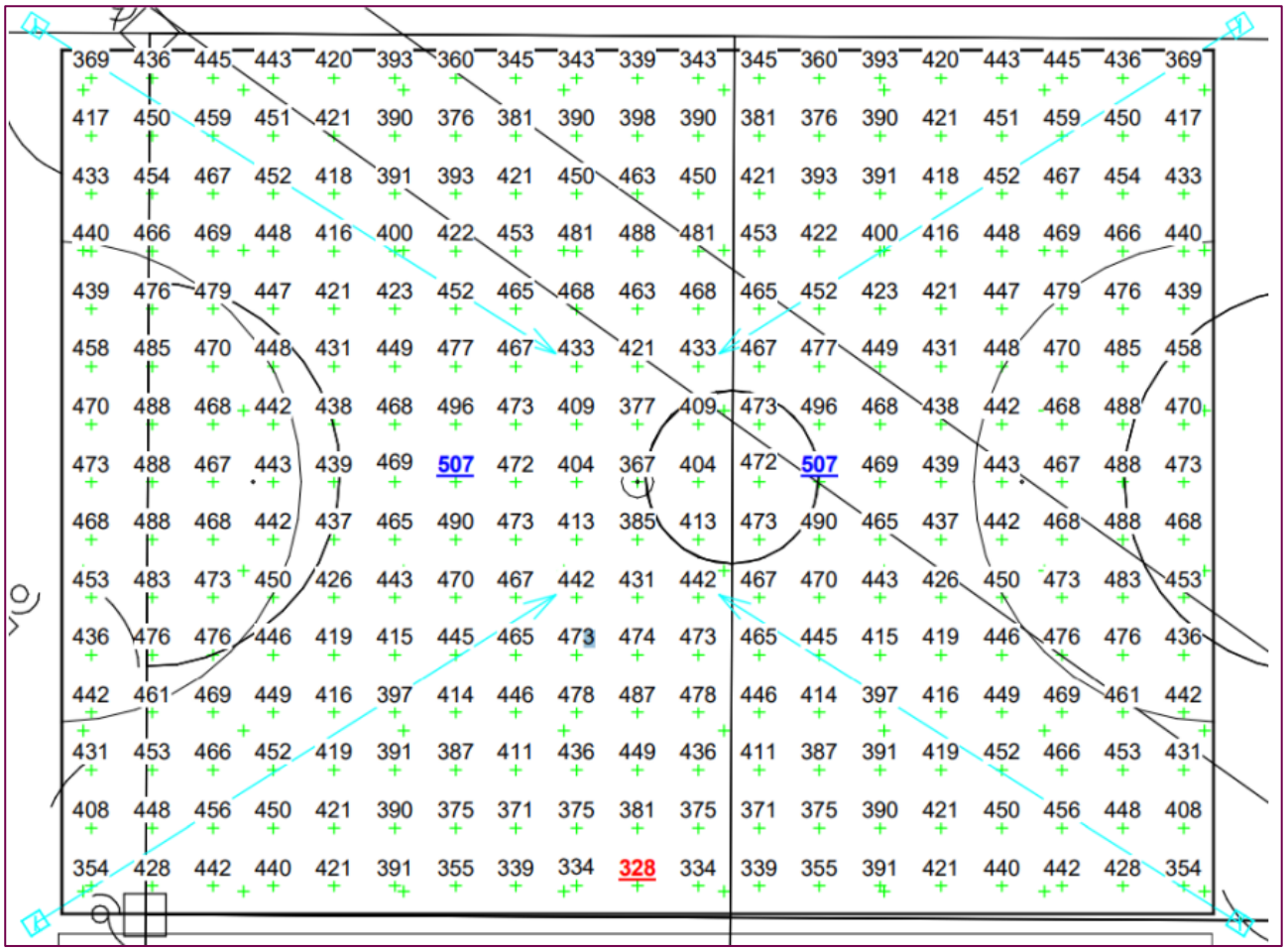

Figure 18.14: Synthetic 5 Aside Soccer MUGA – MUGA 1

18.5.7.9.9 Lighting Column Positions – MUGA 2

There will be a total of 6No. (approx. 12m) columns for each pair of MUGA pitches.

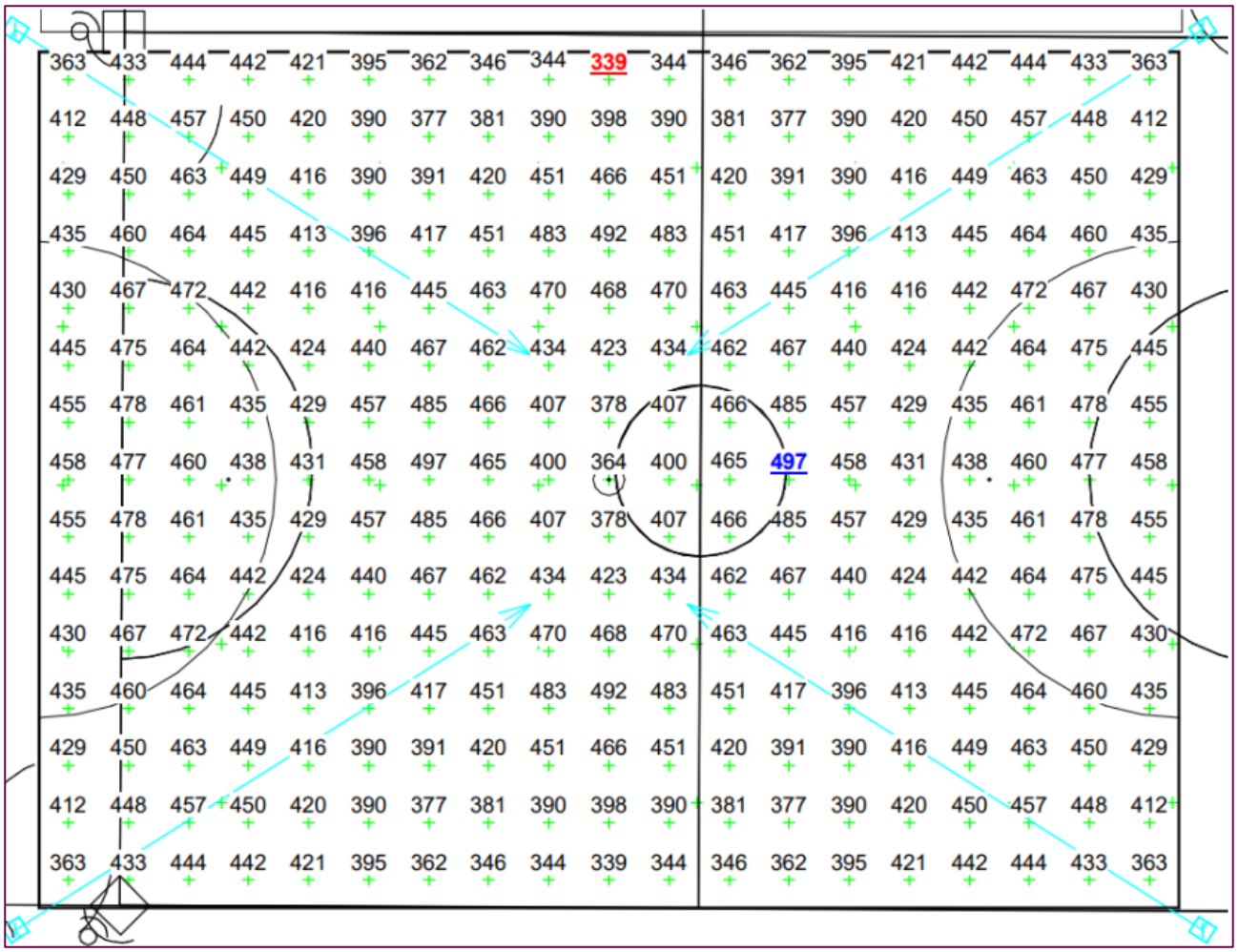

Figure 18.15: Synthetic 5 Aside Soccer MUGA – MUGA 2

18.5.7.9.10 Lighting Column Positions – MUGA 3

There will be a total of 6No. (approx. 12m) columns for each pair of MUGA pitches.

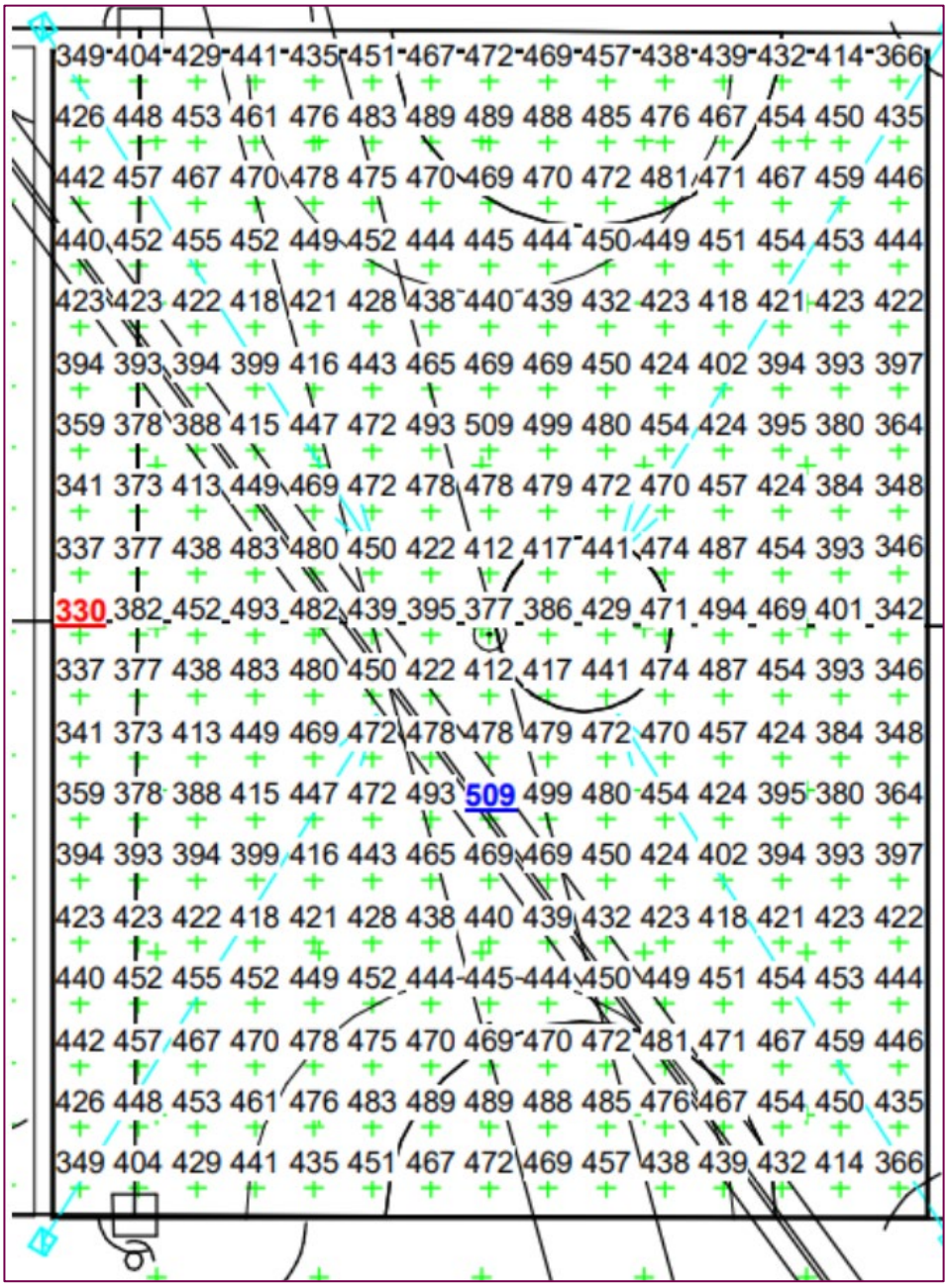

Figure 18.16: Synthetic 5 Aside Soccer MUGA – MUGA 3

18.5.7.9.11 Lighting Column Positions – MUGA 4

There will be a total of 6No. (approx. 12m) columns for each pair of MUGA pitches.

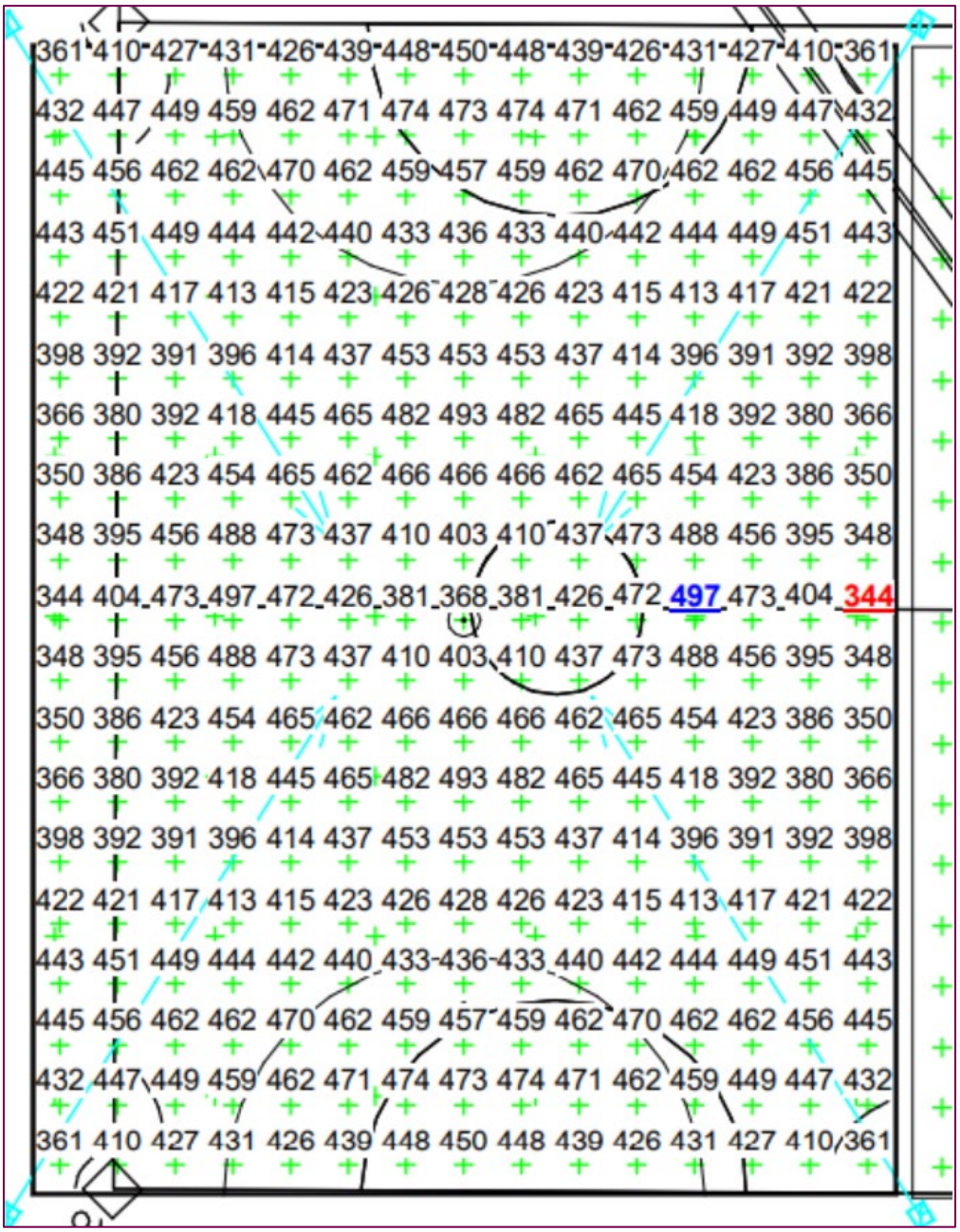

Figure 18.17: Synthetic 5 Aside Soccer MUGA – MUGA 4

18.5.7.10 Athletics Sprint Track

18.5.7.10.4 Design Illuminance

Table 18.16 summarises the light levels for the athletics sprint track.

Table 18.16: Summary of light levels for the entitled track

	Sprint Track
Eav (lux)	395
Emin (lux)	285
Emax (lux)	**524**
Emin/Eav	0.72
Emin/Emax	0.54

18.5.7.10.5 CIBSE Lighting Guidance

Table 18.17 summarises the relevant CIBSE light levels for athletics.

Table 18.17: Summary of relevant CIBSE light levels for athletics.

	Athletics
Class	**III**
Eav (lux)	200
Emin/Eav	0.70

Sprint track is classed as class III for an outdoor track.

18.5.7.10.6 Light Fitting Quantity

For the athletics track there will be a total of 2No. (approx. 12m) columns.

18.5.7.10.7 Electrical Loading

The total installed power associated with the athletics track luminaires is 3.01kW.

18.5.7.10.8 Controls

Control via DALI. Dimmable DALI cable for each column, CAT6 Local control cabinets for each pitch. Linked to central site control panel.

18.5.7.10.9 Lighting Column Positions – Athletics Sprint Track

There will be a total of 2No (approx. 12m) columns on the athletics sprint track.

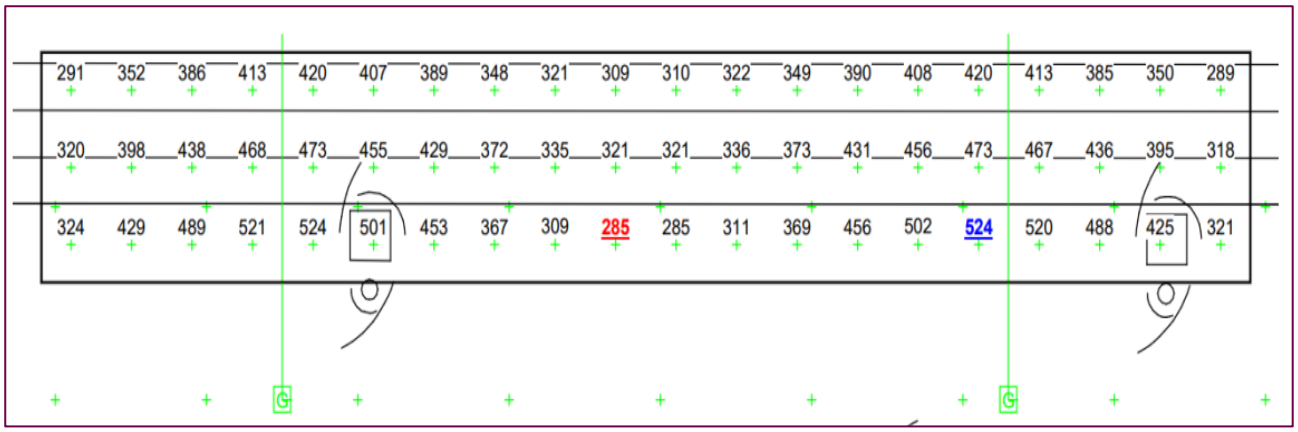

Figure 18.18: Athletics Sprint Track

18.5.8 Operational Lighting Analysis

When an external area is lit by some incident task light (such as a floodlight), there is always some degree of obtrusive light; some light will inherently escape from the site installation into the local environment. This is a consequence of surface reflectance, fitting profile, positioning, and mounting height. As discussed below, it is important to properly control the degree of obtrusive lighting due to the potential negative impact it can have on the surrounding area. Lighting calculations have been carried out for the proposed installation design that allow the degree of obtrusive lighting to be measured and assessed against relevant criteria.

18.5.8.5 Consequences of Obtrusive Lighting

Obtrusive light, if not controlled, can have an adverse effect on residents, the local ecology, and adjacent lighting installations.

18.5.8.5.4 Residential Impact

The circadian rhythm in humans is dependent on bright light during the day and minimal light at night. Frequent disruption of the circadian rhythm can negatively affect human health. Obtrusive light incident on windows may disrupt the sleep of nearby residents, therefore light intrusion on occupied buildings should be minimised as much as possible.

18.5.8.5.5 Ecological Impact

Uncontrolled obtrusive lighting can have a severely negative impact on nocturnal fauna, especially bats. Artificial lighting can delay bats emerging at night to forage, which shortens the amount of time they are active. Furthermore, bright lighting may draw insects, upon which bats prey, away from their natural foraging sites meaning they would need to fly greater distances increasing the likelihood of exhaustion or being hunted.

The illumination of bat roosting sites and commuter routes (dark areas which bats move through) must be avoided. Light restrictions may be enacted based upon the feeding and roosting of bats if it is deemed necessary, following an environmental impact study.

Plants (flora) use light as a source of energy and information.

Artificial lighting can induce budding and flowering out of season, opening plants up to frost damage, and also inhibit leaf growth by affecting cryptochrome proteins sensitive to blue light.

18.5.8.6 Mitigating Obtrusive Lighting

General measures that mitigate the effect of obtrusive lighting, that have been considered for the proposed installation, are outlined below.

18.5.8.6.4 Installation Positioning

If there is space available, the distance between the lighting installation and sensitive areas can be maximised while maintaining a balance against other design principals.

A buffer zone along the site boundary that excludes high powered lighting would significantly reduce the magnitude of obtrusive lighting.

18.5.8.6.5 Directional Lighting

In regard to a lighting installation, the design should focus the light on the area of interest as much as possible to limit spill lighting.

When selecting light fittings, calculations should be used to verify that the light profile of said fittings are sufficient to both provide the target light level and concurrently mitigate the amount of spill lighting. The mounting height should also be chosen appropriately.

18.5.8.6.6 Lighting Controls

A curfew for the floodlighting installation should be set in place, where pitch activity ends, and the lighting installation is switched off.

The maximum acceptable light levels during pre-curfew times are greater than those during post curfew times. Obtrusive lighting calculations may necessitate a curfew to stay within these acceptable limits.

18.5.8.7 Obtrusive Lighting

As discussed above, obtrusive light is light emitted by site luminaires that escapes from the targeted area. The obtrusive light level (illuminance) of the proposed floodlighting installation was calculated on a grid and assessed against guidance criteria.

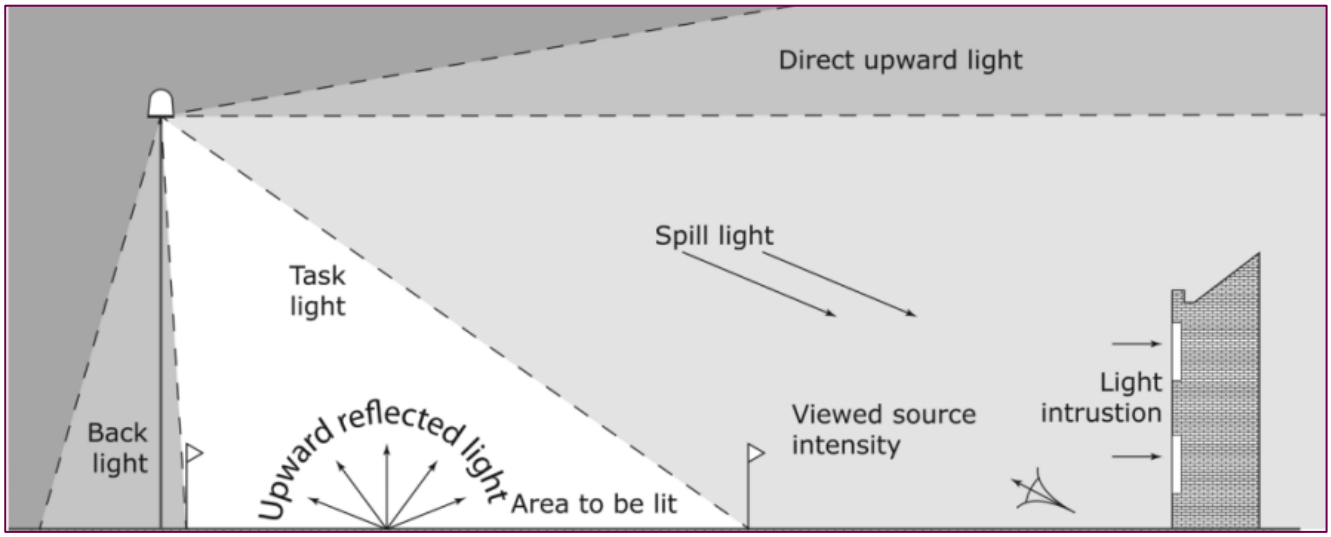

Figure 18.19: Types of obtrusive light

18.5.8.7.4 Environmental Zone

The permitted luminance of obtrusive light depends on the site's proximity of the site to the town centre and any existing curfew regulations. In the case no curfew regulations are available, the higher values shall not be exceeded, and the lower values should be taken as preferable limits.

As outlined in Section18.4.2 of this Chapter, the northern, western and southern boundaries of the proposed development site consist mainly of suburban and residential areas (**Environmental Zone 3**).

Given the proximity from town centre and the presence of suburbs, an environmental zone of **E3** is selected for the proposed development.

Table 18.18: Environmental Zones

Environmental Zone	Surrounding	Lighting Environment	Examples
E0	Protected	Dark (SQM 20.5+)	Astronomical Observable dark skies, UNESCO starlight reserves, IDA dark sky places
E1	Natural	Dark (SQM 20 to 20.5)	Relatively uninhabited rural areas, National Parks, Areas of Outstanding Natural Beauty, IDA buffer zones etc.
E2	Rural	Low District Brightness (SQM 15 to 20)	Sparsely inhabited rural areas, village or relatively dark outer suburban locations
E3	**Suburban**	**Medium district brightness**	**Well inhabited rural and urban settlements. Small town centres of suburban locations**
E4	Urban	High district brightness	Town/city centres with high levels of night-time activity

18.5.8.7.5 Limitation of Obtrusive Light

The table below summarises the maximum illuminance allowed to be incident upon adjacent properties:

Table 18.19: Limiting Ev values for each environmental zone

Environmental Zone	Light Level on Properties	
	Ev (lux)	
	Pre-Curfew	Post-Curfew
E1	2	0
E2	5	1
E3	**10**	**2**
E4	25	5

Ev is the maximum value of vertical illuminance on properties in lux

The obtrusive lighting calculations in this report use a maintenance factor (MF) of 1.0, which differs from the performance MF used in design. According to ILP Guidance PLG 04, obtrusive light calculations must always use a MF of 1.0 to represent the worst-case scenario.

To consider an observer's point of view, the vertical illuminance was calculated at a height z = 5m across the site to represent the light intrusion on the first floor of nearby buildings. Due to the nature of the floodlighting profile, light levels will be greater at lower values of z given that no shading is present.

Pitch elevation is assumed to be uniform, elevation of residential houses is included for.

External building facades are taken to be accurate on plan drawings.

18.5.8.8 Design Measures taken to Reduce Obtrusive Light

Measures that were taken to help mitigate the propagation of obtrusive light:

- In the case of the ATU Sports Hub, the pitches were kept as far away from residential spaces as is reasonable.
- Low light pollution, directional fittings were specified throughout.
- The fitting type and mounting height have been selected depending on their function. For example, along walkways, bollard fittings were used to further lower the light profile of the site.
- A lighting controls strategy w/ photocell and time clock is implemented to enable the control of external site lighting and to comply with acceptable light levels at both post- and precurfew times.
- Asymmetrical profile floodlight fittings were used which limits their angle of tilt, thereby minimising the risk of glare.
- An extensive control scheme has been considered, meaning the floodlights can be controlled independently from each other depending on usage requirements.
- There is a difference between what is acceptable during curfew and non-curfew times, for this reason controls have been proposed to conform to these time frames.
- Pitch lighting will be reduced from competition levels for training.

18.5.8.9 Simulation Software Assumptions

In calculating the light levels of the installation on areas surrounding the site, it was made sure that any assumptions made would tend towards the worst-case scenario. The advantage the residential area would gain by being on a different elevation was not allotted. In reality, glare would be dramatically reduced by being at a higher elevation. Also, no allowance is made for external shading (for example, vegetation, topography.) Furthermore, no allowance is made for internal shading devices (for example, curtains.) For the light level plots, it was assumed that all pitch floodlighting was on, and set to the maximum competition level.

18.5.8.10 Illuminance plots: horizontal (Eh) and Vertical (Ev)

See below for illuminance plots, both horizontal (Eh) and vertical (Ev).

18.5.8.10.4 Horizontal (Eh) Illumination Calculation

Figure 18.20 below illustrates the calculated horizontal (eh) contour illuminance from the proposed development. Circled in red are the nearest sensitive receptors, located at Brookfield Heights and Hazelwood Drive.

Z = 0m

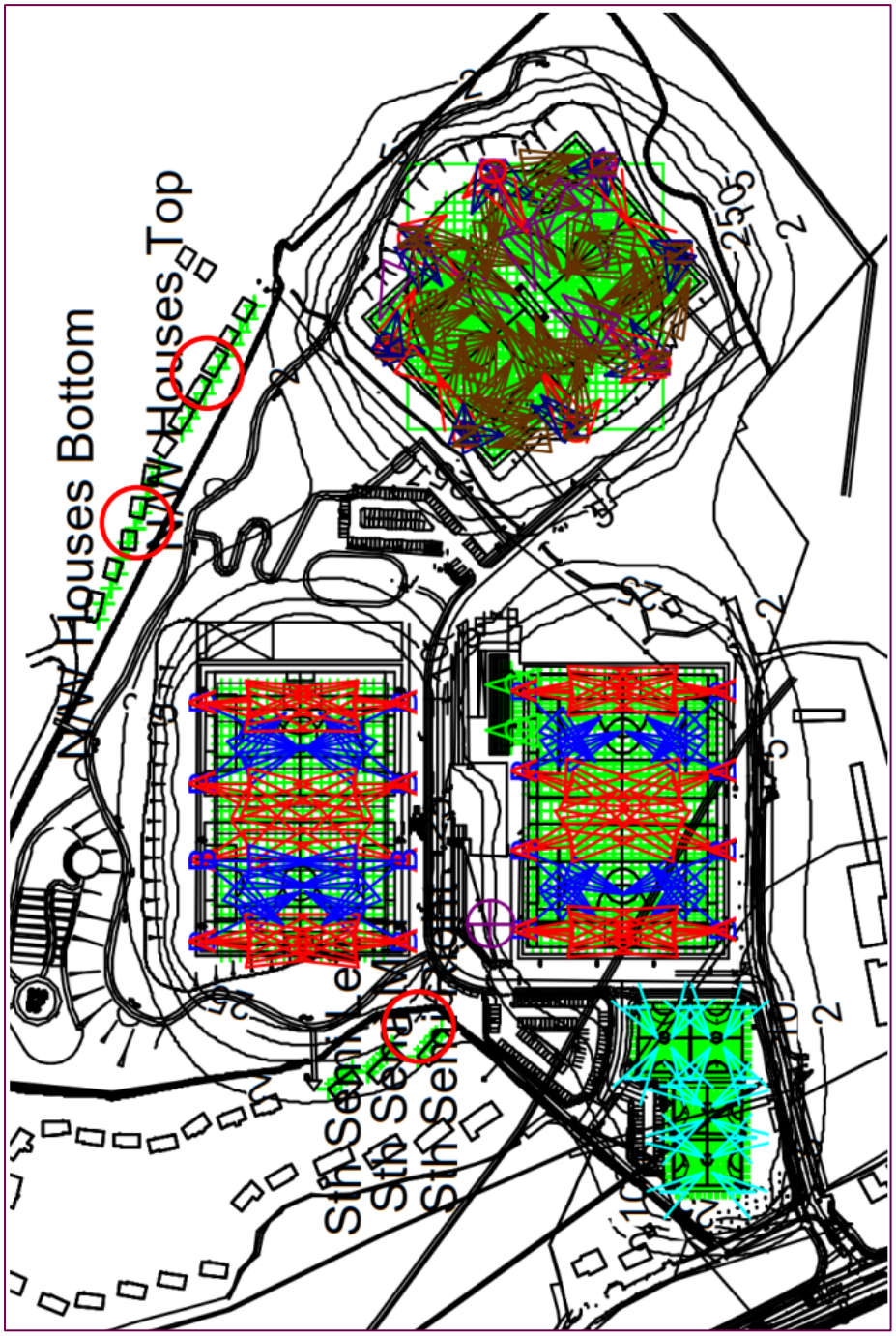

Figure 18.20: Contour illuminance (horizontal)

Figures 18.21 – 18.23 below illustrate a detailed close up of the calculated horizontal (eh) contour illuminance from the proposed development on sensitive receptors, located at Brookfield Heights (North-west top and bottom) and Hazelwood Drive (south) right.

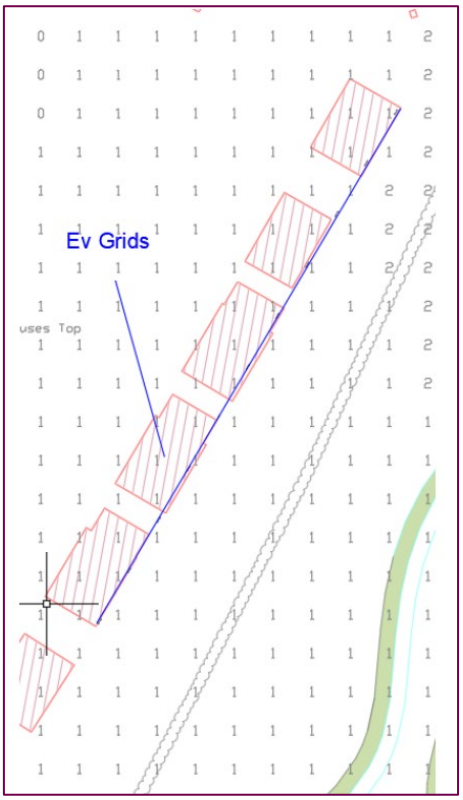

Figure 18.21: Grid illuminance (horizontal): Residential buildings (north-west) Top

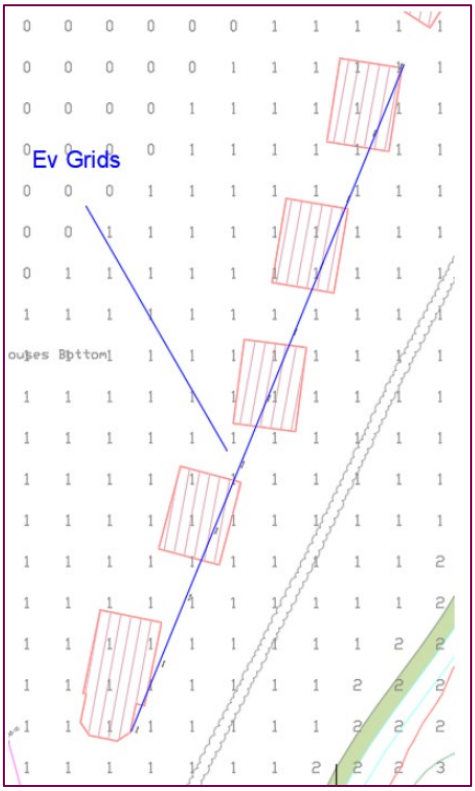

Figure 18.22: Grid illuminance (horizontal): Residential buildings (north-west) Bottom

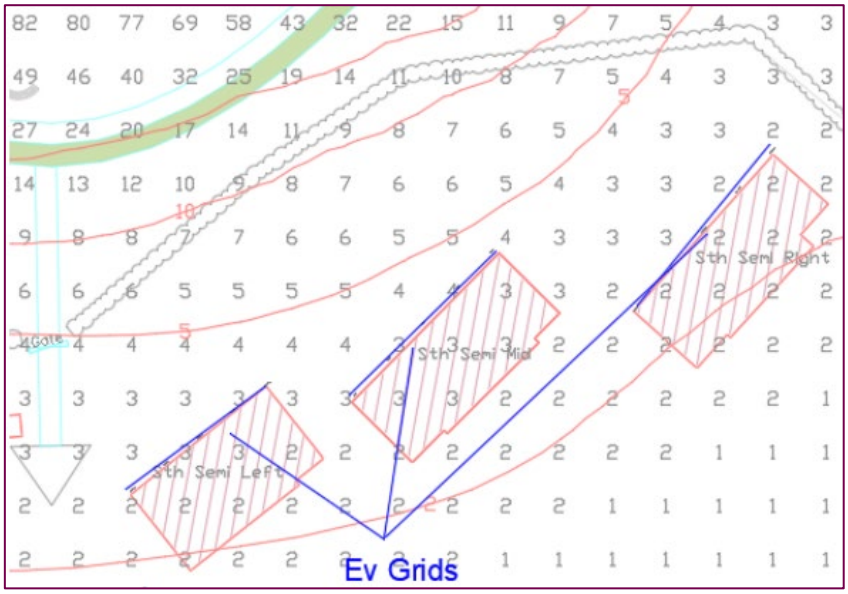

Figure 18.23: Grid illuminance (horizontal): Residential buildings (south) top and bottom, respectively

18.5.8.10.5 Vertical (Ev) Illumination Calculation

Nearby sensitive receptors on the residential-site boundary are defined below:

- North-west Houses, top (Brookfield Heights)
- North-west Houses, bottom (Brookfield Heights)
- South Semi-Detached Houses (south) right (Hazelwood Drive)

It is noted that residential buildings are not provided with the expected degree of shading, that would otherwise separate them from the proposed site. Some of the buildings may be at a higher elevation than modelled.

Grid illuminance views of the above residential facades are shown below:

18.5.8.10.5.1 North-west Houses, top (Brookfield Heights)

Vertical (Ev) grid illuminance views of the residential facades located to the North-west (top of Brookfield Heights), are shown below in Figure 18.24 below.

Note: The lower red line is representative of the ground floor window level and the top red line is representative of the 1st floor window level

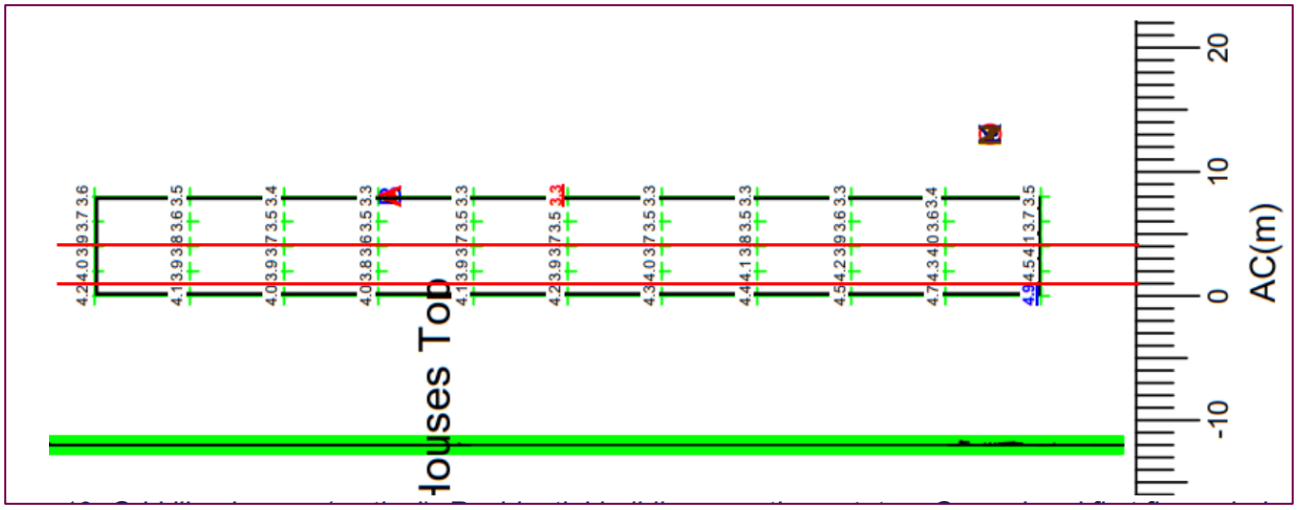

Figure 18.24: Grid illuminance (vertical): Residential buildings, north-west, top. Ground and first floor window levels shown

As illustrated in Figure 18.24 above the predicted Vertical (Ev) Illumination Calculation for residential properties located to the North-west (top of Brookfield Heights) are as follows.

- Ground floor window level: 3.8 – 4.9 Vertical (Ev) Illuminance; and
- First floor window level: 3.6 – 4.1 Vertical (Ev) Illuminance.

18.5.8.10.5.2 North-west Houses, bottom (Brookfield Heights)

Vertical (Ev) grid illuminance views of the residential facades located to the North-west (bottom of Brookfield Heights), are shown below in Figure 18.25 below.

Note: The lower red line is representative of the ground floor window level and the top red line is representative of the 1st floor window level.

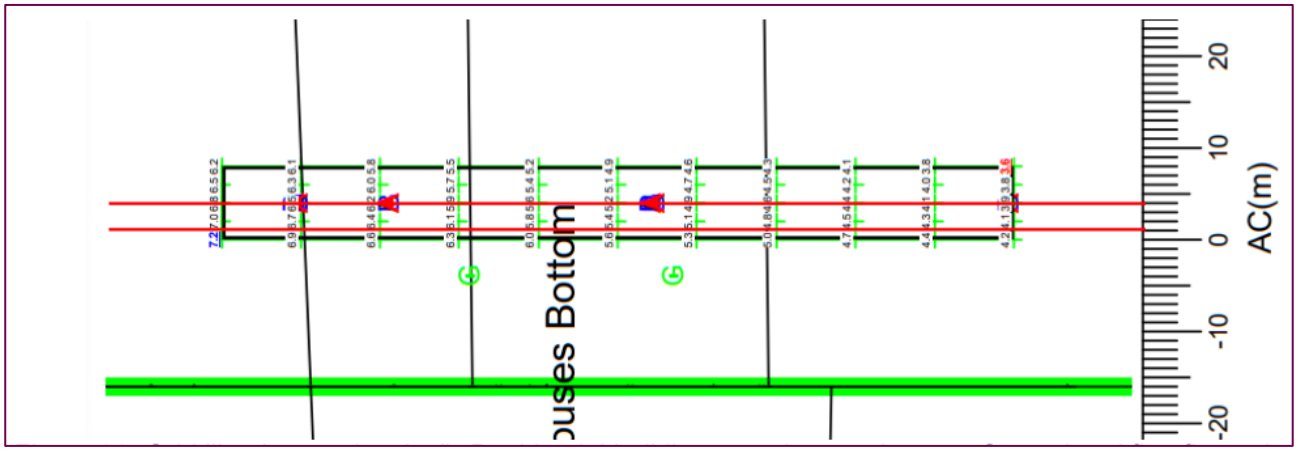

Figure 18.25: Grid illuminance (vertical): Residential buildings, north-west, bottom. Ground and first floor window levels shown

As illustrated in Figure 18.25 above the predicted Vertical (Ev) Illumination Calculation for residential properties located to the North-west (bottom of Brookfield Heights) are as follows.

- Ground floor window level: 4.1 – 7.2 Vertical (Ev) Illuminance; and
- First floor window level: 3.9 – 6.8 Vertical (Ev) Illuminance.

18.5.8.10.5.3 South Semi-Detached Houses, right (Hazelwood Drive)

Vertical (Ev) grid illuminance views of the residential facades located to the North-west (bottom of Brookfield Heights), are shown below in Figure 18.26 below.

Note: The lower red line is representative of the ground floor window level and the top red line is representative of the 1st floor window level.

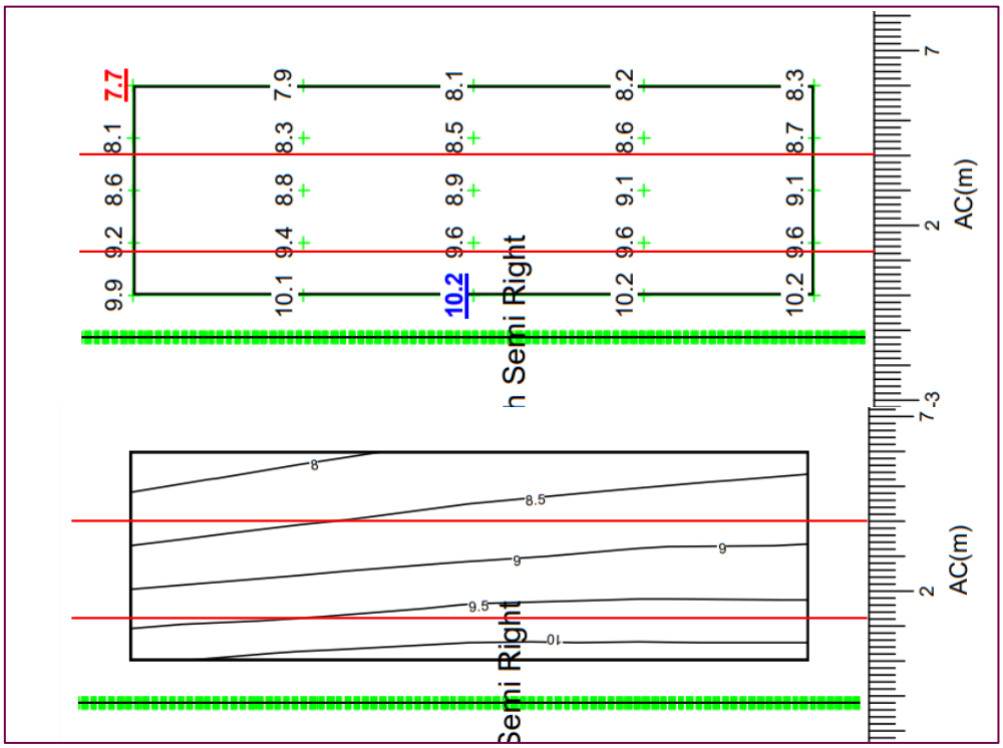

Figure 18.26: Grid and contour illuminance (vertical): Residential buildings, south, right. Ground and first floor window levels shown.

As illustrated in Figure 18.26 above the predicted Vertical (Ev) Illumination Calculation for residential properties located to the South (to the right on Hazelwood Drive) are as follows.

- Ground floor window level: 9.2 – 9.6 Vertical (Ev) Illuminance; and
- First floor window level: 8.1 – 8.7 Vertical (Ev) Illuminance.

18.5.8.11 Discussion of Results

The maximum allotted spill light level on E3 (suburban) property windows is 10 lux for pre-curfew time frames.

From the above illumination contour plots, points of interest, where adjacent buildings are most at risk, are looked at in detail to determine the maximum incident vertical illuminance on the associated facade.

Regarding these residential buildings, under the worst-case scenario, the vertical illuminance incident on the building surfaces does not exceed 10lux at the window levels, meaning they are within the limits of a suburban environmental zone.

18.5.8.11.4 ESB Networks building, east point of interest

Regarding the commercial properties on the east side of the site, the property is modelled as slightly exceeding the 10lux illuminance boundary. A maximum illuminance of 11 lux is incident on this building. The building is in compliance with an E4 (urban) environmental zone which allows for a maximum of 25 lux.

This building is assumed not to be occupied during evening hours and would not be as great as concern as the residential buildings.

Grid illuminance view of the commercial area is shown below.

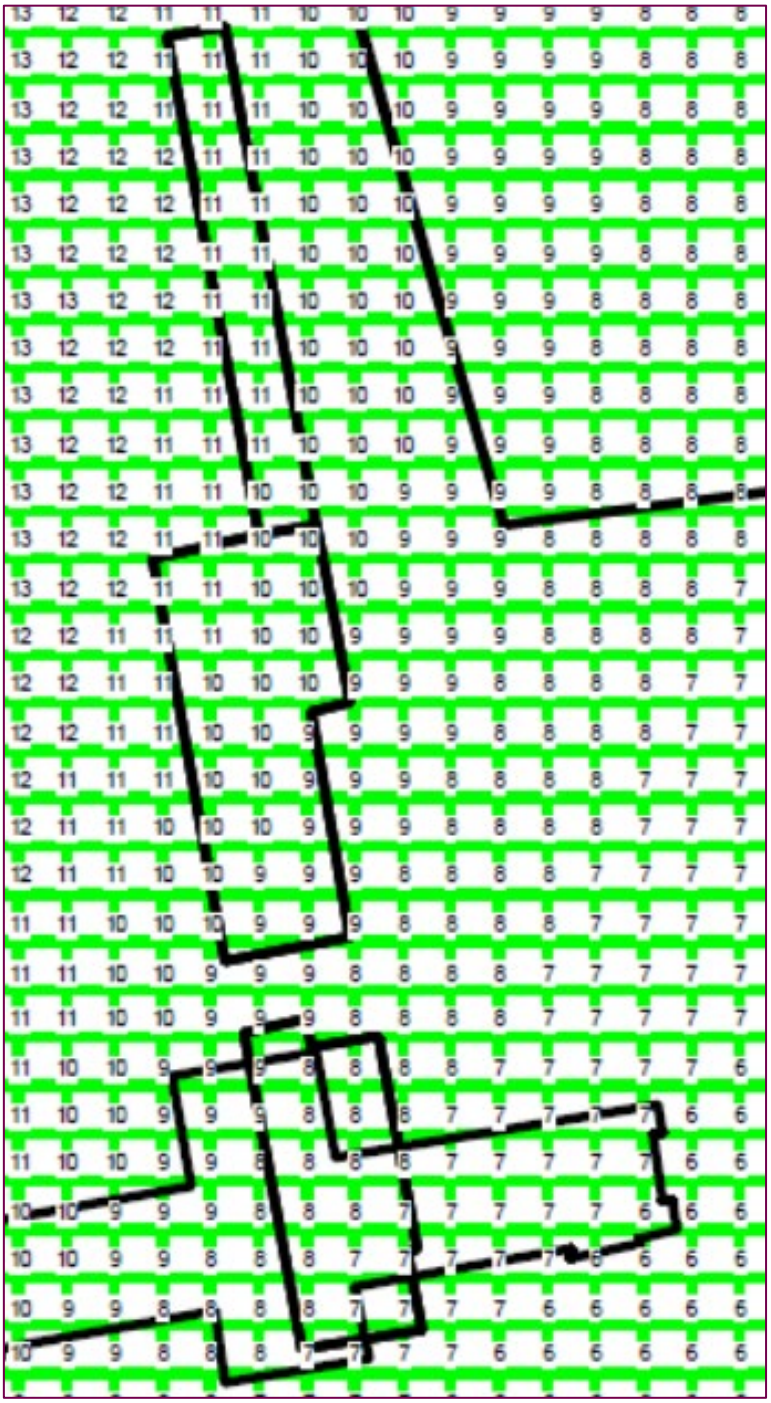

Figure 18.27: Grid illuminance (vertical): ESB Networks building, east point of interest

18.5.8.12 Sky Glow

Skyglow is the illumination of the sky via upward light, either direct or reflected. This artificial light can wash out natural light sources.

18.5.8.12.4 Limitation of Skyglow

The table below summarises the upward light ratio allowed to be incident upon adjacent properties:

Table 18.20: Limiting upward light ratios for each environmental zone

Environmental Zone	Upward Light Ratio %
E1	0
E2	2.5
E3	**5**
E4	15

Upward light ratio is the proportion of the flux of the luminaires that is emitted above the horizontal, when the luminaires are mounted in their installed position and attitude and given in %.

18.5.8.12.5 Upward Light Ratio (ULR) Calculation

The ULR of the whole installation, given the worst case (all floodlights on) is 0.01 ULR.

Table 18.21: Limiting upward light ratios for the proposed lighting installation

Installation	Upward Light Ratio %
Sports Hub Floodlighting	1

18.5.8.12.6 Discussion of Results

The upward skyglow for the installation is shown to be within the limits for the specified environmental zone, given pre-curfew hours.

18.5.9 Assessment of Construction Lighting Effects

It is anticipated the key potential sources of light during the construction phase will include the following:

- Floodlight and security lighting associated with temporary car parking areas for workers, any secure compound and any perimeter fencing/hoarding
- Security lighting will be operational during the hours of darkness. Security lighting is normally concentrated towards the perimeter and entrances to a construction site.
- Health and safety lighting associated with working areas.

Lighting for health and safety will be required where work is required to take place during the hours of diminishing ambient lighting levels which is likely to occur when the construction works are carried out during the winter months.

This form of lighting will become non-operational outside of the operational working hours of the construction site. The magnitude of effects on receptors at nearby residential properties caused by this type of lighting are considered to be minor adverse (for nuisance glare and light trespass at worst) due to the temporary-short term nature that this lighting will be in operation (Likely to occur during winter months where daylight hours are reduced).

On balance, this element of the works will have an overall minor adverse effect for the duration of the construction phase. A range of mitigation measures are detailed in order to control and manage potential impacts from construction lighting. These are detailed in section 18.5.13.

18.5.10 Assessment of Operational Lighting Effects

18.5.10.5.4 Operational Phase – Glare/Source (Luminaire) Intensity

In context of the ILP guidance notes, the industry standard would be a 'pass' against the benchmark and conversely non-compliance would be a 'fail'. The limitations indicated within the ILP document are maximum values.

Notwithstanding, these benchmarks are advisory and not mandatory, furthermore the ILP document acknowledges that it may be difficult to achieve compliance in all respects. The following sections detail the lighting scheme in terms of the ILP guidance notes.

Operational phase impacts are detailed in Table 18.22 and compares the estimated luminance with the E3 Environmental Zone recommendations.

Table 18.22: Interpolated Luminaire Intensity - Proposed Lighting

Area Ref No.	Description of Area	Environmental Zone E3 Advisory Design Criteria
1	Residential buildings, North-west Houses, top (Brookfield Heights)	Pass
2	Residential buildings, North-west Houses, bottom (Brookfield Heights)	Pass
3	Residential buildings, South Semi-Detached Houses, right (Hazelwood Drive)	Pass
4	ESB Networks building, east point of interest	N/A

All areas will be designed to satisfy the pre-curfew and post-curfew recommendations as set out in Table 18.5 for relevant environmental zones as referenced. The proposed lighting is predicted to be none/negligible and insignificant for high and medium sensitivity receptors (residential and road users).

The design principles indicate that there will be no breaches of the guidance values represented in the ILP guidance. Luminaire type, position and orientation will ensure that non-conformance of the ILP guidance will not occur at surrounding sensitive receptors.

18.5.10.6 Operational Phase - Light Trespass/Light Intrusion

The adoption of detailed mitigation measures, reference to design standards and use of best available technology (BAT) in the lighting design (LED lighting proposed) will ensure that there is no significant impact from light trespass/nuisance from lighting as part of the proposed development.

The proposed lighting will be designed to have impacts of.

- none/negligible and insignificant for high sensitivity receptors (residential)
- none/negligible and insignificant for medium sensitivity receptors (commercial); and
- none/negligible and insignificant for medium sensitivity receptors (road users).

The design principles indicate that there will be no breaches of the guidance values presented in the ILP guidance.

Luminaire type and position will ensure that non-conformance of the ILP guidance will not occur at sensitive receptors. To avoid any potential for lighting impact on adjacent sensitive receptors, as set out in the mitigation section of this chapter.

18.5.10.7 Operational Phase – Sky Glow

The proposed development will not contribute significantly to sky glow due to the observed sky glow from the suburban area. Given the subjective nature of sky glow, it is difficult to quantify the potential effects due to a number of variables, including that sky glow is measured as a percentage change. Furthermore, best practice guidance will be adopted, which includes the requirement to minimise upwards light emitted and contributions towards sky glow.

Sky glow is considered to apply on an area-wide basis. The luminaire that will be utilised for the lighting design will fit within the E3 Environmental Zone. The proposed lighting is designed to be none/negligible and insignificant for high sensitivity receptors (commercial) and none/negligible and insignificant for medium sensitivity receptors (road users) and would ‘pass’ the acceptability criteria of the ILP guidance.

18.5.10.8 Operational Phase – Building Luminance

Building luminance will be limited to avoid over lighting and related to the general district brightness. In this proposed development building luminance is applicable to buildings directly illuminated as a night-time feature as against the illumination of a building caused by spill light from adjacent luminaires or luminaires fixed to the building but used to light an adjacent area.

The proposed lighting is predicted to be negligible in terms of building luminance as the selected luminaries will ensure adherence to standards set in the ILP and would ‘pass’ the acceptability criteria of the ILP guidance.

18.5.11 Assessment of Cumulative Effects

Cumulative effects are those that may result from the combination of past, present or future actions of existing or planned activities in a close proximity to a project. Cumulative impacts with regard to lighting are not expected due to the distance of other projects to the site. Artificial lighting from other application sites is highly unlikely to impact on the proposed development.

While a single activity may itself result in an insignificant impact, it may, when combined with other impacts (significant or insignificant) in the same geographical area and occurring at the same time, result in a cumulative effect that is significant.

An assessment of the planning approved developments within the local area has shown that there is limited interaction between the proposed development and the planning approved developments.

Where appropriate, other neighbouring schemes have detailed lighting designs and predictions incorporated and submitted as part of planning applications. No significant cumulative artificial lighting impacts are predicted.

18.5.12 Inter-relationships

There is an interrelationship with ecology. The proposed lighting regime will give rise to light levels greater than 1 lux upon all areas of retained habitat within the site and in addition all areas of proposed landscape planting. It is noted that the vast majority of proposed lighting, which is intended to illuminate the various proposed sports fields, will be intermittent in nature and is likely be used more in seasonal period when evenings are darker which also tend to be the periods during which bat activity levels are lower.

Further information on the impact of lighting on bats is detailed in Chapter 14 Biodiversity and is not further detailed in this chapter.

18.5.13 Mitigation Measures

18.5.13.5 Construction Phase Mitigation Measures

The measures required during construction will be installed and arranged with reference to current health and site safety requirements and lighting design best practice, to provide low impact lighting schemes. The impact of any obtrusive light effects on the nocturnal environment will be reduced by the application of the following measures;

1. The use of temporary works lighting will be minimised in terms of frequency and duration.
2. Confine lighting to the task area.
3. Use lower power security lighting where possible (and ensure minimal horizontal/vertical light spill).
4. No luminaires must be allowed to emit light above the horizontal plane.
5. Operate a curfew and minimise the duration of any floodlighting.
6. Operating during normal working hours.
7. Specify the lowest powered light sources possible; and
8. Use of solid site hoarding to contain and limit light spill around the proposed development site during construction (at the same time also improving security).

Specifically in relation to temporary lighting, lighting will be kept to the minimum required for the activity (meeting health and safety requirements). The measures required during construction will be installed and arranged with reference to current health and site safety requirements and lighting design best practice, to provide low impact lighting schemes.

Post-installations checks and monitoring of the lighting installations will be undertaken to ensure that correct tilt angles and appropriate direction of lighting are being achieved.

Such monitoring will ensure that during the construction phase, levels of lighting are maintained in accordance with best practice standards.

18.5.13.6 Operational Phase Mitigation Measures

The lighting scheme concepts are designed to prevent nuisance glare and minimise light trespass. The lighting associated with the proposed development is to provide artificial lighting for security, operational, employee/worker/operative, and internal safety purposes. Measures will be implemented throughout the design scheme to ensure this is achieved without compromising the requirements for adequate lighting.

The key features of the design in mitigation of potential impacts are:

1. The limitations for obtrusive light obtained from the ILP Guidance Notes for the Reduction of Obtrusive Light GN01:2020 as referenced should be adhered to.
2. Lighting levels are designed to relevant British standards (BS EN 12464-2:2014 Light and lighting. Lighting of workplaces. Outdoor workplaces).
3. Any security lighting will be directional on Quay Lane. Impacts on peripheral areas will be minimised by use of appropriate lighting systems.
4. The adoption of detailed mitigation measures through reference to design standards and use of best available technology (BAT) in the lighting design will ensure that there is no significant impact from nuisance glare from lighting as part of the proposed development.
5. LED luminaires are used; and
6. Any lighting restrictions shall be implemented with agreement with Donegal County Council to define hours of illumination as required.

18.5.13.7 Luminaires

It is essential to select the correct luminaire with the right optical distribution and mounting height to minimise light spill and obtrusive light effects, while at the same time providing adequate lighting performance for the required area. The type of luminaire, its light distribution and instalment are all factors which need to be considered.

18.5.13.7.4 Installation

When considering luminaire installation, it is beneficial to use as high a mounting height as possible. As illustrated in Figures 18.28 and 18.29 below, a lower mounting height can result in a significant amount of light spill. The angle of the luminaire is also important. To ensure glare is kept to a minimum, the angle of the luminaire beam must be no greater than 70°. Higher mounting heights allow lower main beam angles, which can assist in reducing glare.

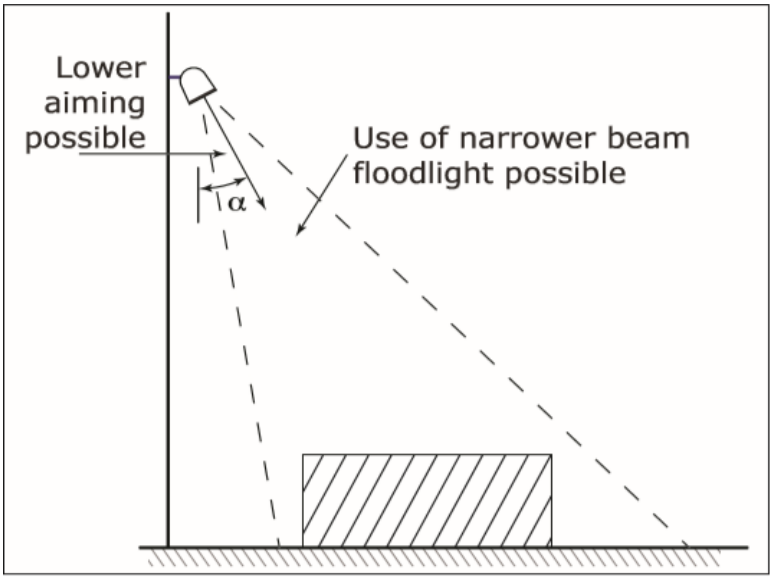

Figure 18.28: Higher Mounting Height – Less Spill Light and Glare

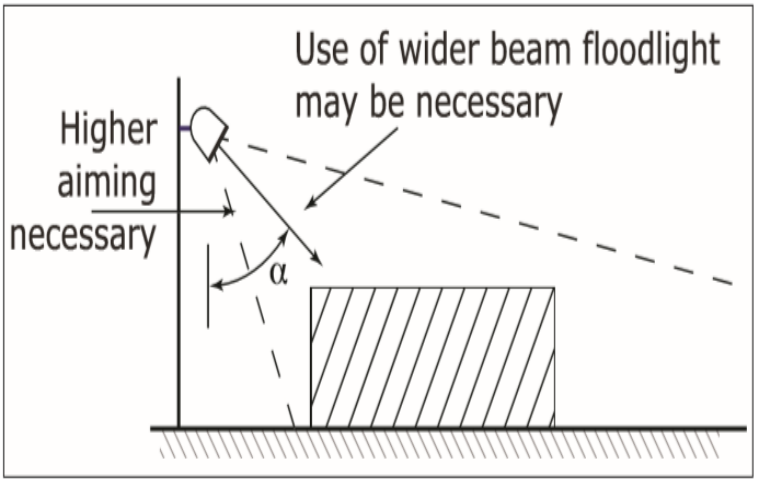

Figure 18.29: Lower Mounting Height –More Spill Light and Glare

The angle of the luminaire is also important. To ensure glare is kept to a minimum, the angle of the luminaire beam must be no greater than 70°. Higher mounting heights allow lower main beam angles, which can assist in reducing glare. Figure 18.30 below, illustrates luminaire aiming angles.

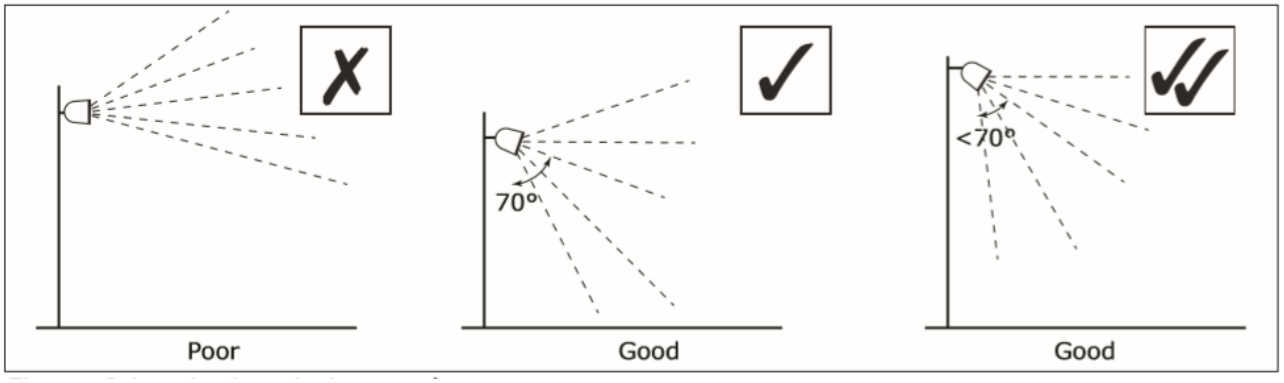

Figure 18.30: Luminaire Aiming Angles

When lighting structures such as buildings or advertising signs, direct light downwards whenever possible. If, like most decorative lighting on buildings, up lighting is required, then it is critical to use the correct optical distribution, coupled with shields if required. Figure 18.31 below illustrates good façade illumination practices.

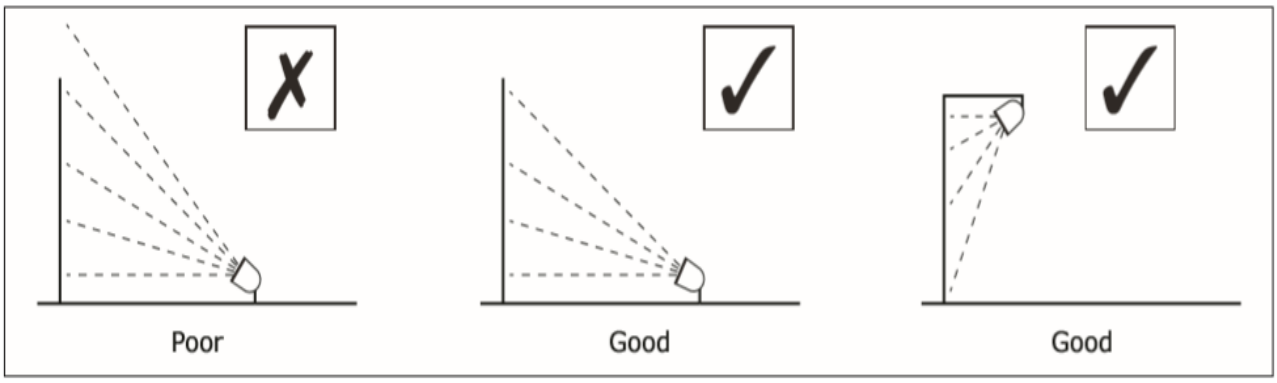

Figure 18.31: Façade Illumination

18.5.13.8 Outdoor Luminaire Classification System

Based upon CIE 150:2017, Figures 18.32 – 18.34 illustrate the different types of luminaire floodlight/projectors and their resulting light beams.

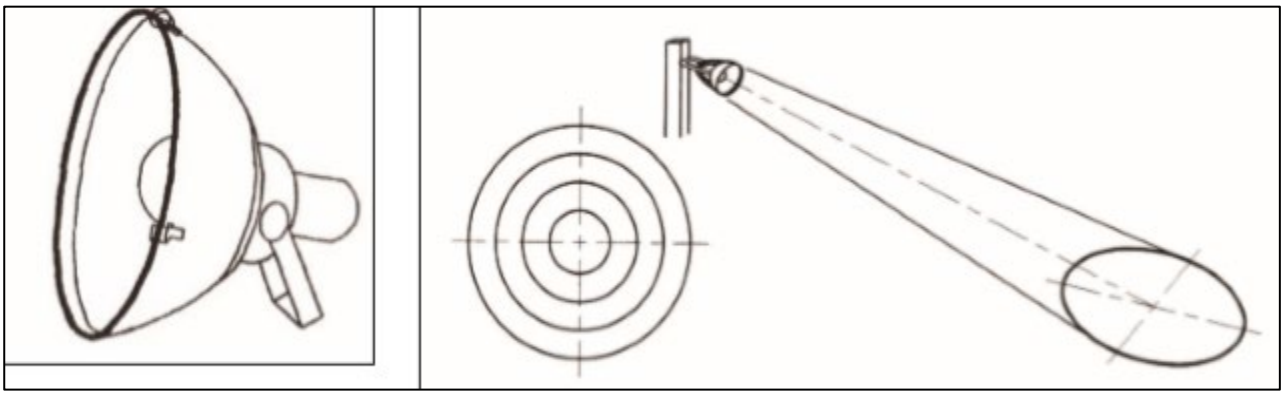

Figure 18.32: Floodlight/Projector Producing a Symmetrical Beam

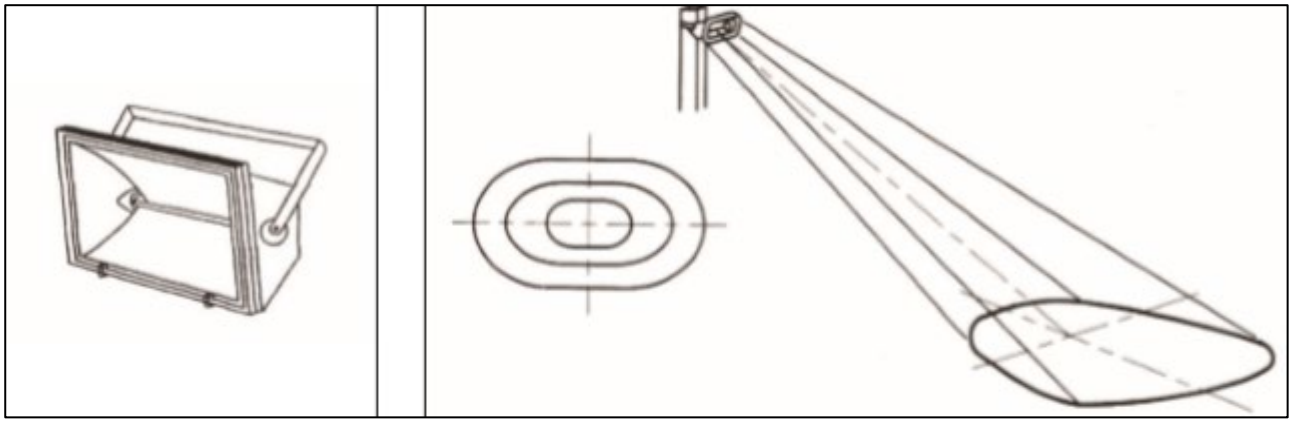

Figure 18.33: Floodlight/Projector Producing a Fan Shaped Beam

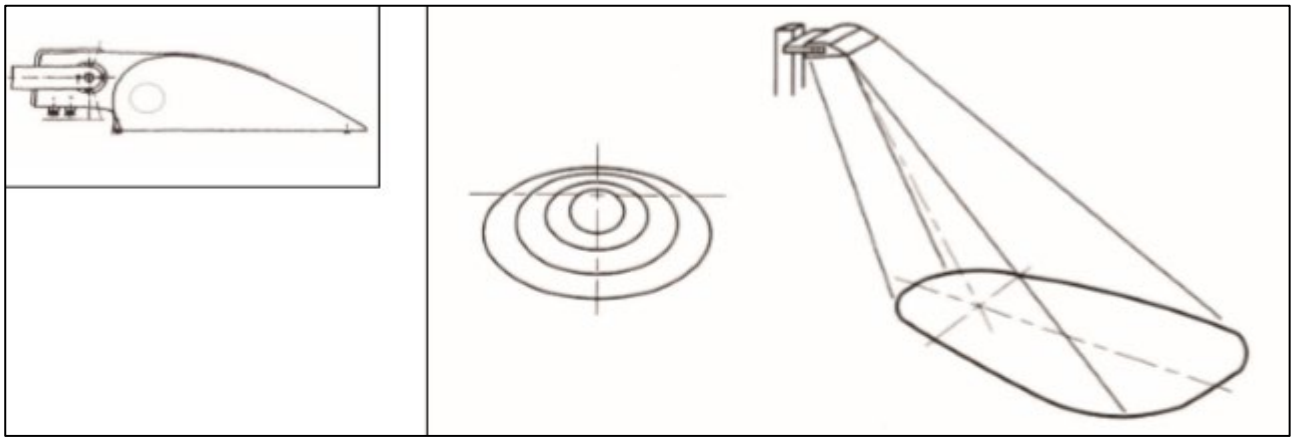

Figure 18.34: Floodlight/Projector Producing a Double Asymmetric Distribution in the Vertical Plane

18.5.13.9 Limiting Obtrusive Light

If required, luminaire accessories may be used to limit obtrusive light and over spill. Figures 18.35 and 18.36 below illustrate these accessories.

Figure 18.35: Luminaire with Cowl, Hood and Shield

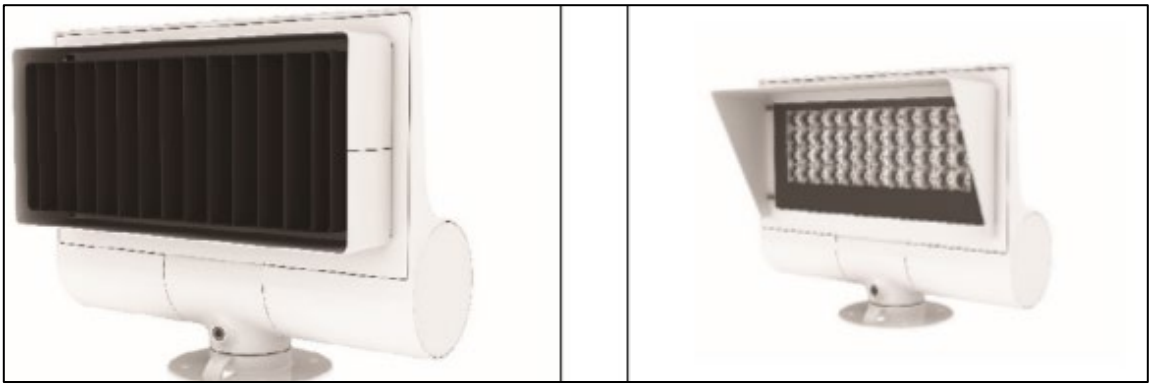

Figure 18.36: Luminaire with Louvre and Luminaire with Cowl

18.5.14 Future Monitoring

Post-installation checks and monitoring of the operational lighting will be undertaken to ensure that correct tilt angles and appropriate direction of lighting are being achieved. Such monitoring will ensure that during the operational phase, levels of lighting are maintained in accordance with best practice standards.

18.5.15 Summary of Effects and Conclusion

Following the implementation of appropriate mitigation, the proposed development will comply with the relevant policies, legislative requirements and best practice guidance in relation to external lighting and minimising light pollution. This will ensure that there is no significant light intrusion on any sensitive receptors during both the construction and operational phase.

Table 18.23: Summary of Likely Environmental Effects on Lighting

Receptor	Sensitivity of receptor	Description of Effect	Duration	Magnitude	Significance	Significant Not significant	Notes
Construction phase							
Residential	High	Light spill from construction lighting	Short term	Minor	Minor Adverse	Not Significant	
Road Users	Low	Light spill from construction lighting	Short term	Minor	Minor Adverse	Not Significant	
Operational phase							
Residential	High	Light spill from construction lighting	Long term	Medium	Moderate adverse	Not significant	
Road Users	Low	Light spill from construction lighting	Long term	Medium	Moderate adverse	Not Significant	

18.6 Limitations of the Assessment

In the absence of statutory guidance, the ILP 'Guidance Notes for the Reduction of Obtrusive Light' have been used as criteria against which to assess the effects of artificial lighting, which is considered best practice. The guidance levels for light nuisance into windows have been used as the principal criteria for assessing the likely effects of artificial lighting associated with the proposed development.

Given the subjective nature of glare, it is difficult to quantify the likely effects due to a number of variables including the type and distance from the light source, and the angle from which it is viewed. In practice, lux levels may vary due to tolerances on luminaires, luminaire positioning, reflection properties and electrical supply.

18.7 References

- Clean Neighbourhoods and Environment Act (NI) 2011.
- Guidance note on the reduction of obtrusive light, The Institution of Lighting Professionals -GN01:2020.
- Environmental considerations for exterior lighting – Chartered Institute of Building Services Engineers (CIBSE).
    - LG 04 Sports lighting
    - LG 06/16 The exterior environment
    - LG 21 Protecting the night-time environment
- BS EN 12464-2:2014 - Light and lighting. Lighting of workplaces. Outdoor workplaces.
- CIE 150:2017 Guide on the Limitation of the Effects of Obtrusive Light from Outdoor Lighting Installations
- GN 01/21 The Reduction of Obtrusive Light
- PLG 04 Guidance on Undertaking Environmental Lighting Impact Assessment
- Guidance Note 01/21 "The Reduction of Obtrusive Light" from the Institution of Lighting Professionals (ILP) outlines the requirements for reducing obtrusive light, as detailed in CIE150:2017 international guidance

19 TRAFFIC AND TRANSPORTATION

19.1 Introduction

This chapter of the EIAR has been prepared to assess the potential impact of the proposed development in terms of traffic and transport. The chapter provides the following:

- An overview of the receiving environment;
- An assessment of the potential impact of the proposed development on the road network, during both the short-term construction phase and long-term operational phase; and
- Identification of the mitigation measures that are required to ensure significant effects are minimised or avoided.

The assessment of the traffic and transport section has been prepared by Glen Moon, a Principal Consultant with SYSTRA. Glen has over 15 years' experience in the traffic and transport industry, and a further 5 years' experience working as an EIAR Project Manager in the renewables industry. He is a Member of the Chartered Institute of Highways and Transportation, and has produced numerous EIAR Traffic and Transport Chapters for developments throughout the UK and Ireland.

This EIAR Chapter has been prepared with reference to the Transport Assessment (TA) which is included under separate cover as part of the planning application for the proposed development.

19.1.1 Development Description

A description of the development is provided in Chapter 2 of the EIAR.

19.1.2 Consultation

The TA has been informed by scoping discussions with both DCC and the DNRO. A Scoping Meeting was held on Tuesday 25th October 2022 in DCC's offices in Letterkenny, and several subsequent online meetings with the DNRO have taken place to discuss the wider N56 Access Strategy, and how the ATU development will support and integrate with this.

An EIAR Scoping report was submitted by RPS in March 2023. DCC's written response was issued on 11th May 2023. It noted that, " The planning authority is satisfied that the Scoping Report comprehensively deals with the broad heading issues to be contained in an EIAR as set out in Schedule 6 of the Planning & Development Regulations 2001 (as amended)".

However, the response identified that whilst the planning authority have been engaged with ATU in pre-planning discussions, there were certain fundamental aspects of the proposal that had not yet been agreed. These included the preferred access strategy. DCC's response noted that:

> *"Currently TII National Policy does not support an access from the N56 (Urban) road between the Kiltoy and Knocknamona Roundabouts and therefore an alternative access from the public road network (potentially from the Lisnenan side) to the development site should be explored with a Traffic and Transport Assessment and Road Safety Audits included within the EIAR with recommendations being made for both the construction and operational phases of the proposed development.*
>
> *Furthermore the TIA should not be restricted to the specifics of access junction arrangements, layout, and capacity but should provide for safety for all transport modes and consideration should be given to the inclusion of a Live Travel Plan or Mobility Management Plan within the Transport and Transport Assessment. Furthermore the scheme needs to consider and provide for pedestrian and cycle paths to show future connections to the adjoining residential & commercial sites".*

A follow-up meeting was held between ATU, DCC, DNRO and SYSTRA on 23rd May 2023, primarily to discuss transport and access issues. Following this, SYSTRA updated the proposed N56 / Knocknamona Crescent / Carnamuggagh Lower signalised junction design, to include the provision of direct Puffin Crossings which would serve both pedestrians and cyclists. This junction has been designed in accordance with the current 80kph speed limit of the road.

TII policy does permit new or enhanced accesses onto National Roads where speed limits are in excess of 80kph, providing that certain criteria are met, including that the development is of regional or national importance. In this instance, SYSTRA would contend that the ATU sports facility is of regional importance, and therefore would permit the formation of a new access point.

A comprehensive Traffic and Transport Assessment (TA) forms part of the application package, and should be read in conjunction with this EIAR chapter. The TA:

- Presents a consideration of the alternative access options that were considered, and identifies why the preferred option was chosen.
- Considers access to the site by all modes.
- Includes a Mobility Management Plan.

The application is also supported by a Stage 1 Road Safety Audit.

19.1.3 Legislation, Policy and Guidance

19.1.3.1 Guidelines

This chapter has been prepared with cognisance of the following guidelines;

- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018);
- Guidelines on the Information to be contained in Environmental Impact Assessment reports (EPA, 2022);
- TII Traffic and Transport Assessment Guidelines (PE-PDV-02045); and
- TII Project Appraisal Guidelines for National Roads (PE-PAG-02017.

There are also a number of relevant national and regional policies which have guided the assessment and the identification and, where necessary, the design of mitigation measures. These include the following documents;

- Donegal County Development Plan (DCC, 2018);
- Design Manual for Urban Roads and Streets (DMURS) (DTTAS & DHPLG, 2013); and
- National Cycle Manual (NTA, 2011).

19.1.3.2 Assessment Criteria

The EPA EIAR guidelines (EPA, 2022) outline a number of definitions that can be used to describe potential significant effects. This includes definitions for the quality, significance, extent, probability, duration and frequency of effects, and the type of effects. Whilst some of these are easily qualified using the EPA guidelines, the significance of the effects is often open to interpretation, and relies on the professional engineering judgement.

In Ireland, there are currently no guidelines or standards which outline how the effect of traffic and transport should be quantified or described for the purposes of Environmental Impact Assessment. However, TII's 'Traffic and Transport Guidelines' indicate that if the impact generated by the additional traffic generated by a

new development may be expected to exceed 10% of the existing traffic movements, it is considered material in the context of the local network. This threshold is reduced to 5% in situations where the network is congested or at other sensitive locations.

The UK's Institute of Environmental Management and Assessment (IEMA) 'Guidelines for the Environmental Assessment of Road Traffic' (2003) state that only links which experience an increase in traffic of 30% should be considered for more detailed assessment, or 10% in sensitive locations or where HGV traffic increases substantially.

As referenced in the IEMA Guidelines, a range of indicators for determining the significance of the relief from severance advises that changes in traffic flow of 30%, 60% and 90% are regarded as producing 'slight', 'moderate' and 'substantial' changes respectively. Additionally, it is generally accepted that traffic flow increases of less than 10% on uncongested roads are generally considered to be 'not significant', given that daily variations in background traffic flow may vary by this amount.

Based on these guidelines and professional judgement, a rating of the potential effects has been assigned to the definitions within the EPA guidelines based on potential traffic increases, as outlined in Table 19.1. To ensure the robustness of the assessment these ratings are more conservative than outlined in the IEMA guidelines. This is intended to guide the assessment of the likely effects of the proposed development.

Table 19.1: Rating of Effects Based in Traffic Contribution

Significance of Effects	Traffic Increase
Imperceptible	0 – 2.5%
Not Significant	2.5 – 5%
Slight	5 – 10%
Moderate	10 – 20%
Significant	20 – 30%
Very Significant	30 – 50%
Profound	50%+

19.2 Baseline Environment

The following section provides a summary of the proposed development's receiving environment. Further details are included in Section 3 of the Traffic and Transport Assessment, which sets out Baseline conditions.

19.2.1 Site Location

The development site is located on the northern outskirts of the town of Letterkenny. It is on currently unoccupied land, bound by the N56 both to the south and the west. It is located approximately 1.9km to the north of ATU campus in central Letterkenny. Figure 19.1 shows the EIAR Study Area and road network in the vicinity of the site.

Figure 19.1: Study Area

19.2.2 Site Access

The site is currently accessed from the N56 / Knocknamona Crescent priority junction, which also provides access to the Letterkenny Recycling Centre, an ESB Networks facility and three private properties.

19.2.3 Pedestrian and Cycle Infrastructure

As a greenfield site, pedestrian infrastructure in the area is limited to footpaths alongside the N56 and Carnamuggagh Lower, and discontinuous footpaths on Knocknamona Crescent. Existing facilities comprise:

- A 2.5m-wide segregated footpath and cycleway on either side of the N56 that runs between the Knocknamona and Kiltoy Roundabouts.
- A footpath on the east side of Knocknamona Crescent that runs for a distance of approximately 280m, stopping just short of the Letterkenny recycling centre.
- Continuous footpaths on either side of the R229 / N56 Kilmacrennan Road.
- Continuous footpaths on Carnamuggagh Lower, between the N56 and Gortlee Road.

19.2.4 Public Transport

There are currently no bus services that pass the site on the N56. The closest bus services run along the R229 / N56 Kilmacrennan Road corridor, 350 metres to the west of Knocknamona Crescent. The Letterkenny Local Transport Strategy (LTS) recognises that bus services in the town are infrequent, and not particularly suited for commuter or student travel.

19.2.5 Local Road Network

19.2.5.1 N56 (Knockmanona Roundabout – Kiltoy Roundabout)

The **N56** is a National Secondary road that links Donegal with Letterkenny. The junctions on the N56 corridor between the Knocknamona Roundabout and the Kiltoy Roundabout are:

- N56 / Knocknamona Crescent priority junction;

- N56 / Carnamuggagh Lower priority junction;
- N56 / IDA Western Access priority junction;
- N56 / IDA Eastern Access priority junction;
- N56 / Business Hub priority junction;
- N56 / Letterkenny Business park priority junction; and
- N56 / R229 Knocknamona Roundabout

To the east of the Knocknamona Roundabout there is a single lane for eastbound traffic and two lanes for westbound traffic. The speed limit on this section is 80km/h.

Between the western and eastern IDA accesses the road reverts to a single lane configuration in each direction, and the speed limit reduces from 80km/h to 50 km/h. The lane configuration then changes beyond the eastern IDA access to a single and dual lane (for eastbound traffic) configuration as far as the Kiltoy roundabout.

19.2.5.2 Knocknamona Crescent

Knocknamona Crescent is a single-carriageway road with a 50km/h speed limit. In addition to the Letterkenny Recycling Centre, it serves three dwellings, an ESB depot and a substation.

To the north of the N56, there are no footpaths on the first 200m of Knocknamona Crescent, and there are no road markings.

19.2.5.3 Carnamuggagh Lower

Carnamuggagh Lower runs north-south between the N56 linking the north of Letterkenny with the town centre**.** It joins the N56 at a priority junction, directly to the south of the proposed development. It is a single carriageway route with a 50 km/h speed limit, and provides the most direct route from the site to the existing ATU campus, primarily running through residential areas.

19.2.5.4 N56 Kilmacrennan Road

N56 Kilmacrennan Road runs north from the Knocknamona Roundabout. It is a single-carriageway road, with a posted speed limit of 60km/h.

19.2.5.5 R229 Kilmacrennan Road

R229 Kilmacrennan Road runs south from the Knocknamona Roundabout towards the town centre It is a single-carriageway road, with a posted speed limit of 60km/h, which reduces to 50kmh 100m to the south of the roundabout.

19.2.6 Traffic Flows

In order to establish the baseline traffic flows, Junction Turning Count (JTC) and Automatic Traffic Counts (ATC) were undertaken in March 2023, as shown in Figure 19.2.

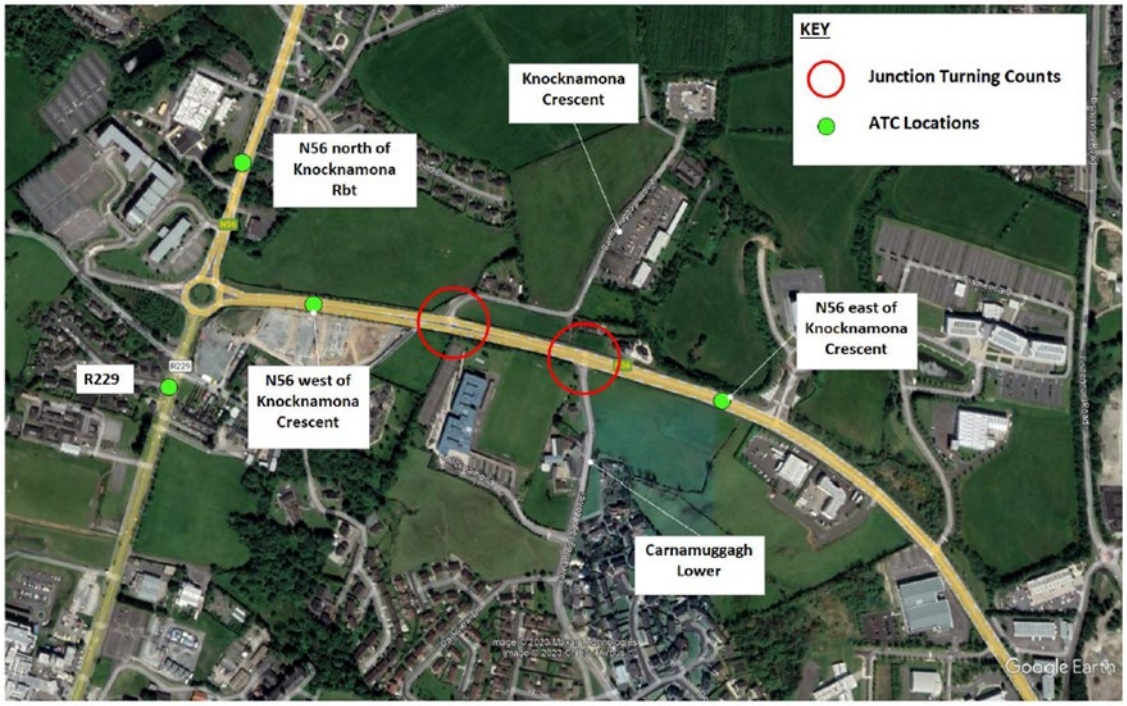

Figure 19.2: Traffic Count Locations

Junction Turning Count (JTC) surveys were undertaken at:

- N56 / Knocknamona Crescent priority junction; and
- N56 / Carnamuggagh Lower priority junction.

Automatic Traffic Counters (ATC) were in place for a 7-day period between 9th March and 15th March, recording classified traffic volumes and speeds. ATC were placed on:

- The N56 to the north of Knocknamona Roundabout;
- The R229 to the south of Knocknamona Roundabout;
- The N56 to the west of Knocknamona Crescent; and
- The N56 to the east of Carnamuggagh Lower.

Table 19.2 presents the recorded traffic flows at each location.

Table 19.2: Baseline Traffic Flows

Link	Base 2023		
	24hr AADT (5-day, veh)	% HGV	Ave. Speed (kph)
Site A - N56 north of Knocknamona Rbt	19,741	5.9%	50.3
Site B - R229 south of Knocknamona Rbt	17,312	0.6%	46.9
Site C - N56 west of Knocknamona Crescent	13,256	1.7%	56.3
Site D - N56 east of Carnamuggagh Lower	12,254	1.7%	73.8

Link	Base 2023		
	24hr AADT (5-day, veh)	% HGV	Ave. Speed (kph)
Knocknamona Crescent	348	3.3%	-
Carnamuggagh Lower	1,870	3.2%	-

19.2.7 Road Safety

At the time of writing, the Road Safety Authority's (RSA's) online collision map is not in operation.

19.2.8 Future Year Baseline

The following scenarios have been considered in the assessment, with and without the development as per the TII PE- Traffic and Transport Assessment Guidelines (PE-PDV-02045):

- Base 2028 (Year of Opening); and
- Base 2043 (Year of Opening + 15).

Future traffic growth between 2023, 2028 and 2043 has been calculated using the Link-Based Growth Rates for the 'West' region set out in Table 5.3.2 of TII Project Appraisal Guidelines for National Roads (PE-PAG-02017). The calculated growth factors are:

- 2023 – 2028: 1.049; and
- 2023 – 2043: 1.138.

19.3 Predicted Effects of the Proposed Development

The traffic impacts of the development have been considered during the construction and operational stages of the development.

19.3.1 Construction Impacts

19.3.1.1 Phasing

The construction phase is anticipated to last for approximately four years, and will comprise the following phases:

- Phase 1 – strip topsoil, cut & fill across whole site to formation levels, 3G Pitch 1, 5-a-side pitches, access roads, parking and temporary changing facilities.
- Phase 2 – Pavilion building.
- Phase 3 – Grass Pitch 2, training ground, hurling wall and community gardens.
- Phase 4 - Soccer pitches and cricket pitch. Walking and running trails developed and bio-diversity garden established.
- Phase 5 – Sports Dome and associated car park.

19.3.1.2 Traffic Generation

The busiest construction period in traffic terms will be during Phase 1, when the bulk earthworks exercise is undertaken. This will involve a cut and fill operation across the entire site, to reduce the need for future import or export of sub-soil material.

Vehicles on-site during this period will include:

- Three 360 degree tracked / wheeled hydraulic excavators;
- A skip lorry;
- A bulldozer;
- Five tipper lorries; and
- A digger.

In addition to the above, it is anticipated that there could be up to 30 two-way HGV trips per day to and from the site.

It is estimated that 15 workers will be regularly on site during this period. This will create around 30 two-way trips on the road network, as workers travel to and from the site. This robustly assumes that there will no car-sharing. In reality, workers will tend to arrive in groups in work vehicles.

In total, at peak times there could therefore be 60 two-way trips generated to the site during a typical working weekday.

All site traffic will arrive via the N56, either to the east or west of the site, and use the existing N56 / Knocknamona Crescent junction (and then Knocknamona Crescent) to access the site. HGVs will be required to travel on designated routes, and to avoid sensitive areas. Construction traffic routes will set out within the Construction Traffic Management Plan (CTMP), and agreed with DCC prior to commencement

19.3.1.3 Impact during Construction

Table 19.3 shows the predicted impact of construction traffic.

Table 19.3: Impact during Construction Phase

Link	24hr AADT (5-day, veh)		
	Base 2028	Development Traffic	2028 Dev Impact
N56 north of Knocknamona Rbt	20,706	60	0.3%
R229 south of Knocknamona Rbt	18,158	60	0.3%
N56 west of Knocknamona Crescent	13,904	60	0.4%
N56 east of Carnamuggagh Lower	12,853	60	0.5%
Knocknamona Crescent	389	60	15.4%
Carnamuggagh Lower	2,082	60	2.9%

The calculations assume a worst-case scenario in which all construction traffic routes along each road.

As per the rating of effects in traffic contribution in Table 19.1, which is based on a conservative interpretation of the EPA Guidelines and IEMA Guidelines, in environmental terms, the proposed development is expected to result in 'Imperceptible' effects on the N56, R229, a 'Not Significant' effect on Carnamuggagh Lower, and a 'Moderate Effect' on Knocknamona Crescent.

The biggest construction impact is expected on Knocknamona Crescent itself, but is considered by SYSTRA not to be significant, resulting in an increase of around 60 trips during the course of the working day, or around 8 trips per hour.

It is expected that HGVs will not be permitted to route along Carnamuggagh Lower, which passes through residential areas en-route to the town centre, but the potential impact has nevertheless been calculated.

19.3.1.4 Mitigation Measures

Whilst the percentage increases in traffic during the construction phase are not considered to be significant, construction traffic will still need to be carefully managed, particularly on Knocknamona Crescent to ensure that specific measures are in place to minimise the impacts on existing residents and businesses.

It is anticipated that provision of a CTMP will be included as a condition on the planning consent.

The CTMP will set out the management measures that will be in place to mitigate the impacts of construction traffic on the local road network. The CTMP will include:

- Confirmation of construction vehicle numbers and routeing;
- Details of directional and safety signs that will be in place on the local road networkl
- Speed limits that will be in place for construction traffic;
- Details of how construction traffic will be scheduled and monitored; and
- Contact details for a Site Liaison Officer, who will be the point of contact for TII, DCC, and the general public.

It has also been assumed that:

- A reputable construction contractor would be procured, with an Environmental Policy and good environmental track record;
- All HGVs delivering materials to the site would be roadworthy, adequately maintained and sheeted as required;
- Adequate traffic management and bankspeople would be deployed for the movement of HGVs; and
- Full HGV loads would be maximised to ensure that part-load deliveries would be minimised.

19.3.2 Operational Phase

19.3.2.1 Traffic Generation

As set out in detail in the TA, travel demand for the facility has been calculated on a ‘first principles’ basis, using a Usage Plan provided by ATU, and mode shares taken from ATU’s annual travel survey, and Census 2016 data.

There are predicted to be 1,161 two-way person trips to the development on a typical weekday, which includes 711 car trips.

The distribution of vehicular trips generated by the development has been based on the information set out in the business case, which suggests that there is a resident population of 39,370 persons within a 20-minute drive-time of the catchment site. Of this figure, 35% or people live within the Letterkenny urban and rural area, and the remaining 65% within surrounding towns and villages. Further detail is provided in the TA.

19.3.2.2 Impact during Operation

Table 19.4 presents the predicted traffic impact during the operational phase of the development.

Table 19.4: Impact during Operational Phase

Link	24hr AADT (5-day, veh)				
	Base 2028	Base 2043	Development Traffic	2028 Dev Impact	2043 Dev Impact
N56 north of Knocknamona Rbt	20,706	22,466	235	1.1%	1.0%
R229 south of Knocknamona Rbt	18,158	19,701	156	0.9%	0.8%
N56 west of Knocknamona Crescent	13,904	15,086	391	2.8%	2.6%
N56 east of Carnamuggagh Lower	12,853	13,946	248	1.9%	1.8%
Knocknamona Crescent	389	421	711	182.8%	169.0%
Carnamuggagh Lower	2,082	2,251	72	3.4%	3.2%

The results demonstrate that during the operational phase, the proposed development will increase daily traffic flows by a maximum of 2.6% along the N56, and 3.2% on Carnamuggagh Lower. With reference to Table 19.1, these are classed as 'Not Significant'.

Traffic flows on Knocknamona Crescent will increase by a high percentage (due to low existing traffic flows), but is considered by SYSTRA not to be significant in environmental terms, resulting in an increase of around 711 trips during the course of the working day, peaking at 166 two-way vehicle trips in the peak development hour (20:00 – 21:00). This equates to an average of around 3 two-way vehicle movements per minute.

There are few receptors on Knocknamona Crescent. These comprise visitors and employees to the Letterkenny Recycling Centre and the ESB depot, and residents of the three properties. At the peak development time, from around 6pm onwards, the recycling centre will not be open, and most employees will have left the ESB depot. Development traffic will not directly pass the three properties on Knocknamona Crescent.

The Transport Assessment assesses the impacts of operational traffic on the capacity of the road network and junctions.

19.3.2.3 Mitigation Measures

The ATU already has a Mobility Management Plan in place, which aims to promote sustainable travel amongst employees and students, and is a signatory to the NTA's 'Smarter Travel Partner' Charter. If consented, the MMP would be extended to include the Sports Hub. The overall aim of the MMP will be to reduce car travel to the site.

The MMP will cover all users of the sites, including students, sports clubs and members of the public.

This will involve:

- Undertaking a separate bi-annual Active Travel Site audit for the Sports Hub site
- Including specific questions on travel to the Sports Hub within the annual travel questionnaire, or specifically targeting Sports Hub users with a separate questionnaire
- Monitoring use of the cycle parking at the Sports Hub, and car park occupancy. This could be done on a 'spot-check' basis at agreed points throughout the year. This would assess whether current provision was sufficient, and help trigger interventions.

- Developing targets and initiatives specifically for the Sports Hub.

19.3.3 Residual Effects

19.3.3.1 Demolition & Construction Phase

Prior to mitigation, the assessment of potential construction traffic impact already demonstrates that no significant effects are expected to arise from traffic associated with the proposed development.

Notwithstanding, this, a CTMP will be implemented during the construction phase which will ensure that the impact of construction traffic is managed and minimised as far as is practicable. As such, the predicted impact during the construction phase is considered to have a negative, slight and short-term effect, which is Not Significant.

19.3.3.2 Operational Phase

Prior to mitigation, the assessment of potential operational traffic impact already demonstrates that no significant effects are expected to arise from operational traffic associated with the proposed development.

Notwithstanding this, a Mobility Management Plan will be implemented as a ‘best practice’ measure which will seek to minimise car-based trips, particularly single-occupancy car trips, through the proposed measures to discourage car use and encourage sustainable transport options. As such, the predicted impact during operational phase is considered to have a a negative, slight and long-term effect, which is Not Significant.

19.4 Monitoring

19.4.1 Construction Phase

The construction phase will be monitored by the appointed site manager and regular progress reports will be prepared. The manager will ensure the mitigation measures outlined will be implemented and adhered to.

19.4.2 Operational Phase

The ATU will ensure the inclusion of the Sports Hub within the existing MMP, which will be regularly monitored through annual travel surveys and reports.

19.5 Interactions and Cumulative Effects

19.5.1 Interactions

Increases in traffic as a result of the development will impact on the performance of the road network (in terms of network delays), air quality and noise.

The impacts on the performance of the transport network are addressed in this EIAR and the Traffic and Transport Assessment report produced by SYSTRA.

The impacts on air quality and noise and vibration are addressed in Chapter 10 Air Quality, and Chapter 9 Noise and Vibration (AWN) respectively.

19.5.2 Potential Cumulative Effects

Regarding the construction phase, the CTMP will ensure coordination with other nearby construction sites to ensure that the impact of the construction traffic will be minimised.

Regarding the operational phase, the junction capacity analysis undertaken within the Traffic and Transport Assessment takes into account land use zonings set out in the Draft Letterkenny Plan 2023-2029, and concludes that the proposed access junction can accommodate predicted demands.

20 INTERACTIONS

20.1 Introduction& Methodology

The EIA Directive and its transposing Regulations requires that in addition to assessing impacts on human beings, fauna, flora, soil, water, air, climate, landscape, material assets and cultural heritage, the interrelationship between these factors in-combination must be taken into account as part of the environmental impact assessment process.

20.2 Interaction & In-combination Effects

Table 20.2 (at end of this chapter) is a matrix table indicating the significant inter-relationships that are likely to occur between the various environmental disciplines with regard to the proposed development. Where a cross exists in a box in the table, this indicates that a relationship exists between the two environmental areas. The purpose of the table is to allow interaction between various disciplines to be recognised, although the level of interaction and in-combination effect will vary in each case. It is assumed in presenting this table that an environmental discipline has a potential inter-relationship both during the construction and operational phases of the development. An assessment of expected interaction and in-combination effect is given in Table 20.1.

Table 20.1 Summary of Interaction and In-combination Effects

Environmental Discipline	Inter-relationship with	Interaction and In-combination Effect
Landscape and Visual	Contaminated Land, Geology & Soils	The quality of the excavated material will dictate if it can be reused on site in landscaped areas. The material of lower quality that cannot be adopted into the proposed development and used on site as landscape fill material will need to be reused or disposed off-site. There are a number of viable options that will be considered, all with the aim of ensuring no impact on the receiving environment. The proposed development will result in a surplus of excavated material, which may contain contaminants. Any contaminated material will be exported to an approved licensed waste facility.
	Biodiversity	Proposed landscape planting will be used to integrate the development into its setting. Areas of new native planting will provide increased biodiversity and habitat. Hedge and deciduous tree bound fields are a predominant feature in the landscape associated with the proposed development and thus provide biodiversity corridors throughout. In order to mitigate for potential impacts associated with the loss of lengths of hedgerow scrub and other habitats within the site, it is proposed that a range of landscape planting will be undertaken. Various areas around the margins of the site, in addition to areas of unused or open space within the scheme design will be subject to planting with a range of native tree species.
	Noise and Vibration	Noise has the potential to interact with LVIA due to the creation of noise attenuation measures. Where noise mitigation recommendations include installation of acoustic barriers close to noise-sensitive receptors, there is a potential relationship with LVIA, as the visual impact of acoustic barriers bears consideration. The installation of acoustic barriers are expected reduce the received sound pressure levels at receptors sufficiently to equate to a 'Low' magnitude of impact. A landscape buffer is provided around the perimeter of the site that would increase the separation distance.

Environmental Discipline	Inter-relationship with	Interaction and In-combination Effect
	Cultural Heritage	Developments can sometimes infringe upon the amenity use and visual setting of a cultural heritage feature and as a result lead to unacceptable impacts. The proposed development will introduce a new type of development within the local area. The introduction of the proposed development will not however impact upon any inter-relationships between monuments located within the local landscape. The nature of the landscape is such that it can absorb the introduction of the proposed development. The Cultural Heritage Chapter concludes that the proposed development will have no significant direct or indirect impact on known cultural heritage sites subject to the implementation of the recommended mitigation.
	Land use & Material Assets	The alteration to existing utilities on the site has potential for visual impact. As far as practicable utilities will be underground and not visible. No significant landscape or visual effects are predicted. New landscape planting will have a beneficial landscape effect.
Contaminated Land, Geology & Soils	Landscape and Visual	The quality of the excavated material will dictate if it can be reused on site in landscaped areas. The material of lower quality that cannot be adopted into the proposed development and used on site as landscape fill material will need to be reused or disposed off-site. There are a number of viable options that will be considered, all with the aim of ensuring no impact on the receiving environment. The proposed development will result in a surplus of excavated material, which may contain contaminants. Any contaminated material will be exported to an approved licensed waste facility.
	Water Quality	Both temporary and permanent impacts on surface waters may occur during construction. Pollution from mobilised suspended solids (silt) is the prime concern. Suspended sediment due to the works associated with the proposed developments extensive earth works with the construction of pitches, associated landscaping and biodiversity gardens. can have a severe negative impact on water quality. If possible, earthworks operations should be limited to the summer months. It is possible that groundwater will be encountered during construction of the 2 natural grass soccer pitches with Cricket Creases (Pitch 3,4, 5) (ground investigation TPO6 and SA04), therefore any dewatering of groundwater encountered during excavations will require careful management to ensure appropriate treatment of suspended solids. In addition to their contribution to sediment release soil erosion, removal of vegetation cover, soil compaction (caused by the bearing weight of heavy machinery) and increased hard standing can alter preferential drainage paths and ultimately change the hydrological regime of a watercourse by changing the timing and magnitude of flows entering it thus exacerbating sediment movement. In the absence of mitigation these processes have the potential to have permanent effects on associated watercourses downstream of the application site having a knock-on effect on water quality. However, the Water Quality Chapter has concluded that through appropriate mitigation measures there will be no significant impacts, such as i.e. drainage ditches may be cut to intercept surface water where there is a risk of significant water flow into excavations or on to adjoining lands.
	Biodiversity	Earthworks by heavy plant in proximity to surface waters carries an inherent risk of pollution of watercourses. There is a risk involved with any construction activity in proximity to surface

Environmental Discipline	Inter-relationship with	Interaction and In-combination Effect
		waters that a pollution incident might arise and result in spills or leaks of polluting substances. The proposal would give rise to the risk of likely significant effects upon both of the European sites through indirect impacts associated with water borne sedimentation and pollution of freshwater habitats and associated effects to qualifying species populations. However, the Biodiversity Chapter has concluded that through appropriate mitigation measures there will be no significant impacts
	Land Use & Material Assets	Excavation of soils and reduction of levels on site can lead to direct impact on utilities above and below ground. Subject to mitigation measures including close liaison with utility companies in advance of construction no significant effects are predicted.
	Air Quality & Climate	Earthworks and disturbance of soils has potential to impact upon air quality. As the risk of dust impact on receptors from soiling has been identified to range from medium to high during the demolition stage specifically, the highest risk category should be applied when considering general mitigation measures. The Air Quality Chapter has concluded that through appropriate mitigation measures there will be low/negligible impacts during construction/ earthworks. There is no significant impact predicted on local air quality concentrations at human exposure receptors or designated sites during the operational phase.
	Noise and Vibration	Machinery used in earthworks and construction could increase noise levels. No significant noise effects are predicted with implementation of mitigation measures. Mitigation by careful scheduling of the works, timing of activities and using best practicable will be implemented such that no significant effects arise, and levels are as low as possible.
Water Quality	Contaminated Land, Geology & Soils	Both temporary and permanent impacts on surface waters may occur during construction. Pollution from mobilised suspended solids (silt) is the prime concern. Suspended sediment due to the works associated with the proposed developments extensive earth works with the construction of pitches, associated landscaping and biodiversity gardens. can have a severe negative impact on water quality. If possible, earthworks operations should be limited to the summer months. It is possible that groundwater will be encountered during construction of the 2 natural grass soccer pitches with Cricket Creases (Pitch 3,4, 5) (ground investigation TPO6 and SA04), therefore any dewatering of groundwater encountered during excavations will require careful management to ensure appropriate treatment of suspended solids. In addition to their contribution to sediment release soil erosion, removal of vegetation cover, soil compaction (caused by the bearing weight of heavy machinery) and increased hard standing can alter preferential drainage paths and ultimately change the hydrological regime of a watercourse by changing the timing and magnitude of flows entering it thus exacerbating sediment movement. In the absence of mitigation these processes have the potential to have permanent effects on associated watercourses downstream of the application site having a knock-on effect on water quality. However, the Water Quality Chapter has concluded that through appropriate mitigation measures there will be no significant impacts, such as i.e. drainage ditches may be cut to intercept surface water where there is a risk of significant water flow into excavations or on to adjoining lands.

Environmental Discipline	Inter-relationship with	Interaction and In-combination Effect
	Biodiversity	Both temporary and permanent impacts on surface waters may occur during construction. Pollution from mobilised suspended solids (silt) is the prime concern. Suspended sediment due to run off from stripped construction areas, stockpiled earth and the dewatering of excavations can have a severe negative impact on water quality. If allowed to enter surface watercourses this run off can give rise to high suspended solids and detrimental impacts, in particular to fisheries and aquatic invertebrates which can impact the ecological status of a water body. However, the Biodiversity Chapter has concluded that through appropriate mitigation measures there will be no significant impacts on water quality.
	Flood Risk and Drainage	Flooding has potential to cause issues for water quality. There is a possibility that flooding could occur during the construction period, emergency measures are therefore required. Silt fencing and settlement ponds shall be placed above the 10-year flood level and stockpiles of soil shall be kept out of the 10-year flood plain. The FRA has shown that no significant effects are predicted.
Biodiversity	Landscape and Visual	Proposed landscape planting will be used to integrate the development into its setting. Areas of new native planting will provide increased biodiversity and habitat. Hedge and deciduous tree bound fields are a predominant feature in the landscape associated with the proposed development and thus provide biodiversity corridors throughout. In order to mitigate for potential impacts associated with the loss of lengths of hedgerow scrub and other habitats within the site, it is proposed that a range of landscape planting will be undertaken. Various areas around the margins of the site, in addition to areas of unused or open space within the scheme design will be subject to planting with a range of native tree species.
	Contaminated Land, Geology & Soils	Earthworks by heavy plant in proximity to surface waters carries an inherent risk of pollution of watercourses. There is a risk involved with any construction activity in proximity to surface waters that a pollution incident might arise and result in spills or leaks of polluting substances. The proposal would give rise to the risk of likely significant effects upon both of the European sites through indirect impacts associated with water borne sedimentation and pollution of freshwater habitats and associated effects to qualifying species populations. However, the Biodiversity Chapter has concluded that through appropriate mitigation measures there will be no significant impacts
	Water Quality	Both temporary and permanent impacts on surface waters may occur during construction. Pollution from mobilised suspended solids (silt) is the prime concern. Suspended sediment due to run off from stripped construction areas, stockpiled earth and the dewatering of excavations can have a severe negative impact on water quality. If allowed to enter surface watercourses this run off can give rise to high suspended solids and detrimental impacts, in particular to fisheries and aquatic invertebrates which can impact the ecological status of a water body. However, the Biodiversity Chapter has concluded that through appropriate mitigation measures there will be no significant impacts on water quality.

Environmental Discipline	Inter-relationship with	Interaction and In-combination Effect
	Noise and Vibration	Disturbance from noise can impact on wildlife depending on the host environment. The noise consultant has liaised with the ecology team during the EIA process to ensure they were aware of the noise impact assessment process including sources of noise during construction and operation and predicted impacts. Overall predictions are that there will be no significant noise impact generated during construction or operation when ecological features are assessed.
	Artificial Light	Uncontrolled obtrusive lighting can have a severely negative impact on nocturnal fauna, especially bats. It is noted that the vast majority of proposed lighting, which is intended to illuminate the various proposed sports fields, will be intermittent in nature and is likely be used more in seasonal period when evenings are darker which also tend to be the periods during which bat activity levels are lower. The Artificial Lighting Chapter concludes that the proposed development will have no significant direct or indirect impact of any obtrusive light effects on the nocturnal environment subject to the implementation of the recommended mitigation.
Air Quality & Climate	Contaminated Land, Geology & Soils	Earthworks and disturbance of soils has potential to impact upon air quality. As the risk of dust impact on receptors from soiling has been identified to range from medium to high during the demolition stage specifically, the highest risk category should be applied when considering general mitigation measures. The Air Quality Chapter has concluded that through appropriate mitigation measures there will be low/negligible impacts during construction/ earthworks. There is no significant impact predicted on local air quality concentrations at human exposure receptors or designated sites during the operational phase.
	Population & Human Health	Construction of the proposed development has the potential to influence human health from nuisance dust and from changes to local air quality associated with construction traffic. However, the human health effects from changes to air quality are predicted to be of local spatial extent, short term duration and intermittent. It is predicted that the impact is not of a concentration or exposure sufficient to quantify any change in baseline health. The magnitude is therefore considered to be negligible.
	Flood Risk & Drainage	The FRA has considered the potential effects of climate change. The storm drainage for the project has been designed using the Innovyze MicroDrainage Design Software which considers both a 10% and 20% increase in flows to account for climate change for the 30-year and 100-year return periods, respectively. No significant effects have been identified in the Flood Risk and Drainage Chapter subject to implementation of mitigation measures.
Population & Human Health	Noise and Vibration	Potential human health effects from changes in noise exposure would be limited to increased annoyance from a reduction in local amenity during the daytime. This would be a direct and local impact resulting from on-site construction activities and associated transport movements. Due to the nature of the construction period, the impact would be short term and intermittent. The human health effects from changes in noise exposure are predicted to be of local spatial extent, short term duration and intermittent. It is predicted that the impact will affect the receptor directly, but is not of a magnitude, exposure, duration or timing to quantify any change in baseline health. The magnitude is therefore considered to be negligible.

Environmental Discipline	Inter-relationship with	Interaction and In-combination Effect
	Traffic & Transport	An increase in HGVs and vehicle movements has the potential to change the transport nature (composition and flow rate on local roads). Depending on the magnitude of change, there is the potential for an increased risk of accident and injury; feelings of isolation from increased severance; and loss of amenity from increased severance or transport disruption. Any change to transport nature and flow rate would be a direct and local impact where due to the nature of the construction period, the impact would be short term and intermittent. The human health effects from changes in transport nature and flow rate are predicted to be of local spatial extent, short term duration and intermittent. It is predicted that the impact will affect the receptor directly but is not of an order of magnitude sufficient to quantify any change in baseline health outcome. The magnitude is therefore considered to be negligible.
	Air Quality & Climate	Construction of the proposed development has the potential to influence human health from nuisance dust and from changes to local air quality associated with construction traffic. However, the human health effects from changes to air quality are predicted to be of local spatial extent, short term duration and intermittent. It is predicted that the impact is not of a concentration or exposure sufficient to quantify any change in baseline health. The magnitude is therefore considered to be negligible.
Noise and Vibration	Landscape and Visual	Noise has the potential to interact with LVIA due to the creation of noise attenuation measures. Where noise mitigation recommendations include installation of acoustic barriers close to noise-sensitive receptors, there is a potential relationship with LVIA, as the visual impact of acoustic barriers bears consideration. The installation of acoustic barriers are expected reduce the received sound pressure levels at receptors sufficiently to equate to a 'Low' magnitude of impact. A landscape buffer is provided around the perimeter of the site that would increase the separation distance.
	Population & Human Health	Potential human health effects from changes in noise exposure would be limited to increased annoyance from a reduction in local amenity during the daytime. This would be a direct and local impact resulting from on-site construction activities and associated transport movements. Due to the nature of the construction period, the impact would be short term and intermittent. The human health effects from changes in noise exposure are predicted to be of local spatial extent, short term duration and intermittent. It is predicted that the impact will affect the receptor directly, but is not of a magnitude, exposure, duration or timing to quantify any change in baseline health. The magnitude is therefore considered to be negligible.
	Biodiversity	Disturbance from noise can impact on wildlife depending on the host environment. The noise consultant has liaised with the ecology team during the EIA process to ensure they were aware of the noise impact assessment process including sources of noise during construction and operation and predicted impacts. Overall predictions are that there will be no significant noise impact generated during construction or operation when ecological features are assessed.
	Contaminated Land, Geology & Soils	Machinery used in earthworks and construction could increase noise levels. No significant noise effects are predicted with implementation of mitigation measures.

Environmental Discipline	Inter-relationship with	Interaction and In-combination Effect
		Mitigation by careful scheduling of the works, timing of activities and using best practicable will be implemented such that no significant effects arise, and levels are as low as possible.
Cultural Heritage	Landscape and Visual	Developments can sometimes infringe upon the amenity use and visual setting of a cultural heritage feature and as a result lead to unacceptable impacts. The proposed development will introduce a new type of development within the local area. The introduction of the proposed development will not however impact upon any inter-relationships between monuments located within the local landscape. The nature of the landscape is such that it can absorb the introduction of the proposed development. The Cultural Heritage Chapter concludes that the proposed development will have no significant direct or indirect impact on known cultural heritage sites subject to the implementation of the recommended mitigation.
Land Use & Material Assets	Landscape & Visual	The alteration to existing utilities on the site has potential for visual impact. As far as practicable utilities will be underground and not visible. No significant landscape or visual effects are predicted. New landscape planting will have a beneficial landscape effect.
	Contaminated Land, Geology & Soils	Excavation of soils and reduction of levels on site can lead to direct impact on utilities above and below ground. Subject to mitigation measures including close liaison with utility companies in advance of construction no significant effects are predicted.
Flood Risk & Drainage	Air Quality & Climate	The FRA has considered the potential effects of climate change. The storm drainage for the project has been designed using the Innovyze MicroDrainage Design Software which considers both a 10% and 20% increase in flows to account for climate change for the 30-year and 100-year return periods, respectively. No significant effects have been identified in the Flood Risk and Drainage Chapter subject to implementation of mitigation measures.
	Water Quality	Flooding has potential to cause issues for water quality. There is a possibility that flooding could occur during the construction period, emergency measures are therefore required. Silt fencing and settlement ponds shall be placed above the 10-year flood level and stockpiles of soil shall be kept out of the 10-year flood plain. The FRA has shown that no significant effects are predicted.
Artificial Light	Biodiversity	Uncontrolled obtrusive lighting can have a severely negative impact on nocturnal fauna, especially bats. It is noted that the vast majority of proposed lighting, which is intended to illuminate the various proposed sports fields, will be intermittent in nature and is likely be used more in seasonal period when evenings are darker which also tend to be the periods during which bat activity levels are lower. The Artificial Lighting Chapter concludes that the proposed development will have no significant direct or indirect impact of any obtrusive light effects on the nocturnal environment subject to the implementation of the recommended mitigation.
Traffic & Transportation	Air Quality & Climate	Potential air quality effects during the construction phase can occur due to dust emissions and from construction traffic movements, with the pollutants of most concern being nitrogen dioxide (NO_2) and particulate matter (PM_{10} and $PM_{2.5}$). Due to the nature and scale of the works, as described above, the construction traffic is deemed to be minimal and does not meet

Environmental Discipline	Inter-relationship with	Interaction and In-combination Effect
		the criteria detailed above. In this regard, employing the TII criteria the construction traffic volumes will not be significant and the resultant air quality impact from construction traffic is negligible. Regarding the operational phase, the junction capacity analysis undertaken within the Traffic and Transport Assessment takes into account future cumulative traffic from the wider CLK Masterplan. Using the significance criteria adopted for this assessment together with professional judgement, the operational are considered to be 'not significant' overall.
	Population & Human Health	An increase in HGVs and vehicle movements has the potential to change the transport nature (composition and flow rate on local roads). Depending on the magnitude of change, there is the potential for an increased risk of accident and injury; feelings of isolation from increased severance; and loss of amenity from increased severance or transport disruption. Any change to transport nature and flow rate would be a direct and local impact where due to the nature of the construction period, the impact would be short term and intermittent. The human health effects from changes in transport nature and flow rate are predicted to be of local spatial extent, short term duration and intermittent. It is predicted that the impact will affect the receptor directly but is not of an order of magnitude sufficient to quantify any change in baseline health outcome. The magnitude is therefore considered to be negligible.
	Noise & Vibration	During the construction phase, there is potential for noise and vibration impacts at the nearest noise-sensitive properties from the use of associated traffic associated with construction. The operation of the proposed development has the potential to impact nearby noise-sensitive receptors due to noise sources from traffic movements and car parking. With the recommended mitigation of an acoustic noise barrier, the impact of noise from car parking and on-site traffic would reduce to 'Low'.

Table 20.2: Inter-relationship Matrix – Potential Interaction between Environmental Disciplines

	Landscape & Visual	Contaminated Land, Geology &Soils	Water Quality	Biodiversity	Air Quality	Noise & Vibration	Cultural Heritage	Land use & Material Assets	Flood Risk & Drainage	Climate & GHGs	Population & Human Health	Waste	Artificial Lighting	Traffic & Transportation
Landscape and Visual		X		X		X	X	X						
Contaminated Land, Geology &Soils	X		X	X	X	X		X						
Water Quality		X		X					X					
Biodiversity	X	X	X										X	
Air Quality		X								X	X			X
Noise & Vibration	X	X		X							X			X
Cultural Heritage	X													
Land use & Material Assets	X	X												
Flood Risk & Drainage			X							X				
Climate & GHGs					X				X		X	X		
Population & Human Health					X	X				X				X
Waste	X									X				
Artificial Lighting				X										
Traffic & Transportation					X	X					X			