Planning and Environmental Consultants

Environmental Impact Assessment Report

Knocknacarra District Centre LRD

Volume 1: Non-Technical Summary and Main Report

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NON-TECHNICAL SUMMARY

Introduction

This Environmental Impact Assessment Report (EIAR) has been prepared by MKO Planning & Environmental Consultants on behalf of Glenveagh Living Ltd, which intends to apply to Galway County Council (GCC) for a Large-Scale Residential Development (LRD) that forms part of a mixed-use development located in the townland of Rahoon and Knocknacarra, Co. Galway.

The proposed site is approximately 2.5 hectares in extent (excluding the existing underground void which has a total area of 0.53 hectares).

The applicant for the proposed development is Glenveagh Living a division of Glenveagh Properties, PLC. Formed in 2017, Glenveagh Properties PLC has assembled a compelling 11,000+ unit landbank for building to capitalise on the favourable market backdrop which exists within the Irish residential sector. With a focus on strategically located developments in the Greater Dublin Area, Cork, Limerick and Galway, the Group comprises two complementary divisions, Glenveagh Homes and Glenveagh Living.

Glenveagh Homes' delivers high quality starter homes to its private customers with selective developments of mid-size and executive houses and apartments in areas of high demand. The business has commenced construction on 12 sites, with 800 units under construction during 2018. Glenveagh Homes has assembled a pipeline of 9,520 units with a 2,000 unit per annum output target by 2023.

Glenveagh Living delivers houses and apartments for the public sector and institutional investors. The Partnerships business focusses on mixed-tenure and joint venture opportunities with the public sector in Ireland. The PRS business delivers large-scale private rental product for institutional investors and currently possesses a pipeline of 1,850 units.

Glenveagh Living have employed an experienced Design Team to ensure that this development will be delivered to meet all the relevant planning, environmental and sustainability requirements.

Need for the Development

There is currently a significant shortage of housing units available for sale and occupancy in the area surrounding Galway City. The rapidly increasing price of housing is a result of the shortage in supply, and many people will soon find themselves unable to afford a home. This problem is also aggravated by a lack of housing units available for the rental market. The proposed development will contribute significantly to alleviating the shortage of housing supply in Galway and brings into use lands zoned specifically for that purpose.

In addition, the construction industry such as the subject development, make a significant contribution to economic development in Ireland. The recent upturn in the economy and thus the construction industry has led to an increase in demand for housing in the surrounding areas of Galway city, which the proposed development will be able to provide for.

Purpose and Structure of this EIAR

The purpose of the EIAR is to document the current state of the environment in the vicinity of the proposed development site and to quantify the likely significant effects of the proposed development on the environment. The EIAR submitted by the applicant provides the relevant environmental information to enable the Environmental Impact Assessment (EIA) to be carried out by the competent authority.

MKO was appointed as planning and environmental consultants on the Proposed Development and commissioned to prepare this EIAR in accordance with the requirements of the Environmental Impact Assessment (EIA) Directive as amended by Directive 2014/52/EU. The EIAR provides information on the receiving environment and assesses the likely significant effects of the project and proposes mitigation measures to avoid or reduce these effects. The function of the EIAR is to provide information to allow the competent authority to conduct the EIA of the Proposed Development.

The EIAR project team comprises a multidisciplinary team of experts with extensive experience in the assessment of similar developments and in their relevant area of expertise. Each chapter of this EIAR has been prepared by a competent expert in the subject matter. The chapters of this EIAR are as follows:

1. *Introduction*
2. *Background to the Proposed Development*
3. *Description of the Proposed Development*
4. *Human Beings, Population & Human Health*
5. *Biodiversity. Flora & Fauna*
6. *Land, Soils and Geology*
7. *Hydrology and Hydrogeology*
8. *Air and Climate*
9. *Noise and Vibration*
10. *Landscape and Visual*
11. *Archaeology & Cultural Heritage*
12. *Material Assets (including Traffic and Transport)*
13. *Interactions of the Foregoing*

A Natura Impact Statement has also been prepared in line with the requirements of the Habitats Directive, and will be submitted to the Planning Authority as part of the planning application documentation.

Background to the Proposed Development

The Background to the Proposed Development chapter presents information on the strategic planning context for the proposed development, the site selection and design process, a description of the proposed development site and its planning history, the assessment of alternatives, scoping and consultation, and the cumulative impact assessment process.

The application site is located in an area zoned 'CI-Commercial/Industrial' within the Galway City Development Plan 2017-2023 (GCDP). The GCDP lists uses which may contribute to the zoning objectives, dependant on the CI location and scale of development and one such use is residential. The land uses outlined in *Table 2.6-1* are deemed appropriate for 'CI' zoned land.

The application site is part of a parcel of lands identified as being the 'Northern Portion of CI lands at Rahoon'. These lands have a number of specific development objectives associated with them as follows:

- *The site shall include for a minimum of residential/residential commercial development of a scale equivalent to 20% of the proportion of all likely future floor proposals. This residential development shall be integrated into the overall scheme.*
- *Development of these lands will only be considered where it can be shown to be linked in with the existing development and shall show how it relates to an overall layout for the area which will include for landscaping, boundary treatment and linkages with the adjoining residential development and transport services.*
- *The provision of a civic open space will be a requirement on this site and lands shall be reserved for this purpose.*

- *Any additional phase of development shall include for the front-loaded delivery of a public/community facility which can be in the form of a community facility, a community health facility, a transport facility, a park and play area over and above normal open space requirements.*
- *Any future development shall include for a number of small retail/service units which can be demonstrated to deliver a broad range of District Centre uses.*

A scoping letter providing details of the application site and the proposed development, was prepared by MKO and circulated on 20th October 2022 in relation to this EIAR. These letters were sent to the agencies, NGOs and other relevant parties.

This EIAR also considers the potential for cumulative effects from the proposed development with other key existing, permitted or proposed projects.

Consideration of Reasonable Alternatives

This section of the EIAR contains a description of the site selection criteria and the reasonable alternatives that were considered for the Proposed Development. This section also outlines the design considerations in relation to the Proposed Development and indicates the main reasons for selecting the chosen option with regards to environmental impacts.

It is important to acknowledge that although the consideration of alternatives is an effective means of avoiding environmental impacts, there are difficulties and limitations when considering alternatives. Indeed, as is clear from the provisions of the EIA Directive itself, the requirement is to consider "reasonable alternatives" which are relevant to the project and its characteristics. In general terms, issues such as hierarchy, non-environmental factors and certain site-specific issues (zoning, ownership, etc.) may also be relevant to the consideration of reasonable alternatives by the developer.

Local planning policy objectives and zoning, proximity to Galway City and delivery of the draft Galway City development Plan 2023-2023 were key facilitators in the selection of the site for the proposed Mixed-Use development. Alternative sites or locations on unzoned lands were therefore not considered for the Proposed Development.

The design of the Proposed Development has been an informed and collaborative process from the outset, involving the designers, developers, engineers, environmental, hydrological and geotechnical, archaeological specialists and traffic consultants. The aim being to reduce potential for environmental effects while designing a project capable of being constructed and viable.

In particular, in developing the proposed design, cognisance was taken of the designs proposed in respect of the previous SHD proposal. Accordingly, the applicant for permission has ensured that elements of the site layout which were unfavourably viewed in the previous decision made by An Bord Pleanála to refuse permission (in March 2020, under ref. no. ABP-305982-19) are not replicated in the Proposed Development the subject of this application.

The scheme presented for assessment as part of this EIA can be considered to be informed by co-design by from a large team who have been guided by meaningful input by the Planning Authority and informed by current European, National and Local policy regarding design, housing quality, biodiversity, sustainable drainage, sustainable transport and placemaking. In addition, the proposed design takes into account updated guidance and legislation at a local and national level which would influence the scheme design.

The management of processes that affect the volumes and characteristics of emissions, residues, traffic and the use of natural resources has formed part of the consideration of reasonable alternatives through the project's development.

The construction works on the site will require the use of raw materials in the form of energy to supply plant and machinery, standard building materials including stone, metals, pipework, concrete, electrical, plumbing etc and raw materials are consumed to manufacture building materials. The use of these resources will be controlled by the employment of best practice construction techniques including waste management practices.

The processes to be employed during the construction of the Proposed Development and described in Chapter 4 of this EIAR and the accompanying Construction Environmental Management Plan (CEMP), are standard best practice for the construction industry in Ireland. There will be no novel processes or methods employed. Since the proposed processes represent industry standard best practice, alternative processes were not considered to be reasonable and were therefore not considered further in the EIAR.

The best practice design and mitigation measures set out in this EIAR will contribute to reducing any risks and have been designed to break the pathway between the site and any identified environmental receptors. The mitigation methods proposed follow the principal of avoidance of impact where possible in the first instance, followed by minimisation of impacts where full avoidance is not possible. The mitigation methods proposed represent industry best practice. Alternative mitigation methods that are not best practice were not considered to be reasonable and were therefore not considered further in the EIAR.

Description of the Proposed Development

The main site area comprises approximately 2.5 hectares of land (excluding the existing underground void which is 0.53 hectares in size) located within the townlands of Rahoon and Knocknacarra, Co. Galway, approximately 3km to the west of Galway City (ITM Coordinates for the centre of the site: X 526810, Y 725338).

The site is bisected by a public access road into the existing Galway Retail Park. The general area is urban in character and is surrounded by a number of residential estates and commercial and industrial buildings. An Irish language school is located at the northern boundary of the site.

The proposed development will be a mixed-use development, providing both residential and commercial units to Galway City and County. It is proposed to construct a total of 227 no. residential units in the form of apartments. These will be comprised of apartment blocks ranging between 4-6 storeys high and will include the following: Block A1: 14 no. 1 bed apartments & 24 no. 2 bed apartments; Block A2: 25 no. 1 bed apartments & 15 no. 2 bed apartments; Block B1: 3 no. 1 bed apartments, 18 no. 2 bed apartments & 3 no. 3 bed apartments; Block B2: 13 no. 1 bed apartments & 21 no. 2 bed apartments; Block B3: 5 no. 1 bed apartments, 22 no. 2 bed apartments & 1 no. 3 bed apartment; Block B4: 11 no. 1 bed apartments & 26 no. 2 bed apartments; Block B5: 13 no. 1 bed apartments & 13 no. 2 bed apartments.

The ground floors of the above apartment blocks will be utilised for commercial units which will encompass circa 1,010 sq. m. Parking for bicycles and cars will be provided for by the development of 49 no. surface car parking spaces (including EV charging spaces), 181 underground car parking spaces and 550 bicycle parking spaces (114 no. short stay and 436 no. long stay spaces). A community facility (circa 118 sq. m), tenant amenity facility (circa 99 sq. m) and childcare facility (circa 561 sq. m) will also be constructed.

Other provisions as part of the proposed development will include shared communal and private open spaces, bin storage, public lighting, site landscaping, services, signage, substation and all other associated site works.

The proposed order of construction of key elements is as follows:

- Site Setup

- Earthworks, including removal of excess material off site to an authorised outlet
- Construction of substructure and services
- Super Structure Frame to buildings in sequence
- Roof and Façade finishes
- External hard and soft landscaping
- Internal fit out
- Site Landscaping

In general, the hours in which vehicles will arrive and depart will coincide with the expected site working hours of 7.00am to 7.00pm in the evening from Monday to Friday, and 8:00am to 5:00pm on Saturday.

Before completion of the construction phase of the proposed development, landscaping works will be carried out to improve the visual amenity of the site. These landscaping works will follow the layout of the landscape plan provided in the Landscape Master Plan.

Routine inspections of construction activities will be carried out on a daily and weekly basis by the Senior Project Manager, Senior Engineers and Foremen to ensure all controls to prevent environmental impact, relevant to the construction activities taking place at the time, are in place.

Population and Human Health

One of the principal concerns in the development process is that people, as individuals or communities, should experience no diminution in their quality of life from the direct or indirect impacts arising from the construction and operation of a development.

Information used in this study was sourced from the Census of Ireland 2011 and 2016, which is the most recent census, the Census of Agriculture 2010 and from the CSO website, www.cso.ie. Census information is divided into Republic of Ireland, CO. Galway and Galway City. The 2016 census data for the Republic of Ireland was consulted as part of the assessment process, and upon comparison with the relevant 2011 data, was found to be consistent. Although, as shown in Chapter 4; between 2011 and 2016 there has been a steep increase of approximately 3000 people within the project Study Area, as represented in the census data.

Information regarding human beings and general socio-economic data were sourced from the Central Statistics Office (CSO), the draft Galway City Development Plan 2023-2029, the draft Galway County Development Plan 2022– 2028', Fáilte Ireland and any other literature pertinent to the area. The study included an examination of the population and employment characteristics of the area. This information was sourced from the Census of Ireland 2016, which is the most recent census for which a complete dataset is available, also the Census of Ireland 2011, the Census of Agriculture 2000 and 2010 and from the CSO website, www.cso.ie.

Between 2011 and 2016 the population within the Study Area increased by 4.2% or 3,139 persons. This growth rate is slightly higher than recorded growth rates for the Republic of Ireland and Galway City which were 3.8% and 2.4% respectively.

There are a wide range of services available in the area. Retail and personal services are found throughout Galway city, with local services in the Gateway Retail Park adjacent to the site and the Westside area of the city. The Westside Branch of the Galway City Council Library is located on Seamus Quirke Road approximately 1 kilometres northeast of the site. The Knocknacarra Medical Centre provides primary care services from a location approximately 0.75 kilometres southwest of the site. University Hospital Galway is located approximately 2 kilometres northeast of the site, while Bon Secours Hospital is also located within the Study Area. Most of the amenities and community facilities, including GAA and other sports clubs, youth clubs and recreational areas, are available in the areas surrounding the site (i.e. Knocknacarra and Salthill), as well as in the wider Galway City.

The primary school located closest to the proposed development site is Gaelscoil Mhic Amhlaigh, located immediately adjacent to the northern boundary of the proposed development site. The secondary school located closest to the proposed development site is Colaiste Éinde, which is located on Threadneedle Road approximately 800 metres southeast of the site. There are over 30 primary schools and 13 secondary schools within the study area for the project. The National University of Ireland (NUI) Galway main campus is located 2.4 kilometres to the northeast of the site. Galway Mayo Institute of Technology (GMIT) is also located within the study area. It is estimated that approximately 20% of the population of Galway city are students.

Key tourist attractions within the wider area of Galway City include NUI Galway, a number of theatres, Sports facilities (Eamon Deacy Park, The Sportsground, Galway Racecourse, Pearse Stadium, etc.). There will be a slight positive cumulative operational impact on tourism between the proposed site and other projects in the area, where an increase in residents and tourists within the area will allow for a positive influence on local tourism.

Biodiversity

Between July 2021 and September 2022, a range of ecological survey work has been undertaken to provide comprehensive information on all ecological aspects of the location of the Proposed Development and the surrounding area. These surveys included detailed assessment of the site in terms of protected habitats and species. The studies and survey work undertaken provide a comprehensive inventory of the flora and fauna of the study area

The proposed development site is bisected by a public access road. This road all associated hard standing areas as well as the bordering footpaths. The northern portion of the proposed development site is dominated by Scrub habitat. A small path has been worn through the area of scrub. The portions of the proposed development site bordering the bisecting public access road and the road within the north-western boundary are classified as Scattered trees and parkland. The southern portion of the proposed development site is dominated by artificial habitats classified as a mosaic of Spoil and bare ground and Recolonising bare ground. Habitats bordering the proposed development site are artificial in nature and consist of Recolonising bare ground as well as Buildings and artificial surfaces.

There are currently no open surface watercourses or drains on the site. However, the Knocknacarra Stream rises to the north of the site at Letteragh and flows southward over a distance of 3km to the sea. A large portion of the lower reach of the Knocknacarra Stream is culverted almost to its sea outfall at Rusheen Bay near Blakes Hill at Salthill. A tributary stream which formerly ran through the site was culverted and realigned to form the surface water sewer network as part of a nearby development in 1996. The culverted tributary and culverted Knocknacarra stream which both form part of the existing storm sewer network flow through the proposed development site and along the eastern boundary of the proposed development site. Storm water runoff from within the site ultimately discharges to Galway Bay Complex SAC and Inner Galway Bay SPA via the culverted tributary, Knocknacarra stream and Rusheen Bay.

A large stand of Himalayan knotweed is present within the proposed development. Himalayan knotweed is listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477 of 2011). An invasive species management plan has been prepared for the management of the Himalayan knotweed infestation within the proposed development site and is being submitted as a part of this project.

Effects upon flora and fauna as a result of removal of vegetation during the construction phase of development would constitute a permanent slight negative on the habitat within the site. Mitigation in the form of a Landscaping Plan has been prepared for the Proposed Development to ameliorate any habitat loss and to maintain connectivity with the wider landscape.

Adverse effects upon nationally designated sites and Ramsar sites as a result of the proposed development are not anticipated, given that impacts to groundwater and surface waters will be prevented, or mitigated where necessary, during the construction of the proposed development. Like any construction project, measures will be in place to prevent and mitigate any effect upon groundwater and surface water resources and these have been detailed in the hydrology chapter of this EIAR and the accompanying CEMP in Appendix 4-2.

Adverse effects upon European Sites are discussed within the Natura Impact Statement which accompanies this report. The NIS concluded that the proposed development, by itself or in combination with other plans and projects, in light of best scientific knowledge in the field, will not adversely affect the integrity of European sites, and no reasonable scientific doubt remains as to the absence of such adverse effects. No significant effects upon biodiversity, flora and fauna as a result of the proposed development are anticipated, given that the proposed development is carried out in compliance with procedures of best practice, and that mitigation is duly applied where necessary.

Land, Soils and Geology

This chapter provides a baseline assessment of the environmental setting of the Proposed Development in terms of land, soils, and geology, and discusses the potential impacts that the construction and operation of the Proposed Development will have. Where required, appropriate mitigation measures to limit any identified potentially significant impacts to soils and geology are recommended and an assessment of residual impacts and significance of effects provided.

A desk study of the proposed development site and the surrounding study area was completed along with a walkover survey and site investigations. In addition, a site inspection of the proposed development site and surrounding area was undertaken by an engineer from Ground Investigations Ireland Ltd (GII) on 29th April 2019.

The purpose of the site inspection was to investigate the site for any surface indications of impacts to land, soils and geology resulting from current land use and confirm the baseline conditions. Particular attention was paid to identifying any potential areas of soil erosion that may have arisen from the operation of agricultural machinery on the site. No evidence of any residual impacts to land, soils and geology was observed.

The elevation of the site ranges between approximately 27m and 32m OD (metres above Ordnance Datum). The overall local topography generally slopes from north to south with an undulating topography. The dominant land use on the bordering land is commercial development to the west, a primary school to the north, and residential development to the south and east.

The Proposed Development site is underlain by the Errisbeg Townland Granite which is part of the Galway Granite formation. This comprises Devonian Megacrystic pink/grey monzogranite (GaEb). These granites are classified by the GSI as a Poor Aquifer -Bedrock which is Generally Unproductive except for Local Zones (Pl).

There are no known areas of soil or ground contamination on the site. During the site walkovers, no areas of particular contamination concern were identified. There are no recorded Geological Heritage sites within the proposed development area.

The Proposed Development will require minor alteration of ground levels to ensure it is at an adequate level for the proposed surface water drainage and foul water drainage due to the relatively flat topography. Excavation of soil and subsoil will be required in preparation for the construction of building foundations, suitable sub-formation for road construction, trenching for foul and drainage water infrastructure and other services. The estimated amounts of excavations and earthworks required for the various components of the Proposed Development are described in the Construction & Environmental Management Plans appended to this EIAR.

Surface water management for the Proposed Development is designed to comply with the Greater Dublin Strategic Drainage Study (GDSDS) policies and guidelines and the requirements of Galway City Council.

The Proposed Development will be subject to a New Connection Agreement with Irish Water, in accordance with their requirements. There is no proposed extraction of groundwater at the site for drinking water purposes.

Further details regarding surface water drainage, water supply and wastewater treatment are provided in the Infrastructure Design Report provided in Appendix 4-6 of the EIAR.

An assessment of the construction and operational phases of the development have been completed, along with a cumulative assessment for the development. An assessment of the potential health effects in relation to soils and geology has also been undertaken. Based on the above, and with implementation of the outlined mitigation measures, no significant impacts on human health and the soils and geology environment are predicted to occur.

Hydrology and Hydrogeology

This chapter of the EIAR identifies, describes, and assesses the potential effects of the Proposed Development on the local hydrological and hydrogeological environment (surface water and ground water).

A walkover survey, including drainage mapping and water sampling, was undertaken by MKO staff on 28th September 2018, 9th October 2018 and the 23rd October 2018, 5th September 2019, and 30th November 2022. DBFL Consulting Engineers visited the site on the 30th of November 2018 to establish any potential sources of flooding, likely routes of floodwaters and key features of the site to inform their Site-Specific Flood Risk Assessment completed for the development.

A desk study and walkover assessment of the site of the Proposed Development and the surrounding area was completed in advance of the site walkover. This involved collection of all relevant geological, hydrological, hydrogeological and meteorological data for the area. The desk study also included a review of the Infrastructure Design Report and Site-Specific Flood Risk Assessment compiled by DBFL Consulting Engineers which sets out the proposed surface water drainage, foul water drainage, watermain design and flood protection measures for the proposed development.

The proposed development site does not contain field drains or natural watercourses. In general, the site of the proposed development is well drained with rainfall percolating to ground and likely travelling via subsurface flow to the culverted stream located at the eastern side of the site., There is a gently sloping topography which is likely to reflect the direction of groundwater flow at the site which is likely from northwest to southeast. There was no surface water or ponding of water observed on the site. The existing roadway that bisects the site is served by gullies which discharge to the municipal storm water drainage system.

The Knocknacarra Stream rises to the north of the site at Letteragh and flows southward over a distance of 3km to the sea. A large portion of the lower reach of the Knocknacarra Stream is culverted almost to its sea outfall at Rusheen Bay near Blakes Hill at Salthill. A tributary stream which formerly ran through the site was culverted and realigned to form the surface water sewer network as part of a nearby development in 1996. There are currently no open surface watercourses or drains on the site.

A detailed flood risk assessment has been completed and there are no recurring flood incidents within the study area boundary according to the OPW's flood mapping. OPW PFRA maps for the area indicates that the eastern area of the site could be impacted by a potential fluvial flood risk zone. No risk of pluvial or coastal flooding is highlighted on the site.

A Site-Specific Flood Risk Assessment (SSFRA) has been prepared for the proposed development (DBFL Consulting Engineers, 2019). This report determined that the Site is within Flood Zone C and concluded that the residential development proposed is appropriate for the Site's flood zone category.

The assessment found that the development has a good level of flood protection up to the 100-year return event. For pluvial floods exceeding the 100-year capacity of the drainage system mitigation measures are proposed to deal with any potential flooding of the constructed development.

The bedrock, which underlie the site are classified as a Poor Aquifer – Bedrock which is Generally Unproductive except for Local Zones (Pl). The vulnerability of the aquifer underlying the site is classified as predominately "Extreme" due to the presence of rock near the surface. The presence of rock near the surface means that there is little, or no protection afforded to any potential bedrock aquifer by soils and subsoils.

There are no groundwater protection zones mapped within the proposed development site or study area. The primary risk to groundwater at the site would be from cementitious materials, hydrocarbon spillage and leakages. These are common potential impacts on all construction sites (such as road works and industrial sites). All potential contamination sources are to be carefully managed at the site during the construction and operational phases of the development and mitigation measures are proposed to deal with these potential minor impacts.

Surface water drainage measures, pollution control and other preventative measures have been incorporated into the project design to minimise significant adverse impacts on water quality and downstream designated sites.

Overall the proposal presents no significant potential for impacts to surface water and groundwater quality provided the proposed mitigation measures are implemented.

Air and Climate

Due to the nature of the development, the general character of the surrounding environment and publicly available information on air quality, air quality sampling, was deemed to be unnecessary for the EIAR.

Air Quality

The Environmental Protection Agency (EPA) has designated four Air Quality Zones for Ireland:

- Zone A: Dublin City and environs
- Zone B: Cork City and environs
- Zone C: 16 urban areas (cities and large towns) with population greater than 15,000
- Zone D: Remainder of the country.

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the Framework Directive and Daughter Directives. The site of the proposed development lies within Zone C, which represents urban areas with a population of greater than 15,000. The EPA publishes Air Monitoring Station Reports for monitoring locations in all four Air Quality Zones. The most recent report on air quality in Ireland, *'Air Quality in Ireland 2020'* was published by the EPA in 2021. The air quality in the vicinity of the Proposed Development site is typical of that of urban areas in Ireland.

Dust is a common emission from construction sites and requires management. As limited excavation works are proposed, the potential for dust generation is limited however mitigation measures have been developed to reduce any potential dust levels.

Climate

Ireland has a temperate, oceanic climate, resulting in mild winters and cool summers. The Met Éireann weather station at Shannon Airport Co. Clare, is the nearest weather and climate monitoring station to the Proposed Development site that has meteorological data recorded for the 30-year period from 1981 – 2010. The monitoring station is located approximately 63 km southeast of the Proposed Development site.

Meteorological data recorded at Shannon over the 30-year period from 1981 – 2010 shows that the wettest months are October, December and January, with July being the driest month. July was also shown to be the hottest month with a mean temperature of 16.4 degrees Celsius. The mean annual wind speed at the station is 9.1 metres per second. The 30-year annual average rainfall is 977.6 mm/yr. this is considered to be slightly above average when compared to the annual average rainfall for Dublin (Merrion Square) which recorded annual average rainfall of 730 mm/yr over the same period.

The construction of foundations and buildings, site roads and associated infrastructure will require the operation of construction vehicles and plant on-site. Greenhouse gas emission, e.g., carbon dioxide (CO_2), carbon monoxide and nitrogen oxides associated with vehicles and plant will arise as a result of the construction activities. This potential impact will be slight, given the insignificant quantity of greenhouse gases that will be emitted, and will be restricted to the duration of the construction phase. Measures, including a Construction and Environmental Management Plan, will be in place to ensure there will be no significant direct or indirect effects on air quality or climate due to greenhouse gas emissions during the construction stage.

The proposed development has been designed to comply with the relevant Building Regulations, including thermal performance and energy saving measures. The Proposed Development includes for the upgrade and provision of additional cycling and pedestrian infrastructure and bicycle parking facilities. The improved pedestrian and cycling infrastructure will provide alternative modes of transport for those living and working locally, which will reduce the dependency on vehicular transport and associated greenhouse gas emissions.

Noise and Vibration

The noise and vibration section of this EIAR has been compiled by AWN Consulting Ltd (AWN) to assess the potential noise and vibration impact of the proposed development in the context of current relevant standards and guidance.

This chapter includes a description of the receiving ambient noise climate in the vicinity of the subject site and an assessment of the potential noise and vibration impact associated with the proposed development. Impacts are assessed from the development for both the short-term construction phase and the long-term operational phase on its surrounding environment. The assessment of direct, indirect and cumulative noise and vibration impacts on the surrounding environment have been considered as part of the assessment.

Mitigation measures are included, where relevant, to ensure the proposed development is constructed and operated in order to ensure minimal impact on the receiving environment.

An assessment of inward noise has been undertaken to ensure no significant impact associated with environmental noise is experienced at the proposed development buildings. The assessment is presented in Section **Error! Reference source not found.**.

The proposed development comprises a mixed-use development of residential apartments and various ground floor commercial units. The development also includes ancillary developments including car and bicycle parking areas, internal road layouts and landscaping. During the operation phase of the project, the closest receptors to most onsite sources will consist of the proposed onsite residential units

The noise assessment of construction vehicle movements associated with the site has shown that the predicted effect will be of neutral, imperceptible and short term, effect on offsite noise sensitive locations considering existing traffic volumes on the local road network.

Landscape and Visual

This chapter of the Environmental Impact Assessment Report (EIAR) addresses the potential landscape and visual impacts of the Proposed Development, which includes plans for a Large-Scale Residential Development for Knocknacarra District Centre, Galway.

The emphasis in this chapter is on the likely significant direct and indirect effects of the Proposed Development. The chapter includes the Landscape and Visual Impact Assessment (LVIA) methodology, a description of the Proposed Development and the existing landscape based on relevant guidance. It includes a description of the landscape policy in the study area in which the Proposed Development Site is located.

The landscape of the site and wider area is described in terms of its existing character, which includes a description of landscape value, the susceptibility of the landscape to change and a determination of landscape sensitivity. The landscape and visual impact assessment of the Proposed Development uses representative viewpoints. The potential impacts in both landscape and visual terms are then assessed, including cumulative impacts.

Overall, the highest negative landscape effects associated with the Proposed Developmentare are localised and are limited to the Proposed Development Site itself which is not highly valued or sensitive in relation to the wider landscape area, given its baseline status. The addition of the Proposed Development will not fundamentally change the character of the landscape area (suburban streetscape) within which it is viewed. There is generally a suburban character to the landscape area which the Proposed Development will somewhat alter as it represents an increased level of development of the Galway West District Centre. However, it is noted that there are already a number of pre-existing and permitted developments located in the immediate vicinity of the Proposed Development (i.e. the Galway Retail Park). The continued development of this district centre is plan-lead and is aligned with the planning policy and land-use zoning.

A Moderate, Direct, Permanent, landscape effect was deemed to arise on the Proposed Development Site during the Operational Phase. In relation to the operational landscape effects on the character of the surrounding streetscape, a Slight, Direct, Permanent residual landscape effect on the character of the surrounding streetscape is deemed to arise.

Overall, visual effects as a result of the Proposed Development are not considered to be Signficant from sensitive locations in the LVIA Study Area (i.e. the local road network, amenity deisgnations, and nearby residential receptors), with the greatest visual effects occuring in relaiton to the nearby An Logan and Gort na Bró housing estates which were deemed to experience a residual visual effect of Moderate signifcance. There are no Significant visual effects envisioned as a result of the Proposed Development.

The greatest landscape and visual effects are likely to be very localised (with most visibility occuring within 500m of the Proposed Devleopment given the level of screening in the suburban streetscape), and considering scale and aesthetic of the Proposed Development, it will not have any Signifcant impact on any key landscape sensitivities or visual amenity.

A dedicated Landscape design is included as part of the Proposed Development and is included in Appendix 4-3. The landscape proposals have been developed through an iterative process by the project team to ensure that the designed landscape meets the amenity requirements of future residents.

Throughout the design process, careful consideration was given to the layout of the proposed civic square and its associated retail and cultural outlets, apartment buildings, open spaces and access roads to ensure that the proposals respond to the fabric of the surrounding landscape, and to also improve access and circulation through the local area for potential future residents, consumers and local community.

Cultural Heritage

The Cultural Heritage section of this EIAR has been prepared by prepared by Miriam Carroll and Annette Quinn of Tobar Archaeological Services. This chapter comprises an assessment of the potential impact of the proposed development on the Cultural Heritage resource. Cultural heritage includes archaeology, architectural built heritage and any other tangible assets.

The assessment of the archaeology and cultural heritage of the proposed development area included desk-based research, GIS map compilation, and a site inspection. A desk-based study of the proposed development area was undertaken in order to assess its archaeological and cultural heritage potential and to identify features of archaeological or cultural heritage significance within or near to the proposed development site. Site inspection was undertaken in March 2019 to assess any potential impacts on known or previously unrecorded sites or monuments.

No recorded monuments are located on the proposed development site. The nearest recorded monument is located c. 81m to the east-north-east of the proposed development area and comprises a designed landscape feature (GA094-056—). To the south-east of this is a ringfort (GA094-111—) which is situated c. 220m to the east of the proposed development site. Given the distance of the proposed development from the aforementioned recorded monuments the proposed development site does not fall within the zone of notification for same.

The designed landscape feature may have been associated with Rahoon House (GA094-047—) which is located a further c. 200m to the north-east. Rahoon House is shown on the 1st and 2nd edition OS maps for the area and the designed landscape feature is located within the associated demesne around the house. No obvious landscape feature is shown on the historic mapping, however, in the area of the recorded monument. A review of the database of excavations undertaken in Ireland yielded three results for Rahoon townland, none of which produced any archaeological finds or features.

No protected structures are located on or within the immediate vicinity of the proposed development site. The nearest Protected Structure is the aforementioned Rahoon House (Ref 8301), located c. 298m to the north-east of the proposed development site boundary.

No direct or indirect impacts to the recorded archaeological or cultural heritage resource as a result of the proposed development have been identified therefore no mitigation measures are required.

A potential direct impact to sub-surface archaeological features which may exist within the northern half of the eastern portion of the proposed development site may occur as a result of ground works. In this regard the following mitigation measure is recommended:

- Archaeological monitoring of all topsoil removal should be undertaken by a suitably qualified archaeologist. A report on the monitoring should be compiled on completion of the works and submitted to the relevant authorities.

No recorded monuments, protected structures or NIAH structures are located within the proposed development site. The southern half of the eastern portion of the site has been developed and subject to ground works, therefore this area has no potential for the presence of sub-surface archaeology. Similarly, the western portion of the site has already been developed and has no potential for the presence of sub-surface archaeology. In situ topsoil appears to be present within the northern half of the

eastern portion of the proposed development site therefore archaeological monitoring of topsoil removal in this area is recommended as appropriate mitigation

Material Assets

Traffic

The local road network in vicinity of the existing and proposed development site is made up of single carriageway local and connector roads. The Western Distributor Road is a major link, connecting Knocknacarra North and South with Galway City Centre through Bishop O'Donnell Road. The junctions in vicinity of the site are uncontrolled with roundabout junctions along the Western Distributor Road. There is a 50km/h speed limit on the roads adjacent to the site.

The existing Gateway Retail Park can be accessed from the Western Distributor Road from the south and the Rahoon Road from the north. The existing road network is illustrated in Figure 13-3 below.

- From the Western Distributor Road, there are two access points:
  - The main access point is through the Gort Na Bró Roundabout, from which one arm connects directly to a mini roundabout via a link road providing access to the existing Gateway Retail Park.
  - The second access point is from the Bóthair Stiofáin roundabout, via an uncontrolled T-junction which connects to the local road (Gateway Retail Park) which in turns connects to the mini roundabout at the access to the existing Gateway Retail Park.
- Access from the north is via the uncontrolled the Rahoon Road T-junction which leads to another uncontrolled T junction with a local road (Gateway Retail Park) which in turn links to the mini roundabout at the access to the existing Gateway Retail Park.

Based upon experience of similar developments, a development if this type and scale is anticipated to require an overall average of 80 operatives across the programme with a peak of 160, subsequently generation on average no more than 20 two-way vehicle trips during the AM and PM periods over the period of the phased construction works. The peak requirement of 160 operatives on site is expected to occur relatively short period of the programme, potentially generating up to 40 two-way vehicle movements in the peak AM and PM periods.

Traffic analysis carried out represents a worst-case appraisal of typical weekday and weekend peak periods focused upon the busiest periods of the day (i.e. AM, Interpeak, PM peak and Weekend peak hours). During the operational phase, on weekdays outside of these peak hours of the day, traffic flows are predicted to be notably lower resulting in the network operating with additional reserve capacity to that forecast for the peak hour periods.

Similarly, over the weekend period both the site generated traffic and the external road network traffic flows have been assessed for the peak hour on a Saturday. Outside of this time, traffic flows are lower resulting in the network operating with additional reserve capacity to that forecast during the peak hour

Utilities and Services

This section of the EIAR sets out the impact assessment of the proposed development with regard to utilities and services, including electricity, telecommunications, gas, water supply, sewage, land-use and waste management.

The construction methodology detailed in Chapter 4: Section 4.4 of this EIAR describes the manner in which the Proposed Development will be constructed, including any excavations and installations of

services. Prior to works, the area where excavations are planned will be surveyed and all existing services will be identified. All relevant bodies i.e., ESB, Bord Gáis, EirGrid, Irish Water, Galway City and County Council, etc. will be contacted and all drawings contacted and drawings for all existing services sought.

Any underground services encountered during the works will be surveyed for level and where possible will be left in place. If there is a requirement to move the service, then the appropriate body (ESB, Gas Networks Ireland, etc.) will be contacted, and the appropriate procedure put in place. Back fill around any utility services will be with dead sand/pea shingle where appropriate. All works will be in compliance with required specifications. Construction methodologies are described in further detail in Chapter 4 of this EIAR.

Any underground services encountered during the works will be surveyed for level and where possible will be left in place. If there is a requirement to move the service, then the appropriate body (ESB, Gas Networks Ireland, Irish Water, etc.) will be contacted, and the appropriate procedure put in place. Backfill around any utility services will be with dead sand/pea shingle where appropriate. All works will be in compliance with required specifications. Further details are provided in Section 4.4 of this EIAR and in the Infrastructure Design Report in Appendix 4-6.

Design stage Construction and Environmental Management Plans and Waste Management Plans have been prepared and will be updated prior to the commencement of construction works, to take account of all requirements of the Planning Authority. The waste hierarchy will always be employed to ensure that the least possible amount of waste is produced during the construction phase, through reuse, recovering and recycling. Principles of the Circular Economy will also be adhered too where possible.

During construction, water will be supplied on site by water tankers for general use. Unless a temporary water supply is secured from Irish Water, potable water will be provided in the form of bottled water for staff use during the construction phase (prior to connections to the municipal water supply).

Portable toilets will be provided for those working on the construction sites throughout the Proposed Development. Wastewater arising on-site from these toilets is stored in a sealed tank located within the portable toilets, and these will be emptied periodically (as required) by permitted waste contractors and transported to municipal wastewater treatment plants for treatment.

The Infrastructure Design Report in Appendix 4-6 of this EIAR present the proposals for the proposed development with regard to Surface Water Drainage, Wastewater Drainage and Potable Water Supply. These elements have been taken into consideration throughout the design of the proposed development and will be implemented in line with all required legislation and relevant best-practice guidelines.

For the construction phase, a project specific Construction and Demolition Waste Management Plan (CDWMP) will be adhered to by all Subcontractors / Specialists and all other site personnel involved in the project

An Irish Water Pre-Connection Enquiry form has been submitted to Irish Water and an Irish Water Feedback form has been received outlining that a water connection can be facilitated for the proposed development.

Interaction of the Foregoing

The preceding sections of this Environmental Impact Assessment Report (EIAR) identify the potential environmental impacts that may occur in terms of Population and Human Health, Biodiversity, Land Soils and Geology, Water, Air and Climate, Noise & Vibration, Landscape & Visual, Cultural Heritage and Material Assets (including Traffic), as a result of the proposed development. All of the potential impacts of the proposed development and the measures proposed to mitigate them have been outlined

in the preceding sections of this report. However, for any development with the potential for significant environmental impact there is also the potential for interaction amongst these impacts. The result of interactive impacts may either exacerbate the magnitude of an impact or ameliorate it.

A matrix is presented in Table 15-1 to identify interactions between the various aspects of the environment already discussed in this report. The matrix highlights the occurrence of potential positive or negative impacts of the proposed development. The matrix is symmetric, with each environmental component addressed in the previous sections of this report being placed on both axes of a matrix, and therefore, each potential interaction is identified twice. Interaction in the matrix does not imply a cumulative impact.

Interactions have been identified between effects on Population and Human Health and effects on Noise and Vibration, Air and Climate, Hydrology and Hydrogeology. Interactions have been identified between effects on Biodiversity, Flora and Fauna with effects on Soils and Geology, Hydrology and Hydrogeology, Noise and Vibration. Interactions have been identified between effects on Soils and Geology with effects on Hydrology and Hydrogeology. Interactions have been identified between effects on Air and Climate with effects on Material Assets.

Where any potential interactive effects have been identified, appropriate mitigation is included in the relevant sections (Sections 4-12) of the EIAR.

In general, there are no significant negative effects associated with the proposed development or potential interactions. The development has been designed to ensure it is in keeping with its surrounds, has limited potential for environmental emissions and will have a generally positive effect for the local community and. Galway City. Where any potential negative impacts have been identified during the assessment process, these impacts have been avoided or reduced by design and the proposed mitigation measures, as presented throughout the EIAR and highlighted in Chapter 15.

The potential for interaction of effects has been assessed throughout this EIAR, as part of the impact assessment process. While the work on all parts of the EIAR was not carried out by MKO, the entire project and all the work of all sub-consultants was managed and coordinated by the company. This EIAR was edited and collated by MKO as an integrated report of findings from the impact assessment process, by all relevant experts, and effects that potentially interact have been assessed in detail in the individual chapters of the EIAR and summarised in Chapter 15.

Schedule of Mitigation Measures

All mitigation measures relating to the pre-commencement and construction phases of the proposed development are set out in the relevant chapters of the EIAR and Construction Environmental Management Plan (CEMP) submitted as part of this Large-Scale Residential Development (LRD) application.

It is intended that the CEMP will be updated where required prior to the commencement of the development, to include all mitigations measures, conditions and or alterations to the EIAR and application documents should they emerge during the course of the planning process and would be submitted to the Planning Authority (Galway City Council) for written approval.

All mitigation measures proposed for the project are outlined in Table 16-1. The mitigation measures have been grouped together according to their environmental field/topic.

The mitigation and monitoring proposals are set out in separate tables in the CEMP (Appendix 4-2) for clarity and tracking of the pre-commencement survey requirements. Where particular monitoring proposed is considered to be a measure of mitigation, it has been included in the consolidated table for all mitigation measures proposed in Chapter 16.

The mitigation proposals in the below format provides an easy to audit list that can be reviewed and reported on during the future phases of the project. The proposal for site inspections and environmental audits are also set out in the Construction and Environmental Management Plan (CEMP) which is included as Appendix 4-2 of this EIAR.

It is intended that the CEMP will be updated where required prior to the commencement of construction to include all mitigations and monitoring measures, conditions and or alterations to the EIAR and application documents should they emerge during the course of the planning process and would be submitted to the relevant Planning Authority for written approval prior to their adoption and implementation.

1. INTRODUCTION

1.1 Introduction

This Environmental Impact Assessment Report ('EIAR') has been prepared by McCarthy Keville O'Sullivan Ltd. (MKO) on behalf of Glenveagh Living Ltd., which intends to apply to Galway City Council pursuant to the provisions of the Planning and Development (Amendment) (Large-scale Residential Development) Act 2021 for permission in respect of a large scale residential development (LRD) located in the townland of Rahoon, Co. Galway. A site location map is included as Figure 1 1.

The overall development site for the Proposed Development is 3.03 hectares in extent (including the existing underground void) and is situated within the Gateway Development in the east of Knocknacarra, County Galway which lies approximately 3km west of Galway City. The proposed scheme will consist of a mix of residential apartment units with a ground floor retail component. Phase 1 and 2 of the Gateway development, which comprise solely a large store retail offer with Dunnes Stores, Next, Harvey Norman, and B&Q among the anchor tenants, along with its associated car parking, have already been completed and lie to the immediate west of the proposed development.

The development site is divided into two separate areas. The main development site measures approximately 2.5 hectares and is bounded to the south and east by the Western Distributor and Gort Na Bró roads respectively with an existing pedestrian link footpath and Gaelscoil Mhic Amlaigh at the boundary to the north. To the south the site neighbours an existing Aldi supermarket where an approximately 2.0m high blockwork wall forms the boundary. The main development site is bisected by an off shoot of the Gort Na Bró road, which effectively splits the site north and south.

In addition to the main development site, the proposed development includes the change of use of an existing underground void, located in the basement level of Gateway Phase 2, to a 181-bay car park. The existing underground void portion of the development site is approximately 0.53 hectares is size. All elements of the development are assessed in the EIAR.

The northern section of the main site is currently comprised of an area of overgrown scrub. The section of the site, south of the road that bisects it, could be described as being brownfield in nature, with native and non-native species recolonising a gravel hardcore area. The southern section of the site is entirely enclosed by timber hoarding. The existing underground void to the northwest of the main development site was constructed during Phase 2 of the Gateway Retail Park development. This area consists of a concrete lined underground void. It is proposed to fit this void out for use as an underground car park.

1.2 Brief Description of the Project

The proposed development will consist of the following:

- Provision of 227 no. residential apartments in 7 no. blocks comprising the following:
  - Block A1: 14 no. 1 bed apartments & 24 no. 2 bed apartments in a block ranging between 3-5 storeys in height;
  - Block A2: 25 no. 1 bed apartments & 15 no. 2 bed apartments in a block ranging between 1-5 storeys in height;
  - Block B1: 3 no. 1 bed apartments, 18 no. 2 bed apartments & 3 no. 3 bed apartments in a block ranging between 3-4 storeys in height;
  - Block B2: 13 no. 1 bed apartments & 21 no. 2 bed apartments in a block ranging between 4-5 storeys in height.
  - Block B3: 5 no. 1 bed apartments, 22 no. 2 bed apartments & 1 no. 3 bed apartment in a block ranging between 3-5 storeys in height;

  - Block B4: 11 no. 1 bed apartments & 26 no. 2 bed apartments in a block ranging between 3-5 storeys in height;
  - Block B5: 13 no. 1 bed apartments & 13 no. 2 bed apartments in a block ranging between 3-4 storeys in height.
- Provision of 1,009.7 sq.m of ground floor commercial units as follows:
  - Unit A101: 411.7 sq.m;
  - Unit A102: 138.2 sq.m;
  - Unit B201: 99.7 sq.m;
  - Unit B202: 133.9 sq.m;
  - Unit B301 3: 226.2 sq.m.
- Provision of a Community Facility (117.8 sq.m);
- Provision of Tenant Amenity Facilities (99.4 sq.m);
- Provision of a Childcare Facility (561.3 sq.m) including an external secure play area;
- Provision of 49 no. surface car parking spaces including EV charging spaces;
- Provision of bicycle parking comprising 114 no. short stay and 436 no. long stay spaces;
- Provision of realigned road between Gort na Bró and Gateway Retail Park Road;
- Change of use of existing underground void to 181 bay underground car park;
- Provision of shared communal and private open spaces, bin storage, public lighting, site landscaping, services, signage, substation, and all associated site development works required to accommodate the proposed development.

1.2.1 References to the Proposed Development

For the purposes of this EIAR, where the 'Proposed Development' is referred to, this relates to all the project components described in detail in Chapter 4 of this EIAR. Where 'The Site' is referred to, this relates to the primary study area for the development, as delineated by the EIAR Study Area in green as shown on Figure 1-1. Individual topics for assessment purposes, i.e., each chapter, indicate the study area used for that topic. The actual site boundary for the purposes of the planning permission application occupies a smaller area within the primary EIAR Site Boundary. The EIAR Study Area encompasses an area of approximately 3.03ha.

1.3 The Applicant

The applicant for the proposed development is Glenveagh Living Ltd. (Glenveagh Living) a division of Glenveagh Properties, PLC. Glenveagh is focused on strategically located developments across Ireland and provides homes for our private, institutional and State customers via three business segments – Suburban, Urban and Partnerships. Glenveagh operate as a single business, capitalising on scale advantages and investing sustainably across each segment to deliver a fair return on capital. Each business segment benefits from our proven delivery platform and industry leading central resources. These central resources span the entire process outside of construction delivery. Glenveagh's single underwriting team is complemented by centralised sustainability, planning and design, manufacturing, procurement, construction management and corporate functions. Glenveagh's strong delivery platform continue to support 3,000 completions per year by 2024.

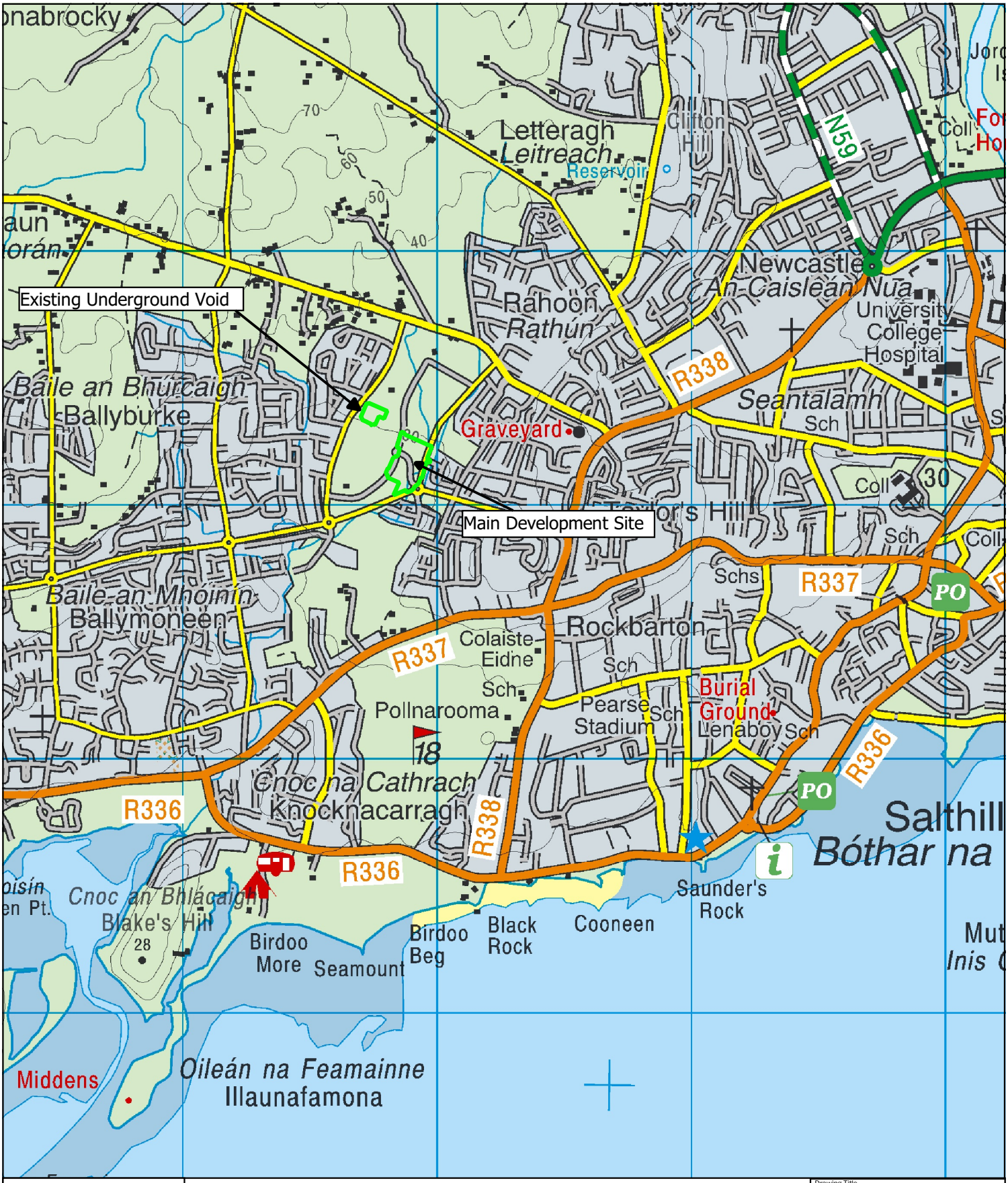
Glenveagh's vision is that everyone should have the opportunity to access great-value, high-quality homes in flourishing communities across Ireland.

1.4 Need for the Development

There is currently a significant shortage of housing units available to service the housing market (including the rental market) in Galway City and the surrounding areas. The rapidly increasing price of housing is a result of the shortage in supply, and many people will soon find themselves unable to afford a home. This problem is also aggravated by a lack of housing units available for the rental

market. The proposed development will contribute significantly to alleviating the shortage of housing supply in Galway and brings into use lands zoned specifically for that purpose.

In addition, the construction industry, through projects such as the proposed development, makes a significant contribution to economic development in Ireland. There remains strong demand for housing in the Galway Metropolitan Area Strategic Plan (MASP) area, for which the proposed development will be able to provide. The proposed large scale residential development will provide a significant supply of mixed tenure residential units which will contribute towards the aim of growing the population of the Galway MASP in a sustainable manner in accordance with national, regional and local planning policy.



Map Legend

EIAR Study Area

N

Drawing Title: **Site Location Map**

Project Title	Knocknacarra District Centre LRD
Drawn By	TM
Checked By	TB
Project No.	210206
Drawing No.	Figure 1-1
Scale	1:20000
Date	07.12.2022

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1.5 Legislative Context

1.5.1 Introduction

The consolidated European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive'), has been transposed into Irish planning legislation by the Planning and Development Acts 2000 as amended and the Planning and Development Regulations 2001 as amended. The EIA Directive was amended by Directive 2014/52/EU which has been transposed into Irish law pursuant to the provisions of amendments made to Part X of the Planning and Development Act 2000 and European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018), as amended.

Accordingly, this EIAR has been prepared in compliance with the EIA Directive as amended by Directive 2014/52/EU and Irish implementing legislation, including Part X of the Planning and Development Act 2000, as amended and Planning and Development Regulations 2001 (S.I. No. 600 of 2001), as amended in particular as amended by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

The European Union Directive 2011/92/EU, amended by EU Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive'), requires Member States to ensure that a competent authority carries out an assessment of the likely significant effects of certain types of project, as listed in the Directive, prior to development consent being given for the project. The Environmental Impact Assessment (EIA) of the proposed development will be undertaken by An Bord Pleanála as the competent authority, in compliance with the provisions of EU and Irish law and guidance.

1.5.2 EIA Screening

The relevant classes/scales of development that require Environmental Impact Assessment (EIA) are set out in Parts 1 and 2 of Schedule 5 of the Planning and Development Regulations 2001, as amended.

Section 172 of the Planning & Development Act 2000, as amended, provides the legislative basis for EIA. It states the following:

"*An environmental impact assessment shall be carried out by a planning authority or the Board, as the case may be, in respect of an application for consent for proposed development where either:*

(a) the proposed development would be of a class specified in –

(i) Part 1 of Schedule 5 of the Planning and Development Regulations 2001, and either –

I. such development would exceed any relevant quantity, area or other limit specified in that Part, or

II. no quantity, area or other limit is specified in that Part in respect of the development concerned,

or

(ii) Part 2 of Schedule 5 of the Planning and Development Regulations 2001 and either –

I. such development would exceed any relevant quantity, area or other limit specified in that Part, or

II. no quantity, area or other limit is specified in that Part in respect of the development concerned,

Accordingly, Schedule 5 of the Planning & Development Regulations 2001, as amended sets out a number of classes and scales of development that require EIA.

With regards to the proposed development, the provisions of Schedule 5, Part 2, Item 10 (b) (iv) require an EIA to be undertaken where it is proposed to carry out the following:

- *10 (b) (iv) 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 built up areas and 20 hectares elsewhere.'*

The proposed residential development is a project which falls under Schedule 5 and has been screened in for EIA given its nature, size (circa 3.03 hectares) and location in a Business District i.e. the Knocknacarra District Centre.

The EIAR provides information on the receiving environment and assesses the likely significant effects of the project, and proposes mitigation measures to avoid or reduce these effects. The function of the EIAR is to provide information to allow the competent authority to conduct the Environmental Impact Assessment (EIA) of the proposed development.

1.5.3 Content of an EIAR

Article 5 of the EIA Directive provides that, where an EIA is required, the developer shall prepare and submit an environmental impact assessment report (EIAR) previously referred to as an Environmental Impact Statement ('EIS'). The information to be provided by the developer shall include at least:

a) a description of the project comprising information on the site, design, size and other relevant features of the project;
b) a description of the likely significant effects of the project on the environment;
c) a description of the features of the project and/or measures envisaged in order to avoid, prevent or reduce and, if possible, offset likely significant adverse effects on the environment;
d) a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the option chosen, taking into account the effects of the project on the environment;
e) a non-technical summary of the information referred to in points (a) to (d); and (f) any additional information specified in Annex IV relevant to the specific characteristics of a particular project or type of project and to the environmental features likely to be affected.

In addition, article 94 of Schedule 6 to, the Planning and Development Act 2000 to 2019 sets out the information to be contained in an EIAR, with which this EIAR complies.

MKO was appointed as environmental consultant on the proposed project and commissioned to prepare this EIAR in accordance with the requirements of the EIA Directive as amended by Directive 2014/52/EU.

1.5.4 EIA Guidance

The Environmental Protection Agency (EPA) published its 'Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, May 2022), which is intended to guide

practitioners preparing an EIAR in line with the requirements set out in the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

In preparing this EIAR regard has also been taken of the provisions of the 'Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment', published by the Department of Housing, Planning and Local Government (DHPLG) in August 2018 to the extent these guidelines are relevant having regard to the enactment of the revised EIA Directive.

The European Commission also published a number of guidance documents in December 2017 in relation to Environmental Impact Assessment of Projects (Directive 2011/92/EU as amended by 2014/52/EU) including 'Guidance on Screening', 'Guidance on Scoping' and 'Guidance on the preparation of the Environmental Impact Assessment Report'. MKO has prepared the EIAR with regard to these guidelines also.

1.6 Purpose and Scope of the EIAR

As part of the Environmental Impact Assessment process, the developer of the project must prepare and submit an Environmental Impact Assessment Report (hereafter referred to as the EIAR). This is the first step of the EIA process, as mentioned in Article 1(2)(g) of European Union Directive 2011/92/EU, as amended by Directive 2014/52/EU on assessment of the effects of certain public and private Projects on the environment ("the EIA Directive"). The EIAR is the document prepared by the developer that presents the output of the assessment. It contains information regarding the project, the likely significant effect of the project, the baseline scenario, the reasonable alternatives considered by the developer, the features and measures to mitigate adverse significant effects as well as a Non-Technical Summary and any additional information specified in Annex IV of the EIA Directive. Article 5 of the EIA Directive sets out what must be included in the EIA Report, and how to ensure that it is both of a sufficient high quality and complete. This EIAR provides a statement of the likely significant effects associated with the proposed large scale housing development.

It is important to distinguish the Environmental Impact Assessment (EIA) to be carried out by the Planning Authority, from the Environmental Impact Assessment Report (EIAR) accompanying the planning application. The EIA is the assessment carried out by the competent authority, which includes an examination that identifies, describes and assesses in an appropriate manner, in the light of each individual case and in accordance with Articles 4 to 11 of the Environmental Impact Assessment Directive, the direct and indirect effects of the proposed development on the following:

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)*

1.7 Structure and Content of the EIAR

1.7.1 General Structure

This EIAR uses the grouped structure method to describe the existing environment, the potential impacts of the proposed development thereon and the proposed mitigation measures. Background information relating to the proposed development, consultation undertaken and a description of the proposed development are presented in separate sections. The grouped format sections describe the impacts of the proposed development in terms of human beings and population, flora and fauna, soils and geology, water, air and climate, noise, landscape, cultural heritage and material assets such as traffic and transportation, together with the interaction of the foregoing.

The chapters of this EIAR are as follows:

- Introduction
- Background to the Proposed Development
- Consideration of Reasonable Alternatives by the developer
- Description of the Proposed Development
- Population & Human Health
- Biodiversity,
- Land, Soils and Geology
- Hydrology and Hydrogeology
- Air and Climate
- Noise and Vibration
- Landscape and Visual
- Cultural Heritage
- Material Assets – including Traffic
- Major Accidents and Natural Disasters
- Interaction of the Foregoing
- Cumulative Effects
- Schedule of Mitigation

The EIAR also includes a non-technical summary, which is a condensed and easily comprehensible version of the EIAR document. The non-technical summary is laid out in a similar format to the main EIAR document and comprises a description of the proposed development followed by the existing environment, impacts and mitigation measures presented in the grouped format.

1.7.2 Description of Likely Significant Effects and Impacts

As stated in the '*Guidelines on the Information to be contained in Environmental Impact Assessment Reports*' (EPA, 2022), an assessment of the likely impacts of a proposed development is a requirement of the EIA process. The statutory criteria for the presentation of the characteristics of potential impacts requires that potential significant impacts are described with reference to the extent, magnitude, complexity, probability, duration, frequency, reversibility and trans-frontier nature (if applicable) of the impact.

The classification of impacts in this EIAR follows the definitions provided in the Glossary of Impacts contained in the following guidance documents produced by the by the European Commission (EC) and Environmental Protection Agency (EPA):

- 'Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report' (EC, 2017)
- 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports – May 2022' (EPA, 2022).
- 'Advice Notes for Preparing Environmental Impact Statements – Draft September 2015' (EPA, 2015).
- 'Advice Notes on Current Practice in the Preparation of Environmental Impact Statements' (EPA, 2003)

Table 1-1 presents the glossary of impacts as published in the EPA guidance documents. Standard definitions are provided in this glossary, which permit the evaluation and classification of the quality, significance, duration and type of impacts associated with a proposed development on the receiving environment. The use of pre-existing standardised terms for the classification of impacts ensures that the EIA employs a systematic approach, which can be replicated across all disciplines covered in the EIAR. The consistent application of terminology throughout the EIAR facilitates the assessment of the proposed development on the receiving environment.

Table 1-1 Impact Classification Terminology (EPA, 2022)

Impact Characteristic	Term	Description
Quality	Positive	A change which improves the quality of the environment
	Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
	Negative	A change which reduces the quality of the environment
Significance	Imperceptible	An effect capable of measurement but without significant consequences
	Not significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
	Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends
	Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment
	Very significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment
	Profound	An effect which obliterates sensitive characteristics
Extent & Context	Extent	Describe the size of the area, number of sites and the proportion of a population affected by an effect
	Context	Describe whether the extent, duration, or frequency will conform or contrast with established (baseline) conditions
Probability	Likely	Effects that can reasonably be expected to occur because of the planned project if all mitigation measures are properly implemented
	Unlikely	Effects that can reasonably be expected not to occur because of the planned project if all mitigation measures are properly implemented
Duration and Frequency	Momentary	Effects lasting from seconds to minutes
	Brief	Effects lasting less than a day
	Temporary	Effects lasting less than a year

Impact Characteristic	Term	Description
	Short-term	Effects lasting one to seven years
	Medium-term	Effects lasting seven to fifteen years
	Long-term	Effects lasting fifteen to sixty years
	Permanent	Effect lasting over sixty years
	Reversible	Effects that can be undone, for example through remediation or restoration
	Frequency	Describe how often the effect will occur. (once, rarely, occasionally, frequently, constantly – or hourly, daily, weekly, monthly, annually)
Type	Indirect	Impacts on the environment, which are not a direct result of the project, often produced away from the project site or because of a complex pathway
	Cumulative	The addition of many minor or significant effects, including effects of other projects, to create larger, more significant effects.
	'Do Nothing'	The environment as it would be in the future should the subject project not be carried out
	Worst Case'	The effects arising from a project in the case where mitigation measures substantially fail
	Indeterminable	When the full consequences of a change in the environment cannot be described
	Irreversible	When the character, distinctiveness, diversity, or reproductive capacity of an environment is permanently lost
	Residual	Degree of environmental change that will occur after the proposed mitigation measures have taken effect
	Synergistic	Where the resultant effect is of greater significance than the sum of its constituents

Each impact is described in terms of its quality, significance, extent, duration and frequency, and type, where possible. A 'Do-Nothing' impact is also predicted in respect of each environmental theme in the EIAR. Residual impacts are also presented following any impact for which mitigation measures are prescribed and any interactions between the impacts are assessed. The remaining impact types are presented as required or applicable throughout the EIAR.

1.8 Project Team

The companies and staff listed in Table 1-2 were responsible for completion of the EIAR in respect of the proposed development. Further details regarding project team members are provided below.

The EIAR project team comprises a multidisciplinary team of experts with extensive experience in the assessment of projects and in their relevant area of expertise. The qualifications and experience of the principal staff from each company involved in the preparation of this EIAR are summarised in Section 1.9.1 below. Each chapter of this EIAR has been prepared by a competent expert in the subject matter. Further details on project team expertise are provided in the Statement of Authority at the beginning of each impact assessment chapter.

Table 1-2 below details the companies and staff that were responsible for completion of the EIAR:

Table 1-2 Companies and Staff Responsible for EIAR Completion

Consultants	Principal Staff Involved in Project	EIAR Input
MKO Tuam Road, Galway, H91 VW84	Michael Watson Thomas Blackwell Tom Madden Sean McCarthy Mary Kelleher Pat Roberts John Hynes Aran von der Geest Moroney Jack Smith- Joseph O'Brien	Project Managers, Scoping and Consultation, Preparation of Natura Impact Statement, EIAR Report Sections: 1. Introduction 2. Background to the Proposed Development 3. Reasonable Alternatives 4. Description of the Proposed Development 5. Population & Human Health 6. Biodiversity. Flora & Fauna. 7. Land, Soils & Geology 8. Hydrology & Hydrogeology 9. Air & Climate 11. Landscape & Visual 14. Risk of Major Accidents 15. Interaction of the Foregoing 16. Schedule of Mitigation
DBFL Consulting Engineers Ormond House, Ormond Quay Upper, Dublin	Aimee Dunne Elena Cuena	Preparation of EIAR Section 13. Material Assets - Traffic and Transport
AWN Consulting Ltd. IDA Business & Technology Park, Clonshaugh, Dublin 17	Leo Williams Abe Scheele	Baseline Noise Survey and preparation of Report Section 10: Noise and Vibration
Tobar Archaeological Services Saleen, Midleton, Co. Cork	Miriam Carroll	Archaeological Impact Assessment and preparation of Section 12: Cultural Heritage

1.8.1 Project Team Members

1.8.1.1 MKO

Michael Watson – Environmental Director

Michael Watson is Project Director and head of the Environment Team in MKO. Michael has over 18 years' experience in the environmental sector. Following the completion of his Master's Degree in Environmental Resource Management, Geography, from National University of Ireland, Maynooth he worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael's professional experience includes managing Environmental Impact Assessments, EPA License applications, hydrogeological assessments, environmental due diligence and general environmental assessment on behalf of clients in the wind farm, waste management, public sector, commercial and industrial sectors nationally. Michaels key strengths include project strategy advice for a wide range and scale of projects, project management and liaising with the relevant local authorities, Environmental Protection Agency (EPA) and statutory consultees as well as coordinating the project teams and sub-contractors. Michael is a key member of the MKO senior management team and as head of the Environment Team has responsibilities to mentor various grades of team members, foster a positive and promote continuous professional development for employees. Michael also has a Bachelor of Arts Degree in Geography and Economics from NUI Maynooth, is a Member of IEMA, a Chartered Environmentalist (CEnv) and Professional Geologist (PGeo).

Thomas Blackwell – Senior Environmental Consultant

Thomas is a Senior Environmental Consultant with over 16 years of progressive experience in environmental consulting. Thomas' professional experience includes managing Environmental Impact Assessments, environmental permitting, environmental due diligence and compliance, and general environmental assessment on behalf of clients in the renewable energy, mining, solid waste management, residential and commercial development, and public sectors. Thomas' multi-sector experience working on projects in multiple jurisdictions has allowed him to develop a wealth of knowledge and understanding of the challenges involved in guiding complex project through the regulatory and planning process.

Tom Madden –Environmental Scientist

Tom Madden is an Environmental Scientist with over 3 years' experience in professional environmental consultancies. Tom holds a BSc (Hons) in Environmental Science from the University of Limerick. Prior to joining MKO, Tom worked with environmental consultancies in Dublin and Carlow where he gained experience from working on a wide range of different projects. Tom's key strengths are in compilation of various types of environmental reports such as EIAR Chapters, EIA Screenings, Construction & Environmental Management Plans and Construction Waste Management Plans. Tom is also proficient in conducting environmental sampling and monitoring such as groundwater, surface water, noise and odour. Since joining MKO, Tom has worked widely on energy infrastructure, commercial, recreational and residential projects, and plays a role in preparing Environmental Impact Assessment Reports, EIA Screening Reports, Construction Environmental Management Plans and Decommissioning and Restoration Plans.

Mary Kelleher –Planner

Mary is a planner who has worked with MKO since March 2022. She holds a Bachelor of Science in Ecology from University College Cork and Masters in Planning and Sustainable Development from University College Cork. As part of her work within MKO, she has worked on Environmental Impact

Assessment Reports for Large Scale Residential Developments, as well as Strategic Infrastructure and Renewable energy developments.

Sean McCarthy –Senior Planner

Sean McCarthy is a Senior Planner with McCarthy O'Sullivan Ltd. with over 8 years of experience in both private practice and local authorities. Sean holds BSc. (Hons) in Property Studies and a Masters in Regional & Urban Planning. Prior to taking up his position with MKO in September 2015, Sean worked as a Planning Officer with the Western Isles Council in Scotland in the UK and prior to that worked as a Graduate Planner with Tipperary County Council. Sean is a chartered town planner with specialist knowledge in one off rural housing, renewable energy developments, quarry consents and retail planning. Since joining MKO Sean has been involved as a Project Planning Consultant on a significant range of energy infrastructure, commercial, housing, retail and residential projects in addition to project managing circa 26MW of solar energy planning applications through the statutory planning system, with more projects in the pipeline. Sean holds chartered membership of the Royal Town Planning Institute.

John Hynes – Ecology Director

John Hynes is a Senior Ecologist and director of the Ecology team with McCarthy O'Sullivan Ltd. with over 9 years of experience in both private practice and local authorities. John holds a B.SC in Environmental Science and a M.Sc. in Applied Ecology. Prior to taking up his position with McCarthy Keville O'Sullivan in March 2014, John worked as an Ecologist with Ryan Hanley Consulting Ltd. and Galway County Council. John has specialist knowledge in Flora and Fauna field surveys. Geographic Information Systems, data analysis, Appropriate Assessment, Ecological Impact Assessment and Environmental Impact Assessment. John's key strengths and areas of expertise are in project management. GIS and impact assessment. Since joining MKO John has been involved as a Senior Ecologist on a significant range of energy infrastructure, commercial, national roads and private/public development projects. Within MKO John plays a large role in the management and confidence building of junior members of staff and works as part of a large multi-disciplinary team to produce EIS Reports. John has project managed a range of strategy and development projects across the Ireland and holds CIEEM membership.

Pat Roberts – Principal Ecologist

Pat Roberts is a Principal Ecologist with McCarthy O'Sullivan Ltd. with over 14 years post graduate experience of providing ecological services in relation to a wide range of developments at the planning, construction and monitoring stages. Pat holds B.Sc.(Hons) in Environmental Science. Pat has extensive experience of providing ecological consultancy on large scale industrial and civil engineering projects. He is highly experienced in the completion of ecological baseline surveys and impact assessment at the planning stage. He has worked closely with construction personnel at the set-up stage of numerous construction sites to implement and monitor any prescribed best practice measures. He has designed numerous Environmental Operating Plans and prepared many environmental method statements in close conjunction with project teams and contractors. He has worked extensively on the identification, control and management of invasive species on numerous construction sites. Prior to taking up his position with MKO in June 2005, Pat worked in Ireland, USA and UK as a Tree Surgeon and as a nature conservation warden with the National Trust (UK) and the US National Park Service. Pats key strengths include his depth of knowledge and experience of a wide range of ecological and biodiversity topics and also in his ability to understand the requirements of the client in a wide range of situations. He is a full member of the Chartered Institute of Ecologists and Environmental Managers (CIEEM).

Aran von der Geest Moroney– Project Ecologist

Aran is a project ecologist with MKO having joined the company in February 2021 and having over 1 years' experience in professional ecological consultancy. Aran holds a first-class honours BSc (Hons) in Ecology and Environmental Biology from University College Cork. Aran's key strengths and areas of expertise are wintering bird surveying and identification, freshwater macroinvertebrate identification and sampling, freshwater pearl mussel surveying, bat surveys, GIS, habitat mapping, preparation of Stage 1 and Stage 2 Appropriate Assessment reports and Ecological Impact Assessment. Since joining MKO, Aran has been involved in a range of mixed use, residential, industrial, restoration, public services, wind energy and forestry projects. Aran has carried out a wide range ecological field surveys in accordance with NRA Guidelines, bat surveys, bird surveys, recording vegetation relevés and freshwater quality analysis using bioindicators. Aran has provided supervision as an ecological clerk of works in residential and wastewater infrastructure projects. Aran is trained in carrying out bat surveys, non-volant mammal surveys, bird surveys, freshwater pearl mussel surveys, white-clawed crayfish surveys, electric fishing surveys and in taking vegetation relevés of vascular plants and has experience in habitat identification and habitat mapping. Within MKO, Aran is responsible for independently carrying out and planning a range of ecological field surveys in accordance with NRA Guidelines and carrying out Appropriate Assessment screenings, Natura Impact Statements, Ecological Impact Assessments, Biodiversity chapters for EIARs, Invasive Species Management Plans and Aquatic reports as part of the ecology team. Aran is a member of CIEEM, holds a current Bat Roost Disturbance licence and holds an IFM Certificate in Electric Fishing.

Jack Workman – Environmental Scientist and LVIA Specialist

Jack Workman is an Environmental Scientist and Landscape and Visual Impact Assessment Specialist with MKO. Jack's primary role at MKO is within the landscape team where he produces the Landscape Visual Impact Assessment (LVIA) chapter of Environmental Impact Assessment reports. Jack holds a BSc. In Psychology, an MSc. in Coastal and Marine Environments (Physical Processes, Policy & Practice) where he was awarded the Prof. Máirín De Valéra distinction in science research award. Prior to taking up his position with MKO, Jack worked as a Geospatial Analyst and Research Assistant with NUIG and also held previous posts in the coastal engineering sector with Royal Haskoning DHV and Saltwater Technologies. Since joining MKO in February 2020, Jack has conducted and project managed all aspects of LVIA for a broad range of commercial infrastructure developments including wind and solar energy projects, grid infrastructure, extraction industry and Strategic Housing Developments. Jack has utilised his specialist knowledge in LVIA to deliver effective consultation during the early-stage design of large infrastructure developments as well as conducting Landscape Capacity Assessments and feasibility studies. Jack holds a membership with the Chartered Institute of Water and Environmental Management, he is an Affiliate member with the British Landscape Institute and is also an active member of the Landscape Research Group.

Jack Smith – Environmental Scientist and LVIA Specialist

Jack is an Environmental Scientist with MKO having joined the company in May 2021. Jack holds a BCL (Hons) Law, an LLM (International Environmental and Energy Law), and a MSc (Hons) in Environmental Science where he focused his studies on Renewable Energy and Marine Spatial Planning. Jack's key strengths and expertise are in geographic information systems, data analysis, report writing and landscape and visual impact assessment. Since joining MKO, Jack has been involved in a range of projects, including residential developments, quarries, wind energy developments and solar energy developments. In his role as an environmental scientist within the Landscape Team, Jack works with other members of the team in the preparation and production of Landscape and Visual Impact Assessment chapters of EIA reports.

James Newell – Graphics Technician

James Newell is a Graphics Technician with McCarthy O'Sullivan Ltd. with over 20 years of experience in private practice. James holds a City and Guilds CAD Certificate in 2D and 3D. Prior to taking up his position with McCarthy Keville O'Sullivan in May 2006, James worked as a pre-press graphic designer with Clodoiri Lurgan Teo. Inverin, Co. Galway. James is a highly creative individual with proficient in numerous graphic & GIS applications. James's key strengths are in photomontage development for the wind & solar energy sector and design production of reports illustrating their visual impacts. Since joining MKO James has contributed to EIS reports in the areas of Wind & Solar farm site drawing design, photomontage, ZTV mapping & shadow flicker analysis. Within MKO James works as part of a shared resources team supporting a variety teams with varied skillsets in addition to managing the KOS's Information technology (I.T.) needs, such as computer & software training &maintenance, virus threats & daily Backups.

Joseph O'Brien – CAD Technician

Joseph O'Brien holds the position of CAD Technician. Joseph holds a BA Honours Level 8 Modelmaking, Design and Digital Effect, Institute of Art Design and Technology (IADT), Dun Laoghaire & City & Guilds Level 3 2D &3D AutoCAD certificates. Joseph's role entails various wind and solar farm projects which require various skills such as mapping, aerial registration and detailed design drawings for projects. Prior to joining us, Joseph worked as a free-lance Modelmaker and CAD Technician. His previous experience included designing various models and props through CAD and then making them for various conventions such as Dublin Comic Con and Arcade Con.

1.8.1.2 AWN Consulting Ltd.

Leo Williams – Senior Acoustic Consultant

Leo Williams is a Senior Acoustic Consultant at AWN Consulting who has over 6 years' experience as an environmental consultant specialising in Acoustics and Environmental Impact Assessment. He graduated from TCD with a BA, BAI (Mechanical and Manufacturing Engineering) and an MAI (Mechanical and Manufacturing Engineering). Leo is a Member of the Institute of Acoustics and has extensive experience in environmental noise impact assessment, in particular residential developments, industrial/manufacturing and renewable energy noise sources. He has experience in room and building acoustics modelling and assessment. He has completed the IOA Diploma in Acoustics and Noise Control.

Abe Scheele - Acoustic Consultant

Abe Scheele is an acoustic consultant at AWN Consulting who holds City & Guilds level 1 & 2 in sound engineering and City & Guilds Music Technology and has been working in the field of acoustics for six years. He has significant experience in modelling and prediction in relation to building, industrial and residential projects and extensive experience in environmental noise surveying.

1.8.1.3 DBFL

Aimee Dunne, CEng MEng BEngTech MIEI MIHE

Aimee is a Chartered Transport Engineer with 11 years' post graduate experience in the areas of traffic engineering and transport planning and has worked within transportation consultancies in the UK, New Zealand and Ireland. Aimee graduated from Heriot-Watt University, Edinburgh in 2010 with an MEng in Civil & Environmental Engineering. Aimee's relevant environmental impact assessment project experience includes the Grand Canal Harbour Mixed Use Development in Dublin 8, Castleforbes Mixed Use Development off Sheriff Street in Dublin 1, Parkside Phase 4 and Parkside 5B at Belmayne.

Elena Cuena, BEng Meng

Elena is a Graduate Transportation Engineer with DBFL Consulting Engineers and has over two years of experience within the industry. She has gained considerable knowledge and experience in transport planning and design within DBFL. Elena graduated from University of Seville with an BEng in Civil Engineering and from the Polytechnical University of Madrid with a MSc in Civil Engineering, both specialising in Transport, Territory and Urbanism.

1.8.1.4 Tobar Archaeological Services

Miriam Carroll and Annette Quinn

Miriam Carroll and Annette Quinn are the directors of Tobar Archaeological Services and both graduated from University College Cork in 1998 with a Masters degree in Methods and Techniques in Irish Archaeology. Both directors are licensed by the Department of Culture, Heritage and the Gaeltacht to carry out excavations and are members of the Institute of Archaeologists of Ireland. Annette Quinn and Miriam Carroll have been working in the field of archaeology since 1994 and have undertaken numerous projects for both the private and public sectors including excavations, site assessments (EIAR) and surveys.

1.9 Preparation

MKO is responsible for the preparation of this EIAR. No difficulties, such as technical deficiencies, lack of information or knowledge, were encountered in compiling any specific information contained in the EIAR.

1.10 Viewing and Purchasing the EIAR

Copies of this EIAR will be available online, including the Non-Technical Summary (NTS), on the Planning Section of the Galway City Council website, under the relevant Planning Reference Number (to be assigned on lodgement of the application).

https://www.galwaycity.ie/online-planning-system

This EIAR and all associated documentation will also be available for viewing at the offices of Galway City Council. The EIAR may be inspected free of charge or purchased by any member of the public during normal office hours at the following address:

Galway City Council,
Planning Department
City Hall
College Road
Galway
H91 X4K8

The EIAR will also be available to view online via the Department of Planning, Housing and Local Government's EIA Portal, which will provide a link to the planning authority's website on which the application details are contained. This EIA Portal was recently set up by the Department as an electronic notification to the public of requests for development consent which are accompanied by an EIAR.

https://www.housing.gov.ie/planning/environmental-assessment/environmental-impact-assessment-eia/eia-portal

The EIAR can also be accessed via the dedicated Large Scale Residential Development (LRD) website for the proposed development.

www.knocknacarradistrictcentrelrd.com

2. BACKGROUND TO THE PROPOSED DEVELOPMENT

2.1 Site of the Proposed Development

2.1.1 Site Location

The application site is located at Gort na Bró, Rahoon, Knocknacarra, Galway approximately 3.1km west of Galway City Centre. The surrounding area is characterised by the established residential suburb of Knocknacarra. The site is accessed via the adjacent Gort na Bró Road and Western Distributor Road. The application site measures approximately 3.03ha, including the underground void located in the Phase 2 retail to the north. Figure 2-1 below illustrates the subject site location. The lands adjoining the site to the west is the location of the Phase 1 and 2 of the Gateway Retail Park. The application site is bounded by Gort na Bró to the east and the retail park link road to the west. The Western Distributor Road, an arterial route serving the city, is located to the south.

Figure 2-1 - Subject Site Location (indicative only)

2.1.2 Physical Characteristics of Site and Surrounding Lands

The proposed site is traversed (east-west) through the centre by a road linking the Western Distributer Road to the internal retail park road. The northern portion of the site consists of a greenfield area with trees lining the southern and western boundaries. The southern portion of the site is formed by a brownfield area with a small area of green space and trees lining the south-east and northern boundaries. The existing trees on the site consist of semi-mature ash, beech, maple, and birch trees. The subject site and surrounding lands are shown below in Figure 2-2, Figure 2-3 and Figure 2-4. A Site-Specific Flood Risk Assessment (SSFRA) has been prepared for the proposed development (DBFL Consulting Engineers, 2022). This report determined that the Site is within Flood Zone C and concluded that the residential development proposed is appropriate for the Site's flood zone category. The lands are zoned within the classification of 'CI-Commercial/Industrial' within the Galway Development Plan 2017-2023

(GDP 2017-2023) which specifically includes residential and commercial use. The site is subject to a site-specific zoning objective which is discussed in section 1.6.2.

There are no Protected Structures or Recorded Monuments on the application site. The nearest Recorded feature on the National Monuments Service is a Designed landscape feature (Record Number: GA094-056) located c. 95m to the east-north-east of the proposed development area.

The application site is located 1.3km north-east of the Galway Bay Complex Special Area of Conservation (SAC) [Site Code: 000268], 1.5km north-east of the Inner Galway Bay Special Protection Area (SPA) [Site Code: 004031] and 1.8km south-east of the Moycullen Bogs Natural Heritage Area (NHA) [Site Code: 002364].

Figure 2-2 Subject Site looking northwest (Drone Imagery 2022)

Figure 2-3 Gateway Retail Park Site looking north (Drone Imagery, 2022)

Figure 2-4 Lands surrounding Subject Site, looking southeast (Drone Imagery, 2022)

2.1.3 Site Access

The development site is accessed via the Gort na Bró Road and Western Distributor Road. From the Western Distributor Road there are two access points. The main access point is at the 5-arm roundabout at Gort Na Bró which leads directly to a mini roundabout that provides access to the existing Gateway Development. Another access is via an uncontrolled T Junction at Bóthar Stiofáin that joins the internal Gateway Retail Park access road. Access from the north of the site is via a T-junction at the Rahoon Road that joins the Retail Park Road south at a mini roundabout located to the south of Gaelscoil Mhic Amhlaigh. Site access can be seen in the drone image of the subject site above, Figure 2-2 For more information in respect of the access, traffic and transportation arrangements associated with the proposed development please see refer to Chapter 13: Traffic and Transport of this EIAR which was prepared by DBFL Consulting Engineers. A Traffic and Transport Assessment prepared by DBFL is enclosed with the overall application for the development for which this EIAR relates.

2.1.4 Proposed Development in context of adjacent developments

The proposed development is part of a phased development scheme at Knocknacarra District Centre. The lands adjoining the site to the west and north are the location of the Gateway Retail Park which is the primary district retail centre serving the surrounding Knocknacarra area. The existing Retail Park is Phase 1 and 2 of the overall development strategy for the 'Gateway Site'. Phase 2 of the Gateway Retail Park comprises approximately 10,000 sq.m of retail floorspace and was completed in 2020. The current application comprises of Phase 3 of the Knocknacarra district centre development and incorporates residential and retail development as well as a creche facility and civic square.

2.2 Planning History

This section sets out the relevant planning history of the site and its immediate surrounds.

2.2.1 Planning Applications within the Application Boundary

An overview of the planning history within the application boundary is provided below in *Table 2-1*.

Table 2-1 Planning Application History within Application Boundary

Application Reference	Applicant	Description	Decision
Pl. Ref. 07/440	Rumbold Ltd.	Permission for a temporary single storey structure (78.14sq.m) to accommodate a show apartment/marketing suite and associated parking, landscaping and site development works	Grant 03.09.2007 - Conditional
Pl. Ref. 17/158	Targeted Investment Opportunities ICAV	Phase 2 of Knocknacarra District Centre comprising a mixed-use 2 storey development (with plant areas at roof level) of c. 11,969.3 sq. m as follows: 6 no. retail units (units 12-17, c. 9,688.6 sq. m GFA); crèche (unit 11, c. 444.4 sq. m) with an external play area; café/restaurant (unit 9, c. 197 sq. m); first floor gym (unit 18, c. 678.1 sq. m) as well as offices (units 7, 8 & 10, c. 786.5 sq. m); provision of new east/west pedestrian link; signage zones c.	Grant 25/07/2007 – Conditional

Application Reference	Applicant	Description	Decision
		143.68 sq. m, canopies on southern elevation; 129 no. basement and 22 no. surface car parking spaces; 116 no. cycle spaces (at surface level); all located to the north of existing Dunnes Stores and surface car park. Permission is also sought for associated ancillary development comprising service yards, refuse areas, hard and soft landscaping, single storey ESB substation (58.2 sq. m), basement entrance, vents, revised surface circulation in southeast corner of site; basement level plant, attenuation areas (& foul pump), works and build out of basement area (to also tie in with existing basement), and all associated site development & drainage works. Primary vehicular access to the proposal will be from new entrance (at northern boundary) from internal access road, all on a site of c. 1.56 hectares	

2.2.2 Previous Strategic Housing Development (SHD) Applications

There has been 1 no. previous SHD application the lands within the site boundary of the proposed development as outlined below.

Planning Reference ABP Ref: BP305982

Glenveagh Living Ltd., applied for planning permission to develop a Strategic Housing Development scheme comprising 332 no. residential units, commercial floorspace, community facilities, creche, and all associated works at Gort na Bro, Knocknacarra, Galway.

On 19th March 2020, An Bord Pleanála refused planning permission for the development. In their direction, the Board stated that they were *"not satisfied that the quality of the communal open space, and limited extent of the proposed podium level deck between Blocks E and F, would provide a sufficient visual and residential amenity for future occupants. The Board noted the concerns of the planning authority with regard to the exposed nature of the site, and the negative impacts of the prevailing winds in the area on high level balconies, and the results of the Wind Microclimate Assessment provided by the applicant, and considered that the changes required to achieve the level of mitigation required would be significant.*

The Board decided not to include these issues in the refusal reason given the substantive reasons for refusal set out in its Order."

The full reason for refusal is outlined below:

> *"1. Having regard to the Guidelines for Planning Authorities on Sustainable Urban Housing: Design Standards for New Apartments, issued by the Department of Housing, Planning and Local Government in March 2018, and having regard to a stated objective of Specific Planning Policy Requirement 4 of these guidelines that "there shall generally be a minimum of 50% dual aspect apartments in a single scheme", it is considered that the ratio of dual aspect apartments*

proposed is substantially below this minimum requirement, and that the proposed development would therefore fail to provide an acceptable standard of amenity for its future occupants.

2. Having regard to the Childcare Facilities - Guidelines for Planning Authorities 2001 it is considered that the proposed childcare facility provision is deficient in the provision of childcare places and is not in accordance with the guidelines for such facilities. The proposed development would, therefore, be contrary to these Ministerial Guidelines and to the proper planning and sustainable development of the area."

The current proposal has been designed to address the concerns highlighted by An Bord Pleanála during the assessment of the Strategic Housing Development as proposed in 2018.

2.2.3 Other Planning Applications within the Vicinity of the Application Site

Table 2-2 below provides a list of the other relevant planning applications which relate to the subject lands and adjacent residential development and has been compiled following a review of Galway County Council's Planning Register in respect of the subject lands. The planning search area was defined following a review of parameters to be assessed as part of an EIA. To this extent, from this search area, a long list of projects considered for the assessment was compiled. Within each chapter of the EIAR, the projects considered for cumulative assessment are selected from this list as are deemed relevant for each discipline. The planning search considered residential, retail and commercial developments in a catchment area illustrated in figure 2-5 well as large infrastructure developments proposed for the greater Galway City Metropolitan Area.

Figure 2-5 Planning history search area for the purposes of cumulative impact assessment.

Table 2-2 Planning application history within the vicinity of the Application Boundary

Application Reference	Applicant	Description	Decision
Pl. Ref. 17/335	Minister For Education & Skills	Retention Permission for development which will consist of the retention of revised site boundary on the north of the school site granted planning permission, under planning reference no. 15/11, to include an additional portion of land in the amenity area associated with the school. Boundary treatment will be the same as that proposed on the original grant of planning permission.	Grant – 08/03/2018 Conditional
Pl. Ref. 17/354	Thomas McDonogh & Sons Ltd.	Permission to construct a 2.4M high security fence, four entrance gates and associated works, on the roadside boundary of their lands at subsites 1, 3, 4, 7 & 8 (Pl. Ref. No. 98/785 refers)	Grant – 22/05/2018 Conditional
Pl. Ref. 18/134	Bórd Bainistíochta Ghaelscoil Mhic Amhlaigh	Cead Pléanála iomlán chun "Ionad Gaeilge" aon stóir "Arás Mhic Amhlaigh" a thógáil d'fhonn áiseanna réamhscolaiochta (naionra) agus iarscoile a sholáthar don scoilphobal agus breis tacaíochta a thabhairt d'fhorbairt nios leithne na Gaeilge I gceantar choc na Cathrach. Is éard a bheidh san áis ná 3 sheomra ranga le haghaid naionra & gníomhaíochtaí iarscoile, seomra ilchuspóireach agus spás ann le haghaidh cruinnithe & gníomhaiochtaí scoile, oifigí limistéir don fhoireann & cóiriocht choimhdeach, agus achar iomlán urláir de thimpeall 485m2 ann. Déanfaidh na hoibreacha láithreáin beartaithe soláthar le haghaidh 21 spás páirceála carr ag leibhéal na sráide lena n-áiritear spásanna páirceála inrochtana, cabhsán/limistéar tiontaithe carranna & limistéar fág agus fuadaigh; limistéar daingnithe spraoi faoin spéir, ceangal le seirbhísí reatha agus oibréacha láithreáin gaolmhara.	Grant – 12/09/2018 Conditional
Pl. Ref. 19/33	Mary Grehan & Pat McGrath	Permission and outline Planning Permission is sought for development which consists of 8 no. new dwelling houses in total: On Site A: full planning permission for new access road & services to 5 no serviced residential sites, these are comprised of: 1 no. Full permission new dwelling house (527m2) & Shed (37m2) all associated site services & landscaping works, & Outline permission for 4 no. dwelling houses with sheds on these serviced sites. On Site B: full planning permission for new access road & services to 3 no. serviced residential sites, these are comprised of 1 no. Full permission new dwelling house (445m2) & Shed (37m2) all associated site services and landscaping works,	Grant – 09/04/2019 Conditional

Application Reference	Applicant	Description	Decision
		& Outline permission for 2 no. dwelling houses with sheds on these serviced sites.	
Pl. Ref. 19/155	Harvey Norman Trading(Ireland) Limited	Planning permission for the development which consists of a change of use of 405 Sq.m at First Floor level, (previously granted under Reg Ref 17/158) from Retail to Restaurant / Café use. The development will comprise of seating area for approx. 120 people, servery, food preparation area and storage rooms along with staff welfare facilities, customer toilets and all ancillary works.	Grant – 24/07/2019 Conditional
ABP Pl. Ref. 304345	Burkeway Homes Ltd.	101 no. residential units (46 no. houses, 55 no. apartments), childcare facility and associated site works.	Grant – 02/08/2019 Conditional
Pl. Ref. 19/208	K King Construction Ltd.	Permission is sought for retention and completion of amendments to previously granted planning permissions ref. 17/30 & 19/68. The proposed amendments are as follows: (1) Retention of change of house type to house numbers 3 to 23 inclusive and house numbers 24 (previously number 26) to house number 33 (previously number 35) inclusive. House type referencing has also been amended for clarity (Previous Type A1 is now Type A/A1. Previously Type A is now Type B/B1. Previous 4 Bed Detached is now Type C. Previous Type C is now Type D). (2) Retention of minor amendments to finished floor levels and footprint locations for house numbers 24 (previously number 26) to house number 33 (previously number 35) inclusive (3) associated site works to the above amendment.	Grant - 10/09/2019 Conditional
ABP Pl. Ref. 304762	O'Malley Construction Company	Demolition of existing house and associated outbuildings, construction of 238 no. residential units (113 no. houses, 125 no. apartments), childcare facility and associated site works.	Grant – 14/10/2019 Conditional
Pl. Ref. 19/305	Galway County Board	Extension of Duration on PL Reg Ref 13/97: Permission to erect and install five no. floodlight columns (of which 3 no. are 30.48m high and 2 no. are 36.6m) with associated floodlights on each column (between 33 no. and 40 no. lighting fixtures on each) fitted to 4.5m radius support frames on each column to provide light levels of 500 lux horizontal and on occasion 1,000 lux horizontal, provision of 550 kVA standby electricity generator to be located underneath the western terrace, associated control gear to provide on/off control and monitoring of lighting system, electrical works and associated site works	Grant- 11/12/2019 Unconditional

Application Reference	Applicant	Description	Decision
Pl. Ref. 19/319	Highgate Properties Ltd.	Permission is sought for change of house types and reconfiguration of individual house sites for previously granted residential development under Pl. Ref 18/438 and Pl. Ref. 16/28 for 11 no. 3 & 2 storey houses. The new proposal comprises of 09 no. 2 storey detached dwellings on reconfigured site plan with boundary treatments, landscape design and all associated site works, and provision of a greenway as previously granted under Pl. Ref. 18/438 and Pl. Ref 16/28.	Grant - 11/03/2020 Conditional
Pl. Ref. 20/56	Targeted Investment Opportunities ICAV	Planning permission is sought for the development which will consist of revisions to permitted phase 2 development (planning reg. Refs. 17/158 & 19/183) to include: the subdivision of unit 16 (c.401 sq.m) into unit 16 (c. 181sq.m) and unit 16b (c. 198 sq.m). This includes the addition of a compartment wall and associated external alterations (entrance and signage) at site of 0.6 hectares	Grant – 09/06/2020 Conditional
Pl. Ref. 20/63	Harvey Norman Trading (Ireland) Limited	Planning permission is sought for the development which will consist of a 66.5 sq.m free standing covered caged area for holding WEEE recyclables, a 11 sq.m dock shelter/weather canopy to the loading door to the North Elevation and a 4.5 sq.m dock shelter to the loading door on the West Elevation, all within the rear service yard along with all necessary and associated site works	Grant – 16/06/2020 Conditional
Pl. Ref. 19/177	Highcross Developments Limited	Permission is sought for the redevelopment of an existing infill and brownfield site to provide for a mixed-use development comprising of a Restaurant Bar, 2 no. neighbourhood retail units and 6 no. apartments. The development will consist of: Demolition of 1 no. existing 2 storey detached dwelling, Construction of a Mixed-use building over basement, with the overall height of the proposed building ranging from 3 storeys to the east to 4 storeys to the west. The basement will consist of a cellar, toilets, refuse areas, storage and ancillary services. The Ground Floor will provide for a Restaurant and Bar use, ancillary services and access areas, as well as 2 no. neighbourhood retail units. The First Floor will also accommodate the restaurant use and ancillary service areas. The second floor will provide for Residential use, i.e. 1 no. two bedroom apartment, 2 no. Three bedroom apartments, with private and communal amenity areas. The third floor will provide for Residential use, i.e. 1 no. three bedroom apartment, 1 no. two bedroom apartment, with	Grant – 26/06/2020 Conditional

Application Reference	Applicant	Description	Decision
		private and communal amenity areas. The fourth floor (to the west of the building), will accommodate Residential Use, i.e. 1 no. three bedroom apartment and private amenity areas. Provision for public realm hard and soft landscaping including shared public open space/ pedestrian plaza at ground floor level, Provision for 72 no. surface carparking spaces, bicycle parking spaces, together with revised boundary treatments and signage, Revised access arrangements to include for a new vehicular entrance from the western Distributor Road and a vehicular exit onto the Clybaun road, together with additional pedestrian connectivity to the public roads bounding the site, Connection to existing public mains water infrastructure, including connection to existing surface water and foul drainage networks, to serve the development, together with all associated site development works and services.	
Pl. Ref. 20/124	Shared Access Limited	Permission to install an 18.1m multi-user free standing support structure carrying telecommunications equipment including antennas, RRUs and dishes, together with associated exchange cabinets, fencing and all associated site development works	Grant – 16/07/2020 Conditional
Pl. Ref. 19/251	Lidl Ireland GmbH	Planning Permission for the development which will consists of the construction of a part single storey, part two storey mixed use development totalling 2,694sqm gross floor space, including: a Licensed Discount Foodstore Supermarket with ancillary off - licence sales measuring 2,154 sqm gross (net retail sales area of 1,377sqm), a Café/ Restaurant measuring 197sqm, a Barbers measuring 80 sqm, a Nail Bar measuring 20 sqm, a physiotherapy clinic measuring 56 sqm, and associated communal areas measuring 187 sqm; and, the provision of associated car parking, free standing and building mounted signage, free standing trolley bay and enclosure, refrigeration and air conditioning plant and equipment, roof mounted solar panels, public lighting, hard and soft landscaping, cycle parking, boundary treatments, vehicular and pedestrian accesses, drainage infrastructure and connections to services / utilities, and all other associated and ancillary development and works above and below ground level	Grant - 10/09/2020 Conditional

Application Reference	Applicant	Description	Decision
Pl. Ref. 20/129	Commissioners of Public Works in Ireland	Permission for development: the development consists of the demolition of 2 no. existing structures (a canteen building and barrage pump house inc. office, locker room and WC) which are to be replaced with 1 new pump house including welfare facilities, stores and office inc. associated site works (A Natura Impact Statement (NIS) will be submitted with the application)	Grant – 20/10/2020 Conditional
Pl. Ref. 20/327	White Cedar Developments	Extension of duration on PL Ref: 14/248: Permission for development which will consist of a total of 58 residential units made up of 32 no. 4 bedroom semidetached 2 and ½ storey houses, 12 no. 4 bedroom 2 and ½ storey detached houses, 2 no. 5 bedroom that is part 2 and ½ storey and part 2 storey detached house, 6 no. 4 bedroom 2 and ½ storey terraced houses and 6 no. 3 bedroom 2 and ½ storey terraced houses. Six of the residential units with on-site parking are proposed to have individual vehicular access directly from the Clybaun Road. Development also to include all associated communal and private open spaces, hard and soft landscaping, site development works and services including connection to the main sewer and proposed internal road layout with 1 new vehicular access to the site from the Clybaun Road, with new paths and new boundary walls and served by 102 shared surface parking as well as the realignment/widening of the Clybaun Road for part of the length of the proposed new development fronting onto the Clybaun Road as well as the provision of a new public footpath along the Clybaun and Rahoon Road	Extension of Duration – Granted 08/02/2021
Pl. Ref. 21/145	McHugh Property Holdings Ltd	Permission for development which will consist of the construction of an ESB Substation and associated site works within a previously granted residential development (Pl. Ref. 18/199) accessed from Gaelcarrig Park and Carn Ard	Grant – 29/06/2021 Conditional
Pl. Ref. 21/108	Leadlane (Clybaun) Limited	Permission for development which will consist of amendments to previously granted planning permission ref: 14/248 (Bord Pleanala Ref: PL 61.245292).Extended under granted planning permission ref:20/327 and previously amended under planning permission references 17/296,18/68 and 18/69. Amendments to include: (a) Superseding 48 no. previously granted 2 and a half story houses with 50 no.2 storey houses. Proposed dwellings to consist of: 18 no.4 bedroom, 2 story semi-detached houses, 14 no.3 bedrrom,2 story semi-detached	Grant – 09/08/2021 Conditional

Application Reference	Applicant	Description	Decision
		houses and 18 no.3 bedroom, 2 story terrace houses (b) Amendment of direct access driveways onto the Clybaun Road (c) Repositioning of Sub-station (d) Provision of additional grouped parking (e) Amendment to red line boundary (f) Repositioning of entrance onto Clybaun road and re-alignment of internal roads to cater for the above revisions & (g) Revision of boundary treatments to cater for proposed revised dwellings and road re-alignments along with all ancillary site works and services	
Pl. Ref. 21/207	K. King Construction	Permission for retention which will consist of the retention of amendments to previously granted Duplex building consisting of 16 no. units under previously granted planning permissions ref: 17/30 (ABP-300032-17) and 19/366. The proposed amendments to be retained are as follows: 1. Retention of the building footprint and building elevations. 2. Alterations to site layout to include the reconfiguration of bin and bicycle stores, grouped parking and the introduction of turning head.	Grant – 11/08/2021 Conditional
ABP Ref. 302885 MA07.302885	Galway National Roads Project Office (Galway County Council)	The N6 Galway City Ring Road is a proposed road to the north of Galway City, approximately 18km in length, extending from a new junction with the R336 at the western side of Bearna to the existing N6 to the east of Galway City at Coolagh, Briarhill. The proposed road comprises a single carriageway from the new junction with the R336 to the Ballymoneen Road (approximately 6km of the route) and a dual carriageway from the Ballymoneen Road to where it joins the existing N6 (approximately 12km of the route), including a junction with the N59 at Letteragh. The proposed road would be a Protected Road from the R336 as far as the junction with the N59 and then a motorway eastward from the N59 junction to the existing N6. The proposal includes a number of junctions, link roads, slip roads and associated infrastructure. The applicant is Galway County Council, on behalf of itself and Galway City Council.	Granted 06/12/2021 Judicial Review order pending[1]

[1] *The project was granted by the Board on the 8th of November 2021. The grant of permission is the subject of judicial review proceedings. An Board Pleanála stated that it would not be opposing the judicial review proceedings on the grounds that the proposed road development is not consistent with the Climate Action Plan 2021. At the time of writing, the matter is before the courts for a determination on the future of the project.*

Application Reference	Applicant	Description	Decision
Pl. Ref. 21/233	Dragamara Limited	Permission for development which consists of a) Demolition of existing basement structures on site and associated infilling. b) Construction of 7 no. residential units consisting of: 6 no.3 storey 4-bed units and 1 no.2 storey 3-bed units. c) New vehicular entrances and pedestrian entrances onto Bóthar Stiofáin, and new pedestrian entrance onto Cloch Ard. d) Boundary treatments; and e) Provision of all associated surface water and foul drainage services and connections ancillary to the residential development, and all associated site works	Grant – 11/11/2021 Conditional
Pl. Ref. 21/213	Pat Codyre	Permission for development which will consist of demolition of agricultural sheds and construction of a dwelling house, domestic garage, and all associated site development works	Grant – 02/12/2021 Conditional
LA1/2022	Galway City Council	The development will consist of (a) 5 no. detached, 2 storey, culturally appropriate Traveller group housing units comprising: (i) 3 no. three-bedroom houses, (iii) 1 no. four-bedroom houses (iii) 1 no. two-bedroom house (b) renewable energy design measures for each unit; and (c) support facilities	
Pl. Ref. 2283	K King Construction	Permission for retention which will consist of retention and completion of amendments to previously granted permission (Ref. 19/366 & 20/344). The amendments consist of revised elevational finishes of the previously granted 2 No. 4-storey blocks of apartments (one level of under croft parking and 32 No. of units per block)	
Pl. Ref. 22/96	K King Construction	Permission for development which will consist of change of use and amendments to three storey mixed use building over undercroft parking previously granted under planning permissions ref: 17/30 (ABP-300032-17) & 19/368 (ABP-308638-20). The proposed amendments are as follows: 1. Change of use from Restaurant use to Bar and Restaurant use. 2. Alterations to building elevations and height. 3. Associated minor amendments to parking, site levels and ancillary site works	
Pl. Ref. 22/133	Westside Shopping Centre LTD	Permission for development which will consist of refurbishment works principally comprising: the upgrade of the southern elevation and a portion of the western elevation including the replacement of the existing cladding and the provision of new/replacement signage and landscaping works in the ancillary carpark.	

Application Reference	Applicant	Description	Decision
Pl. Ref. 22140	Peter Keane	Extension of duration on Pl. Reg. Ref. No. 16/286 - Permission is being sought for completion of development commenced under planning ref. 05/883. a) The construction of 6 No. semi-detached two storey houses (no change). b) Minor revisions to 15 No. apartments over three floors and associated parking and amenity space to meet design standards for new apartments introduced in September 2007. c) Minor revisions to single storey two house unit to accommodate six persons with special needs. d) The carparking to existing house No.'s 29 to 31 (no change). e) The rear garden fencing, footpaths, carparking and cul de sac to existing house No's 32 to 35 (no change). All of the above to connect to the existing services permitted and constructed under Pl. Ref. 05/883	
Pl. Ref. 21430	Leadlane (Clybaun) Limited	Permission for development which will consist of amendments to previously granted planning permission ref: 14/248 (Bord Pleanala Ref: Pl 61.245292) extended under granted planning permission ref: 20/327 and previously amended under planning permission references 17/296, 18/68 and 21/108. Amendments to include: (A) Superseding 2 no. previously granted 3 story duplex buildings including creche with one Assisting living apartment building containing 47 apartments. Proposed Apartments to consist of 26 no. 2 bedroom and 21 no. 1 bedroom apartments (B) Repositioning of sub-station (C) Revised group parking and landscaping with public lighting (D) Secure entrance gates (E) Secure pedestrian access from the Clybaun Road to ground floor apartment terraces and public open space (F) re-alignment of internal roads to cater for the above revisions & (G) Revision of boundary treatments to cater for proposed apartment building along with all ancillary site works and services	
Pl. Ref. 22188	John Higgins	Permission for development which will consist of the construction of a new dwelling house and garage, together with associated site works. services, and connections to public utilities	
Pl. Ref. 22121	Galway Golf Club	Permission for development which will consist of the construction of an on-course Male & Female WC including all ancillary site works	
Pl. Ref. 2256	Burkeway Homes Ltd	Permission for development which will consist of: 1) Demolition of existing derelict bungalow and outbuilding. 2) Construction of 82 no. residential units comprising: 53 no. houses, 14	

Application Reference	Applicant	Description	Decision
		no. apartment units, 8 no. duplex units, 7 no. community units. 3) Construction of 1 no. community facility (Ability West Day Centre). 4) Provision of footpath along the Letteragh Road. 5) Provision of shared communal and private open space, car and bicycle parking, bin storage, site landscaping, services, access with Letteragh Road and all associated site development works. The application is accompanied by a Natura Impact Statement (NIS)	
ABP Ref. 61.314050	Vantage Towers Limited	Permission to erect a 24m high telecommunications lattice structure with antennas, dishes, headframe and associated telecommunications equipment all enclosed by security fencing and construction of new access track.	
Pl. Ref. 21386 ABP Ref. 314970-22	Belville Building & Construction (Galway) Limited	Permission for development which will consist of (A) demolition of existing bungalow and associated out buildings (B) the construction of a 3-storey apartment building, containing a total of 14 no. units with the following breakdown of residential mix: 4 no. 1 bedroom apartments, 9 no. 2 bedroom apartments and 1 no. 3 bedroom apartments (C) the provision of a new vehicular & pedestrian access point off the Rahoon Road (D) vehicular parking combined with secure covered bicycle parking spaces, visitor bicycle parking spaces and external communal bin storage (E) with public realm landscaping & solar panels to roof level (F) and all other ancillary site-works and services	

2.3 National Planning Policy

This section of the report sets out the relevant national, regional and local planning policies and objectives of relevance to the proposed development.

2.3.1 Planning Policy Statement 2015

The Department of Environment, Community and Local Government's (DECLG) Planning Policy Statement 2015 encourages planning authorities to engage in active land management by leading and managing the development process and ensuring that land zoned for development actually comes into use in accordance with Development Plan policy and in tandem with supporting infrastructure. The policy statement acknowledges that creating a consolidated urban form fosters the development of compact neighbourhoods and a critical mass which contributes to the viability of economic, social, and transport infrastructure.

2.3.2 National Planning Framework

In 2018, the Government of Ireland adopted the National Planning Framework (NPF) entitled *Ireland 2040* to succeed the National Spatial Strategy. The NPF comprises the Government's proposed long-term strategic planning framework to guide national, regional and local planning and investment decisions over the next 25 years. It is intended that the NPF will be a strategic document that will provide the framework for future development and investment in Ireland, providing a long-term and place-based aspect to public policy and investment, and aiming to coordinate sectoral areas such as housing, jobs, transport, education, health, environment, energy and communications, into an overall coherent strategy.

The NPF has a number of national policy objectives that articulate delivering on a compact urban growth programme and are relevant to Galway City Councils consideration of the proposed Large Scale Residential Development, these include:

- National Policy Objective 1(b) relating to population growth in the region;
- National Policy Objectives 2(a) relating to growth in our cities;
- National Policy Objective 4 relating to attractive, well-designed liveable neighbourhoods;
- National Policy Objective 5 relating to sufficient scale and quality of urban development;
- National Policy Objective 6 relating to increased residential population and employment in urban areas.

National Policy Objective 1b states in the context of population growth to 2040:

'Northern & Western Region – population growth of 160,000 - 180,000 additional people.'

There is a significant population growth allocated to the Northern & Western Region in which Galway is the main urban centre. In order to facilitate this population growth there will be a requirement to develop large numbers of new houses and apartments, approx. 20,000 units based on a standard household size of 2.7 people. There is a considerable divide to be bridged in order to bring housing provision from its current under-supply to the level required to accommodate the population growth forecasts. However, it is important that more sustainable development patterns are established in order to facilitate targeted services and infrastructure investment. The proposed development will deliver 227 no. residential units and these homes would be developed in accordance with the objectives described above.

2.3.3 Housing For All 2021

Housing for All was published on the 2nd of September 2021 and sets out how the Government of Ireland plan to improve Irelands housing system. The plan is devised to provide suitable, sustainably built and viable housing, with the overarching goal of providing every citizen in the state with access to quality housing. To achieve this vision the plan has set out a strategy or pathway system The four pathways are outlined as:

- *'Supporting home ownership and increasing affordability*
- *Eradicating homelessness, increasing social housing delivery and supporting social inclusion*
- *Increasing new housing supply*
- *Addressing vacancy and efficient use of existing stock'*

With the implementation of these four pathways, the Government of Ireland aim to provide an average of 33,000 new homes each year from 2021 to 2030.

2.4 Section 28 Ministerial Guidelines

There are various Ministerial Guidelines in respect of residential development, with those most relevant to the proposed development included below.

2.4.1 Design Manual for Urban Roads and Streets (DMURS) (2013)

Design Manual for Urban Roads and Streets (DMURS) was published by the Department of Transport, Tourism and Sport and the Department of Environment, Community and Local Government in April 2013. DMURS provides guidance relating to the design of urban roads and streets. DMURS encourages designers to give due consideration to creating a 'sense of place' which is of core significance to the creation of safe and more integrated street designs. The guidance document notes that four interlinked characteristics influence the sense of place within a street, including:

- Connectivity: The creation of vibrant and active places requires pedestrian activity. This in turn requires walkable street networks that can be easily navigated and are well connected.
- Enclosure: A sense of enclosure spatially defines streets and creates a more intimate and supervised environment. A sense of enclosure is achieved by orientating buildings toward the street and placing them along its edge. The use of street trees can also enhance the feeling of enclosure.
- Active Edge: An active frontage enlivens the edge of the street creating a more interesting and engaging environment. An active frontage is achieved with frequent entrances and openings that ensure the street is overlooked and generate pedestrian activity as people come and go from buildings.
- Pedestrian Activity/Facilities: The sense of intimacy, interest and overlooking that is created by a street that is enclosed and lined with active frontages enhances a pedestrian's feeling of security and well-being. Good pedestrian facilities (such as wide footpaths and well-designed crossings) also make walking a more convenient and pleasurable experience that will further encourage pedestrian activity.

The DMURS guidance emphasises that these four characteristics represent the basic measures that should be established in order to create people friendly streets that facilitate more sustainable neighbourhoods.

2.4.2 Urban Development and Building Heights Guidelines for Planning Authorities 2018

These guidelines, published by the Minister under Section 28 of the Planning and Development Act 2000 (as amended), are intended to set out national planning policy guidelines on building heights in relation to urban areas, building from the strategic policy framework set out in Project Ireland 2040 and the National Planning Framework.

Traditional building heights in most urban areas in Ireland vary somewhat within a limited and generally low-rise range. To meet the needs of a growing population and to limit the expansion of urban areas outwards, planning policy requires more focus on building up urban infill sites and either reusing or redeveloping existing sites and buildings that may not be in the optimal usage.

2.4.3 Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities 2020

The DECLG published the *Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities* in 2020. The new guidelines are the result of an updating of previous Departmental guidelines published in 2018 and have been prepared, taking account of up-to-date evidence of projected future housing demand, the overall policy context of *Rebuilding Ireland*, and the *National Planning Framework*, as well as circumstances prevailing in the housing market.

The focus of this guidance is on the apartment building itself and on the individual units within it. The 2020 guidelines specify planning policy requirements for:

- General locational consideration;
- Apartment mix within apartment schemes;
- Internal space standards for different types of apartments;
- Dual aspect ratios;
- Floor to ceiling height;
- Apartments to stair/lift core ratios;
- Storage spaces;
- Amenity spaces including balconies/patios;
- Car parking; and
- Room dimensions for certain rooms

2.4.4 Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas 2009

The 'Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas' and the accompanying 'Urban Design Manual: A Best Practice Guide' (2009) set out the criteria on planning for sustainable neighbourhoods under four main themes, namely, provision of community facilities, efficient use of resources, amenity or quality of life issues and conservation of the built and natural environment.

The Guidelines advocate an urban design and quality-led approach to creating urban densities will be promoted, where the focus will be on creating sustainable urban villages and neighbourhoods. A varied typology of residential units is promoted within neighbourhoods in order to encourage a diverse choice of housing options in terms of tenure, unit size, building design and to ensure demographic balance in residential communities.

2.4.5 Childcare Facilities - Guidelines for Planning Authorities 2001

In all new housing areas over 75 units, the provision of one childcare facility with a minimum of 20 childcare spaces is required, in line with the *Ministerial Guidelines for Planning Authorities on Childcare Facilities (DECLG 2001)* and to create sustainable residential neighbourhoods. With regard to larger housing developments, Section 2.4 of the guidelines state planning authorities should require the provision of at least one childcare facility for new housing areas unless there are significant reasons to the contrary. Appendix I of the Guidelines sets out general standards and minimum floors areas for proposed childcare facilities.

2.4.6 The Planning System And Flood Risk Management, Guidelines For Planning Authorities (2009)

The Planning System and Flood Risk Management Guidelines were issued by the Minister of the Environment, Heritage and Local Government under Section 28 of the Planning and Development Act 2000.

2.5 Regional Planning Policy Context

2.5.1 Regional Spatial and Economic Strategy Northern & Western Regional Assembly 2020-2032

The Regional Spatial and Economic Strategy (RSES) Northern & Western Regional Assembly (NWRA) 2020 – 2032 provides a framework for long-term strategic development in the West Region, which comprises the administrative areas of Galway County Council, Galway City Council, Mayo County Council and Roscommon County Council. The Northern & Western Regional Assembly (NWRA) published the Regional Spatial and Economic Strategy (RSES) in March 2020 and are set within the context of national planning policy, including the NPF, providing a statutory link between national and local planning policy and objectives. The RSES outlines arrangements for a co-ordinated metropolitan area strategic plan (MASP) for the Galway Metropolitan Area. The MASP has been provided with statutory underpinning to act as 12-year strategic planning and investment framework. The MASP is an opportunity for Galway to address recent growth legacy issues and build on key strengths, including a vibrant arts and cultural scene, year-round tourism and an attractive natural setting. As outlined in the MASP, in Section 3.6 of the RSES, the Galway Metropolitan Area has considerable land capacity that can significantly contribute to meeting the housing demands based on population targets set out in the NPF and the RSES. The targets are that:

1. *"The population of Galway MASP to grow by 27,500 to 2026 and by a further 14,500 to 2031 with the population of the city and suburbs accommodating 23,000 to 2026 and a further 12,000 to 2031.*

2. *Deliver at least half (50%) of all new homes that are targeted within the MASP to be within the existing built-up footprint."*

2.6 Local Planning Policy Context

2.6.1 Galway City Development Plan 2017-2023

The Galway City Development Plan 2017-2023 (Development Plan) came into effect on Saturday 7th January 2017.

The application site is located in an area zoned 'CI-Commercial/Industrial' within the Galway City Development Plan 2017-2023 (GCDP). The GCDP lists uses which may contribute to the zoning objectives, dependant on the CI location and scale of development and one such use is residential. The land uses outlined in *Table 2.6-1* are deemed appropriate for 'CI' zoned land.

Table 2-3 CI Zoning Objectives

Zoning Objective CI To provide for enterprise, light industry and commercial uses other than those reserved to the CC zone.	
Uses which <u>are compatible with</u> and contribute to the zoning objective, for example	▪ Warehousing/Storage ▪ **Retail of a type and of a scale appropriate to the function and character of the area** ▪ Specialist offices ▪ Offices of a type and of a scale appropriate to the function and character of the area ▪ Light Industry ▪ Accommodation for Travellers ▪ **Childcare facilities** ▪ Community and cultural facilities
Uses which <u>may contribute to</u> the zoning objectives, dependant on the CI location and scale of development, for example:	▪ General industry (small scale) ▪ Service retailing ▪ **Residential content of a scale that would not unduly interfere with the primary use of the land for CI purposes and would accord with the principles of sustainable neighborhoods outlined in Chapter 2** ▪ Offices ▪ Car parks (including heavy vehicle parks) ▪ Waste management facility ▪ Public transportation facility ▪ Public utilities ▪ Outdoor recreation ▪ Commercial leisure/indoor recreation ▪ Places of worship

The application site is part of a parcel of lands identified as being the 'Northern Portion of CI lands at Rahoon'. These lands have a number of specific development objectives associated with them as follows:

- *The site shall include for a minimum of residential/residential commercial development of a scale equivalent to 20% of the proportion of all likely future floor proposals. This residential development shall be integrated into the overall scheme.*

- *Development of these lands will only be considered where it can be shown to be linked in with the existing development and shall show how it relates to an overall layout for the area which will include for landscaping, boundary treatment and linkages with the adjoining residential development and transport services.*

- *The provision of a civic open space will be a requirement on this site and lands shall be reserved for this purpose.*

- *Any additional phase of development shall include for the front-loaded delivery of a public/community facility which can be in the form of a community facility, a community health facility, a transport facility, a park and play area over and above normal open space requirements.*

- *Any future development shall include for a number of small retail/service units which can be demonstrated to deliver a broad range of District Centre uses.*

Table 11. 3 of the Development Plan provides density standards for CI zoned lands as follows:

- Maximum Site Coverage 0.80
- Maximum Plot Ratio 1.25

2.6.2 Draft Galway City Development Plan 2023-2029

The Draft Galway City Development Plan 2023-2029 aims to set out policies and objectives for the sustainable development of Galway City for the plan period. Preparation of the draft plan commenced in January 2021 and the final amended version of the plan will be published and adopted in 2023. The Draft Plan has been prepared to correlate with National and Regional policy documents that have been adopted since the Galway City Development Plan 2017-2023 was finalised. The draft plan is in accordance with the following documents which had not yet been published in the period of preparation for the 2017-2013 development plan:

- Regional Spatial and Economic Strategy (RSES) Northern & Western Regional Assembly (NWRA) 2020 – 2032;
- National Planning Framework;
- Urban Development and Building Heights Guidelines for Planning Authorities;

The Draft Plan encourages sustainable development of the city in a compact and well-integrated form, and economic growth as a regional driver. The City's population is set to increase to approximately 120,000 by 2031. In order to accommodate this population growth in a sustainable manner and avoid urban sprawl, compact development within the built footprint of the city is vital.

Under the Draft Plan the subject site of the proposed development has a specific zoning objective. Section 10.21 of the draft plan outlines the subject site as Knocknacarra District Centre (North) Opportunity Site, describing site details and use of the wider district lands. The function of the site as an *'urban village'* which requires a mixed use of the land. Objective 10.21 states that:

> *"This site measures approximately 4 hectares and is located in the designated Knocknacarra District Centre. The wider district centre lands already accommodate significant development including the Gateway Retail Park, office space and Gaelscoil Mhic Amhlaigh primary school. This area provides a range of convenience and comparison multiples. This site is the last remaining undeveloped parcel in the northern section of the District Centre.*
>
> *A key element of the overall vision for the Knocknacarra District Centre is that it functions as an 'urban village' type centre rather than purely a shopping area. This was supported through specific development objectives for the district centre lands in the 2017-2023 plan, which required a mix of uses including service retail, public health facilities, community, recreational and residential uses, to achieve vibrancy and distinctiveness and local identity. In particular the requirement to provide for a 20% residential content has not been delivered to date and will be required to be fulfilled on this site in addition to the provision of a high quality public realm which will accommodate a civic space as a focus for community activity and amenity.*

Any proposed development should include for a spatial framework having regard to guidance set out in Chapter 8 and will be required to consider the following:

- *Development will be integrated within the overall district centre and proposals will be required to demonstrate linkage with the wider neighbourhood area, the transport, pedestrian and cycle networks and linkage to the green network.*
- *Any development shall include for a high quality urban design.*

- *Any design shall integrate the realigned link road of the N6 GCRR."*

Figure 2-6 Draft GCDP 2023-2029 Zoning Objective

The review of the Galway City Development Plan is expected to be completed in December 2022 adopted in January 2023.

2.6.3 Galway Transportation Strategy

The Galway Transport Strategy (GTS) 2016 represents a partnership approach between Galway City Council, Galway County Council and the National Transport Authority. It includes a series of measures which will address the transport problems experienced across the city particularly during peak hours, over a phased and co-ordinated basis over the next 20 years, based on priority needs. The GTS has established that the reduction in traffic congestion requires both improvements to public transport, cycling and walking networks and the provision of a new orbital route.

The proposed measures were arrived at following transport modelling which included defining the existing transport problems, predicting future travel demands, access mode share and assessing their mutual impacts and interdependencies. The strategy includes traffic management, giving priority to walking cycling and bus movements, modifications to the traffic network, management of parking activities and heavy goods vehicles, improvements to the public realm and use of 'smarter mobility'. These measures are designed to both address the current significant problems and inefficiencies in the movement of people and goods within and around the city and to establish a long-term transport plan that will underpin the future sustainable growth of the city as supported by the Core Strategy of the GCDP 2017-2023.

2.6.4 Galway Urban Density and Building Heights Study 2021

The Galway Urban Density and Building Heights Study 2021 is set out to examine the optimal building heights and density to allow for continued population growth and sustainable development. As Galway

City continues to grow it becomes increasingly important to protect the unique character and built heritage of the city while providing for the increasing need for residential development. The study was prepared to inform development which seeks to respond to an compact growth agenda at a national level, while nurturing what is unique to Galway City, in particular the historic core, the coastline and river landscapes.

2.7 Scoping and Consultation

2.7.1 Scoping Document

Scoping is the process of determining the content, depth, and extent of topics to be covered in the environmental information to be submitted to a competent authority for projects that are subject to an Environmental Impact Assessment (EIA). This process is conducted by contacting the relevant authorities and Non-Governmental Organisations (NGOs) with interest in the specific aspects of the environment likely to be affected by the proposal. These organisations are invited to submit comments on the scope of the EIA and EIAR and the specific standards of information they require. Consultees are invited to contribute to the EIA process by suggesting baseline data, survey techniques and potential impacts that should be considered as part of the EIA process and in its preparation. Comprehensive and timely scoping helps ensure that the EIAR refers to all relevant aspects of the proposed development and its potential effects on the environment. In this way, scoping not only informs the content and scope of the EIAR, but provides a feedback mechanism for the proposed design itself.

A scoping letter providing details of the application site and the proposed development, was prepared by MKO and circulated on 20th October 2022 in relation to this EIAR. These letters were sent to the agencies, NGOs and other relevant parties listed in *Table 2.7-1*.

MKO requested the comments of the relevant personnel/bodies in their respective capacities as consultees with regards to the EIA process.

2.7.2 Scoping Responses

Table 2.7-1 lists the responses received to the scoping document circulated on 20th October 2022. Copies of all scoping responses received are included in Appendix 2-1 of this EIAR. The recommendations of the consultees have informed the EIA process and the contents of the EIAR. If further responses are received, the comments of the consultees will be considered to further to assist documenting any impacts the development may have had on the surrounding environment during its lifetime. The responses of the consultees are summarised below in *Table 2.7-1*.

Table 2-4 – EIAR Consultees and Responses

No.	Consultee	Response
1.	An Taisce	Email acknowledgement on 25th of October 2022
2.	Department of Agriculture, Food and the Marine	No response
3.	Minister for Arts, Heritage, Regional, Rural and Gaeltacht Affairs - Nature Conservation (Department of Culture, Heritage and the Gaeltacht)	No response
4.	Failte Ireland	No response

No.	Consultee	Response
5.	Geological Survey of Ireland	Response received 7th December 2022
6.	Health Service Executive	No response
7.	Inland Fisheries Ireland	Response received 22nd November 2022
8.	Galway City Council – Transportation and Infrastructure Department	No response
9.	Galway City Council – Environment Department	No response
10.	Galway City Council – Heritage Officer	No response
11.	Irish Water	No response
12.	Transport Infrastructure Ireland	Response received 28th October 2022
13.	Office of Public Works	Email acknowledgement on 25th of October 2022
14.	The Heritage Council	No response
15.	ESB Networks	No response
16.	National Transport Authority	No response

2.7.2.1 An Taisce

An email was received confirming receipt of the scoping letter. No comment was given.

2.7.2.2 Office of Public Works

An email was received confirming receipt of the scoping letter. No comment was given.

2.7.2.3 Inland Fisheries Ireland

IFI have no objection to the proposed development provided that appropriate pollution mitigation measures are implemented during the course of works. Guidance document was provided for reference.

2.7.2.4 Geological Survey of Ireland

Advised of publicly available datasets when conducting EIAR, planning and scoping processes. The response highlighted the presence of an aquifer classed as a 'Poor Aquifer – Bedrock which is generally unproductive except for Local Zones' underlies the proposed development and recommends the use of Groundwater Viewer in the course of assessments. GSI provided information on mapping services which can be used in the course of EIAR and Environmental Assessments namely:

- Groundwater Map
- Ground water Climate Map Viewer

- Geological Mapping
- Natural Resources (Minerals/Aggregates)
- Geochemistry of soils, surface waters, sediments

GSI requested copies of any reports detailing results of any future site investigations carried out.

2.7.2.5 Transport Infrastructure Ireland

TII recommended general guidance for preparation of an EIAR.

2.7.3 Pre-Planning Meetings

2.7.3.1 Stage 1: LRD Preplanning Meeting with Galway City Council

A Pre-planning meeting between the Applicant and Galway City Council was held on the 16th of May 2022 under the provisions of Section 247 of the Planning and Development Act (2000) as amended. The scheme and alterations to the proposed development were introduced to the Council representatives in attendance. The agenda was focused on the concerns of the Council regarding the retail strategy, building height, pedestrian movement, public transport, landscaping, the proposed plaza, waste management and the operation of proposed retail units. From this meeting the Applicant and design team took full cognisance of the issues raised and the overall planning documentation has evolved since the Pre-Planning meeting to reflect these discussions.

2.7.3.2 Stage 2: LRD Preplanning Meeting with Galway City Council

Under Section 32B of the Planning and Development Act 2000 (as amended) the applicant requested a Stage 2 Large Scape Residential Development Meeting with the Planning Authority. The statutory meeting was held on the 27th of September 2022 via Microsoft Teams. In accordance with Section 32D of the Act, of the LRD Opinion was issued to the applicant by Galway City Council. The LRD Opinion outlined issues to be addressed by the Applicant and design team prior to the submission of a planning application. 17 no. issues were raised by Galway City Council to be addressed, related but not limited to relevant planning policy, building height and scale, wind and micro-climate, movement and access, invasive species and ecological assessment. The LRD Opinion provided a comprehensive list of assessments and reports that should be included in an application.

2.8 Cumulative Impact Assessment

This Environmental Impact Assessment Statement (EIAR) includes a description of likely significant impacts of the project, includes an assessment of cumulative impacts that may arise. The factors considered in relation to cumulative effects include human beings, flora and fauna, soil, water, climatic factors, landscape, noise, cultural heritage, and material assets.

The potential cumulative impact of the proposed residential development and other relevant developments has been carried out with the purpose of identifying what influence the proposed development will have on the surrounding environment when considered cumulatively and in combination with relevant permitted, proposed, and constructed projects in the vicinity of the application site.

2.8.1 Methodology for the Cumulative Assessment of Projects

The Cumulative Impact Assessments (CIA) of projects has four principle aims:

1. *To establish the range and nature of existing projects within the cumulative impact study area of the proposed residential development.*
2. *To summarise the relevant projects which have a potential to create cumulative impacts.*
3. *To establish anticipated cumulative impact findings from expert opinions within each relevant field. Detailed cumulative impact assessments are included in each relevant section of the EIAR.*
4. *To identify the projects that hold the potential for cumulative interaction within the context of the proposed development and discard projects that will neither directly or indirectly contribute to cumulative impacts.*

Assessment material for this cumulative impact assessment was compiled on the relevant developments within the vicinity of the proposed development. The material was gathered through a search of the Galway City Council Online Planning Register, reviews of relevant Environmental Reports, or Environmental Impact Assessment Report (EIAR) documents, planning application details and planning drawings, and served to identify past and future projects, their activities, and their environmental impacts. Developments relevant to each matter considered in the EIAR were chosen from the list of projects provided in Table 2.2 and considered in the cumulative impact assessment.

3. REASONABLE ALTERNATIVES

3.1 Introduction

Article 5 of the Environmental Impact Assessment (EIA) Directive as amended by Directive 2014/52/EU states that the information provided in an Environmental Impact Assessment Report (EIAR) should include a description of the reasonable alternatives studied by the developer, which are relevant to the project and its specific characteristics, and an indication of the main reasons for the final choice, taking into account the environmental effects.

The primary obligation under Article 5(1)(d) of the EIA Directive is upon the developer to provide a description of the 'reasonable alternatives' considered in the course of the application process. In this regard, the Directive states as follows:

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

The consideration of alternatives is an effective means of avoiding environmental impacts. As set out in the 'Draft Guidelines on The Information to be Contained in Environmental Impact Assessment Reports' (EPA, 2017), the presentation and consideration of reasonable alternatives investigated is an important part of the overall EIA process.

This chapter of the EIAR contains a description of the reasonable alternatives that were considered in respect of the development of the site, in terms other land-use options, unit numbers, unit types, design, construction methods and site layout.

It is important to acknowledge that although the consideration of alternatives is an effective means of avoiding environmental impacts, there are difficulties and limitations when considering alternatives. Indeed, as is clear from the provisions of the EIA Directive itself, the requirement is to consider "reasonable alternatives" which are relevant to the project and its characteristics. In general terms, issues such as hierarchy, non-environmental factors and certain site-specific issues may also be relevant to the consideration of reasonable alternatives by the developer.

Hierarchy

EIA is concerned with projects. The Environmental Protection Agency's draft guidelines (EPA, 2017) state that, in some instances, neither the applicant nor the competent authority can be realistically be expected to examine options that have already been previously determined by a higher authority, such as a national plan or regional programme for infrastructure which are examined by means of a Strategic Environmental Assessment (SEA), the higher tier form of environmental assessment.

Non-environmental Factors

EIA is confined to the potential significant environmental effects and that influences consideration of alternatives. However, other non-environmental factors will be important to the developer of a project, for example project economics, engineering feasibility or planning considerations.

Site-specific Issues

The EPA guidelines state that the consideration of alternatives also needs to be set within the parameters of the availability of the land, i.e. the site may be the only suitable land available to the

developer, or the need for the project to accommodate demands or opportunities that are site-specific. Such considerations should be on the basis of alternatives within a site, for example design and layout.

3.2 Methodology

The EU Guidance Document (EU, 2017) on the preparation of an EIAR outlines the requirements of the EIA Directive and states that, in order to address the assessment of reasonable alternatives, the Developer needs to provide the following:

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

There is limited European and National guidance on what constitutes a 'reasonable alternative' however the EU Guidance Document (EU, 2017) states that reasonable alternatives "*must be relevant to the proposed project and its specific characteristics, and resources should only be spent assessing these alternatives*".

The guidance also acknowledges that "*the selection of alternatives is limited in terms of feasibility. On the one hand, an alternative should not be ruled out simply because it would cause inconvenience or cost to the Developer. At the same time, if an alternative is very expensive or technically or legally difficult, it would be unreasonable to consider it to be a feasible alternative*".

The current Draft EPA Guidelines (EPA, 2017) state that "*It is generally sufficient to provide a broad description of each main alternative and the key issues associated with each, showing how environmental considerations were taken into account is deciding on the selected option. A detailed assessment (or 'mini-EIA') of each alternative is not required.*"

Consequently, taking consideration of the legislative and guidance requirements into account, this chapter addresses alternatives under the following headings:

- 'Do Nothing' Alternative;
- Alternative Sites;
- Alternative Layouts;
- Alternative Design Considerations;
- Alternative Land-uses;
- Alternative Processes and
- Alternative Mitigation Measures.

Each of these is addressed in the following sections.

3.3 "Do Nothing" Alternative

If the Proposed Development was not to proceed, the opportunity to develop 228 no. residential units comprising a mixture of apartments, open space, landscaping and ancillary works at this appropriately zoned site would be lost.

Under the "Do Nothing" alternative, the lands would not be used for the development of housing. There remains a long-standing housing need both in Knocknacarra, and the area of the Galway MASP in general, as identified in the RSES and draft Galway City Development Plan 2023 – 2029. Therefore, under this "Do Nothing" scenario, the construction of badly needed housing would have to occur on another site in the Knocknacarra or Galway MASP area to fulfil that need. It is entirely possible that any alternative site would be less suitable than the Proposed Development site and would potentially put pressure on the use of lands not currently zoned or serviced with utilities. In circumstances where

the utilisation of alternative unzoned lands and the non-utilisation of lands zoned for residential development would represent an unsustainable land use, the "Do-Nothing" alternative was not considered the appropriate option.

3.4 Alternative Sites

The site is zoned within a classification of 'CI-Commercial/Industrial' within the Galway Development Plan 2017-2023 which specifically includes residential use. The lands comprising the site of the Proposed Development are available to the applicant for development and consideration of alternative sites which are not available to the applicant for the Proposed Development is not considered necessary or appropriate. During the design process for the Proposed Development, as set out below, several iterations of the site layout and alternative designs were considered. The documentation submitted with this planning application demonstrates that the subject site and the surrounding area have the environmental capacity to accommodate the Proposed Development without any significant impacts on the environment.

3.5 Alternative Layouts

This section analyses a number of alternative development options for the site and provides an overview as to the manner in which the Proposed Development design has evolved and provides evaluation of the comparable potential for environmental effects. The design process was an iterative process, where findings at each stage of the design's evolution were used to further refine the design, always with the intention of minimising the potential for environmental impacts.

In particular, in developing the proposed design, cognisance was taken of the designs proposed in respect of the previous SHD proposal. Accordingly, the applicant for permission has ensured that elements of the site layout which were unfavourably viewed in the previous decision made by An Bord Pleanála to refuse permission (in March 2020, under ref. no. ABP-305982-19) are not replicated in the Proposed Development the subject of this application.

The scheme presented for assessment as part of this EIA can be considered to be informed by co-design by from a large team who have been guided by meaningful input by the Planning Authority and informed by current European, National and Local policy regarding design, housing quality, biodiversity, sustainable drainage, sustainable transport and placemaking. In addition, the proposed design takes into account updated guidance and legislation at a local and national level which would influence the scheme design.

3.5.1 Alternatives Developed for Previous SHD Proposal (ABP-305982-19)

The iterative design process implemented in the development of previous SHD proposal (ABP-305982-19) for this site is summarised below.

3.5.1.1 Alternative Layout 1 – Presented to GCC at Section 247 Meeting (21st November 2018)

This proposal incroporated 330 no. residential units (108 no. 1-bed units, 169 no. 2-bed units and 23 no. 3-bed units)

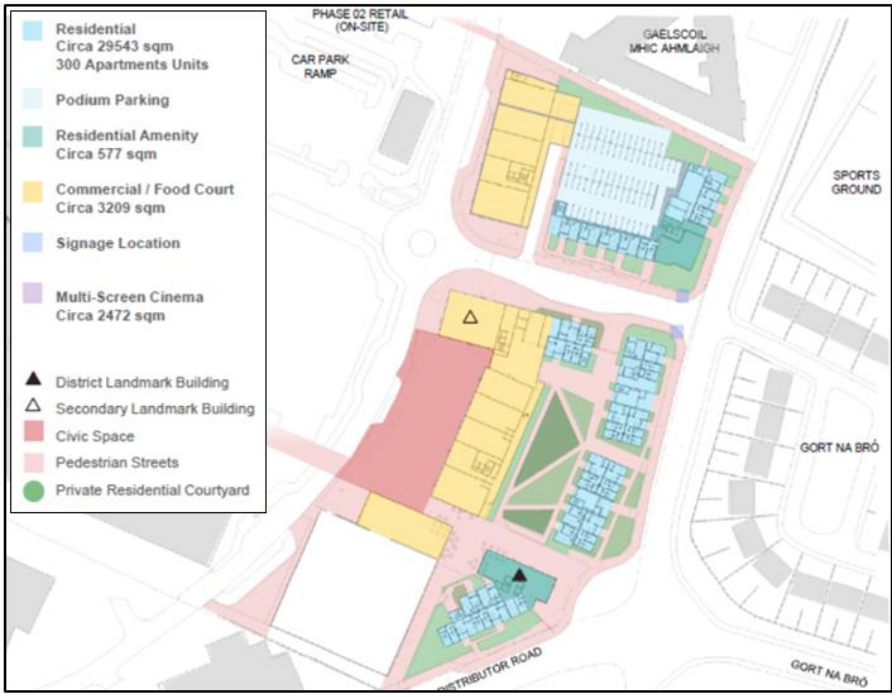


Figure 3-1 Alternative Layout 1

3.5.1.2 Alternative Layout 2 – Presented to GCC at Section 247 Meeting (20th February 2019)

This proposal incroporated 335 no. residential units (102 no. 1-bed units, 214 no. 2-bed units and 19 no. 3-bed units) with a Plot Ratio of 1.60:1.

Figure 3-2 Alternative Layout 2

3.5.1.3 Alternative Layout 3 – Presented to ABP & GCC at the Tri-Partite Meeting [18th July 2019]

This proposal incroporated 335 no. residential units (96 no. 1-bed units, 218 no. 2-bed units and 21 no. 3-bed units) with a Plot Ratio of 1.45. The Northern Blocks and Block B were re-configured.

Figure 3-3 Alternative Layout 3

3.5.1.4 Alternative Layout 4 – Previous SHD Application (APB 305982-19)

As outlined in Section 2.2.2. of this EIAR, Glenveagh Properties., previously applied for permission (ref. no. ABP-305982-19) to develop a Strategic Housing Development scheme comprising the construction of 335 no. residential units: 96 no. 1 bed apartments 218 no. 2 bed apartments, 21 no. 3 bed apartments, Provision of 2,571 sq.m of commercial floorspace. Provision of 85 no. car parking spaces and provision of realigned road between Gort na mBro and Gateway Retail Park Road, change of use of underground void to 183 bay underground car park, Provision of community space, shared communal and private open space, site landscaping, site services and all associated site development works. This layout is illustrated in Figure 3-4, below.

Figure 3-4: Alternative Layout 4

An Bord Pleanála refused planning permission for the development on 20th March 2020. In their direction, the Board identified 2 no. reasons for refusal.

1. *Having regard to the Guidelines for Planning Authorities on Sustainable Urban Housing: Design Standards for New Apartments, issued by the Department of Housing, Planning and Local Government in March 2018, and having regard to a stated objective of Specific Planning Policy Requirement 4 of these guidelines that 'there shall generally be a minimum of 50% dual aspect apartments in a single scheme', it is considered that the ratio of dual aspect apartments proposed is substantially below the minimum requirement, and the Proposed Development would therefore fail to provide an acceptable standard of amenity for its future occupants.*
2. *Having regard to the Childcare Facilities – Guidelines for Planning Authorities 2001 it is considered that the proposed childcare facility provision is deficient in the provision of childcare places and is not in accordance with the guidelines for such facilities. The*

Proposed Development would, therefore, be contrary to these Ministerial Guidelines and to the proper planning and sustainable development of the area.

It was therefore decided to redesign the project in a manner so as to avoid these potentially negative effects.

3.5.2 Alternative Layout 5 – LRD Stage 1 Section 247 Meeting with Galway City Council

On 16th May 2022 a redesigned scheme for Knocknacarra District Centre was presented to Galway City Council under the provisions of Section 247 of the Planning and Development Act 2000 (as amended). This pre-planning meeting constituted 'Stage 1' or the LRD Process.

The scheme as presented (Fig. 3-5 below) included:

- A reduction in unit numbers from 335 no. to 257 no.
- A reduction in density from 138 no. units per hectare to 106 no. units per hectare
- Reduction in overall height from 4-7 no. storeys to 305 no. storeys.
- Relocated public plaza
- Reorientation of apartment blocks
- Reduction in retail floor space

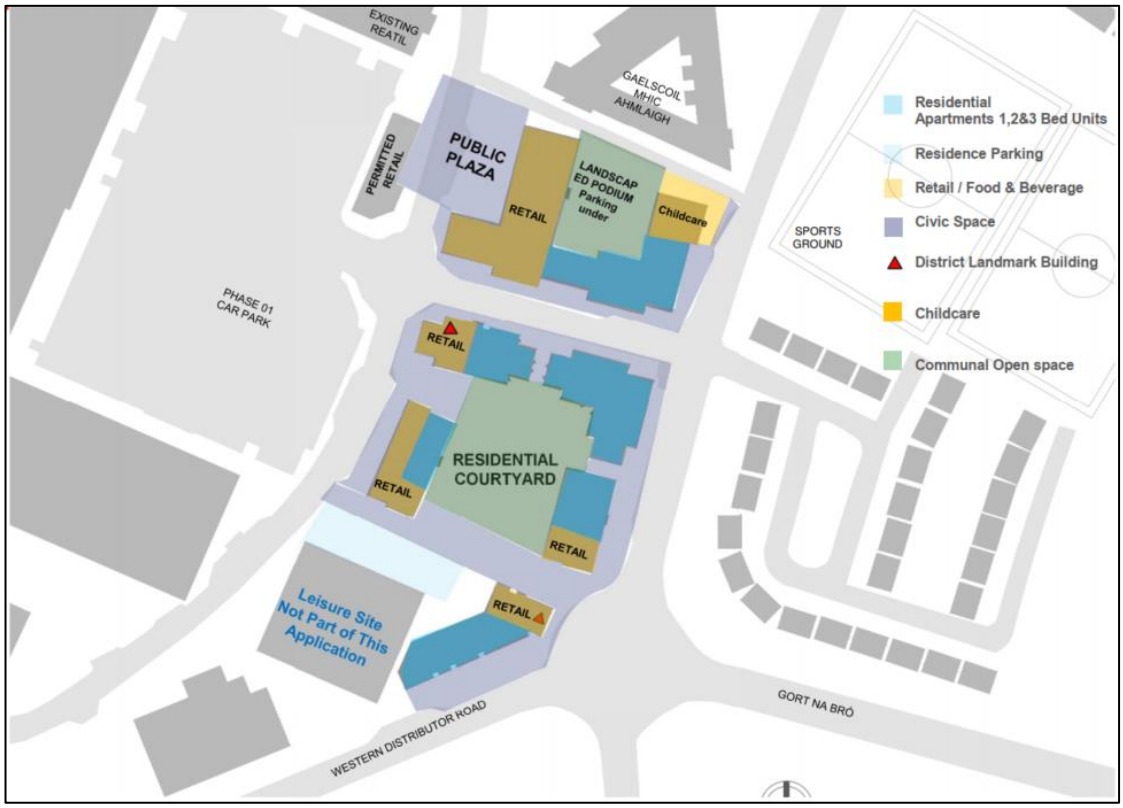


Figure 3-5 Alternative Layout 5

The Planning authority advised the following be considered in the next stages of design:

- Consider transitional increase in height of blocks;
- Re-consider housing unit mix;

- Careful consideration must be given to landscape design, particularly the quality and detail of proposed podium garden and the interface of northern boundary with adjacent school;
- Retail location should be reconsidered, particularly retail at south western locations;
- Consider location of community space – should be provided at Civic Square location
- Consider a drop-off bay for creche.

3.5.3 Alternative Layout 6 – Stage 2 Large Residential Development Meeting

Following further detailed design of the Proposed Development, the applicant submitted proposals to Galway City Council for the purposed of requesting a Stage 2 LRD Meeting. This meeting was held on 12th September 2022. The design of the scheme as presented took into account advice of the Planning Authority in earlier pre-planning meetings. The following development (Fig. 3-6 below) was proposed:

- 266 no. apartment units in 7 no. 5-storey blocks
- Provision of 1,217.8 sq.m of commercial floor space;
- Provision of a childcare facility (332.7 sq.m);
- Provision of community use facilities (101.49 sq.m)
- The provision of 595 bike parking spaces\ including 133 no. short stay and 462 no. long stay spaces;
- The provision of 97 ground floor car parking spaces including 21 no. electric vehicle spaces and 6 no. universal access parking spaces;
- The change of use of underground void to 130 bay underground car park; including 21 no. electric vehicle spaces
- Realignment of road between Gort na Bró and Gateway Retail Park Road;
- The provision of 3 no. children's play areas consisting of
    - 2 no. areas for 2–6-year-olds (174 sq.m)
    - 1 no. area for 6–12-year-olds (273 sq.m).

Following this meeting and under the provisions of Section 32D of the Planning and Development (Large Scale Residential Developments) Act 2021, the Planning Authority issued the applicant a 'Stage 2 LRD Opinion'. The Planning authority set out the following design considerations which were taken into account in the design process and in the final iteration of the Proposed Development:

- Height strategy to be considered in particular heights of blocks adjoining pedestrian footpaths and roadways
- Balcony design to be considered – particularly non-screened balconies, a microclimate study should be carried out.
- Demonstrate how the development accords with Section 11.2.6 of the Galway City Development Plan, in particular the requirement to provide a successful civic square in terms of size and location.

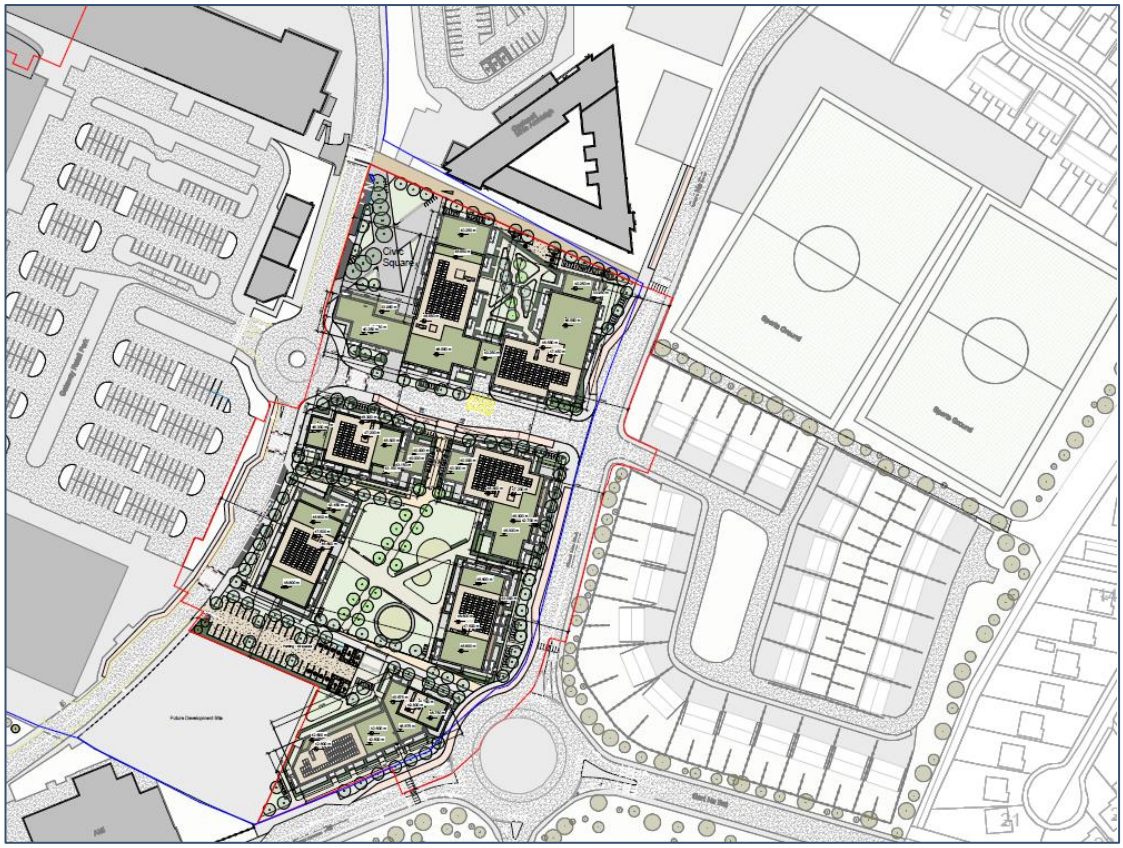


Figure 3-5 Alternative Layout 6

3.5.4 Alternative Layout 7 – Current Proposed Development

The Proposed Development layout is indicated below in Figure 3-7. The Proposed Development layout builds on Alternative Layout 6 and seeks to address issues in relation to height and massing as well as the concerns raised by the Planning Authority in relation to the Civic Square, landscape considerations, balcony amenity, pedestrian connectivity and over all design quality of the Proposed Development. The final configuration is 227 no. residential apartments in 7 no. blocks ranging between 4 and 6 storeys in height. The height of Blocks A 1 and A2 have been graduated in height from the northern perimeter toward the re-aligned central access road. Block B5 has reduced in height to three storeys with graduated height from 2 no. to 5 no. storeys on Blocks B2 and B3. Balconies have been screened by glazing finishes and, following a micro-climate and wind comfort study have been demonstrated to provide appropriate residential amenity. Landscape design was re-considered to take into account access and connectivity. The removal of a block on the southern portion of the Civic Square has resulted in a larger Civic Square which allows for the co-existence of retail/food and beverage space alongside public open space for events and community activities. A outdoor stage area has been provided on the civic square in proximity to a community use space at the northern end of the civic square. Planting schedules of the Landscape design has been informed by input from the Ecology Team who carried out the Ecological Impact Assessment, wind comfort study and microclimate analysis.

Figure 3-6 Proposed Development

3.6 Alternative Design Considerations

The proposed mix of uses are mutually compatible and support the viable completion of the development on site as well as complementing existing adjacent land use. Increased public access to the site facilities and amenities benefit both the future residents and the local community.

The Proposed Development has been prepared in accordance with the Policies and Objectives, contained in the National Planning Framework, Regional Spatial and Economic Strategy, Galway City Development Plan 2017-2023, draft Galway City Development Plan 2023-2029 and has been the subject of a pre-application consultations meetings with the Planning Authority prior to lodgment. A detailed account of the pre-planning discussions is set out in Section 2.7.3 of this EIAR.

3.7 Alternative Land Uses

The Proposed Development comprises residential uses, a creche facility and commercial retail uses. It is considered that the proposed land uses are deemed appropriate for 'CI' zoned land as outlined in the Galway City Development Plan 2017-2023. As such consideration of alternative land uses were not considered necessary.

3.8 Alternative Processes

The management of processes that affect the volumes and characteristics of emissions, residues, traffic and the use of natural resources has formed part of the consideration of reasonable alternatives through the project's development.

The construction works on the site will require the use of raw materials in the form of energy to supply plant and machinery, standard building materials including stone, metals, pipework, concrete, electrical, plumbing etc and raw materials are consumed to manufacture building materials. The use of these resources will be controlled by the employment of best practice construction techniques including waste management practices.

The processes to be employed during the construction of the Proposed Development, and described in Chapter 4 of this EIAR, are standard best practice for the construction industry in Ireland. There will be no novel processes or methods employed. Since the proposed processes represent industry standard best practice, alternative processes were not considered to be reasonable and were therefore not considered further in the EIAR.

3.9 Alternative Mitigation

The best practice design and mitigation measures set out in this EIAR will contribute to reducing any risks and have been designed to break the pathway between the site and any identified environmental receptors. The mitigation methods proposed follow the principal of avoidance of impact where possible in the first instance, followed by minimisation of impacts where full avoidance is not possible. The mitigation methods proposed represent industry best practice. Alternative mitigation methods that are not best practice were not considered to be reasonable and were therefore not considered further in the EIAR

4. DESCRIPTION OF THE PROPOSED DEVELOPMENT

4.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) describes the proposed development and its component parts. The proposed development will consist of the following:

1. *Provision of 227 no. residential apartments in 7 no. blocks comprising the following:*
   - *(a) Block A1: 14 no. 1 bed apartments & 24 no. 2 bed apartments ranging from between 3-5 storeys in height;*
   - *(b) Block A2: 25 no. 1 bed apartments & 15 no. 2 bed apartments ranging between 1-5 storeys in height;*
   - *(c) Block B1: 3 no. 1 bed apartments, 18 no. 2 bed apartments & 3 no. 3 bed apartments in a block ranging from between 3-4 storeys in height;*
   - *(d) Block B2: 13 no. 1 bed apartments & 21 no. 2 bed apartments ranging between 4-5 storeys in height;*
   - *(e) Block B3: 5 no. 1 bed apartments, 22 no. 2 bed apartments & 1 no. 3 bed apartment in a block ranging between 3-5 storeys in height;*
   - *(f) Block B4: 11 no. 1 bed apartments & 26 no. 2 bed apartments in a block ranging between 3-5 storeys in height;*
   - *(g) Block B5: 13 no. 1 bed apartments & 13 no. 2 bed apartments in a block ranging between 3-4 storeys in height.*

(2) Provision of circa 1,010 sq. m of ground floor commercial units as follows:
   - *(a) Unit A101: circa 412 sq.m;*
   - *(b) Unit A102: circa 138 sq.m;*
   - *(c) Unit B201: circa 100 sq.m;*
   - *(d) Unit B202: circa 134 sq.m;*
   - *(e) Unit B301 3: circa 226 sq.m*

(3) Provision of a Community Facility (circa 118 sq.m);
(4) Provision of Tenant Amenity Facilities (circa 99 sq.m);
(5) Provision of a Childcare Facility (circa 561 sq.m) including an external secure play area;
(6) Provision of 49 no. surface car parking spaces including EV charging spaces;
(7) Provision of bicycle parking comprising 114 no. short stay and 436 no. long stay spaces;
(8) Provision of realigned road between Gort na Bró and Gateway Retail Park Road;
(9) Change of use of existing underground void to 181 bay underground car park;
(10) Provision of shared communal and private open spaces, bin storage, public lighting, site landscaping, services, signage, substation, and all associated site development works required to accommodate the proposed development.

4.2 Existing Site Description

4.2.1 Site Layout

The main site area comprises approximately 2.5 hectares of land (excluding the existing underground void) located within the townlands of Rahoon and Knocknacarra, Co. Galway, approximately 3km to the west of Galway City (ITM Coordinates for the centre of the site: X 526810, Y 725338).

The site is bisected by a public access road into the existing Galway Retail Park. The general area is urban in character and is surrounded by a number of residential estates and commercial and industrial buildings. An Irish language school is located at the northern boundary of the site.

There are no protected structures or archaeological monuments located within the application site. The nearest recorded monument (GA0320) is located c. 95 metres north-east of the site, however this is separated from the site by the Gort na Bró road. Therefore, given the distance and separation of the site from the recorded monument by the Gort na Bró road, the proposed development site does not fall within the zone of notification.

The proposed development is not located in any European sites (designated pursuant to the obligations under the Habitats Directive and Birds Directive). However, the site is located approximately 1.3km north-east of the Galway Bay Complex (SAC) and approximately 1.5 kilometres north of the Inner Galway Bay (SPA). In this regard, an Appropriate Assessment Screening has been undertaken and a Natura Impact Statement has been prepared to accompany the application, so as to enable Galway City Council, as competent authority, to carry out a Stage Two Appropriate Assessment.

Figure 4-1 provides an overview of the proposed development.

4.2.2 Site Access

The proposed site access is via Gort Na Bró, which can be accessed from the roundabout to the east of the subject site on the Western Distributor Road. The existing access road to the existing retail park shall be kept open to traffic until the proposed road diversion is fully completed.

A network of footpaths throughout the proposed development will provide a high rate of accessibility to the landscaped amenity areas including parks, playgrounds and open play areas. The inclusion of these attractive, well designed walking routes will encourage pedestrians to access the local facilities on foot as opposed to taking their personal vehicles.

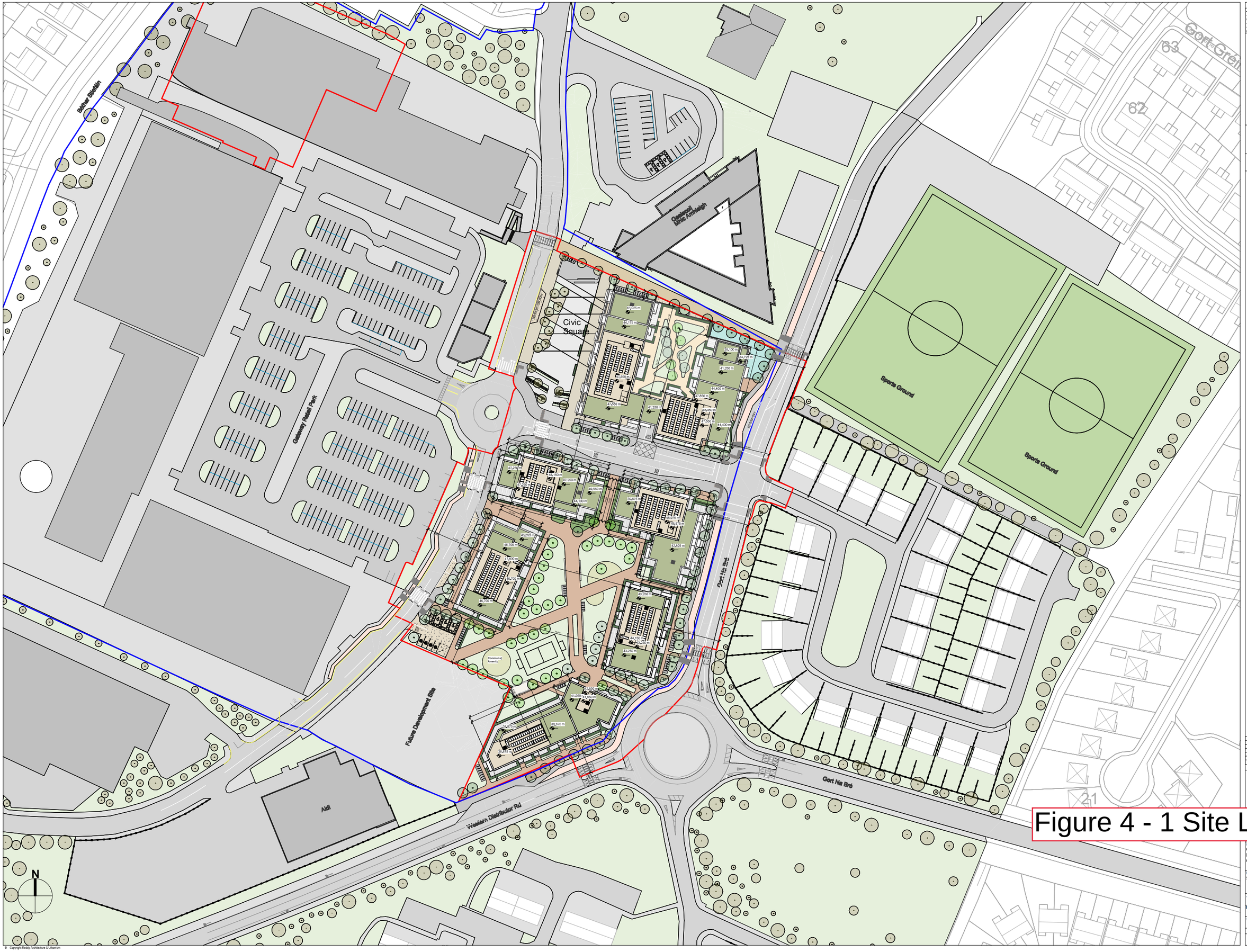
4.3 Description of the Development

The proposed development will be a mixed-use development, providing both residential and commercial units to Galway City and County. It is proposed to construct a total of 227 no. residential units in the form of apartments. These will be comprised of apartment blocks ranging between 4-6 storeys high and will include the following: Block A1: 14 no. 1 bed apartments & 24 no. 2 bed apartments; Block A2: 25 no. 1 bed apartments & 15 no. 2 bed apartments; Block B1: 3 no. 1 bed apartments, 18 no. 2 bed apartments & 3 no. 3 bed apartments; Block B2: 13 no. 1 bed apartments & 21 no. 2 bed apartments; Block B3: 5 no. 1 bed apartments, 22 no. 2 bed apartments & 1 no. 3 bed apartment; Block B4: 11 no. 1 bed apartments & 26 no. 2 bed apartments; Block B5: 13 no. 1 bed apartments & 13 no. 2 bed apartments.

The ground floors of the above apartment blocks will be utilised for commercial units which will encompass circa 1,010 sq. m. Parking for bicycles and cars will be provided for by the development of 49 no. surface car parking spaces (including EV charging spaces), 181 underground car parking spaces and 550 bicycle parking spaces (114 no. short stay and 436 no. long stay spaces). A community facility

(circa 118 sq. m), tenant amenity facility (circa 99 sq. m) and childcare facility (circa 561 sq. m) will also be constructed.

Other provisions as part of the proposed development will include shared communal and private open spaces, bin storage, public lighting, site landscaping, services, signage, substation and all other associated site works.



Notes:
- Do not scale from this drawing, Use figured dimensions in all cases.
- Verify dimensions on site and report any discrepancies to the Architect immediately.
- This drawing to be read in conjunction with the Architect's Specification.
- © This drawing is copyright and may only be reproduced with the Architect's permission.

Drawing Notes:

SCALE 1:500 — 5 0 5 10 15 20 25 m

BOUNDARY AREA (RED LINE): 3,035 ha

- PROPOSED APPLICATION BOUNDARY
- LAND UNDER OWNERSHIP OF THE APPLICANT
- GREEN ROOF
- BALLASTED ROOF

Rev.	Date	Drwn	Details of Issue / Revision
P3	30/11/2022	SG	LRD Stage 3 Submission
P2	18/11/2022	SG	Issued for Information
P1	09/11/2022	SG	Issued for Information
P4	28/10/2022	SG	Issued for Information
P3	14/10/2022	SG	Issued for Information
P2	23/09/2022	NM	LRD Stage 2 Submission

Issues & Revisions

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Project Details:
Gateway Retail Park
Knocknacarra,
Galway

Drawing Title:
Site Wide, Planning Permission, Roof Layout Plan

Job No.	Sheet Size	Scale @A0
P21-114D	A0_Landscape	As indicated
Issue Date	Drawn By	Reviewed By
24/08/2022	GLS	JH
Status	Purpose of Issue	
P3	Planning	

Project + System + Spatial Zone + Level + Type + Originator + Role + Number | Revision
GRP-1-02-SW-RF-DR-RAU-AR-1092 | P3-S-7

Figure 4 - 1 Site Layout

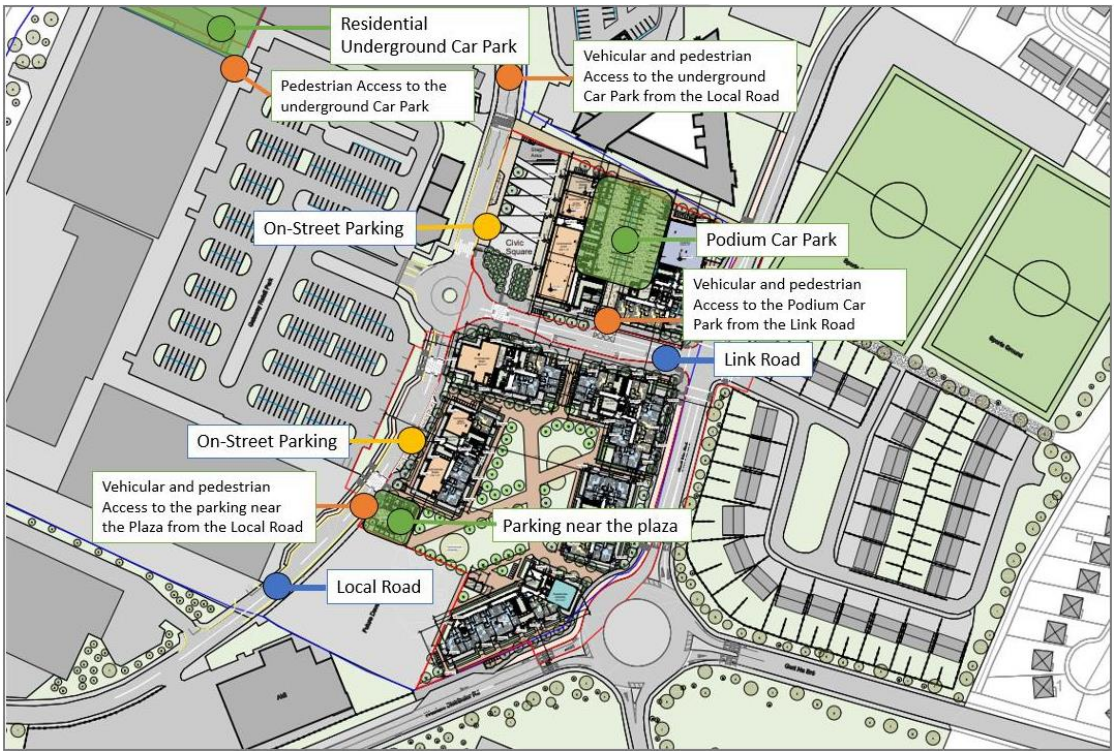

Figure 4-2 Site Access

4.4 Proposed Construction Works

The detailed drawings in respect of the construction phase of the proposed development can be seen at Appendix 4-1 to this EIAR. A Construction and Environmental Management Plan (CEMP) which has been prepared by DBFL Consulting Engineers can be seen at Appendix 4-2.

4.4.1 Hoarding

The site will be enclosed with a hoarding along the site boundary, details of which are to be agreed with Galway City Council. Hoarding panels will likely be a maximum of 2.4 metres in height including supports and appropriate anchoring (Designed by Temporary Works Engineer) Site hoarding will include external lighting, and Health and Safety warnings at appropriate intervals. and will be maintained and kept clean for the duration of the project.

4.4.2 Pedestrian and Cyclist Safety

The site will not be open to members of the public. When vehicles are entering the construction site, or leaving the site, these movements should be supervised by road marshals. The construction site gates will be kept closed when not in use and monitored by security. Traffic cones and set-back signage should be put in place to warn and safely direct cyclists around obstructions.

A network of footpaths throughout the proposed development will provide a high rate of accessibility to the local facilities within the area. The inclusion of these attractive, well designed walking routes will encourage pedestrians to access the local facilities on foot as opposed to taking their personal vehicles.

4.4.3 Proposed Hours in which Vehicles will Arrive and Depart

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

In general, the hours in which vehicles will arrive and depart will coincide with the expected site working hours of 7.00am to 7.00pm in the evening from Monday to Friday, and 8:00am to 5:00pm on Saturday. The construction phase of the proposed development is expected to last approximately 2 years in total, and construction of the proposed development will proceed in a sequential manner.

4.4.4 Access Arrangements for Vehicles

The access arrangements will be as specified in the statutory publications "Traffic Management Guidelines" manual and the "Traffic Signs Manual" and as agreed with Galway City Council.

All deliveries and vehicles into site will access the site from the designated site entrances which will be located along the Gort Na Bró and Western Distributor Road.

The location of the construction entrance and access will be regularly reviewed during the construction to ensure that the pedestrian and vehicular access points are located and maintained appropriately.

4.4.5 Size of Vehicles

It is anticipated that there will be numerous types of delivery vehicles used to bring material to and from the site. These include:

- Skip lorries. These will standard yard skips for waste.
- Spoil excavation.
- Ready mix concrete lorries.
- Flatbed delivery vehicles for the delivery of various material.

4.4.6 Parking and Loading Arrangements

A "Just in Time" approach will be implemented for the delivery of particular building materials such as concrete formwork and large structural steels. The location of this materials storage facility will be within the site boundary and the proposed location is identified in the Construction and Environmental Management Plan appended to this EIAR.

Materials will be stored within the boundary of the site. It is proposed to provide on-site car parking spaces within the site boundary for workers during the construction.

4.4.7 Site Compound and Facilities

Site staff facilities will be provided including suitable washing and dry room facilities for construction staff, canteen, sanitary facilities, first aid room, office accommodation etc. Access to the compound will be security controlled and all site visitors will be required to sign in on arrival and sign out on departure. The compound will be constructed using a clean permeable stone finish and will be enclosed with hoarding/fencing. Any wastewater will be removed by vacuum tanker using an authorized waste collector.

The proposed location of the Contractor compound will be internally within the site for the initial stages; however an external site compound may be required as works progress.

4.4.8 Phasing

The proposed development will be constructed in two phases as indicated in the proposed development phasing plan included in Appendix A of the CEMP. Site 2 and the proposed access road realignment will be constructed in Phase 1. The existing access road to the existing retail park will be kept open to traffic until the proposed road diversion is complete. The existing access road will be decommissioned in Phase 2 after the new road diversion is complete. Specific control measures will be implemented to fully segregate construction traffic from external pedestrian traffic such as a site marshal.

A Traffic Management Plan (TMP) shall be issued to Galway City Council for approval prior to works commencing on site. The approved TMP and any revisions thereof shall be set up and implemented on site. All necessary signage shall be erected in the weeks prior to any works commencing along and on adjacent roads to the proposed development giving advance warning to traffic, pedestrians / members of the public. Every effort shall be made to minimize the impact of the above works on local residences and traffic. The construction phase of the proposed development is expected to last approximately 2 years in total.

4.4.9 Site Landscaping

Before completion of the construction phase of proposed development, landscaping works will be carried out to improve the visual amenity of the site. These landscaping works will follow the layout of the landscape plan provided by Derek Howlin Landscape Architects which is included in Appendix 4-3 in this EIAR.

There are no landscape designations on the subject site. The site will not impact on any designated views or prospects within the draft Galway City Development Plan 2023-2029.

4.5 Construction Methodologies

This section describes the construction methodologies that will be used for the proposed housing development. Further details are also provided in the Construction and Environmental Management Plan (CEMP) included as Appendix 4-2 of this EIAR.

4.5.1 General Construction Measures

Communication with the public, local residents and businesses adjacent the development will be an important responsibility of the Senior Project Manager and delegated persons. All parties will be always kept up to date and informed both shortly prior and during the construction period.

A Traffic Management Plan (TMP) will be issued to Galway County Council for approval prior to works commencing on site. The approved TMP and any revisions thereto will be set up and implemented on site. All necessary signage will be erected in the weeks prior to any works commencing along and on adjacent roads to the proposed development giving advance warning to traffic, pedestrians / members of the public. Every effort will be made to minimise the impact of the above works on local residences and traffic. A draft construction traffic management plan is included as Appendix 4-4 of this EIAR.

- All personnel will be inducted and made familiar with Risk Assessments / Method Statements (RAMS) and Traffic Management Plans.
- All site-specific safety rules will be adhered to.

- All plant operators will have appropriate CSCS training.
- All personnel will have SOLAS Safe Pass training
- Fire extinguishers and first aid supplies will be available in the work area.
- All adjacent roadways will be maintained in clean condition at all times.
- Helmets, high visibility clothing and safety footwear will be worn at all times.
- Biometric turnstiles to be used to prevent unauthorized access to the site
- Competent foremen will be on site at all times.

4.5.2 Soil Stripping & Temporary Stockpiling

The excavation and stripping of soils and subsoils will be required across much of the site, and this soil will need to be redistributed and temporarily stockpiled around the site as the proposed development progresses. Prior to the construction phase of the proposal, site levelling will be undertaken. During these works, topsoil from the development area of the site will be stripped and stored in a designated storage area for reuse. Where these works occur, the following will apply:

- The area where excavations are planned will be surveyed and all existing services will be identified.
- All relevant bodies i.e. ESB, Bord Gáis, Eircom, Galway City Council etc. will be contacted and all drawings for all existing services sought.
- All plant operators and general operatives will be inducted and informed as to the location of any services.
- All plant operators and general operatives will be inducted and informed as to the identification of invasive species.
- A tracked 360-degree excavator will be used to strip the topsoil, and a dumper will be used to move the excavated materials to the temporary stockpile location.
- All excavated material which is not required for future landscaping works or for backfill of excavations will be removed to an authorised waste recovery facility. This will also apply to material which is not suitable for reuse on site.
- All stockpiles will be damped down or covered in a sheet of polythene, as required, which will prevent the creation of nuisance dust, and will also prevent sediment runoff in times of heavy precipitation.

4.5.3 Temporary Site Compound

The proposed temporary compound area incorporates temporary site offices, staff facilities and car-parking areas and will be located within the red line boundary of the site. It should be noted that an external site compound may be required as works progress.

A dedicated waste management area will be located within the compound, with waste to be sorted and collected from site by permitted collectors. Potable drinking water will be supplied via water coolers located within the staff facilities, which will be restocked on a regular basis as required during the construction phase. A supply contract will be set up with a water cooler supply company with water supplies delivered to site as required for the duration of the construction period.

Temporary port-a-loo toilets located within portacabins will be used during the construction phase. Wastewater from staff toilets will be directed to a sealed storage tank, with all wastewaters being tankered off site by permitted waste collector to wastewater treatment plants. Power will be supplied by a diesel generator, located within the compound until a temporary power supply is established. The construction compound will be used for temporary storage of some construction materials, prior to their delivery to the required area of the site.

4.5.4 Site Roads

The construction methodology for the proposed internal roads is outlined as follows:

- Excavation will take place until a competent stratum is reached.
- The competent stratum will be overlain with up to 500mm of granular fill.
- A layer of geogrid/geotextile may be required at the surface of the competent stratum.
- A final hard surface layer will be placed over the excavated road to provide a road profile to accommodate construction traffic.
- Prior to completion of the construction works on site, the finished road surface will be applied.

4.5.5 Excavation and Services Installation

Services will be required to each property in the proposed development. Where these are located, the following will apply:

- The area where excavations are planned will be surveyed and all existing services will be identified.
- All relevant bodies i.e. ESB, Bord Gáis, Eircom, Galway City Council etc. will be contacted and all drawings for all existing services sought.
- A traffic management plan will be produced as required for connection works to the existing service network.
- A road opening licence will be obtained as required for connection to existing services.
- All plant operators and general operatives will be inducted and informed as to the location of any services.
- A tracked 360-degree excavator or similar will be used to excavate the trench to the required dimensions.
- All excavated material will be removed to an authorised waste recovery facility or, if suitable, stock piled and reused for backfilling and landscaping where appropriate.
- Once the trench has been excavated the ducting/pipework will then be placed in the trench as per specification.
- Once the service ducts/pipework has been installed couplers will be fitted as required and capped to prevent any dirt etc. entering the ducts/pipes.
- The as built location of the ducting/pipework will be surveyed using a total station/GPS.
- Backfill material will be carefully placed so as not to displace the ducting/pipework within the trench.
- The appropriate warning/marker tape will be installed above the ducts/pipes at the appropriate depths.
- The surface will be reinstated as per original specification or to the requirements of the site layout/Local Authority as appropriate.

4.5.5.1 Existing Underground Services

Any underground services encountered during the works will be surveyed for level and where possible will be left in place. If there is a requirement to move the service, then the appropriate body (ESB, Gas Networks Ireland, etc.) will be contacted, and the appropriate procedure put in place. Back fill around any utility services will be with dead sand/pea shingle where appropriate. All works will be in compliance with required specifications.

4.5.6 Building Construction

The buildings will be constructed by the following methodology:

- The area where excavations are planned will be surveyed and all existing services will be identified.
- All relevant bodies i.e. ESB, Bord Gáis, Eircom, Galway City Council etc. will be contacted and all drawings for all existing services sought.
- The area of each building will be marked out using ranging rods or wooden posts and the soil and overburden stripped and removed to nearby storage area for later use in landscaping. Any excess material will be sent to an authorised recovery facility.
- All plant operators and general operatives will be inducted and informed as to the location of any services.
- A tracked 360-degree excavator or similar will be used to excavate the area down to the level indicated by the designer and appropriately shuttered reinforced concrete will be laid over it;
- The block work walls will be built up from the foundation (including a DPC) and the floor slab constructed, having first located any ducts or trenches required by the follow on mechanical and electrical contractors;
- The block work will then be raised to wall plate level and the gables & internal partition walls formed. Scaffold will be erected around the outside of the buildings for this operation;
- Any concrete slabs will be lifted into position using an adequately sized mobile crane;
- The timber roof trusses will then be lifted into position using a telescopic load all or mobile crane depending on site conditions. The roof trusses will then be felted, battened, tiled and sealed against the weather.
- Windows, electrics, plumbing and all other building components and services will be installed in as timely a manner as is possible.
- Each building will be inspected and certified by an engineer at the appropriate stages of construction.

4.5.7 Landscaping works

Prior to completion of works on the development site, the landscaping works will be carried out. The proposed landscaping plan is shown in Appendix 4-3. The finishes include areas of amenity grassland, footpaths, and tree planting. This work will be carried out before the completion of each phase in order to ensure that the development will be aesthetically pleasing place for residents to live. These works will involve the use of plant and machinery in order to carry out tasks such as earth moving. Materials which have been stockpiled for the task will be used as much as possible, and material will only be imported where it is required. Hoarding will be erected around the site boundary for the duration of the construction works.

4.5.8 Construction Site Management Incorporated into Project Design

The following measures have been incorporated, by design, into the construction phase of the project to avoid potential effects on sensitive ecological receptors.

4.5.8.1 Pollution Prevention Control Measures

The Construction Industry Research and Information Association (CIRIA) provide guidance on the control and management of water pollution from construction sites ('Control of Water Pollution from Construction Sites, guidance for consultants and contractors', CIRIA, 2001). The construction phase of the proposed development will adhere to this guidance and will ensure that surface water arising during the course of construction activities will contain minimal sediment. The following methods and best practice measures will ensure that sediment release and potential for pollution during the construction phase is minimised and reduced to insignificant:

Drainage

The following measures will be put in place to prevent the transportation of silt laden water or pollutants from entering the wider environments including downstream watercourses.

- Adjacent drainage systems/groundwater need to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. To prevent this from occurring surface water discharge from site will be managed and controlled for the duration of the construction works until the permanently surface water drainage system of the proposed site is complete
- A temporary drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff from the site during construction.
- Concrete batching will take place off site, wash down and wash out of concrete trucks will take place off site and any excess concrete is not to be disposed of on site. Pumped concrete will be monitored to ensure there is no accidental discharge. Mixer washings are not to be discharged into surface water drains/sewers.
- Discharge from any vehicle wheel wash areas is to be directed to on-site settlement tanks/ponds, debris and sediment captured by vehicle wheel washes are to be disposed off-site at a licensed facility.
- Foul drainage discharge from the construction compound will be tankered off site to a licensed facility until a connection to the public foul drainage network has been established.

Hydrocarbons

The use of hydrocarbons during the construction process can result in the potential for pollution and accidental spillage to enter natural watercourses downstream of the site via surface runoff and groundwater. The following measures have been built into the construction design phase of the project.

- All oils, fuels, paints and other chemicals will be stored in a secure bunded construction hardstand area.
- Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any drainage systems.
- A response procedure will be put in place to deal with any accidental pollution events and spillage kits will be available and construction staff will be familiar with the emergency procedures and use of the equipment.

It is also recommended that the following additional measures be implemented at the site during the construction phase, if necessary:

- All plant and machinery will be serviced before being mobilised to site;
- No plant maintenance will be completed on site, any broken down plant will be removed from site to be fixed;
- Refuelling will be completed in a controlled manner using drip trays at all times;
- Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas away from open water;
- Fuel containers will be stored within a secondary containment system, e.g. bunds for static tanks or a drip tray for mobile stores;
- Containers and bunding for storage of hydrocarbons and other chemicals will have a holding capacity of 110% of the volume to be stored;
- Ancillary equipment such as hoses and pipes will be contained within the bund;
- Taps, nozzles or valves will be fitted with a lock system;
- Fuel and chemical stores including tanks and drums will be regularly inspected for leaks and signs of damage;

- Drip-trays will be used for fixed or mobile plant such as pumps and generators in order to retain oil leaks and spills;
- Only designated trained operators will be authorised to refuel plant on site;
- Procedures and contingency plans will be set up to deal with emergency accidents or spills; and,
- An emergency spill kit with oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spill. A specific team of staff will be trained in the use of spill containment.
- The following guidelines and documents will inform the detailed planning of the works phase: -

    - Good practice guidelines on the control of water pollution from construction sites developed by the Construction Industry Research and Information Association (CIRIA) in particular;
    - C532 Control of water pollution from construction sites: guidance for consultants and contractors (Masters-Williams et al, 2001); and
    - SP156 Control of water pollution from construction sites - guide to good practice (Murnane et al, 2002).
    - Requirements for the protection of fisheries habitat during construction and development works at river sites developed by the ERFB. http://www.fisheriesireland.ie/Research/recent-publications.html.

4.5.8.2 Invasive Species

The introduction and/or spread of invasive species such as Japanese Knotweed, Himalayan Knotweed, Himalayan Balsam, Gunnera, and Giant Hogweed for example, could result in the establishment of the species and this may have knock on effects on the surrounding environs.

During the ecological site walkover, which was carried out on the 27th of September 2022, Himalayan Knotweed was noted to be established within the confines of the southern section of the site. As a result of this third schedule invasive species being present on the proposed development site, a site-specific Invasive Species Management Plan has been created. This is attached as Appendix 4-5.

Appropriate control measures will be incorporated into the design and construction phase of the development to ensure that the relevant measures (outlined in the following section below) will be implemented.

4.5.8.2.1 *Control Measures for the Management of Invasive Species*

- All earthworks machinery shall be thoroughly pressure-washed prior to arrival on site and prior to their further use elsewhere.
- Care should be taken not to disturb or cause the movement of invasive species fragments, either intentionally or accidentally
- If any existing stands of invasive species are found on site, they should be clearly demarcated by temporary fencing and tracking within them should be strictly avoided. A minimum buffer of seven metres should be applied to avoid disturbance of lateral rhizomes
- If any excavations must be carried out in areas of Japanese Knotweed, the excavated material should not be moved from the location. The machinery must be thoroughly pressure-washed in a designated area at least 25 metres from any watercourse before moving on to an area that is not yet infected.
- All contractors and staff should be briefed about the presence, identification and significance of Japanese Knotweed before commencement of works
- Good construction site hygiene should be employed to prevent the spread of these species with vehicles thoroughly washed prior to leaving any site with the potential to

have supported invasive species. All plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) should be thoroughly cleaned down using a power washer unit prior to arrival on site to prevent the spread of invasive plant species such as Japanese Knotweed and Rhododendron. All washing must be undertaken in areas with no potential to result in the spread of invasive species.

- When working at locations in proximity to natural watercourses, a suitable barrier should be erected between the watercourse and the stand of invasive species. This will assist in preventing the spread of any invasive species into the watercourse during their removal. There are no watercourses on the proposed development site, but cognizance should be had of any watercourses on neighbouring sites.
- Any material that is imported onto any site to be verified by a suitably qualified ecologist to be free from any invasive species listed on the 'Third Schedule' of Regulations 49 & 50 of Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011). This will be carried out by searching for rhizomes and plant material.
- Any soils or subsoils contaminated with invasive species will be sent for disposal to an authorized waste facility.
- The treatment and control of invasive alien species will follow guidelines issued by the National Roads Authority – The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads (NRA 2010) and the Environment Agency (2013) – The Knotweed Code of Practice: Managing Japanese Knotweed on Development Sites (Version 3, amended in 2013).

4.6 Other Site Details

4.6.1 Waste Management

The treatment of waste is to be employed by the contractor or a specialist waste management contractor as a trade package. This contractor is responsible for:

- Ensuring the site is kept clean and safe
- The collection of waste from a central point
- Segregation of waste on site.

The waste management contractor should ensure that all access routes, fire escapes and staircases are swept and kept clear of debris on a regular basis to maintain high standards of health and safety on the project. No fires will be permitted on site.

The contractor shall adhere to the Construction and Demolition Waste Management Plan (CDWMP) for the project to ensure that all material is disposed of at an appropriately licensed land fill site. The contractor shall ensure maximum recycling, reuse and recovery of waste with diversion from landfill, where possible. A copy of the CDWMP is included as Appendix 4-9 of this EIAR.

In order to ensure appropriate segregation of waste on site, a material storage zone will be provided in the compound area. This storage zone will include material recycling areas and facilities. A series of 'way finding' signage will be provided to route staff and deliveries into the site and to designated compound or construction areas, as appropriate.

The proposed development and the required materials have been designed with the principles of the circular economy in mind as outlined in the accompanying Building Life Cycle Report (Appendix 4-10). Sustainable and recyclable building materials will be used where possible during the construction phase of the proposed development to allow for a high recycling rate of building materials should they need to be recycled in the future.

Excavated excess soils that are required to be exported off-site shall be tested to determine their classification as hazardous or non-hazardous in accordance with EPA Waste Classification – List of Waste & Determining if Waste is Hazardous or Non-Hazardous. Non-Hazardous soils may be suitable for re-use in other construction sites and may be declared as a by-product in accordance with Article 27 of the European Communities (Waste Directive) Regulations 2011. Article 27 requires that the material classified not a waste, but a by-product must meet specific criteria and that that a declaration of a material as a by-product is notified to the EPA. The EPA publication "Guidance on Soil and Stone By-Products in the context of Article 27 of the European Communities (Waste Directive) Regulations – Version 3 June 2019 shall be considered in this regard. The records of all Article 27 declarations shall be maintained on-site.

4.6.2 Dust

Dust prevention and monitoring measures will be included for control of any site airborne particulate pollution. These measures will be put in place by the contractor. The level of monitoring and adoptions of mitigation measures will vary throughout the construction works depending on the type of activities being undertaken and the prevailing weather conditions at the time.

Dust control will be achieved by:

- The minimum criteria to be maintained shall be the limit for Environmental Protection Agency (EPA) specification for licensed facilities in Ireland, which is 350mg/m2/day.
- The Construction team will monitor the contractor's regime on an ongoing basis throughout the project to endeavour to minimise impact on a surrounding community.
- If dust levels become an issue, then all dust generating activities on site will cease until such time as weather conditions improve (e.g. wind levels drop or rain falls) or mitigation measures such as damping down of the ground are completed.
- During peak vehicle movements, where there is a likelihood of dirt on construction vehicles exiting the site, a dedicated road sweeper will be put in place until these works are competed.
- If dirt generation extends onto public roads, road sweeping will be carried out as well, including if necessary cleaning of silt from road gullies.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods. Material stockpiles containing fine or dusty elements shall be covered with tarpaulins. Aggregates will be transported to and from the site in covered trucks.
- Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system.
- A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated.
- A dedicated road sweeper shall be put in place during peak vehicle movements.
- Site roadways shall be maintained in a stoned hardcore condition not allowing soil to accumulate that may create dust.
- Wheel wash equipment shall be set up at the site exit gate for all construction vehicles to pass through prior to leaving the site thus ensuring that no dirt etc. is transported outside the site onto the roadways.

4.6.3 Noise

The Contractor shall ensure that the level of noise and vibration resulting from the construction of the works does not constitute a nuisance, and that noise and vibration emissions conform to the requirements of BS 5228: 2009 Code of Practice for Noise and Vibration Control on Construction Sites, Part 1 and Part 2. All plant shall be adequately silenced to conform to the requirements of BS 5228.

If significant noise and vibration activities are to be carried out on site, the contractor will ensure that there is prior liaison with other resident / local business etc. with a view to ensuring that excess noise is not generated by the works beyond the site curtilage and that contract details are available along with agreed protocols.

The contractor to use the Best Management Practice and mitigation measures to prevent or minimise noise levels from the works through the provision and proper maintenance, use and operation of all machinery. Contractor shall operate in accordance with the Safety, Health and Welfare at Work (General Application) Regulations 2007, part 5 Noise and Vibration.

Further measures to be implemented at the site for the control of noise and vibration will be:

- The contractor shall appoint a designated person to manage all environmental complaints including noise. A noise complaint procedure shall be implemented in which the details of any noise related complaint are logged, investigated and where required; measures are taken to ameliorate the source of the noise complaint.
- A strictly enforced noise management programme shall be implemented at the site from the outset of construction activities.
- Appropriate signage shall be erected in the vicinity of the site to inform HGV drivers that engines shall not be left idling for prolonged periods and that the use of horns shall be banned at all times. HGV's queuing on any local or public road shall not be permitted and it shall be the responsibility of site management to ensure this policy is enforced.
- All onsite generator units (if required) used to supply electricity to the site shall be super silenced or enclosed and located away from any receptor.
- The principal of controlling noise at source shall be implemented at the site. Best practice mitigation techniques as specified in BS 5228:2009+A1 2014 – Noise and Vibration Control on Construction and Open Sites shall be implemented during the construction phase and are detailed in this Section.
- Plant used onsite during the construction phase shall be maintained in a satisfactory condition and in accordance with manufacturer recommendations. In particular, exhaust silencers shall be fitted and operating correctly at all times.
- Defective silencers will be immediately replaced.
- Where it is proposed to operate plant during the period 0700-0800 h, standard 'beeper' reversing alarms shall be replaced with flat spectrum alarms.
- Solid barriers (hoarding) shall be erected to site boundary

4.6.4 Road Cleaning and Wheel Washing

Provision shall be made for the cleaning by road sweeper etc. of all access routes to and from the site during the course of the works as required. It is intended that cleaning will be undertaken regularly and not allowed to accumulate. A wheel wash facility will be provided on site to clean site traffic leaving the site. Waste water generated at this washing facility will be directed to on-site settlement tanks/ponds. Debris and sediment captured by vehicle washes will be disposed off-site at an appropriately licensed facility.

4.6.5 Water Supply

Water will be supplied on site by water tankers for general use during the construction phase. Potable water will be provided in the form of bottled water for staff use.

4.6.6 Wastewater Management

Portable toilets will be provided for the working on the construction site. Wastewater arising on-site from these toilets is stored in a sealed tank located within the portable toilets, and these will be emptied periodically (as required) by permitted waste contractors and transported to municipal wastewater treatment plants for treatment until such time that a connection to the public foul drainage network has been established.

Sewage or greywater generated during the operational phase of the proposed development will be collected by the proposed wastewater network for the development and directed to the local municipal wastewater treatment plant for treatment via the sewage collection network.

4.6.7 Surface Water Runoff

Adjacent drainage systems/groundwater need to be protected from sedimentation and erosion dur to direct surface water runoff generated on-site during the construction phase. To prevent this from occurring surface water discharge from site will be managed and controlled for the duration of the construction works until the permanently surface water drainage system of the proposed site is complete.

A temporary drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff from the site during construction. All works shall be undertaken in accordance with the CIRIA document, 'Control of Water Pollution from Construction Sites, guidance for consultants and contractors'.

All fuels, oils, paints and other chemicals will be stored in a secure bunded construction hardstand area. Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any drainage systems. A response procedure will be put in place to deal with any accidental pollution events and spillage kits will be available and construction staff will be familiar with the emergency procedures and use of the equipment.

All concrete batching will take place off-site, wash down and wash out of concrete trucks will take place off site and any excess concrete will not be disposed of on site. Pumped concrete will be monitored to ensure there is no accidental discharge. Discharge from any vehicle wheel wash areas is to be directed to on-site settlement tanks/ponds. Debris and sediment captured by vehicle wheel washes are to be disposed off-site at a licensed facility.

4.6.8 Aggregates

The aggregates required for the construction of the proposed development will be sourced, as much as is possible and practicable, from quarries and suppliers located as near as possible to the proposed development. This will reduce the potential for any negative impacts associated with the haulage of the materials to the site of the proposed development. Existing soils and subsoils located on the site will be used where possible to reduce the amount of such materials required for import onto the site. Aggregates will be transported to the site in covered trucks.

4.6.9 Construction Traffic/Plant

As part of the Construction Stage Safety Plan for the works a Traffic Management Plan (TMP) will be prepared in accordance with the principles outlined below and held on site. It shall comply at all times with the requirements of;

- Chapter 8 of the Department of the Environment Traffic Signs Manual, current edition, published by The Stationery Office, and available from the Government Publications Office, Sun Alliance House, Molesworth Street, Dublin 2;
- Guidance for the Control and Management of Traffic at Road Works (June 2010) prepared by the Local Government Management Services Board;
- Any additional requirements detailed in the Design Manual for Roads and Bridges & Design Manual for Urban Roads & Streets (DMURS)

During the construction of the proposed infrastructure works, any unsuitable material or unusable material will be disposed offsite to a suitably licensed landfill facility in accordance with the regulations for same and the project Construction Waste Management Plan.

Construction traffic will be consist of the following categories:

- Private vehicles owned and driven by site construction and supervisory staff,
- Excavation plant, dumper trucks and materials delivery vehicles involved in site development works,

The following mitigation measures will be implemented, if necessary in order to minimise movement and potential impacts associated with construction phase traffic:

- Consolidation of delivery loads to / from the site and management of large deliveries on site to occur outside of peak periods,
- Use of precast/prefabricated materials where possible,
- Adequate storage space on site to be provided where possible,
- Scheduling of movements to outside peak traffic times and school pick-up/drop off times,
- Al vehicles to switch off engines when not in use,
- No idling of vehicles at the site,
- Vehicle cleaning and wheel washing to take place on leaving the site,
- On-road vehicles to comply to set emission standards,
- All non-road mobile machinery (NRMM) to be fitted with appropriate exhaust systems and to be regularly serviced,
- Haul routes to be hard surfaced and cleaned and appropriate speed limits applied around the site.

4.6.9.1 Staff and Parking

The site is readily accessible by bus services within nearby walking distance. On-site employees will generally arrive before 07:00, thus avoiding the morning peak hour traffic. Construction employees will generally depart after 17:00. It should be noted that a large proportion of construction workers may arrive in shared transport.

Construction traffic will not be permitted to park on the public roads or within the general area outside the main site. Restricted parking facilities will be provided by the contractor.

4.7 Operational Phase

The proposed development will require periodic maintenance throughout the operational phase. The operation of a residential development is not a recognized source of environmental emissions or nuisance and so there will be no adverse effects associated with its operation.

It is proposed to divert the existing surface water sewers within the site to align the drainage layout with the proposed diversion of the existing access road to the Gateway Retail Park. Both Site 1 and Site 2 of the proposed development will be provided with a surface water drainage network to collect surface water flows from the apartment blocks and commercial units. The Site 2 storm drainage will be constructed in the ground floor car park and attenuated outflows will connect with the existing 375mm diameter sewer to the north-west of the site. The Site 1 storm drainage will discharge attenuated outflows to the existing 450mm diameter sewer to the south-west of the site.

The surface water strategy incorporates attenuation of storm water to limit discharge from the site, although storage facilities and SUDs elements will be designed to allow infiltration or reduction of run-off volumes and rates where possible.

Run-off from roofs and any additional run-off from the landscaped courtyard podium slab is designed to be conveyed to the surface water drainage network at ground floor level. Two underground surface water attenuation tanks will be provided for the development to attenuate surface water flows for the 100 year critical storm + 10% allowance for climate change in accordance with GDSDS. A concrete attenuation tank will be located beneath the ground floor car park in Site 2, a concrete tank is proposed due to the presence of structural columns in the vicinity of the tank. A Storm-tech attenuation system will be located beneath the courtyard in Site 1.

A number of green roofs are proposed to be installed at the proposed development. The green roof will provide interception and reduction of flow rates at the beginning of the treatment train, providing source control for a large area of the development. A minimum of 50% of the apartments roof area is proposed to be green roof. After surface water has passed through the green roof, this will pass through to the surface water drainage network to the attenuation system.

The proposed foul drainage layout for the development will be similar to the surface water drainage. It is proposed to divert the existing foul water sewers within the site to align the drainage layout with the proposed diversion of the existing access road to the Gateway Retail Park. Both Site 1 and Site 2 of the proposed development will be provided with a foul drainage network to collect foul flows from the apartment blocks and commercial units. The Site 2 foul drainage will be constructed in the ground floor car park and will connect with the existing 225mm diameter sewer to the north-west of the site. The Site 1 foul drainage will discharge to the existing 225mm sewer to the south-west of the site.

In order to accommodate water supply to the proposed development, it is proposed to divert the existing watermains within the site and utilise the existing 150mm diameter watermain to the north-west of the site to supply the development. The proposed watermain layout will connect to the existing 150mm watermain located in the 'Gort Ná Bró' road to the east of the site. The residential blocks will be supplied from two centralised water plantrooms, while the commercial units will have individual connections. A detailed map of the existing water supply network in the vicinity of the site is provided in the Infrastructure Design Report (Appendix 4-6).

4.7.1 Property Management – Operational Stage

A property management company will be formed at an early stage of the development to ensure that all property management functions are dealt with for the development.

The property management company has a number of key responsibilities including compiling the service charge budget for the development for agreement with the owners' management company. The

service charge budget covers such items as cleaning, landscaping, refuse management, utility bills, insurance, maintenance, and security. A full detailed summary of the provisions which the estate management company and appointed managing agents will be responsible for is outlined in the Estate Management Strategy Report which is attached in Appendix 4-11.

4.7.2 Sustainable Energy Use

The following are an example of the energy saving measures that are planned for the dwellings to assist in reducing costs for the occupants:

The design of the building will limit the amount of energy required for its operation and the amount of carbon dioxide (CO2) emissions associated with this energy use insofar as is reasonably practicable. The key issues to be addressed in order to provide energy efficient homes equipped for challenges anticipated by a changing climate are to provide an energy performance for the dwellings to limit the calculated primary energy consumption and related CO2 emissions are calculated using the Dwelling Energy Assessment Procedure (DEAP) published by SEAI.

For the new dwellings, a reasonable proportion of the energy consumption to meet the energy performance of the dwellings will be provided by reasonable energy sources limiting heat loss and, where appropriate, availing of heat gain through the fabric of the building. Further provisions will also be implemented at the new dwellings in relation to energy use:

- Providing and commissioning energy efficient space and water heating systems with efficient heat sources and effective controls
- Providing the dwelling owner with sufficient information about the building, the fixed building services and their maintenance requirements so that the building can be operated in such a manner as to use no more fuel and energy than is reasonable

One of the major goals of the environmental sustainability strategy is to minimise energy demand and carbon emissions within the development. This will be achieved through a number of measures including the use of Heat Pumps, Mechanical Ventilation, Heat Recovery Units and LED Lighting throughout. Space has been allocated within each apartment for the connection of Renewable Technologies as part of the overall initial Energy Plan

NZEB REQUIREMENTS

NZEB (Nearly Zero Energy Buildings), means a building that has a very high energy performance where the nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources including energy from renewable sources produced on-site or nearby. In order to achieve this, a target of 20% Renewables Energy Ratio (RER) has been set as the NZEB energy from renewable sources on-site or nearby target. The software tool provided by SEAI will be provided to support the calculation of the RER. It is recognised that in certain confined situations it may not be possible to achieve the full 20% RER.

In addition to the reduced energy usage, all new buildings must generate 20% of their energy from renewable energy sources, although this may be reduced to 10% where the energy performance of the building is more than 10% better than the reference building. This option of further reducing energy use is likely to be selected for most buildings.

As part of the design process, consideration shall be taken into account with regards to the requirements of NZEB to ensure the building meets with its requirements. The 20% or 10% requirement can be provided by heat pumps or solar PV panels.

Sustainable options are being investigated to assist in achieving reduced overall energy consumption and usage within the proposed buildings. The proposed development will meet the requirements for

Conservation of Fuel and Energy in Dwellings (Part L, Building Regulations Technical Guidance Document, 2021) and as such will meet the requirements for compliance with Nearly Zero Energy Building (NZEB) Standards. The proposed development and its relevance to NZEB regulations is described in detail in the Utilities and Energy Sustainability Report which was compiled by Penston MEP Consulting and is included in Appendix 4-7 and the Architectural Design Report (Appendix 4-8).

4.8 Decommissioning Phase

It is not intended that the proposed buildings will be removed, as permanent planning permission is being sought for this development. The proposed development will form an integral part of the local housing needs. Therefore, it is intended that the proposed development will be retained permanently and will not be decommissioned.

5. POPULATION AND HUMAN HEALTH

5.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) describes the potential impacts of the proposed development on human beings, population and human health and has been completed in accordance with the guidance referred to in Chapter 1 of this EIAR and, in addition, the 'EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects' (Fáilte Ireland). The full description of the proposed development is provided in Chapter 4 of this EIAR.

The key issues examined in this section of the EIAR include population, human health, employment and economic activity, land-use, tourism, noise and health and safety.

5.2 Statement of Authority

This section of the EIAR has been prepared by Tom Madden and reviewed by Thomas Blackwell and Michael Watson, all of MKO. Tom is an Environmental Scientist and has over three years working in various Environmental Consultancies throughout Ireland. He holds a BSc (Hons) in Environmental Science from the University of Limerick. Thomas has over 15 years of progressive experience in environmental consulting in Ireland and the USA. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin. Michael has over nineteen years' experience in the environmental sector and had worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael completed an MA in Environmental Management at NUI, Maynooth in 1999. Michael is a professional geologist (PGeo) and full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv).

5.3 Methodology

Information regarding human beings and general socio-economic data were sourced from the Central Statistics Office (CSO), the draft Galway City Development Plan 2023-2029, the draft Galway County Development Plan 2022– 2028', Fáilte Ireland and any other literature pertinent to the area. The study included an examination of the population and employment characteristics of the area. This information was sourced from the Census of Ireland 2016, which is the most recent census for which a complete dataset is available, also the Census of Ireland 2011, the Census of Agriculture 2000 and 2010 and from the CSO website, www.cso.ie.

Census information is divided into State, Provincial, County, Major Town and District Electoral Division (DED or ED) level but may not be available for all levels. For the purposes of this section of the EIAR, ED level data was used wherever possible. The information at this level was analysed and compared to the same information at national and county level. This method provides an average or standard with which the Human Beings Study Area information can be compared.

In order to make inferences about the population and other statistics in the vicinity of the subject site, the Human Beings Study Area for the Human Beings section of the EIAR was defined in terms of Galway City. Galway City was selected to represent the Human Beings Study Area for the proposed development, as although the site is situated in the western extent of the city, it will have an impact on the entire population of Galway City.

The Human Beings Study Area is shown in Figure 5-1. The Human Beings Study Area has a combined population of 78,668 persons and comprises a total land area of 4,915 hectares or 49.15 square kilometres (Source: CSO Census of the Population 2016).

Map Legend

- Site Boundary
- Population Study Area - Galway City

N

Drawing Title	Population and Human Health Study Area
Project Title	Knocknacarra District Centre LRD
Drawn By: BC	Checked By: TB
Project No.: 210206	Drawing No.: Figure 5-1
Scale: 1:75,000	Date: 2022.12.14

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5.4 Receiving Environment

5.4.1 General Site Description

The Proposed Development site approximately 2.5 hectares (excluding the existing underground void) in extent and is located in the townlands of Rahoon and Knocknacarra, Co. Galway. ITM coordinates for the centre of the site are X 526810 Y 725338.

The site is bisected by a public access road into the existing Galway Retail Park. The general area is urban in character and is surrounded by a number of residential estates and commercial and industrial buildings.

The proposed development site consists of scrub land in the northern portion of the site and an area of hardcore in the southern portion of the site. There is a small area of landscaped area adjacent to the access road that bisects the site. The existing underground void to the northwest of the main development site was constructed during Phase 2 of the Gateway Retail Park development. This area consists of a concrete lined underground void. It is proposed to fit this void out for use as an underground car park.

The elevation of the site ranges between approximately 27m and 32m OD (metres above Ordnance Datum). The overall local topography generally slopes from north to south with an undulating topography. The dominant land use on the bordering land is commercial development to the west, a primary school to the north and residential developments to the south and east.

5.4.2 Settlement and Land-use

The proposed development involves the construction of a residential development, childcare facility, community space and all associated works at Knocknacarra, Co. Galway.

The proposed development site is comprised of brownfield, areas of existing hardcore, scattered trees and grassland. Land-use in the wider area includes residential, industrial and commercial uses. The area immediately to the west of the site is comprised of an existing retail park. A gaelscoil bounds the site to the north and residential housing estates and commercial premises are located to the south and east.

The area around the site is dominated by residential housing developments along with commercial premises. There are several hundred existing houses located within 500m of the proposed development site. Other permitted and proposed developments are also located in the area surrounding the site and are listed in Chapter 2 of this EIAR. The nearest existing residential housing development is the Gort Na Bró housing development which is approximately 25m to the east of the site.

The site is in a location which has been zoned within the classification of 'CI-Commercial/Industrial' within the Galway Development Plan 2017-2023 which specifically includes residential use.

5.4.3 Population

5.4.3.1 Population Trends

In the four years between the 2011 and the 2016 Census, the population of Ireland increased by 3.8%. During this time, the population of Galway City grew by 4.2% to 78,668 persons. Other population statistics for the State and County Galway have been obtained from the Central Statistics Office (CSO) and are presented in Table 5-1.

Table 5-1 Population 2011 – 2016 (Source: CSO)

Area	Population Change		% Population Change
	2011	2016	2011 - 2016
State	4,588,252	4,761,865	3.8%
County Galway	175,124	179,390	2.4%
Galway City (Study Area)	75,529	78,668	4.2%

The data presented in Table 5-1 shows that the population of Galway City increased by 4.2% between 2011 and 2016. This rate of population growth is higher than that recorded at national level from 2011 – 2016. The population for County Galway shows a 2.4% rate of growth for the time between 2011-2016. This is lower than the growth rate for Galway City and the Republic of Ireland for the same time.

5.4.3.2 Population Density

The population densities recorded within the State, County Galway and Galway City during the 2016 Census are shown in Table 5-2.

Table 5-2 Population Density in 2016 (Source: CSO)

Area	Population Density (Persons per square kilometre)	
	2011	2016
State	67.5	70
County Galway	41.77	43.00
Galway City (Study Area)	1,537	1,601

The population density of Galway City recorded during the 2016 Census was 1,601 persons per square kilometre. This figure is significantly higher than the national population density of 70 persons per square kilometre and the county population density of 43.00 persons per square kilometre.

5.4.3.3 Household Statistics

The number of households and average household size recorded within the Republic of Ireland, Co. Galway and Galway City during the 2011 and 2016 Censuses are shown in Table 5-3.

Table 5-3 Number of Household and Average Household Size 2011 – 2016 (Source: CSO)

Area	2011		2016	
	No. of House-holds	Avg. Size (persons)	No. of House-holds	Avg. Size (persons)
State	1,654,208	2.7	1,702,289	2.7
County Galway	60,952	2.8	63,040	2.8
Galway City (Study Area)	27,726	2.6	28,859	2.6

In general, the figures in Table 5-3 show that while the number of households in the Republic of Ireland, County and DED level has continued to increase, the average number of people per household has remained the same, i.e. there are more households but similar or more people per house. Average household size recorded within Galway City during the 2011 and 2016 Censuses are slightly lower than that observed at national and County level during the same time periods.

5.4.3.4 Age Structure

Table 5-4 presents the percentages for the Republic of Ireland, Co. Galway and Galway City population within different age groups as defined by the Central Statistics Office during the 2016 Census.

Table 5-4 Population per Age Category in 2016 (Source: CSO)

Area	Age Category				
	0 - 14	15 – 24	25 - 44	45 - 64	65 +
State	21.1%	12.1%	29.5%	23.8%	13.4%
County Galway	22.7%	10.9%	26.3%	25.6%	14.5%
Galway City	16.8%	17.1%	35.0%	19.8%	11.2%

The proportion of the population within each age category at county level is similar to those recorded at national level for most categories. Within Galway City, where there is an expected difference, the highest population percentage occurs in the 25 – 44 category.

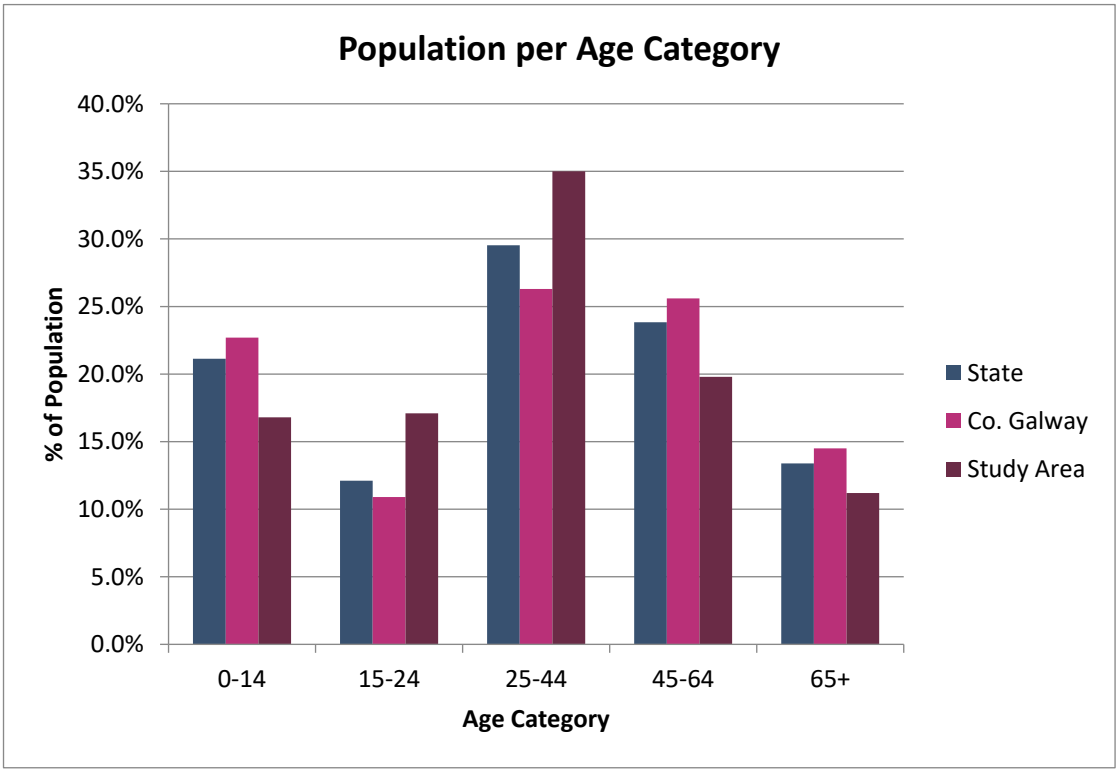


Figure 5-2 Population per Age Category in 2016 (Source: CSO)

5.4.4 Employment and Economic Activity

5.4.4.1 Employment by Socio-Economic Group

Socio-economic grouping divides the population into categories depending on the level of skill or educational attainment required. The 'Higher Professional' category includes scientists, engineers, solicitors, town planners and psychologists. The 'Lower Professional' category includes teachers, lab technicians, nurses, journalists, actors and driving instructors. Skilled occupations are divided into manual skilled, such as bricklayers and building contractors; semi-skilled, e.g. roofers and gardeners; and unskilled, which includes construction labourers, refuse collectors and window cleaners. Figure 5-3 shows the percentages of those employed in each socio-economic group in the Republic of Ireland, Co. Galway and Galway City during 2016.

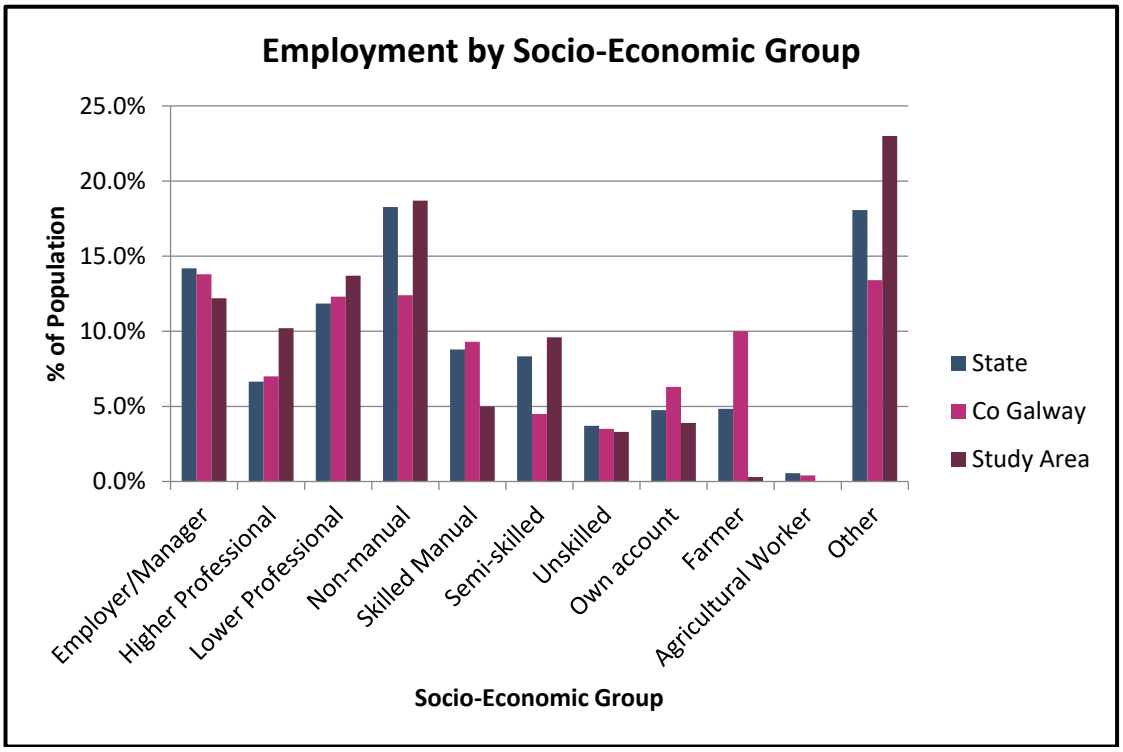


Figure 5-3 Employment by Socio-Economic Group in 2016 (Source: CSO)

The highest level of employment within Galway City was recorded in the 'Other' category. Approximately 23% of those employed within Galway City form part of this category, in comparison to 13.1% of the County population and 18.1% of the national population. After 'Other', the next highest levels of employment within the city are in the Non-manual and Lower Professional categories. The categories in which the lowest percentage of the Galway City population was recorded are Agricultural Worker (0.1% of the Study Area population) and Farmer (0.3% of Study Area population).

The CSO figures for socio-economic grouping have a limitation of including the entire population, rather than just those who are in the labour force. It is likely that this is what gives rise to the high proportion of the population shown to be in the "Other" category in Figure 5-3.

5.4.5 Land Use

The proposed development involves replacing the scrub land and brownfield site with a mixture of buildings and landscaped areas.

The proposed development site is zoned as 'Enterprise, Light Industry and Commercial' within the Galway City Development Plan 2017 - 2023 (CDP) which specifically includes residential use. Land bordering the site on the north, west and south-west has the same zoning. To the east and south, land is mainly zoned as 'Residential' and interspersed with 'Recreational and Amenity'. There are also areas zoned as 'Community, Cultural and Institutional', Agriculture', 'Agriculture and High Amenity' and 'Low Density Residential' in the study area. Zoning for the site is shown in Figure 5-4.

There is currently a significant shortage of housing units available for sale and the occupancy in the area surrounding Galway City. The rapidly increasing price of housing is a result of the shortage in supply and many people will soon find themselves in a situation where they will be unable to afford a home. This problem is also aggravated by a lack of housing units available for the rental market also. The proposed development will contribute significantly to alleviating the shortage of housing supply in Galway and brings into use lands zoned specifically for that purpose.

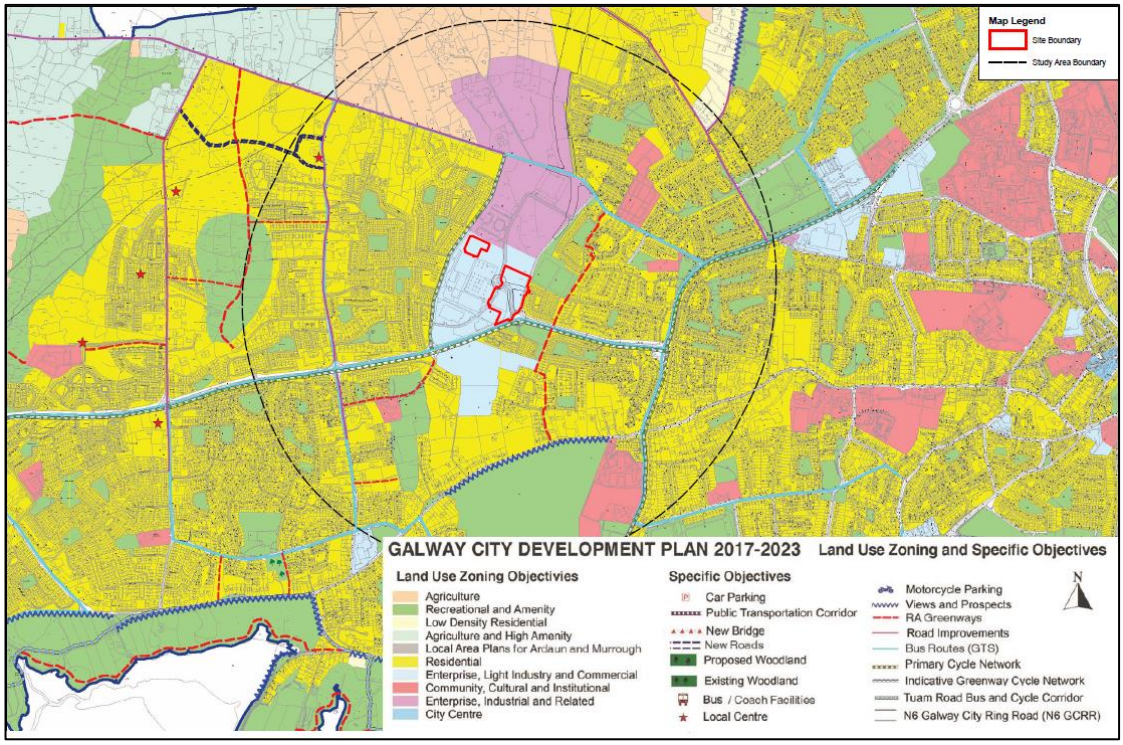


Figure 5-4 Galway City Development Plan – Land Use Zoning

5.4.6 Tourism

5.4.6.1 Tourist Numbers and Revenue

Tourism is one of the major contributors to the national economy and is a significant source of full time and seasonal employment. During 2019, total tourism revenue generated in Ireland was approximately €9.5 billion, an increase on the €9.4 billion revenue recorded in 2018. Overseas tourist visits to Ireland in 2019 grew by 0.7% to 9.7 million ('*Tourism Facts 2019*, Fáilte Ireland, March 2021).

Ireland is divided into seven tourism regions. Table 5-5 shows the total revenue and breakdown of overseas tourist numbers to each region in Ireland during 2019 ('Tourism Facts 2019, Fáilte Ireland, March 2021).

Table 5-5 Overseas Tourists Revenue and Numbers 2019 (Source: Fáilte Ireland)

Region	Total Revenue (€m)	Total Number of Overseas Tourists (000s)
Dublin	€2,210m	6,644
Mid-East/Midlands	€ 348m	954
South-East	€261m	945
South-West	€970m	2,335
Mid-West	€472m	1,432
West	€653m	1,943
Border	€259m	768
Total	€5,174m	15,021

The proposed site is located within the West Region. According to 'Regional tourism performance in 2019' (Fáilte Ireland, March 2021) the West Region which comprises Counties Galway, Mayo and Roscommon, benefited from approximately 13.0% of the total number of overseas tourists to the country and approximately 12.6% of the associated tourism income generated in Ireland in 2019.

5.4.6.2 Tourist Attractions

There are no tourist attractions pertaining specifically to the site of the proposed development. Key tourist attractions within the wider area of Galway City include NUI Galway, a number of theatres, Sports facilities (Pearse Stadium, Eamon Deacy Park, The Sportsground, Galway Racecourse etc.). Bearna golf club is located approximately 4.5km to the west of the proposed development site. The proposed development does not directly impact on any of these sites of existing tourism attractions. The nearby Twelve Hotel, Ardilaun Hotel, Rockbarton House Hotel and other tourist accommodations in the wider area will attract a significant number of tourists to stay. In addition, The Wild Atlantic Way, which passes the site approximately 1.32km to the south, attracts large numbers of domestic and overseas tourists.

There are a number of large festivals and events held regularly in Galway City which attract a large number of visitors. These include the Galway Races, the Galway International Arts Festival, the Galway Oyster Festival, the Galway Comedy Festival, the Galway Food Festival, the Galway Film Fleadh, The Galway Christmas Market, Cuirt Literary Festival and many others. These festivals attract large crowds and can result in an increase in traffic volumes on main roads at certain times.

There are no designated focal points or views within the site boundary of the proposed development. The closest scenic viewpoint to the proposed development site is located at Silver Strand, which is approximately 2.91km to the south-west of the proposed development site. The focus of this view is the coastal waters within Galway Bay. The hills of Clare and the Burren in the background are an important feature of this view. For further information on this view, see Landscape and Visual, Chapter 12 of this EIAR.

The potential for visual impacts arising from the proposed development on the wider landscape and scenic roads is assessed in Chapter 12of this EIAR.

5.4.7 Local Amenities

5.4.7.1 Education

The closest primary school to the proposed development site is Gaelscoil Mhic Amhlaigh which is located adjacent to the site's northern boundary. The nearest secondary school is Coláiste Éinde College which is located ON Threadneedle Road approximately 800 metres to the south-east of the site. There are over 30 primary schools and 13 secondary schools within the study area for this project.

The University of Galway (formerly National University of Ireland (NUI) Galway) main campus is the nearest third level institute to the proposed site and is located approximately 2.37 kilometres to the north-east. The Atlantic Technological University (formerly GMIT) Galway campus is also located within the study area. It is estimated that approximately 20% of the population of Galway City are students.

5.4.7.2 Access and Public Transport

Within the surrounding vicinity of the site, there are many local transport links and amenities which are available to all residents in the local area.

Ceannt train station (Galway City centre) is located approximately 3.2 kilometres east of the site. The station provides train services to Dublin, Limerick and Cork and intervening stations.

There are several bus stops located in Bearna village which is a short walk away from the application site. The bus stops for route 412, 405 and 414 are all located within 5 minutes walking distance of the proposed development site.Bus services from Galway city centre include Galway city (east and north), NUIG, GMIT, Dublin, Dublin Airport, Cork (via Limerick), Ennis (via Co Clare), Donegal (via Sligo) and intervening stops.

Within the proposed development site, pedestrian and cycle infrastructure will be provided, ensuring connectivity with adjoining routes and off-site networks. High quality secure bicycle parking facilities for both short term and long-term bicycle parking requirements will also be provided.

5.4.7.3 Amenities and Community Facilities

Most of the amenities and community facilities, including GAA and other sports clubs, youth clubs and recreational areas, are available in the areas surrounding the site (i.e. Bearna, Knocknacarra and Furbo), as well as in the wider Galway area. The nearest churches to the site are the Galway City Baptist Church and St John the Apostle Catholic Church which are located approximately 550m and 1.68km to the south-west respectively.

There are a wide range of services available in the area. Retail and personal services are found in close proximity to the site with the Gateway Retail Centre being located across the Gort na Bró road which runs adjacent to the site's western boundary. There are also numerous retail outlets within Galway City Centre. The closest library is operated by Galway City Council and is located approximately 1km to the north-east. The Knocknacarra Medical Centre provides primary care services from a location approximately 0.75 kilometres southwest of the site. University Hospital Galway is located approximately 2 kilometres northeast of the site, while Bon Secours Hospital is also located within the Study Area.

5.5 Proposed Development

The proposed development is described in full Chapter 4 and will generally comprise the following:

The proposed development will be a mixed-use development, providing both residential and commercial units to Galway City and County. It is proposed to construct a total of 227 no. residential units in the form of apartments. These will be comprised of apartment blocks ranging between 4-6 storeys high and will include the following: Block A1: 14 no. 1 bed apartments & 24 no. 2 bed apartments; Block A2: 25 no. 1 bed apartments & 15 no. 2 bed apartments; Block B1: 3 no. 1 bed apartments, 18 no. 2 bed apartments & 3 no. 3 bed apartments; Block B2: 13 no. 1 bed apartments & 21 no. 2 bed apartments; Block B3: 5 no. 1 bed apartments, 22 no. 2 bed apartments & 1 no. 3 bed apartment; Block B4: 11 no. 1 bed apartments & 26 no. 2 bed apartments; Block B5: 13 no. 1 bed apartments & 13 no. 2 bed apartments.

The ground floors of the above apartment blocks will be utilised for commercial units which will encompass circa 1,010 sq. m. Parking for bicycles and cars will be provided for by the development of 49 no. surface car parking spaces (including EV charging spaces), 181 underground car parking spaces and 550 bicycle parking spaces (114 no. short stay and 436 no. long stay spaces). A community facility (circa 118 sq. m), tenant amenity facility (circa 99 sq. m) and childcare facility (circa 561 sq. m) will also be constructed.

Other provisions as part of the proposed development will include shared communal and private open spaces, bin storage, public lighting, site landscaping, services, signage, substation and all other associated site works.

5.6 Human Health

The consideration of potential impacts on human health are examined in detail in the Air & Climate, Noise & Vibration, Geology and Soils, Hydrology & Hydrogeology and Traffic Sections of the EIAR. These chapters should be consulted for detailed information on potential impacts; however, a brief summary of the key information is provided in Section 5.7 below. Potential issues relating to health and safety, and amenity concerns are also discussed below.

5.7 Social and Economic Assessment

5.7.1 Market Demand for the Proposed Development

The Government's Action Plan for Housing and Homelessness, Rebuilding Ireland, July 2016 (the Action Plan), acknowledges that since the economic collapse in 2008, very low levels of housing have been constructed, especially in the main cities and urban areas where they have continued to be needed. The overarching aim of the Action Plan is to ramp up delivery of housing from its current under-supply across all tenures to help individuals and families meet their housing needs. The Plan sets ambitious targets to double the annual level of residential construction to 25,000 homes and deliver 47,000 units of social housing in the period to 2021, while at the same time making the best use of the existing housing stock and laying the foundations for a more vibrant and responsive private rented sector.

Furthermore, The Regional Spatial & Economic Strategy for the Northern & Western Regional Assembly (RSES NWRA) was adopted on 24th January 2020. The principal purpose of the (RSES) is to support the implementation of the National Planning Framework (NPF) and the economic policies and objectives of the Government by providing a long-term strategic planning and economic framework for the development of the regions. Section 3.6 of the RSES sets out the Galway Metropolitan Area Strategic Plan (MASP). The Vision of this MASP is that Galway will be a leading global city, renowned as a

successful, sustainable, competitive, compact and accessible city of scale that supports a high quality of life, maintains its distinctive identity and supports its rich heritage, language and cultural experience.

The RSES outlines arrangements for a co-ordinated metropolitan area strategic plan (MASP) for the Galway Metropolitan Area. The MASP has been provided with statutory underpinning to act as 12-year strategic planning and investment framework. The MASP is an opportunity for Galway to address recent growth legacy issues and build on key strengths, including a vibrant arts and cultural scene, year-round tourism and an attractive natural setting.

As outlined in the MASP, in Section 3.6 of the RSES, the Galway Metropolitan Area has considerable land capacity that can significantly contribute to meeting the housing demands based on population targets set out in the NPF and RSES. The targets are as follows (per section 3.6.3.1 of the RSES):

1) Population of Galway MASP to grow by 27,500 to 2026 and by a further 14,500 to 2031 with the population of the City and Suburbs accommodating 23,000 to 2026 and a further 12,000 to 2031.
2) Deliver at least half (50%) of all new homes that are targeted within the MASP to be within the existing built-up footprint.

5.8 Likely and Significant Impacts and Associated Mitigation Measures

5.8.1 Do-Nothing Effects

If the proposed development were not to proceed, there would be no change to the existing environment. The potential for additional investment and employment in the area in relation to the construction and operation of the proposed site would be lost. It is considered that the 'Do Nothing' impact would be permanent, negative and slight as the proposed development site would contribute to the much-needed housing stock for Galway City and County.

5.8.2 Construction Phase

5.8.2.1 Health and Safety

During the construction phase, the operation of machinery, increased construction traffic and risk to health from onsite spillages, dust and noise; pose a potential health and safety risk to the employees of the proposed development.

The presence and operation of heavy machinery and traffic entering and leaving the subject site also poses a potential risk to members of the public that make use of the surrounding access roads.

These are considered to be short term potential significant negative impacts.

Mitigation

- A site-specific Health and Safety Plan will be in place for the proposed site. All site staff will be made aware of and adhere to the Health and Safety Plan.
- Operate a Site Induction Process for all site staff,
- Ensure all site staff will have current 'CSCS' training or 'Safe Pass' cards,
- Site hoarding will include Health and Safety warnings at appropriate intervals
- Fire extinguishers and first aid supplies to be available in the work area.
- All adjacent roadways will be maintained in clean condition at all times.
- Appropriate Personal Protective Equipment (PPE) to be worn at all times.
- Biometric turnstiles will be used at the site to prevent unauthorised access to the site.

Residual Effects

With the implementation of the above mitigation measures, there will be a Short-term, slight Negative Impact in terms of Health and Safety during the construction phase.

5.8.2.2 Employment and Investment

There will be an improvement in employment in the area of the proposed development, as it is anticipated that there will be an increase in job opportunities for those working within the construction sector, building services and supplies, as well as in local businesses. Those to be employed at the proposed site will be from the local area so any increased revenue from this employment returns directly to the local community.

Residual Effect

The proposed development will result in a Short-term, slight positive impact on employment and investment during the construction phase

5.8.2.3 Population

During the construction phase of the proposed development, there will be no negative impact on population, as it is predicted that the majority of staff and construction workers on site will be from the local or regional area.

Residual Effect

The proposed development will result in no negative impact on population during the construction phase

5.8.2.4 Tourism

During the construction phase of the proposed development, there will be no direct negative impacts on tourism, as there are no tourist attractions on, or immediately adjacent to, the subject site. There is potential for short term, slight negative effects on local tourism as a result of increased traffic associated with the construction phase of the proposed development, however, given the relatively small scale of the development these impacts are not likely to be significant. Traffic impacts associated with the proposed development are discussed in detail in Chapter 13 of this EIAR.

Mitigation

The following construction stage mitigation measure relating to traffic shall apply:

- A Traffic Management Plan (TMP) shall be issued to Galway City Council for approval prior to works commencing on site. The approved TMP and any revisions thereof shall be set up and implemented on site. All necessary signage shall be erected in the weeks prior to any works commencing along and on adjacent roads to the proposed development giving advance warning to traffic, pedestrians / members of the public. Every effort shall be made to minimize the impact of the above works on local residences and traffic.

Residual Effect

With the implementation of the above mitigation measures, residual impacts be short term, imperceptible, and of neutral effect in terms of Tourism during the construction phase

5.8.2.5 Land-use

The construction phase involves a change in land use of the site from a previous greenfield/brownfield site, to use as a temporary construction site. The proposed development will result in a permanent change in land-use to one of residential and amenity use. This is considered to be a permanent positive impact on an area of land that is zoned for this specific use.

Residual Effect

The proposed development will result in No negative impact on land use.

5.8.2.6 Economic Activity

During the construction phase of the proposed residential development, increased employment is likely to result in an improvement in economic activity in the local area of the proposed development site, particularly within the construction sector, building services and supplies, as well as in local businesses. The increase in employment of construction workers within the local or regional area, will have a medium to long term, positive impact on the economy.

Residual Effect

The proposed development will result in no negative impact in terms of Economic Activity during the construction phase.

5.8.2.7 Noise

There will be an increase in noise levels in the vicinity of the proposed development site during the construction phase, as a result of heavy vehicles and building operations. The potential noise impacts that will occur during the construction phase of the proposed development are further considered in Section 10 of this EIAR.

Mitigation

The CEMP states that the contractor shall ensure that the level of noise and vibration resulting from the construction of the works does not constitute a nuisance, and that noise and vibration emissions conform to the requirements of BS 5228: 2009 Code of Practice for Noise and Vibration Control on Construction Sites, Part 1 and Part 2. All plant shall be adequately silenced to conform to the requirements of BS 5228. Other best practice measures for noise control are included in the CEMP and will be adhered to onsite during the construction phase of the proposed development in order to mitigate the slight negative impact associated with this phase of the development. The measures include:

- If significant noise and vibration activities are to be carried out on site, the contractor will ensure that there is prior liaison with other resident / local business etc. with a view to ensuring that excess noise is not generated by the works beyond the site curtilage and that contract details are available along with agreed protocols.
- Contractor to use the Best Management Practice and mitigation measures to prevent or minimise noise levels from the works through the provision and proper maintenance, use and operation of all machinery. Contractor shall operate in accordance with the Safety,

Health and Welfare at Work (General Application) Regulations 2007, part 5 Noise and Vibration.

- The contractor shall appoint a designated person to manage all environmental complaints including noise. A noise complaint procedure shall be implemented in which the details of any noise related complaint are logged, investigated and where required; measures are taken to ameliorate the source of the noise complaint. A strictly enforced noise management programme shall be implemented at the site from the outset of construction activities.
- Appropriate signage shall be erected in the vicinity of the site to inform HGV drivers that engines shall not be left idling for prolonged periods and that the use of horns shall be banned at all times. HGV's queuing on any local or public road shall not be permitted and it shall be the responsibility of site management to ensure this policy is enforced.
- All onsite generator units (if required) used to supply electricity to the site shall be super silenced or enclosed and located away from any receptor.
- The principal of controlling noise at source shall be implemented at the site. Best practice mitigation techniques as specified in BS 5228:2009+A1 2014 – Noise and Vibration Control on Construction and Open Sites shall be implemented during the construction phase and are detailed in this Section.
- Construction operations will in general be confined to the period Monday-Friday 0700-1900 h, and Saturday 0800-1700 h.
- Plant used onsite during the construction phase shall be maintained in a satisfactory condition and in accordance with manufacturer recommendations. In particular, exhaust silencers shall be fitted and operating correctly at all times. Defective silencers will be immediately replaced.
- Where it is proposed to operate plant during the period 0700-0800 h, standard 'beeper' reversing alarms shall be replaced with flat spectrum alarms.
- Solid barriers (hoarding) shall be erected at the site boundary.

Residual Effect

With the implementation of the above mitigation measures, there will be a short-term, moderate, negative effect on population and human health in terms of Noise during the construction phase.

5.8.2.8 Dust and Air Quality

Potential dust and vehicle emission sources during the construction phase of the proposed development include the use of machinery and plant and on-site vehicular traffic. The entry and exit of vehicles from the site may result in the transfer of dust to the public road, particularly if the weather is wet. This may cause nuisance to residents and other road users, thereby creating a short-term slight negative impact. The potential impacts that will occur during the construction phase of the proposed development are further considered in Section 9 of this EIAR. Dust emissions resulting from the construction of the proposed development, if uncontrolled have the potential to have a short term, slight, negative impact on human health.

Mitigation

The following measures are included in the CEMP and will be enforced to ensure that dust and vehicle emission nuisance during the construction phase beyond the site boundary is minimised:

- A regime for monitoring dust levels in the vicinity of the site will be put in place during the works. The level of monitoring and adoptions of mitigation measures will vary throughout the construction works depending on the type of activities being undertaken and the prevailing weather conditions at the time.
- The minimum criteria to be maintained shall be the limit for Environmental Protection Agency (EPA) specification for licensed facilities in Ireland, which is 350mg/m2/day. The

Construction team will monitor the contractor's regime on an ongoing basis throughout the project to endeavour to minimise impact on a surrounding community.

- If dust levels become an issue, then all dust generating activities on site will cease until such time as weather conditions improve (e.g. wind levels drop or rain falls) or mitigation measures such as damping down of the ground are completed,
- During peak vehicle movements, where there is a likelihood of dirt on construction vehicles exiting the site, a dedicated road sweeper will be put in place until these works are completed.
- If dirt generation extends onto public roads, road sweeping will be carried out as well, including if necessary, cleaning of silt from road gullies.
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods. Material stockpiles containing fine or dusty elements shall be covered with tarpaulins. Aggregates will be transported to and from the site in covered trucks.
- Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system,
- A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated,
- A dedicated road sweeper shall be put in place during peak vehicle movements,
- Site roadways shall be maintained in a stoned hardcore condition not allowing soil to accumulate that may create dust,
- Wheel wash equipment shall be set up at the site exit gate for all construction vehicles to pass through prior to leaving the site thus ensuring that no dirt etc. is transported outside the site onto the roadways.

Residual Effect

With the implementation of the above mitigation measures, there will be a Short-term, Imperceptible Negative effect in terms of dust and air quality, and a short term, imperceptible, negative effect in terms of human health during the construction phase.

5.8.2.9 Traffic

Construction traffic will be predominantly via the Western Distributor Road roundabout to the east of the site. By necessity it will entail traversing the existing estate roads which will be maintained by the Contractor for the duration of the works. Warning signage will be provided for pedestrians and other road users on all approaches.

As part of the Construction Stage Safety Plan, a Traffic Management Plan (TMP) will be prepared. This TMP shall be compiled in accordance with all relevant guidance and legislation.

It is envisaged that construction site traffic will consist of the following categories:

- Private vehicles, owned and driven by site construction and supervisory staff,
- Excavation plant, dumper trucks and materials delivery vehicles involved in site development works.

The location of the vehicular entrance and access will be regularly reviewed during the construction phase to ensure that the pedestrian and vehicular access points are located and maintained properly.

The potential impacts for traffic and transportation are discussed in detail in Section 13 of this EIAR.

Residual Effect

The proposed development will have a Short-term, Slight Negative Effect in terms of traffic during the construction phase.

5.8.2.10 Human Health

Dust emissions resulting from the construction of the proposed development, if uncontrolled have the potential to have a short term, slight, negative impact on human health. Likewise, there will be an increase in noise levels in the vicinity of the proposed development site during the construction phase, as a result of heavy vehicles and building operations. In the absence of mitigation, there is potential for short term, slight, negative impacts on human health as a result of noise.

Mitigation

The mitigation measures discussed above in Sections 5.7.2.7 and 5.7.2.8 will be implemented to minimise potential impacts on Human Health during the construction phase

Residual Effect

With the implementation of the above mitigation measures, there will be a Short-term, Imperceptible Negative effect in terms of human health during the construction phase.

5.8.3 Operational Phase

5.8.3.1 Health and Safety

The proposed development will be constructed in compliance with all current health and safety regulation and specifications. Therefore, upon completion the proposed development is unlikely to have any negative significant impact on human health.

Residual Effect

No negative impact

5.8.3.2 Employment and Investment

Once the site has been developed and is fully operational, the site will require the hiring of those with specialist skills in regard to upkeep and maintenance of the development and with regards to employment opportunities provided by the creche facility, which could result in the transfer of these skills into the local workforce, thereby having a long-term moderate positive impact on the local skills base.

Residual Effect

No negative impact

5.8.3.3 Population

Once the site has been developed and is fully operational, there will be a change to the population of the Study Area, where an increase in housing will cause an influx of new residents into the area. This will allow for changes in population trends, population density, household size and age structure in a

manner that has been planned for and provided for in the Galway City Development Plan, RSES and NPF.

Residual Effect

No negative impact

5.8.3.4 Tourism

During the operational phase of the proposed development, there will be no negative impact on tourism. The increase in number of residents within the local or regional area, will have a slight long-term positive impact on tourism.

Potential landscape and visual effects of the proposed development are analysed in detail in Chapter 12 of this EIAR. The magnitude of change in the landscape arising as a result of the proposed development is considered to be Moderate in localised areas around the site. The magnitude of change in the landscape of the wider study area (LVIA study area to 1 km) as a whole is deemed to be Slight.

The Proposed Development Site is considered to have a strong ability to accommodate the Proposed Development without undue consequences to the maintenance of the landscape character and in compliance with planning policies/strategies. The Proposed Development is aligned with the land use zoning objectives for the site. In consideration of this factor, the susceptibility to change is deemed to be Low. Based on this analysis there will be no significant effect on tourism due to visual or landscape impacts resulting from the construction of the proposed development.

There is one linear protected view located within the LVIA Study Area as shown on Figure 12-8 above, V12, which is described as "seascape views of Galway Bay from Kingston Road". The Proposed Development Site will not be visible from this view and the focus of this view is in the opposite direction.

In relation to any potential updates or changes to land use zoning in the DGCDP, it is apparent from a review of the City Map from the current iteration of that draft plan, and Section 5.7.3 of the DGCDP itself, that there is no change planned to the protected views of special amenity value within the LVIA Study Area, although, it is noted that the protected view V12 in the adopted GCDP is now numbered as V3 in the DGCDP. The description of the view has not changed.

There was 1 no protected view (V3) identified in the LVIA study area. The Proposed Development Site will not be visible from this view and the focus of this view is in the opposite direction. Therefore, there will be no landscape and visual effects upon the scenic amenity of this view arising from the proposed development. In light of Fáilte Ireland's *EIAR Guidelines for the Consideration of Tourism and Tourism Related Projects*, and based on the limited visibility of the proposed development from scenic viewpoints, the proposed development will not adversely impact the perception of pace of life or safety in the local area.

Residual Effect

There will be a slight, long-term positive effect in terms of tourism during the operational phase

5.8.3.5 Land-use

The site is currently comprised of a part greenfield and part brownfield site. The proposed residential development will result in a permanent change in land-use to residential use and amenity use. The change in the land-use of the site would be significant in the context of the local and wider area, with resultant permanent moderate positive impact on land-use.

Residual Effect

There will be a permanent, moderate, positive impact in terms of Land-Use during the operational phase.

5.8.3.1 Amenity

The provision of a new civic square will have a positive impact in terms of amenities available to the general population. The proposed square will be public and will not be limited to residents of the proposed housing development. In addition, the square is designed to facilitate additional permeability through the scheme and direct access to the nearby school and retail park.

Residual Effect

There will be a moderate, permanent, positive effect on amenity during the operation phase

5.8.3.2 Noise

There will be an imperceptible increase in noise levels in the vicinity of the proposed development site once the development has been built, as a result of increased population and increased vehicles making use of the development. The potential noise impacts that will occur during the operational phase of the proposed development are further described in Section 10 of this EIAR.

Residual Effect

There will be a permanent, imperceptible, neutral impact in terms on noise during the operational phase.

5.8.3.3 Dust and Air Quality

There will be no impact on human health from dust emissions in the vicinity of the proposed development site once the development has been built and all construction vehicles and personal are offsite.

Any further works which may need to occur on site as part of maintenance and repairs during the operation of the site, may cause slight short term dust emissions, and is unlikely to have any negative significant impact on human health. The potential dust and air quality impacts that will occur during the operational phase of the proposed development are further described in Chapter 9 of this EIAR.

Mitigation

No mitigation will be required on site as the impact is assessed as being imperceptible and will not be noticed within the area which already contains many residential developments.

Residual Effect

There will be a permanent, imperceptible, neutral impact in terms of Dust and Air Quality, and Human Health, during the operational phase.

5.8.3.4 Traffic

During the operational phase of the proposed development, access to the proposed development is to be facilitated via new and existing road infrastructure.

TRICS data for the proposed development was obtained in order to inform the trip rate associated with such a development. It is anticipated that a total of 148 trip movements in the AM peak and a total of 190 trip movements in the PM peak will result from the proposed development.

Some of the trips from residential units will be internal trips, i.e. trips between the retail park and the residential might be linked to each other, meaning it would not create additional vehicle trips. Therefore, these trip rates applied are likely to represent a conservative, worst-case scenario in terms of trip generation. They are considered to be in excess of likely trip generation particularly when considering current trends relating to car ownership, car sharing and a wider general increase in sustainable modal shares.

The traffic impact assessment, as summarised in Section 13 of the EIAR and presented in Appendix 13-1, indicates that in terms of base year traffic, all key junctions assessed operate within capacity. The assessment of all future scenarios also demonstrates that with the introduction of traffic generation associated with the proposed development on the adjacent local road network, all junctions are expected to operate within capacity with no adverse impacts in terms of traffic queuing, delay or capacity. The overall impacts of the project on traffic are likely to be long term, not significant, and negative in effect.

Further details on the traffic and transportation impact assessment are presented in Section 13 of this EIAR

Mitigation

The proposed development is consistent with all national, regional and local policies. In particular those policies and objectives aligned with active and sustainable travel and transportation. The following transportation characteristics are integrated into the development proposal to assist in mitigating the impacts:

- A design driver for the development has been to promote and facilitate a wide range of mobility at ground floor, through and around the site. The arrangement of blocks and development of the landscape design re-enforces the natural desire lines along the east and west access, whilst creating a delightful and enjoyable experience. The scheme is highly permeable in all directions across the site for pedestrians and cyclists and around the site, where improvements along the site boundary also support good mobility
- The newly aligned East-West Road will provide improved access and visibility to the Gateway Retail Park and residential districts, offering the opportunity to create a new street between the two clusters of blocks. This street, will offer the scheme a sense of enclosure and activity along the newly aligned road, strengthening the sense of place and the urban centre.
- Pedestrian and cycle permeability has been prioritised as a design driver in the overall masterplan of the scheme. An important consideration has been to ensure that wider connectivity to the surrounding area is improved for pedestrians and cyclists and to reduce dependency on private vehicular transport. Car use is still an important factor in sub-urban locations and whilst the dominance of the car at street level has been reduced, an appropriate provision of car parking has been allocated for residents and visitors. Car parking has been carefully positioned in convenient but unobtrusive locations.
- The newly aligned East-West Road will provide improved access and visibility to the Gateway Retail park and residential districts, offering the opportunity to create a new street between the two clusters of blocks. This street, will offer the scheme a sense of

enclosure and activity along the newly aligned road, strengthening the sense of place and the urban centre.

Further positive indicators for connections at the site are outlined below and within the Architectural Design Report attached in Appendix 4-8:

- There are attractive routes in and out for pedestrians and cyclists.
- The development is located in or close to a mixed-use centre.
- The developments layout makes it easy for a bus to serve the scheme.
- The layout links to existing movement routes and the places people will want to get to.
- Appropriate density, dependent on location, helps support efficient public transport.

The development contains the required infrastructure to provide electric charging to all car parking spaces.

Residual Effect

With the implementation of the above mitigation measures, there will be a long-term, not significant, negative effect in terms of traffic during the operational phase.

5.8.3.5 Vulnerability of the Project to Natural Disaster

A residential development is not a recognised source of pollution. Should a major accident or natural disaster occur the potential sources of pollution onsite during the operational phase is limited. Sources of pollution at the proposed development with the potential to cause significant environmental pollution and associated negative effects on health such as storage of wastes etc. are limited.

Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited to flooding and fire. The risk of flooding is addressed in Section 8 of this EIAR. All buildings are located in Indicative Flood Zone C as stated in the Site-Specific Flood Risk Assessment. It is considered that the risk of significant fire occurring, affecting the proposed site and causing the site to have significant environmental effects is limited.

Mitigation

The risk of pluvial and or fluvial flooding is minimised by the incorporation of a properly designed surface drainage and gravity sewer network, underground attenuation tanks, green roofs on apartment blocks and permeable paving and permeable car parking spaces for drainage management. The management of surface water for the proposed development has been designed to comply with the policies and guidelines outlined in the Greater Dublin Strategic Drainage Study (GDSDS) and with requirements of Galway City Council. These guidelines require the following 4 main criteria to be provided by the design:

- Criterion 1: River Water Quality Protection – satisfied by providing interception storage and treatment within the green podium in Site 2, and the porous asphalt within the civic plaza in Site 1 and green roofs on apartment blocks.
- Criterion 2: River Regime Protection – satisfied by attenuating to greenfield run-off rates.
- Criterion 3: Level of Service (flooding) for the site – satisfied by the development's surface water drainage design, planned flood routing, run-off contained within site, flood storage and building set greater than 0.5m above 100-year flood level.
- Criterion 4: River flood protection - attenuation volume and discharge limit designed to greenfield run-off rates (long term storage not provided).

To meet the requirements of the surface water policy above, the surface water strategy has been described in this section to give a clearer indication of how the design development has progressed to the submitted design:

- It is proposed to divert the existing surface water sewers within the site to align the drainage layout with the proposed diversion of the existing access road to the Gateway Retail Park. Both Site 1 and Site 2 of the proposed development will be provided with a surface water drainage network to collect surface water flows from the apartment blocks and commercial units. The Site 2 storm drainage will be constructed in the ground floor car park and attenuated outflows will connect with the existing 375mm diameter sewer to the north-west of the site. The Site 1 storm drainage will discharge attenuated outflows to the existing 450mm diameter sewer to the south-west of the site.
- The surface water strategy incorporates attenuation of storm water to limit discharge from the site, although storage facilities and SUDs elements will be designed to allow infiltration or reduction of run-off volumes and rates where possible.
- Run off from roofs and any additional run-off drom the landscaped courtyard podium slab is designed to be conveyed to the surface water drainage at ground floor level. Two underground surface water attenuation tanks will be provided for the development to attenuate surface water flows for 100 year critical storm + 10% allowance for climate change in accordance with GDSDS. A concrete attenuation tank will be located beneath the ground floor car park in Site 2. A Stormtech attenuation system will be located beneath the courtyard in Site 1.
- Green Roof – this will be an extensive type green roof with 80mm minimum construction depth. All necessary safety requirements will be designed and constructed to ensure safe maintenance can occur. The green roof will provide interception and reduction of flow rates at the beginning of the treatment train, providing source control for a large area of the development. A minimum of 50% of the apartments roof area is proposed to be green roof, this will pass through to the surface water drainage network to the attenuation system.
- In accordance with GDSDS, it is proposed to provide sustainable urban drainage systems (SUDs) for managing storm water from the site. SUDs elements which were found to be applicable to the site include slot drains, green roofs, permeable paving, rain gardens, swales and attenuation storage systems

Proposed site drainage is described in detail in the Infrastructure Design Report attached in Appendix 4-7 of this EIAR.

Residual Effect

With the implementation of the above mitigation measures, there will be an Unlikely Imperceptible Temporary Negative Impact in terms of vulnerability to natural disasters during the operational phase.

5.8.4 Cumulative Effects Resulting from Interactions between Various Elements of the Proposed Development

The interaction of the various elements of the proposed development was considered and assessed in this EIAR with regards population and human health. The potential for each individual element of the proposed development on its own to result in significant effects on human beings was considered in the impact assessment. The entire project including the interactions between all its elements was also considered and assessed for its potential to result in significant effects on population and human health in the impact assessment presented.

All interactions between the various elements of the project were considered and assessed both individually and cumulatively within this chapter. Where necessary, mitigation was employed to ensure that no cumulative effects will arise as a result of the interaction of the various elements of the development with one another.

5.8.5 Cumulative In-Combination Effects

The potential cumulative effects of the proposed development in combination with the other projects described in Chapter 2 of this report have been considered in terms of impacts on Population and Human Health.

Of the projects listed in Chapter 2 of this EIAR it was determined that, due to proximity and scale, the two projects listed in Table 5.6 below have to potential for cumulative effects on Population and Human Health in combination with the proposed development. Where appropriate the application documentation, EIAR and NIS have been reviewed to inform the assessment.

Table 5-6 Local/Nearby Developments

	Description	Decision
ABP Ref. PL61 .304345	**SHD Application: Townlands of Letteragh and Rahoon, Letteragh Road, Letteragh, Rahoon, Co. Galway - ABP Ref. PL61 .304345** On 02/08/2019, An Bord Pleanála granted permission for the development of 101 no. residential units (46 no. houses, 55 no. apartments), childcare facility and associated site works on lands to the east of Ballymoneen Road in the townland of Ballyburke, Galway. This development is located approximately 1 km to the north-east of the proposed development at Knocknacarra District Centre, Co. Galway and is nearing completion of development	Grant
ABP Ref. PL61 .304762	**SHD Application: Lands to the east of Ballymoneen Road in the townland of Ballyburke, Galway - ABP Ref. PL61 .304762** On 14/10/2019, An Bord Pleanála granted permission for the demolition of an existing house and associated outbuildings, and the construction of 238 no. residential units (113 no. houses, 125 no. apartments), and a childcare facility with associated site works on lands to the east of Ballymoneen Road in the townland of Ballyburke, Galway. This development is located approximately 1.2 km to the east of the proposed development at Knocknacarra District Centre, Co. Galway.	Grant

5.8.5.1 Health and Safety

Any potential cumulative impacts between the construction of the proposed residential development and the other projects in terms of health and safety will be mitigated by the requirement for all projects to adhere to Health & Safety legislation. There will therefore be no significant cumulative effects in terms of health and safety.

5.8.5.2 Dust and Noise

Potential cumulative effects associated with dust and noise are addressed in Chapters 9 and 10 of this EIAR respectively and conclude that there will be imperceptible effects. Furthermore, it is highly unlikely that all projects would be constructed at the same time and so the potential for cumulative dust and noise effects during the construction phase is limited. The mitigation measures outlined in Chapter 9 of this EIAR will ensure that there will be no significant cumulative effects on human health in terms of dust and air quality as a result of the proposed development in combination with other projects.

5.8.5.3 Traffic

Potential cumulative effects associated with traffic are addressed in Section 13 of this EIAR. The findings of the assessment indicate that none of the developments listed in Section 2 of this EIAR, that are imminent or have been granted permission, are likely to result in potential cumulative traffic impacts with the proposed development. The cumulative impact of these development projects has been accounted for and it will result in a likely, long term, not significant negative effect.

5.8.5.4 Employment and Investment

In terms of employment and economic benefit, there will be a significant, short-term, positive, cumulative impact between the proposed residential site and the other projects due to the majority of construction workers and materials being sourced locally, thereby helping to sustain employment in the construction trade.

The injection of money in the form of salaries and wages to those employed during the construction phase of the proposed residential site and the other projects, has the potential to result in a slight increase in household spending and demand for goods and services in the local area. The same can be said with regards to employment opportunities which would be created with the development of the proposed creche. This would result in local retailers and businesses experiencing a short-term and long-term positive impact on their cash flow.

5.8.5.5 Land-use

The surrounding land-uses of residential and commercial will continue during the operational phase of the proposed residential site.

The proposed development will have a positive impact on the surrounding area. There is therefore no potential for cumulative negative impacts on landuse.

5.8.5.6 Tourism and Amenity

As discussed in Section 5.4.6 there are no tourist attractions pertaining specifically to the site of the proposed development, however there are numerous attractions located in the wider area of Galway City and County.

There will be a slight positive cumulative operational impact on tourism between the proposed site and other projects in the area, where an increase in workers, residents, and tourists within the area will allow for a positive influence on local tourism.

6. BIODIVERSITY

6.1 Introduction

This chapter assesses the likely significant effects that the proposed largescale residential development (LRD) (the 'Proposed Development') may have on Flora and Fauna (and biodiversity) and mitigates any potential effects that are identified. Particular attention has been paid to species and habitats of ecological importance. These include species and habitats with national and international protection under the Wildlife Acts 1976-2012 the European Communities (Birds and Natural Habitats) Regulations 2011 (as amended) and the EU Birds Directive 2009/147/EC and EU Habitats Directive 2009/147/EC, 92/43/EC Habitats Directive among other relevant legislation. Where potential effects are identified, mitigation is prescribed and residual impacts on flora and fauna are assessed.

Between July 2021 and September 2022, a range of ecological survey work has been undertaken to provide comprehensive information on all ecological aspects of the location of the Proposed Development and the surrounding area. These surveys included detailed assessment of the site in terms of protected habitats and species. The studies and survey work undertaken provide a comprehensive inventory of the flora and fauna of the study area.

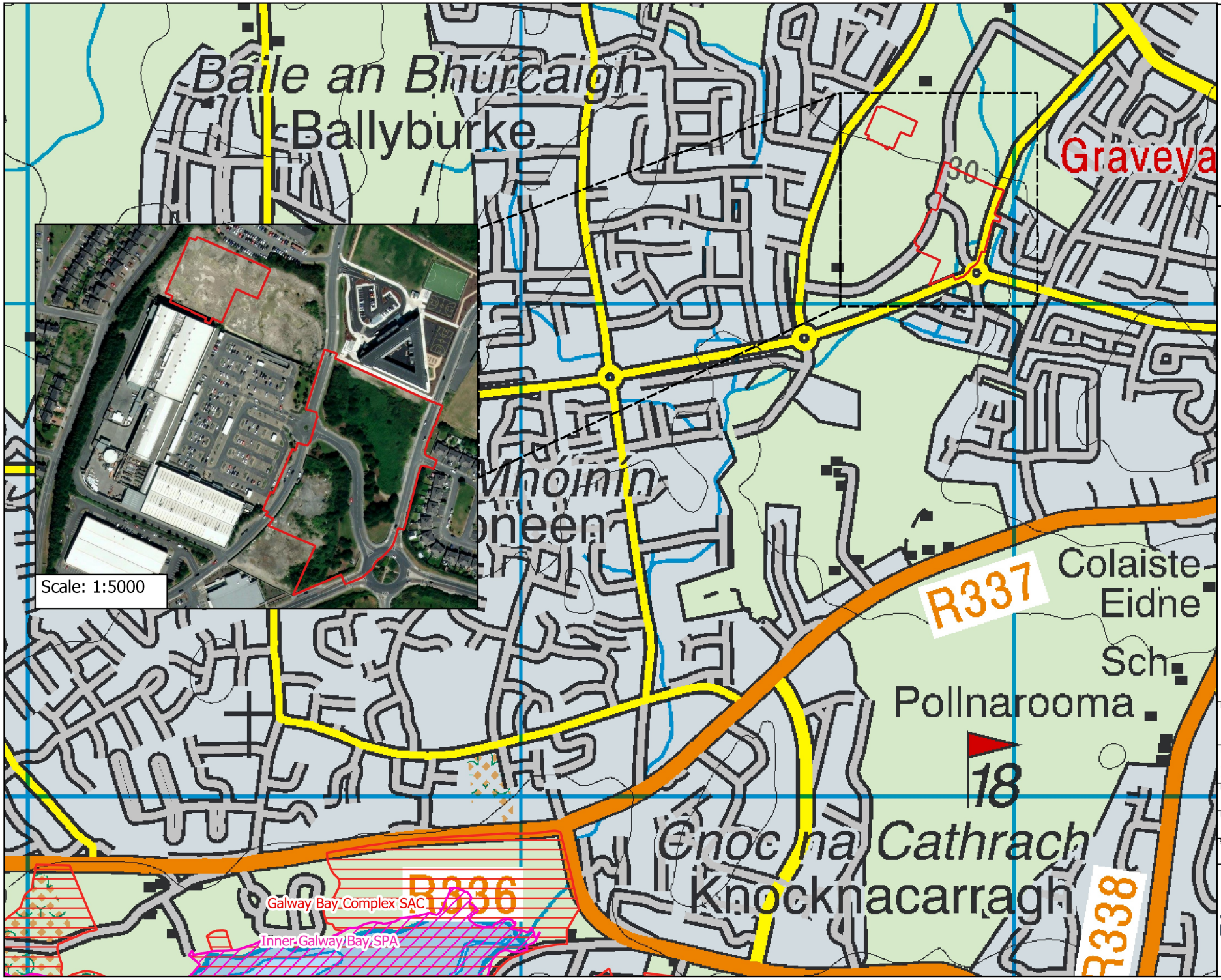
The chapter is structured as follows:

- The Introduction provides a description of the legislation, guidance and policy context regarding Flora and Fauna.
- This is followed by a comprehensive description of ecological survey and impact assessment methodologies that were followed to inform the robust assessment of likely significant effects on ecological receptors.
- A description of the Baseline Ecological Conditions and Receptor Evaluation is then provided.
- This is followed by an assessment of effects which are described with regard to the development. Potential Cumulative effects in combination with other plans and projects are fully assessed.
- Proposed mitigation and best practice measures to ameliorate the identified effects are described and discussed. This is followed by an assessment of residual effects taking into consideration the effect of the proposed mitigation and best practice measures.
- The conclusion provides a summary statement on the overall significance of predicted effects on Ecology.

A full description of the proposed project and all proposed works is presented in Chapter 4 of this EIAR.

The following defines terms utilised in this chapter:

- The terms 'proposed development site', 'development site' and 'application site' refer to the planning application site as outlined in red in Figure 6-1. Ecological surveys undertaken covered the entire 'proposed development site' excluding the existing underground car park, and the impacts and cumulative assessments provided below deals with the proposed application site only.
- "Key Ecological Receptor" (KER) is defined as a species or habitat occurring within the zone of influence of the development upon which likely significant effects are anticipated.
- "Zones of Influence" (ZOI) for individual ecological receptors refers to the zone within which potential effects are anticipated. ZOIs differ depending on the sensitivities of particular habitats and species and were assigned in accordance with best available guidance and through adoption of a precautionary approach.



Map Legend

- Site Boundary
- Special Area of Conservation (SAC)
- Special Protection Area (SPA)

N

Drawing Title: Site Location

Project Title: Knocknacarra District Centre LRD

Drawn By	Checked By
AvdGM	RW
Project No.	Drawing No.
210206	Fig 6-1
Scale	Date
1:10000	13.12.2022

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6.2 Legislation, Guidance and Policy Context

This EIAR is prepared in accordance with the requirements of the 2011 EIA Directive as amended by EIA Directive 2014/52/EU.

The following is the key legislation applicable in respect of habitats and fauna in Ireland:

- Irish Wildlife Act 1976 to 2022.
- The European Communities (Birds and Natural Habitats) Regulations 2011 (transposes EU Birds Directive2009/147/EC and EU Habitats Directive 2009/147/EC, 92/43/EC).
- S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009 and S.I. No. 722 of 2003 European Communities (Water Policy) Regulations which implement EU Water Framework Directive (2000/60/EC) and provide for implementation of 'daughter' Groundwater Directive (2006/118/EC).

The following legislation applies with respect to Invasive alien species:

- Regulation 49 and 50 of European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477 of 2011) (as amended).

The guidelines listed below were consulted in the preparation of this document to provide the scope, structure and content of the assessment. They are among the recognised guidance in Environmental Impact Assessment and National Road Scheme assessments.

- Guidelines for Ecological Impact Assessment in the UK and Ireland. Terrestrial, Freshwater and Coastal (CIEEM, 2018, updated 2022).
- Guidelines for assessment of Ecological Impacts of National Road Schemes, (NRA, 2009).
- EPA (2022). Revised guidelines on the information to be contained in Environmental Impact Statements. Environmental Protection Agency.
- Advice Notes for preparing Environmental Impact Statements (Environmental Protection Agency, Draft September 2015)
- Environmental Assessment and Construction Guidelines (NRA, 2006).

This assessment has been prepared with respect to the various planning policies and strategy guidance documents listed below:

- Planning and Development Acts 2000 – 2017.
- Galway City Council (2016). Galway City Development Plan 2017 – 2023.
- Draft Galway City Development Plan 2023-2029.
- DoEHLG (2013). *Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment*. Department of the Environment, Community and Local Government (where relevant).
- European Commission (2002). *Assessment of plans and projects significantly affecting Natura 2000 sites*.

The Development Applications Unit (DAU) of the Department of Culture, Heritage & The Gaeltacht was consulted on the 20th October 2022. No response has been received to date.

6.3 Statement of Authority

An initial multi-disciplinary walkover survey was undertaken in August 2021 by Kevin McElduff (B.Sc.) of MKO. The site was revisited on multiple occasions between July 2021 and August 2021 by MKO ecologists Kevin McElduff, Keith Costello (B.Sc.), and Ellen Tuck (B.Sc.). Donal Folan, who was a student participating in an internship program in MKO at the time the surveys were carried out, also accompanied the surveyors. A multidisciplinary walkover survey and invasive species survey was undertaken by MKO ecologist Aran von der Geest moroney (B.Sc.) and Patrick O'Boyle (B.Sc., M.Sc.) in September 2022. MKO ecologists are trained in field ecology and are experts in undertaking surveys to this level.

This report has been prepared by Aran von der Geest Moroney (B.Sc.). This report has been reviewed by Rachel Walsh (B.Sc.) who has over 2 years' experience in ecological assessment.

6.4 Methodology

Assessing the impacts of any project and associated activities requires an understanding of the ecological baseline conditions prior to and at the time of the project proceeding. Ecological baseline conditions are those which exist in the absence of proposed activities (CIEEM, 2018, updated 2022).

The following sections outline the methodologies utilised to establish the baseline ecological condition of the proposed development site.

6.4.1 Desk Study

The desk study undertaken for this assessment included a thorough review of available ecological data including the following:

- Review of online web-mappers: National Parks and Wildlife Service (NPWS), EPA (Envision), Water Framework Directive (WFD).
- Review of the publicly available National Biodiversity Data Centre (NBDC) web-mapper.
- Records from the National Parks and Wildlife Services ('NPWS') web-mapper and review of specially requested records from the NPWS Rare and Protected Species Database for the hectads in which the Proposed Development is located.
- Review of NPWS Article 17 Metadata and GIS Database Files
- Review of N6 Galway City Transport Project; Ecological information presented in the Route Selection Report: Chapter 4: http://www.n6galwaycity.ie.
- Review of N6 Galway City Ring Road Environmental Impact Assessment Report (2018)

6.4.2 Field Surveys

6.4.2.1 Multi-disciplinary ecological walkover surveys

A multi-disciplinary ecological walkover survey was undertaken on 19th August 2021, in accordance with NRA *Guidelines on Ecological Surveying Techniques for Protected Flora and Fauna on National Road Schemes* (NRA, 2009) by Kevin McElduff (B.Sc.) of MKO. The study area for the walkover survey included the proposed development site (also referred to as the application site) as outlined in red in Figure 6-1. This survey provided baseline data on the ecology of the study area and assessed whether further detailed habitat or species-specific ecological surveys were required. The site was revisited by MKO ecologists Aran von der Geest Moroney (B.Sc.) and Patrick O' Boyle (B.Sc., M.Sc.) in September 2022. During this visit, detailed habitat and invasive species surveys of the development site were undertaken. In addition, between July and August 2021 MKO ecologists carried out detailed bat surveys of the development site.

Habitats were identified in accordance with the Heritage Council's *'Guide to Habitats in Ireland'* (Fossitt, 2000). Habitat mapping was undertaken with regard to guidance set out in '*Best Practice Guidance for Habitat Survey and Mapping*' (Smith *et al.*, 2011). Plant nomenclature for vascular plants follows '*New Flora of the British Isles*' (Stace, 2010), while mosses and liverworts nomenclature follows '*Mosses and Liverworts of Britain and Ireland - a field guide'* (British Bryological Society, 2010).

The walkover surveys were designed to detect the presence, or likely presence, of a range of protected habitats and species that may occur in the vicinity of the proposed development. Incidental sightings/observations of birds and additional fauna were noted during the site visits. Surveys were undertaken in accordance best practice guidance (TII, 2008: Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes).

During the multi-disciplinary ecological walkover surveys, a thorough search of the site for mammals was undertaken and the potential for the study area to support protected mammals listed in the Wildlife Acts, 1976–2019 was also assessed.

A search for non-native invasive species was also undertaken. The survey focused on the identification of invasive species listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (As Amended) (S.I. 477 of 2015). During the walkover survey in 2021 a stand of Himalyan knotweed (*Persicaria wallichii*) was identified within the development site. During the walkover survey of 2022 the extent of Himalayan knotweed was reassessed, mapped and an associated Invasive Species Management Plan (ISMP) was prepared. The Invasive Species Management Plan has been submitted as part of this application.

Seasonal factors that affect distribution patterns and habits of species were taken into account when conducting the surveys. The potential of the site to support certain populations (in particular those of conservation importance that may not have been recorded during the field survey due to their seasonal absence or nocturnal/cryptic habits) was assessed.

All plants were readily identifiable, and it is considered that a comprehensive an accurate assessment of the habitats was achieved.

Dedicated bat surveys were also carried out at the proposed development site. Details of these surveys can be found in the following subsections.

6.4.2.2 Bat Surveys

6.4.2.2.1 *Habitat Suitability Assessment*

Bat walkover surveys of the study area were carried out during daylight hours on the 27th July and 24th of August 2021. The landscape features on the site were visually assessed for potential use as bat roosting habitats and commuting/foraging habitats using a protocol set out in BCT *Bat Surveys for Professional Ecologists: Good Practice Guidelines* (3rd edn.) (Collins, 2016). Table 4.1 of the 2016 BCT Guidelines identifies a grading protocol for assessing structures, trees and commuting/foraging habitat for bats. The protocol is divided into four Suitability Categories: *High, Moderate, Low* and *Negligible*.

6.4.2.2.2 *Roost Assessment Survey*

A search for roosts was undertaken within the boundary of the proposed development. The aim was to determine the presence of roosting bats and the need for further survey work or mitigation. The site was visited on multiple occasions in July and August 2021. All structures and trees were assessed for their potential to support roosting bats. Any potential roost sites were subject to a roost assessment. This comprised a detailed inspection of the exterior and interior (if accessible) to look for evidence of bat

use, including live and dead specimens, droppings, feeding remains, urine splashes, fur oil staining and noises.

Trees within the site were also assessed from ground level, with the aid of binoculars. Any potential tree roosts were examined for the presence of rot holes, hazard beams, cracks and splits, partially detached bark, knot holes, gaps between overlapping branches and any other potential roost features (i.e., PRFs) identified by Andrews (2018).

6.4.2.2.3 *Dusk and Dawn Activity surveys*

Three dusk and one dawn surveys were carried out in July/August 2021. The aim of the surveys was to identify if there were bats present at the Proposed Development site, what bat species were present and to gather any information on bat foraging and commuting behaviour. The activity surveys included walked transects across the extent of the proposed site during the dusk and dawn surveys. Surveys were carried out by Keith Costello, Ellen Tuck and Kevin McElduff. Further details on bat activity survey effort can be found in Appendix 6-1.

6.4.2.2.4 *Static Detector Survey*

Full spectrum bat detectors, Song Meter Mini (Wildlife Acoustics, Maynard, MA, USA), were deployed during static surveys to record bat activity at four fixed locations over a 4-week period in 2021. The four locations of static detectors were selected to represent the range of habitats present within the site, including favourable bat habitats. Settings used were those recommended by the manufacturer for bats, with minor adjustments in gain settings and band pass filters to reduce background noise when recording. Detectors were set to record from 30 minutes before sunset until 30 minutes after sunrise. The Song Meter automatically adjusts sunset and sunrise times using the Solar Calculation Method when provided with GPS coordinates.

The survey was designed to utilise two static detectors to monitor bat activity. Two full spectrum bat detectors, Song Meter SM4 detectors were deployed on site on the 27th of July 2021. The detectors were moved to alternative locations within the site on the 10th of August 2021, to sample a range of habitats, before being collected on the 25th of August 2021. Static detector locations can be found in Appendix 6-1, Figure 3-2.

6.4.2.3 Bird Surveys

During the walkover surveys undertaken in 2021 and 2022, all bird species observed and heard within the study area were recorded.

6.4.3 Methodology for Assessment of Effects

6.4.3.1 Geographical Framework

Guidance on Ecological Impact Assessment (CIEEM, 2018, updated 2022) recommends categories of nature conservation value that relate to a geographical framework (e.g. international, through to local). This assessment utilises the geographical framework described in *Guidelines for Assessment of Ecological Impact of National Road Schemes* (NRA 2009). The guidelines provide a basis for determination of whether any particular site is of importance on the following scales:

- International
- National
- County
- Local Importance (Higher Value)
- Local Importance (Lower Value)

Locally Important (lower value) receptors include habitats and species that are widespread and of low ecological significance only in the local area. Internationally Important sites are designated for conservation as part of the Natura 2000 Network (SAC or SPA) or provide the best examples of habitats or internationally important populations of protected flora and fauna.

6.4.3.2 Characterising Ecological Impacts and Effects

Effects identified have been described in accordance with (EPA, 2022) impact assessment criteria presented in Table 6-6-1. The criteria for characterising magnitude and scale of ecological impacts are further contextualised based on CIEEM guidelines (CIEEM, 2019) in Table 6–6-2.

The following terms were utilised when quantifying duration:

- Temporary – up to 1 year
- Short-term – 1 to 7 years
- Medium term – 7 to 15 years
- Long term – 15 to 60 years
- Permanent – over 60 years

Table 6-6-1 Criteria for assessing impact quality based on (EPA, 2022)

Effect Type	Criteria
Positive	A change which improves the quality of the environment e.g. increasing species diversity, improving reproductive capacity of an ecosystem or removing nuisances.
Neutral	No effects or effects that are imperceptible, within normal bounds of variation or within the margin of forecasting error.
Negative	A change which reduces the quality of the environment e.g. lessening species diversity or reducing the reproductive capacity of an ecosystem or by causing nuisance.

Table 6-6-2 Criteria for characterising magnitude and scale of ecological impacts (CIEEM, 2019)

Characteristic	Definition
Positive or Negative	Positive impact – a change that improves the quality of the environment e.g. by increasing species diversity, extending habitat or improving water quality. This may also include halting or slowing an existing decline in the quality of the environment. Negative impact – a change which reduces the quality of the environment e.g. destruction of habitat, removal of foraging habitat, habitat fragmentation, pollution.
Extent	The spatial or geographical area over which the impact/effect may occur under a suitably representative range of conditions.
Magnitude	Magnitude refers to size, amount, intensity and volume. It should be quantified if possible and expressed in absolute or relative terms e.g. the amount of habitat lost, percentage change to habitat area, percentage decline in a species population.
Duration	Impacts and effects may be described as short, medium or long-term and permanent or temporary and are defined in months/years. Duration is defined in relation to ecological characteristics.
Frequency and Timing	The number of times an activity occurs will influence the resulting effect. The timing of an activity or change may result in an impact if it coincides with critical life-stages or seasons.
Reversibility	An irreversible effect is one from which recovery is not possible within a reasonable timescale or there is no reasonable chance of action being taken

Characteristic	Definition
	to reverse it. A reversible effect is one from which spontaneous recovery is possible or which may be counteracted by mitigation.

6.4.3.3 Significance of Effect

The criteria for assessing impact significance based on EPA guidelines is outlined in Table 6-6-3 (EPA, 2017).

Table 6-6-3 Criteria for assessing impact significance based on (EPA, 2022)

Effect Magnitude	Definition
No change	No discernible change in the ecology of the affected feature.
Imperceptible effect	An effect capable of measurement but without noticeable consequences.
Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Slight effect	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Moderate effect	An effect that alters the character of the environment that is consistent with existing and emerging trends.
Significant effect	An effect which, by its character, its magnitude, duration or intensity alters a sensitive aspect of the environment.
Very Significant	An effect which, by its character, magnitude, duration or intensity significantly alters most of a sensitive aspect of the environment.
Profound effect	An effect which obliterates sensitive characteristics.

As per TII (NRA, 2009) and CIEEM (2018, updated 2022) best practice guidelines the following key elements should also be examined when determining the significance of effects:

The likely effects on 'integrity' should be used as a measure to determine whether an impact on a site is likely to be significant (NRA, 2009)
A 'significant effect' is an effect that either supports or undermines biodiversity conservation objectives (CIEEM, 2019).

6.4.3.3.1 *Integrity*

In the context of EcIA, 'integrity' refers to the coherence of the ecological structure and function, across the entirety of a site, that enables it to sustain all of the ecological resources for which it has been valued. Impacts resulting in adverse changes to the nature, extent, structure and function of component habitats and effects on the average population size and viability of component species, would affect the integrity of a site, if it changes the condition of the ecosystem to unfavourable.

6.4.3.3.2 *Conservation status*

An impact on the conservation status of a habitat or species is considered to be significant if it will result in a change in conservation status. According to CIEEM (2018, 2022) guidelines the definition for conservation status in relation to habitats and species are as follows:

Habitats – conservation status is determined by the sum of the influences acting on the habitat that may affect its extent, structure and functions as well as its distribution and its typical species within a given geographical area

Species – conservation status is determined by the sum of influences acting on the species concerned that may affect its abundance and distribution within a given geographical area.

As defined in the EU Habitats Directive 92/43/EEC, the conservation of a habitat is favourable when:

Its natural range, and areas it covers within that range, are stable or increasing
The specific structure and functions which are necessary for its long-term maintenance exist and are likely to continue to exist for the foreseeable future
The conservation status of its typical species is favourable.

The conservation of a species is favourable when:

Population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats
The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future
There is and will probably continue to be, a sufficiently large habitat to maintain its population on a long-term basis.

According to the NRA/CIEEM methodology, if it is determined that the integrity and/or conservation status of an ecological feature will be impacted on, then the level of significance of that impact is related to the geographical scale at which the impact will occur (i.e. local, county, national, international).

6.4.3.4 Mitigation

The development has been designed to specifically avoid, reduce and minimise effects on biodiversity. Where potential effects on biodiversity are predicted, mitigation has been prescribed to avoid, reduce and abate such effects.

Proposed best practice design and mitigation measures are specifically set out and are realistic in terms of cost and practicality. They have been subject to detailed design and will effectively address the effects on identified biodiversity.

The potential effects of the proposed development were considered and assessed to ensure that all effects on biodiversitys are adequately addressed, and no significant residual effects are likely to remain following the implementation of mitigation measures / best practice.

6.4.3.5 Limitations

The information provided in this EIAR chapter accurately and comprehensively describes the baseline ecological environment; provides an accurate prediction of the likely ecological effects of the proposed development; prescribes best practice and mitigation as necessary; and, describes the residual ecological impacts. The specialist studies, analysis and reporting have been undertaken in accordance with the appropriate guidelines.

The habitats and species on the site were readily identifiable and comprehensive assessments were made during the field visits undertaken between July 2021 and September 2022. This falls within the optimal time of year to undertake habitat surveys (Smith *et al.* 2011). Bat surveys were undertaken at the appropriate time of the year and in suitable weather conditions (Collins 2016).

No significant limitations in the scope, scale or context of the assessment have been identified.

6.5 Baseline Conditions and Receptor Evaluation

6.5.1 Desk Study

The following sections detail the results of a survey of published material that was consulted as part of the desk study for the purposes of the Ecological Assessment. These included the Site Synopses for designated sites and other data compiled by the National Parks and Wildlife Service (NPWS) of the Department of Housing, Local Government and Heritage, plant distribution atlases, National Biodiversity Data Centre Records, the "Route Selection Report: Chapter 4" of the N6 Galway City Transport Project Environmental Impact Statement, the N6 Galway City Ring Road Environmental Impact Assessment Report (2018), NPWS Article 17 Metadata and GIS Database Files, and other research publications.

6.5.1.1 Designated Sites

The Habitats Directive (together with the Birds Directive) forms the cornerstone of Europe's nature conservation policy. It is built around two pillars: the Natura 2000 network of protected sites and the strict system of species protection. All in all the directive protects over 1,000 animal and plant species and over 200 "habitat types" (e.g. special types of forests, meadows, wetlands, etc.), which are of European importance.

With the introduction of the EU Habitats Directive (92/43/EEC) and Birds Directive (79/409/EEC) which were transposed into Irish law as S.I. No. 94/1997 *European Communities (Birds and Natural Habitats) Regulations* 1997, the European Union formally recognised the significance of protecting rare and endangered species of flora and fauna, and also, more importantly, their habitats. The 1997 Regulations and their amendments were subsequently revised and consolidated in S.I. No. 477/2011- *European Communities (Birds and Natural Habitats) Regulations* 2011. This legislation requires the establishment and conservation of a network of sites of particular conservation value that are to be termed 'European Sites'.

6.5.1.1.1 *Special Areas of Conservation*

Articles 3 – 9 of the EU Habitats Directive (92/43/EEC) provide the EU legislative framework of protecting rare and endangered species of flora and fauna, and habitats. Annex I of the Directive lists habitat types whose conservation requires the designation of Special Areas of Conservation (SAC). Priority habitats, such as Turloughs, which are in danger of disappearing within the EU territory are also listed in Annex I. Annex II of the Directive lists animal and plant species (e.g. Marsh Fritillary, Atlantic Salmon, and Killarney Fern) whose conservation also requires the designation of SAC. Annex IV lists animal and plant species in need of strict protection such as Lesser Horseshoe Bat and Otter, and Annex V lists animal and plant species whose taking in the wild and exploitation may be subject to management measures. In Ireland, species listed under Annex V include Irish Hare, Common Frog and Pine Marten.

Species can be listed in more than one Annex, as is the case with Otter and Lesser Horseshoe Bat which are listed on both Annex II and Annex IV.

6.5.1.1.2 *Special Protection Areas*

Council Directive 79/409/EEC of 2 April 1979 on the conservation of wild birds (Birds Directive) has been substantially amended several times. In the interests of clarity and rationality the said Directive was codified in 2009 and is now cited as Directive 2009/147/EC. The Directive instructs Member States to take measures to maintain populations of all bird species naturally occurring in the wild state in the EU (Article 2). Such measures may include the maintenance and/or re-establishment of habitats in order to sustain these bird populations (Article 3).

A subset of bird species have been identified in the Directive and are listed in Annex I as requiring special conservation measures in relation to their habitats. These species have been listed on account of

inter alia: their risk of extinction; vulnerability to specific changes in their habitat; and/or due to their relatively small population size or restricted distribution. Special Protection Areas (SPAs) are to be identified and classified for these Annex I listed species and for regularly occurring migratory species, paying particular attention to the protection of wetlands (Article 4).

6.5.1.1.3 Nationally Designated Sites

Natural Heritage Areas (NHAs) and Proposed Natural Heritage Areas (pNHAs) are heritage sites that were designated for the protection of flora, fauna, habitats and geological sites under the Wildlife (Amendment) Act 2000. These sites do not form part of the Natura 2000 network and the AA process, or screening for same, does not apply to NHAs or pNHAs.

6.5.1.1.4 Identification of the Designated Sites within the Likely Zone of Influence of the Proposed Development

Special Areas of Conservation (SACs) and Special Protection Areas for Birds (SPAs) are sites preserved for nature conservation as designated under the European Habitats Directive and are collectively known as 'Natura 2000 or European Sites'. The potential for effects on European Sites is fully considered in the AA Screening Report and Natura Impact Statement that accompanies this application. The Article 6(3) Appropriate Assessment Screening report identified the potential for the proposed development to result in significant effects on the following European Sites:

- Galway Bay Complex SAC [000268]
- Inner Galway Bay SPA [004031]

The EPA Guidance (2022) states "A biodiversity section of an EIAR, for example, should not repeat the detailed assessment of potential effects on European sites contained in documentation prepared as part of the Appropriate Assessment process, but it should refer to the findings of that separate assessment in the context of likely significant effects on the environment, as required by the EIA Directive." Therefore, the assessment of impacts on European Sites is not repeated here. However, Section 6.6.5 provides a summary of the key assessment findings with regard to European Designated Sites.

Natural Heritage Areas (NHAs) are designated under the Wildlife (Amendment) Act 2000 and their management and protection is provided for by this legislation and planning policy. The potential for effects on these designated sites is fully considered in this EcIA.

Proposed Natural Heritage Areas (pNHAs) were designated on a non-statutory basis in 1995 but have not since been statutorily proposed or designated. However, the potential for effects on these designated sites is fully considered in Section 6.4.2 of this EcIA.

The following methodology was used to establish which nationally designated sites have the potential to be impacted by the proposed development:

- Initially the most up to date GIS spatial datasets for all nationally designated sites and water catchments were downloaded from the NPWS website (www.npws.ie) and the EPA website (www.epa.ie) on the 04/11/2022. The datasets were utilized to identify Designated Sites which could feasibly be affected by the proposed development.
- All Nationally Designated Sites that could potentially be affected were identified using a source-pathway - receptor model. To provide context for the assessment, Nationally Designated Sites within a distance of 15km surrounding the development site are shown on Figure 6-2 and Figure 6-3. Sites that were further away from the proposed development were also considered. In this case, no potential for significant effect on sites more than 15km from the development site was identified.
- A map of all the Nationally Designated Sites around the Development Site is provided in Figure 6-2 and Figure 6-3.

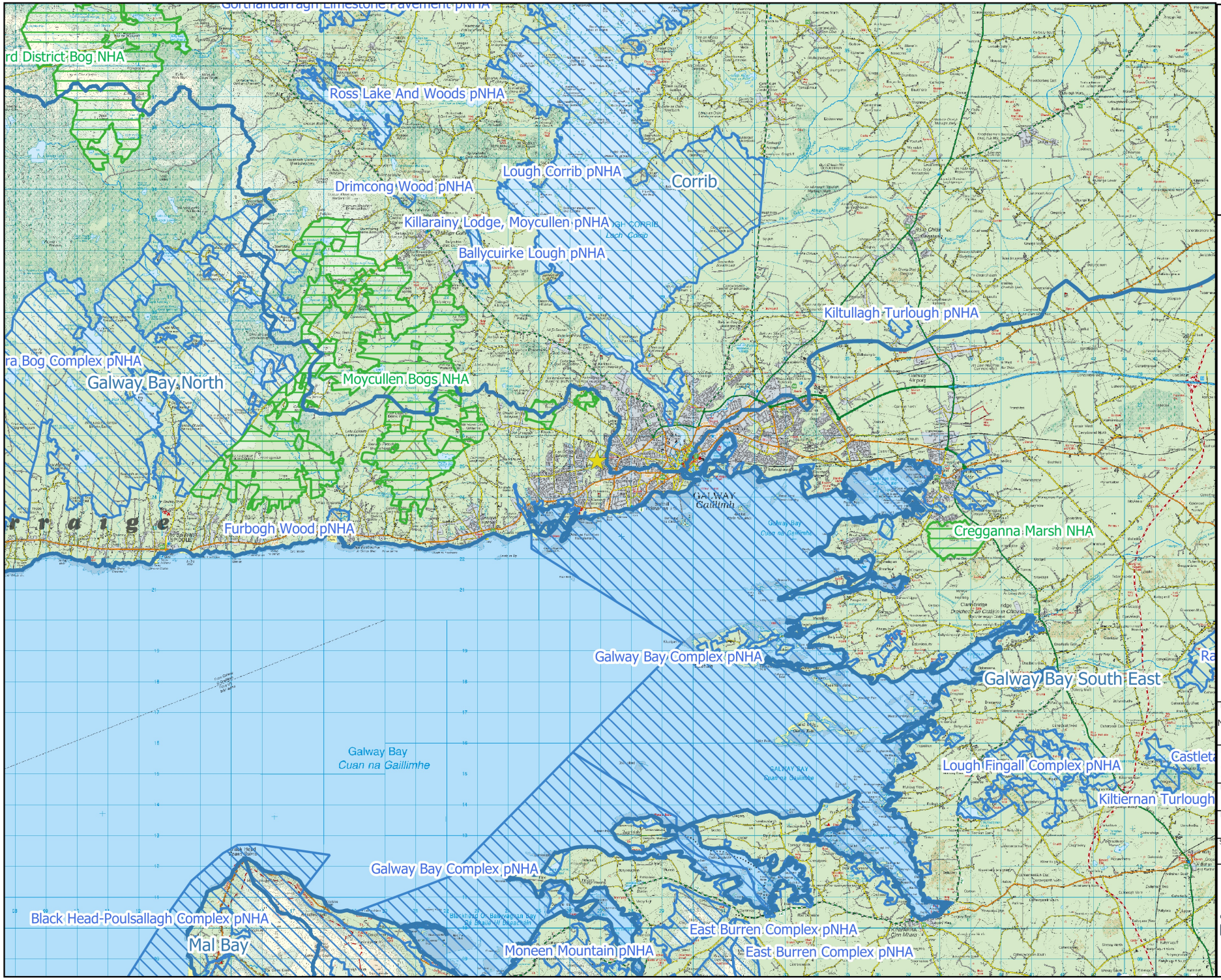
- Catchment mapping was used to establish or discount potential hydrological connectivity between the site of the proposed development and any Nationally Designated Sites. The hydrological catchments are also shown in Figure 6-2 and groundwater bodies are shown in Figure 6-3.
- Table 6-4 provides details of all relevant Nationally Designated Sites as identified in the preceding steps and assesses which, if any, are within the likely Zone of Impact.
- The site synopses for these sites, as per the NPWS website (www.npws.ie), were consulted and reviewed at the time of preparing this report.

Table 6-6-4 Nationally designated sites in the Zone of Influence

Designated site and distance from proposed development	Likely Zone of Impact Determination
Natural Heritage Areas	
Moycullen Bogs NHA [002364] **Distance:** 1.4km	There will be no direct effects as the proposed development is located entirely outside of the designated site. Due to the terrestrial nature of the designated site, there is no potential pathway for indirect effects. **The site is not within the Likely Zone of Impact and no further assessment is required.**
Cregganna Marsh NHA [000253] **Distance:** 10.8km	There will be no direct effects as the proposed development is located entirely outside of the designated site. The site is located within a separate hydrological catchment and groundwater body. Therefore, there is no pathway for indirect effect. There is no suitable supporting habitat for Greenland White-fronted Goose within the proposed development site. Therefore, due to the lack of supporting habitat and the intervening distance between the proposed development site and the designated site, no ex-situ disturbance effects are anticipated. **The site is not within the Likely Zone of Impact and no further assessment is required.**
Proposed Natural Heritage Areas	
Galway Bay Complex pNHA [000268] **Distance:** 1.3km	There will be no direct effects as the proposed development is located entirely outside of the designated site. There is potential for indirect effect via overland flow of polluted water to the surface water sewer system located within the proposed development site which discharges to Rusheen Bay 2km downstream of the proposed development site. Additionally, the designated site is located within the same groundwater catchment area as the proposed development and there is potential for indirect effects via the percolation of water into the surface water sewer system within the site which discharges to Rusheen Bay 2km downstream of the proposed development site. **The site is in the Likely Zone of Impact and further assessment is required.**
Lough Corrib pNHA [000297]	There will be no direct effects as the proposed development is located entirely outside of the designated site.

Distance: 2.5km	The pNHA is located within a separate hydrological catchment and groundwater body to the proposed development site. Therefore, there is no potential for indirect effect on the pNHA. **The site is not within the Likely Zone of Impact and no further assessment is required.**
Ballycuirke Lough pNHA [000228] **Distance:** 6.4km	There will be no direct effects as the proposed development is located entirely outside of the designated site. The pNHA is located within a separate hydrological catchment and groundwater body to the proposed development site. Therefore, there is no potential for indirect effect on the pNHA. **The site is not in the Likely Zone of Impact and further no assessment is required.**
Furbogh Wood pNHA [001267] **Distance:** 8.1km	There will be no direct effects as the proposed development is located entirely outside of the designated site. Due to the terrestrial nature of the designated site, there is no potential pathway for indirect effects. **The site is not within the Likely Zone of Impact and no further assessment is required.**
Killarainy Lodge, Moycullen pNHA [002083] **Distance:** 9km	There will be no direct effects as the proposed development is located entirely outside of the designated site. Due to the terrestrial nature of the designated site, there is no potential pathway for indirect effects. **The site is not within the Likely Zone of Impact and no further assessment is required.**
Connemara Bog Complex pNHA [002034] **Distance:** 9.8km	There will be no direct effects as the proposed development is located entirely outside of the designated site. The pNHA is located upgradient of the proposed development site. In addition, there is no surface water connectivity between the pNHA and the proposed development. According to GSI (1st Draft Spiddal GWB Description June. 2004), groundwater flow paths for the Spiddal groundwater body in which both the proposed development and the pNHA are located tend towards the south and are likely to be short (up to 100m). The pNHA is located 9.8km north west of the proposed development site. Therefore, there is no potential for indirect effect on the pNHA. **The site is not in the Likely Zone of Impact and no further assessment is required.**
Drimcong Wood pNHA [001260] **Distance:** 10km	There will be no direct effects as the proposed development is located entirely outside of the designated site. Due to the terrestrial nature of the designated site, there is no potential pathway for indirect effects. **The site is not within the Likely Zone of Impact and no further assessment is required.**

Kiltullagh Turlough pNHA [000287] **Distance:** 10.3km	There will be no direct effects as the proposed development is located entirely outside the boundary the designated site. The site is located within a separate groundwater body and there is no potential for indirect effect. **The site is not in the Likely Zone of Impact and no further assessment is required.**
Ross Lake and Woods pNHA [001312] **Distance:** 12km	There will be no direct effects as the proposed development is located entirely outside of the designated site. The pNHA is located within a separate hydrological catchment and groundwater body to the proposed development site. Therefore, there is no potential for indirect effect on the pNHA. **The site is not in the Likely Zone of Impact and no further assessment is required.**
East Burren Complex pNHA [001926] **Distance:** 13.8km	There will be no direct effects as the proposed development is located entirely outside the boundary the designated site. The pNHA is located within a separate hydrological catchment and groundwater body to the proposed development site. Therefore, there is no potential for indirect effect on the pNHA. **The site is not in the Likely Zone of Impact and no further assessment is required.**
Ramsar Site	
Inner Galway Bay Site Number: 838	There will be no direct effects as the proposed development is located entirely outside of the designated site. There is potential for indirect effect to the Ramsar Site via overland flow of polluted water to the surface water sewer system located within the proposed development site which discharges to Rusheen Bay 2km downstream of the proposed development site. Additionally, the Ramsar Site is located within the same groundwater catchment area as the proposed development and there is potential for indirect effects via the percolation of water into the surface water sewer system within the site which discharges to Rusheen Bay 2km downstream of the proposed development site. **The site is in the Likely Zone of Impact and further assessment is required.**



Map Legend

- Site Location
- Natural Heritage Area (NHA)
- Proposed Natural Heritage Area (pNHA)
- WFD Catchments

Drawing Title
Nationally Designated Sites in realtion to Site Location and WFD Catchments

Project Title
Knocknacarra District Centre LRD

Drawn By	Checked By
AvdGM	RW
Project No.	Drawing No.
210206	Fig 6-2
Scale	Date
1:160000	04.11.2022

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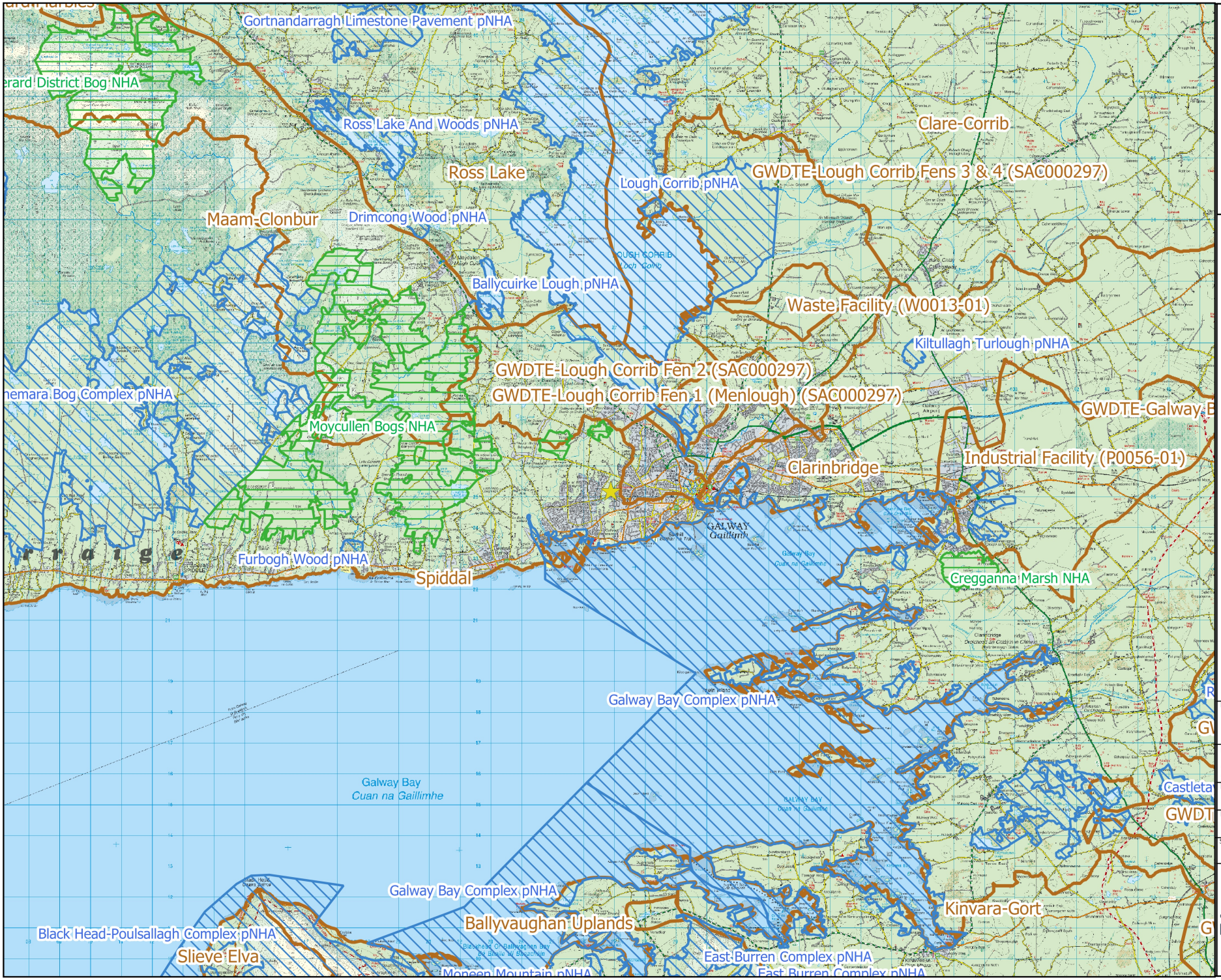

Map Legend

- Site Location
- Natural Heritage Area (NHA)
- Proposed Natural Heritage Area (pNHA)
- WFD Groundwater Bodies

Drawing Title
Site Location in relation to Nationally Designated Sites and Groundwater Bodies

Project Title
Knocknacarra District Centre LRD

Drawn By	Checked By
AvdGM	RW
Project No.	Drawing No.
210206	Fig 6-3
Scale	Date
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6.5.1.2 New Flora Atlas

A search was made in the New Atlas of the British & Irish Flora (Preston et al., 2002), on 08/11/2022, to investigate whether any rare or unusual plant species listed as Annex II of the Habitats Directive which are listed as rare on the Red Data List (Curtis and McGough 1988) or protected under the Flora (Protection) Order, 2022 had been recorded in the relevant 10km squares in which the study site is situated (M22), during the 1987-1999 atlas survey (Table 6-6-5).

6-6-5 Records of species listed under the Flora Protection Order 2022 or the Irish Red Data Book for Vascular Plants

Common Name	Scientific Name	Status
Slender cottongrass	*Eriophorum gracile*	FPO
Small white orchid	*Pseudorchis albida*	FPO, VU (Vulnerable)
Awlwort	*Subularia aquatica*	VU (Vulnerable)
Spiked sedge	*Carex spicata*	NT (Near Threatened)
Frog orchid	*Coeloglossum viride*	NT (Near Threatened)
Pipewort	*Eriocaulon aquaticum*	NT (Near Threatened)
Common cottongrass	*Eriophorum gracile*	NT (Near Threatened)
Corn marigold	*Chrysanthemum segetum*	NT (Near Threatened)
Hoary rock-rose	*Helianthemum oelandicum*	NT (Near Threatened)
Common gromwell	*Lithospermum officinale*	NT (Near Threatened)
Dense-flowered orchid	*Neotinea maculata*	NT (Near Threatened)
Tubular water-dropwort	*Oenanthe fistulosa*	NT (Near Threatened)
Sea-kale	*Crambe maritima*	NT (Near Threatened)
Spring gentian	*Gentiana verna*	NT (Near Threatened)
Autumn gentian	*Gentianella amarella*	NT (Near Threatened)
Field gentian	*Gentianella campestris*	NT (Near Threatened)
Henbane	*Hyoscyamus niger*	NT (Near Threatened)
Thread-leaved Watercrowfoot	*Ranunculus baudotii*	NT (Near Threatened)
Least bur-reed	*Sparganium natans*	NT (Near Threatened)
Yellow horned-poppy	*Glaucium flavum*	NT (Near Threatened)
Green field-speedwell	*Veronica agrestis*	NT (Near Threatened)
Wildflower knapweed	Centaurea scabiosa	Near Threatened (NT)

6.5.1.3 National Biodiversity Data Centre

A search of the NBDC records for the relevant hectad, M22, provided details on a number of species of conservation concern. Table 6-6-6 lists the protected faunal species (excluding birds) recorded within the hectad M22. Table 6-6-7 lists the protected bird species recorded within the hectad M22. The findings of ecological surveys undertaken for the Galway City Transport Plan (GCTP, 2015) were also reviewed.

Table 6-6-6 National Biodiversity Data Centre Records

Common Name	Scientific Name	Habitats Directive
European Eel	*Anguilla Anguilla*	OSPAR
Thornback Ray	*Raja clavate*	OSPAR
Common Oyster	*Ostrea edulis*	OSPAR
Dog Whelk	*Nucella lapillus*	OSPAR
Sea Lamprey	*Petromyzon marinus*	OSPAR, Annex II
Hedgehog	*Erinaceus europaeus*	WA
Eurasian Badger	*Meles meles*	WA
Irish Stoat	*Mustela erminea subsp. hibernica*	WA
Irish Hare	*Lepus timidus subsp. hibernicus*	Annex V, WA
Bottle-nosed Dolphin	*Tursiops truncates*	Annex II, Annex IV, WA
Striped Dolphin	*Stenella coeruleoalba*	Annex IV, WA
Common Porpoise	*Phocoena phocoena*	Annex II, Annex IV, WA, OSPAR
Common Seal	*Phoca vitulina*	Annex II, Annex V, WA
Grey Seal	*Halichoerus grypus*	Annex II, Annex V, WA
Long-finned Pilot Whale	*Globicephala melas*	Annex IV, WA
Minke Whale	*Balaenoptera acutorostrata*	Annex IV, WA
Pygmy Sperm Whale	*Kogia breviceps*	Annex IV, WA
Cuvier's Beaked Whale	*Ziphius cavirostris*	Annex IV, WA
Common Dolphin	*Delphinus delphis*	Annex IV, WA
Natterer's Bat	*Myotis nattereri*	Annex IV, WA
Common Frog	*Rana temporaria*	Annex V, WA

Common Name	Scientific Name	Habitats Directive
Smooth Newt	*Lissotriton vulgaris*	WA
Marsh Fritillary	*Euphydryas aurinia*	Annex II
Common Lizard	*Zootoca vivipara*	WA
Leathery Turtle	*Dermochelys coriacea*	Annex IV, WA, OSPAR
Brown Long-eared Bat	*Plecotus auritus*	Annex IV, WA
Daubenton's Bat	*Myotis daubentonii*	Annex IV, WA
Pygmy Shrew	*Sorex minutus*	WA
Eurasian Red Squirrel	*Sciurus vulgaris*	WA
European Otter	*Lutra lutra*	Annex II, Annex IV, WA
Lesser Noctule	*Nyctalus leisleri*	Annex IV, WA
Pine Marten	*Martes martes*	Annex V, WA
Pipistrelle	*Pipistrellus pipistrellus sensu lato*	Annex IV, WA
Soprano Pipistrelle	*Pipistrellus pygmaeus*	Annex IV, WA

Annex II, Annex IV, Annex V – Of EU Habitats Directive, WA – Irish Wildlife Acts (1976-2022), OSPAR – OSPAR Convention

Table 6-6-7 NBDC Records for Birds (M22)

Common Name	Scientific Name	Status
Arctic Tern	*Sterna paradisaea*	Annex I
Wood Sandpiper	*Tringa erythropus*	Annex 1
Turtle Dove	*Streptopelia turtur*	BoCCI Red List [Passage]
Slavonian Grebe	*Podiceps auritus*	Annex 1, BoCCI Red List [Wintering]
Grey Plover	*Pluvialis squatarola*	BoCCI Red List [Wintering]
Grey Wagtail	*Motacilla cinerea*	BoCCI Red List [Breeding]
Curlew Sandpiper	*Calidris ferruginea*	BoCCI Red List [Passage]
Purple Sandpiper	*Calidris maritima*	BoCCI Red List [Wintering]
Oystercatcher	*Haematopus astralegus*	BoCCI Red List [Breeding & Wintering]
Barn Owl	*Tyto alba*	BoCCI Red List [Breeding]
Goldeneye	*Bucephala clangula*	BoCCI Red List [Wintering]
Stock Dove	*Columba oenas*	BoCCI Red List [Breeding]

Common Name	Scientific Name	Status
Bar-tailed Godwit	*Limosa lapponica*	Annex I, BoCCI Red List [Wintering]
Black-throated Diver	*Gavia arctica*	Annex I
Common Kingfisher	*Alcedo atthis*	Annex I
Common Redshank	*Tringa totanus*	BoCCI Red List (Breeding & Wintering)
Common Scoter	*Melanitta nigra*	BoCCI Red List [Breeding & Wintering]
Common Tern	*Sterna hirundo*	Annex I
Corn Crake	*Crex crex*	Annex I, BoCCI Red List [Breeding]
Dunlin	*Calidris alpina*	Annex I, BoCCI Red List [Breeding & Wintering]
Knot	*Calidris canutus*	BoCCI Red List [Wintering]
Eurasian Curlew	*Numenius arquata*	BoCCI Red List [Breeding & Wintering]
Eurasian Woodcock	*Scolopax rusticola*	BoCCI Red List [Breeding]
European Golden Plover	*Pluvialis apricaria*	Annex I, BoCCI Red List (Breeding & Wintering)
Great Northern Diver	*Gavia immer*	Annex I
Grey Partridge	*Perdix perdix*	BoCCI Red List [Breeding]
Hen Harrier	*Circus cyaneus*	Annex I
Little Egret	*Egretta garzetta*	Annex I
Little Gull	*Larus minutus*	Annex I
Little Tern	*Sternula albifrons*	Annex I
Meadow Pipit	*Anthus pratensis*	BoCCI Red List [Breeding]
Mediterranean Gull	*Larus melanocephalus*	Annex I
Swift	*Apus apus*	BoCCI Red List [Breeding]
Merlin	*Falco columbarius*	Annex I
Northern Lapwing	*Vanellus vanellus*	BoCCI Red List (Breeding & Wintering)
Peregrine Falcon	*Falco peregrinus*	Annex I
Razorbill	*Alca torda*	BoCCI Red List [Breeding]
Red Grouse	*Lagopus lagopus*	BoCCI Red List [Breeding]
Red Wing	*Turdus iliacus*	BoCCI Red List [Wintering]
Red-throated Diver	*Gavia stellate*	Annex I

Common Name	Scientific Name	Status
Long-tailed Duck	*Clangula hyemalis*	BoCCI Red List [Wintering]
Scaup	*Aythya marila*	BoCCI Red List [Wintering]
Sandwich Tern	*Sterna sandvicensis*	Annex I
Whooper Swan	*Cygnus cygnus*	Annex I
Snipe	*Gallinago gallinago*	BoCCI Red List [Breeding & Wintering]
Kittiwake	*Rissa tridactyla*	BoCCI Red List [Breeding]
Kestrel	*Falco tinnunculus*	BoCCI Red List [Breeding]
Yellowhammer	*Emberiza citronella*	BoCCI Red List [Breeding]

Annex I – Of EU Birds Directive, Red List – Birds of Conservation Concern in Ireland (Population for which the species is red listed in brackets).

6.5.1.3.1 Invasive Species

The NBDC database also contains records of invasive species identified within the relevant grid square M22. Records of invasive species for within the hectad M22 are provided in Table 6-6-8.

Table 6-6-8 NBDC records for Third Schedule invasive species in the hectad M22

Common Name	Scientific Name
Wireweed	*Sargassum muticum*
Ruddy Duck	*Oxyura jamaicensis*
Roach	*Rutilus rutilus*
Water Fern	*Azolla filiculoides*
Canadian Waterweed	*Elodea canadensis*
Japanese Knotweed	*Fallopia japonica*
Rhododendron	*Rhododendron ponticum*
Giant Rhubarb	*Gunnera tinctoria*
Himalayan Knotweed	*Persicaria wallichii*
American Mink	*Mustela vison*
Giant Knotweed	*Fallopia sachalinensis*
Indian Balsam	*Impatiens glandulifera*
Zebra Mussel	*Dreissena (Dreissena) polymorpha*
Spanish Bluebell	*Hyacinthoides hispanica*
Three-cornered Garlic	*Allium triquetrum*
Brown Rat	*Rattus norvegicus*

Bohemian Knotweed	*Fallopia japonica x sachalinensis = F. x bohemica*

6.5.1.4 NPWS Records

NPWS online records were searched to determine whether any rare or protected species of flora or fauna were recorded in the 10 kilometre grid square, M22, in which the study area lies. A data request was also sent to the NPWS and data received in relation to the grid square. Table 6-6-9 lists the rare and protected species records which lie within hectad M22. All of these species are protected under the Wildlife Act (1976) and the Wildlife (Amendment) Act (2000).

Table 6-6-9 Records for rare and protected species, NPWS

Common Name	Scientific Name	Status
Small white orchid	*Pseudorchis albida*	FPO, Red List VU
Lesser horseshoe bat	*Rhinolophus hipposideros*	Annex II, IV
Yellow Horned-poppy	*Glaucium flavum*	Red List NT
Field Gentian	*Gentianella campestris*	Red List NT
Barn owl	*Tyto alba*	BoCCI Red List
Shag	*Phalacrocorax aristotelis*	BoCCI Amber List
Sea lamprey	*Petromyzon marinus*	Annex II, Red List NT
Smooth Newt	*Lissotriton vulgaris*	WA
Common Frog	*Rana temporaria*	WA, Annex V
Common Lizard	*Lacerta vivipara*	WA
Otter	*Lutra lutra*	Annex II, Annex IV
Common Dolphin	*Delphinus delphis*	Annex IV, WA, Red List NE
Common Porpoise	*Phocoena phocoena*	Annex II, Annex IV, WA, Red List NE
Badger	*Meles meles*	WA
Irish hare	*Lepus timidus subsp. hibernicus*	Annex V, WA
Eurasian Pygmy Shrew	*Sorex minutus*	WA
Harbour Seal	*Phoca vitulina*	Annex II, Annex V, WA
West European Hedgehog	*Erinaceus europaeus*	WA
Reindeer lichen	*Cladonia portentosa*	Annex V
Irish Stoat	*Mustela erminea*	WA
Henbane	*Hyoscyamus niger*	Red List NT

Common Name	Scientific Name	Status
Spiked Sedge	*Carex spicata*	Red List NT
Awlwort	*Subularia aquatica*	Red List VU
Cladonia ciliata	*Cladonia ciliata*	Annex V
Gentianella amarella subsp. hibernica	*Gentianella amarella subsp. hibernica*	Red List NT
Slender Cottongrass	*Eriophorum gracile*	FPO, Red List NT
Sphagnum denticulatum	*Sphagnum denticulatum*	Annex V
Sea Kale	*Crambe maritima*	Red List NT
Helianthemum oelandicum subsp. piloselloides	*Helianthemum oelandicum subsp. piloselloides*	Red List NT

Annex II, Annex IV, Annex V – Of EU Habitats Directive, WA – Irish Wildlife Acts (1976-2022), Red Data List (Curtis and McGough 1988), Red List Status EN - Endangered; NT – Near Threatened; VU - Vulnerable, BoCCI Red List – Birds of Conservation Concern in Ireland (Population for which the species is red listed in brackets), AEWA -Agreement on the Conservation of African-Eurasian Migratory Waterbirds [1999].

6.5.1.5 Additional Fauna

The proposed development site does not fall within any sensitivity area for freshwater pearl mussel (*Margaritifera margaritifera*). The nearest such area, i.e. the Knock catchment (Catchments of other extant populations) is located over 3.8km west of the proposed development site. There are no watercourses within the proposed development site that have suitability for freshwater pearl mussel and there is no surface water connectivity between the proposed development site and the Knock catchment.

NBDC records show that marsh fritillary (*Euphydryas aurinia*), is known to occur within the hectad (M22). Other species, including badger (*Meles meles*), common frog (*Rana temporaria*) and otter (*Lutra lutra*) are likely to be recorded in the wider area, based on the results of the NBDC data search and NPWS data request.

6.5.1.6 N6 Galway City Transport Project (2015)

A review of publicly available information, on studies undertaken as part of the N6 Galway City Transport Project (GCTP), was carried out. This review shows that the site is within the ecological study areas and the habitats on site have been assessed as part of the project (GCTP, 2015), available at http://www.n6galwaycityringroad.ie/). The habitats within the proposed development site have been classified as Dense Bracken (HD1), Recolonising Bare Ground (ED3), Wet Grassland (GS4) and Scrub (WS1) and assigned a value of non-annex habitat of local importance. No rare or protected plant species were recorded within the proposed development site during the surveys.

The site has been surveyed for bats as part of the N6 study, including walked transects routes and car transect routes. No bat roosts or foraging/commuting bats were recorded within the development site during the N6 study. Leisler's bat, common pipistrelle and soprano pipistrelle were recorded in the wider area during the course of the N6 study.

6.5.1.7 NPWS Article 17 Habitat Datasets

The available NPWS Article 17 habitats datasets were reviewed. There were no records for any EU Annex I habitats recorded within, adjacent or in the vicinity of the proposed works site.

NPWS mapped Annex I 4030 Dry Heath and 4010 Wet Heath habitats are located in excess of 770m west of the proposed development site.

6.5.1.8 Water Quality

The EPA web-mapper (https://gis.epa.ie/EPAMaps/) was consulted on the 15/11/2022 regarding the water quality and status of waterbodies that are located downstream of the site of the proposed development.

There is one watercourse within the proposed development area, a tributary of the Knocknacarragh. The EPA code for this waterbody is IE_WE_31K160960, segment code: 31_1071. This watercourse has been culverted as a result of a previous development from 1996 and was incorporated into the storm sewer network. This watercourse flows into the Knocknacarragh, much of which is also culverted, and discharge to Rusheen Bay and thus has connectivity to the Inner Galway Bay SPA and Galway Bay Complex SAC, Galway Bay Complex pNHA and the Inner Galway Bay Ramsar Site approx. 2km downstream (hydrological distance). According to the river waterbodies risk the watercourse IE_WE_31K160960 has been assessed as being under review. The water quality of Rusheen Bay, to which the culverted Knocknacarragh stream discharges, has a Coastal Waterbody Status of 'unpolluted' and a coastal waterbodies risk projection of 'not at risk'.

The proposed development site is located in the Knocknacarragh_010 Sub Basin, Knock [Furbo]_SC_010 Subcatchment, Galway Bay North Catchment and Hydrometric Area 31 (https://gis.epa.ie/EPAMaps/).

The site is located in the Spiddal groundwater catchment. This groundwater catchment has an assigned WFD Ground Waterbody Approved Risk of 'not at risk'.

The Water Framework Directive (WFD) Ground Waterbody Status 2013-2018 and 2106-2021 assigned the Spiddal groundwater catchment as having 'good' status.

The Water Framework Directive (WFD) Ground Waterbody Status 2013-2018 and 2106-2021 assigned the Spiddal groundwater catchment as having 'good' status.

6.5.1.9 Flood Risk Assessment

To identify those areas as being at risk of flooding OPW's indicative river and coastal flood map (www.floodmaps.ie), CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie), Department of Environment, Community and Local Government on-line planning mapping (www.myplan.ie) and historical mapping (i.e. 6" and 25" base maps) were consulted.

There is no identifiable map text on local available historical 6" or 25" mapping for the study area that identify lands that are "prone to flooding".

There are no recurring flood incidents within the study area boundary according to the OPW's flood mapping. There are no areas within the study area mapped as "Benefiting Lands". Benefiting lands are defined as a dataset prepared by the Office of Public Works identifying land that might benefit from the implementation of Arterial (Major) Drainage Schemes (under the Arterial Drainage Act 1945) and indicating areas of land subject to flooding or poor drainage.

Tidal flooding is not relevant as the site is approximately 1.8 km from the coast and more than 28m above sea level.

The OPW PFRA map for the area indicates that the eastern area of the site could be impacted by a potential fluvial flood risk zone. No risk of pluvial or coastal flooding is highlighted on the site. The PFRA report and maps are available at www.floodinfo.ie and identify areas deemed to be at risk of flooding (referred to as Areas for Further Assessment, or 'AFAs'), as they require more detailed assessment on the extent and degree of flood risk by the later CFRAM Studies. The flood extents maps indicates that the eastern area of the subject site could be impacted by a potential fluvial flood risk zone. No risk of pluvial or coastal flooding is highlighted on the site. The Western Catchment Flood Risk Assessment and Management (CFRAM) study provides further assessment of areas identified in the PFRA for further investigation. The subject site's catchment area was not identified in the PFRA for further investigation therefore it is outside the Western CFRAM "Area of Further Assessment" boundary for Galway City.

A Site-Specific Flood Risk Assessment (SSFRA) has been prepared for the proposed development (DBFL Consulting Engineers, 2022) (Appendix 8-1). This report determined that the Site is within Flood Zone C and concluded that the residential development proposed is appropriate for the Site's flood zone category.

The assessment also found that the development has a good level of flood protection up to the 100-year return event. For pluvial floods exceeding the 100-year capacity of the drainage system then the proposed flood routing mitigation measures should protect the areas with lower finish floor levels by directing flood water to the drainage outfall.

6.5.1.10 Conclusions of the Desk Study

The desktop study has provided information about the existing environment in hectad M22, within which the proposed development is located.

The mammal species recorded within the hectad have widespread range and distributions in Ireland and are likely to be recorded frequently throughout Ireland. A number of protected bird species have been previously recorded within the hectad M22. The proposed development site is located approx. 1.3km to Galway Bay Complex SAC, 1.5km to Inner Galway Bay SPA and 1.3km to Galway Bay Complex (pNHA) but is buffered from these sites by an urban landscape.

A hydrological connection to Inner Galway Bay SPA, Galway Bay Complex SAC, Galway Bay Complex pNHA and the Inner Galway Bay Ramsar Site exists via the storm sewer system within the proposed development site which ultimately discharges to Rusheen Bay.

There are records for protected Annex I habitats from the wider area, however, there are no mapped Annex I habitats within the development site itself.

6.5.2 Results of Ecological Surveys

6.5.2.1 Description of Habitats within the Ecological Survey Area

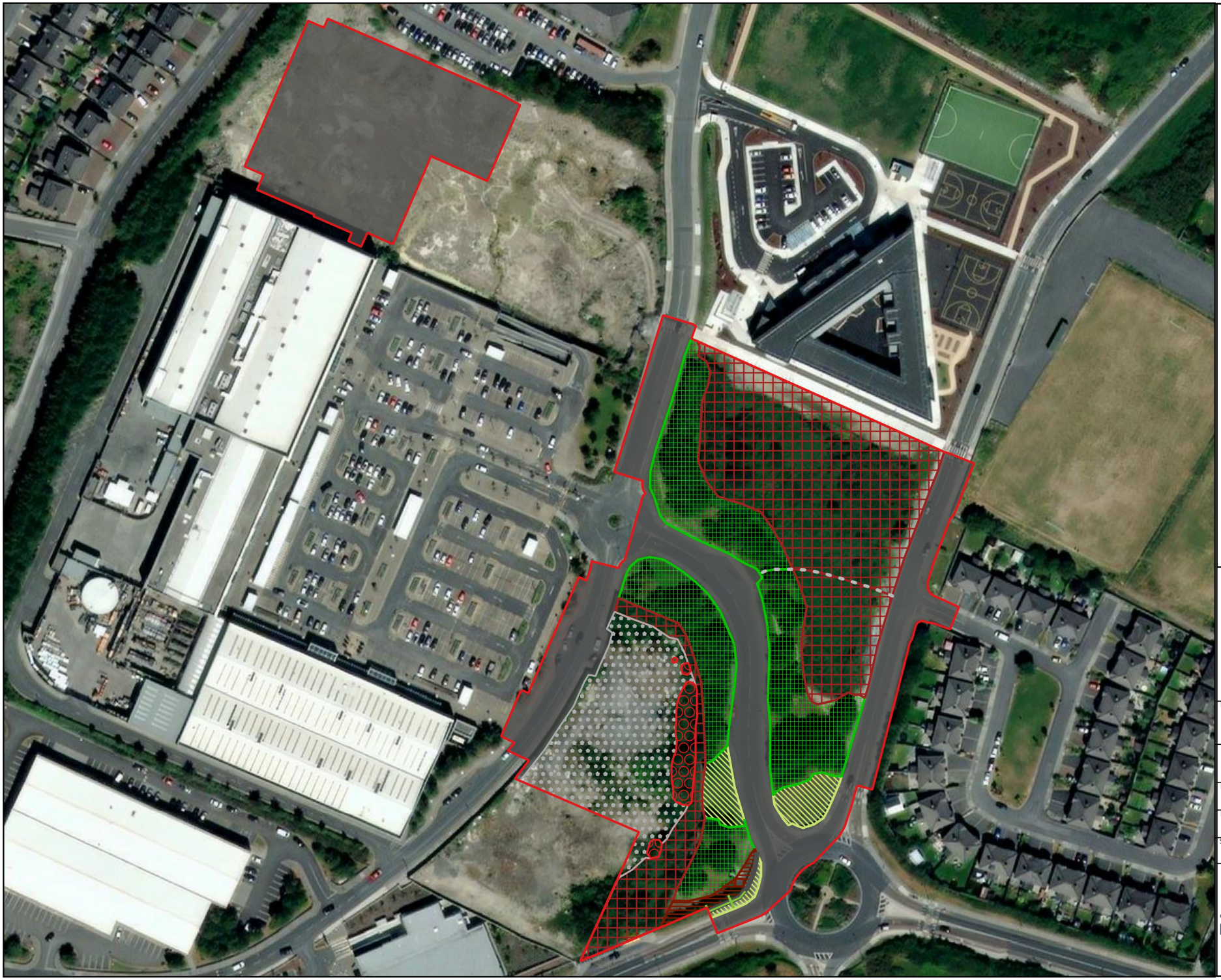
Assessing the impacts of any project and associated activities requires an understanding of the ecological baseline conditions prior to and at the time of the project proceeding. Ecological Baseline conditions are those existing in the absence of proposed activities (CIEEM 2018, updated 2022).

A multidisciplinary ecological walkover survey of the site was conducted on the 19th of August 2021 by Kevin Mc Elduff (B.Sc.) and a follow up multidisciplinary ecological walkover survey of the site was conducted on the 27th of September 2022 by Aran von der Geest Moroney (B.Sc.) and Patrick O'Boyle (B.Sc., M.Sc.), in line with NRA (2009) guidelines (Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes). The ecological surveys were undertaken within the optimal time of year to undertake a habitat and flora survey (Smith et. al 2011).

The multidisciplinary walkover survey comprehensively covered the proposed development site (the application site) as well as the wider study area. The habitats recorded during the site visit are listed in (Table 6-6-10). A habitat map is provided in Figure 6-4. A habitat map with site layout underlain is provided in Figure 6-5.

Table 6-6-10 Habitats recorded within the proposed development boundary (Fossitt, 2000)

Habitat	Code
Scrub	WS1
Spoil and bare ground	ED2
Recolonising bare ground	ED3
Buildings and artificial surfaces	BL3
Amenity grassland	GA2
Scattered trees and parkland	WD5
Ornamental/ non-native shrub	WS3
Hedgerows	WL1



Map Legend

- Site Boundary
- Buildings and artificial surfaces (BL3)
- Spoil and bare ground (ED2)/ Recolonising bare ground(ED3)
- Recolonising bare ground (ED3)
- Amenity grassland (GA2)
- Scattered trees and parkland (WD5)
- Scrub (WS1)
- Ornamental/ non-native shrub (WS3)
- Spoil and bare ground (ED2)/ Recolonising bare ground(ED3)
- Hedgerows (WL1)
- Ornamental/ Non-Native Shrub (WS3)

Drawing Title

Habitat Map

Project Title

Knocknacarra District Centre LRD

Drawn By	Checked By
AvdGM	RW
Project No.	Drawing No.
210206	Fig 6-4
Scale	Date
1:1900	13.12.2022

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Map Legend

- Site Boundary
- Buildings and artificial surfaces (BL3)
- Spoil and bare ground (ED2)/ Recolonising bare ground(ED3)
- Recolonising bare ground (ED3)
- Amenity grassland (GA2)
- Scattered trees and parkland (WD5)
- Scrub (WS1)
- Ornamental/ non-native shrub (WS3)
- Spoil and bare ground (ED2)/ Recolonising bare ground(ED3)
- Hedgerows (WL1)
- Ornamental/ Non-Native Shrub (WS3)

Drawing Title
Habitat Map with Site Layout Underlain

Project Title
Knocknacarra District Centre LRD

Drawn By	Checked By
AvdGM	RW
Project No.	Drawing No.
210206	Fig 6-5
Scale	Date
1:1800	13.12.2022

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The proposed development site is bisected by a public access road. This road all associated hard standing areas as well as the bordering footpaths are classified as **Buildings and artificial surfaces (BL3)** (Plate 6-1). Areas of concrete block and stone wall and footpath along boundaries of the site are also classified under this designation (Plate 6-2).

The northern portion of the proposed development site is dominated by **Scrub (WS1)** habitat characterised by bindweed (*Calystegia sepium),* willowherb (*Epibolium* spp.), immature willows (*Salix* spp.), gorse (*Ulex europaeus*), bramble (*Rubus fruticosus* agg.), ragwort (*Senecio jacobaea),* dandelion (*Taraxacum officinale* agg.), and butterfly bush (*Buddleja davidii*) among other common and widespread species (Plate 6-3). A small path has been worn through the area of scrub. This worn path as well as patches of exposed ground within the area of scrub are classified as **Spoil and bare ground (ED2)/ Recolonising bare ground (ED3)** (Plate 6-4).

The portions of the proposed development site bordering the bisecting public access road and the road within the north-western boundary are classified as **Scattered trees and parkland (WD5)** characterised by maple(*Acer platanoides*), sycamore (*Acer pseudoplatanus*), beech (*Fagus sylvatica*), birch (*Betula* spp.), ash (*Fraxinus excelsior*), and willow as well as areas of **Amenity grassland (GA2)** dominated by perennial ryegrass (*Lolium perenne*), yorkshire fog (*Holcus lanatus*), white clover (*Trifolium repens*), dandelion, creeping buttercup (*Ranunculus repens*) and yarrow (*Achillea millefolium*) (Plate 6-5).

The southern portion of the proposed development site is dominated by artificial habitats classified as a mosaic of **Spoil and bare ground (ED2)** and **Recolonising bare ground (ED3)** (Plate 6-6). Large areas of the southern portion of the proposed development site area classified as a mosaic of **Scrub (WS1)** characterised by willow, gorse, bramble, bindweed, ivy (*Hedera* spp.), nettle (*Urtica dioica*), and Willowherb and **Ornamental/ non-native shrub (WS3)** dominated by himalayan knotweed (*Persicaria wallichii*) and butterfly bush (Plate 6-7).

A short immature **Hedgerow (WL1)** is present within the south eastern boundary of the proposed development site (Plate 6-8). A short planted line of **Ornamental/ non-native shrub (WS3)** is present along the western boundary of the proposed development site bordering the existing car park west of the proposed development.

Habitats bordering the proposed development site are artificial in nature and consist of **Recolonising bare ground (ED3)** as well as **Buildings and artificial surfaces (BL3)**.

There are currently no open surface watercourses or drains on the site. However, the Knocknacarra Stream rises to the north of the site at Letteragh and flows southward over a distance of 3km to the sea. A large portion of the lower reach of the Knocknacarra Stream is culverted almost to its sea outfall at Rusheen Bay near Blakes Hill at Salthill. A tributary stream which formerly ran through the site was culverted and realigned to form the surface water sewer network as part of a nearby development in 1996. The culverted tributary and culverted Knocknacarra stream which both form part of the existing storm sewer network flow through the proposed development site and along the eastern boundary of the proposed development site. Storm water runoff from within the site ultimately discharges to Galway Bay Complex SAC, Inner Galway Bay SPA, Galway Bay Complex pNHA and the Inner Galway Bay Ramsar Site via the culverted tributary, Knocknacarra stream and Rusheen Bay.

No habitats listed under Annex I of the EU habitats Directive were identified within the site boundary. All habitats within the proposed development area are highly modified and they do not provide significant potential supporting habitat for populations of QI/ SCI species within nearby European Sites.

Plate 6-1 Road bisecting the proposed development site classified as Buildings and artificial surfaces (BL3)

Plate 6-2 Block and stone walls present at the east of the proposed development site

Plate 6-3 The northern portion of the proposed development site dominated by Scrub (WS1) habitat

Plate 6-4 Worn path within the area of scrub classified as Spoil and bare ground (ED2)/ Recolonising bare ground (ED3)

Plate 6-5 Amenity grassland (GA2) as well as Scattered trees and parkland (WD5) habitat present within the centre and north western portion of the proposed development site

Plate 6-6 Southern portion of the proposed development site dominated by artificial habitats classified as a mosaic of Spoil and bare ground (ED2) and Recolonising bare ground (ED3)

Plate 6-7 Large areas of the southern portion of the proposed development site area classified as a mosaic of Scrub (WS1) and Ornamental/ non-native shrub (WS3).

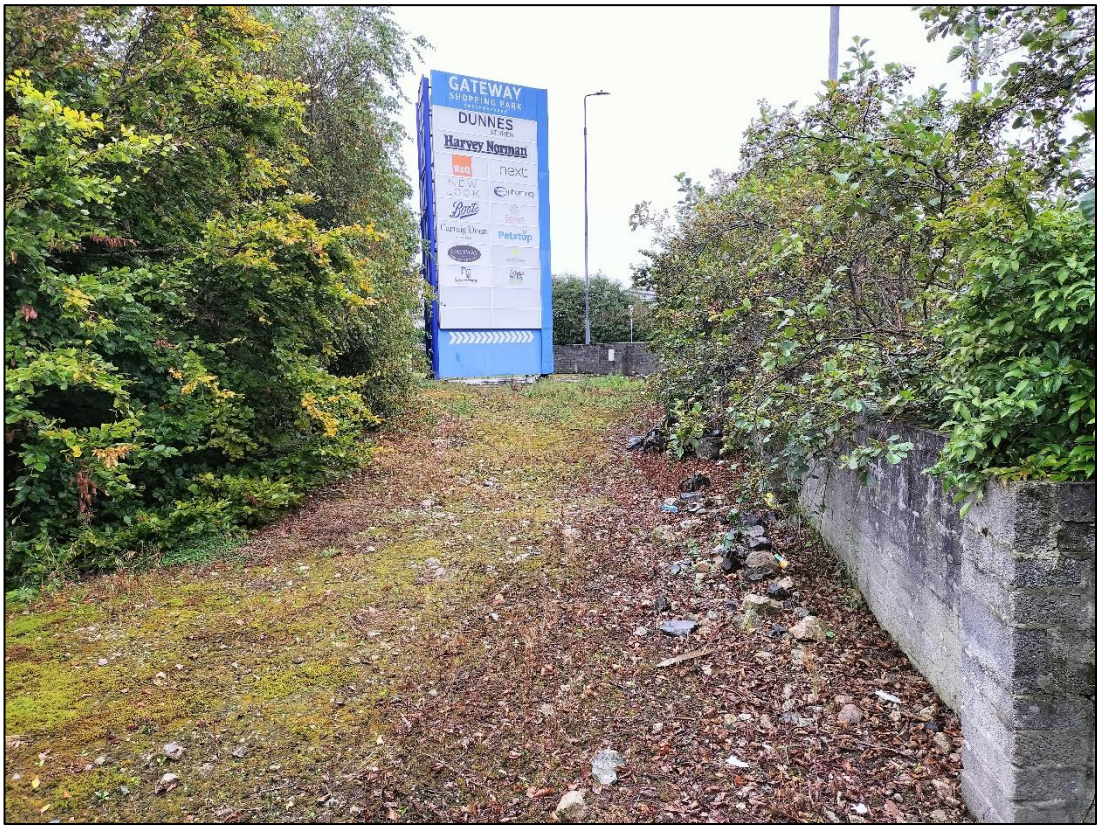

Plate 6-8 Hedgerow (WL1) (Right of picture) within the South Eastern portion of the proposed development boundary

6.5.2.2 Protected Flora

The desk study identified a number of plant species of conservation concern previously recorded within hectad M22, in which the proposed development is located. No Red Listed vascular plants or Flora Protection Order species, including those species identified in the desk study, were recorded at the proposed development site during the site visits undertaken between 2021 and 2022.

6.5.2.3 Invasive Species

The site of the proposed development was surveyed for the presence of invasive species (listed under the 'Third Schedule' of Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011). A large stand of Himalayan knotweed is present within the proposed development. Himalayan knotweed is listed on the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations (S.I. 477 of 2011) (Plate 6-9). An invasive species management plan has been prepared for the management of the Himalayan knotweed infestation within the proposed development site and is being submitted as a part of this project.

Plate 6-9 Himalayan knotweed within the southern portion of the proposed development site

6.5.2.4 Significance of Habitats

The habitats within and adjacent to the development site were evaluated in accordance with the criteria developed by the National Roads Authority (NRA) –outlined in *Guidelines for Assessment of Ecological Impacts of National Road Schemes* (NRA, 2009) which classifies sites in terms of their ecological importance, *i.e.* International Importance, National Importance, County Importance, Local Importance (Higher Value) or Local Importance (Lower Value).

None of the habitats within the works areas correspond to habitats listed on Annex I of the EU Habitats Directive.

The **Ornamental/ non-native shrub (WS3)** habitat was assigned no importance as it is comprised predominantly of a third schedule invasive (Himalayan knotweed) which has a variety of negative impacts on wildlife and native vegetation by impeding regeneration of native species and altering species diversity and suitable habitat for native fauna.

The **Amenity grassland (GA2)**, **Buildings and artificial surfaces (BL3)**, **Recolonising bare ground (ED3)** and **Spoil and bare ground (ED2)** habitats within the proposed development site were assigned *Local Importance (Lower Value)* as they are of low ecological significance, highly modified in nature and abundant in the wider area.

The **Scrub (WS1)**, **Scattered trees and parkland (WD5)** and **Treeline (WL2)** habitats were assigned *Local Importance (Higher Value)* as they help maintain links and ecological corridors between features of higher ecological value and are likely to be utilized by commuting and foraging bats.

6.5.2.5 Fauna in the Existing Environment

6.5.2.5.1 *Mammals*

Non-volant mammals

A thorough survey of the development site was undertaken for mammals during the site visits undertaken in 2021 and 2022. The site is located approx. 1.3km from Galway Bay Complex SAC which is designated for otter (*Lutra lutra*) and harbour seal (*Phoca vitulina*). The development site does not support suitable habitat for these species. As outlined in Section 6.5.1.8 the small stream within the proposed development site is currently culverted and as such provides no suitable habitat for the above-mentioned QI species.

No evidence of badger (*Meles meles*) was recorded and no badger setts were located within the development site. No evidence of other species such as Irish hare, pygmy shrew or Irish stoat, protected under the Irish Wildlife Act 1976-2022 were recorded during the site visit but these species are likely to occur in the wider area, at least on occasion. However, these species have widespread and favourable ranges in Ireland and suitable habitats are widespread in the area.

Bats

Bat Habitat Appraisal

A daytime walkover survey and inspection of the site was conducted on the 27th July 2021. Following the search for roosts, no structures were identified on site. The site was also checked for potential tree roosts. Trees within the site consisted of a mixture of immature and semi mature, sycamore, beech, birch, ash and willow. No trees within the Proposed Development site were identified as having any potential roost features (PRF's). As such, the Proposed Development site was considered to have *Negligible* suitability for roosting bats.

With regard to foraging and commuting bats, areas of spoil and bare ground, recolonising bare ground, buildings and artificial surfaces, ornamental shrubs *and* amenity grassland and were considered *Low* suitability, i.e., habitat that could be used by small numbers of commuting or foraging bats (Collins, 2016). Hedgerows, scrub and scattered trees forming boundary habitats provide some connectivity to the surrounding landscape. As such, they were assessed as having *Moderate* suitability i.e., Continuous habitat connected to the wider landscape that could be used by bats for commuting such as lines of trees and scrub or linked back gardens (Collins, 2016).

Dusk and Dawn Activity Surveys

Numerous foraging and commuting bats were recorded during the dusk and dawn bat activity surveys. In total, 57 bat passes were recorded. Activity was dominated by Soprano pipistrelle (*Pipistrellus pygmaeus*) n=28. This was followed by Common pipistrelle (*Pipistrellus pipistrellus*) n=22. These species are common and widespread across Ireland. In addition, very small numbers of Leisler's bat (*Nyctalus leisleri*) n=6 and *Myotis spp.* n=1 were also recorded. Activity levels were concentrated along the scattered trees that border the road which bisects the site. Overall activity within the site during the dusk and dawn activity surveys was low. Table 6-11 shows total bat passes per species, per survey. Further details and Figures related to bat activity surveys can be found in Appendix 6-1, Section 4.3.2.

Table 6-11 Manual Transect Results - Total Bat Passes Per Survey

Species	Dusk 27th July	Dawn 10th August	Dusk 24th August	Total
Myotis spp.	1	-	-	**1**
Leisler's bat	3	2	1	**6**
Common pipistrelle	6	1	15	**22**
Soprano pipistrelle	6	2	20	**28**
Grand Total	**16**	***5***	**36**	***57***

Static Detector Surveys

Two static detectors were deployed on the site at four different locations (Appendix 6-1, Figure 3-2), based on likely areas of bat activity, for a total of 29 nights. These detectors allowed a specified look into species composition, commuting and foraging activities within the site.

All recordings were later analysed using bat call analysis software Kaleidoscope Pro v.5.4.2 (Wildlife Acoustics, MA, USA). Bat species were identified using established call parameters, to create site-specific custom classifiers. All identified calls were also manually verified. In total 8,171 bat passes were recorded.

Analysis of the detector recordings positively identified five bats to species level. Bat species included: Soprano pipistrelle *(Pipistrellus pygmaeus)* (n=5,960) and Common pipistrelle *(Pipistrellus pipistrellus)* (n=1,940). Leisler's bat *(Nyctalus leisleri)* (n=265) was encountered less frequently. Nathusius' pipistrelle (*Pipistrellus nathusii*) (n=3) and brown long-eared bat *(Plecotus auritus)* (n=3) was rarely encountered, with less than 1% of total bats recorded.

Analysis of the detector recordings also highlighted the total bat passes per detector and total bat passes per night. Further details on static detector results can be found in Appendix 6-1.

Overall, five bat species were recorded across the Proposed Development site. No evidence of roosting bats was identified on the site of the Proposed Development. Foraging and commuting was mainly associated with scattered trees and areas of scrub at the centre of the site along the main road.

6.5.2.5.2 Birds

Bird species recorded within the proposed development site during walkover surveys included common species such as blackbird (*Turdus merula*), robin (*Erithacus rubecula*), magpie (*Pica pica*), jackdaw (*Corvus monedula*), hooded crow (*Corvus cornix*), rook (*Corvus frugilegus*), wren (*Troglodytes troglodytes*), pied wagtail (*Motacilla alba yarrellii*), goldfinch (*Carduelis carduelis*) and starling (*Sturnus vulgaris*).

The development site is located approx. 1.5km from Inner Galway Bay SPA which is designated for a number of wintering and reproducing wetland bird species. The development site does not support suitable habitat for the SCI bird species for which the SPA is designated.

6.5.2.5.3 Other Faunal Taxa

The desk study identified records for the Annex II species marsh fritillary (*Euphydryas aurinia*) in the 10km hectad, M22, within which the proposed development is located. Therefore the site was assessed for suitable marsh fritillary habitat during the site visits in 2021 and 2022. The site was searched for devil's bit scabious (*Succisa pratensis*), the host plant for marsh fritillary. No devil's bit scabious was recorded within the proposed development site and no suitable habitat for marsh fritillary was recorded. No ponds likely to support breeding populations of common frog were identified within the study area.

No evidence of any other protected faunal taxa was recorded on the site of the proposed development.

6.5.2.6 Importance of the Fauna

Ecological evaluation within this section follows a methodology that is set out in Chapter three of the '*Guidelines for Assessment of Ecological Impacts of National Roads Schemes'* (NRA, 2009).

All bat species in Ireland are protected under the Bonn Convention (1992), Bern Convention (1982) and the EU Habitats Directive (92/43/EEC). Additionally, in Ireland bat species are afforded further protection under the Birds and Natural Habitats Regulations (2011) and the Wildlife Acts 1976-2022.

Bats as an Ecological Receptor have been assigned *Local Importance (Higher value)* on the basis that the habitats within the Proposed Development site are utilized by a regularly occurring bat population of *Local Importance.* The results of the bat surveys, carried out in 2021 indicate that the Proposed Development site does not provide significant suitable habitat for a roosting bat population of ecological significance. No roosting site of *National Importance* (i.e. site greater than 100 individuals) was recorded within the site.

None of the bird species recorded within the site during the site visit are Red listed under the Birds of Conservation Concern in Ireland (BoCCI) or in Annex I of the EU Birds Directive. Bird species recorded within the site boundaries during the site visit were an assemblage of common birds, likely to

be common and widespread in the area and which provide biodiversity in a local context. Thus, bird species have been assessed as of *Local Importance (Higher Value)*.

No evidence of non-volant mammals was observed within the proposed development site during the field surveys undertaken in 2021 and 2022. The proposed development site does not provide suitable supporting habitat for QI species of the nearby Galway Bay Complex SAC. No evidence of suitable habitat for marsh fritillary (*Euphydryas aurinia*) was found within the proposed development site. The field visit found no evidence of the site of the proposed development providing significant habitat for any other protected faunal taxa.

6.5.2.7 Importance of Ecological Receptors

Table 6-6-12 lists all identified receptors and assigns them an ecological importance in accordance with the Guidelines for Assessment of Ecological Impacts of National Road Schemes (NRA, 2009). This table also provides the rationale for this determination and identifies the habitats that are Key Ecological Receptors

Table 6-6-12 Importance of Ecological Receptors

Habitat and Geographic Importance	KER Y/N	Rationale
Habitats		
Habitats of Local Importance (Higher value): Hedgerows (WL1) Scrub (WS1) Scattered trees and parkland	Yes	These habitats are classified as of *Local Importance (Higher value)* as they help maintain links and ecological corridors between features of higher ecological value and are likely to be utilized by commuting and foraging bats and other faunal species. These habitats are therefore included as KERs.
Habitats of Local Importance (Lower value): Amenity grassland (GA2) Spoil and bare ground (ED2) Recolonising bare ground (ED3) Buildings and artificial surfaces (BL3)	No	These habitats are classified as of *Local Importance (Lower value)* as they are highly modified and/or are common and widespread in a local, national and international context. These habitats are therefore, not included as KERs.
Habitats of No Importance: Ornamental/ non-native shrub (WS3)	No	This habitat is classified as of no importance as it is comprised predominantly of a third schedule invasive (Himalayan knotweed) which has a variety of negative impacts on wildlife and native vegetation by impeding regeneration of native species and altering species diversity and suitable habitat for native fauna. This habitat is therefore, not included as a KER.
Fauna		
Bats – Local Importance (Higher value):	Yes	Based on the information identified within the desk study, the assessment of the habitats and features on site during the site visit, and the results of the bat survey, bat species have been identified as of *Local Importance (Higher value).*

		No evidence of roosting bats was identified within the site. The results of the bat survey, carried out in 2021, indicates that the Proposed Development site does not provide significant suitable habitat for a roosting bat population of ecological significance. No roosting site of National Importance (i.e. site greater than 100 individuals) was recorded within the site. However, the site is utilised by commuting and foraging bats. Following the precautionary principle, there is potential for loss of habitat and disturbance. For this reason, bats have been included as KER.
Birds – Local Importance (Higher value):	Yes	The site was utilised by a bird population of *Local Importance (Higher Value).* The species assemblage was typical of the wider area and represents local biodiversity. Birds of *Local Importance (Higher Value)* are included as a KER due to the loss of supporting habitat throughout the site.
Designated Sites		
Galway Bay Complex SAC **(International Importance):**	Yes	This SAC is located 1.3km from the proposed development site. Taking a precautionary approach, there is potential for the proposed development to significantly affect this European Site through water pollution via overland flow of pollutant laden waters to the storm sewer system present within the proposed development site which discharges to Rusheen Bay, and thus it is included as a KER.
Inner Galway Bay SPA **(International Importance):**	Yes	This SPA is located 1.5km from the site of the proposed development. Taking a precautionary approach, there is potential for the proposed development to significantly affect this European Site through water pollution via overland flow of pollutant laden waters to the storm sewer system present within the proposed development site which discharges to Rusheen Bay, and thus it is included as a KER.
Galway Bay Complex pNHA **(National Importance):**	Yes	This pNHA is located 1.3km from the development site. Taking a precautionary approach, there is potential for the proposed development to significantly affect this Designated Site through water pollution via overland flow of pollutant laden waters to the storm sewer system present within the proposed development site which discharges to Rusheen Bay, and thus it is included as a KER.
Inner Galway Bay (Ramsar Site) **(International Importance):**	Yes	Taking a precautionary approach, there is potential for the proposed development to significantly affect this Ramsar Site through water pollution via overland flow of pollutant laden waters to the storm sewer system present within the proposed development site which discharges to Rusheen Bay, and thus it is included as a KER.

6.6 Ecological Impact Assessment

6.6.1 Do Nothing Effect

The proposed development site is dominated by highly modified habitats that are artificial in nature. In addition there is a Himalyan knotweed infestation within the site. If the proposed development were not to go ahead, it is likely that the proposed development site would remain in its current condition without any designated use outside of the transport facilities of the road which currently bisects the site.

6.6.2 Impacts During Construction

Effects on the key ecological receptors (KERs) as defined in the preceding sections, during the construction phase of the proposed development are described in the sections below.

6.6.2.1 Impacts on Habitats

The development footprint will result in the permanent loss of Amenity grassland (GA2), Spoil and bare ground (ED2), Recolonising bare ground (ED2) and buildings and artificial surfaces, considered to be of *Local Importance (Lower value).* Loss of these habitats to the footprint of the proposal is not considered to be significant at any geographic scale. These habitats are common and widespread in the locality and have a low biodiversity value.

The development footprint will result in the permanent loss of Ornamental/ non-native shrub (WS3), considered to be of *no importance.* Loss of this habitats to the footprint of the proposal is not considered to be significant at any geographic scale. Loss of this habitat will have an overall positive effect on the proposed development site. Potential impacts associated with biosecurity during construction are considered in Section 6.6.2.4 below.

The loss, degradation or fragmentation of habitats that have been identified as Key Ecological Receptors to facilitate construction is described in the following sections.

6.6.2.1.1 *Habitats of Local Importance Higher Value*

Scattered trees and parkland (WD5), Hedgerows (WL1), Scrub (WS1)

Table 6-6-13 Impacts on Scattered trees and parkland (WD5), Hedgerows (WL1) and Scrub (WS1)

Description of Effect	The proposed development will result in the loss of all immature hedgerow (16 metres), all scattered trees and parkland (0.37 hectares) and all scrub (0.79 hectares) habitat within the site.
Characterisation of unmitigated effect	In the absence of mitigation, the loss of the above outlined habitats constitutes a permanent slight negative effect on the habitat within the site. Whilst these habitats do not correspond to any Annex I Habitat, they add considerable biodiversity value to the site. They also contribute to the ecological and habitat connectivity throughout the site and within the wider area. Given the small area of the habitats to be lost and the presence of similar habitat in the wider area, the loss of the above outlined habitats is considered to be a permanent slight negative impact at the local scale.
Assessment of Significance prior to mitigation	The loss of all immature hedgerow (16 metres), all scattered trees and parkland (0.37 hectares) and all scrub (0.79 hectares) habitat is considered significant at a local scale.

Mitigation/Compensation	The development will result in the complete loss of all immature hedgerow, scattered trees and parkland and scrub habitat within the proposed development site. However, a landscaping plan has been prepared for the proposed development to ameliorate any habitat loss and to maintain connectivity with the wider landscape. **Mitigation** › A landscaping plan has been prepared for the proposed development (Refer to Appendix 4-3) which includes for the planting of a linear strip of native hedgerow, planting of 111 trees which are predominantly native, rain gardens, open green spaces and green roofs. to ameliorate immature hedgerow, scrub and tree loss and ensure there is no net loss in suitable ecological habitat features. › Ecological input was made into the planting schedule within the landscape plan for tree planting across the proposed development site and the native hedgerow in the south of the proposed development site. Species incorporated into the planting scheme include *Quercus petraea* (Sessile Oak), *Alnus glutinosa* (Alder), *Corylus avellana* (Hazel), *Malus syvestris* (Crab Apple), *Arbutus unedo* (Strawberry Tree), *Crataegus monogyna* (Hawthorn), *Prunus spinosa* (Blackthorn) and *Viburnum opulus* (Guelder Rose). These species are native, well suited to the local environment and landscape and provide a range of opportunities for pollinators, nesting and foraging habitat for birds and linear habitats for commuting and foraging bats.
Residual Effect following Mitigation	Following the implementation of the mitigation as described above no signfiicant residual effects are anticipated.
Potential for Cumulative Effect	The proposed development will not result in any permanent loss of hedgerow habitat within the site when taking into account the landscape plan prepared for the proposed development. It therefore cannot contribute to any significant cumulative effect in this regard. The proposed development will result in permanent long-term loss of scrub and scattered trees and parkland habitat within the site. However, a landscape plan has been prepared for the proposed development (Detailed above). This landscape plan provides for the creation of habitats of a similar ecological value as the lost scrub and scattered trees and parkland habitats. It therefore cannot contribute to any significant cumulative effect in this regard.

6.6.2.2 Impacts on Fauna

The potential impacts on faunal species that have been identified as Key Ecological Receptors to facilitate construction of the proposed development is described in the following sections.

6.6.2.2.1 *Bats*

No evidence of roosting bats and no potential roost features were identified within the Proposed Development site during the daytime inspections and dusk and dawn activity surveys. Overall, the site is not considered to provide significant suitable roosting habitat for bat species and habitats were assessed as having *'Negligible'* suitability for roosting bats. Given that no potential for impact on roosting bats exists there is no requirement for mitigation. No potential for significant impact on bat roosting habitat exists.

Table 6-6-14 Impacts on Bats During Construction

Description of Effect	**Habitat Fragmentation** The Proposed Development will result in the loss of some linear habitat features i.e., all immature hedgerow (16 metres), all scattered trees and parkland (0.37 hectares) and all scrub (0.79 hectares) habitat within the site. Scattered trees, immature hedgerow and scrub within the Proposed Development boundary were assessed as *Moderate* suitability for foraging and commuting bats. These habitats provide connectivity to the wider landscape. The loss of these landscape features during construction could result in the fragmentation of foraging and commuting corridors for bat species. Low levels of bat activity were recorded during the bat surveys in 2021.
	Disturbance Construction of the Proposed Development will result in increased human activity, noise and lighting within the proposed site. Therefore, the potential for disturbance to bats requires consideration. However, the Proposed Development is in close proximity to existing residential and commercial developments to the south and east as well as busy local roads. It is likely that bat species in the area are accustomed to some levels of disturbance.
Characterisation of unmitigated effect	**Habitat Fragmentation** The loss of linear habitat features would constitute a permanent slight effect on commuting and foraging bats. While the trees individually are of limited biodiversity value, collectively they contribute to ecological and habitat connectivity throughout the site and with the wider area. The magnitude of this impact is Slight at the local scale given the small number affected.
	Disturbance In the absence of appropriate design, construction phase lighting has the potential to disturb bats by illumination of commuting and foraging areas. This is assessed as a temporary slight effect.
Assessment of Significance prior to mitigation	**Habitat Fragmentation** This is a permanent slight effect on a receptor of *Local Importance (Higher Value).* The loss of a small number of trees, hedgerow and scrub within the site is not considered significant at any geographical scale.
	Disturbance This is a temporary slight effect on a receptor of *Local Importance (Higher Value).* Disturbance during the construction phase of the proposed development is not considered significant at any geographical scale.
Mitigation	**Habitat Fragmentation** A landscape plan has been prepared for the development which outlines plans for additional tree planting. The landscape plan also includes areas of open amenity grassland and mixed native woodland planting. The proposed landscape plan includes for the planting of a linear strip of native hedgerow, planting of 111 predominantly native trees, rain gardens, open green spaces and green roofs, to ameliorate immature hedgerow, scrub and tree loss and ensure there is no net loss in suitable ecological habitat features.

	Disturbance Where lighting is unavoidable during construction, low-intensity lighting and motion sensors will be used to limit illumination. Exterior lighting, during construction, shall be designed to minimize light spillage, thus reducing the effect on areas outside the Proposed Development, and consequently on bats i.e., Lighting will be directed away from mature trees/treelines around the periphery of the site boundary to minimize disturbance to bats. Directional accessories will be used to direct light away from these features, e.g., through the use of light shields (Stone, 2013). The luminaries will be of the type that prevent upward spillage of light and minimize horizontal spillage away from the intended lands.
Residual Effect following Mitigation	**Habitat Fragmentation** With the implementation of the prescribed mitigation measures, no significant effects are predicted.
	Disturbance With the implementation of the prescribed mitigation measures, no significant effects are predicted.
Potential for Cumulative Effect	**Habitat Fragmentation** The proposed development will not result in any significant effect in regard to habitat loss for bats. It therefore cannot contribute to any cumulative effect in this regard.
	Disturbance The proposed development will not result in any significant effect in regard to disturbance to bats. It therefore cannot contribute to any cumulative effect in this regard.

6.6.2.2.2 *Birds*

Table 6-6-15 Impacts during the construction phase on Birds of Local Importance (Higher value)

Description of Effect	**Habitat Loss / degradation** The proposed development will result in the loss of all immature hedgerow (16 metres), all scattered trees and parkland (0.37 hectares) and all scrub (0.79 hectares) habitat within the site. These provide good nesting habitat for a range of common bird species.
	Disturbance The loss of the immature hedgerow, trees and scrub throughout the site has the potential to result in disturbance to birds and potentially to cause mortality to juvenile birds in the nest.
Characterisation of unmitigated effect	**Habitat Loss** In the absence of mitigation, the loss of a scrub, trees and immature hedgerow has the potential to result in a permanent negative effect in respect of bird nesting habitat. This is considered to be a slight effect on this receptor of local importance due to the presence of large areas of suitable habitat in the wider area.
	Disturbance In the absence of mitigation, the loss of scrub, trees and immature hedgerow has the potential to result in a short-term negative effect on nesting bird species. The magnitude of

	this impact has the potential to be significant if the works result in mortality of young birds in the nest.
Assessment of Significance prior to mitigation	**Habitat Loss** There is no potential for significant effects on birds as a result of habitat loss.
	Disturbance There is potential for significant effects on bird species as a result of disturbance.
Mitigation	**Habitat Loss** In order to mitigate for the loss of a small immature hedgerow, scrub and trees within the site, a landscape plan has been prepared (detailed in Appendix 4-3). The landscape plan includes for the planting of a linear strip of native hedgerow, planting of 111 trees which are predominantly native and hedging throughout the site to ameliorate loss of suitable habitat features. In addition, swift bricks are proposed to be installed within the proposed development which will create further suitable habitat for birds. Detailed drawings of swift brick locations can be found in Appendix 4-1 (drawings: GRP-1-02-SW-ZZZ-DR-RAU-AR-2002 and GRP-1-02-SW-ZZZ-DR-RAU-AR-2001).
	Disturbance Where possible, all cutting of trees, scrub and tall vegetation will be undertaken outside the bird nesting season which runs from the 1st March to the 31st August. Any cutting of vegetation that may be required outside the season described above will be supervised by a suitably qualified ecologist to ensure that no bird nests are present. Should nesting birds be encountered, the trees will be left until nesting activity has concluded.
Residual Effect following Mitigation	**Habitat Loss** – No significant effect
	Disturbance – No significant effect.
Potential for Cumulative Effect	**Habitat Loss** The proposed development will not result in any significant effect in regard to habitat loss for birds. It therefore cannot contribute to any cumulative effect in this regard. The proposed development will result in the creation of additional habitat for swifts which at present doesn't exist within the proposed development site. Detailed drawings of swift brick locations can be found in Appendix 4-1 (drawings: GRP-1-02-SW-ZZZ-DR-RAU-AR-2002 and GRP-1-02-SW-ZZZ-DR-RAU-AR-2001).
	Disturbance The proposed development will not result in any significant effect in regard to disturbance to birds. It therefore cannot contribute to any cumulative effect in this regard.

6.6.2.3 Impacts on Water Quality

The potential for impacts on water quality is detailed in full in Chapter 8 of this EIAR. The chapter concluded that:

"*There are no open surface watercourses within or adjacent to the site. As a result, there is limited potential for impact on water quality or the downstream designated sites.*

Notwithstanding this, during each phase of the proposed development (construction and operation) a number of activities will take place on the proposed development site which will have the potential to affect the hydrological regime or water quality at the site or its vicinity. These potential impacts generally arise from sediment input from runoff and other pollutants such as hydrocarbons and cement based compounds, with the former having the most potential for impact during the construction phase.

Surface water drainage measures, pollution control and other preventative measures have been incorporated into the project design to minimise significant adverse impacts on water quality and downstream designated sites.

The surface water drainage plan will focus on silt management and to control runoff rates. The key surface water control measure is that there will be no direct discharge of untreated development runoff into local watercourses during either the construction or operational phases of the project. Attenuated surface water drainage will discharge to the municipal storm drainage system during the operational phase of the development.

During the operational stage there will be no impact on water environment. This will be achieved by avoidance methods and design methods including the use of attenuation tanks and pollutant interceptor devices as outlined in the accompanying Infrastructure Design Report (Appendix 4-7).

Preventative measures during construction include fuel and concrete management and a waste management plan which will all be incorporated into the Construction and Environmental Management Plan (Refer to Appendix 4-2).

Overall, the proposal presents no significant impacts to surface water and groundwater quality provided the proposed mitigation measures are implemented.

No significant cumulative impacts on groundwater or designated sites are anticipated."

Table 6-6-16 Impacts on Water Quality During Construction

Description of Effect	No open surface watercourses were identified within the proposed development site. However, as detailed in section 6.5.1.8, a potential for hydrological connectivity exists via surface water runoff to the public sewer within the proposed development site which discharges to Rusheen Bay. Additionally contaminated water may percolate through bedrock and into the surface water sewer system within the proposed development site. Taking a precautionary approach in the absence of mitigation there is potential for pollution of surface and ground waters in Galway Bay as a result of pollution arising from construction activities.
Characterisation of unmitigated effect	In the absence of best practice design and mitigation the potential impact on water quality is considered to be a temporary moderate-significant negative impact.
Assessment of Significance prior to mitigation	Taking a precautionary approach, moderate - significant effects on water quality are anticipated at a local geographic scale during the construction of the proposed development.
Mitigation	The pathway that would allow potentially moderate – significant negative effects to occur via deterioration in water quality was considered in the design of the proposed development. Detailed mitigations are present in Chapter 8 of this EIAR and are summarised here. In addition, a Construction and Environmental Management Plan (CEMP) has been prepared for the proposed development and is included with the planning application documents and can be found in Appendix 4-2. The following best practice mitigation and environmental control measures as outlined in Chapter 8 of this EIAR and the CEMP have been incorporated into the proposed development: **Earthworks**

- Adjacent drainage systems/groundwater need to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. To prevent this from occurring surface water discharge from site will be managed and controlled for the duration of the construction works until the permanently surface water drainage system of the proposed site is complete.
- A temporary drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff from the site during construction.
- All works shall be undertaken in accordance with the CIRIA document, 'Control of Water Pollution from Construction Sites, guidance for consultants and contractors'
- All oils, fuels, paints and other chemicals will be stored in a secure bunded construction hardstand area. Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any drainage systems. A response procedure will be put in place to deal with any accidental pollution events and spillage kits will be available and construction staff will be familiar with the emergency procedures and use of the equipment
- Concrete batching will take place off site, wash down and wash out of concrete trucks will take place off site and any excess concrete is not to be disposed of on site. Pumped concrete will be monitored to ensure there is no accidental discharge. Mixer washings are not to be discharged into surface water drains/sewers
- Discharge from any vehicle wheel wash areas is to be directed to on-site settlement tanks/ponds, debris and sediment captured by vehicle wheel washes are to be disposed off-site at a licensed facility.
- Foul drainage discharge from the construction compound will be tankered off site to a licensed facility until a connection to the public foul drainage network has been established.

- A summary of surface water controls that can be employed during the earthworks and construction phase are as follows:

Source controls:
Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sandbags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems.
Small working areas, covering stockpiles, weathering off stockpiles, cessation of works in certain areas or other similar/equivalent or appropriate measures.
In-Line controls:
Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sandbags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriates systems.
Treatment systems:
Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems.
Silt Fences:
Silt fences will be placed up-gradient of all drains where construction is proposed. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to watercourses of sand and gravel sized sediment, released from excavation of mineral sub-soils of glacial and glacio-fluvial origin, and entrained in surface water runoff. Inspection and maintenance of these structures during construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase.
Silt Bags:
Silt bags will be used where small to medium volumes of water need to be pumped from excavations or swales. As water is pumped through the bag, most of the

sediment is retained by the geotextile fabric allowing filtered water to pass through. Silt bags will be used with natural vegetation filters.

Shallow Excavation Dewatering

- Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations will be put in place if required;
- The interceptor drainage will be discharged to the site constructed drainage system or onto natural vegetated surfaces and not directly to surface waters;
- If required, pumping of excavation inflows will prevent build-up of water in the excavation;
- The pumped water volumes will be discharged via volume and sediment attenuation ponds adjacent to excavation areas, or via silt bags.
- There will be no direct discharge to the on-site main drains, and therefore no risk of hydraulic loading or contamination will occur; and,
- Daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work should immediately be stopped and a geotechnical assessment undertaken.

Hydrocarbons

- A temporary drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff from the site during construction
- All oils, fuels, paints and other chemicals will be stored in a secure bunded
construction hardstand area.
- Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any drainage systems.
- A response procedure will be put in place to deal with any accidental pollution events and spillage kits will be available and construction staff will be familiar with the emergency procedures and use of the equipment.
- Fuels stored on site will be minimised. Any storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction;
- Spill kits will be available to deal with accidental spillages.
- A named person will be given the task of overseeing the pollution prevention measures agreed for the site to ensure that they are operating safely and effectively as well as having responsibility for the implementation of Emergency Procedures for spill control measures

Wastewater Disposal

- A self-contained port-a-loo with an integrated waste holding tank will be used at the site compounds, maintained by the providing contractor, and removed from site on completion of the construction works; and,
- No wastewater will be discharged on-site during either the construction or operational phase.

Cement Based Products

- Concrete batching will take place off site
- Wash down and wash out of concrete trucks will take place off site
- Any excess concrete is not to be disposed of on -site
- Pulped concrete will be monitored to ensure that there is no accidental discharge.
- Mixer washings are not to be discharged into surface water drains or sewers

	In addition, standard best practice environmental control measures will also be incorporated in the Construction Environmental Management Plan (CEMP).
Residual Effect following Mitigation	With the implementation of the prescribed mitigation measures, no significant effects are predicted.
Potential for Cumulative Effect	The proposed development will not result in any significant effect in regard to water quality. It therefore cannot contribute to any cumulative effect in this regard.

6.6.2.4 Biosecurity

A number of stands of the third schedule invasive plant species, Himalayn knotweed (*Persicaria wallichii*), are present within the proposed development site. Due in part to spreading vegetatively and rapid growth, Himalayan Knotweed is highly invasive and can impact native species by shading out native and rare plant species. A site specific Invasive Spceies Managment Plan has been prepared by MKO 2022, for the treatment of Himamalan knotweed within the proposed development site (Appendix 4-5).

A full description of mitigations can be found within the ISMP. A brief summary of mitigations is presented below:

- Initially it is proposed for two rounds of spraying of the Himalayan knotweed during the growing season of 2023 (Once in the spring and once in the summer).
- It is proposed to excavate Himalayan knotweed and infested soils to formation level and export infested material off-site to a licensed waste facility under an NPWS license.
- Strict Biosecurity protocols will be adhered to including the establishment of a bio-secure zone/ buffer for works, brush down area for boots and clean down area for wheels of vehicles.
- Once excavations have ceased root barrier membrane will be installed to prevent any potential remnant rhizomes from damaging future infrastructure.
- The installation of root barrier membrane will be checked by a suitably qualified ecologist to ensure root barrier membrane has been properly laid and sealed.
- The ecologist will also supervise the excavation of the Himalayan Knotweed and its transferral to trucks for off-site disposal.

Post implementation of mitigation measures no significant effect on biodiversity is anticipated as a result of the presence of Himalayan knotweed.

6.6.3 Impacts During Operational Phase

6.6.3.1 Change of Habitat Use

There will be no additional habitat loss associated with the operational phase of the proposed development.

6.6.3.2 Disturbance to Fauna

The operational phase of the proposed development will be permanent. At present the proposed development site is situated in a highly urbanised environment and is subject to high levels of disturbance. The proposed development site is adjacent to busy shopping centres, residential developments, a school and is bisected by a busy public road. The areas where bats were recorded the most (along the roadway and scattered trees and parkland habitat bordering it) are currently illuminated by street lamps.

The proposed development provides for 227 residential units, commercial floorspace, community facility space, tenant use facilities, crèche facility and associated external pay area, car parking, and associated lighting and other services in the Knocknacarra area. As such the development will result in some increased activity in the area as well as increased lighting and noise.

In the absence of best practice design, the lighting associated with the development has the potential to disturb foraging and commuting activity for bats. In the absence of mitigation, this is considered to be a potential moderate effect.

No suitable habitat for QI species for the nearby Galway Bay Complex SAC, harbor seal or otter, was identified on site during the site visits. There are no above ground watercourses within the development site and the site is buffered from suitable habitat by an urban landscape. There is no potential for disturbance effects on these species during the operational stage of the development.

No SCI bird species associated with Inner Galway Bay SPA were recorded roosting or foraging within the site during field surveys carried out in 2021 and 2022. The development site is extensively buffered from the SPA by an urban landscape. The NIS submitted as part of the planning application fully assesses the potential for disturbance and displacement of SCI bird species associated with Inner Galway Bay SPA. No potential for disturbance effects on the SCI bird species for Inner Galway Bay SPA during the operational stage of the development was identified.

The potential impacts on bats during the operational stage of the development are described in the following below.

6.6.3.3 Bats

Table 6-6-17 Impacts on Bats During Operational Phase

Description of Effect	The operation of the Proposed Development will result in increased human activity, noise and lighting within the proposed site. Therefore, the potential for disturbance to bats requires consideration. However, the Proposed Development is in close proximity to existing residential and commercial developments to the south and east as well as busy local roads. It is likely that bat species in the area are accustomed to some levels of disturbance.
Characterisation of unmitigated effect	The operational phase of the proposed development has the potential to result in permanent slight effect on the local bat populations in the form of disturbance as a result of lighting.

Assessment of Significance prior to mitigation	This is assessed as a permanent slight effect on a receptor of Local Importance (Higher Value), and is not considered significant at any geographical scale.
Mitigation	The lighting plan for the operational phase of the Proposed Development, has been designed with consideration of the following: Bat Conservation Trust (Guidance Note 08/18 Bats and Artificial Lighting in the UK (BCT, 2018), *Bat Conservation Ireland (Bats and Lighting: Guidance Notes for Planners, Engineers, Architects and Developers, BCI, 2010)* to minimise light spillage, thus reducing any potential disturbance to bats. The design will incorporate the following: › The site entrance is designed in accordance with the requirements of IS 13201-2:2015 for a lighting class level of P3. The residential development is designed in accordance with lighting class level of P4. › The main proposed lighting scheme throughout the residential roads and walkways within the development consists of LED streetlights mounted on 4m to 8m poles. (Refer to drawing G023-PMEP-01-00-DR-E-01 for Site Lighting layout and G025-PMEP-01-00-DR-E-02 for the Site Lighting Iso-Lux Contour Lux Levels layout). The height of public lighting poles are in accordance with Galway City Council specification requirements. › All pole mounted streetlights within the Residential development have been designed with zero-degree tilt and will have zero light uplift to ensure limited unwanted light spill. › Each street light fitting will be controlled via an individual Photoelectric Control Unit (PECU). The operation of the lighting will be on a dusk-dawn profile, 35 lux on/18 lux off. In addition, all lighting will be dimmed by 30% post curfew, this will limit the amount of upward sky glow at night. For this development. post curfew is considered to be 11pm. › Utilisation of 3000K colour correlated temperature LED luminaires in the residential road and circulation routes. Site entrance will utilise 4000K LED luminaires.
Residual Effect following Mitigation	With the implementation of the prescribed mitigation measures, no significant effects are predicted.
Potential for Cumulative Effect	The proposed development will not result in any significant effect in regard to disturbance to bats. It therefore cannot contribute to any cumulative effect in this regard.

6.6.3.4 Impacts on Water Quality

As per Section 1.1 of the DBFL Infrastructure Design Report (Appendix 4-6), The site will be dissected into Site 1 and Site 2 by the proposed diversion of the existing access road to the Gateway Retail Park.

Plate 6-10 Site 1 and Site 2 designations as per DBFL Infrastructure Design Report (Source: Fig 1-1 Site Location (Site Boundary Indicative Only, DBFL Infrastructure Design Report).

6.6.3.4.1 *Production of Foul Sewage*

The proposed foul drainage layout for the development will be similar to the surface water drainage. It is proposed to divert the existing foul water sewers within the site to align the drainage layout with the proposed diversion of the existing access road to the Gateway Retail Park. Both Site 1 and Site 2 of the proposed development will be provided with a foul drainage network to collect foul flows from the apartment blocks and commercial units. The Site 2 foul drainage will be constructed in the ground floor car park and will connect with the existing 225mm diameter sewer to the north-west of the site. The Site 1 foul drainage will discharge to the existing 225mm sewer to the south-west of the site. Foul sewer calculations are provided in Appendix E of the DBFL Consulting Infrastructure Design Report. The proposed foul sewer design and layout is in accordance with the Irish Water Code of Practice for Wastewater Infrastructure and The Irish Water Infrastructure Standard Details.

The operational phase of the proposed project will result in the production of foul waters/sewage.

All foul water will be discharged to the public sewer and will be treated at the Galway Mutton Island Wastewater Treatment Plant before discharge to Galway Bay. The Mutton Island WWTP has a current capacity of 170,000 p.e.

Treatment process includes the following:

- Preliminary Treatment (Screening & Grit Removal)
- Primary Treatment (Upward Flow Settlement Tanks)
- Secondary Treatment (Activated Sludge)

A letter has been received from Irish Water confirming that a water connection can be facilitated for the proposed development. Given that waste will be appropriately treated to the required standards in the public sewer system; no potential for adverse impact on water quality exists.

Correspondence with Irish Water, Reference No CDS22004822 is provided in Appendix 6-2 of this EIAR.

6.6.3.4.2 *Surface Water Runoff*

Surface water management proposals are described in detail in Section 4.2 and 4.3 of the DBFL Infrastructure Design Report (Appendix 4-6). The management of surface water for the proposed development has been designed to comply with the policies and guidelines outlined in the Greater Dublin Strategic Drainage Study (GDSDS) and with the requirements of Galway City Council.

It is proposed to divert the existing surface water sewers within the site to align the drainage layout with the proposed diversion of the existing access road to the Gateway Retail Park. Both Site 1 and Site 2 of the proposed development will be provided with a surface water drainage network to collect surface water flows from the apartment blocks and commercial units. The Site 2 storm drainage will be constructed in the ground floor car park and attenuated outflows will connect with the existing 375mm diameter sewer to the north-west of the site. The Site 1 storm drainage will discharge attenuated outflows to the existing 450mm diameter sewer to the south-west of the site.

The surface water strategy incorporates attenuation of storm water to limit discharge from the site, although storage facilities and SUDs elements will be designed to allow infiltration or reduction of run-off volumes and rates where possible.

Run-off from roofs and any additional run-off from the landscaped courtyard podium slab is designed to be conveyed to the surface water drainage network at ground floor level. Two underground surface water attenuation tanks will be provided for the development to attenuate surface water flows for the 100-year critical storm + 10% allowance for climate change in accordance with GDSDS. A concrete attenuation tank will be located beneath the ground floor car park in Site 2, a concrete tank is proposed due to the presence of structural columns in the vicinity of the tank. A Stormtech attenuation system will be located beneath the courtyard in Site 1.

There will also be an extensive type of green roof with a 80mm minimum construction depth. All necessary safety requirements will be designed and constructed to ensure safe maintenance can occur. The green roof will provide interception and reduction of flow rates at the beginning of the treatment train, providing source control for a large area of the development. A minimum of 50% of the apartments roof area is proposed to be green roof. After surface water has passed through the green roof, this will pass through to the surface water drainage network to the attenuation system. It should be noted that the drainage network and attenuation in Site 1 have been sized to include the future district centre use site to the south.

The following SUDs elements are applicable to the proposed scheme and layout:

- Slot drains draining to bio retention areas on part of civic plaza within Site 1 to provide treatment, storage and reduce run-off rates.
- Green roofs at apartment blocks
- Green podium with landscaped areas and raised planters to reduce run-off rates and total impermeable area.
- Permeable paving parking bays and footpaths
- Rain gardens and swales
- Two attenuation storage systems for the attenuation of storm water up to the 100-year storm event +10% allowance for climate change
- A class 1 Bypass Separator's to be provided on the outfall of each network

Storm-water attenuation for the development has been sized in accordance with the requirements of the GDSDS. Run-off rates from the proposed development to the public system are in accordance with the GDSDS.

The operational phase of the proposed project will result in the production of surface water.

If not adequately treated, there is potential for indirect impacts on ground water and surface water quality. To prevent pollutants or sediments discharging into water courses from surface drainage the GDSDS requires "interception storage" to be incorporated into the development. This interception storage is designed to receive the run-off for rainfall depths of 5mm up to 10mm. A Class 1 Bypass Separator will be provided on each outfall from the surface water drainage network.

Water quality risks are reduced by use of interception storage, silt traps, and Class 1 Bypass Separators. Taking into account the above measures no significant impacts in terms of water quality from surface water drainage are expected due to the proposed development.

6.6.4 Impacts on Designated Sites

6.6.4.1 Impacts on European Sites

The EPA Guidance 2022 states:

> *"a biodiversity section of an EIAR, should not repeat the detailed assessment of potential effects on European sites contained in a Natura Impact Statement"* but should *"incorporate their key findings as available and appropriate"*.

This section provides a summary of the key assessment findings with regard to Special Areas of Conservation (SACs) and Special Protection Areas (SPAs).

No direct significant effect were identified for any SAC or SPA as a result of the proposed development. Potential indirect impacts on European Designated sites (SACs and SPAs) are assessed within a separate Screening for Appropriate Assessment (AA) and Natura Impact Statement.

The AASR identified a potential pathway for impact on Galway Bay Complex SAC and Inner Galway Bay SPA in the form of deterioration of surface water quality resulting from pollution associated with the construction and operational phases of the development. Although no open surface watercourses were identified on-site, the construction and operational phase of the proposed development may result in overland flow to the public storm sewer system which discharges at Rusheen Bay. Also taking a precautionary approach there exists potential for pollution to groundwaters via the percolation of polluting materials through the bedrock underlying the site. Pollution of surface water and groundwater may result in adverse impacts of the downstream aquatic or groundwater influenced QI/SCI habitats and species of Galway Bay Complex SAC and Inner Galway Bay SPA in the absence of mitigation.

The NIS objectively concluded that that the proposed project, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site.

The NIS report concludes that:

*"*Where the potential for any adverse effect on any European Site has been identified, the pathway by which any such effect may occur has been robustly blocked through the use of avoidance, appropriate design and mitigation measures as set out within this report and its appendices. The measures ensure that the construction, operation of the proposed development does not adversely affect the integrity of European sites.

Therefore, it can be objectively concluded that the proposed development, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site. *".*

Residual Effect

No significant effect.

The potential for impact on European sites has been fully assessed in the NIS that has been prepared in support of the current application.

6.6.4.2 Impacts on Nationally Designated Sites

Impacts on nationally designated sites including NHAs and pNHAs are considered in this section of the report. Where there are pathways for effect on Nationally designated sites a full ecological impact assessment is provided below.

The proposed development is located approx. 2km upstream of Galway Bay Complex pNHA. A potential pathway for impact on Galway Bay Complex pNHA in the form of deterioration of surface water quality resulting from pollution associated with the construction and operational phases of the development was identified. Although no open surface watercourses were identified on-site, the construction and operational phase of the proposed development may result in overland flow to the public storm sewer system which discharges at Rusheen Bay. Also taking a precautionary approach there exists potential for pollution to groundwaters via the percolation of polluting materials through the bedrock underlying the site. Pollution of surface water and groundwater may result in adverse impacts of the downstream pNHA in the absence of mitigation.

However, taking into account mitigations outlined in sections 6.6.2.3 and 6.6.3.4 of this report, this pathway has been robustly blocked and no potential for significant effect on Galway Complex pNHA exists post implementation of appropriate mitigation.

No significant effects on nationally designated sites are anticipated.

6.6.4.3 Impacts on Ramsar Sites

Impacts on Ramsar Sites are considered in this section of the report. Where there are pathways for effect on Ramsar sites a full ecological impact assessment is provided below.

A potential pathway for impact on the Inner Galway Bay Ramsar Site in the form of deterioration of surface water quality resulting from pollution associated with the construction and operational phases of the development was identified. Although no open surface watercourses were identified on-site, the construction and operational phase of the proposed development may result in overland flow to the public storm sewer system which discharges at Rusheen Bay. Also taking a precautionary approach there exists potential for pollution to groundwaters via the percolation of polluting materials through the bedrock underlying the site. Pollution of surface water and groundwater may result in adverse impacts of the downstream Ramsar site in the absence of mitigation.

However, taking into account mitigations outlined in sections 6.6.2.3 and 6.6.3.4 of this report, this pathway has been robustly blocked and no potential for significant effect on Inner Galway Bay exists post implementation of appropriate mitigation.

No significant effects on Ramsar sites are anticipated.

6.6.5 Impacts of the Decommissioning Phase

The proposal is considered to be permanent and thus there will be no decommissioning works associated with the proposal. Any demolition or maintenance works on the site would be likely to have similar impacts in terms of disturbance to those associated with the construction phase of the project as detailed in previous sections.

6.7 Cumulative Impacts

6.7.1 Plans

The following plans have been reviewed and are taken into consideration as part of this assessment:

- Draft Galway City Development Plan 2023-2029
- Galway City Development Plan 2017-2023
- Galway City Biodiversity Action Plan 2014-2024
- National Biodiversity action Plan 2017-2021
- Northern and Western Regional Assembly Regional Spatial and Economic Strategy 2020-2032

The review focused on policies and objectives that relate to Biodiveristy (Table 6-18). **No potential for cumulative impacts when considered in conjunction with the current proposed works were identified**.

Table 6-18 Review and Assessment of Compliance with Plans for Galway City

Plans	Key Policies/Issues/Objectives Directly Related to European Sites, Biodiversity and Sustainable Development in The Zone of Influence	Assessment of Conservation Works Compliance with Policy
Draft Galway City Development Plan 2023-2029	**Policy 5.1 Green Network and Biodiversity** › Support sustainable use and management of areas of ecological importance, parks and recreation amenity areas and facilities through an integrated green network policy approach in line with the Galway Recreation and Amenity Needs Study and where superseded by the Green Space Strategy, where it can be demonstrated that there will be no adverse impacts on the integrity of European sites. › Support the retention and enrichment of biodiversity throughout the city in recognition of the need to protect and restore biodiversity to increase the resilience of natural and human systems to climate change. › Support the implementation of the National Biodiversity Action Plan (2017- 2021) and the All-Ireland Pollinator Plan (2021-2025) and support the actions of the City Council's Heritage Plan 2016-2021 and Biodiversity Action Plan 2014-2024 relating to the promotion of ecological awareness, biodiversity and best practices. › Support climate action through implementation of nature based solutions that enhance biodiversity in the green network, including measures such as tree planting, SuDS, use of green infrastructure. Such measures will be informed by the Green Space Strategy. › Promote the integration of nature based solutions and green/blue infrastructure in all new developments as appropriate to contribute to the city's climate resilience and require large scale development proposals to include a green infrastructure and biodiversity plan. › Achieve a sustainable balance between meeting future recreational needs (both passive and active) and the preservation of the city's biodiversity and ecological and cultural heritage. › Co-operate with the NPWS, landowners and stakeholders in the preparation and implementation of management plans for designated European sites. › Enhance linkages and connectivity within the green network identified in Table 5.1 of the Draft Galway City Development Plan 2023-2029. › Ensure that all passive and active recreational proposals are considered in the context of potential impact on the environment, sites of ecological and biodiversity importance and general amenity.	The Draft Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to biodiversity. No potential for cumulative impacts when considered in conjunction with the current proposal were identified. There will be no impact on designated sites or biodiversity as a result of the development. Best practice preventative measures will be implemented to avoid effects on biodiversity as outlined in section 6.6 of this report.

	› Continue to implement measures to increase and restore biodiversity in open spaces and road verges through the no mow grass management initiative, and ornamental pollinator projects such as the perennial bulb planting scheme. **Policy 5.2. Protected Spaces: Sites of European, National and Local Ecological Importance** › Protect European Sites that form part of the Natura 2000 network (including Special Protection Areas and Special Areas of Conservation) in accordance with the requirements in the EU Habitats Directive (92/43/EEC), EU Birds Directive (2009/147/EC) and associated national legislation. › Ensure that all plans or projects within the Plan area will only be authorised and / or supported after the competent authority has ascertained based on scientific evidence, screening for appropriate assessment and /or a Habitats Directive Assessment that: (i) The plan or project will not give rise to an adverse direct, indirect or secondary effect on the integrity of any European Site (either individually or in combination with other plans or projects); or (ii) The plan or project will have an adverse effect on the integrity of any European Site (that does not host a priority natural habitat type/and or a priority species) but there are no alternative solutions and the plan or project must nevertheless be carried out for imperative reasons of overriding public interest, including those of a social or economic nature. In this case, it will be a requirement to follow procedures set out in legislation and agree and undertake all compensatory measures necessary to ensure the protection of the overall coherence of Natura 2000; or (iii) The plan or project will have an adverse effect on the integrity of any European Site (that hosts a natural habitat type and/or a priority species) but there are no alternative solutions and the plan or project must nevertheless be carried out for imperative reasons for overriding public interest, restricted to reasons of human health or public safety, to beneficial consequences of primary importance for the environment or, further to an opinion from the Commission, to other imperative reasons of overriding public interest. In this case, it will be a requirement to follow procedures set out in legislation and agree and undertake all compensatory measures necessary to ensure the protection of the overall coherence of Natura 2000. › Protect, conserve and promote the nationally designated sites of ecological importance, including existing and proposed Natural Heritage Areas (NHA and pNHAs) in the city › Protect, conserve and support the development of an ecological network throughout the city which will improve the ecological coherence of the Natura 2000 network in accordance with Article 10 of the Habitats Directive.	

	› Protect Local Biodiversity Areas, wildlife corridors and stepping stones based on the Galway Biodiversity Action Plan 2014-2024 and support the biodiversity of the city in the Council's role/responsibilities, works and operations, where appropriate. › Encourage, in liaison with the NPWS, the sustainable management of features which are important for the ecological coherence of the network of European sites and essential, by their linear or continuous nature or as stepping stones for the migration, dispersal and genetic exchange of wild species. › Support the actions of the Galway City Council Heritage Plan 2016-2021 and any update and Biodiversity Action Plan 2014-2024 relating to the promotion of ecological awareness and biodiversity, the protection of wildlife corridors and the prevention of wildlife habitat fragmentation. › Co-operate with the NPWS, landowners and stakeholders in the preparation and implementation of management plans for designated sites. › Protect and conserve rare and threatened habitats and their key habitats, (wherever they occur) listed on Annex I and Annex IV of the EU Habitats Directive (92/43EEC) and listed for protection under the Wildlife Acts 1976-2000. › Ensure that plans and projects with the potential to have a significant impact on European Sites (SAC or SPA) whether directly, indirectly or in combination with other plans or projects are subject to Appropriate Assessment, under Article 6 of the Habitats Directive (92/43EEC) and associated legislation and guidelines, to inform decision making. › Achieve a sustainable balance between meeting future recreational needs (both passive and active) and the protection of the city's ecological heritage. › Support the inclusion of natural features, such as trees, hedgerows, stone walls, ponds and the use of green design features and the incorporation of biodiversity measures in developments layouts. › Support and implement measures to control and manage alien/invasive species, where appropriate. › Protect the ecological integrity of statutory Nature Reserves, refuges for fauna and Annex 1 Habitats. **Policy 5.3 Blue Spaces: Coast, Canals and Waterways** › Protect and maintain the integrity of the coastal environment and waterways by avoiding significant impacts and meeting the requirements of statutory bodies, national and European legislation and standards.	

	› Conserve and protect natural conservation areas within the coastal area and along waterways and ensure that the range and quality of associated habitats and the range and populations of species are maintained. › Support the implementation of the recommendations of the River Basin Management Plan in relation to the protection of water quality of surface waters, groundwater and coastal waters. › Ensure development and uses adhere to the principles of sustainable development and restrict any development or use which negatively impact on water quality. › Have regard to European and national best practice when assessing development in or near coastal areas which is likely to have significant effects on the integrity, defined by the structure and function, of any designated European sites, protected coastal and marine fauna and flora. › Ensure the protection of the River Corrib as a Salmonid River, where appropriate. › Ensure any development within the aquatic environment shall be carried out in consultation with prescribed bodies and with adherence to their guidelines. › Protect and maintain, where feasible, undeveloped riparian zones and natural floodplains along the River Corrib and its tributaries. › Ensure that development does not have a significant adverse impact, incapable of satisfactory mitigation, on protected species. **Policy 5.4 Green Spaces: Urban Woodlands and Trees** › Make Tree Preservation Orders for individual trees or groups of trees within the city, where appropriate. › Integrate existing trees and hedgerows on development sites where appropriate and require tree planting, as part of landscaping schemes for new developments.	
Galway City Council Development Plan 2017-2023	**Policy 4.1 Green Network** › Support sustainable use and management of areas of ecological importance, parks and recreation amenity areas and facilities through an integrated green network policy approach in line with Galway City Recreation and Amenity Needs Study, where it can be demonstrated that there will be no adverse impacts on the integrity of European Sites. › Support the actions of the City Council's Heritage Plan 2016-2021 and Biodiversity Action Plan 2014-2024 relating to the promotion of ecological awareness and biodiversity.	The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to biodiversity. No potential for cumulative impacts when considered in conjunction with the current proposal were identified. There will be no impact on designated sites or biodiversity as a result of the development. Best

	› Ensure that all passive and active recreational proposals are considered in the context of potential impact on the environment, sites of ecological and biodiversity importance and general amenity **Policy 4.2 Protected Spaces: Sites of European, National and Local Ecological Importance** › Protect European sites that form part of the Natura 2000 network (including Special Protection Areas and Special Areas of Conservation) in accordance with the requirements in the EU Habitats Directive (92/43/EEC), EU Birds Directive (2009/147/EC) and associated national legislation. › Protect, conserve and promote the nationally designated sites of ecological importance, including existing and proposed Natural Heritage Areas (NHAs and pNHAs) in the city. › Protect, conserve and support the development of an ecological network throughout the city which will improve the ecological coherence of the Natura 2000 network in accordance with Article 10 of the Habitats Directive. › Protect Local Biodiversity Areas, wildlife corridors and stepping stones identified in the Galway City Habitat Inventory 2005 and Galway Biodiversity Action Plan 2014-2024 in supporting the biodiversity of the city and in the Council's role/responsibilities, works and operations, where appropriate. › Protect and conserve rare and threatened flora and fauna and their key habitats, (wherever they occur) listed on Annex I and Annex IV of the EU Habitats Directive (92/43EEC) and listed for protection under the Wildlife Acts 1976-2000 **Policy 4.3 Blue Spaces: Coast, Canals and Waterways** › Conserve and protect natural conservation areas within the coastal area and along waterways and ensure that the range and quality of associated habitats and the range and populations of species are maintained. › Ensure the protection of the River Corrib as a Salmonid River, where appropriate. › Protect and maintain, where feasible, undeveloped riparian zones and natural floodplains along the River Corrib and its tributaries. Ensure that development does not have a significant adverse impact, incapable of satisfactory mitigation, on protected species.	practice preventative measures will be implemented to avoid effects on biodiversity as outlined in section 6.6 of this report.
Draft Galway City Biodiversity Action Plan 2014-2024	**Aims and Objectives of the Galway City Biodiversity Action Plan** › **To raise awareness and appreciation of biodiversity.**	The Action plan was comprehensively reviewed, with particular reference to Aims and Objectives that relate to biodiversity. No potential for

	Seeks to raise awareness and appreciation of the many benefits of biodiversity among all sectors of society by providing information, education and training opportunities. A change in attitudes is key to protecting the great variety of life contained in the natural world around us and to protect our environment, › **To maintain and enhance biodiversity within the city.** Recognises the responsibility of the local authority and other state agencies to protect habitats and species of national and international conservation importance, and the potential to enhance biodiversity within the city. Aims to increase public participation in biodiversity initiatives and promotes a partnership approach to conserving biodiversity. › **To increase our knowledge and understanding of biodiversity.** Recognises the need for a solid knowledge-base in order to protect biodiversity effectively and the importance of making this information available and accessible to the public and decision makers.	cumulative impacts when considered in conjunction with the current proposal were identified. There will be no impact on designated sites or biodiversity as a result of the development. Best practice preventative measures will be implemented to avoid effects on biodiversity as outlined in section 6.6 of this report. In addition creation of swift nesting habitat on site using swift box's will create habitat for swifts which previously wasn't present within the proposed development site.
National Biodiversity Action Plan 2017-2021	**Target 6.2** - Sufficiency, coherence, connectivity, and resilience of the protected areas network substantially enhanced by 2020.	The Development plan was comprehensively reviewed, with particular reference to Policies and Objectives that relate to biodiversity. No potential for cumulative impacts when considered in conjunction with the current proposal were identified. There will be no impact on designated sites or biodiversity as a result of the development. There will be no hinderance to connectivity between the protected areas network. Best practice preventative measures will be implemented to avoid effects on biodiversity and the protected areas network as outlined in section 6.6 of this report.
Northern and Western Regional Assembly Regional Spatial and Economic Strategy 2020-2032	**Regional Policy Objective 5.5** – Ensure efficient and sustainable use of all our natural resources, including inland waterways, peatlands, and forests in a manner which ensures a healthy society a clean environment and there is no net contribution to biodiversity loss arising from development supported in this strategy. Conserve and protect designated areas and natural heritage area. Conserve and protect European sites and their integrity.	The strategy was reviewed, with particular reference to Policies and Objectives that relate to biodiversity. No potential for cumulative impacts when considered in conjunction with the current proposal were identified.

	Regional Policy Objective 5.7 - Ensure that all plans, projects and activities requiring consent arising from the RSES are subject to the relevant environmental assessment requirements including SEA, EIA and AA as appropriate	There will be no impact on designated sites or biodiversity as a result of the development. Best practice preventative measures will be implemented to avoid effects on biodiversity as outlined in section 6.6 of this report..

6.7.2 Other Plans & Projects

As described in Chapter 2 of the EIAR, relevant projects have been assessed in-combination with the Permitted Development and include planning applications in the vicinity of the site, within the zone of influence of all habitats and species considered in this report. These have not been repeated here to reduce the duplication of information within this EIAR. However, they have been fully considered in the assessment.

In the review of the projects that was undertaken, no connection between the site, that could potentially result in additional or cumulative impacts was identified. Neither was any potential for different (new) impacts resulting from the combination of the various projects and plans in association with the proposal. Taking into consideration the reported residual effects from other plans and projects in the area and the predicted effects with the current proposal, no significant residual cumulative effects have been identified with regard to biodiversity.

6.8 Conclusion

There will be no significant impacts on biodiversity given the nature, scale and design of the proposal. No significant residual effects on surface water quality, groundwater quality or the local hydrological/hydrogeological regime were identified.

The potential residual impacts on ecological receptors will not be significant and no potential for the proposed development to contribute to any cumulative impacts on biodiversity when considered in-combination with other plans and projects was identified.

Provided that the proposed development is constructed and operated in accordance with the design described within this application, significant effects on biodiversity are not anticipated at any geographic scale.

Potential negative effects on water quality and downstream ecological receptors and designated sites have been mitigated through a constraint led design process. With the implementation of best practice measures there will be no impact on water quality. This pathway has been robustly blocked and no potential for residual effects remains.

Taking the above information into consideration and having regard to the precautionary principle, it is considered that the proposed development will not result in the loss of habitats or species of high ecological significance and will not have any significant effects on the ecology of the wider area. The proposed landscaping plan will account for loss of habitats within the proposed development site. The Invasive species management plan will address the invasive infestation within the proposed development site.

Provided that the development is constructed in accordance with the design and best practice that is described within this application, significant effects on biodiversity are not anticipated at any geographic scale.

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7. GEOLOGY AND SOILS

7.1 Introduction

7.1.1 Background & Objectives

McCarthy Keville O'Sullivan (MKO), on behalf of Glenveagh Living, has carried out an assessment of the likely significant effects of a proposed mixed-use development at Knocknacarra, west of Galway, on the land, soils and geology of the receiving environment.

This chapter provides a baseline assessment of the environmental setting of the Proposed Development in terms of land, soils, and geology, and discusses the potential impacts that the construction and operation of the Proposed Development will have. Where required, appropriate mitigation measures to limit any identified significant impacts to soils and geology are recommended and an assessment of residual impacts and significance of effects provided.

7.1.2 Statement of Authority

This section of the EIAR has been prepared by Tom Madden and reviewed by Thomas Blackwell and Michael Watson, all of MKO. Tom is an Environmental Scientist and has over three years working in various Environmental Consultancies throughout Ireland. He holds a BSc (Hons) in Environmental Science from the University of Limerick. Thomas has over 15 years of progressive experience in environmental consulting in Ireland and the USA. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin. Michael has over nineteen years' experience in the environmental sector and had worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael completed an MA in Environmental Management at NUI, Maynooth in 1999. Michael is a professional geologist (PGeo) and full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv).

7.1.3 Relevant Legislation

The EIAR is prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU. The requirements of the following legislation are complied with:

- Planning and Development Acts 2000 to 2019 and the Planning and Development Regulations 2001 to 2019;
- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment, including Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive);
- Planning and Development Act, 2000, as amended;
- Planning and Development Regulations 2001 as amended including as amended by the European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which transposes the provisions of Directive 2014/52/EU into Irish law; and,
- The Heritage Act 1995, as amended.

7.1.4 Relevant Guidance

The land, soils and geology chapter of this EIAR was prepared having regard, where relevant, to guidance contained in the following documents:

- Environmental Protection Agency (2022): Guidelines on the Information to be contained in Environmental Impact Assessment Reports;
- Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements; and,
- National Roads Authority (2005): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (DoHPLG, 2018); and,
- Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU), (European Union, 2017).

7.2 Assessment Methodology

7.2.1 Desk Study

A desk study of the proposed development site and the surrounding study area was completed along with a walkover survey and site investigations. The desk study involved collecting all the relevant geological data for the Proposed Development and study area. This included consultation with the following:

- Environmental Protection Agency database (www.epa.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Bedrock Geology 1:100,000 Scale Map Series, Sheet 14 (Geology of Galway Bay). Geological Survey of Ireland (GSI, 2003);
- Geological Survey of Ireland – 1:25,000 Field Mapping Sheets; and,
- General Soil Map of Ireland 2nd edition (www.epa.ie).

7.2.2 Impact Assessment Methodology

Using information from the desk study and data from the site investigation, an estimation of the importance of the soil and geological environment within the study area is assessed using the criteria set out in Table 7.1 (NRA, 2008).

Table 7.1. Estimation of Importance of Soil and Geology Criteria (NRA, 2008).

Importance	Criteria	Typical Example
Very High	Attribute has a high quality, significance or value on a regional or national scale. Degree or extent of soil contamination is significant on a national or regional scale. Volume of peat and/or soft organic soil underlying route is significant on a national or regional scale.	Geological feature rare on a regional or national scale (NHA). Large existing quarry or pit. Proven economically extractable mineral resource
High	Attribute has a high quality, significance or value on a local scale. Degree or extent of soil contamination is significant on a local scale. Volume of peat and/or soft organic soil underlying site is significant on a local scale.	Contaminated soil on site with previous heavy industrial usage. Large recent landfill site for mixed wastes. Geological feature of high value on a local scale (County Geological Site). Well drained and/or high fertility soils. Moderately sized existing quarry or pit. Marginally economic extractable mineral resource.
Medium	Attribute has a medium quality, significance or value on a local scale. Degree or extent of soil contamination is moderate on a local scale. Volume of peat and/or soft organic soil underlying site is moderate on a local scale.	Contaminated soil on site with previous light industrial usage. Small recent landfill site for mixed Wastes. Moderately drained and/or moderate fertility soils. Small existing quarry or pit. Sub-economic extractable mineral Resource.
Low	Attribute has a low quality, significance or value on a local scale. Degree or extent of soil contamination is minor on a local scale. Volume of peat and/or soft organic soil underlying site is small on a local scale.	Large historical and/or recent site for construction and demolition wastes. Small historical and/or recent landfill site for construction and demolition wastes. Poorly drained and/or low fertility soils. Uneconomically extractable mineral resource.

The statutory criteria (EPA, 2022) for the assessment of impacts require that likely impacts are described with respect to their extent, magnitude, type (*i.e.* negative, positive or neutral) probability, duration, frequency, reversibility, and transfrontier nature (if applicable). The descriptors used in this environmental impact assessment are those set out in EPA (2022) Glossary of Impacts as shown in Chapter 1 of this EIAR. In addition, the two impact characteristics proximity and probability are described for each impact and these are defined in Table 7.2.

In order to provide an understanding of this descriptive system in terms of the geological/hydrological environment, elements of this system of description of impacts are related to examples of potential impacts on the geology and morphology of the existing environment, as listed in Table 7.3.

Table 7.2. Additional Impact Characteristics.

Impact Characteristic	Degree/ Nature	Description
Proximity	Direct	An impact which occurs within the area of the proposed project, as a direct result of the proposed project.
	Indirect	An impact which is caused by the interaction of effects, or by off-site developments.
Probability	Low	A low likelihood of occurrence of the impact.
	Medium	A medium likelihood of occurrence of the impact.
	High	A high likelihood of occurrence of the impact.

Table 7.3. Impact descriptors related to the receiving environment.

Impact Characteristics		Potential Geological/Hydrological Impacts
Quality	Significance	
Negative only	Profound	Widespread permanent impact on: - The extent or morphology of a cSAC. - Regionally important aquifers. - Extents of floodplains. Mitigation measures are unlikely to remove such impacts.
Positive or Negative	Very Significant/ Significant	Local or widespread time dependent impacts on: -The extent or morphology of a cSAC / ecologically important area. -A regionally important hydrogeological feature (or widespread effects to minor hydrogeological features). -Extent of floodplains. Widespread permanent impacts on the extent or morphology of a NHA/ecologically important area, Mitigation measures (to design) will reduce but not completely remove the impact – residual impacts will occur.
Positive or Negative	Moderate	Local time dependent impacts on: - The extent or morphology of a cSAC / NHA / ecologically important area. - A minor hydrogeological feature. - Extent of floodplains. Mitigation measures can mitigate the impact OR residual impacts occur, but these are consistent with existing or emerging trends
Positive, Negative or Neutral	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities.
Positive, Negative or Neutral	Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.

Neutral	Imperceptible	No impacts, or impacts which are beneath levels of perception, within normal bounds of variation, or within the bounds of measurement or forecasting error.

7.3 Receiving Environment

7.3.1 Site Description & Topography

The Proposed Development site approximately 2.5 hectares (excluding the existing underground void) in extent and is located in the townlands of Rahoon in Knocknacarra, Co. Galway.

The site is bisected by a public access road into the existing Galway Retail Park. The general area is urban in character and is surrounded by a number of residential estates and commercial and industrial buildings.

The proposes site consists of scrub land in the northern portion of the site and an area of hardcore in the southern portion of the site. There is a small area of landscaped amenity grassland adjacent to the access road that bisects the site. The existing underground void to the northwest of the main development site was constructed during Phase 2 of the Gateway retail Park development. This area consists of a concrete lined underground void. It is proposed to fit this void out for use as an underground car park.

The elevation of the site ranges between approximately 27m and 32m OD (metres above Ordnance datum). The overall local topography generally slopes from north to south with an undulating topography. The dominant land use on the bordering land is commercial development to the west, a primary school to the north and residential developments to the south and east.

7.3.2 Soils and Subsoils

According to GSI mapping (www.gsi.ie), the site is dominated by shallow, well drained mineral soils (AminSW) in the northern portion of the site and shallow, reasonably drained mineral soil derived from mainly acidic parent materials (AminSRPT) in the southern portion of the site. There is an area in the middle of the site that is classified as deep, poorly drained mineral soils, derived mainly from non-calcareous parent material (AminPD)

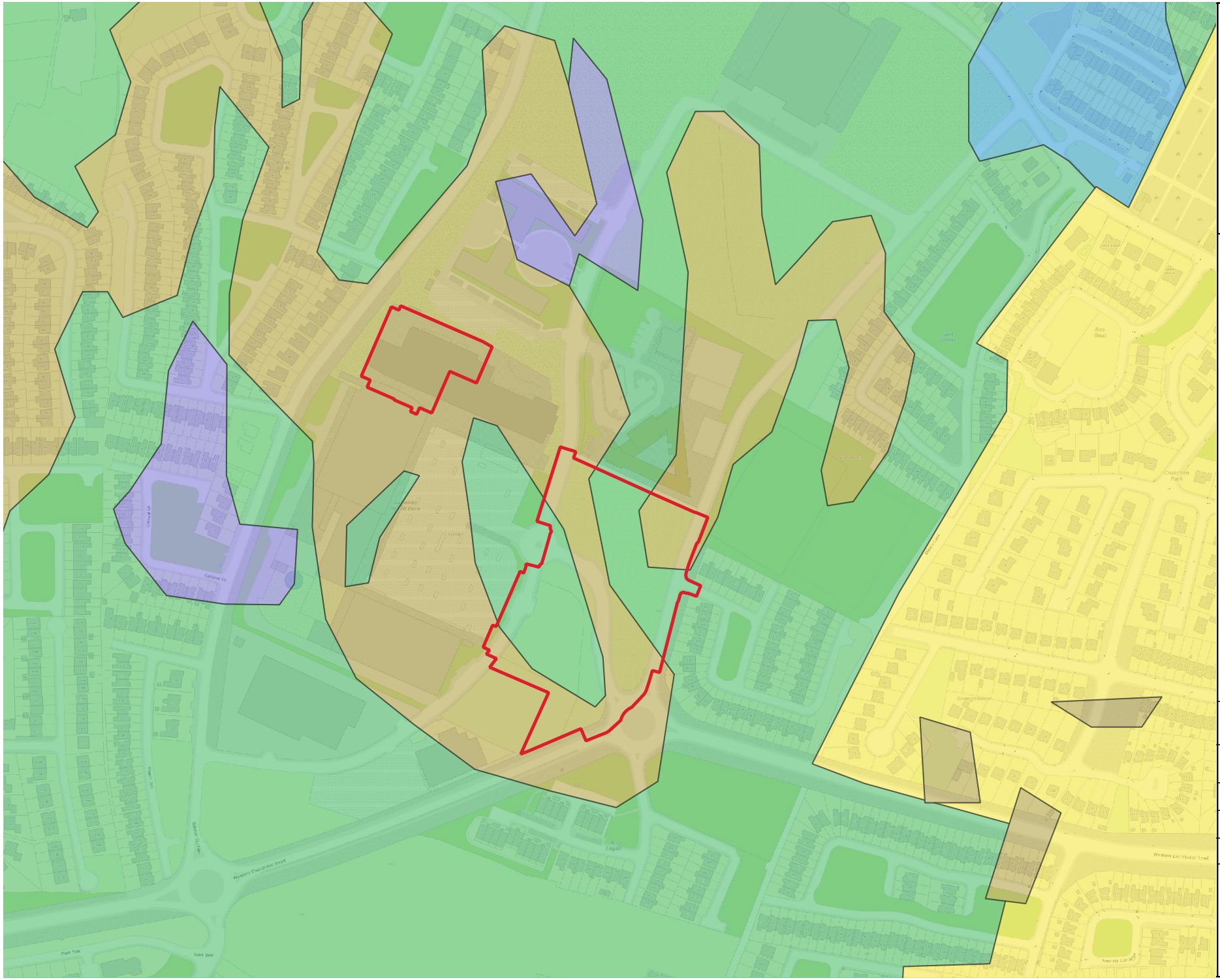
The mapped subsoil type (www.gsi.ie) for the proposed site indicate that the majority of the site either has bedrock at the surface (Rck) or is underlain by granite till (TGr). The local subsoils map is shown as Figure 7.1.

The ground conditions encountered during the site investigation are summarised below. The sequence of strata encountered were variable across the site and are generally comprised of Made Ground, Peat, Soft Cohesive Deposits, Granular Deposits (Possible Weathered Bedrock), and Presumed Bedrock.

7.3.3 Bedrock Geology

Based on the GSI bedrock map of the region, the Proposed Development site is underlain by the Errisbeg Townland Granite which is part of the Galway Granite formation. This comprises Devonian Megacrystic pink/grey monzogranite (GaEb). These granites are classified by the GSI as a Poor Aquifer -Bedrock which is Generally Unproductive except for Local Zones (Pl).

A bedrock geology map of the area is included as Figure 7.2.



Drawing Title

Local Subsoils

Project Title	Knocknacarra District Centre LRD EIAR
Drawn By: TM	Checked By: TB
Project No.: 210206	Drawing No.: Fig 7-1
Scale: 1:4000	Date: 16.12.2022

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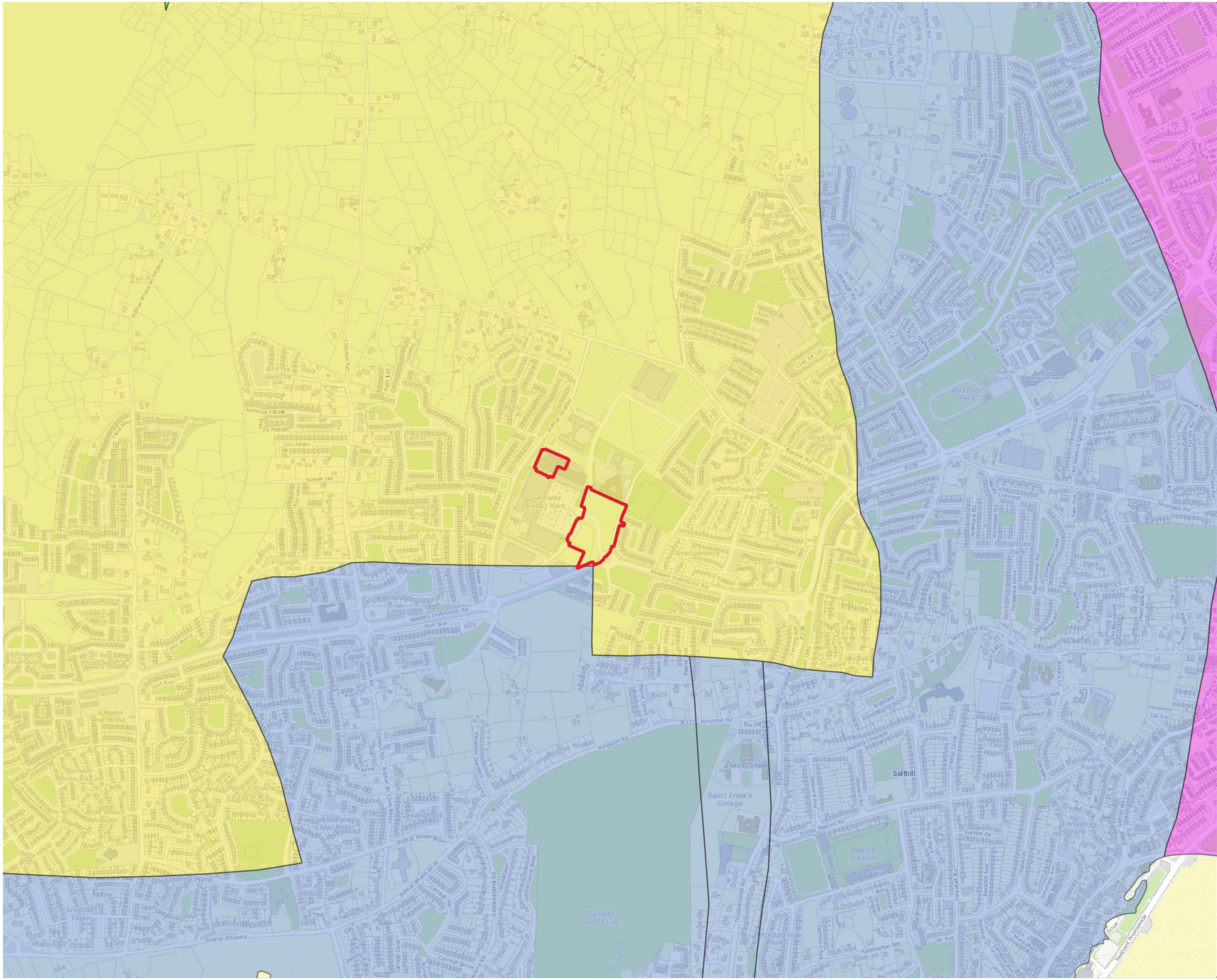

Map Legend

- Site Boundary

Bedrock Geology

- Errisbeg Townland Granite
- Metagabbro & orthogneiss suite
- Murvey Granite

Drawing Title: Bedrock Geology	
Project Title: Knocknacarra District Centre LRD EIAR	
Drawn By: TM	Checked By: TB
Project No.: 210206	Drawing No.: Fig 7-2
Scale: 1:15000	Date: 16.12.2022

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7.3.4 Geological Heritage and Designated Sites

There are no recorded Geological Heritage sites within the proposed development area. The closest geological heritage site is the Barna Drumlin Swarm, which is located approximately 2km southwest of the site.

To the southwest of the proposed site is the Galway Bay Complex SAC (Code: 000268), and drainage from the site enters the Inner Galway Bay SPA (Code: 004031) approximately 1.5 kilometres downstream of the proposed site at Rusheen Bay.

7.3.5 Soil Contamination

There are no known areas of soil contamination on the site. During the site walkovers, no areas of particular contamination concern were identified. Any material on the site appears to be excavated rock type material.

According to the EPA online mapping (https://gis.epa.ie/EPAMaps), there are no licenced waste facilities on or within the immediate environs of the proposed development site.

There are no historic mines at or in the immediate vicinity of the site that could potentially have contaminated tailings.

7.3.6 Economic Geology

The GSI Online Minerals Database accessed via the Public Data Viewer shows no quarries within the proposed development area.

The GSI online Aggregate Potential Mapping Database shows that the proposed development site is not located within an area mapped as being of Very High or High granular aggregate potential (i.e. potential for gravel reserves).

7.4 Characteristics of the Proposed Development

The proposed development is described in full Chapter 4 and will generally comprise the following:

The proposed development will be a mixed-use development, providing both residential and commercial units to Galway City and County. It is proposed to construct a total of 227 no. residential units in the form of apartments. These will be comprised of apartment blocks ranging between 4-6 storeys high and will include the following: Block A1: 14 no. 1 bed apartments & 24 no. 2 bed apartments; Block A2: 25 no. 1 bed apartments & 15 no. 2 bed apartments; Block B1: 3 no. 1 bed apartments, 18 no. 2 bed apartments & 3 no. 3 bed apartments; Block B2: 13 no. 1 bed apartments & 21 no. 2 bed apartments; Block B3: 5 no. 1 bed apartments, 22 no. 2 bed apartments & 1 no. 3 bed apartment; Block B4: 11 no. 1 bed apartments & 26 no. 2 bed apartments; Block B5: 13 no. 1 bed apartments & 13 no. 2 bed apartments.

The ground floors of the above apartment blocks will be utilised for commercial units which will encompass circa 1,010 sq. m. Parking for bicycles and cars will be provided for by the development of 49 no. surface car parking spaces (including EV charging spaces), 181 underground car parking spaces and 550 bicycle parking spaces (114 no. short stay and 436 no. long stay spaces). A community facility (circa 118 sq. m), tenant amenity facility (circa 99 sq. m) and childcare facility (circa 561 sq. m) will also be constructed.

Other provisions as part of the proposed development will include shared communal and private open spaces, bin storage, public lighting, site landscaping, services, signage, substation and all other associated site works.

The proposed development will typically require minor alteration of ground levels to ensure it is at an adequate level for the proposed surface water drainage and foul water drainage, and to mitigate flood risk. Detailed drawings in respect ground levels can be seen at Appendix 4-1 to this EIAR. Excavation of soil and subsoil will be required for the proposed development in preparation for the construction of building foundations and in the preparation of a suitable sub-formation for road construction, trenching for foul and drainage water infrastructure and other services. Significant excavations are not required as there are no subsurface basement type structures proposed to be constructed.

Surface Water Drainage

Surface water management proposals are described in detail in Appendix 4-6 Infrastructure Design Report and are summarised below.

The management of surface water for the proposed development has been designed to comply with the policies and guidelines outlined in the Greater Dublin Strategic Drainage Study (GDSDS) and with the requirements of Galway City Council.

It is proposed to divert the existing surface water sewers within the site to align the drainage layout with the proposed diversion of the existing access road to the Gateway Retail Park. Both Site 1 and Site 2 of the proposed development will be provided with a surface water drainage network to collect surface water flows from the apartment blocks and commercial units. The Site 2 storm drainage will be constructed in the ground floor car park and attenuated outflows will connect with the existing 375mm diameter sewer to the north-west of the site. The Site 1 storm drainage will discharge attenuated outflows to the existing 450mm diameter sewer to the south-west of the site.

The surface water strategy incorporates attenuation of storm water to limit discharge from the site, although storage facilities and SUDs elements will be designed to allow infiltration or reduction of run-off volumes and rates where possible.

Run-off from roofs and any additional run-off from the landscaped courtyard podium slab is designed to be conveyed to the surface water drainage network at ground floor level. Two underground surface water attenuation tanks will be provided for the development to attenuate surface water flows for the 100 year critical storm + 10% allowance for climate change in accordance with GDSDS. A concrete attenuation tank will be located beneath the ground floor car park in Site 2, a concrete tank is proposed due to the presence of structural columns in the vicinity of the tank. A Stormtech attenuation system will be located beneath the court yard in Site 1.

There will also be an extensive type of green roof with a 80mm minimum construction depth. All necessary safety requirements will be designed and constructed to ensure safe maintenance can occur. The green roof will provide interception and reduction of flow rates at the beginning of the treatment train, providing source control for a large area of the development. A minimum of 50% of the apartments roof area is proposed to be green roof. After surface water has passed through the green roof, this will pass through to the surface water drainage network to the attenuation system. It should be noted that the drainage network and attenuation in Site 1 have been sized to include the future district centre use site to the south.

Water Supply

As part of the proposed development, it is proposed to divert the existing watermains within the site, and utilise the existing 150mm diameter watermain to the north-west of the site to supply the development.

The proposed watermain layout will connect to the existing 150mm watermain located in the 'Gort Ná Bró' road to the east of the site. The residential blocks will be supplied from two centralised water plantrooms, while the commercial units will have individual connections.

The proposed watermain design and layout is in accordance with Irish Water Code of Practice for Water Infrastructure and the Irish Infrastructure Standard Details.

Wastewater Infrastructure

The proposed foul drainage layout for the development will be similar to the surface water drainage. It is proposed to divert the existing foul water sewers within the site to align the drainage layout with the proposed diversion of the existing access road to the Gateway Retail Park. Both Site 1 and Site 2 of the proposed development will be provided with a foul drainage network to collect foul flows from the apartment blocks and commercial units. The Site 2 foul drainage will be constructed in the ground floor car park and will connect with the existing 225mm diameter sewer to the north-west of the site. The Site 1 foul drainage will discharge to the existing 225mm sewer to the south-west of the site. Foul sewer calculations are provided in Appendix E of the DBFL Consulting Infrastructure Design Report (EIAR Appendix 4-7).

Car parking incidental drainage at ground floor level beneath the podium slab level, will gravitate to the lowest point before passing through an interceptor, where this will discharge to the foul network.

The proposed foul sewer design and layout is in accordance with the Irish Water Code of Practice for Wastewater Infrastructure and The Irish Water Infrastructure Standard Details.

7.5 Potential Impacts of the Proposed Development

7.5.1 Do Nothing Scenario

If the proposed development were not carried out, the site would remain in its current form of hardcore surface and overgrown scrub. The potential direct impacts to land, soils, and geology are considered to be long term, imperceptible, neutral in the Do-Nothing scenario.

The lands are zoned for development and so continuing the existing land uses would be contrary to local policy and, would have a slight negative effect in the context of losing the benefits associated with the proposed land uses.

7.5.2 Potential impacts and Mitigation Measures – Construction Stage

The likely impacts of the proposed mixed-use development and mitigation measures that will be put in place to eliminate or reduce them are shown below. These relate to the construction stage. It should be noted that the main potential impacts on the soils and geology environment will occur during the construction stage.

7.5.2.1 Subsoil Excavation and Bedrock Excavation

Excavation of existing fill, subsoil and bedrock will be required for site levelling, for the installation of foundations for the access roads, carpark and buildings, and service trenching. This will result in a permanent relocation of soil and subsoil at most excavation locations. The excavated materials are expected to include existing fill material, topsoil/subsoil, and some granite bedrock. The bedrock at the site can be classified as of "Low" importance, and the soil and subsoil deposits at the site could be classified as of "Low" importance as neither are unique and are abundant in the wider landscape.

Mechanism: Extraction/excavation.

Receptor: Land, topsoil, subsoil and bedrock.

Potential Impact: Negative, slight, direct, likely, permanent impact on soil, subsoil and bedrock at a local level.

7.5.2.1.1 *Mitigation Measures/Impact Assessment*

- Excavated (existing) overburden material will be reused on site, where possible;
- A minimal volume of topsoil and subsoil will be removed to allow for infrastructural work to take place due to optimisation of the layout by mitigation by design (no basement structures are proposed); and,
- Construction of service trenching, pumping station and surface water attenuation features will generate excess material. All excess material will be sent to an authorised soil and stone or waste recovery facility.

7.5.2.1.2 *Residual Impact*

Due to the shallow nature of the excavations, the design measure to reuse excavated materials onsite and the 'low' value of the soil and rock resource the magnitude of the effect is considered to be a negative, direct, slight, likely, permanent impact on topsoil, subsoils and bedrock.

7.5.2.1.3 *Significance of Effects*

No significant effects on land, topsoil, subsoils or bedrock are anticipated.

7.5.2.2 Contamination of Soil by Leakages and Spillages and Alteration of Soil Geochemistry

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a significant pollution risk. The accumulation of spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. Large spills or leaks have the potential to result in significant effects on the geological and water environment.

Pathway: Topsoil, subsoil and bedrock pore space.

Receptor: Topsoil, subsoil and bedrock.

Potential Impact: Negative, direct, slight, short term, medium probabilty impact on topsoil, subsoils and bedrock.

7.5.2.2.1 *Proposed Mitigation Measures*

- A temporary drainage system shall be installed prior to the commencement of the construction works
- All works shall be undertaken in accordance with the CIRIA document, 'Control of Water Pollution from Construction Sites, guidance for consultants and contractors'
- All plant and machinery will be serviced before being mobilised to site;
- No plant maintenance will be completed on site, any broken down plant will be removed from site to be fixed;
-
- All oils, fuels, paints and other chemicals will be stored in a secure bunded construction hardstand area. Refueling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any drainage systems. A response procedure will be put in place to deal with any accidental pollution events and spillage kits will be available and construction staff will be familiar with the emergency procedures and use of the equipment.
- Concrete batching will take place off site, wash down and wash out of concrete trucks will take place off site and any excess concrete is not to be disposed of on site. Pumped concrete will be monitored to ensure there is no accidental discharge. Mixer washings are not to be discharged into surface water drains/sewers
- Discharge from any vehicle wheel wash areas is to be directed to on-site settlement tanks/ponds, debris and sediment captured by vehicle wheel washes are to be disposed off-site at a licensed facility.
- Foul drainage discharge from the construction compound will be tankered off site to a licensed facility until a connection to the public foul drainage network has been established.

Highest standards of site management will be maintained, and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the site and surrounding environment during construction. A named person will be given the task of overseeing the pollution prevention measures agreed for the site to ensure that they are operating safely and effectively as well as having responsibility for the implementation of Emergency Procedures for spill control measures..

7.5.2.2.2 *Residual Impact*

The use and storage of hydrocarbons and small volumes of chemicals is a standard risk associated with all construction sites. The measures identified above to mitigate the risk of spills and leaks, will be applied during the construction phase. The residual effect is assessed as - Negative, imperceptible, direct, short-term, low probability effect on peat and subsoils and bedrock.

7.5.2.2.3 *Significance of Effects*

No significant effects on land, soils, subsoils or bedrock are anticipated.

7.5.2.3 Geological impact on local Designated Sites

Mechanism: Excavation / handling / storage of soil/subsoils.

Receptor: Land, topsoil, subsoil and associated designated sites.

Potential Impact: None, no direct excavation or development of any local designated sites are proposed. No indirect impacts on Designated Sites are anticipated.

Residual Impact

None.

7.5.3 Potential Impacts and Mitigation Measures – Operational Stage

No impacts on soils and geology are anticipated during the operational phase. The operational stage of the development consists of the typical activities in a residential area and will not involve further disturbance to the topsoil, subsoils and geology of the area.

No significant cumulative impacts on the land, soils and geology environment are envisaged during the operational stage.

7.5.3.1 Assessment of Health Effects

Potential health effects arise mainly through the potential for soil and ground contamination. Residential and retail developments are not a recognized source of significant pollution and so the potential for effects during the operational phase are negligible. Hydrocarbons will be used onsite during construction. However, the volumes will be small in the context of the scale of the project and will be handled and stored in accordance with best practice mitigation measures. The potential residual impacts associated with soil or ground contamination and subsequent health effects are imperceptible.

7.5.4 Potential Cumulative Effects

7.5.4.1 Cumulative Effects Resulting from Interactions between Various Elements of the Proposed Development

The interaction of the various elements of the proposed development was considered and assessed in this EIAR with regards land, soils and geology. The potential for each individual element of the proposed development on its own to result in significant effects on land, soils and geology was considered in the impact assessment. The entire project including the interactions between all its elements was also considered and assessed for its potential to result in significant effects on geological receptors in the impact assessment presented. The complex interactions between the requirement for site grading and the requirement to protect downstream waters, human health, and other receptors were taken into account for the entire project and any impacts avoided through a series of mitigation measures that were fully described. The management and handling of potentially harmful materials across the entire project was assessed with mitigation proposed and described fully.

All interactions between the various elements of the project were considered and assessed both individually and cumulatively within this chapter. Where necessary, mitigation was employed to ensure that no cumulative effects will arise as a result of the interaction of the various elements of the development with one another.

7.5.4.2 Cumulative In-Combination Effects

The potential cumulative effects of the proposed development in combination with the other projects described in Section 2.6.2 of this report have been considered in terms of impacts on land, soils and geology. Where appropriate the application documentation, EIAR and NIS have been reviewed to inform the assessment. There are no active quarries, major earthworks, or other associated activities which could impact upon the soils and geological environment adjacent the proposed development site.

The scale of the proposed earthworks at the Proposed Development site is negligible in the context of the other projects within and around the City and so the potential cumulative effects are considered imperceptible.

With the implementation of mitigation measures for the proposed development as outlined above, no significant cumulative impacts on land, soils and geology environment are anticipated during the construction or operation phases of the proposed development in combination with other developments. Potential cumulative impact will be permanent, imperceptible, and neutral.

7.5.5 Conclusion

Excavation of existing fill, topsoil, subsoil and bedrock will be required for site leveling and for the installation of drainage and services (wastewater, water supply, electricity, etc.) infrastructure. This will result in a permanent removal of subsoil and bedrock at most excavation locations.

Where possible, excess material will be used for reinstatement and landscaping works around the site at the end of the construction phase. Storage and handling of hydrocarbons/chemicals will be carried out using best practice methods. Measures to prevent subsoil erosion during excavation and reinstatement will be undertaken to prevent water quality impacts.

No significant impacts on the land, soil and geology of the site will occur due to the proposed development

8. HYDROLOGY AND HYDROGEOLOGY

8.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) identifies, describes, and assesses the potential effects of the 'Proposed Development' on the local hydrological and hydrogeological environment (surface water and ground water). This section of the EIAR has been completed in accordance with the EIA guidance and legislation set out in Chapter 1: Introduction. The full description of the Proposed Development is provided in Chapter 4 of this EIAR.

8.1.1 Background & Objectives

McCarthy Keville O'Sullivan (MKO), on behalf of Glenveagh Living, has carried out an assessment of the likely significant effects of a proposed mixed-use development at Knocknacarra, Co. Galway on water aspects (hydrology and hydrogeology) of the receiving environment.

This chapter provides a baseline assessment of the environmental setting of the proposed development in terms of hydrology and hydrogeology and discusses the potential impacts that the construction and operation of the proposed development will have. Where required, appropriate mitigation measures to limit any identified significant impacts to water are recommended and an assessment of residual impacts and significance of effects provided.

The objectives of the assessment are:

- Produce a baseline study of the existing water environment (surface water and groundwater including connectivity with local designated sites) in the area of the proposed development site;
- Identify likely negative impacts of the proposed development on surface water and groundwater during construction and operational phases of the development;
- Identify mitigation measures to avoid, remediate or reduce significant negative effects; and,
- Assess significant residual effects and cumulative impacts of the proposed development along with other local commercial and infrastructural developments.

8.1.2 Statement of Authority

This section of the EIAR has been prepared by Tom Madden and reviewed by Thomas Blackwell and Michael Watson, all of MKO. Tom is an Environmental Scientist and has over three years working in various Environmental Consultancies throughout Ireland. He holds a BSc (Hons) in Environmental Science from the University of Limerick. Thomas has over 15 years of progressive experience in environmental consulting in Ireland and the USA. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin. Michael has over nineteen years' experience in the environmental sector and had worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael completed an MA in Environmental Management at NUI, Maynooth in 1999. Michael is a professional geologist (PGeo) and full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv).

8.1.3 Relevant Legislation

This EIAR is prepared in accordance with the requirements of European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive') as amended by Directive 2014/52/EU.

Regard has also been taken of the requirements of the following legislation (where relevant) as it pertains to the water environment:

- S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) Regulations, and subsequent Amendments (S.I. No. 84 of 1994, S.I. No. 101 of 1996, S.I. No. 351 of 1998, S.I. No. 93 of 1999, S.I. No. 450 of 2000 and S.I. No. 538 of 2001, S.I. 134 of 2013 and the Minerals Development Act 2017), the Planning and Development Act 2000 (as amended), and S.I. 600 of 2001 Planning and Development Regulations and subsequent Amendments. These instruments implement EU Directive 85/337/EEC and subsequent amendments, on the assessment of the effects of certain public and private projects on the environment;
- Directives 2011/92/EU and 2014/52/EU on the assessment of the effects of certain public and private projects on the environment, including Circular Letter PL 1/2017: Implementation of Directive 2014/52/EU on the effects of certain public and private projects on the environment (EIA Directive);
- Planning and Development Act, 2000, as amended;
- S.I. No 296 of 2018: European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 which transposes the provisions of Directive 2014/52/EU into Irish law;
- S.I. No. 293 of 1988: European Communities (Quality of Salmonid Waters) Regulations, resulting from EU Directive 78/659/EEC on the Quality of Fresh Waters Needing Protection or Improvement in order to Support Fish Life;
- S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009 (as amended by S.I. No. 296/2009; S.I. No. 386/2015; S.I. No. 327/2012; and S.I. No. 77/2019 and giving effect to Directive 2008/105/EC on environmental quality standards in the field of water policy and Directive 2000/60/EC establishing a framework for Community action in the field of water policy) and S.I. No. 722 of 2003 European Communities (Water Policy) Regulations which implement EU Water Framework Directive (2000/60/EC) establishing a framework for the Community action in the field of water policy and provide for implementation of 'daughter' Groundwater Directive (2006/118/EC) on the protection of groundwater against pollution and deterioration. Since 2000 water management in the EU has been directed by the Water Framework Directive (2000/60/EC) (as amended by Decision No. 2455/2011/EC; Directive 2008/32/EC; Directive 2008/105/EC; Directive 2009/31/EC; Directive 2013/39/EU; Council Directive 2013/64/EU; and Commission Directive 2014/101/EU ("WFD"). The WFD was given legal effect in Ireland by the European Communities (Water Policy) Regulations 2003 (S.I. No. 722 of 2003
- S.I. No. 684 of 2007: Waste Water Discharge (Authorisation) Regulations 2017, resulting from EU Directive 80/68/EEC on the protection of groundwater against pollution caused by certain dangerous substances (the Groundwater Directive);S.I. No. 106 of 2007: European Communities (Drinking Water) Regulations 2007and S.I. No. 122 of 2014: European Communities (Drinking Water) Regulations 2014, arising from EU Directive 98/83/EC on the quality of water intended for human consumption (the "Drinking Water Directive") and EU Directive 2000/60/EC;
- S.I. No. 9 of 2010: European Communities Environmental Objectives (Groundwater) Regulations 2010 (as amended by S.I. No. 389/2011; S.I. No. 149/2012; S.I. No. 366/2016; the Radiological Protection (Miscellaneous Provisions) Act 2014; and S.I. No. 366/2016); and,

The EIAR is prepared in accordance with the requirements of European Union and Irish legislation identified in Chapter 1. In addition, consideration has been given to the following provisions relevant to the assessment of potential effects of the proposed SHD on hydrology and hydrogeology:

- EU Water Framework Directive (2000/60/EC)
- EU Groundwater Directive (2006/118/EC)
- European Communities (Quality of Salmonid Waters) Regulations;
- European Communities (Environmental Objectives)(Surface Waters) Regulations 2009, as amended
- European Communities (Water Policy) Regulations 2003, as amended provide for implementation of 'daughter'.
- S.I. No. 9 of 2010: European Communities Environmental Objectives (Groundwater) Regulations 2010, as amended; and
- S.I. No. 296 of 2009: European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009, as amended.

8.1.4 Relevant Guidance

The water section of the EIAR is carried out in accordance with guidance contained in the following:

- Environmental Protection Agency (2022): Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- European Commission (2017): Environmental Impact Assessment of Projects – Guidance on the Preparation of the Environmental Impact Assessment Report;
- Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;
- National Roads Authority (2005): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes;
- Inland Fisheries Ireland (2016): Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Watercourses;
- PPG1 - General Guide to Prevention of Pollution (UK Guidance Note);
- PPG5 – Works or Maintenance in or Near Watercourses (UK Guidance Note);
- CIRIA (Construction Industry Research and Information Association) 2006: Guidance on 'Control of Water Pollution from Linear Construction Projects' (CIRIA Report No. C648, 2006); and,
- CIRIA 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006.

8.2 Methodology

8.2.1 Desk Study

A desk study of the proposed development study area was largely completed prior to the undertaking of field mapping and walkover assessments. The desk study involved collecting all relevant geological, hydrological, hydrogeological and meteorological data for the area. The desk study also included a review of the Infrastructure Design Report and Site-Specific Flood Risk Assessment compiled by DBFL Consulting Engineers which sets out the proposed surface water drainage, foul water drainage, watermain design and flood protection measures for the proposed development. The following data sources were also reviewed:

- Environmental Protection Agency database (www.epa.ie);
- Environmental Protection Agency River Catchment Mapper (www.catchments.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);

- Met Eireann Meteorological Databases (www.met.ie);
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- Water Framework Directive Map Viewer (www.catchments.ie);
- Bedrock Geology 1:100,000 Scale Map Series, Sheet 14 (Geology of Galway Bay). Geological Survey of Ireland (GSI, 2003);
- Geological Survey of Ireland - Groundwater Body Characterisation Reports;
- OPW Indicative Flood Maps (www.floodinfo.ie);
- Environmental Protection Agency – "Hydrotool" Map Viewer (www.epa.ie);
- CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie); and,
- Department of Environment, Community and Local Government on-line mapping viewer (www.myplan.ie).
- Hydrological survey data associated with historical projects on the site
- Site Specific Flood Risk Assessment Report (DBFL 2022)
- Infrastructure Design Report (DBFL 2022)

8.2.2 Site Investigations

A walkover survey, including drainage mapping and water sampling, was undertaken by MKO staff on 28th September 2018, 9th October 2018 and the 23rd October 2018, 5th September 2019, and 30th November 2022. DBFL Consulting Engineers visited the site on the 30th of November 2018 to establish any potential sources of flooding, likely routes of floodwaters and key features of the site to inform their Site-Specific Flood Risk Assessment completed for the development.

The hydrological walkover survey involved:

- Walkover survey and hydrological mapping of the proposed site the surrounding area were undertaken whereby water flow directions and drainage patterns were recorded (where present);

8.2.3 Impact Assessment Methodology

Please refer to Chapter 1 of the EIAR for details on the impact assessment methodology (EPA, 2002, 2003, 2015 and 2017). In addition to the above methodology, the sensitivity of the water environment receptors was assessed on completion of the desk study and baseline study. Levels of sensitivity which are defined in Table 7.1 are then used to assess the potential effect that the Proposed Development may have on them.

Table 8-1 Receptor Sensitivity Criteria (Adapted from www.sepa.org.uk)

Sensitivity of Receptor	
Not sensitive	Receptor is of low environmental importance (e.g., surface water quality classified by EPA as A3 waters or seriously polluted), fish sporadically present or restricted. Heavily engineered or artificially modified and may dry up during summer months. Environmental equilibrium is stable and is resilient to changes which are considerably greater than natural fluctuations, without detriment to its present character. No abstractions for public or private water supplies. GSI groundwater vulnerability "Low" – "Medium" classification and "Poor" aquifer importance.
Sensitive	Receptor is of medium environmental importance or of regional value. Surface water quality classified by EPA as A2. Salmonid species may be present and may be locally important for fisheries. Abstractions for private water supplies. Environmental equilibrium copes well with all natural fluctuations but cannot absorb some changes greater than this without altering part of its present character. GSI groundwater vulnerability "High" classification and "Locally" important aquifer.

Sensitivity of Receptor	
Very sensitive	Receptor is of high environmental importance or of national or international value i.e., NHA or SAC. Surface water quality classified by EPA as A1 and salmonid spawning grounds present. Abstractions for public drinking water supply. GSI groundwater vulnerability "Extreme" classification and "Regionally" important aquifer

8.3 Receiving Environment

8.3.1 Site Description & Topography

The Proposed Development site is located in the townland of Knocknacarra, west of Galway City in Co. Galway. The total study area is approximately 2.5 hectares (excluding the existing underground void) in area.

The elevation of the site ranges between approximately 27m and 32m OD (metres above Ordnance Datum). The overall local topography generally slopes from north to south with an undulating topography. The dominant land use on the bordering land is commercial development to the west, a primary school to the north, and residential development to the south and east. The proposed site consists of scrub land in the northern portion of the site and an area of hardcore in the southern portion of the site.

There are no surface watercourse on the site and it is likely that much of the rainfall that falls on the site drains through the soils.

8.3.2 Water Balance

Long term rainfall and evaporation data was sourced from Met Éireann. The 30-year annual average rainfall (1981 - 2010) recorded at Shannon Airport station, located approximately 65 kilometres south of the Proposed Development site, are presented in Table 7.2 below. This is the closest station to the proposed development site for which recent 30-year annual average rainfall data are available.

(Please note that these rainfall data are used for baseline characterisation purposes only and are not used for assessing runoff volumes pre/post development or for drainage design).

Table 8-2 Local Average long-term Rainfall Data (mm) at Shannon Airport

Station		X-Coord		Y-Coord		Ht (MAOD)		Opened		Closed		
Shannon Airport		08°53'58" W		52°42'19" N		15		1937		N/A		
Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Total
102.3	76.2	78.7	59.2	64.8	69.8	65.9	82	75.6	104.9	94.1	104	977.6

The long-term average potential evapotranspiration (PE) for the Shannon Airport station is 562 mm/yr. This value is used as a best estimate of the site PE. Actual Evaporation (AE) at the site is estimated as 534mm/yr (which is 0.95 PE).

The effective rainfall (ER) represents the water available for runoff and groundwater recharge. The ER for the site is calculated as follows:

$$\text{Effective rainfall (ER)} = \text{AAR} - \text{AE}$$

= 977.6 mm/yr – 534 mm/yr

ER = 443.6 mm/yr

Based on groundwater recharge coefficient estimates (22.5%) from the GSI (www.gsi.ie) an estimate of 100 mm/year average annual recharge is given for the study area. This means that the hydrology of the study area is characterised by high surface water runoff rates and low groundwater recharge rates.

Therefore, annual recharge and runoff rates for the site are estimated to be 100 mm/yr and 344 mm/yr respectively. The greenfield runoff rates for the site have been calculated in the Site-Specific Flood Risk Assessment (SSFRA) for the project. A copy of the SSFRA is included as Appendix 8-1 of this EIAR.

8.3.3 Regional & Local Hydrology

On a regional scale, the site is located within Hydrometric Area 31, Galway Bay North. The site is located in the 31 Galway Bay North catchment and in the Knock [Furbo]_SC_010 sub-catchment under the Water Framework Directive (WFD). A regional hydrology map is shown as Figure 8.1.

The Knocknacarra Stream rises to the north of the site at Letteragh and flows southward over a distance of 3km to the sea. A large portion of the lower reach of the Knocknacarra Stream is culverted almost to its sea outfall at Rusheen Bay near Blakes Hill at Salthill. A tributary stream which formerly ran through the site was culverted and realigned to form the surface water sewer network as part of a nearby development in 1996. There are currently no open surface watercourses or drains on the site.

A local hydrology map is shown as Figure 8.2.

8.3.4 Site Drainage

In general, the site of the proposed development is well drained with rainfall percolating to ground and likely travelling via subsurface flow to the culverted stream located at the eastern side of the site. There is a gently sloping topography which is likely to reflect the direction of groundwater flow at the site which is likely from northwest to southeast. There was no surface water or ponding of water observed on the site. The existing roadway that bisects the site is served by gullies which discharge to the municipal storm water drainage system.

8.3.5 Flood Risk Identification

To identify those areas as being at risk of flooding OPW's indicative river and coastal flood map (www.floodmaps.ie), CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie), Department of Environment, Community and Local Government on-line planning mapping (www.myplan.ie) and historical mapping (i.e. 6" and 25" base maps) were consulted.

There is no identifiable map text on local available historical 6" or 25" mapping for the study area that identify lands that are "prone to flooding".

There are no recurring flood incidents within the study area boundary according to the OPW's flood mapping. There are no areas within the study area mapped as "Benefiting Lands". Benefiting lands are defined as a dataset prepared by the Office of Public Works identifying land that might benefit from the implementation of Arterial (Major) Drainage Schemes (under the Arterial Drainage Act 1945) and indicating areas of land subject to flooding or poor drainage.

Tidal flooding is not relevant as the site is approximately 1.8 km from the coast and more than 28m above sea level.

The OPW PFRA map for the area indicates that the eastern area of the site could be impacted by a potential fluvial flood risk zone. No risk of pluvial or coastal flooding is highlighted on the site. The PFRA report and maps are available at www.floodinfo.ie and identify areas deemed to be at risk of flooding (referred to as Areas for Further Assessment, or 'AFAs'), as they require more detailed assessment on the extent and degree of flood risk by the later CFRAM Studies. The flood extents maps indicates that the eastern area of the subject site could be impacted by a potential fluvial flood risk zone. No risk of pluvial or coastal flooding is highlighted on the site. The Western Catchment Flood Risk Assessment and Management (CFRAM) study provides further assessment of areas identified in the PFRA for further investigation. The subject site's catchment area was not identified in the PFRA for further investigation therefore it is outside the Western CFRAM "Area of Further Assessment" boundary for Galway City.

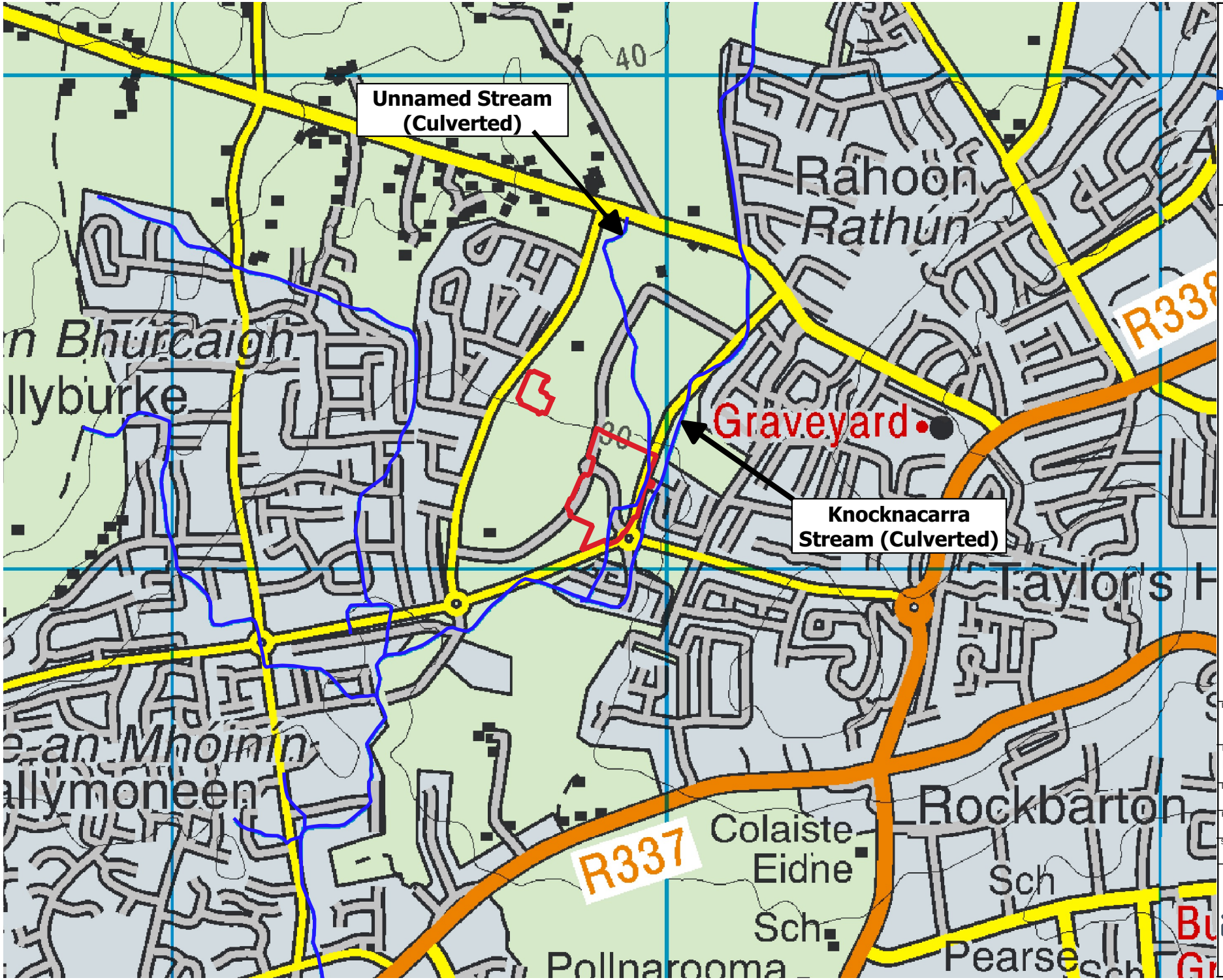
A Site-Specific Flood Risk Assessment (SSFRA) has been prepared for the proposed development (DBFL Consulting Engineers, 2022) and is included in Appendix 8-1. This report determined that the Site is within Flood Zone C and concluded that the residential development proposed is appropriate for the Site's flood zone category.

The assessment also found that the development has a good level of flood protection up to the 100-year return event. For pluvial floods exceeding the 100-year capacity of the drainage system then the proposed flood routing mitigation measures should protect the areas with lower finish floor levels by directing flood water to the drainage outfall.

8.3.6 Surface Water Hydrochemistry

There are no open surface waters on the project site. Therefore, no surface water quality testing was carried out.

The EPA Envision map viewer was consulted on 22nd of November 2022 regarding the water quality status of the watercourses downstream of the Study Area. The following water quality status results were determined from the online EPA Envision map viewer. The water quality of Rusheen Bay, to which the culverted Knocknacarra stream discharges, has a Coastal Waterbody Status of 'unpolluted' and a coastal waterbodies risk projection of 'not at risk'. Groundwater in the study area has a ground waterbody status of 'good' and a risk projection of 'not at risk'.



Map Legend

- Site Boundary
- Streams

N

Drawing Title: Local Hydrology

Project Title: Knocknacarra District Centre LRD EIAR	
Drawn By: TM	Checked By: TB
Project No.: 210206	Drawing No.: Fig 8-2
Scale: 1:35000	Date: 16.12.2022

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8.3.7 Hydrogeology

Granites and other igneous intrusive rocks, which are mapped to underlie the proposed development site are classified by the GSI (www.gsi.ie) as a Poor Aquifer – Bedrock which is Generally Unproductive except for Local Zones. A bedrock aquifer map is shown as Figure 8.3.

This aquifer has expected transmissivity in the range of 20-30m2/d (this may be higher in the vicinity of faults) and low storativity (<0.5%). Groundwater here should be unconfined (GSI, 2004).

Groundwater flow paths are expected to be concentrated in fractures and weathered zones in the vicinity of faults. The flow paths are typically short (up to 100 metres). The flow direction is generally to the south, driven by topography (GSI, 2004).

Shallow groundwater from this aquifer generally discharges to streams and lakes. Small springs and seeps are likely to occur at the stream heads and along their course (GSI, 2004).

8.3.8 Groundwater Vulnerability

The vulnerability rating of the aquifer within the overall site is classified as “Extreme” due to rock near the surface.

Due to the low permeability and transmissivity of the fractured bedrock aquifer underlying the site, there is a relatively low potential for groundwater recharge, dispersion and movement within the aquifer.

8.3.9 Groundwater Hydrochemistry

There are no groundwater quality data for the proposed development site and groundwater sampling would generally not be undertaken for this type of development in terms of EIAR reporting as groundwater quality impacts would not be anticipated. There are also no proposed discharges to ground.

The WFD status for the local groundwater body in terms of water quality is Good and therefore this is assumed to be the baseline condition for groundwater in the area of the proposed development.

Based on data from GSI publication Calcareous/Non calcareous classification of bedrock in the Republic of Ireland (WFD,2004), alkalinity for this bedrock type generally ranges from 43 – 199mg/L while electrical conductivity and hardness were reported to have mean values of 442µS/cm and 148mg/L respectively.

8.3.10 Water Framework Directive Water Body Status & Objectives

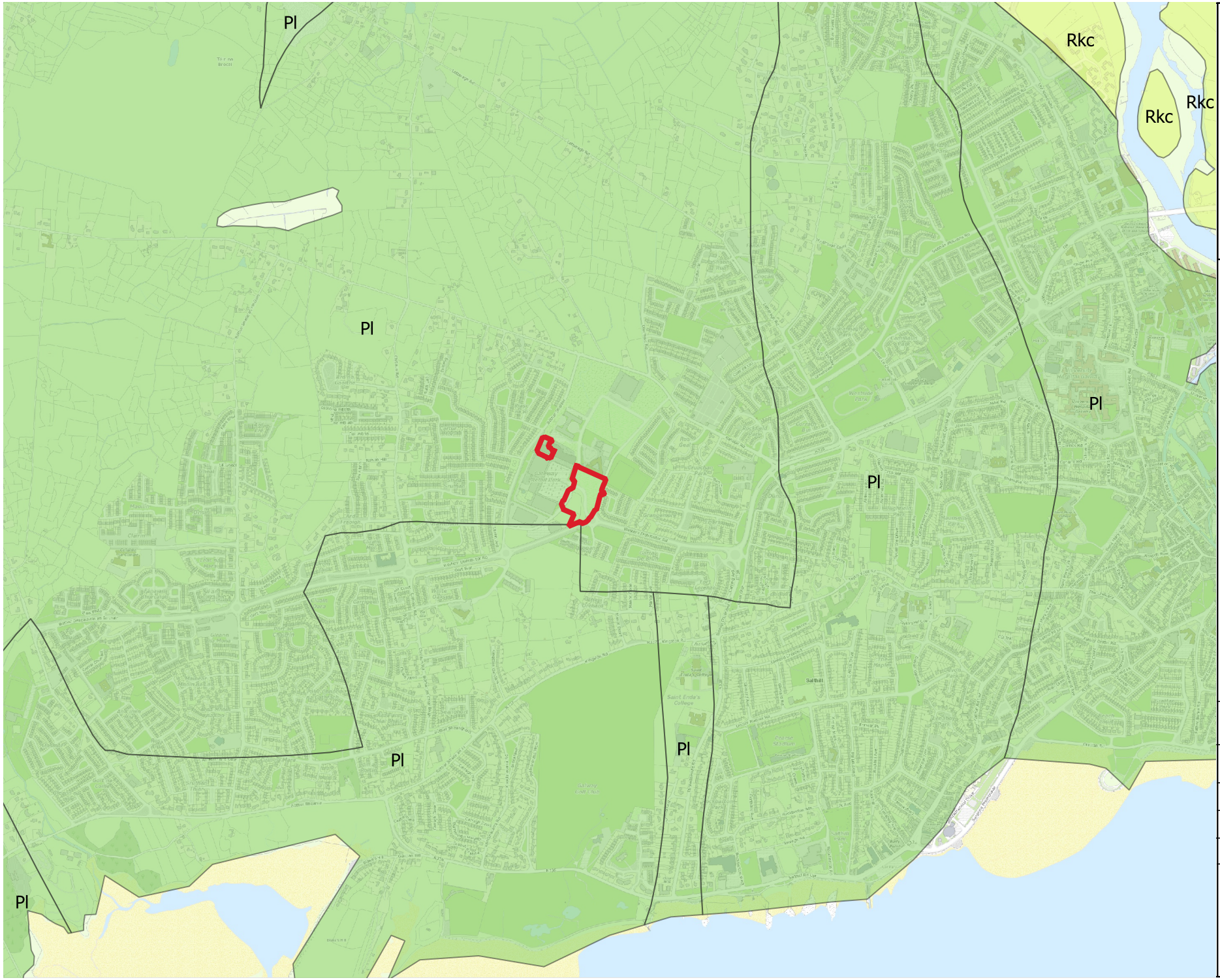
Local Groundwater Body and Surface Water Body status and risk result are available from (www.catchments.ie). The Knocknacarra Stream rises to the north of the site at Letteragh and flows southward over a distance of 3km to the sea. A large portion of the lower reach of the Knocknacarra Stream is culverted almost to its sea outfall at near Blakes Hill at Salthill. The stream which formerly ran through the site was culverted and realigned to form the surface water sewer network as part of a nearby development in 1996. The WFD status for the Knocknacarra Stream (IE_WE_31K160960) is Unassigned. This stream has been assigned a “Review” risk status. The stream discharges to Inner Galway Bay North (IE_WE_170_0000) which has been assigned a WFD water quality status of “Good” and a risk status of “Not at Risk”.

The proposed development site predominantly drains to both the underlying subsoil and aquifer. The WFD status for the local groundwater body (IE_WE_G_0004) in terms of water quality is Good.

8.3.11 Groundwater Body Status

Local Groundwater Body (GWB) status information are available (www.catchments.ie). Refer to Figure 8.4 for the location and extent of local groundwater body.

The Spiddal GWB (IE_WE_G_0004) which underlies the Proposed Development site is assigned a 'Review' risk status based on the quantitative status and chemical status of the GWB. This refers to the risk of deteriorating or being at less than Good status in the future.



Map Legend

Site Boundary

Bedrock Aquifers

Poor aquifer, bedrock which is generally unproductive except for local zones (Pl)

Regionaly important aquifer, Karstified (conduit) - Rkc

N

Drawing Title

Bedrock Aquifers

Project Title	Knocknacarra District centre LRD EIAR
Drawn By: TM	Checked By: TB
Project No.: 210206	Drawing No.: Fig 8-3
Scale: 1:35000	Date: 16.12.2022

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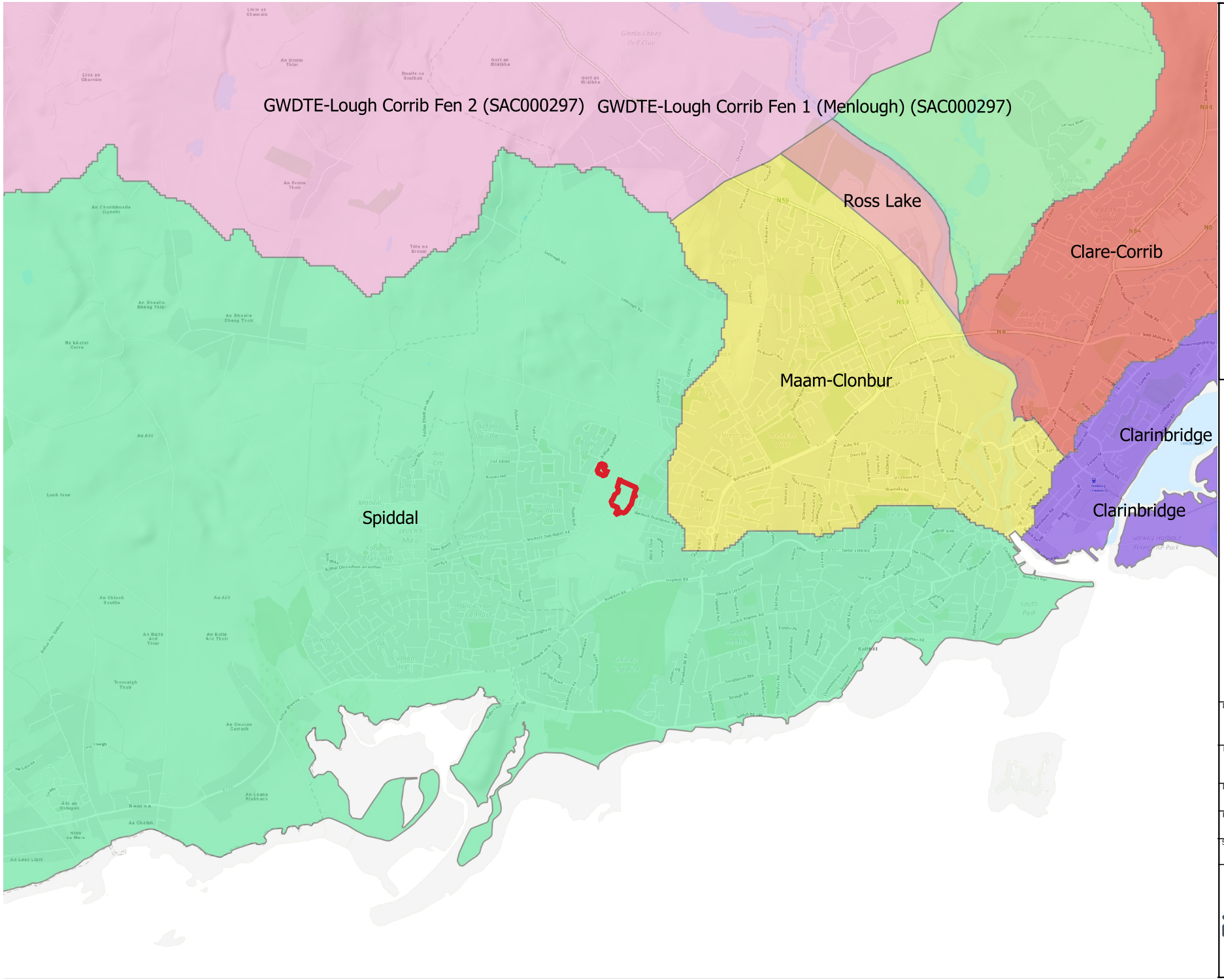

Map Legend

- Site Boundary

Groundwater Bodies

- Clare-Corrib
- Clarinbridge
- GWDTE-Lough Corrib (Menlough) (SAC0002
- GWDTE-Lough Corrib (SAC000297)
- GWDTE-Lough Corrib (SAC000297)
- Maam-Clonbur
- Ross Lake
- Spiddal

Drawing Title: Groundwater Bodies

Project Title: Knocknacarra District centre LRD EIAR

Drawn By	Checked By
TM	TB
Project No.	Drawing No.
210206	Fig 8-4
Scale	Date
1:35000	16.12.2022

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8.3.12 Designated Sites & Habitats

Designated sites include National Heritage Areas (NHAs), Proposed National Heritage Areas (pNHAs), Special Areas of Conservation (SACs), candidate Special Areas of Conservation (cSAC) and Special Protection Areas (SPAs).

The Galway Bay Complex SAC (Code: 000268) is located approximately 1.3 kilometres southwest of the site and the Inner Galway Bay SPA (Code: 004031) is located approximately 1.5 kilometres to the southwest of the site. The Culverted Knocknacarra Stream which flows adjacent to the site, enters the Inner Galway Bay SPA (Code: 004031) approximately 1.5m downstream of the proposed site.

The Lough Corrib SAC (Code: 000297), Connemara Bog Complex SAC (Code: 002034), Ross Lake and Woods SAC (Code: 001312), East Burren Complex SAC (Code: 001926), Moneen Mountain SAC (Code: 000054), Lough Corrib SPA (Code: 004042), Cregganna Marsh SPA (Code: 004142) and Connemara Bog Complex SPA (Code: 004181) are all located within 15 kilometres of the site. Detailed discussion of designated sites is provided in the NIS for the project and in Section 5.3 of this EIAR.

8.3.13 Water Resources

There are no groundwater protection zones mapped within the proposed development site or study area. There are no mapped private well locations (GSI database to accuracy of <50m) within 1km, which were obtained from the GSI well database (www.gsi.ie).

Only a small number of groundwater wells would be expected in the area, given the urban setting and the high availability of water networks in the area. Notwithstanding this, an assessment of groundwater resources relative to the proposed development is completed below.

8.3.14 Receptor Sensitivity

Due to the nature of this development, being near surface construction activities, combined with the nature of the hydrological regime and bedrock aquifer type, impacts on groundwater are generally negligible and surface water is generally the main sensitive receptor assessed during impact assessments.

Groundwater

The primary risk to groundwater at the site would be from cementitious materials, hydrocarbon spillage and leakages. No interruption of existing groundwater drainage pathways below the site will occur due to the shallow nature of excavations within the development.

The above are common potential impacts on all construction sites (such as road works and industrial sites). All potential contamination sources are to be carefully managed at the site during the construction and operational phases of the development and mitigation measures are proposed below to deal with these potential minor impacts.

Based on criteria set out in Table 8.1 the aquifer at the site is classified as a Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones. Therefore, the site can be classed as Not Sensitive to pollution on account of being a Poor Aquifer. Also, any contaminants which may be accidently released on-site may also discharge to local storm water sewer that discharges to Rusheen Bay and the public sewer system.

Surface Water

Comprehensive surface water mitigation and controls are outlined below to ensure protection of all downstream receiving waters during construction and operational phases of the development. Mitigation measures will ensure that surface runoff from the developed areas of the site will be of a high

quality and will therefore not impact on the quality of downstream surface water bodies. Any introduced drainage works at the development site will mimic the existing hydrological regime, and discharge will be to existing sewers and to ground via soakaways, thereby avoiding changes to surface water flow volumes leaving the site.

8.4 Characteristics of the Proposed Development

The proposed development will be a mixed-use development, providing both residential and commercial units to Galway City and County. It is proposed to construct a total of 227 no. residential units in the form of apartments. These will be comprised of apartment blocks ranging between 4-6 storeys high and will include the following: Block A1: 14 no. 1 bed apartments & 24 no. 2 bed apartments; Block A2: 25 no. 1 bed apartments & 15 no. 2 bed apartments; Block B1: 3 no. 1 bed apartments, 18 no. 2 bed apartments & 3 no. 3 bed apartments; Block B2: 13 no. 1 bed apartments & 21 no. 2 bed apartments; Block B3: 5 no. 1 bed apartments, 22 no. 2 bed apartments & 1 no. 3 bed apartment; Block B4: 11 no. 1 bed apartments & 26 no. 2 bed apartments; Block B5: 13 no. 1 bed apartments & 13 no. 2 bed apartments.

The ground floors of the above apartment blocks will be utilised for commercial units which will encompass circa 1,010 sq. m. Parking for bicycles and cars will be provided for by the development of 49 no. surface car parking spaces (including EV charging spaces), 181 underground car parking spaces and 550 bicycle parking spaces (114 no. short stay and 436 no. long stay spaces). A community facility (circa 118 sq. m), tenant amenity facility (circa 99 sq. m) and childcare facility (circa 561 sq. m) will also be constructed.

Other provisions as part of the proposed development will include shared communal and private open spaces, bin storage, public lighting, site landscaping, services, signage, substation and all other associated site works.

The proposed development will typically require minor alteration of ground levels to ensure it is at an adequate level for the proposed surface water drainage and foul water drainage, and to mitigate flood risk. Detailed drawings in respect ground levels can be seen at Appendix 4-1 to this EIAR.

Excavation of soil and subsoil will be required for the proposed development in preparation for the construction of building foundations and in the preparation of a suitable sub-formation for road construction, trenching for foul and drainage water infrastructure and other services. Significant excavations are not required as there are no subsurface basement type structures proposed to be constructed.

8.4.1 Proposed Site Infrastructure and Drainage Management

8.4.1.1 Surface Water Drainage

Surface water management proposals are described in detail in Section 4.2 and 4.3 of the Infrastructure Design Report (Appendix 4-6). The management of surface water for the proposed development has been designed to comply with the policies and guidelines outlined in the Greater Dublin Strategic Drainage Study (GDSDS) and with the requirements of Galway City Council.

It is proposed to divert the existing surface water sewers within the site to align the drainage layout with the proposed diversion of the existing access road to the Gateway Retail Park. Both Site 1 and Site 2 of the proposed development will be provided with a surface water drainage network to collect surface water flows from the apartment blocks and commercial units. The Site 2 storm drainage will be constructed in the ground floor car park and attenuated outflows will connect with the existing 375mm

diameter sewer to the north-west of the site. The Site 1 storm drainage will discharge attenuated outflows to the existing 450mm diameter sewer to the south-west of the site.

The surface water strategy incorporates attenuation of storm water to limit discharge from the site, although storage facilities and SUDs elements will be designed to allow infiltration or reduction of run-off volumes and rates where possible.

Run-off from roofs and any additional run-off from the landscaped courtyard podium slab is designed to be conveyed to the surface water drainage network at ground floor level. Two underground surface water attenuation tanks will be provided for the development to attenuate surface water flows for the 100-year critical storm + 10% allowance for climate change in accordance with GDSDS. A concrete attenuation tank will be located beneath the ground floor car park in Site 2, a concrete tank is proposed due to the presence of structural columns in the vicinity of the tank. A Stormtech attenuation system will be located beneath the courtyard in Site 1.

There will also be an extensive type of green roof with a 80mm minimum construction depth. All necessary safety requirements will be designed and constructed to ensure safe maintenance can occur. The green roof will provide interception and reduction of flow rates at the beginning of the treatment train, providing source control for a large area of the development. A minimum of 50% of the apartments roof area is proposed to be green roof. After surface water has passed through the green roof, this will pass through to the surface water drainage network to the attenuation system. It should be noted that the drainage network and attenuation in Site 1 have been sized to include the future district centre use site to the south.

The following SUDs elements are applicable to the proposed scheme and layout:

- Slot drains draining to bio retention areas on part of civic plaza within Site 1 to provide treatment, storage and reduce run-off rates.
- Green roofs at apartment blocks
- Green podium with landscaped areas and raised planters to reduce run-off rates and total impermeable area.
- Permeable paving parking bays and footpaths
- Rain gardens and swales
- Two attenuation storage systems for the attenuation of storm water up to the 100-year storm event +10% allowance for climate change
- A class 1 Bypass Separator's to be provided on the outfall of each network

Storm-water attenuation for the development has been sized in accordance with the requirements of the GDSDS. Run-off rates from the proposed development to the public system are in accordance with the GDSDS.

8.4.1.2 Wastewater Infrastructure

The proposed foul drainage layout for the development will be similar to the surface water drainage. It is proposed to divert the existing foul water sewers within the site to align the drainage layout with the proposed diversion of the existing access road to the Gateway Retail Park. Both Site 1 and Site 2 of the proposed development will be provided with a foul drainage network to collect foul flows from the apartment blocks and commercial units. The Site 2 foul drainage will be constructed in the ground floor car park and will connect with the existing 225mm diameter sewer to the north-west of the site. The Site 1 foul drainage will discharge to the existing 225mm sewer to the south-west of the site. Foul sewer calculations are provided in Appendix E of the DBFL Consulting Infrastructure Design Report. The proposed foul sewer design and layout is in accordance with the Irish Water Code of Practice for Wastewater Infrastructure and The Irish Water Infrastructure Standard Details.

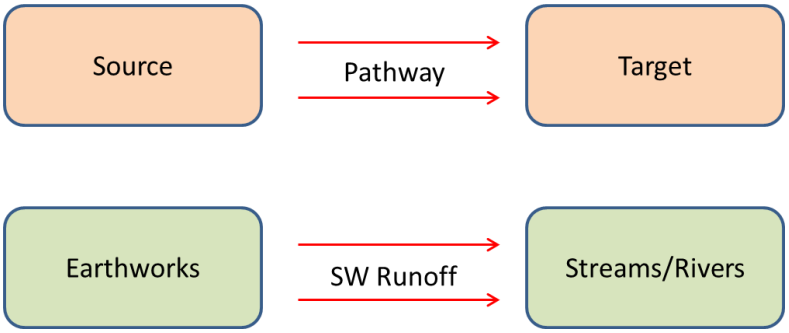
8.4.1.3 Water Supply

As part of the proposed development, it is proposed to divert the existing watermains within the site and utilise the existing 150mm diameter watermain to the north-west of the site to supply the development. The proposed watermain layout will connect to the existing 150mm watermain located in the 'Gort Ná Bró' road to the east of the site. The residential blocks will be supplied from two centralised water plantrooms, while the commercial units will have individual connections. The proposed watermain design and layout is in accordance with Irish Water Code of Practice for Water Infrastructure and the Irish Infrastructure Standard Details.

8.5 Potential Impacts and Mitigation Measures

8.5.1 Overview of Impact Assessment Process

The conventional source-pathway-target model (see below, top) was applied to assess potential impacts on downstream environmental receptors (see below, bottom as an example) as a result of the proposed housing development.



Where potential impacts are identified, the classification of impacts in the assessment follows the descriptors provided in the Glossary of Impacts contained in the following guidance documents produced by the Environmental Protection Agency (EPA):

- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022);
- Advice Notes on Current Practice in the Preparation of Environmental Impact Statements (EPA, 2003);

The description process clearly and consistently identifies the key aspects of any potential impact source, namely its character, magnitude, duration, likelihood and whether it is of a direct or indirect nature.

In order to provide an understanding of the stepwise impact assessment process applied below, we have firstly presented below a summary guide that defines the steps (1 to 7) taken in each element of the impact assessment process. The guide also provides definitions and descriptions of the assessment process and shows how the source-pathway-target model, and the EPA impact descriptors are combined.

Using this defined approach, this impact assessment process is then applied to the development construction and operational activities which have the potential to generate a source of significant adverse impact on the geological and hydrological/ hydrogeological (including water quality) environments.

Table 8-3 Summary Guide of Impact Assessment Process

Step 1	Identification and Description of Potential Impact Source This section presents and describes the activity that brings about the potential impact or the potential source of pollution. The significance of effects is briefly described.	
Step 2	**Pathway / Mechanism:**	The route by which a potential source of impact can transfer or migrate to an identified receptor. In terms of housing developments, surface water and groundwater flows are the primary pathways, or for example, excavation or soil erosion are physical mechanisms by which a potential impact is generated.
Step 3	**Receptor:**	A receptor is a part of the natural environment which could potentially be impacted upon, e.g. human health, plant / animal species, aquatic habitats, soils/geology, water resources, water sources. The potential impact can only arise as a result of a source and pathway being present.
Step 4	**Pre-mitigation Impact:**	Impact descriptors which describe the magnitude, likelihood, duration and direct or indirect nature of the potential impact before mitigation is put in place.
Step 5	**Proposed Mitigation Measures:**	Control measures that will be put in place to prevent or reduce all identified significant adverse impacts. In relation to housing developments, these measures are generally provided in two types: (1) mitigation by avoidance, and (2) mitigation by engineering design.
Step 6	**Post Mitigation Residual Impact**:	Impact descriptors which describe the magnitude, likelihood, duration and direct or indirect nature of the potential impacts after mitigation is put in place.
Step 7	**Significance of Effects:**	Describes the likely significant post mitigation effects of the identified potential impact source on the receiving environment.

8.5.2 Do Nothing Scenario

Current land use (construction compound/scrub) will continue. Surface water drainage and infiltration to ground will continue as is occurring currently with no impact on either surface or groundwater.

8.5.3 Construction Phase Potential Impacts

8.5.3.1 Earthworks

Construction phase activities including site levelling, service trench construction, levelling/construction and building foundation excavation will require earthworks resulting in removal of vegetation cover and excavation of any minor local pockets of organic soil/subsoils, and bedrock. The main risk will be from surface water runoff from bare soil and soil storage areas during construction works.

Much of the surface water generally percolates to ground. However, the construction activities can result in the release of suspended solids to local drainage features and could result in an increase in the suspended sediment load, resulting in increased turbidity which in turn could affect the water quality in downstream waters (Knocknacarra Stream).

Pathways: Drainage and surface water discharge routes. Pathways are limited as there are no open watercourses onsite.

Receptors: Down-gradient transitional and water dependent ecosystems.

Pre-Mitigation Impact: Indirect, negative, moderate, short-term, likely impact.

Proposed Mitigation Measures

The closest sensitive receptor is the culverted Knocknacarra Stream. It is not proposed to alter the existing alignment or culvert associated with this stream. However, attenuated surface water runoff will ultimately discharge to the municipal storm drainage system of which this stream forms a part of.

Management of surface water runoff and subsequent treatment prior to release off-site will be undertaken during construction work as follows:

- Adjacent drainage systems/groundwater need to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. To prevent this from occurring surface water discharge from site will be managed and controlled for the duration of the construction works until the permanently surface water drainage system of the proposed site is complete.
- A temporary drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff from the site during construction.
- All works shall be undertaken in accordance with the CIRIA document, 'Control of Water Pollution from Construction Sites, guidance for consultants and contractors'
- All oils, fuels, paints and other chemicals will be stored in a secure bunded construction hardstand area. Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any drainage systems. A response procedure will be put in place to deal with any accidental pollution events and spillage kits will be available and construction staff will be familiar with the emergency procedures and use of the equipment
- Concrete batching will take place off site, wash down and wash out of concrete trucks will take place off site and any excess concrete is not to be disposed of on site. Pumped concrete will be monitored to ensure there is no accidental discharge. Mixer washings are not to be discharged into surface water drains/sewers
- Discharge from any vehicle wheel wash areas is to be directed to on-site settlement tanks/ponds, debris and sediment captured by vehicle wheel washes are to be disposed off-site at a licensed facility.
- Foul drainage discharge from the construction compound will be tankered off site to a licensed facility until a connection to the public foul drainage network has been established.

Mitigation by Design:

A summary of surface water controls that can be employed during the earthworks and construction phase are as follows:

- Source controls:
  - Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sandbags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems.
  - Small working areas, covering stockpiles, weathering off stockpiles, cessation of works in certain areas or other similar/equivalent or appropriate measures.
- In-Line controls:
  - Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sandbags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriates systems.
- Treatment systems:
  - Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems.
- Silt Fences:
  - Silt fences will be placed up-gradient of all drains where construction is proposed. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to watercourses of sand and gravel sized sediment, released from excavation of mineral sub-soils of glacial and glacio-fluvial origin, and entrained in surface water runoff. Inspection and maintenance of these structures during construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase.
- Silt Bags:
  - Silt bags will be used where small to medium volumes of water need to be pumped from excavations or swales. As water is pumped through the bag, most of the sediment is retained by the geotextile fabric allowing filtered water to pass through. Silt bags will be used with natural vegetation filters.

Residual Impact

Subject to the implementation of the listed mitigation measures the residual impact will be Indirect, imperceptible, short-term, medium probability, and of negative effectt on downstream surface waters.

Significance of Effects

For the reasons outlined above, no significant impacts on surface water quality are expected due to site excavation work. There is limited hydraulic connectivity between the site and watercourses and mitigation measures will be employed on a precautionary basis.

8.5.3.2 Potential Surface Water Quality Impacts from Shallow Excavation Dewatering

Some groundwater seepages may potentially occur in foundation excavations. Dewatering will create additional volumes of water to be treated by the runoff management system. Inflows will likely require management and treatment to reduce suspended sediments. No contaminated land was noted at the site and therefore historical pollution sources are not anticipated.

Pathway: Overland flow and site drainage network.

Receptor: Down-gradient surface water bodies.

Pre-Mitigation Impact: Indirect, negative, moderate, short-term, medium probability impact to surface water quality.

Mitigation Measures

Management of excavation seepages and subsequent treatment prior to discharge into the site drainage network will be undertaken as follows:

- Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations will be put in place if required;
- The interceptor drainage will be discharged to the site constructed drainage system or onto natural vegetated surfaces and not directly to surface waters;
- If required, pumping of excavation inflows will prevent build-up of water in the excavation;
- The pumped water volumes will be discharged via volume and sediment attenuation ponds adjacent to excavation areas, or via silt bags.
- There will be no direct discharge to the on-site main drains, and therefore no risk of hydraulic loading or contamination will occur; and,
- Daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work should immediately be stopped and a geotechnical assessment undertaken.

Residual Impact

The potential source of sediment can be readily controlled, and the pathway broken using the silt bag and silt fencing systems and therefore the residual impact will be Indirect, imperceptible, short-term, low probability, and of negative effect on downstream surface waters. The pathway between the site works areas and receptors are broken by the nature of the site which does not have open water courses onsite combined with the proposed mitigation.

No impact on groundwater levels or groundwater quality will occur.

Significance of Effects

No significant impacts on surface water quality are expected due to excavation dewatering.

8.5.3.3 Potential Release of Hydrocarbons during Construction Stage

Accidental spillage during refuelling of construction plant with petroleum hydrocarbons is a significant pollution risk to groundwater, surface water and associated ecosystems, and to terrestrial ecology. The accumulation of small spills of fuels and lubricants during routine plant use can also be a pollution risk. Hydrocarbon has a high toxicity to humans, and all flora and fauna, including fish, and is persistent in the environment. It is also a nutrient supply for adapted micro-organisms, which can rapidly deplete dissolved oxygen in waters, resulting in death of aquatic organisms.

Pathway: Groundwater flowpaths and site drainage network.

Receptor: Groundwater and surface water.

Pre-Mitigation Impact:

Indirect, negative, slight, short term, likely impact to local groundwater quality.

Indirect, negative, moderate, short term, unlikely impact to surface water quality.

Proposed Mitigation Measures:

Mitigation by Design:

- A temporary drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff from the site during construction
- All oils, fuels, paints and other chemicals will be stored in a secure bunded construction hardstand area.
- Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any drainage systems.
- A response procedure will be put in place to deal with any accidental pollution events and spillage kits will be available and construction staff will be familiar with the emergency procedures and use of the equipment.
- Fuels stored on site will be minimised. Any storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction;
- Spill kits will be available to deal with accidental spillages.

Highest standards of site management will be maintained, and utmost care and vigilance followed to prevent accidental contamination or unnecessary disturbance to the site and surrounding environment during construction. A named person will be given the task of overseeing the pollution prevention measures agreed for the site to ensure that they are operating safely and effectively as well as having responsibility for the implementation of Emergency Procedures for spill control measures.

Residual Effects

With the implementation of the mitigation measures set out above, the residual impacts on ground water and surface water will be indirect, imperceptible, short-term, unlikely, and of negative effect.. The pathway between the hydrocarbons and the receptor is broken by the nature of the site, which is dry combined with the proposed mitigation measures.

Significance of Effects

No significant effects on surface water or groundwater quality are anticipated.

8.5.3.4 Groundwater and Surface Water Contamination from Wastewater Disposal

Release of effluent from on-site wastewater systems has the potential to impact on groundwater and surface waters if not properly managed.

Pathway: Groundwater flowpaths and site drainage network.

Receptor: Down-gradient well supplies, groundwater quality and surface water quality.

Pre-mitigation Impact

Indirect, negative, significant, short-term, unlikely impact to surface water quality.

Indirect, negative, slight, short-term, unlikely impact to local groundwater.

Proposed Mitigation Measures

Mitigation by Avoidance:

- A self-contained port-a-loo with an integrated waste holding tank will be used at the site compounds, maintained by the providing contractor, and removed from site on completion of the construction works; and,
- No wastewater will be discharged on-site during either the construction or operational phase.

Residual Impact
No impact.

Significance of Effects
No significant effects on surface water or groundwater quality are anticipated.

8.5.3.5 Release of Cement-Based Products
Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. A pH range of ≥ 6 ≤ 9 is set in S.I. No. 293 of 1988 Quality of Salmonid Water Regulations, with artificial variations not in excess of ± 0.5 of a pH unit. Entry of cement-based products into the site drainage system, into surface water runoff, and hence to surface watercourses or directly into watercourses represents a risk to the aquatic environment.

Pathway: Site drainage network.

Receptor: Surface water and transitional water hydrochemistry.

Pre-Mitigation Impact: Indirect, negative, moderate, short term, likely impact to surface water.

Proposed Mitigation Measures
Mitigation by Avoidance:

- Concrete batching will take place off site
- Wash down and wash out of concrete trucks will take place off site
- Any excess concrete is not to be disposed of on -site
- Pulped concrete will be monitored to ensure that there is no accidental discharge.
- Mixer washings are not to be discharged into surface water drains or sewers

Residual Impact

The potential source of pollution can be readily controlled, and standard procedures will ensure no significant releases will occur. The pathway between the cement works and receptors are broken by the nature of the site which does not have open water courses combined with the proposed mitigation. Residual impacts are unlikely, indirect, imperceptible, short term, and of negative effect.

Significance of Effects
No significant effects on surface water quality are anticipated.

8.5.3.6 Potential Impacts on Hydrologically Connected Designated Sites

The Galway Bay Complex SAC (Code: 000268) and Inner Galway Bay SPA (Code: 004031) are located less than 1.5 kilometres to the southwest of the site. The culverted Knocknacarra Stream has been incorporated into the storm sewer system and flows adjacent to the site. Discharges from the site could conceivably enter the culverted stream which discharges into the Galway Bay Complex SAC and Inner Galway Bay SPA at Rusheen Bay. The construction of the development will involve earth moving and levelling operations which create the potential for pollution in various forms to run off the site, i.e. the generation of suspended solids and the potential for spillage of fuels associated with the refuelling of excavation machinery. Taking a precautionary approach, the construction works have potential, in the absence of mitigation, to impact on groundwater and surface water quality. Pollutants may run off the

site into the public stormwater system outside the site, which ultimately discharges to Rusheen Bay, thus having connectivity to Inner Galway Bay SPA and Galway Bay Complex SAC. There is also the possibility that pollutants may percolate through the ground and ultimately discharge to the SAC/SPA via this diffuse pathway.
Possible effects include water quality impacts which could be significant if mitigation is not put in place.

Pathway: Surface water and groundwater flowpaths.

Receptor: Down-gradient water quality and designated sites.

Pre-Mitigation Impact: Indirect, negative, moderate, short term, likely impact to surface water quality.

Proposed Mitigation Measures

Standard best practice environmental control measures will be implemented during the construction phase of the development. The pathway that would allow potential impacts to occur was considered in the design of the project. The accompanying CEMP (DBFL, 2022) and Natura Impact Statement (NIS) (MKO, 2022) sets out the environmental management framework to be adhered to during the construction phase of the development and it incorporates the mitigating principles to ensure no adverse impact on the integrity of European Sites. These documents include comprehensive detail regarding site set up, pollution prevention, hydrocarbon management, disturbance limitation, construction monitoring and biosecurity. Standard best practice environmental control measures have been incorporated in the design of the development and are outlined in the following subsections. In addition, the 'Infrastructure Design Report '(DBFL Consulting Engineers, 2022) and the CEMP (DBFL Consulting Engineers, 2022), (see Appendices 4-6 and 4-2), include measures for the avoidance of impact on groundwater and surface water during construction. As outlined above (Section 8.5.3.1 – 8.5.3.5) and reiterated here, controls will also be put in place to manage risks associated with hydrocarbons/chemicals and cement-based products used during construction phase. The following pollution control measures will be put in place:

- Sediment and Erosion – Adjacent drainage systems/groundwater need to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. To prevent this from occurring surface water discharge from site will be managed and controlled for the duration of the construction works until the permanently surface water drainage system of the proposed site is complete. A temporary drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff by the site during construction.
- Accidental Spills and Leaks – All oils, fuels, paints and other chemicals will be stored in a secure bunded construction hardstand area. Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any drainage systems. A response procedure will be put in place to deal with any accidental pollution events and spillage kits will be available and construction staff will be familiar with the emergency procedures and use of the equipment.
- Concrete – Concrete batching will take place off site, wash down and wash out of concrete trucks will take place off site and any excess concrete is not to be disposed of on site. Pumped concrete will be monitored to ensure there is no accidental discharge. Mixer washings are not to be discharged into surface water drains.
- Disposal of Wastewater from Site – Discharge from any vehicle wheel wash areas is to be directed to on-site settlement tanks/ponds, debris and sediment captured by vehicle wheel washes are to be disposed off-site at a licensed facility.
- Foul drainage discharge from the construction compound will be tankered off site to a licensed facility until a connection to the public foul drainage network has been established.

The proposed mitigation measures for protection of surface water quality which will include on site drainage control measures will ensure that the quality of runoff from proposed development areas will be very high. Connections to the public foul and surface water sewers will not be completed until approval has been received from the local authority and Irish Water. All drainage works will be constructed and tested in accordance with the local authority/ Irish Water requirements. As outlined above, controls will also be put in place to manage risks associated with hydrocarbons/chemicals and cement-based products used during construction phase.

Residual Impact

No impacts on water quality or hydrologically connected designated sites will occur. There will be no impacts on groundwater levels or existing hydrological regime or groundwater flowpaths relating to designated sites, including the Galway Bay Complex SAC or Galway Bay SPA.

Therefore, no significant effects on groundwater or surface water quality and downstream designated sites are anticipated.

No significant impacts on groundwater levels, existing hydrological regime, or groundwater flowpaths relating to designated sites, including the Galway Bay Complex SAC or Galway Bay SPA will occur. No impacts on water quality or downstream designated sites are anticipated. The potential pathway between the site works area and receptors has been broken to ensure no impacts on designated sites.

Significance of Effects

No significant impacts on groundwater levels, existing hydrological regime, or groundwater flowpaths relating to designated sites, including the Galway Bay Complex SAC or Galway Bay SPA will occur.

8.5.4 Operational Phase Impacts

8.5.4.1 Potential Increased Downstream Flood Risk due to Increased Hardstanding Area.

Replacement of the greenfield surface with hardstand surfaces will result in an increased risk of pluvial flooding due to low permeability surfaces which will inhibit any downward percolation of rainwater.

The management of surface water for the proposed development has been designed to comply with the policies and guidelines outlined in the Greater Dublin Strategic Drainage Study (GDSDS) and with the requirements of Galway City Council.

It is proposed to divert the existing surface water sewers within the site to align the drainage layout with the proposed diversion of the existing access road to the Gateway Retail Park. The proposed development will be provided with a surface water drainage network to collect surface water flows from the apartment blocks and commercial units. Attenuated outflows from the northern portion of the site will connect with the existing 375mm diameter sewer to the north-west of the site. Storm drainage from the southern portion of the site will discharge attenuated outflows to the existing 450mm diameter sewer to the south-west of the site.

The surface water strategy incorporates attenuation of storm water to limit discharge from the site, although storage facilities and SUDs elements will be designed to allow infiltration or reduction of run-off volumes and rates where possible.

Run-off from roofs and any additional run-off from the landscaped courtyard podium slab is designed to be conveyed to the surface water drainage network at ground floor level. Two underground surface water attenuation tanks will be provided for the development to attenuate surface water flows for the 100 year critical storm + 10% allowance for climate change in accordance with GDSDS. One concrete

attenuation tank will be located beneath the ground floor car park in Site 2, and one Stormtech attenuation system will be located beneath the civic plaza in Site 1.

There will be an extensive green roof with a minimum depth of 80mm installed as part of the proposed development. All necessary safety requirements will be designed and constructed to ensure safe maintenance can occur. The green roof will provide interception and reduction of flow rates at the beginning of the treatment train, providing source control for a large area of the development. A minimum of 50% of the apartments roof area is proposed to be green roof. After surface water has passed through the green roof, this will pass through to the surface water drainage network to the attenuation system. The drainage network and attenuation in Site 1 has been sized to include the future district centre use site to the south.
Pathway: Site surface water drainage network.

Receptor: Surface watercourses.

Pre-Mitigation Impact

Direct, negative, slight, long term, low probability impact.

Proposed Mitigation Measures
The risk of pluvial flooding is minimised by using an attenuated surface water drainage network. Surface water run-off from the overall development will be attenuated to greenfield run-off rates.

Residual Impact
Direct, neutral, imperceptible, long term, low probability effect in relation to flood risk.

Significance of Effects

No significant impacts in terms of flooding are expected due to the proposed development.

8.5.4.2 Potential Downstream Water Quality Impacts from Surface Water Drainage.

The operational phase of the proposed project will result in the production of surface water. If not adequately treated, there is potential for indirect impacts on ground water and surface water quality. To prevent pollutants or sediments discharging into water courses from surface drainage the GDSDS requires “interception storage” to be incorporated into the development. This interception storage is designed to receive the run-off for rainfall depths of 5mm up to 10mm. A Class 1 Bypass Separator will be provided on each outfall from from the surface water drainage network.

Pathway: Site surface water drainage network.

Receptor: Groundwater aquifer and/or surface watercourses.

Pre-Mitigation Impact: Direct, negative, slight, long term, low probability impact.

Proposed Mitigation Measures
Water quality risks are reduced by use of interception storage, silt traps, and Class 1 Bypass Separators

Residual Impact
Direct, negative, imperceptible, long term, low probability effect in relation to water quality.

Significance of Effects

No significant impacts in terms of water quality from surface water drainage are expected due to the proposed development.

8.5.4.3 Potential Water Quality Impacts from Foul Drainage.

The operational phase of the proposed project will result in the production of foul sewage. If not adequately treated, there is potential for impacts on ground water and surface water quality.

The proposed foul drainage layout for the development will be similar to the surface water drainage. It is proposed to divert the existing foul water sewers within the site to align the drainage layout with the proposed diversion of the existing access road to the Gateway Retail Park.

Both Site 1 and Site 2 of the proposed development will be provided with a foul drainage network to collect foul flows from the apartment blocks and commercial units. The Site 2 foul drainage will be constructed in the ground floor car park and will connect with the existing 225mm diameter sewer to the north-west of the site. The Site 1 foul drainage will discharge to the existing 225mm sewer to the south-west of the site.

The proposed foul sewer design and layout is in accordance with the Irish Water Code of Practice for Wastewater Infrastructure and The Irish Water Infrastructure Standard Details.

All foul water will be discharged to the public sewer and will be treated at the Galway Mutton Island Wastewater Treatment Plant (WWTP) before discharges to Galway Bay. The Mutton Island WWTP has a current capacity of 170,000 p.e.

Treatment process includes the following:

- Preliminary Treatment (Screening & Grit Removal)
- Primary Treatment (Upward Flow Settlement Tanks)
- Secondary Treatment (Activated Sludge)

A letter has been received from Irish Water confirming that a water connection can be facilitated for the proposed development. Given that waste will be appropriately treated to the required standards in the public sewer system; no potential for adverse impact on water quality exists

Pathway: Site surface water drainage network.

Receptor: Groundwater aquifer and/or surface watercourses.

Pre-Mitigation Impact: Direct, negative, significant, long term, likely impact.

Proposed Mitigation Measures

All foul water will be discharged to the public sewer and will be treated at the Galway Mutton Island Wastewater Treatment Plant

Residual Impact

Given that waste will be appropriately treated to the required standards in the public sewer system; no potential for adverse impact on water quality exists.

Significance of Effects

No significant impacts in terms of water quality are expected due to the proposed development.

8.5.5 Assessment of Potential Health Effects

Potential health effects are associated with negative impacts on public and private water supplies and potential flooding. There are no mapped public supply group water scheme groundwater protection zones in the area of the proposed development.

The proposed site design and mitigation measures outlined in the previous subsections ensures that the potential for impacts on the water environment are not significant and so there is no pathway to public or private water supplies which in turn could impact human health.

The flood risk assessment for the development has also shown that the risk of the proposed development contributing to downstream flooding is also very low, and also that the risk of inundation of the development within the site post construction is very low due to the proposed design and site layout.

8.5.6 Potential Cumulative Effects

8.5.6.1 Cumulative effects resulting from Interactions between various elements of the proposed development

The interaction of the various elements of the proposed development was considered and assessed in this EIAR with regards hydrology. The potential for each individual element of the proposed development on its own to result in significant effects on water receptors was considered in the impact assessment. The entire project including the interactions between all its elements was also considered and assessed for its potential to result in significant effects on water receptors in the impact assessment presented. The complex interactions between the requirement for site drainage and the requirement to protect the Trusky Stream and other receptors were taken into account for the entire project and any impacts avoided through a series of mitigation measures that were fully described. The management and handling of potentially harmful materials across the entire project was assessed with mitigation proposed and described fully.

All interactions between the various elements of the project were considered and assessed both individually and cumulatively within this chapter. Where necessary, mitigation was employed to ensure that no cumulative effects will arise as a result of the interaction of the various elements of the development with one another.

8.5.6.2 Cumulative Effects In-Combination with Other Projects

The potential cumulative effects of the proposed development in combination with all the other projects listed in Section 2.3 of this EIAR have been considered in terms of impacts on hydrology and hydrogeology.

Of the projects listed in Section 2.2 of this EIAR it was determined that, due to proximity and scale, the three projects listed in Table 8.10 below, have the potential for cumulative effects in combination with the proposed development. There are 2 no. proposed housing developments with permission granted in the locality. A description of the development types is included below within Table 8-10 and where appropriate the application documentation, EIAR and NIS have been reviewed to inform the assessment.

Table 8.4 Local/ Nearby Developments

	Description	Decision
ABP Pl Ref: 304345	Permission is sought for retention and completion of amendments to previously granted planning permissions ref. 17/30 & 19/68. The proposed amendments are as follows: (1) Retention of change of house type to house numbers 3 to 23 inclusive and house numbers 24 (previously number 26) to house number 33 (previously number 35) inclusive. House type referencing has also been amended for clarity (Previous Type A1 is now Type A/A1. Previously Type A is now Type B/B1. Previous 4 Bed Detached is now Type C. Previous Type C is now Type D). (2) Retention of minor amendments to finished floor levels and footprint locations for house numbers 24 (previously number 26) to house number 33 (previously number 35) inclusive (3) associated site works to the above amendment	Grant - 10/09/2019 Conditional
Abp Pl REF: 304762	Demolition of existing house and associated outbuildings, construction of 238 no. residential units (113 no. houses, 125 no. apartments), childcare facility and associated site works.	Grant – 14/10/2019 Conditional

There are no proposed discharges of any substance from the site during the construction phase of the proposed development. The hydrological regime will not be altered significantly during the construction phase. Potential emissions from the site are therefore related to potential uncontrolled releases and so a range of procedures, management plans and infrastructural mitigation proposals have been identified and described earlier in this chapter and will be implemented to ensure that such uncontrolled releases do not occur. The potential for residual impacts on water and ground water receptors is considered to be imperceptible and so the potential for cumulative effects associated with these receptors is limited. It is highly unlikely that all projects would be constructed at the same time and so the potential for multiple uncontrolled releases to water are also not likely. Should some or all projects be constructed at the same time, the water quality controls at the Proposed Development site will ensure no likely significant cumulative effects will occur. Furthermore, it should be noted that planning and construction standards require that similar water quality controls will be implemented at the other sites, thus further reducing the potential for likely, significant cumulative effects.

During the operational phase, discharges from the proposed development will be as per pre-development rates and water quality will be controlled. Again, the water quality controls at the Proposed Development site will ensure no likely significant effects cumulatively will occur during the operational phase. Mandated water quality controls at the other project sites will further reduce the potential for likely, significant cumulative effects.

Wastewater effluent arising from the operational phase of the proposed development will be piped to, and treated at, the municipal wastewater treatment plant. The Mutton Island treatment plan operates under licence from the EPA. The EPA cannot issue a licence in the event that emissions from that facility could lead to unacceptable environmental emissions. In circumstances where Irish Water has confirmed that the waste water arising from the proposed development will be treated at the Mutton Island wastewater treatment plant, the potential for cumulative effects associated with the wastewater discharges does not arise.

No significant cumulative impacts on the water environment are anticipated during the construction or operational phases in circumstances where the proposed mitigation measures are implemented effectively. The 2 no. developments in the locality of the proposed development have been designed with appropriate water and wastewater services as has the Proposed Development.

8.5.7 Conclusion

There are no open surface watercourses within or adjacent to the site. As a result, there is limited potential for impact on water quality or the downstream designated sites.

Notwithstanding this, during each phase of the proposed development (construction and operation) a number of activities will take place on the proposed development site which will have the potential to affect the hydrological regime or water quality at the site or its vicinity. These potential impacts generally arise from sediment input from runoff and other pollutants such as hydrocarbons and cement based compounds, with the former having the most potential for impact during the construction phase.

Surface water drainage measures, pollution control and other preventative measures have been incorporated into the project design to minimise significant adverse impacts on water quality and downstream designated sites.

The surface water drainage plan will focus on silt management and to control runoff rates. The key surface water control measure is that there will be no direct discharge of untreated development runoff into local watercourses during either the construction or operational phases of the project. Attenuated surface water drainage will discharge to the municipal storm drainage system during the operational phase of the development.

During the operational stage there will be no impact on water environment. This will be achieved by avoidance methods and design methods including the use of attenuation tanks and pollutant interceptor devices as outlined in the accompanying Infrastructure Design Report (Appendix 4-6).

Preventative measures during construction include fuel and concrete management and a waste management plan which will all be incorporated into the Construction and Environmental Management Plan (Refer to Appendix 4-2).

Overall, the proposal presents no significant impacts to surface water and groundwater quality provided the proposed mitigation measures are implemented.

No significant cumulative impacts on groundwater or designated sites are anticipated.

9. AIR & CLIMATE

9.1 Introduction

McCarthy Keville O'Sullivan (MKO), on behalf of Glenveagh Living, has carried out an assessment of the potential impacts of the proposed large scale residential development (LSRD) consisting of 227 no. apartments together with a communal facility, commercial floor spaces, associated outdoor amenity areas, car parking and all associated site works at Knocknacarra, Co. Galway on Air and Climate.

This Chapter provides a description of the baseline environment in terms of air and climate and identifies, describes, and assesses the potential significant direct and indirect effects of the proposed development on air and climate. Where required, appropriate mitigation measures to limit any identified likely significant impacts to air and climate are recommended and an assessment of residual impacts and significance of any such residual effects is also provided. Where appropriate, monitoring measures to ensure the implementation of the proposed mitigation are also described.

9.1.1 Background

The Proposed Development is located on approximately 2.5 hectares (excluding the existing underground void which has an area of 0.53 hectares) of land located within the townland of Rahoon in Knocknacarra. Galway City Centre is located approximately 3km to the east. The site is bisected by a public access road into the existing Galway Retail Park. The general area is urban in character and is surrounded by a number of residential estates and commercial and industrial buildings.

The proposed site consists of scrub land in the northern portion of the site and an area of hardcore in the southern portion of the site. There is a small area of landscaped amenity grassland adjacent to the access road that bisects the site. The existing underground void to the northwest of the main development site was constructed during Phase 2 of the Gateway Retail Park development. This area consists of a concrete lined underground void. It is proposed to fit this void out for use as an underground car park.

Due to the non-industrial nature of the Proposed Development and the general character of the surrounding environment, air quality sampling was deemed to be unnecessary for this EIAR. It is expected that air quality in the existing environment is good, since there are no major sources of air pollution (e.g. heavy industry) in the vicinity of the site.

9.1.2 Statement of Authority

This section of the EIAR has been prepared by Tom Madden and reviewed by Thomas Blackwell and Michael Watson, all of MKO. Tom is an Environmental Scientist and has over three years working in various Environmental Consultancies throughout Ireland. He holds a BSc (Hons) in Environmental Science from the University of Limerick. Thomas has over 15 years of progressive experience in environmental consulting in Ireland and the USA. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin. Michael has over nineteen years' experience in the environmental sector and had worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael completed an MA in Environmental Management at NUI, Maynooth in 1999. Michael is a professional geologist (PGeo) and full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv).

9.1.3 Relevant Guidance

The air quality and climate section of this EIAR has been prepared out in accordance with the 'EIA Directive' as amended by Directive 2014/52/EU. It has also been carried out in accordance with the guidance listed in Section 1.4.1 of Chapter 1: Introduction, where relevant and the 'Guidance on Integrating Climate Change and Biodiversity into Environmental Impact Assessment' (European Commission, 2013).

9.2 Air Quality

9.2.1 Air Quality Standards

In 1996, the Air Quality Framework Directive (96/62/EC) was published. This Directive was transposed into Irish law by the Environmental Protection Agency Act 1992 (Ambient Air Quality Assessment and Management) Regulations 1999. The Directive was followed by four Daughter Directives, which set out limit values for specific pollutants:

- The first Daughter Directive (1999/30/EC) deals with sulphur dioxide, oxides of nitrogen, particulate matter and lead.
- The second Daughter Directive (2000/69/EC) addresses carbon monoxide and benzene. The first two Daughter Directives were transposed into Irish law by the Air Quality Standards Regulations 2002 (SI No. 271 of 2002).
- A third Daughter Directive, Council Directive (2002/3/EC) relating to ozone was published in 2002 and was transposed into Irish law by the Ozone in Ambient Air Regulations 2004 (SI No. 53 of 2004).
- The fourth Daughter Directive, published in 2007, deals with polyaromatic hydrocarbons (PAHs), arsenic, nickel, cadmium and mercury in ambient air.

The Air Quality Framework Directive and the first three Daughter Directives have been replaced by the Clean Air for Europe (CAFE) Directive (Directive 2008/50/EC on ambient air quality), which encompasses the following elements:

- The merging of most of the existing legislation into a single Directive (except for the Fourth Daughter Directive) with no change to existing air quality objectives.
- New air quality objectives for $PM_{2.5}$ (fine particles) including the limit value and exposure concentration reduction target.
- The possibility to discount natural sources of pollution when assessing compliance against limit values.
- The possibility for time extensions of three years (for particulate matter PM10) or up to five years (nitrogen dioxide, benzene) for complying with limit values, based on conditions and the assessment by the European Commission.

Table 9-1 below sets out the limit values of the CAFE Directive, as derived from the Air Quality Framework Daughter Directives. Limit values are presented in micrograms per cubic metre ($\mu g/m^3$) and parts per billion (ppb). The notation PM_{10} is used to describe particulate matter or particles of ten micrometres or less in aerodynamic diameter. $PM_{2.5}$ represents particles measuring less than 2.5 micrometres in aerodynamic diameter.

The CAFE Directive was transposed in to Irish legislation by the Air Quality Standards Regulations 2011 (S.I. No. 180 of 2011). These Regulations supersede the Air Quality Standards Regulations 2002 (S.I. No. 271 of 2002), the Ozone in Ambient Air Regulations 2004 (S.I. No. 53 of 2004) and the Ambient Air Quality Assessment and Management Regulations 1999 (S.I. No. 33 of 1999).

Table 9-1 Limit values of Directive 2008/50/EC, 1999/30/EC and 2000/69/EC (Source: EPA)

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m3)	Limit Value (ppb)	Basis of Application of Limit Value	Attainment Date
Sulphur dioxide (SO_2)	Protection of Human Health	1 hour	350	132	Not to be exceeded more than 24 times in a calendar year	1st Jan 2005
Sulphur dioxide (SO_2)	Protection of human health	24 hours	125	47	Not to be exceeded more than 3 times in a calendar year	1st Jan 2005
Sulphur dioxide (SO_2)	Protection of vegetation	Calendar year	20	7.5	Annual mean	19th Jul 2001
Sulphur dioxide (SO_2)	Protection of vegetation	1st Oct to 31st Mar	20	7.5	Winter mean	19th Jul 2001
Nitrogen dioxide (NO_2)	Protection of human health	1 hour	200	105	Not to be exceeded more than 18 times in a calendar year	1st Jan 2010
Nitrogen dioxide (NO_2)	Protection of human health	Calendar year	40	21	Annual mean	1st Jan 2010
Nitrogen monoxide (NO) and nitrogen dioxide (NO_2)	Protection of ecosystems	Calendar year	30	16	Annual mean	19th Jul 2001
Particulate matter 10 (PM_{10})	Protection of human health	24 hours	50	-	Not to be exceeded more than 35 times in a calendar year	1st Jan 2005

Pollutant	Limit Value Objective	Averaging Period	Limit Value (µg/m3)	Limit Value (ppb)	Basis of Application of Limit Value	Attainment Date
Particulate matter 2.5 ($PM_{2.5}$)	Protection of human health	Calendar year	40	-	Annual mean	1st Jan 2005
Particulate matter 2.5 ($PM_{2.5}$) Stage 1	Protection of human health	Calendar year	25	-	Annual mean	1st Jan 2015
Particulate matter 2.5 ($PM_{2.5}$) Stage 2	Protection of human health	Calendar year	20	-	Annual mean	1st Jan 2020
Lead (Pb)	Protection of human health	Calendar year	0.5	-	Annual mean	1st Jan 2005
Carbon Monoxide (CO)	Protection of human health	8 hours	10,000	8,620	-	1st Jan 2005
Benzene (C_6H_6)	Protection of human health	Calendar Year	5	1.5	-	1st Jan 2010

The Ozone Daughter Directive 2002/3/EC is different from the other Daughter Directives in that it sets target values and long-term objectives for ozone rather than limit values. Table 9-2 presents the limit and target values for ozone.

Table 9-2 Target values for Ozone Defined in Directive 2008/50/EC

Objective	Parameter	Target Value for 2010	Target Value for 2020
Protection of human health	Maximum daily 8 hour mean	120 mg/m^3 not to be exceeded more than 25 days per calendar year averaged over 3 years	120 mg/m^3
Protection of vegetation	AOT40 calculated from 1 hour values from May to July	18,000 $mg/m^3.h$ averaged over 5 years	6,000 $mg/m^3.h$
Information Threshold	1 hour average	180 mg/m^3	-
Alert Threshold	1 hour average	240 mg/m^3	-

AOT_{40} is a measure of the overall exposure of plants to ozone. It is the sum of the excess hourly concentrations greater than 80 $\mu g/m^3$ and is expressed as $\mu g/m^3$ hours.

9.2.1.1 Air Quality and Health

The Environmental Protection Agency (EPA) 2021 report 'Air Quality in Ireland' noted that in Ireland, the premature deaths attributable to air pollution are estimated at 1,300 people per year. A more recent European Environmental Agency Report, 'Air Quality in Europe – 2022 Report' highlights the negative effects of air pollution on human health. The report stated that Air pollution is the largest environmental health risk in Europe and significantly impacts the health of the European population, particularly in urban areas. In 2020, exposure to concentrations of fine particulate matter above the 2021 World Health Organization guideline level resulted in 238,000 premature deaths in the EU-27. Air pollution also causes morbidity, whereby people live with disease – entailing both personal suffering and significant health care costs. Exposure to nitrogen dioxide above the respective guideline level led to 49,000 premature deaths. Acute exposure to ozone caused 24,000 premature deaths. In Ireland it is estimated that 490, 50 and 70 premature deaths were linked to PM 2.5 particulates, NO2 and O3 emissions respectively during 2020 (Source: Air Quality in Europe – 2022 Report', EEA, 2022). These emissions, along with others including nitrogen oxides (NOx) and sulphur oxides (SOx) are produced during fossil fuel-based electricity generation in various amounts, depending on the fuel and technology used.

9.2.2 Air Quality Zones

The Environmental Protection Agency (EPA) has designated four Air Quality Zones for Ireland:

- Zone A: Dublin City and environs.
- Zone B: Cork City and environs.
- Zone C: 16 urban areas with population greater than 15,000.
- Zone D: Remainder of the country.

These zones were defined to meet the criteria for air quality monitoring, assessment and management described in the Framework Directive and Daughter Directives. The site of the proposed development lies within Zone C, which represents Other Cities and Large Towns.

9.2.3 Existing Air Quality

The EPA publishes Air Monitoring Station Reports for monitoring locations in all four Air Quality Zones. The most recent ambient air quality monitoring data for air quality is available in the "Air Quality in Ireland 2022" report, published by the EPA in September 2022. The figures from the summary tables appendix of this report relate to air quality data from Ennis (45km to the south of the site), Portlaoise (123km to the south-east), Castlebar (64km to the north-west) and Claremorris (45km to the northt) Monitoring Stations, have been used to inform the tables below. These monitoring locations lie within Zone C (Ennis and Portlaoise) and D (Castlebar and Claremorris) respectively. Similar measurement values for all air quality parameters at the Zone C sites (Ennis and Portlaoise) would be expected for the proposed development site. Castlebar and Claremorris are located within Zone D and therefore would be expected to have lower measurement values than that of the proposed development site.

9.2.3.1 Sulphur Dioxide (SO2)

Sulphur Dioxide data for Ennis, Co. Clare for 2019 is presented in Table 9-3 below.

Table 9-3 Sulphur Dioxide Data for Ennis, 2019

Parameter	Measurement
No. of hours	8,760
No. of measured values	8,672
Percentage Coverage	99%
Maximum hourly value	92 µg/m^3
Annual Mean hourly value	3.6 µg/m^3
Maximum 24-hour mean (Daily)	27.7 µg/m^3

Neither the hourly limit value (350 µg/m^3, see Table 9-1) nor lower assessment threshold (50 µg/m^{3}Daily Limit set out in the CAFE Directive were exceeded during the monitoring period. Air quality of the proposed development site would be expected to be similar.

9.2.3.2 Particulate Matter (PM10)

Particulate matter (PM10) data for the 2019 monitoring period in Claremorris is presented in Table 9-4

Table 9-4 Particulate Matter (PM_{10}) Data for Claremorris, 2019

Parameter	Measurement
No. of days	365
No. of measured values	336
Percentage Coverage	92%
Maximum daily value	44 µg/m^3
Mean daily value (Annual)	11 µg/m^3
No. of Days values exceeded 50 µg/m^3 threshold	0

The 24-hour limit value for the protection of human health (50 µg/m^3, see Table 9-1) was not exceeded during the 2019 measurement period. The CAFE Directive stipulates that this assessment threshold should not be exceeded more than 35 times in a calendar year. There were no daily exceedances of the upper or lower assessment thresholds (see Table 9-4 above).

Air quality of the proposed development site would be expected to be slightly higher in terms of PM10 levels.

9.2.3.3 Nitrogen Dioxide (NO_2)

Nitrogen dioxide and oxides of nitrogen data for the 2019 monitoring period at Castlebar is presented in Table 9-5.

Table 9-5 Nitrogen Dioxide and Oxides of Nitrogen Data Castlebar, 2019

Parameter	Measurement
No. of hours	8,760
No. of measured values	8,585
Percentage Coverage	98%
Maximum hourly value (NO_2)	86 µg/m^3
Mean hourly value (Annually) (NO_2)	8 µg/m^3
No. of exceedances of Upper Limit (140 µg/m^3)	0
No. of exceedances of Lower Limit (100 µg/m^3)	0

Neither the upper assessment threshold of 140 µg/m^3 or lower threshold of 100 µg/m3 was exceeded. The CAFE Directive stipulates that these thresholds should not be exceeded more than 18 times in a calendar year. The mean hourly NO2 value of 8 µg/m^{3}during the measurement period was below the annual lower assessment threshold for the protection of human health, which is 40 µg/m^3 for the calendar year.

9.2.3.4 Carbon Monoxide (CO)

Carbon Monoxide data for the 2019 monitoring period at Portlaoise is presented in 8-6. The average concentration of carbon monoxide was 0.3 mg/m3. The carbon monoxide limit value for the protection of human health is 10,000 µg/m3 (or 10mg/m3). On no occasions were values in excess of the 10 mg limit value set out in Directives 2000/69/EC or 2008/69/EC.

Table 9-6 Carbon Monoxide Data for Portlaoise 2019

Hourly Values	Result
No. of hours	8,760
No. of measured values	7,972
Percentage Coverage	91%
Maximum hourly value	1 mg/m^3
Mean hourly value (Annual)	0.1 mg/m^3

9.2.3.5 Ozone (O_3)

Ozone data for Castlebar from 2019 is presented in Table 9-7.

Table 9-7 Summary statistics for O3 concentrations for 2019 Castlebar

Parameter	Measurement
Annual Mean	50 µg/m^3
Median	53 µg/m^3
% Data Capture	99%
No. of days > 120	0 days
Maximum 8-hour value	93 µg/m^3

The legislation stipulates that a daily limit of 120 mg/m^3 should not be exceeded on more than 25 days for ozone. On no occasions were mean daily values in excess of the limit value.

9.2.4 Dust Monitoring

9.2.4.1 Background

The extent of dust generation at any site depends on the type of activity undertaken, the location, the nature of the dust, i.e. soil, sand, etc., and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather.

The potential dust-related effects on local air quality and the relevant associated mitigation measures are presented in Section 9.2.6 below.

9.2.5 Likely and Significant Air Quality Impacts of the Proposed Development and Associated Mitigation Measures

9.2.5.1 "Do-Nothing" Scenario

If the proposed development were not to proceed, there would be no change to existing air quality conditions in the area and therefore there would be no negative effects. There would be no potential for minor emissions to occur as a result of the construction and operational phases of the proposed development.

9.2.5.2 Construction Phase Potential Impacts and Mitigation Measures

9.2.5.2.1 *General Air Quality*

The construction of the proposed development will require the use of machinery and plant, thereby giving rise to exhaust emissions. This is likely to have a short-term slight negative effect, which will be reduced through the use of the best practices mitigation measures as presented below.

Mitigation

- All vehicles to switch off engines when not in use,
- No idling vehicles,

- On-road vehicles to comply to set emission standards,
- All non-road mobile machinery (NRMM) to be fitted with appropriate exhaust system and to be regularly serviced,
- Haul routes to be hard surfaced and cleaned and appropriate speed limits applied around the site,
- Aggregate materials for the construction infrastructure will be sourced onsite from the proposed cut areas, where possible, which further reduced potential emissions.

Residual Effect

Following implementation of the mitigation measures outlined above, residual impacts will be short term, Imperceptible and of Negative effect.

9.2.5.2.2 *Dust Emissions*

The potential for dust to be emitted will depend on the type of activity being carried out in conjunction with environmental factors including levels of rainfall, wind speed and wind direction.

Dust generation rates depend on the site activity, particle size (in particular the silt content, defined as particles smaller than 75 microns in size), the moisture content of the material and weather conditions. Dust emissions are dramatically reduced where rainfall has occurred due to the cohesion created between dust particles and water and the removal of suspended dust from the air. It is typical to assume no dust is generated under “wet day” conditions where rainfall greater than 0.2 mm has fallen. Information collected from Shannon Meteorological Station (1981-2010) identified that typically 211 days per annum are “wet”. Thus, for greater than 55% of the time no significant dust generation will be likely due to meteorological conditions. Without mitigation, the likely effect of construction phase dust emissions will be short term, slight, and negative.

Mitigation

- A regime for monitoring dust levels in the vicinity of the site during the works will be put in place. The level of monitoring and adoptions of mitigation measures will vary throughout the construction works depending on the type of activities being undertaken and the prevailing weather conditions at the time.
- The Construction team will monitor the contractor’s regime on an ongoing basis throughout the project to endeavour to minimise impact on a surrounding community.
- If dust levels become an issue, then all dust generating activities on site will cease until such time as weather conditions improve (e.g. wind levels drop or rain falls) or mitigation measures such as damping down of the ground are completed
- Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods. Material stockpiles containing fine or dusty elements shall be covered with tarpaulins. Aggregates will be transported to and from the site in covered trucks.
- Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system.
- A complaints log will be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated.
- Site roadways shall be maintained in a stoned hardcore condition not allowing soil to accumulate that may create dust.

Residual Effect

Following implementation of the mitigation measures outlined above, residual impacts of dust generation from the construction phase will be Short-term Imperceptible and of Negative effect.

9.2.5.3 Operational Phase Potential Impacts and Mitigation Measures

There will be no impact on the environment or human health from dust emissions in the vicinity of the proposed development site once the development has been built and all construction vehicles and personnel are offsite.

Any further works which may need to occur on site as part of maintenance and repairs during the operation of the site, may cause localised imperceptible, temporary dust emissions, and is unlikely to have any negative significant impact on human health.

Mitigation

No mitigation will be required on site during the majority of the operational phase for the proposed development, as the impact is assessed as being imperceptible, and will not be noticed within the area which already contains many residential developments.

Residual Effect

Short term, Imperceptible, Neutral

9.2.5.4 Assessment of Potential for Impacts on Health

Whilst the construction phase of the proposed development is likely to lead to dust and vehicle emissions, the implementation of the mitigation measures described above will prevent or minimise potential effects and the residual effects will be imperceptible. The CEMP submitted with this application provides that the proposed development will be constructed in accordance with good management practice including good site design and layout, adopting appropriate working methods, choosing the right equipment and ensuring that the workforce understands the company's responsibilities and is familiar with good working practice and dust suppression techniques. The potential for health effects arising from the construction stage are considered short term, imperceptible, and negative as the potential for both exhaust and dust emissions will be limited and controlled through the mitigation measures described above.

During the operational phase, there will be no impact on human health from dust emissions in the vicinity of the proposed development site once the development has been built and all construction vehicles and personal are offsite.

9.3 Climate

9.3.1 Climate Change and Greenhouse Gases

Climate change is one of the most challenging global issues facing us today and is primarily the result of increased levels of greenhouse gases in the atmosphere. These greenhouse gases come primarily from the combustion of fossil fuels in energy use. Changing climate patterns are thought to increase the frequency of extreme weather conditions such as storms, floods and droughts. In addition, warmer weather trends can place pressure on animals and plants that cannot adapt to a rapidly changing environment.

All relevant legislation and policy in relation to climate is outlined in detail in Chapter 2 of this EIAR. A summary of the same is provided in the following sections.

9.3.1.1 Greenhouse Gas Emission Targets

Ireland is a Party to the Kyoto Protocol, which is an international agreement that sets limitations and reduction targets for greenhouse gases for developed countries. It is a protocol to the United Nations Framework for the Convention on Climate Change. The Kyoto Protocol came into effect in 2005, as a result of which, emission reduction targets agreed by developed countries, including Ireland, are now binding.

Under the Kyoto Protocol, the EU agreed to achieve a significant reduction in total greenhouse gas emissions in the period 2008 to 2012. Ireland's contribution to the EU commitment for the period 2008 – 2012 was to limit its greenhouse gas emissions to no more than 13% above 1990 levels.

9.3.1.1.1 *Doha Amendment to the Kyoto Protocol*

In Doha, Qatar, on 8th December 2012, the "Doha Amendment to the Kyoto Protocol" was adopted. The amendment includes:

- New commitments for Annex I Parties to the Kyoto Protocol who agreed to take on commitments in a second commitment period from 1 January 2013 to 31 December 2020;
- A revised list of greenhouse gases (GHG) to be reported on by Parties in the second commitment period; and
- Amendments to several articles of the Kyoto Protocol which specifically referenced issues pertaining to the first commitment period and which needed to be updated for the second commitment period.

During the first commitment period, 37 industrialised countries and the European Community committed to reduce GHG emissions to an average of five percent against 1990 levels. During the second commitment period, thirty-seven Parties committed to reduce GHG emissions by at least 18 percent below 1990 levels in the eight-year period from 2013 to 2020; however, the composition of Parties in the second commitment period is different from the first.

Under the protocol, countries must meet their targets primarily through national measures, although market-based mechanisms such as international emissions trading can also be utilised.

9.3.1.1.2 *COP21 Paris Agreement*

COP21 was the 21st session of the Conference of the Parties (COP) to the United Nations Convention. Every year since 1995, the COP has gathered the 196 Parties (195 countries and the European Union) that have ratified the Convention in a different country, to evaluate its implementation and negotiate new commitments. COP21 was organised by the United Nations in Paris and held from 30th November to 12th December 2015.

COP21 closed on 12th December 2015 with the adoption of the first international climate agreement (concluded by 195 countries and applicable to all). The twelve-page text, made up of a preamble and 29 articles, provides for a limitation of the temperature rise to below 2°C above pre-industrial levels and even to tend towards 1.5°C. It is flexible and takes into account the needs and capacities of each country. It is balanced as regards adaptation and mitigation, and durable, with a periodical ratcheting-up of ambitions.

9.3.1.1.3 COP26 Climate Change Conference

The UN Climate Change Conference of the Parties (COP26) was held in Glasgow from the 31st of October to the 12th of November 2021. There were four key objectives that had been identified for COP 26 which included:

- Secure global net zero by 2050 and keep 1.5 degrees within reach
- Adapt to protect communities and natural habitats to the already changing climate
- Mobilise climate finance whereby developed countries must deliver on raising $100bn in climate finance per year
- Finalise the Paris Rulebook (rules needed to implement the Paris Agreement) and turn ambitions into action

Although COP26 was considered unsatisfactory in delivering the action and commitments needed to reach the Paris Agreement targets, it did raise the global ambition on climate action. Whilst COP26 failed to meet the 1.5 degree target and did not manage to secure the $100bn in climate finance there were a number key successes which included the following:

- Green finance for the net zero economy – establishment of the Glasgow Financial Alliance for Net Zero of $130 trillion of private capital to accelerate the transition to a net-zero economy.
- Disclosure and transparency for the private sector.
- Increasing the pace of implementing the Paris Agreement.

9.3.1.1.4 Climate Action Plan 2021

The Climate Action Plan 2021 (CAP 2021) was launched in November 2021. CAP 2021 follows the Climate Act 2021, which commits Ireland to a *legally binding target of net-zero greenhouse gas emissions no later than 2050, and a reduction of 51% by 2030.* CAP 2021 sets out indicative ranges of emissions reductions for each sector of the economy. The emissions reductions by 2030 by sector are as follows:

- Electricity: 62-81%
- Transport: 42-50%
- Buildings: 44-56%
- Industry/Enterprise: 29-41%
- Agriculture: 22-30% reduction
- Land Use, Land Use Change and Forestry (LULUCF): 37-58%

Some of the key actions of CAP 2021 include the following:

Enterprise:

The green economy, including retrofitting, renewable energy, clean mobility, and sustainable agriculture will create high quality employment, and the IDA will also seek to attract businesses to invest in decarbonisation technologies. The IDA, Enterprise Ireland and the SEAI will work to help decarbonise industry and align grants and other supports with emissions reductions. The government will also produce a Climate Toolkit for business. Among the measures to cut emissions are increasing the uptake of carbon-neutral heating, and decreasing the embodied carbon in building materials through using more wood in construction. [24-37% reduction in emissions by 2030]

Buildings:

Government has already committed to retrofit 500,000 homes by 2030 (including increased funding through the National Development Plan particularly for free upgrades for low-income households) and

will install 680,000 renewable energy heat sources in both new and existing residential buildings. We recognise that we will need work out ways to assist broader society with the costs of retrofitting. The new National Retrofit Plan will drive demand, make retrofitting more affordable, and expand the capacity of the industry including training of workers. A further 3 specialist training centres will be established. Other measures include increased targets for district heating and the public sector and strengthening building standards for all buildings. [44-56% reduction in emissions by 2030]

Transport:

The plan calls for a significant cut in transport emissions by 2030 through measures including:

- 500,000 extra walking, cycling and public transport journeys per day by 2030
- Increasing the proportion of kilometres driven by passenger electric cars to between 40 and 45% by 2030, in addition to a reduction of 10% in kilometres driven by the remaining internal combustion engine cars All replacements for bus and commuter rail vehicles and carriages to be low or zero carbon by 2030
- Increased rollout of rural public transport through Connecting Ireland. [42-50% reduction in emissions by 2030]

CAP 2021 assumes full implementation of the Climate Action Plan 2019 (DCCAE, 2019).

9.3.1.1.5 *Climate Change Performance Index*

Established in 2005, the Climate Change Performance Index (CCPI) is an independent monitoring tool which tracks countries climate protection performance. It assesses individual countries based on climate policies, energy usage per capita, renewable energy implementation and Greenhouse Gas Emissions (GHG) and ranks their performance in each category and overall. The 2022 CCPI was published in November 2021. While the CCPI 2022 indicated signs of potential reductions in global emissions, no country achieved its Paris Climate targets and therefore the first three places of the ranking system remain unoccupied.

Ireland, ranked 39th in 2020, has dropped 7 places to 46th for 2021, and remains as a "low" performer in international performance. However, it remains at "very low" at on the Greenhouse Gas Emissions ratings. As detailed in the CCPI report published in 2019 "significant challenges lie ahead in closing Ireland's emission gap, meeting the current (2030) target and aligning Ireland's emission trajectory with a net zero goal for 2050". Ireland is one of the worst performing countries in the Greenhouse Gas Emissions category.

9.3.1.1.6 *Programme for Government*

The Programme for Government was published in October 2020 and last updated April 2021. In relation to climate change the programme recognises that the next ten years are a critical period in addressing the climate crisis. It is an ambition of the programme to more than halve carbon emissions over the course of the decade (2020-2030). The programme notes that the government are committed to reducing greenhouse gas emissions by an average 7% per annum over the next decade in a push to achieve a net zero emissions by the year 2050. The programme also recognises the severity of the climate challenge as it clarifies that:

"Climate change is the single greatest threat facing humanity"

9.3.1.1.7 Climate Action and Low Carbon Development (Amendment) Act 2021

The Climate Action and Low Carbon Amendment Bill 2021, entitled an Act, is a piece of legislation which commits the country to move to a climate resilient and climate neutral economy by 2050. This Bill was passed into law in July 2021.

The Programme for Government has committed to a 7% average yearly reduction in overall greenhouse gas emissions over the next decade, and to achieving net zero emissions by 2050. This Bill will manage the implementation of a suite of policies to assist in achieving this target.

The Bill includes the following key elements, among others:

- Places on a statutory basis a 'national climate objective', which commits to pursue and achieve no later than 2050, the transition to a climate resilient, biodiversity-rich, environmentally -sustainable and climate-neutral economy.
- Embeds the process of carbon budgeting into law, Government are required to adopt a series of economy-wide five-year carbon budgets, including sectoral targets for each relevant sector, on a rolling 15-year basis, starting in 2021.
- Actions for each sector will be detailed in the Climate Action Plan, updated annually.
- A National Long Term Climate Action Strategy will be prepared every five years.
- Government Ministers will be responsible for achieving the legally-binding targets for their own sectoral area with each Minister accounting for their performance towards sectoral targets and actions before an Oireachtas Committee each year.
- Strengthens the role of the Climate Change Advisory Council, tasking it with proposing carbon budgets to the Minister.
- Provides that the first two five-year carbon budgets proposed by the Climate Change Advisory Council should equate to a total reduction of 51% emissions over the period to 2030, in line with the Programme for Government commitment.

9.3.1.1.8 Carbon Budgets

The first national carbon budget programme proposed by the Climate Change Advisory Council, approved by Government and adopted by both Houses of the Oireachtas in April 2022 comprises three successive 5-year carbon budgets[1]. The total emissions allowed under each budget are shown in Table 9-8

Table 9-8 Proposed Carbon Budgets of the Climate Change Advisory Council

	2021 – 2025 Carbon Budget 1	2026 – 2030 Carbon Budget 2	2031 – 2035 Provisional Carbon Budget 3
	All Gases		
Carbon Budget (Mt CO_2eq)	295	200	151
Annual Average Percentage Change in Emissions	-4.8%	-8.3%	-3.5%
The figures are consistent with emissions in 2018 of 68.3 Mt CO_2eq reducing to 33.5 Mt CO_2eq in 2030 thus allowing compliance with he 51% emissions reduction target by 2030			

[1] *Climate Change Advisory Council Carbon Budget Technical Report (October 2021)* https://www.gov.ie/en/publication/9af1b-carbon-budgets/

9.3.1.1.9 Emissions Projections

Ireland's 2020 target under the EU Effort Sharing Decision (ESD[2]) is to achieve a 20% reduction on 2005 levels of non-Emissions Trading Scheme (non-ETS) sector emissions (agriculture, transport, residential, commercial, non-energy intensive industry, and waste). Ireland is set to miss its target for compliance with the ESD as our non-ETS emissions are projected to be 7% below 2005 levels in 2020 under both projected scenarios compared to the target of 20% below 2005 levels by 2020. This projection includes the impact of COVID on the 2020 emissions which due to national lockdowns saw Transport emissions decline but Agriculture emissions largely unaffected. Ireland is projected to exceed the 2020 ESD targets despite the impact of the pandemic.

The Environmental Protection Agency (EPA) publish Ireland's Greenhouse Gas Emission Projections and at the time of writing, the most recent report, *'Ireland's Greenhouse Gas Emissions Projections 2020–2040'* was published in June 2021. The report includes an assessment of Ireland's progress towards achieving its emission reduction targets out to 2020, 2030 and 2040 set under the EU ESD and Effort Sharing Regulation (ESR[3]).

The EPA has produced two scenarios in preparing these greenhouse gas emissions projections: a "With Existing Measures" (WEM) scenario and a "With Additional Measures" (WAM) scenario. These scenarios forecast Irelands greenhouse gas emissions in different ways. The WEM scenario assumes that no additional policies and measures, beyond those already in place by the end of 2019 (latest national greenhouse gas emission inventory), are implemented. The WAM scenario assumes that in addition to the existing measures, there is also full implementation of planned government policies and measures to reduce emissions such as those in the 2019 Climate Action Plan.

The EPA Emission Projections Update notes the following key trends:

- Total greenhouse gas emissions are projected to decrease from the latest 2019 levels by 3% by 2030 under the "With Existing Measures" scenario.
- Under the "With Additional Measures" scenario, emissions are estimated to decrease by 20% by 2030.
- Ireland's Non ETS emissions are projected to be 7% below 2005 levels in 2020 under both the 'With Existing Measures' and 'With Additional Measures' scenarios. The target for Ireland is a 20% reduction.
- Ireland exceeded its annual binding limits in 2016, 2017, 2018 and 2019.
- Over the period 2013 – 2020, Ireland is projected to cumulatively exceed its compliance obligations by 12.2 Mt CO_2 (metric tonnes of Carbon Dioxide) equivalent under the 'With Existing Measures' scenario and the 'With Additional Measures' scenario.

The report concludes:

- *"Projections indicate that Ireland will exceed the carbon budget over the period 2021-2030 by 51.3 Mt CO_2 equivalent assuming LULUCF flexibilities described in the Regulation are fully utilised."*
- *"To determine compliance under the Effort Sharing Decision, any overachievement of the binding emission limit in a particular year (between 2013 and 2020) can be banked and used towards compliance in a future year. However, even using this mechanism Ireland will still be in non-compliance according to the latest projections."*
- *"A significant reduction in emissions over the longer term is projected as a result of the expansion of renewables (e.g. wind), assumed to reach 55% by 2030 under the*

[2] *DECISION No 406/2009/EC of 23 April 2009 on the effort of Member States to reduce their greenhouse gas emissions to meet the Community's greenhouse gas emission reduction commitments up to 2020*
[3] *REGULATION (EU) 2018/1999 on the Governance of the Energy Union and Climate Action*

'With Existing Measures' scenario and 70% by 2030 under the 'With Additional Measures' scenario"

- *"The projects reflect plans to bring Ireland onto a lower carbon trajectory in the longer term. However, Ireland still faces significant challenges in meeting EU 2030 targets in the non-ETS sector and national 2050 reduction targets in the electricity generation, built environment and transport sectors. Progress in achieving targets is dependent on the level of implementation of current and future plans."*

In July 2022 the EPA also published '*Ireland's Provisional Greenhouse Gas Emissions 1990-2021*'. The key findings from the report are as follows:

- *"For 2021, Ireland's total national greenhouse gas emissions (excluding Land Use Land Use Change and Forestry – LULUCF) are estimated to have increased by 4.7% on 2020 levels to 61.53 Mt CO2 equivalent"*
- *The Provisional estimates of greenhouse gas emissions for the period 1990- 2021 indicate that Ireland will exceed its 2019 annual limit set under the EU's Effort Sharing Decision (ESD) by 6.98 Mt CO2eq.*
- *Transport emissions increased by 6.1% in 2021 compared to 2020, an additional 0.63 Mt CO2 eq.*

23.5% of the budget for the first (2021-2025) Carbon Budget period has already been used up in 2021, places additional pressure on emissions reductions in the subsequent years and implementation of effective measures will need to be swiftly stepped up to avoid the budget being exceeded.

9.3.2 Climate and Weather in the Existing Environment

County Galway has a temperate oceanic climate, resulting in mild winters and cool summers. The prevailing wind direction is between south and west which bring moist air and frequent rain.

The Met Éireann weather station at Shannon, County Clare is the nearest weather and climate monitoring station with 30-year averages from 1981-2010, to the subject site, located approximately 64km south of the site. Meteorological data recorded at Shannon over the 30-year period from 1981-2010 is shown in Table 9-8 overleaf. The wettest months are October and December, and April is the driest. July is the warmest month with a mean daily temperature of 16.4° Celsius.

9.3.2.1 Wind

The wind field characteristics of the area are important climatological elements in examining the potential for the generation of fugitive dust emissions from the site. Fugitive dust emissions from a surface occur if the winds are sufficiently strong and turbulent and the surface is dry and loose, together causing re-suspension of particulate matter from the ground. A wind speed at ground level in excess of about five metres per second is considered to be the threshold above which re-suspension of fine sized material from an exposed surface may occur. The surface needs to have a relatively low moisture content for this type of dust emission to take place and any wetting either by rainfall or sprayers, will greatly reduce the potential of fugitive dust emissions. The mean annual wind speed at the station, in Shannon, is 4.6 metres per second.

9.3.2.2 Rainfall

Long term rainfall data was obtained from the monitoring station at Shannon. The 30-year annual average rainfall for Shannon is 978 mm/yr. This is considered to be high when compared to the annual average rainfall for Dublin (Merrion Square) which recorded annual average rainfall of 730 mm/yr over the same period. Rainfall levels at the proposed development site are anticipated to be similar to those

recorded at Shannon. This will be due to both these sites being located on the western Atlantic seaboard.

Table 9-9 Data from Met Éireann Weather Station, Shannon Airport, Co. Clare 1981 to 2010

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
TEMPERATURE (degrees Celsius)													
Mean daily max	8.8	9.2	11.1	13.3	16.0	18.3	19.8	19.6	17.7	14.3	11.1	9.0	14.0
Mean daily min	3.2	3.2	4.5	5.7	8.2	10.9	12.9	12.7	10.8	8.2	5.5	3.6	7.4
Mean temperature	6.0	6.2	7.8	9.5	12.1	14.6	16.4	16.2	14.2	11.2	8.3	6.3	10.7
Absolute max.	14.8	15.5	18.3	23.5	27.2	30.2	30.6	29.8	26.1	22.3	17.6	15.3	30.6
Min. maximum	-2.4	0.9	3.5	5.4	8.0	11.8	13.8	13.0	11.1	7.0	0.8	-6.0	-6.0
Max. minimum	11.8	12.3	11.7	13.0	15.3	17.8	19.4	19.3	17.8	16.3	13.4	12.9	19.4
Absolute min.	-11.2	-5.5	-5.8	-2.3	0.2	3.6	6.7	4.4	1.7	-2.0	-6.6	-11.4	-11.4
Mean num. of days with air frost	5.3	5.1	2.1	0.7	0.0	0.0	0.0	0.0	0.0	0.5	2.3	4.8	20.8
Mean num. of days with ground frost	13.7	12.6	11.0	8.3	3.3	0.3	0.0	0.1	1.2	3.8	9.5	12.5	76.3
RELATIVE HUMIDITY (%)													
Mean at 0900UTC	87.1	87.0	85.0	79.8	76.3	76.8	80.0	82.1	84.7	87.0	88.9	88.4	83.6
Mean at 1500UTC	80.5	74.6	70.5	64.4	63.3	65.1	68.0	68.2	69.2	75.2	80.5	83.1	71.9
SUNSHINE (hours)													
Mean daily duration	1.6	2.3	3.2	5.1	5.8	5.2	4.5	4.5	3.9	2.9	2.0	1.4	3.5

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Greatest daily duration	8.1	10.2	11.0	13.6	15.6	15.8	15.7	14.4	12.2	10.1	8.3	7.1	15.8
Mean no. of days with no sun	9.2	6.4	5.7	2.4	1.9	2.0	2.4	2.3	2.9	5.5	7.8	11.1	59.8
RAINFALL (mm)													
Mean monthly total	102.3	76.2	78.7	59.2	64.8	69.8	65.9	82.0	75.6	104.9	94.1	104.0	977.6
Greatest daily total	38.2	29.4	28.1	40.2	25.0	40.6	39.5	51.0	52.3	36.9	26.9	41.2	52.3
Mean num. of days with >= 0.2mm	20	16	19	16	16	15	16	18	16	20	20	19	211
Mean num. of days with >= 1.0mm	16	12	14	11	12	11	12	13	12	16	15	15	159
Mean num. of days with >= 5.0mm	8	5	5	4	4	4	4	5	4	7	6	7	63
WIND (knots)													
Mean monthly speed	10.3	10.2	10.0	9.0	8.9	8.5	8.5	8.2	8.4	9.2	9.1	9.4	9.1
Max. gust	75	80	65	62	59	51	52	55	62	71	66	83	83
Max. mean 10-minute speed	52	46	44	40	37	37	38	35	40	47	41	57	57
Mean num. of days with gales	1.7	0.9	0.8	0.3	0.2	0.1	0.0	0.1	0.1	0.6	0.7	1.2	6.7
WEATHER (mean no. of days with..)													
Snow or sleet	2.3	2.3	1.4	0.5	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.3	8.0
Snow lying at 0900UTC	0.6	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.9

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Hail	3.6	3.3	3.4	2.2	1.2	0.1	0.1	0.1	0.3	0.9	1.1	2.4	18.6
Thunder	0.9	0.5	0.4	0.3	0.5	0.5	0.8	0.4	0.2	0.4	0.4	0.5	5.7
Fog	3.3	2.0	2.1	1.9	1.5	1.4	1.4	2.0	2.9	2.9	3.9	4.2	29.6

9.3.3 Likely and Significant Climate Impacts and Mitigation Measures

9.3.3.1 'Do-Nothing' Scenario

If the proposed development were not to proceed, there would be no change to existing climate conditions and therefore there would be no negative effects. There would be no potential for minor emissions to occur as a result of the construction and operational phases of the proposed development.

9.3.3.2 Construction Phase Potential Impacts and Mitigation Measures

The construction of the proposed development will require the operation of construction vehicles and plant. Greenhouse gas emissions, e.g. carbon dioxide (CO2), carbon monoxide and nitrogen oxides associated with vehicles and plant will arise as a result of the construction activities. This potential impact will be slight, given the insignificant quantity of greenhouse gases that will be emitted, and will be restricted to the duration of the construction phase. Therefore, this is a short-term slight negative impact. Mitigation measures to reduce this impact are presented below.

The transport of construction materials to the site will also give rise to greenhouse gas emissions associated with the transport vehicles. This constitutes a slight negative impact in terms of air quality. Mitigation measures in relation to greenhouse gas emissions are presented below.

Mitigation Measures

- All vehicles to switch off engines when not in use,
- No idling vehicles,
- On-road vehicles to comply to set emission standards,
- All non-road mobile machinery (NRMM) to be fitted with appropriate exhaust system and to be regularly serviced,
- Haul routes to be hard surfaced and cleaned and appropriate speed limits applied around the site,
- Aggregate materials for the construction infrastructure will be sourced onsite from the proposed cut areas, where possible, which further reduced potential emissions.

Residual Effect

With the implementation of the mitigation measures discussed above there will be a Short-term Imperceptible Negative Effect on Climate as a result of greenhouse gas emissions.

9.3.3.3 Operational Phase Potential Impacts and Mitigation Measures

The proposed development includes a residential development along with a creche facility, commercial floor spaces, associated outdoor amenity areas, car parking and all associated site works.

The proposed residential development is designed to achieve reduced overall consumption and usage within the buildings. The development will meet the requirements Conservation of Fuel and Energy in Dwellings (Part L, Building Regulations Technical Guidance Document, 2021) and as such will meet

the requirements for compliance with Nearly Zero Energy Building Standards. Therefore, the climate impacts from the proposed development are expected to be imperceptible.

Full details of the thermal performance and energy saving measures incorporated into the proposed development are set out in the Architectural Design Report and Utilities and Energy Sustainability Report, which form Appendix 4-7 and Appendix 4-8 of this EIAR.

Mitigation Measures

As the proposed development will have no significant negative effects on climate, mitigation measures are not proposed other than the measures outlined in the Architectural Design report and Utilities and Energy Sustainability Report in Appendix 4-7 and Appendix 4-8 of this EIAR. These measures will minimise any effect that the development might have on climate in the long-term.

Residual Effect

There will be a Long-term, Imperceptible, Neutral Effect on climate associated with the proposed project.

9.3.3.4 Assessment of Potential for Impacts on Human Health

Whilst the construction phase of the proposed development has the potential to lead to slight increases in greenhouse gas emissions, the implementation of the mitigation measures described above will prevent or minimise potential effects of this and the residual effects will be short term and imperceptible. The CEMP submitted with this application provides that the proposed development will be constructed in accordance with good management practice including good site design and layout, adopting appropriate working methods, choosing appropriate materials and equipment and ensuring that the workforce understands the company's responsibilities and is familiar with good working practice and emission minimisation techniques. The potential for health effects are considered imperceptible as the potential for greenhouse gas emissions will be limited and controlled through site and project design and mitigation measures.

Residual Effect

There will be a Short-term Imperceptible Negative Effect on Human Health as a result of the construction phase of the proposed development.

9.4 Cumulative Effects resulting from Interactions between Various Elements of the Proposed Development

The interaction of the various elements of the proposed development was considered and assessed in this EIAR with regards air and climate. The potential for each individual element of the proposed development on its own to result in significant effects on air and climate was considered in the impact assessment. The entire project including the interactions between all its elements was also considered and assessed for its potential to result in significant effects on air and climate in the impact assessment presented.

All interactions between the various elements of the project were considered and assessed both individually and cumulatively within this chapter. Where necessary, mitigation was employed to ensure

that no cumulative effects will arise as a result of the interaction of the various elements of the development with one another.

9.5 Potential Cumulative In-Combination Effects

The potential cumulative effects on air and climate arising from the proposed development, in combination with other developments in the vicinity, including all those listed in Section 2.2.3 of this EIAR, are now considered. It is noted that the other land use activities in the area are mostly residential and commercial. The majority of the developments listed in Chapter 2 consist of modifications to, or extensions of, existing houses or buildings, changes of use for existing commercial units, and other small scale development projects in a suburban area. Where appropriate the application documentation, EIAR and NIS for the projects in Section 2.2.3 have been reviewed to inform this assessment.

9.5.1 General Air Quality

Residential heating, transport vehicles and other local construction activities and the construction of the proposed development will require the consumption of fossil fuels and therefore will lead to a minor level of air emissions cumulatively. However, with the implementation of the mitigation measures discussed above, there will be no significant cumulative impacts arising from the construction phase of the proposed development (as the air quality impacts will be imperceptible) and other local existing and planned developments. Cumulative impacts resulting from the proposed development, in combination with other projects, will be negative, short term, and imperceptible

9.5.2 Dust Emissions

Dust emissions from the other land use activities in the area are likely to be imperceptible and localised to the immediate area of those projects. The potential for dust emissions from the construction phase of the proposed development exist but the residual effects will be imperceptible given the proposed mitigation measures in Sections 9.2.5.2.2 above. Therefore, cumulative impacts resulting from the proposed development, in combination with other projects, will be negative, short term, and imperceptible

9.5.3 Climate

The construction of the proposed development, in conjunction with other developments in the area (listed in Chapter 2 of this EIAR), will require plant items which consume fossil fuels and therefore will lead to a minor emission of greenhouse gases cumulatively. However, given the small-scale operations and proposed mitigation measures for the proposed development, the cumulative impacts will be short term, negative, and imperceptible in the context of the potential for impacts on climate change. There is no potential for significant cumulative climate impacts between the operational phase of the proposed development and the other projects listed in Chapter 2.

10. NOISE AND VIBRATION

10.1 Introduction

This section of the EIAR has been prepared by AWN Consulting Ltd (AWN) to assess the potential noise and vibration impact of the proposed development in the context of current relevant standards and guidance.

This chapter includes a description of the receiving ambient noise climate in the vicinity of the subject site and an assessment of the potential noise and vibration impact associated with the proposed development. Impacts are assessed from the development for both the short-term construction phase and the long-term operational phase on its surrounding environment. The assessment of direct, indirect and cumulative noise and vibration impacts on the surrounding environment have been considered as part of the assessment.

Mitigation measures are included, where relevant, to ensure the proposed development is constructed and operated in order to ensure minimal impact on the receiving environment.

An assessment of inward noise has been undertaken to ensure no significant impact associated with environmental noise is experienced at the proposed development buildings. The assessment is presented in Section 10.2.5.

This assessment has been prepared by Abe Scheele (Acoustic Consultant) who holds City & Guilds level 1 & 2 in sound engineering and City & Guilds Music Technology and has been working in the field of acoustics for six years. He has significant experience in modelling and prediction in relation to building, industrial and residential projects and extensive experience in environmental noise surveying.

This assessment has been prepared by Leo Williams (Senior Acoustic Consultant) Senior Acoustic Consultant at AWN Consulting who has over 6 years' experience as an environmental consultant specialising in Acoustics and Environmental Impact Assessment. He graduated from TCD with a BA, BAI (Mechanical and Manufacturing Engineering) and an MAI (Mechanical and Manufacturing Engineering). Leo is a Member of the Institute of Acoustics and has extensive experience in environmental noise impact assessment, in particular residential developments, industrial/manufacturing and renewable energy noise sources. He has experience in room and building acoustics modelling and assessment. He has completed the IOA Diploma in Acoustics and Noise Control.

10.2 Methodology

The assessment has been undertaken with reference to the most appropriate guidance documents relating to environmental noise and vibration which are set out in the following sections. In addition to specific noise and vibration guidance documents, the following Environmental Protection Agency (EPA) guidelines were considered and consulted in the preparation of this Chapter:

- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports –(EPA, 2022); and
- Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment (Department of Housing, Planning & Local Government, 2018);

The study has been undertaken using the following methodology:

- An environmental noise survey has been undertaken in the vicinity of the subject site in order to characterise the existing baseline noise environment;
- A review of the most applicable standards and guidelines has been conducted in order to set a range of acceptable noise and vibration criteria for the construction and operational phases of the proposed development;
- Predictive calculations have been performed during the construction phase of the project at the nearest sensitive locations to the development site;
- Predictive calculations have been performed to assess the potential impacts associated with the operation of the development at the most sensitive locations surrounding the development site;
- A schedule of mitigation measures has been proposed to reduce, where necessary, the identified potential outward impacts relating to noise and vibration from the proposed development; and,
- An assessment of noise inwards on the development has been carried out.

10.2.1 Construction Phase – Noise Criteria

10.2.1.1 General Construction

There is no published statutory Irish guidance relating to the maximum permissible noise level that may be generated during the construction phase of a project. Local Authorities typically control construction activities by imposing limits on the hours of operation and consider noise limits at their discretion.

British Standard BS 5228 – 1: 2009+A1:2014: Code of practice for noise and vibration control on construction and open sites – Noise (hereinafter referred to as BS 5228-1:2009+A1:2014) is referred to as appropriate criteria relating to permissible construction noise threshold levels for a development of this scale may be found in BS 5228-1:2009+A1:2014.

Potential noise impacts during the construction stage of a project are often assessed in accordance with BS 5228-1:2009+A1:2014. Various mechanisms are presented as examples of determining if an impact is occurring, these are discussed in the following paragraphs.

ABC Method

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

BS 5228-1:2009+A1:2014 sets out guidance on permissible noise levels relative to the existing noise environment. Table 10.1 sets out the values which, when exceeded, signify a significant effect at the facades of residential receptors.

Table 10-1 Example Threshold of Significant Effect at Dwellings

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

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

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

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

D. 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays and 07:00 – 23:00 Sundays.

For the appropriate assessment period (i.e. daytime in this instance) the ambient noise level is determined and rounded to the nearest 5 dB. If the construction noise exceeds the appropriate category value, then a significant effect is deemed to occur. It should be noted that this assessment method is only valid for residential properties and if applied to commercial premises without consideration of other factors may result in an excessively onerous thresholds being set.

The closest residential noise sensitive properties to the proposed development are houses at Gort na Bro some 30m to the east of the site and apartments at An Logain some 45m to the south.

To the north Gaelscoil Mhic Amhlaigh is located adjacent to the site boundary some 15m from areas of expected major works.

Fixed Limits

To the west are several commercial premises, the closest being located some 50m to the west of the site.

When considering non-residential receptors, reference is made to BS 5228-1:2009+A1:2014, which gives several examples of acceptable limits for construction noise, the most simplistic being based upon the exceedance of fixed noise limits. For example, paragraph E.2 states: -

> *"Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut."*

Paragraph E.2 goes on to state: -

> *"Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed: -*

70 decibels (dBA) in rural, suburban areas away from main road traffic and industrial noise;

75 decibels (dBA) in urban areas near main roads in heavy industrial areas".

Proposed Threshold Noise Levels

Taking into account the proposed documents outlined above and making reference to the baseline noise environment monitored around the development site (see Section 10.3), BS 5228-1:2009+A1:2014 has been used to inform the assessment approach for construction noise in line with best practice.

The following Construction Noise Threshold (CNT) levels are proposed for the construction stage of this development:

- For residential and education NSLs it is considered appropriate to adopt 65 dB(A) CNT. Given the baseline monitoring carried out, it would indicate that Category A values are appropriate using the ABC method.
- For commercial NSLs it is considered appropriate to adopt the 75 dB(A) CNT, given the suburban environment in which the closest commercial properties reside, in line with BS 5228-1:2009+A1:2014.

Interpretation of the CNT

In order to assist with interpretation of CNTs, Table 10-2 includes guidance as to the likely magnitude of impact associated with construction activities, relative to the CNT. This guidance is derived from Table 3.16 of *DMRB: Noise and Vibration* and adapted to include the relevant significance effects from the *EPA Guidelines* (EPA 2017).

Table 10-2 Construction Noise Significance Ratings

Guidelines for Noise Impact Assessment Significance (DMRB)	CNT per Period	EPA EIAR Significance Effects	Determination
Negligible	Below or equal to baseline noise level	Not Significant	Depending on CNT, duration & baseline noise level
Minor	Above baseline noise level and below or equal to CNT	Slight to Moderate	
Moderate	Above CNT and below or equal to CNT +5 dB	Moderate to Significant	
Major	Above CNT +5 to +15 dB	Significant, to Very Significant	

The adapted DMRB guidance outlined will be used to assess the predicted construction noise levels at NSLs and comment on the likely impacts during the construction stages.

10.2.1.2 Construction Traffic

In order to assist with the interpretation of construction traffic noise, Table 10-3 includes guidance as to the likely magnitude of impact associated with changes in traffic noise levels along an existing road. This is taken from Table 3.17 of the DMRB Noise and Vibration (UKHA 2020).

Table 10-3 Likely Effect Associated with Change in Traffic Noise Level – Construction Phase

Magnitude of Impact	Increase in Traffic Noise Level (dB)
Negligible	Less than 1.0
Minor	Greater than or equal to 1.0 and less than 3.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Major	Greater than or equal to 5.0

In accordance with the DMRB Noise and Vibration, construction noise and construction traffic noise impacts shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding:

- Ten or more days or night in any 15 consecutive day or nights;
- A total number of days exceeding 40 in any six consecutive months.

10.2.2 Construction Phase – Vibration Criteria

Vibration standards address two aspects: those dealing with cosmetic or structural damage to buildings and those with human comfort. For the purpose of this scheme, the range of relevant criteria used for surface construction works for both building protection and human comfort are expressed in terms of Peak Particle Velocity (PPV) in mm/s.

Building Damage

With respect to vibration, British Standard BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Vibration recommends that, for soundly constructed residential property and similar structures that are generally in good repair, a threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak component particle velocity (in frequency range of predominant pulse) of 15mm/s at 4Hz increasing to 20mm/s at 15Hz and 50mm/s at 40Hz and above. The standard also notes that below 12.5 mm/s PPV the risk of damage tends to zero. It is therefore common, on a cautious basis to use this lower value. Taking the above into consideration the vibration criteria in Table 10-4 are recommended.

Table 10-4 Recommended Vibration Criteria During Construction Phase

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

Expected vibration levels from the construction works will be discussed further in Section 10.4.2.

Human Perception

People are sensitive to vibration stimuli at levels orders of magnitude below those which have the potential to cause any cosmetic damage to buildings. There are no current standards which provide guidance on typical ranges of human response to vibration in terms of PPV for continuous or intermittent vibration sources.

BS5228-2:2009+A1:2014, provides a useful guide relating to the assessment of human response to vibration in terms of the PPV. Whilst the guide values are used to compare typical human response to

construction works, they tend to relate closely to general levels of vibration perception from other general sources.

Table 10-5 below summarises the range of vibration values and the associated potential effects on humans.

Table 10-5 Guidance on Effects of Human Response to PPV Magnitudes

Vibration Level, PPV	Effect
0.140mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies. At lower frequencies people are less sensitive to vibration.
0.3mm/s	Vibration might be just perceptible in residential environments.
1mm/s	It is likely that a vibration level of this magnitude in residential environments will cause complaint.

Vibration typically becomes perceptible at around 0.15 to 0.3 mm/s and may become disturbing or annoying at higher magnitudes. However, higher levels of vibration are typically tolerated for single events or events of short-term duration, particularly during construction projects and when the origin and or the duration of vibration is known. For example, hard ground breaking can typically be tolerated at vibration levels up to 2.5 mm/s if adequate public relations are in place and timeframes are known. These values refer to the day-time periods only.

During surface construction works (ground breaking etc.) the vibration limits set within Table 10-5 would be perceptible to building occupants and have the potential to cause subjective effects. The level of effect is, however, greatly reduced when the origin and time frame of the works are known and limit values relating to structural integrity are adequately communicated. In this regard, the use of clear communication and information circulars relating to planned works, their duration and vibration monitoring can significantly reduce vibration effects to the neighbouring properties.

Interpretation of the Human Response to Vibration

In order to assist with interpretation of vibration thresholds, Table 10-6 presents the significance table relating to potential impacts to building occupants during construction based on guidance from BS5228-2:2009+A1:2014.

Table 10-6 Human Response Vibration Significance Ratings

Criteria	Impact Magnitude	Significance Rating
≥10 mm/s PPV	Very High	Very Significant
≥1 mm/s PPV	High	Moderate to Significant
≥0.3 mm/s PPV	Medium	Slight to Moderate
≥0.14 mm/s PPV	Low	Not significant to Slight
Less than 0.14 mm/s PPV	Very Low	Imperceptible to Not significant

10.2.3 Operational Phase – Noise Criteria

10.2.3.1 Additional Traffic on Surrounding Roads

There are no specific guidelines or limits relating to traffic related sources along the local or surrounding roads. Given that traffic from the development will make use of existing roads already carrying traffic volumes, it is appropriate to assess the calculated increase in traffic noise levels that will arise because of vehicular movements associated with the development. In order to assist with the interpretation of the noise associated with additional vehicular traffic on public roads, Table 10-7 is taken from DMRB Design Manual for Roads and Bridges (DMRB), Highways England Company Limited, Transport Scotland, The Welsh Government and The Department for Regional Development Northern Ireland, (2020).

Table 10-7 Significance in Change of Noise Level

Change in Sound Level (dB)	Subjective Reaction	Magnitude of Impact	EPA Glossary of Effects1
10+	Over a doubling of loudness	Major	Significant
5 – 9.9	Up to a doubling of loudness	Moderate	Moderate
3 – 4.9	Perceptible	Minor	Slight
0.1 – 2.9	Imperceptible	Negligible	Imperceptible
0	None	No Change	Neutral

The guidance outlined in Table 10-7 will be used to assess the predicted increases in traffic levels on public roads associated with the proposed development and comment on the likely long-term impacts during the operational phase.

10.2.3.2 Mechanical Plant and Services

The most appropriate standard used to assess the impact of a new continuous source (i.e. plant items) to a residential environment is BS 4142 Methods for rating and assessing industrial and commercial sound (2014). This standard describes a method for assessing the impact of a specific noise source at a specific location with respect to the increase in "background" noise level that the specific noise source generates. The standard provides the following definitions that are pertinent to this application:

- "Specific sound level, $L_{Aeq,Tr}$" is equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T. This level has been determined with reference to manufacturers information for specific plant items.
- "Rating level" $L_{Ar,Tr}$ is the specific noise level plus adjustments for the character features of the sound (if any), and;
- "Background noise level" is the A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T. This level is expressed using the L_{A90} parameter. These levels were measured as part of the baseline survey.

[1] *EPA Guidelines on the Information to be contained in Environmental Impact Assessment Reports, (Draft August 2017)*

The assessment procedure in BS4142: 2014 is outlined as follows:

1. determine the specific noise level;
2. determine the rating level as appropriate;
3. determine the background noise level, and;
4. subtract the background noise level from the specific noise level in order to calculate the assessment level.

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific source will have an adverse impact or a significant adverse impact. A difference of +10 dB or more is likely to be an indication of a significant adverse impact. A difference of around +5 dB is likely to be an indication of an adverse impact, dependent on the context. Where the rated plant noise level is equivalent to the background noise level, noise impacts are typically considered to be neutral.

10.2.4 Operational Phase – Vibration Criteria

The development is mixed-use-residential in nature, therefore it is not anticipated that there will be any impact associated with vibration during the operational phase.

10.2.5 Inward Noise Impact Assessment

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

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

Stage 1 - Comprises a high-level initial noise risk assessment of the proposed site considering either measured and or predicted noise levels; and,

Stage 2 – Involves a full detailed appraisal of the proposed development covering "key elements" that include:

- Element 1 - Good Acoustic Design Process;
- Element 2 - Noise Level Guidelines;
- Element 3 - External Amenity Area Noise Assessment

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

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

Element 2 of the ProPG document sets out recommended internal noise targets derived from BS 8233 (2014). The recommended indoor ambient noise levels are set out in Table 10-8 and are based on

annual average data, that is to say they omit occasional events where higher intermittent noisy events may occur.

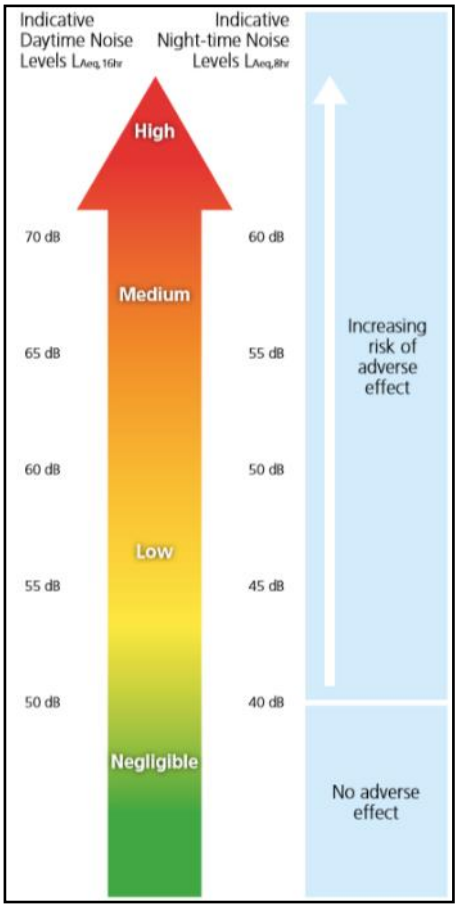


Figure 10-1 ProPG Stage 1 - Initial Noise Risk Assessment

Table 10-8 ProPG Internal Noise Levels

Activity	Location	Day (07:00 to 23:00hrs) dB $L_{Aeq,16hr}$	Night (23:00 to 07:00hrs) dB $L_{Aeq,8hr}$
Resting	Living room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB $L_{Amax,T}$*

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

In addition to these absolute internal noise levels ProPG provides guidance on flexibility of these internal noise level targets. For instance, in cases where the development is considered necessary or desirable, and noise levels exceed the external noise guidelines, then a relaxation of the internal L_{Aeq} values by up to 5 dB can still provide reasonable internal conditions.

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

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

10.3 Baseline Environment

The subject site is located on lands between Gateway Retail Park and Western Distributor Road, Knocknacarra, County Galway. To the north is a school, residential areas to the east and south with commercial areas to the south and west. The existing noise environment is dictated by road traffic from the roads adjacent to and through the development site.

Baseline monitoring has been undertaken at the development site to determine the range of noise levels at varying locations across the site and at the nearest noise sensitive locations.

10.3.1 Baseline Noise Survey

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

Choice of Measurement Locations

The measurement locations are described below and shown in Figure 10-2.

AN1 located to the western portion of the site, approximately the distance from the road of development building facades.

AN2 located to the north east of the site adjacent to Gaelscoil Mhic Amhlaigh.

AN3 located to the south to the north of houses at An Logan.

Figure 10-2 Noise Survey Locations

Survey Periods

The noise survey was carried out over the following periods:

Table 10-9 Survey Periods

Aspect	Survey Position	Survey Period
Noise	AN1, AN2 and AN3	11:45 to 14:35 on 17 November 2022

Instrumentation

The noise measurements were carried out using the equipment listed below.

Table 10-10 Noise Monitoring Equipment Details

Measurement	Manufacturer	Equipment Model	Serial Number	Calibration date
Sound Level Meter	Bruel & Kjaer	2250	2818091	November 2021
Calibrator	Rion	NC-75	34313057	August 2021

Measurement Parameters

The noise survey results are presented in terms of the following parameters.

L_{Aeq} is the equivalent continuous sound level. It is a type of average and is used to describe a fluctuating noise in terms of a single noise level over the sample period.

L_{AFmax} is the instantaneous maximum sound level measured during the sample period using the 'F' time weighting.

L_{A90} is the sound level that is exceeded for 90% of the sample period. It is typically used as a descriptor for background noise.

The "A" suffix 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.

Survey Results and Discussion

The results of the noise survey at three monitoring locations are summarised below.

Location AN1

Table 10-11 Measured Noise Levels at AN1

Date	Time	Measured Noise Levels (dB re. $2x10^{-5}$Pa)		
		L_{Aeq}	L_{Amax}	L_{A90}
17/11/2022	11:48	65	79	54
	12:45	65	76	54
	13:42	65	76	55

Measured noise levels at the survey location were dictated by passing traffic on the road and in nearby car parks. Occasional pedestrian activity, i.e. voices, etc. was observed.

Ambient noise levels were of the order of 65 dB L_{Aeq}. Background noise levels were in the range of 54 to 55 dB L_{A90}.

Location AN2

Table 10-12 Measured Noise Levels at AN2

Date	Time	Measured Noise Levels (dB re. $2x10^{-5}$Pa)		
		L_{Aeq}	L_{Amax}	L_{A90}
17/11/2022	12:08	60	76	46
	13:04	61	82	51
	14:02	59	86	47

Measured noise levels at the survey location were dictated by passing traffic. Distant construction and plant noise also contributed to the background noise levels. Other noise sources observed were a drone overhead, HGV passbys and pedestrian activity nearby.

Ambient noise levels were in the range of 59 – 61 dB L_{Aeq}. Background noise levels were in the range of 46 to 51 dB L_{A90}.

Location AN3

Table 10-13 Measured Noise Levels at AN3

Date	Time	Measured Noise Levels (dB re. $2x10^{-5}$Pa)		
		L_{Aeq}	L_{Amax}	L_{A90}
17/11/2022	12:26	66	76	53
	13:23	66	84	54
	14:20	66	80	53

Measured noise levels at the survey location were dictated by passing traffic and use of a nearby glass bottle bank. Occasionally HGV pass-by occurred.

Ambient noise levels were of the order of 66 dB L_{Aeq}. Background noise levels were in the range of 53 to 54 dB L_{A90}.

10.4 Potential Impacts of the Proposed Development

10.4.1 Construction Phase – Noise

During the construction phase of the proposed development, a variety of items of plant will be in use, such as excavators, piling equipment, dumper trucks, compressors and generators. Due to the nature of daytime activities undertaken on a construction site such as this, there is potential for generation of significant levels of noise. The flow of vehicular traffic to and from a construction site is also a potential source of relatively high noise levels.

BS 5228-1 contains noise level data for various construction machinery. The noise levels relating to site clearance, ground excavation and loading lorries (dozers, tracked excavators and wheeled loaders) reach a maximum of 81 dB $L_{Aeq,T}$ at a distance of 10 m. For this assessment, a worst-case scenario is assumed of 3 no. such items with a sound pressure level (SPL) of 81 dB at 10 m operating simultaneously along the closest works boundary. This would result in a total noise level of 86 dB at 10 m and an equivalent combined sound power level of 114 dB LWA. This worst-case scenario is the typical assumption made for developments of this size, on the basis that it is unlikely that more than 3 no. items of such plant/equipment would be operating simultaneously in such close proximity to each other.

Guidance on the approximate attenuation achieved by standard construction hoarding surrounding construction sites is also provided in BS 5228-1. It states that when the top of the plant is just visible to the receiver over the noise barrier, an approximate attenuation of 5 dB can be assumed, while a 10 dB attenuation can be assumed when the noise screen completely hides the sources from the receiver. The former scenario can be assumed in this case due to the proximity of the noise-sensitive locations, i.e. houses along the site boundary are positioned such that upper storeys are overlooking the site and perimeter hoarding is expected to partially hide the noise source.

Table 10-14 shows the potential noise levels calculated at various distances based on the assumed sound power level and attenuation provided by the barrier of 5 dB.

The closest noise sensitive locations have been identified as shown in Figure 10-3. The closest residential noise sensitive properties to the proposed development are houses at Gort na Bro some 30m

to the east of the site and apartments at An Logain some 45m to the south. To the north Gaelscoil Mhic Amhlaigh is located adjacent to the site boundary some 15m from areas of expected major works. To the west are several commercial premises, the closest being located some 50m to the west of the site.

Review of the baseline noise survey and the threshold values indicates that the appropriate daytime noise criteria for construction noise are as follows:

- Residential receptors 65 dB $L_{Aeq,T}$
- Education receptors 65 dB $L_{Aeq,T}$
- Commercial/industrial receptors 75 dB $L_{Aeq,T}$

A night-time threshold is not included as construction work will not be taking place at night.

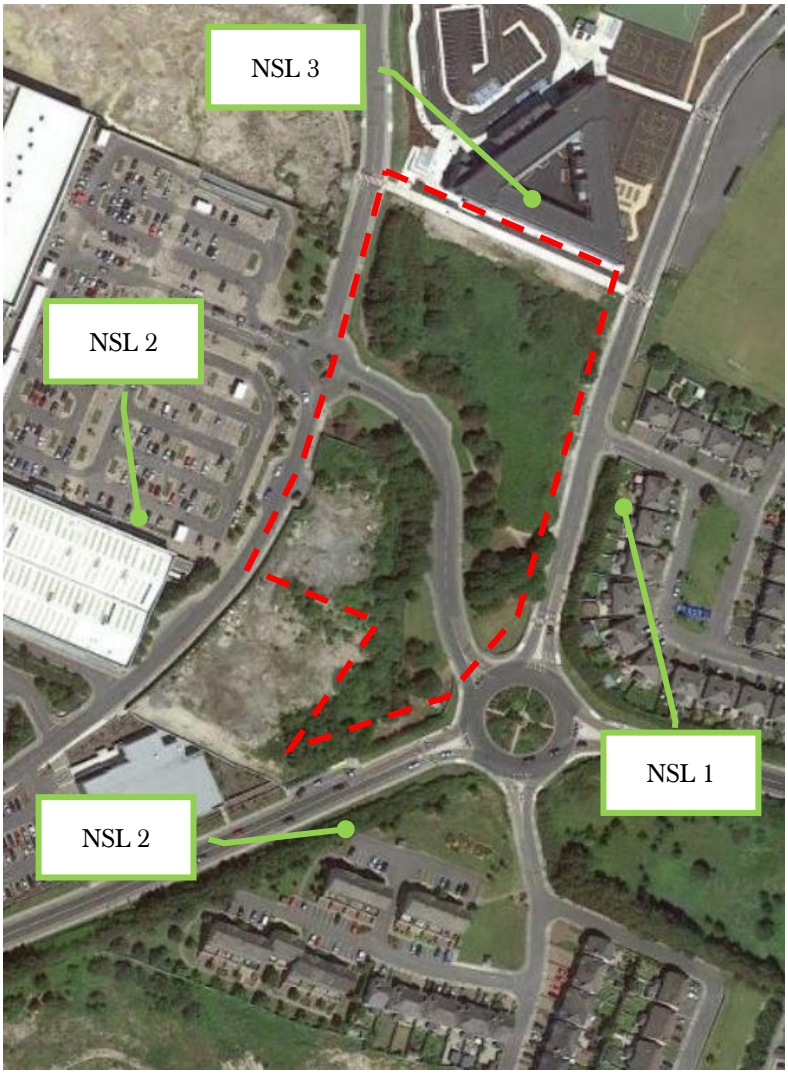


Figure 10-3 Noise Sensitive Locations

Predicted construction noise levels at various distances from areas of works are set out below.

Table 10-14 Significance in Change of Noise Level

Description of Noise Source	Sound Power Level (dB $L_{w(A)}$)	Calculated noise levels at varying distances (dB $L_{Aeq,T}$)				
		15m	20m	30m	50m	100m
3 no. items each with SPL of 81 dB at 10 m operating simultaneously.	114	74	71	67	62	55

The calculated noise levels in Table 10-14 show that the significance criteria for residential receptors will be exceeded at locations that are up to 40m from areas of major construction works. In this instance the nearest houses representative of NSL 1 are some 30-35m from areas of major works and therefore the contribution of construction noise is predicted to be in the range of +2 dB above the recommended criteria, therefore a negative, moderate to significant and short-term impact is expected at these nearest residential locations. At residential NSLs located at distances further than 40m, the expected effect is negative, moderate and short term.

The calculated noise levels show that the significance criteria for education receptors will be exceeded at locations that are up to 40m from areas of major construction works. In this instance the nearest facades of the adjacent school (NSL 3) are approximately 15m from areas of major works and therefore the contribution of construction noise is predicted to be in the range of +9 dB above the recommended criteria, therefore a negative, significant to very significant and short-term impact is expected at these nearest residential locations.

The predicted construction noise levels at commercial NSLs, the closest being some 50m from works (NSL1) is predicted to be below the recommended noise criteria and therefore a negative, slight and short-term impact is predicted.

In order to minimise the impact of construction activity good practice measures are detailed in Section 10.7.

Rock Breaking

Site investigations indicate that rock breaking may be required during the construction phase. In order to determine the potential noise impact associated with this activity, using guidance set out in BS 5228-1:2009+A1:2014. Table 10-15 outlines typical plant items and associated noise levels that are anticipated for rock breaking. An on-time for the activities has assumed to be 50% of a 12-hour working day.

Table 10-15 Potential Construction Noise Levels associated with Rock Breaking

Activity	Item of Plant (BS5228 Ref)	L_{Aeq} at 10m
Rock Breaking	Excavator Mounted Rock Breaker (C.9.12)	85
	Dump Truck (C2.30)	79
	Dozer (C2.13)	78

Table 10-16 below presents the predicted daytime noise levels associated with rock breaking at the nearest noise sensitive locations.

Table 10-16 Indicative Construction Noise Levels at Nearest Noise Sensitive Locations

Construction Phase	Item of Plant (BS 5228-1 Ref)	L_{Aeq} at distance (m)			
		(10m)	(20m)	(30m)	(50m)
Rock Breaking	Excavator Mounted Rock Breaker (C.9.12)	77	71	67	63
	Dump Truck (C2.30)	71	65	61	57
	Dozer (C2.13)	70	64	60	56

With reference to Table 10-2, construction predictions indicate that a significant to very significant impact may temporarily occur when works are on-going at the site boundaries, i.e. at distances of 10-30m from the nearest NSLs. The predicted noise levels at distances of 50m and greater from rock breaking is predicted to be of negative, moderate and temporary impact.

It should be noted that these are worst case scenarios that assume plant for the activity will operate along the boundary line at the closest point to a sensitive receptor, under real world conditions the rock breaking activity will only occur where rock is discovered and determined that removal is necessary.

Where rock breaking takes place away from boundaries, towards the centre of the site, the distances to nearby NSLs will be larger and therefore construction noise levels will be lower than these levels, for the majority of the time. It should also be noted that blasting is not proposed at any stage of the project and rock will be extracted via mechanical means. The duration of rock breaking activity will be measured in weeks rather than months with the exact duration dependant on ground conditions and the contractors approach.

Construction Traffic

An increase in traffic volume of 25% is required in order for an associated increase of 1 dB to be realised. Estimated Construction traffic flows have been provided by DBFL Consulting Engineers. On the local traffic routes at Knocknacarra increased traffic volumes are predicted to be below 25% as such the predicted change in noise level associated with additional traffic on the surrounding existing road network has a negligible effect. The impact is therefore neutral, imperceptible and short term.

10.4.2 Construction Phase – Vibration

Potential for vibration impacts during the construction phase programme are associated with rock breaking and excavations.

During rock breaking in the excavation phase, there is potential for vibration to propagate through the ground. Empirical data for this activity is not provided in the BS 5228- 2:2009+A1:2014 standard, however the likely levels of vibration from this activity is expected to be below the vibration threshold for building damage on experience from other sites.

AWN have previously conducted vibration measurements under controlled conditions, during trial construction works, on a sample site where concrete slab breaking was carried out. The trial construction works consisted of the use of the following plant and equipment when measured at various distances:

- 3 tonne hydraulic breaker on small CAT tracked excavator
- 6 tonne hydraulic breaker on large Liebherr tracked excavator

Vibration measurements were conducted during various staged activities and at various distances. Peak vibration levels during staged activities using the 3 Tonne Breaker ranged from 0.48 to 0.25 PPV (mm/s) at distances of 10 to 50m respectively from the breaking activities. Using a 6 Tonne Breaker, measured vibration levels ranged between 1.49 to 0.24 PPV (mm/s) at distances of 10 to 50m respectively.

The range of values recorded provides some context in relation to typical ranges of vibration generated by rock breaking activity which may be required on the proposed development site. This range of vibration magnitudes indicate vibration levels at the closest neighbouring buildings are expected to be below the limits set out in Table 10-4 to avoid any cosmetic damage to buildings.

In terms of disturbance to building occupants, breaking works undertaken within close proximity to the receptors on the northern site perimeter have the potential to emit perceptible vibration levels.

The potential vibration impact during the construction phase if of negative, not significant and temporary impact.

Notwithstanding the above, any construction activities undertaken on the site will be required to operate below the recommended vibration threshold set out in Table 10-4 during all activities.

10.4.3 Operational Phase – Noise

10.4.3.1 Additional Traffic on Adjacent Roads

During the operational phase of the proposed development, there will be an increase in vehicular traffic associated with the site on some surrounding roads. A traffic impact assessment relating to the proposed development has been prepared by DBFL consulting engineers, as part of this EIAR. Using this information, the related noise impacts along the relevant road links has been assessed. Road Links are presented in Figure 10-4.

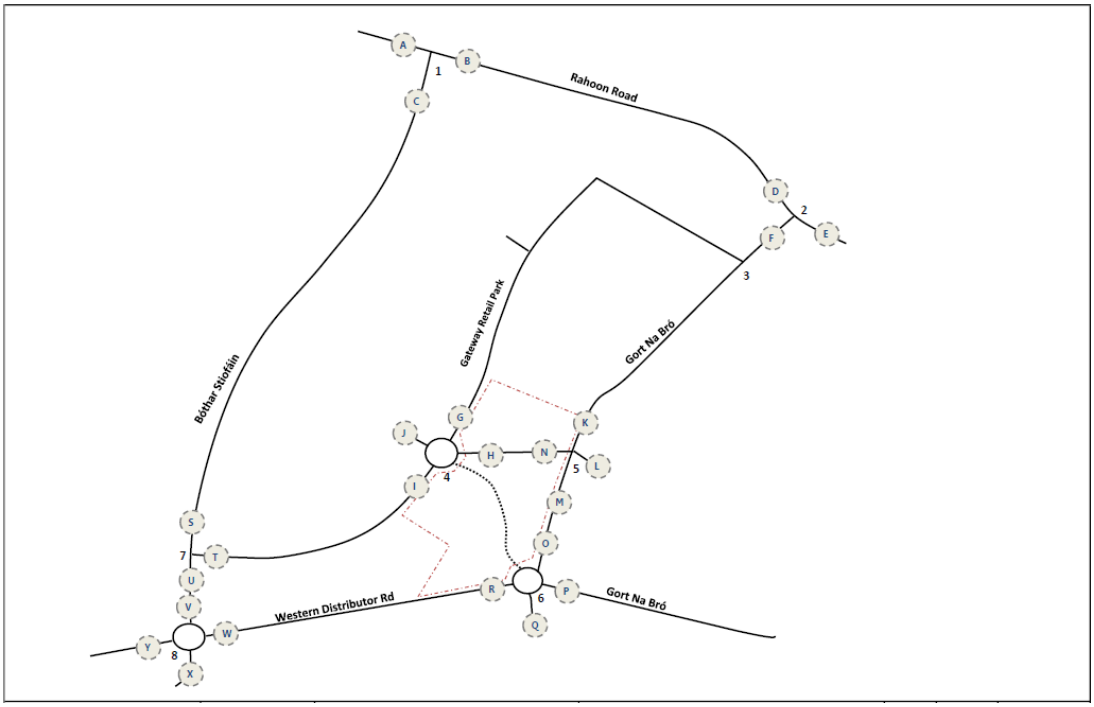


Figure 10-4 Road Links associated with the development site

Table 10-17 below presents the predicted change in noise level at different road links around the site for the year of opening and the design year using the Annual Average Daily Traffic (AADT) flows along the road links under consideration.

Table 10-17 Predicted Change in Noise Level associated with Vehicular Traffic – 2024

Road Link	Opening Year (2024)		
	Do Nothing - AADT Without Development	Do Something - AADT With Development	Change in Noise Level (dB)
F	4,774	4,972	0.2
G	3,624	4,219	0.7
H	4,753	5,219	0.4
I	6,592	6,958	0.2
J	7,467	7,467	0.0
K	2,518	2,567	0.1
L	486	486	0.0
M	7,057	7,483	0.3
N	4,934	5,410	0.4
O	2,160	2,961	1.4
P	10,024	10,060	0.0
Q	307	307	0.0
R	9,493	9,493	0.0

With reference to Table 10-7, for the Opening Year 2024 the predicted change in noise level associated with additional traffic on the surrounding existing road network has a negligible effect. The impact is therefore neutral, imperceptible and long term.

10.4.3.2 Mechanical Plant and Services

It is expected that the principal items of building and mechanical services plant will be associated with ventilation and heating of the apartment blocks. These items will be selected at a later stage, however, they will be designed and located so that there is no negative impact on sensitive receivers in proximity to the proposed development. The services plant will be designed/attenuated to meet the relevant plant noise criteria for day and night-time periods at nearby sensitive receivers as set out in Section 10.2.3.

The effect associated with building services plant, once designed to achieve the relevant noise criteria, is categorised as negative, imperceptible and long term.

10.4.3.3 Inward Noise Impact Assessment

The development lands are bound to the south by the Western Distribution Road and local roads east and west which dominate the noise environment along these boundaries. In order to establish noise

levels across the development site an acoustic noise model was developed and calibrated against noise levels measured during the baseline study on site and EPA noise maps.

Noise Model of Study Area

Proprietary noise calculation software was used for the purposes of establishing the prevailing noise levels on the proposed site. The selected software, Brüel & Kjær Type 7810 Predictor, calculates noise levels in accordance with the Calculation of Road Traffic Noise (CRTN - ISBN 0 11 550847 3) issued by the UK Department of Transport in 1988. This is the standard recognised for the prediction of road traffic noise by Transport Infrastructure Ireland (TII) and the Environmental Noise Regulations 2006 SI/140 2006.

Road Traffic Noise Modelled

A change in road layout is proposed as part of the new development. Road traffic data provided by DBFL Consulting Engineers was used to account for the impact this new road layout would have on the amenity areas and the inward noise impact in the proposed development site.

Noise Model Validation

Noise levels provided by The EPA round 3 noise maps were used to calibrate the noise model to within 2 dB of the calculated values. The resultant daytime levels output from the model calibration are slightly higher that the average measured levels (AN3) but are representative of periods of higher noise levels measured on site. This is regarded as very strong correlation in respect of predicted noise levels. Noise levels are calculated over daytime periods, i.e. 07:00 to 23:00hrs and night-time periods, 23:00 to 07:00 hrs.

Table 10-18 Calculated and Measured Noise Levels at Development Site

Location	Time Period	Measured Noise Level (dB)	Calculated Noise Level (dB)
AN3	Daytime, $L_{Aeq,16hr}$	66	68

Figure 10-5 and Figure 10-6 display the calculated noise contours across the site for day and night-time periods at a height of 4m above ground, i.e. the typical height of a first floor window.

The results of the modelling exercise demonstrate that highest noise levels are experienced along the south and west of the site in proximity to the road edges and reduce considerably by 10 dB towards the centre of the site, in the absence of any development buildings.

Figure 10-5 Initial Noise Risk Assessment – Daytime (4m height)

Figure 10-6 Initial Noise Risk Assessment – Night time (4m height)

Giving consideration to the noise levels presented in the previous sections the initial site noise risk assessment has concluded that the level of risk across the site lies within the Low to Medium noise risk categories.

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

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

Given the above, it can be concluded that the development site may be categorised as Low to Medium Noise Risk and as such the Acoustic Design Statement (following here and also in Section 10.6.2.1) is required to demonstrate that suitable care and attention has been applied in mitigating and minimising noise impact to such an extent that an adverse noise impacts will be avoided in the final development.

It should be noted that ProPG states the following with regard to how the initial site noise risk is to be used:

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

Following the guidance contained in ProPG, therefore, it does not preclude residential development on sites that are identified as having medium or high noise levels. It merely identifies the fact that a more considered approach will be required to ensure the developments on the higher risk sites are suitably designed to mitigate the noise levels. The primary goal of the approach outlined in ProPG is to ensure that the best possible acoustic outcome is achieved for a particular site.

Acoustic Design Statement – Part 1

Façade Noise Levels

Noise levels have been predicted across the proposed development site during day and night-time periods using the noise model developed to include the development buildings. Figure 10-7 and Figure 10-8 illustrate the predicted traffic noise levels for daytime and night-time at heights of 4m.

Figure 10-7 Predicted Noise Levels – Daytime (4m Height)

Predicted daytime noise levels across the site range from <50 dB in sheltered areas, screened from road traffic, to 67 dB along the western boundary.

Figure 10-8 Predicted Noise Levels – Night-time (4m Height)

Predicted night-time noise levels across the site range from <40 - 50 dB in sheltered areas, screened from road traffic, to 58 dB along the southern boundary which faces on to Distribution Road.

Where façade noise levels are less than 55 dB $L_{Aeq,16hr}$ during the day and 50 dB $L_{Aeq,8hr}$ at night it is possible to achieve reasonable internal noise levels while also allowing for supplementary ventilation of dwellings with open windows. Therefore, for those properties where the façade noise levels are less than 55 dB $L_{Aeq,16hr}$ during the day and 50 dB $L_{Aeq,8hr}$ at night no further mitigation is required, typically facades facing inwards on the courtyard.

Where façade levels are above the levels detailed above, the sound insulation performance of the building façade becomes important and a minimum sound insulation performance specification is required for windows and vents to ensure that when windows are closed the internal noise criteria are achieved.

Proposed Façade Treatment

Predicted noise levels on several facades are above a level whereby internal noise levels are achieved with standard double glazing and therefore mitigation in the form of enhanced glazing and ventilators will be required. The facades where mitigation is required are outlined in Figure 10-9.

Figure 10-9: Facades requiring enhanced glazing and ventilation

The British Standard BS EN 12354-3: 2000: *Building acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 3: Airborne sound insulation against outdoor sound* provides a calculation methodology for determining the sound insulation performance of the external envelope of a building. The method is based on an elemental analysis of the building envelope and can take into account both the direct and flanking transmission paths.

The Standard allows the acoustic performance of the building to be assessed taking into account the following:

- Construction type of each element (i.e. windows, walls, etc.);
- Area of each element;
- Shape of the façade, and;
- Characteristics of the receiving room.

The principles outlined in BS EN 12354-3 are also referred to in BS8233 and Annex G of BS8233 provides a calculation method to determine the internal noise level within a building using the composite sound insulation performance calculated using the methods outlined in BS EN 12354-3. The methodology outlined in Annex G of BS8233 has been adopted here to determine the required performance of the building facades.

The specification of this enhanced façade is discussed in Section 10.6.2.1

External Noise Levels

Figure 10-10 presents the calculated day time noise levels across the site with the development buildings in place. The contours are calculated for a height of 1.5m.

External noise levels within the majority of communal open spaces, communal terraces and private balconies across the development site are within the recommended range of noise levels from ProPG of between 50 – 55 dB $L_{Aeq,16hr}$ as illustrated in Figure 10-10.

Outdoor space along the western boundary at the Civic Plaza experience higher than the ideal range of noise levels outlined above due to proximity to local roads, however this is offset somewhat by the desirability of proximity to urban surroundings and proximity and accessibility of public transport and local amenities. There is also provision of internal amenity space within the development itself to the north of the site at blocks A1 and A2 and centrally located among blocks B2, B3, B4 and B5 benefitting from the screening provided due to the building layout.

It is considered that the objectives of achieving suitable external noise levels are achieved within the overall site, therefore no further mitigation is required to control external noise levels across amenity areas.

Figure 10-10 Predicted Daytime Noise Levels – External Amenity Areas – 1.5m height

Comment on Other Noise Sources

It was observed during the noise survey that a bottle bank was in use to the south of the proposed development. The permitted use of bottle banks is typically restricted to the daytime only. With respect to noise it is considered there is potential for momentary impacts while the bottle bank is in use.

10.5 'Do-Nothing' Impact

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

That said, if the proposed development were not to proceed, then a different development, similar in nature may be constructed as the land is zoned for development in keeping with national policy.

10.6 Mitigation Measures

10.6.1 Construction Phase

With regard to construction activities, best practice control measures for noise and vibration from construction sites are found within BS 5228 (2009 +A1 2014) Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2. Whilst construction noise and vibration impacts are expected to vary during the construction phase depending on the distance between the activities and noise sensitive buildings, the contractor will ensure that all best practice noise and vibration control methods will be used, as necessary in order to ensure impacts at off-site NSLs are minimised.

The best practice measures set out in BS 5228-1 and BS 5228-2 includes guidance on several aspects of construction site mitigation measures, including, but not limited to:

- selection of quiet plant;
- noise control at source;
- screening; and,
- liaison with the public.

Construction activities will vary depending on the phase of construction.

Noise Control at Source

If replacing a noisy item of plant is not a viable or practical option, consideration will be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods in consultation with the supplier. For example, resonance effects in panel work or cover plates will be reduced through stiffening or application of damping compounds; rattling and grinding noises can often be controlled by fixing resilient materials in between the surfaces in contact.

Referring to the potential noise generating sources for the works under consideration, the following best practice migration measures will be considered:

- The lifting of bulky items, dropping and loading of materials will be restricted to normal working hours.
- Mobile plant should be switched off when not in use and not left idling.
- For piling plant, noise reduction can be achieved by enclosing the driving system in an acoustic shroud.
- For concrete mixers, control measures will be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum.
- For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials.
- Demountable enclosures can also be used to screen operatives using hand tools and will be moved around site as necessary.
- All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.

Screening

Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control.
In addition, careful planning of the site layout will also be considered. The placement of site buildings such as offices and stores will be used, where feasible, to provide noise screening when placed between the source and the receiver.

Liaison with the Public

A designated environmental liaison officer will be appointed to site during construction works. Any noise complaints will be logged and followed up in a prompt fashion by the liaison officer. In addition, where a particularly noisy construction activity is planned or other works with the potential to generate high levels of noise, or where noisy works are expected to operate outside of normal working hours etc., the liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works.

Project Programme

The phasing programme will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. During excavation/ rock breaking or other high noise generating works are in progress on a site at the same time as other works of construction that themselves may generate significant noise and vibration, the working programme will be phased so as to prevent unacceptable disturbance at any time.

Consideration will be given to nearby noise sensitive locations generally, and with respect to time periods whereby the locations are more sensitive or less sensitive to potential disturbance due to noise or vibration. .

Monitoring

Construction noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the development works to check compliance with the construction noise criterion. Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.

Vibration monitoring stations should continually log vibration levels using the Peak Particle Velocity parameter (PPV, mm/s) in the X, Y and Z directions, in accordance with BS ISO 4866: 2010: Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures.

10.6.2 Operational Phase

Mechanical Plant Noise

Best practice guidance details an assessment methodology to derive appropriate noise limits at the nearest noise sensitive properties that must be achieved in order to ensure the effect of plant noise is acceptable. To achieve these noise limits consideration will be given, at the detailed design stage, to a variety of mitigation measures and forms of noise control techniques. Some example of these measures are as follows:

- Duct mounted attenuators on the atmosphere side of air moving plant;
- Splitter attenuators or acoustic louvres providing free ventilation to internal plant areas;
- Solid barriers screening any external plant;
- Anti-vibration mounts on reciprocating plant.

In addition to the above, it is proposed that the following practices are adopted to minimise potential noise disturbance for neighbours.

- All mechanical plant items e.g. motors, pumps etc. shall be regularly maintained to ensure that excessive noise generated any worn or rattling components is minimised;
- Any new or replacement mechanical plant items, including plant located inside new or existing buildings, shall be designed so that all noise emissions from site do not exceed the noise limits outlined in this document.

10.6.2.1 Inward Noise Impact - Design Statement Part 2

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

In this instance residential units on the facades highlighted in Figure 10-9 will be provided with glazing and ventilation that achieves the minimum sound insulation performances as set out in Table 10-19 and Table 10-20. Other facades in the development have no minimum requirement for sound insulation.

Table 10-19 Sound Insulation Performance Requirements for Glazing, SRI (dB)

Zone	Nominal R_w (dB)	SRI (dB) per Octave Band Centre Frequency (Hz)					
		125	250	500	1k	2k	4k
	37	26	27	34	40	38	46

The overall R_w and $D_{ne,w}$ outlined in this section are provided for information purposes only. The over-riding requirement is the Octave Band sound insulation performance values which may also be achieved using alternative glazing and ventilation configurations.

Test data should be sought from the supplier of the glazing at detailed design stage to ensure that the acoustic specification is met.

The following performance requirements apply to all ventilation paths from outside the building. This can be achieved by passive acoustic wall or window vents or via mechanical ventilation systems.

Table 10-20 Acoustic Performance Requirements for Vents, $D_{n,e,w}$ (dB)

Zone	Nominal $D_{n,e,w}$ (dB)	SRI (dB) per Octave Band Centre Frequency (Hz)					
		125	250	500	1k	2k	4k
	38	30	33	38	37	36	28

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

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

10.7 Residual Impacts

10.7.1 Construction Phase

10.7.1.1 Noise

The construction noise assessment has shown that predicted noise levels associated with general construction activity at the location of development buildings, i.e. distances of 40m from nearest NLS, are above the noise criteria and therefore for these works a negative, moderate to very significant and short-term effect is predicted.

For the time periods whereby works are taking place close to the site boundary at distances of 15-30m from NSLs, the predicted effect at these nearest NLS is negative, significant to very significant and temporary.

At sensitive locations at distances of 50m and greater from construction works, the predicted construction noise level is within the noise criteria and therefore the predicted effect is negative, moderate and short term.

In the case that rock breaking activities take place it is predicted the potential effect at distances up to 20m will be negative, significant to very significant and temporary.

The noise assessment of construction vehicle movements associated with the site has shown that the predicted effect will be of neutral, imperceptible and short term, effect on offsite noise sensitive locations considering existing traffic volumes on the local road network.

10.7.1.2 Vibration

Due to the nature of the proposed construction works and the large distance between vibration-generating activity and residential and educational sensitive locations, the effect at these locations is expected to be negative, not significant and temporary.

10.7.2 Operational Phase

10.7.2.1 Noise

Mechanical Plant

Plant items will be located and selected so that cumulative plant noise emissions from the proposed development achieve the appropriate noise criteria, the noise impact is predicted to be neutral, imperceptible and long-term.

Additional Traffic on Adjacent Roads

Based on the traffic flows associated with the operation of the proposed development the impacts are predicted to be neutral, imperceptible and long term.

10.7.2.2 Vibration

There are no proposed sources of vibration associated with the operation of the proposed development. The associated effects can therefore be described as neutral, imperceptible, and long term.

10.8 Cumulative Impacts

10.8.1 Construction Phase

During the construction phase of the proposed development, construction noise on site will be localised and will therefore likely the primary noise source at the nearest noise sensitive receivers. There is a development plot to the southwest of the proposed development where future development is likely. Should construction of both sites occur simultaneously there is potential for cumulative noise impacts at noise sensitive receivers equidistant from the two sites.

In this scenario, it is recommended that liaison between construction sites is on-going throughout the duration of the construction phase. Contractors should schedule work in a co-operative effort to limit the duration and magnitude of potential cumulative impacts on nearby sensitive receptors. Cumulative construction noise impacts are expected to be negative, significant and short-term at times of high activity on both sites.

The contractor will be required to control noise impacts associated with this development in line with the guidance levels included in Table 10.1 and follow the best practice control measures within BS 5228 -1.

It is also likely that the proposed development will be completed before construction commences on the adjacent development, in which case no cumulative effects would manifest.

Any large scale future projects that are not yet proposed or permitted would also need to be the subject of EIA in turn, to ensure that no significant impacts resulting from noise and vibration will occur as a result of those developments.

10.8.2 Operational Phase

Cumulative impacts associated with the operational phase of the development are expected to be limited to increases in traffic on local roads. The predicted increase in noise level associated with the proposed development range from neutral to imperceptible, i.e. at such a minimal level that in the instance that the noise level increase were to be summed with that associated with another future development, that the cumulative increase would remain not significant.

10.9 Interactions

In compiling this environmental impact assessment, reference has been made to the project description provided by the project co-ordinators in Chapter 2 (Description of Proposed Project), project drawings provided by the project architects and information relating to construction activities provided by the engineers. Noise emission sources from the proposed development during the construction and operational phases will be from construction plant and activity. The noise impact assessment has been prepared in consultation with the design team and traffic consultant, referring to the traffic flow projections set out in Chapter 13 (Traffic and Transportation).

The potential impacts on human beings in relation to the generation of noise and vibration during the construction phases are discussed in Chapter 5 (Population and Human Health. In summary, high levels of noise and vibration could cause a degree of nuisance to people in nearby sensitive locations. Implementation of the mitigation measures set out and adherence to good practice noise reducing measures will ensure that the residual impact on human health will be lessened. Similarly, during the operational phase, plant selections designed to achieve the relevant noise criteria will result in a residual impact that is imperceptible to people in nearby noise sensitive locations.

10.10 References

- Environmental Impact Assessment of Projects: Guidance on the preparation of the Environmental Impact Assessment Report (European Commission, 2017);
- Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2022);
- BSI (1993). BS 7385: 1993 Evaluation and measurement for vibration in buildings Part 2: Guide to damage levels from ground borne vibration;
- BS 4142: 2014: Methods for Rating and Assessing Industrial and Commercial Sound;
- BSI (2014). BS 5228-1:2009 +A1:2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise;
- BSI (2014). BS 5228-2:2009+A:2014 Code of Practice for noise and vibration control of construction and open sites - Part 2: Vibration;
- EPA (2015). Advice Notes for Preparing Environmental Impact Statements. Draft. September 2015;
- ISO (2016). ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures;

- UK Department of Transport (1998). Calculation of Road Traffic Noise;
- UKHA (2020). Design Manual for Roads and Bridges Sustainability & Environment Appraisal LA 111 Noise and Vibration Revision 2;
- The Professional Practice Guidance on Planning & Noise (ProPG) May 2017.

11. ARCHAEOLOGICAL, ARCHITECTURAL AND CULTURAL HERITAGE

11.1 Introduction

The purpose of this chapter is to assess the potential effects of the Proposed Development on the surrounding archaeological, architectural and cultural heritage landscape. The assessment is based on both a desktop review of the available cultural heritage and archaeological data and a comprehensive programme of field walking of the EIAR study area. The report amalgamates desk-based research and the results of field walking to identify areas of archaeological/architectural/cultural significance or potential, likely to be impacted by the Proposed Development. An assessment of potential effects, including cumulative effects, is presented, and a number of mitigation measures are recommended where appropriate. The visual effect of the Proposed Development on any newly discovered monuments/sites of significance as well as known recorded monuments is also assessed. This section of EIAR has been completed in accordance with the guidance set out by the Environmental Protection Agency (EPA) in the EPA guidelines (2022).

11.1.1 Proposed Development

The proposed development is located at the Knocknacarra District Centre, Galway on a site which extends to 2.4Ha. The proposed development will consist of the following:-

1. Provision of 227 no. residential apartments in 7 no. blocks comprising the following:
   a. Block A1: 14 no. 1 bed apartments & 24 no. 2 bed apartments in a block ranging between 3-5 storeys in height;
   b. Block A2: 25 no. 1 bed apartments & 15 no. 2 bed apartments in a block ranging between 1-5 storeys in height;
   c. Block B1: 3 no. 1 bed apartments, 18 no. 2 bed apartments & 3 no. 3 bed apartments in a block ranging between 3-4 storeys in height;
   d. Block B2: 13 no. 1 bed apartments & 21 no. 2 bed apartments in a block ranging between 4-5 storeys in height.
   e. Block B3: 5 no. 1 bed apartments, 22 no. 2 bed apartments & 1 no. 3 bed apartment in a block ranging between 3-5 storeys in height;
   f. Block B4: 11 no. 1 bed apartments & 26 no. 2 bed apartments in a block ranging between 3-5 storeys in height;
   g. Block B5: 13 no. 1 bed apartments & 13 no. 2 bed apartments in a block ranging between 3-5 storeys in height.

2. Provision of 1,009.7 sq.m of ground floor commercial units as follows:
   i. Unit A101: 411.7 sq.m;
   ii. Unit A102: 138.2 sq.m;
   iii. Unit B201: 99.7 sq.m;
   iv. Unit B202: 133.9 sq.m;
   v. Unit B301 3: 226.2 sq.m.
3. Provision of a Community Facility (117.8 sq.m);
4. Provision of Tenant Amenity Facilities (99.4 sq.m);
5. Provision of a Childcare Facility (561.3 sq.m) including an external secure play area;
6. Provision of 49 no. surface car parking spaces including EV charging spaces;
7. Provision of bicycle parking comprising 114 no. short stay and 436 no. long stay spaces;
8. Provision of realigned road between Gort na Bró and Gateway Retail Park Road;
9. Change of use of existing underground void to 181 bay underground car park;

10. Provision of shared communal and private open spaces, bin storage, public lighting, site landscaping, services, signage, substation, and all associated site development works required to accommodate the proposed development.

The full description of the proposed development is provided in Chapter 4 of this EIAR.

11.1.2 Statement of Authority

This section of the EIAR has been prepared by Miriam Carroll and Annette Quinn of Tobar Archaeological Services. Miriam and Annette both graduated from University College Cork in 1998 with a Masters degree in Methods and Techniques in Irish Archaeology. Both directors are licensed by the Department of Housing, Local Government and Heritage to carry out excavations and are members of the Institute of Archaeologists of Ireland. Annette Quinn and Miriam Carroll have been working in the field of archaeology since 1994 and have undertaken numerous projects for both the private and public sectors including excavations, site assessments (EIAR) and surveys. Miriam Carroll and Annette Quinn are directors of Tobar Archaeological Services which has been in operation for 19 years.

11.1.3 Legislation and Guidelines

11.1.3.1 Current Legislation

Archaeological monuments are safeguarded through national and international policy, which is designed to secure the protection of the cultural heritage resource. This is undertaken in accordance with the provisions of the European Convention on the Protection of the Archaeological Heritage (Valletta Convention). This was ratified by Ireland in 1997.

Both the National Monuments Acts 1930 to 2004 and relevant provisions of the Cultural Institutions Act 1997 are the primary means of ensuring protection of archaeological monuments, the latter of which includes all man-made structures of whatever form or date. There are a number of provisions under the National Monuments Acts which ensure protection of the archaeological resource. These include the Register of Historic Monuments (1997 Act) which means that any interference to a monument is illegal under that Act. All registered monuments are included on the Record of Monuments and Places (RMP).

The Record of Monuments and Places (RMP) was established under Section 12 (1) of the National Monuments (Amendment) Act 1994 and consists of a list of known archaeological monuments and accompanying maps. The Record of Monuments and Places affords some protection to the monuments entered therein. Section 12 (3) of the 1994 Amendment Act states that any person proposing to carry out work at or in relation to a recorded monument must give notice in writing to the Minister (Environment, Heritage and Local Government) and shall not commence the work for a period of two months after having given the notice. All proposed works, therefore, within or around any archaeological monument are subject to statutory protection and legislation (National Monuments Acts 1930-2004).

Under the Heritage Act (1995) architectural heritage is defined to include ‘all structures, buildings, traditional and designed, and groups of buildings including street-scapes and urban vistas, which are of historical, archaeological, artistic, engineering, scientific, social or technical interest, together with their setting, attendant grounds, fixtures, fittings and contents...’. A heritage building is also defined to include ‘any building, or part thereof, which is of significance because of its intrinsic architectural or artistic quality or its setting or because of its association with the commercial, cultural, economic, industrial, military, political, social or religious history of the place where it is situated or of the country or generally‘.

11.1.3.1.1 *Granada Convention*

The Council of Europe, in Article 2 of the 1985 Convention for the Protection of the Architectural Heritage of Europe (Granada Convention), states that 'for the purpose of precise identification of the monuments, groups of structures and sites to be protected, each member State will undertake to maintain inventories of that architectural heritage'. The Granada Convention emphasises the importance of inventories in underpinning conservation policies.

The NIAH was established in 1990 to fulfill Ireland's obligations under the Granada Convention, through the establishment and maintenance of a central record, documenting and evaluating the architectural heritage of Ireland. Article 1 of the Granada Convention establishes the parameters of this work by defining 'architectural heritage' under three broad categories of Monument, Groups of Buildings, and Sites:

- Monument: all buildings and structures of conspicuous historical, archaeological, artistic, scientific, social or technical interest, including their fixtures and fittings;
- Group of buildings: homogeneous groups of urban or rural buildings conspicuous for their historical, archaeological, artistic, scientific, social or technical interest, which are sufficiently coherent to form topographically definable units;
- Sites: the combined works of man and nature, being areas which are partially built upon and sufficiently distinctive and homogenous to be topographically definable, and are of conspicuous historical, archaeological, artistic, scientific, social or technical interest.

The Council of Europe's definition of architectural heritage allows for the inclusion of structures, groups of structures and sites which are considered to be of significance in their own right, or which are of significance in their local context and environment. The NIAH believes it is important to consider the architectural heritage as encompassing a wide variety of structures and sites as diverse as post boxes, grand country houses, mill complexes and vernacular farmhouses.

11.1.3.2 Policies of the Galway City Development Plan 2017-23

The Galway City Development Plan 2017-2023 outlines a number of policies relating to archaeology and built heritage as follows.

Policy 8.5 Archaeology

Protect the archaeological heritage of the city.

Ensure that proposed development within the designated city centre Zone of Archaeological Potential is not detrimental to the character of an archaeological site or its setting.

Have regard to the archaeological recommendations of the Department of Arts, Heritage, Rural, Regional and Gaeltacht Affairs on any planning applications.

Endorse the sustainable use of archaeological heritage as an educational and cultural resource and promote public awareness of the archaeological heritage of the city.

Require the surveying, recording or excavation of archaeological heritage during the development process where appropriate.

Seek the preservation in-situ or, at a minimum, preservation by record of archaeological sites/monuments included in the Record of Monuments and Places.

Ensure that any development proposal with potential to impact on archaeological heritage includes for an archaeological assessment. This includes within terrestrial, riverine, inter-tidal and sub-tidal environments.

Promote the protection of the varied industrial heritage of the city and encourage greater appreciation and public awareness of this heritage.

The Development Plan also outlines policies and objective in relation to built heritage such as Protected Structures, Vernacular Structures etc as follows:

Policy 8.2 Built Heritage - Record of Protected Structures

Encourage the protection and enhancement of structures listed in the Record of Protected Structures.

Ensure new development enhances the character or setting of a protected structure.

Avoid protected structures becoming endangered by neglect or otherwise by taking appropriate action in good time.

Consider the inclusion in the Record of Protected Structure of buildings and structures of special interest.

Consult with the Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs regarding any planning applications relating to protected structures and national monuments.

Implement proactive measures to encourage the conservation of protected structures.

Policy 8.4 Vernacular Heritage

Encourage the rehabilitation, renovation and re-use of existing structures that contribute to the character of the city.

Increase public awareness of the vernacular heritage of the city through publication of the Survey and Inventory of Galway City's Thatched Buildings.

11.2 Methodology

The assessment of the archaeology and cultural heritage of the proposed development area included desk-based research, GIS map compilation, and a site inspection. A desk-based study of the proposed development area was undertaken in order to assess its archaeological and cultural heritage potential and to identify features of archaeological or cultural heritage significance within or near to the proposed development site. Site inspection was undertaken in March 2019 to assess any potential impacts on known or previously unrecorded sites or monuments.

11.2.1 Desktop Assessment

A number of sources were consulted as part of the desktop assessment of the proposed development in order to ensure that all the known and potential archaeology and cultural heritage of the area was considered as part of this report.

The sources consulted included but were not limited to the following:

- The Sites and Monuments Record (SMR)
- The Record of Monuments and Places (RMP)
- The Topographical Files of the National Museum of Ireland on www.heritagemaps.ie
- Down Survey Barony maps (1656-8) (www.downsurvey.tcd.ie)

- First edition Ordnance Survey map
- Second edition Ordnance Survey map
- Third edition Ordnance Survey map
- Aerial photographs
- Excavations Database
- National Inventory of Architectural Heritage (NIAH)
- Galway City Development Plan 2017-2023

11.2.1.1 Record of Monuments and Places

A primary cartographic source and base-line data for the assessment was the consultation of the Sites and Monuments Record (SMR) and Record of Monuments and Places (RMP) for County Galway. All known recorded archaeological monuments are indicated on 6 inch Ordnance Survey (OS) maps and are listed in this record. The SMR/RMP is not a complete record of all monuments as newly discovered sites may not appear in the list or accompanying maps. In conjunction with the consultation of the SMR and RMP the electronic database of recorded monuments which may be accessed at Historic Environment Viewer (archaeology.ie) was also consulted.

11.2.1.2 Cartographic Sources and Aerial Photography

The 1st (1840s) and 2nd (1900s) edition OS maps for the area were consulted as was OSI aerial photography and Down Survey Barony maps (1656-8).

11.2.1.3 Topographic Files – National Museum of Ireland

Details relating to finds of archaeological material and monuments in numerous townlands in the country are contained in the topographical files held in the National Museum of Ireland. The townland within which the development is located were checked for such finds on www.heritagemaps.ie.

11.2.1.4 Excavations Database

The excavations database is an annual account of all excavations carried out under license in Ireland. The database is available on line at www.excavations.ie and includes excavations from 1985 to 2022. This database was consulted as part of the desktop research for this assessment to establish if any archaeological excavations had been carried out within or near to the proposed development area.

11.2.1.5 National Inventory of Architectural Heritage

This source lists some of the architecturally significant buildings and items of cultural heritage and is compiled on a county by county basis by the Department of Culture, Heritage and the Gaeltacht. The NIAH database was consulted for all townlands within and adjacent to the study area. The NIAH survey for Galway has been published and was downloaded on to the base mapping for the proposed development. The National Inventory of Architectural Heritage (NIAH) is a state initiative under the administration of the former Department of Arts, Heritage and the Gaeltacht and established on a statutory basis under the provisions of the Architectural Heritage (National Inventory) and Historic Monuments (Miscellaneous Provisions) Act 1999.

The purpose of the NIAH is to identify, record, and evaluate the post-1700 architectural heritage of Ireland, uniformly and consistently as an aid in the protection and conservation of the built heritage. NIAH surveys provide the basis for the recommendations of the Minister for the Department of Culture, Heritage and the Gaeltacht to the planning authorities for the inclusion of particular structures in their Record of Protected Structures (RPS). The published surveys are a source of information on the selected structures for relevant planning authorities.

11.2.1.6 Record of Protected Structures

The dataset for Galway City Protected Structures is available on-line and was added to the base mapping for the proposed development in order to assess any potential impacts to such structures.

11.2.2 Geographic Information Systems

A geographic information system (GIS) was used to manage the datasets relevant to the archaeological and architectural heritage assessment and for the creation of all the maps in this report. This involved the overlaying of the relevant archaeological and architectural datasets on georeferenced aerial photographs and road maps (ESRI), where available. The integration of this spatial information allows for the accurate measurement of distances of a proposed development from archaeological sites and the extraction of information on 'monument types' from the datasets. Areas of archaeological sensitivity may then be highlighted in order to mitigate the potential negative effects of the development on archaeological heritage.

11.2.3 Field Inspection

The development area was inspected by Tobar Archaeological Services over one day in March 2019. A walk-over survey of the proposed development site was undertaken, and a photographic and descriptive record made of same (see Section 11.3.1 below).

11.2.4 Assessment of Likely Significant Effects

The likely effects on the existing archaeological and cultural heritage environment are assessed using the criteria as set out in the EPA guidelines (2022). The following terminology is used when describing the likely effects of the Proposed Development from a Cultural Heritage perspective.

11.2.4.1 Types of Impact

Direct impacts arise where an archaeological heritage feature or site is physically located within the footprint of the development whereby the removal of part, or all of the feature or site is thus required.

Indirect impacts may arise as a result of subsurface works undertaken outside the footprint of the development, secondary environmental change such as a reduction in water levels and visual impacts.

Cumulative Impacts arise when the addition of many impacts create a larger, more significant impact.

Residual Impacts are the degree of environmental changes that will occur after the proposed mitigation measures have been implemented.

11.2.4.1.1 *Magnitude of Effects (Significance)*

- Profound: Applies where mitigation would be unlikely to remove adverse effects. Reserved for adverse, negative effects only. An effect which obliterates sensitive characteristics. These effects arise where an archaeological site is completely and irreversibly destroyed.
- Very Significant: An effect which by its character, magnitude, duration or intensity significantly alters most of the sensitive aspect of the environment.
- Significant: An effect which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment. An effect like this would be where part of a site would be permanently impacted upon, leading to a loss of character, integrity and data about an archaeological site.

- Moderate: An effect that alters the character of the environment in a manner that is consistent with existing and emerging baseline trends. A moderate effect arises where a change to an archaeological site is proposed which though noticeable, is not such that the integrity of the site is compromised and which is reversible. This arises where an archaeological site can be incorporated into a modern day development without damage and that all procedures used to facilitate this are reversible.
- Slight: An effect which causes noticeable changes in the character of the environment without affecting its sensitivities. A slight effect would not directly impact or affect an archaeological site.
- Not Significant: An effect which causes noticeable changes in the character of the environment but without significant consequences.
- Imperceptible: An effect on an archaeological site capable of measurement but without significant consequences.

11.3 Receiving Environment

11.3.1 Description of Study Area

The proposed site is located in the townland of Rahoon, on Gort na Bró, Rahoon, Knocknacarra, Galway approximately 3.1km west of Galway City Centre (Figure 11.1). The surrounding area is characterised by the established residential suburb of Knocknacarra. The lands adjoining the site to the west are the location of the Gateway Retail Park which is the primary district retail centre serving the surrounding area. The application site is bounded by Gort na Bró to the east and the retail park link road to the west. The Western Distributor Road, an arterial route serving the city, is located to the south. The application site has an area of approximately 2.43 ha and is traversed by the road which links Gort na Bró and the Gateway Retail Park. The southern portion of the site is formed primarily by waste ground and is surrounded by advertising hoarding. The northern portion of the site is formed mainly by scrub and some small trees. the surrounding area is primarily residential in character with the Gateway Retail Park located immediately to the west. The site is bordered to the north by Gaelscoil Mhic Amhlaigh, a newly built primary school.

The roughly rectangular area at the east side of the existing Gateway Retail Park is currently divided into two portions by an existing road which provides access to the aforementioned retail park. To the north of the intervening public road the site is largely overgrown and is enclosed at the south and west by a low earthen berm planted with trees. Inside the berm the ground level is much lower, probably representing original ground level and is much overgrown with briars. On the day of the site visit access to this area was possible and showed the area to be grass-covered with localised areas of ground disturbance and an area overgrown with briars towards the north.

Plate 11-1: Interior of northern half of eastern portion of proposed development site, looking north towards school.

Plate 11-2: North-east side of eastern portion of proposed development area looking north.

Plate 11-3: South-east end of northern half of eastern portion of proposed development site, looking south.

Plate 11-4: Overgrown area towards northern end of eastern portion of proposed development site, looking west.

Plate 11-5: Access road currently dividing the eastern portion of the proposed development site, looking south towards construction compound (arrow).

Plate 11-6: Hardcore surfaced carpark within construction compound which occupies southern half of the eastern portion of the proposed development site.

Figure 11.1: Site location map.

11.3.2 Archaeological Heritage

For the purposes of this report archaeological heritage includes all recorded archaeological monuments listed in the RMP/SMR and shown on the associated maps, sites identified during archaeological excavations as summarised in the Excavations Database and any find spots listed in the Topographical Files of the National Museum of Ireland.

11.3.2.1 National Monuments

The term 'national monument' as defined in Section 2 of the National Monuments Act (1930) means a monument 'the preservation of which is a matter of national importance by reason of the historical, architectural, traditional, artistic or archaeological interest attaching thereto...'. National monuments in State care include those which are in the ownership or guardianship of the Minister for Arts, Heritage and the Gaeltacht (DAHG). Other owners of national monuments are empowered under Section 5 of the National Monuments Act (1930) to appoint the Minister for Culture, Heritage and the Gaeltacht as guardian of such monuments. This means in effect that while the property of such a monument remains vested in the owner, its maintenance and upkeep are the responsibility of the State. Monuments which may be defined as national monuments are also in the ownership or guardianship of Local Authorities which have similar responsibilities under the National Monuments Acts (1930-2004) to DCHG.

For national monuments in the ownership or guardianship of the Minister or a Local Authority or which are subject to a preservation order or temporary preservation order, the prior written consent of the Minister is required for any works at or in proximity to the monument.

No National Monuments are located on or in close proximity to the proposed development site at Rahoon, Galway, the nearest (Merlin Park Castle, Nat. Mon. No. 609) being over 6km to the east.

11.3.2.2 Recorded Monuments

No recorded monuments are located on the proposed development site. The nearest recorded monument is located c. 81m to the east-north-east of the proposed development area and comprises a designed landscape feature (GA094-056—). To the south-east of this is a ringfort (GA094-111—) which is situated c. 220m to the east of the proposed development site (Figure 11.2). Given the distance of the proposed development from the aforementioned recorded monuments the proposed development site does not fall within the zone of notification for same.

No information pertaining to the recorded monuments in the vicinity of the site is currently available on the Historic Environment Viewer (Historic Environment Viewer (archaeology.ie). The designed landscape feature may have been associated with Rahoon House (GA094-047—) which is located a further c. 200m to the north-east. Rahoon House is shown on the 1st and 2nd edition OS maps for the area (see section 11.3.3.1 below) and the designed landscape feature is located within the associated demesne around the house. No obvious landscape feature is shown on the historic mapping, however, in the area of the recorded monument.

The site of the nearest monument GA094-056— was assessed from the adjacent public road. It is currently occupied by a playing pitch and no above-ground trace of this monument is apparent (**Error! Reference source not found.**). The setting of these monuments has been much altered as a result of modern residential developments and the footprint of the demesne surrounding Rahoon House is consequently no longer identifiable. Rahoon House is also a Protected Structure (see 11.3.3.2 below for further discussion).

Plate 11-7: Site of recorded monument GA094-056— in playing pitch, looking NE from adjacent public road.

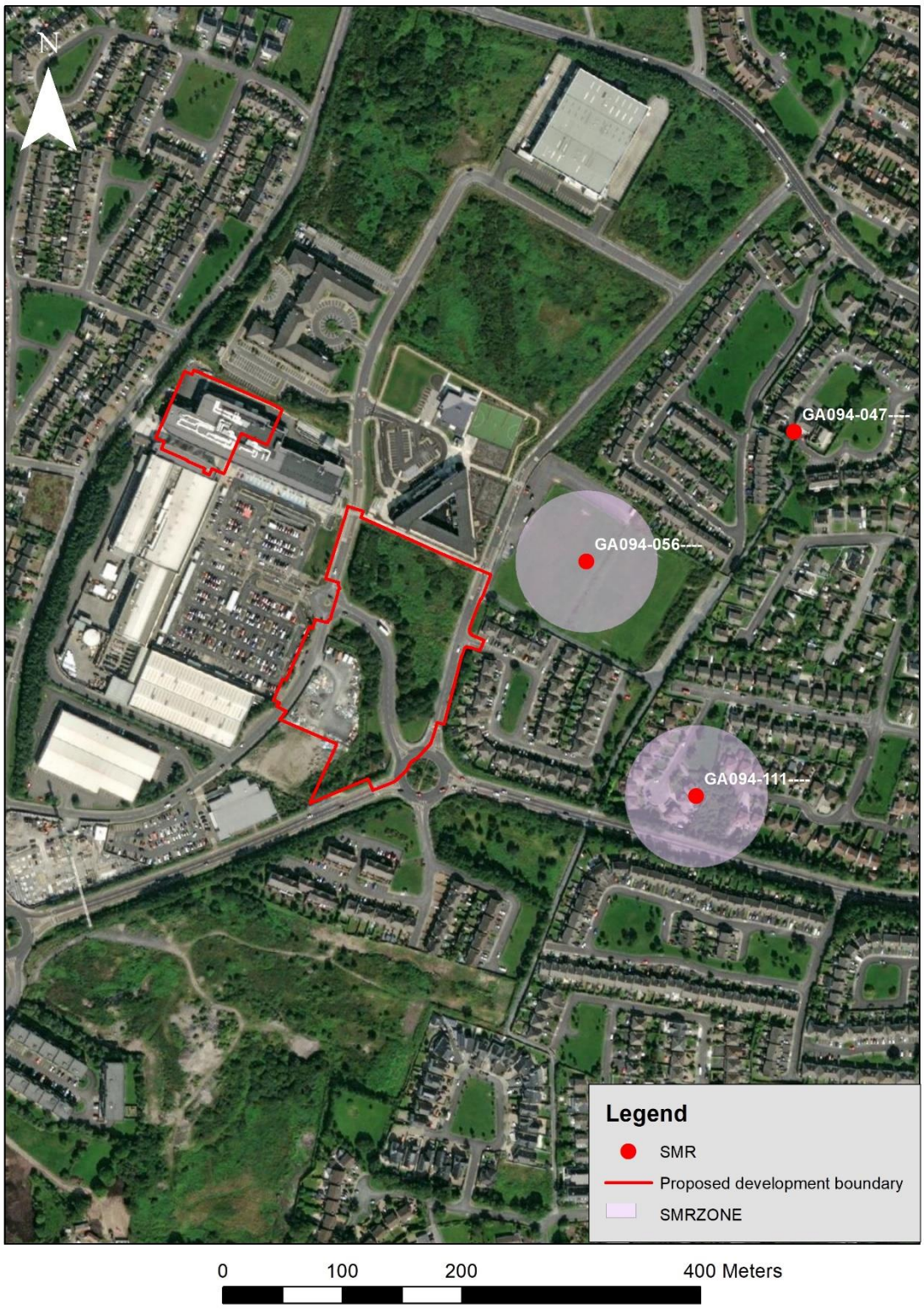


Figure 11.2: Recorded monuments in the vicinity of the proposed development site.

11.3.2.3 Excavations Database

A review of the database of excavations undertaken in Ireland yielded three results for Rahoon townland, none of which produced any archaeological finds or features. The following summaries provide an account of the work carried out under licence within the townland of Rahoon and the area of Knocknacarragh.

1993:114 - Rahoon, Galway
County: Galway Site name: Rahoon
Sites and Monuments Record No.: N/A Licence number: 93E0078
Author: Martin Fitzpatrick, New Line, Athenry, Co. Galway.
Site type: Enclosure
ITM: E 526967m, N 725029m
The trial trenching and watching brief at Rahoon took place on 27th May 1993.
On the east shoulder of a ridge running north-west/south-east, the monument consisted of a poorly preserved triangular-shaped enclosure, delimited by boulders averaging 0.9m in height. A total of two trenches were dug mechanically, dissecting the enclosure. The first running north-west/south-east through the middle of the site, the second running perpendicular to the first in a north-east/southwest direction. Apart from the excavation of the two trenches, the digger also removed the boulders delimiting the site, which proved to be of a single course.

The two trenches revealed no archaeological features or deposits, nor was there any indication of onsite activity. The site is of no archaeological importance and may have been, as local history suggests, the work of a local landlord.

1997:215 - Knocknacarragh/Rahoon, Galway
County: Galway Site name: KNOCKNACARRAGH/RAHOON
Sites and Monuments Record No.: N/A Licence number: 96E0018 and 97E0060
Author: Anne Connolly, Archaeological Services Unit Ltd, Purcell House, Oranmore, Co. Galway.
Site type: No archaeological significance
ITM: E 525794m, N 724709m
Six areas were archaeologically monitored in the course of a fifteen-month period as part of the Knocknacarragh Main Drainage Scheme. In those areas where the trenching was monitored (Areas 13), much, and in most cases total, disturbance was a feature of the upper stratigraphy, with tarmac, hard-core and shallow layers of mixed fill of modern nature representing recent activity. Natural sandy subsoils underlay these layers and bedrock occurred directly below this, sometimes at a very shallow depth and sometimes fluctuating to c. 2m below current ground level.

In Areas 4, 5 (under licence 96E0018) and 6 (97E0060), the previously undisturbed green areas, topsoilstripping revealed a shallow, heavily humic layer overlying stones and bedrock. No archaeological features or deposits came to light in any of the areas monitored.

2001:520 - Knocknacarragh Main Drainage Scheme, Galway
County: Galway Site name: Knocknacarragh Main Drainage Scheme
Sites and Monuments Record No.: Adjacent to SMR 94:20 Licence number: 01E0498
Author: Anne Carey, Archaeological Services Unit Ltd, Purcell House, Oranmore, Co. Galway.
Site type: Monitoring
ITM: E 525794m, N 724709m
Monitoring of the pipeline along existing roadways and through Galway Golf Club was carried out during 2001. Nothing of archaeological significance was discovered. The Knocknacarragh Main Drainage Scheme is an ongoing project and monitoring of further excavations will be carried out in the coming year.

11.3.2.4 Topographical Files of the National Museum of Ireland

The database of find spots held in the National Museum of Ireland was checked on www.heritagemaps.ie for any recorded finds within the study area. No find spots are recorded for the area of the proposed development site. The nearest find spot is situated c. 1.5km to the south-west and comprises a wooden mill shaft.

National Museum Point: Wooden Mill Shaft (?), Wooden Mould Binding (?)

Name 1971:954 (a), 954 (b)
Object Type Wooden Mill Shaft (?), Wooden Mould Binding (?)

11.3.3 Architectural Heritage

11.3.3.1 Cartographic Record

A review of the available historic mapping for the area does not show any potential archaeological features on the proposed development site. The Down Survey map (1656-8) for Galway names Rahoon (Figure 11.3) but no further detail is apparent as the individual barony maps do not survive. The first edition OS map (1837-1842) does not indicate any features of archaeological potential within the proposed development site, nor does the later second edition map (1888-1913).

The first edition map shows Rahoon House to the north-east and its associated demesne which bounds the proposed development site to the east. Rahoon Stream is also named immediately to the east (Figure 11.4). The site itself would appear to have largely consisted of largely open, marshy ground with some field enclosures. The second edition OS map also depicts Rahoon House to the north-east with no structures or features within the proposed development site (Figure 11.5).

Figure 11.3 Extract from Down Survey map of Galway (1656-8) showing 'Rahoone' to the west of Galway city.

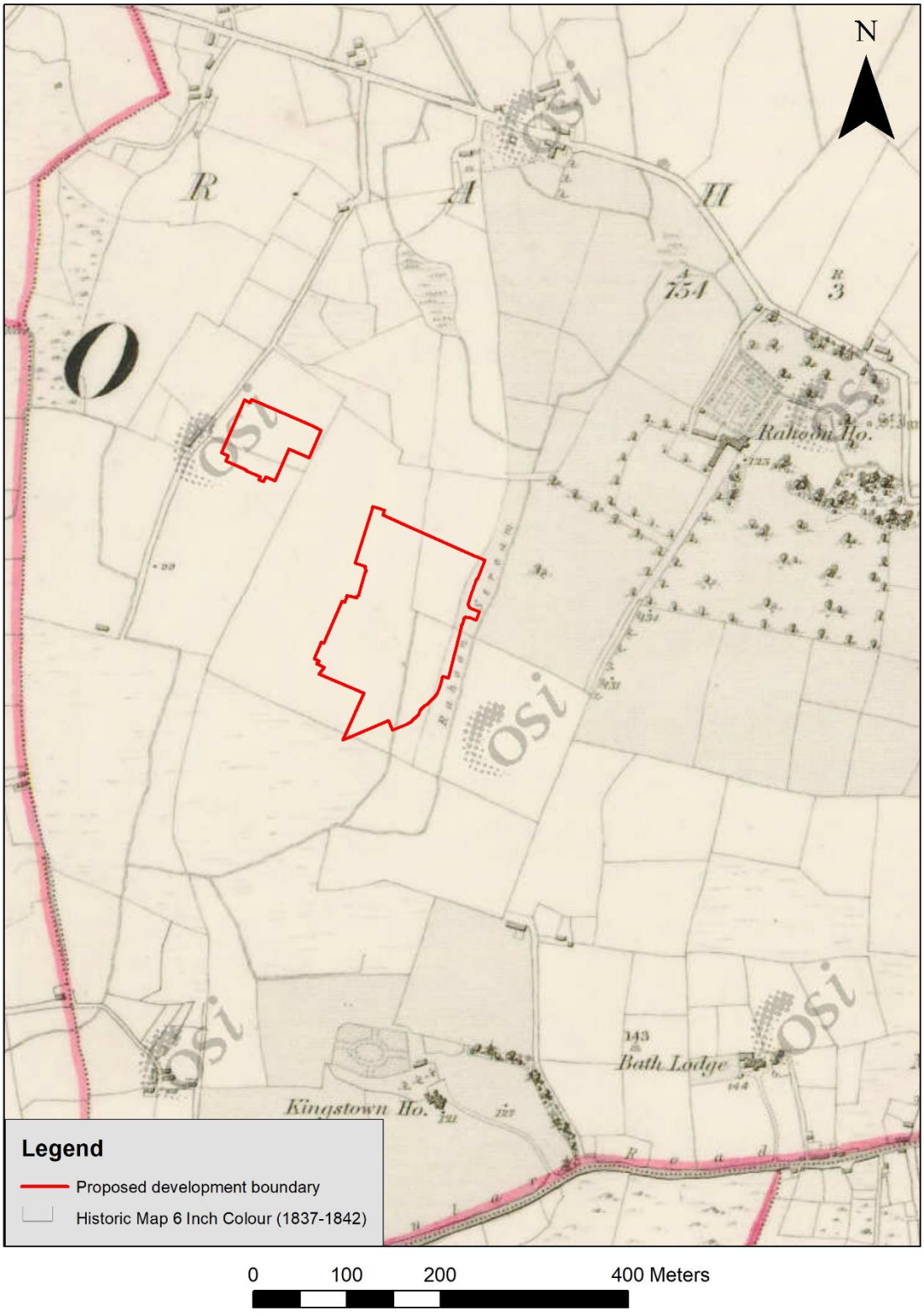


Figure 11.4: Proposed site boundary on 1st edition OS background. Note Rahoon House to NE and associated shaded demesne.

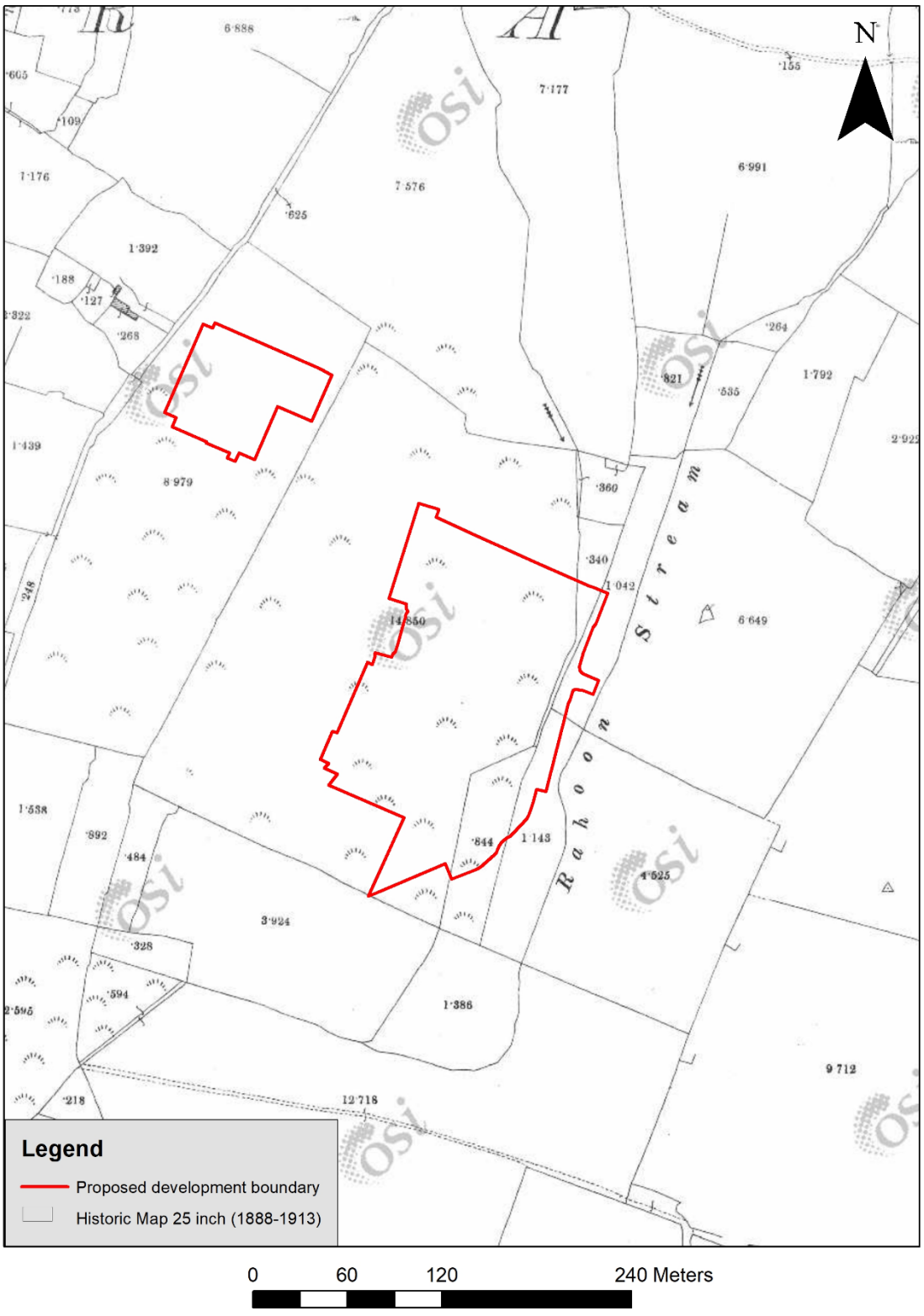


Figure 11.5: Proposed development site boundary on 2nd edition OS background.

11.3.3.2 Protected Structures

No protected structures are located on or within the immediate vicinity of the proposed development site. The nearest Protected Structure is the aforementioned Rahoon House (Ref 8301), located c. 298m to the north-east of the proposed development site boundary (Figure 11.6). The structure comprises a 5 bay two storey over basement house and is now surrounded by modern residential developments. The

features of the Protected Structure include the house itself, a 16th century coat-of-arms, a 17th century doorway, wall, gate piers and reused architectural fragments.

Plate 11-8: Rahoon House RPS Ref. 8301 (RPS Galway City Council).

The Record of Protected Structures

Galway City Council

Unique Identity Number: 8301
Address: Rahoon House, Rahoon.
Description: 5 bay, 2 storey over basement, building.
Map: O.S. 3407–05, 3407–10 Scale: 1:1000
National Grid Co–Ordinates: E127255 N225345
Special Interest: Architectural / Historical / Archaeological.
Site Features: Includes C16th coat of arms, C17th doorway, wall, gate piers and re–used architectural fragments.
Section of Map Indicating Structure: Shaded Green.

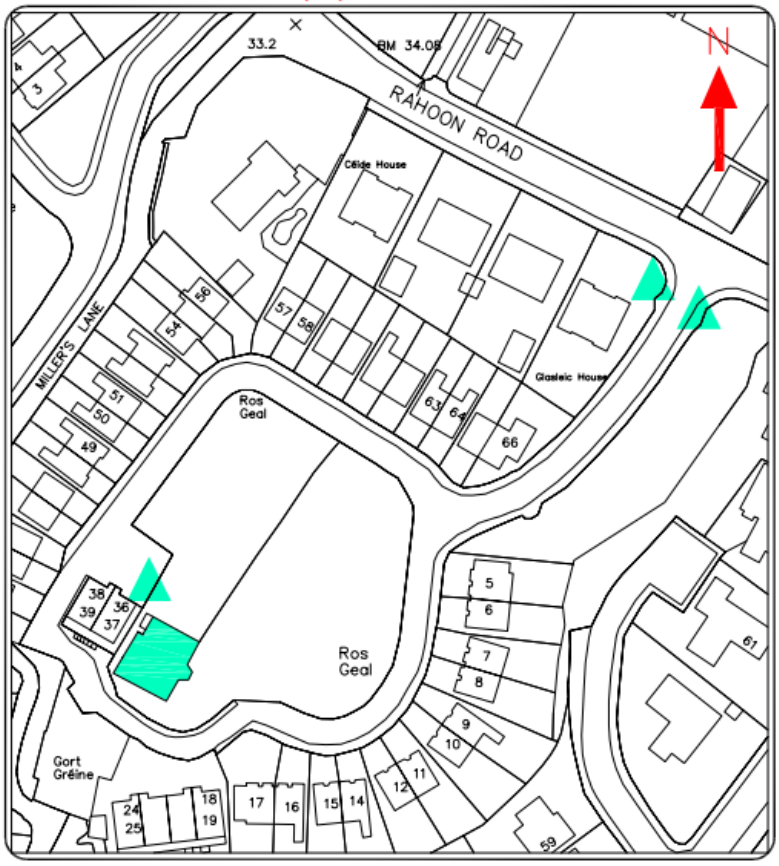


Figure 11.6: Extract from Galway City RPS for Rahoon House (RPS Ref. 8301).

It is described in the Landed Estates Database (https://landedestates.ie/) as follows:

'In 1786 Wilson refers to Rahoon as the seat of Mr. French. In the early 19th century it was a Bodkin house, occupied by Roderick O'Connor at the time of the first Ordnance survey. It was held in fee by Thomas C. Dickson at the time of Grifith's Valuation and valued at £27. This house was bought by Kennedy O'Brien in the early 1870s and remained in his family's possession until the 1930s. Buildings are still extant at the site.'

This would imply that the house was in existence by the late 18th century and is depicted on the first edition (1840s) OS map.

Figure 11.7: Proposed development site boundary in relation to Protected Structure 8301, Rahoon House.

The Architectural Heritage Protection Guidelines for Planning Authorities (2011) discusses the notion of curtilage and attendant grounds associated with protected structures. While the notion of curtilage is not defined by legislation, it is taken to be the 'parcel of land immediately associated with that structure and which is (or was) in use for the purposes of the structure.' (ibid., 191). In the case of a large country house items such as stable buildings, walled gardens, lawns and ha-has may all be considered to form part of its curtilage unless at a distance from the building (ibid.). It is also noted, however, that the extent of the curtilage of a protected structure would need to be determined on a case-by-case basis and

'ideally should be identified by the planning authority prior to inclusion of the structure in the RPS....' (ibid.). The Guidelines go on to say that in instances where the curtilage of a protected structure has not previously been identified 'a planning authority should take the opportunity to identify its extent at the time of making a declaration in respect of the protected structure' (ibid., 192).

A similar scenario exists when determining the attendant grounds of a protected structure. Attendant grounds are those lands located outside the curtilage but which are associated with the structure and are 'intrinsic to its function, setting and/or appreciation' (ibid.). A planning authority has the power to protect all features of importance which lie within the attendant grounds of a protected structure, however, such features must be specified in the RPS. The Guidelines go on to say that where the curtilage of a protected structure has not been established at the time of inclusion in the RPS, the planning authority should ensure that all important features are either 'a) specified as being in the attendant grounds of the protected structure or b) are themselves entered into the RPS and c) the owners and occupiers notified of the protection.'

The curtilage or attendant grounds of Rahoon House have not been formally identified by the planning authority. In any case, the ground immediately surrounding the house and within its demesne (as depicted on the first edition OS map) which could be suggested as forming part of its curtilage is now occupied by modern residential development and is significantly altered from its original form. The proposed development site at Rahoon is located outside the demesne of Rahoon House and would not have formed part of its curtilage. The lands may have originally formed part of the attendant grounds of the house, however, this association no longer prevails given the change in ownership which has occurred through the decades and the fact that the lands are no longer linked to the use or occupation of the house.

11.3.3.3 NIAH Structures and Garden Survey

No NIAH structures are located on or in the immediate vicinity of the proposed development site. The nearest structure listed in the NIAH are the gate piers (Reg. 30311001) marking the original entrance into Rahoon House which are also included in the Protected Structure (Reg. 8301) discussed above (Figure 11.8). The piers are described in the NIAH survey (www.buildingsofireland.ie) as follows:

Rahoon Road, Ros Geal Estate, Galway, County Galway **30311001**

Reg. No.	30311001
Date	1840 - 1880
Previous Name	N/A
Townland	RAHOON
County	County Galway
Coordinates	127375, 225426
Categories of Special Interest	ARTISTIC TECHNICAL
Rating	Regional
Original Use	gates/railings/walls
In Use As	gates/railings/walls

Description
Gateway, built c.1860, comprising four gate piers in form of cut limestone Roman Doric-style columns flanking vehicular and pedestrian entrances, with tooled limestone plinths and carved limestone caps. Cast-iron double-leaf and single gates.

Appraisal
This gateway makes a strong visual statement at the entrance to the grounds of the former Rahoon House, now Ros Geal estate. It exhibits high quality stoneworking and decorative ironworking, enriching the aesthetic aspirations of the composition.

Rahoon House is also included in the NIAH garden survey which notes that 'Housing has been constructed on this site'.

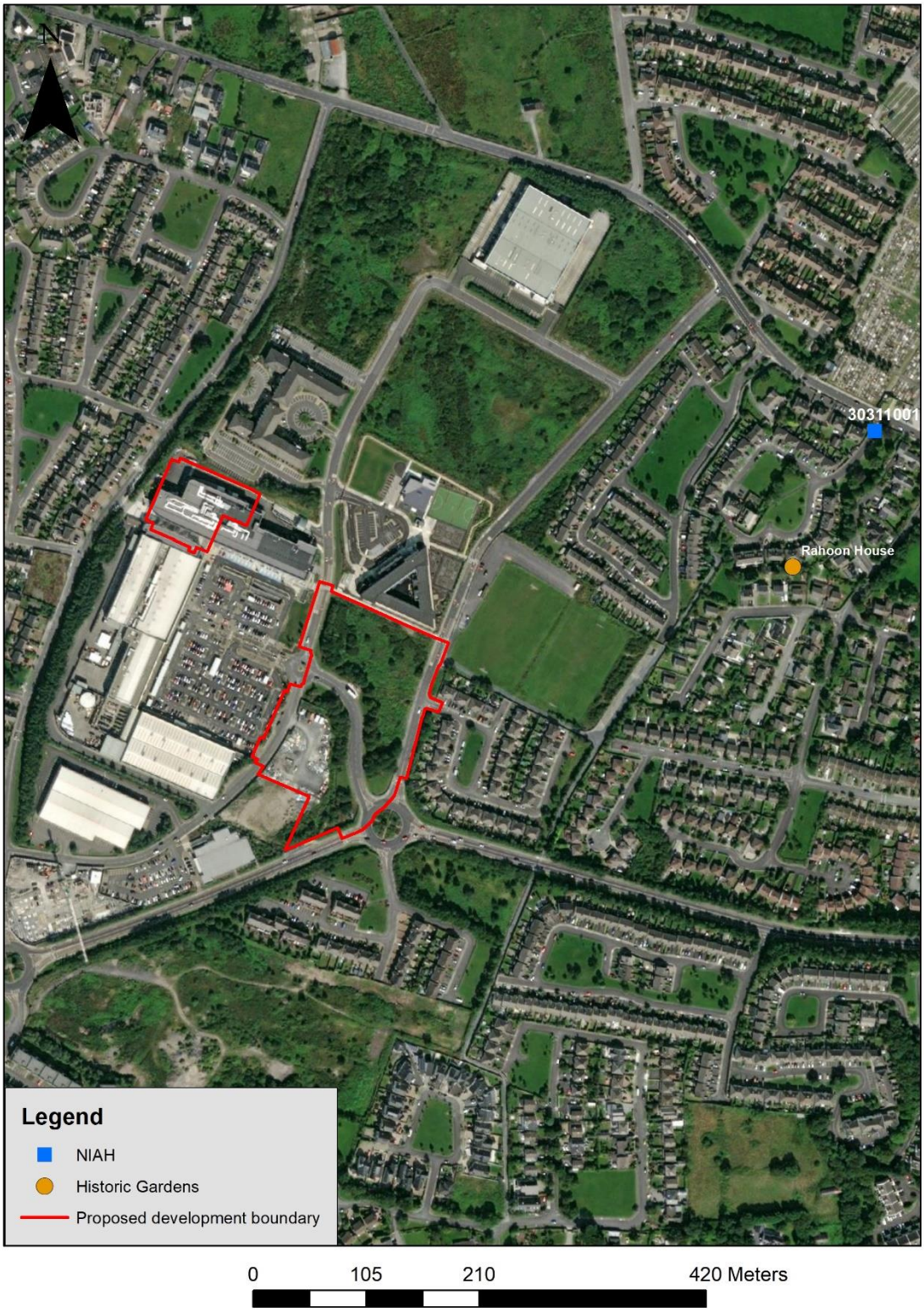


Figure 11.8: Proposed development site boundary in relation to nearest NIAH structure and historic garden.

11.4 Likely and Significant Impacts and Associated Mitigation Measures

11.4.1 Do-Nothing Effects

If the proposed residential development were not to proceed, there would be no change to the existing environment. There would be no impact on any potential features/deposits and/or artefacts of archaeological significance which may be located on the site.

11.4.2 Construction Phase

11.4.2.1 Direct Impacts

Potential impacts during the construction phase of the proposed development could include damage to recorded monuments, newly recorded monuments, sub-surface features, Protected Structures or items listed in the NIAH by excavations works or tracking machinery, etc. The aim of the assessment, however, is to highlight any potential impacts as described above so that suitable mitigation measures may be implemented in order to avoid any such impacts.

11.4.2.1.1 *Recorded Archaeological Resource*

No National Monuments or recorded monuments are located on the proposed development site. No direct impacts on this resource are therefore identified.

11.4.2.1.2 *Newly Recorded Monuments/Sites*

No new potential archaeological sites were noted within the proposed development site during the walk-over survey. No direct impacts are therefore identified to this resource.

11.4.2.1.3 *Sub-surface Archaeology*

The proposed development site has previously undergone extensive ground works and the western portion is already occupied by existing buildings. No in situ topsoil would appear to be present in the southern portion of the eastern portion of the proposed development site. The northern portion of this area, whilst somewhat altered from its original state due to adjacent developments may have extant in situ topsoil in some places.

Despite groundworks associated with adjoining developments, in situ topsoil may be present within some areas of the northern half of the eastern portion of the proposed development site. The potential therefore exists for the presence of sub-surface archaeological deposits in this area and appropriate mitigation measures are recommended in order to ameliorate any potential impacts to such features (see Section 11.4.5 below).

No potential impacts to sub-surface archaeology within the southern portion of this area of the proposed development site are identified. Similarly, there is no potential for in situ sub-surface archaeology in the western portion of the proposed development site as it is already developed. No potential direct impacts to sub-surface archaeology in this area are therefore identified.

11.4.2.1.4 *Protected Structures*

No protected structures are located on or within the immediate vicinity of the proposed development site, therefore no impacts to this resource are identified.

11.4.2.1.5 *NIAH and Garden Survey*

No NIAH structures are located on or within the immediate vicinity of the proposed development site, therefore no impacts to this resource are identified.

11.4.3 Operational Phase

11.4.3.1 Indirect (Visual) Impacts

Operational impacts are taken to be those that are occurring after the construction phase of the project, when all construction activities have been completed and the proposed development is built. In terms of archaeology and upstanding cultural heritage items these impacts are mainly indirect (visual) impacts.

11.4.3.1.1 *Recorded Archaeological Resource*

No recorded monuments are located on or within the immediate vicinity of the proposed development site. The nearest monument is located c. 81m to the north-east of the eastern portion of the proposed development area and comprises a designed landscape feature (GA094-056—). The area of the recorded monument is now occupied by two playing pitches and no surface trace of this feature is apparent. The immediate and wider setting of this monument has already been significantly altered by surrounding modern developments. The introduction of the proposed development to this already developed environment will not result in any additional impact to the setting of this monument.

11.4.3.1.2 *Newly Recorded Monuments/Sites*

No new archaeological monuments were noted on the proposed development site during the site walk-over survey. No indirect impacts on such features will therefore occur.

11.4.3.1.3 *Protected Structures*

No Protected Structures are located on or within the immediate vicinity of the proposed development site. The nearest Protected Structure is Rahoon House and associated entrance gate piers (Reg. 8301), c. 298m to the north-east. The immediate and wider setting of this protected structure and its curtilage has already been significantly altered by the introduction of residential developments to the lands immediately surrounding the house. The introduction of the proposed development at a distance of almost 300m to this already much-altered landscape will not result in any additional impact to the protected structure.

11.4.3.1.4 *NIAH and Garden Survey*

No NIAH structures are located on or within the immediate vicinity of the proposed development site. The nearest structure comprises the gate piers marking the original entrance to Rahoon House, c. 440m to the north-east. Rahoon House and lands are recorded in the garden survey which states that housing now occupies the site. Given the distance of the proposed development from the gate piers and the already altered setting of these structures and associated historic garden, no indirect impacts to these features are identified.

11.4.4 Cumulative Impacts

Cumulative impact is defined as 'The addition of many small impacts to create one larger, more significant, impact' (EPA 2002, 33). It is also defined as 'impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project' (EC 1999).

In this regard in order to assess overall cumulative effects on archaeology and cultural heritage the proposed project is considered in the context of a number of existing, proposed and permitted developments in the area.

The nearest existing developments comprise retail and commercial properties immediately to the west and north-west, with existing residential developments to the east and north-east. The addition of the proposed development to this already largely altered landscape will not result in a visual impact to any nearby recorded monuments, protected structures or NIAH structures or features.

In terms of potential cumulative direct impacts the southern half of the eastern portion of the proposed development area is not regarded as having any potential for sub-surface archaeological remains. Similarly, the western portion of the proposed development area is already developed. Therefore no direct cumulative impacts to this resource will occur in these areas. Any potential cumulative direct impacts which may occur to sub-surface archaeological features within the northern portion of the east side of the proposed development site will be mitigated against as discussed below.

11.4.5 Mitigation

No direct or indirect impacts to the recorded archaeological or cultural heritage resource as a result of the proposed development have been identified therefore no mitigation measures are required.

A potential direct impact to sub-surface archaeological features which may exist within the northern half of the eastern portion of the proposed development site may occur as a result of ground works. In this regard the following mitigation measure is recommended:

- Archaeological monitoring of all topsoil removal should be undertaken by a suitably qualified archaeologist. A report on the monitoring should be compiled on completion of the works and submitted to the relevant authorities.

11.4.6 Residual Impacts

Sub-surface archaeological sites, if detected during archaeological monitoring will be preserved by record (archaeologically excavated) and therefore a full record made of same. In this regard, the potential impact on this element of the archaeological resource after the implementation of mitigation measures is likely to be Slight.

11.4.7 Significance of Effects

Based on the assessment above there will be no significant effects to the archaeological, architectural or cultural heritage resource.

11.5 Conclusion

No recorded monuments, protected structures or NIAH structures are located within the proposed development site. The southern half of the eastern portion of the site has been developed and subject to ground works, therefore this area has no potential for the presence of sub-surface archaeology. Similarly, the western portion of the site has already been developed and has no potential for the presence of sub-surface archaeology. In situ topsoil appears to be present within the northern half of the eastern portion of the proposed development site therefore archaeological monitoring of topsoil removal in this area is recommended as appropriate mitigation.

11.6 Bibliography

Department of Arts, Heritage, Gaeltacht and the Islands, 1999, Framework and Principles for the Protection of the Archaeological Heritage, 1999.

Other Sources

Record of Monuments and Places (RMP) for County Galway.
http://webgis.archaeology.ie/historicenvironment
www.excavations.ie
www.heritagemaps.ie
www.landedestates.nuigalway.ie

12. LANDSCAPE AND VISUAL

12.1 Introduction

This chapter of the Environmental Impact Assessment Report (EIAR) addresses the potential landscape and visual impacts of the Proposed Development, which includes plans for a Large-Scale Residential Development for Knocknacarra District Centre, Galway.

The emphasis in this chapter is on the likely significant direct and indirect effects of the Proposed Development. The chapter includes the Landscape and Visual Impact Assessment (LVIA) methodology, a description of the Proposed Development and the existing landscape based on relevant guidance. It includes a description of the landscape policy in the study area in which the Proposed Development Site is located.

The landscape of the site and wider area is described in terms of its existing character, which includes a description of landscape value, the susceptibility of the landscape to change and a determination of landscape sensitivity. The landscape and visual impact assessment of the Proposed Development uses representative viewpoints. The potential impacts in both landscape and visual terms are then assessed, including cumulative impacts.

A full description of the Proposed Development is provided in Chapter 4 of this EIAR.

12.1.1 Statement of Authority

MKO has developed extensive expertise and experience over the last 15 years in the Landscape and Visual Impact Assessment of a range of projects, including residential developments, quarries, road schemes, renewable energy developments and a range of other projects.

This Landscape and Visual Impact Assessment was carried out by Juan Alvedro, an LVIA Professional. Juan is a Landscape Architect, LVIA specialist and Senior Landscape Architect at MKO. Juan has experience conducting LVIA and his primary role at MKO is producing the Landscape and Visual chapter of EIA reports. Juan holds a Master's in Landscape Architecture and a Bh. in Forest Engineering and Natural Resources Management, and he is a member of the International Federation of Landscape Architecture and a member of the Galician Forest Engineering Association.

This chapter was reviewed by Jack Smith, MSc., a Landscape and Visual Impact Professional. Jack is an Environmental Scientist and Landscape and Visual Impact Assessment (LVIA) specialist with MKO. Jack is an Affiliate member of the British Landscape Institute and holds membership with the Landscape Research Group. Jack's primary role at MKO is producing the LVIA chapter of EIA reports.

12.1.2 'Do-Nothing' Scenario

If the Proposed Development were not to proceed, there would be no change to the existing environment. No further activity will take place on the subject site. The impact associated with the do-nothing scenario is neutral as the existing disturbed ground and scrub would not change significantly.

12.1.3 Proposed Development Description

The applicant seeks planning permission for a Large Residential Development (LRD) in Knocknacarra District Centre, Gort Na Bró, Rahoon, Galway. The Proposed Development will consist of:

1. *Provision of 227 no. residential apartments in 7 no. blocks comprising the following:*
    a. *Block A1: 14 no. 1 bed apartments & 24 no. 2 bed apartments ranging from between 3-5 storeys in height;*
    b. *Block A2: 25 no. 1 bed apartments & 15 no. 2 bed apartments ranging between 1-5 storeys in height;*
    c. *Block B1: 3 no. 1 bed apartments, 18 no. 2 bed apartments & 3 no. 3 bed apartments in a block ranging from between 3-4 storeys in height;*
    d. *Block B2: 13 no. 1 bed apartments & 21 no. 2 bed apartments ranging between 4-5 storeys in height;*
    e. *Block B3: 5 no. 1 bed apartments, 22 no. 2 bed apartments & 1 no. 3 bed apartment in a block ranging between 3-5 storeys in height;*
    f. *Block B4: 11 no. 1 bed apartments & 26 no. 2 bed apartments in a block ranging between 3-5 storeys in height;*
    g. *Block B5: 13 no. 1 bed apartments & 13 no. 2 bed apartments in a block ranging between 3-4 storeys in height.*
2. *Provision of circa 1,010 sq. m of ground floor commercial units as follows:*
    a. *Unit A101: circa 412 sq.m;*
    b. *Unit A102: circa 138 sq.m;*
    c. *Unit B201: circa 100 sq.m;*
    d. *Unit B202: circa 134 sq.m;*
    e. *Unit B301 3: circa 226 sq.m*
3. *Provision of a Community Facility (circa 118 sq.m);*
4. *Provision of Tenant Amenity Facilities (circa 99 sq.m);*
5. *Provision of a Childcare Facility (circa 561 sq.m) including an external secure play area;*
6. *Provision of 49 no. surface car parking spaces including EV charging spaces;*
7. *Provision of bicycle parking comprising 114 no. short stay and 436 no. long stay spaces;*
8. *Provision of realigned road between Gort na Bró and Gateway Retail Park Road;*
9. *Change of use of existing underground void to 181 bay underground car park;*
10. *Provision of shared communal and private open spaces, bin storage, public lighting, site landscaping, services, signage, substation, and all associated site development works required to accommodate the proposed development.*

See chapters 1 to 4 (inclusive) of this EIAR for full descriptions of the site and the Proposed Development. Figure 12-1 (below) shows a plan view of the Proposed Development. A comprehensive description of the existing conditions and character of the landscape at the site and wider landscape setting are included in Section 12.3 – *Landscape Baseline.*

The Proposed Development comprises two areas, the red outlined area (top-left of the image) to the north-west of the main infrastructure of the Proposed Development is proposed as underground car parking where no infrastructure will be constructed, only change in the assignment of car parking spaces. The other red outlined area (centre of the image) on Figure 12-1 below is where the infrastructure and buildings of the Proposed Development are to be located. In relation to the assessment of effects from a landscape and visual perspective it is emphasised that the underground car parking elements of the Proposed Development essentially (from a landscape and visual perspective) comprises a reassignment of car parking spaces and no elements of this aspect of the Proposed Development will rise above the existing ground level. Consequently, visibility of the Proposed Development is restricted to locations within the existing underground car park. It is considered that that this will not give rise to any likely Significant landscape or visual effects and so the alterations to the underground car park are not considered further in this chapter.

A dedicated Landscape Design Report is included as part of this planning application, which demonstrates that the Proposed Development provides the following relevant elements in relation to the surrounding streetscape:

1. *Create a pedestrian & cycle path network through the site which can be extended over time.*
2. *Provide communal open space that is overlooked and framed by the residential units providing an attractive setting and passive surveillance.*
3. *Civic square with high amenity and aesthetic values. designed to be a flexible space with infrastructure to cater for a wide range of uses, including outdoor cultural events.*
4. *Roof garden over ground level car park. communal open space defined by the surrounding residential units. Tree planting in raised planters to provide filtered screening and to 'soften' the built elements.*
5. *Landscaped buffer zone between the private open space of ground floor residential units and adjacent public paths.*

These elements can be seen in the figures below.

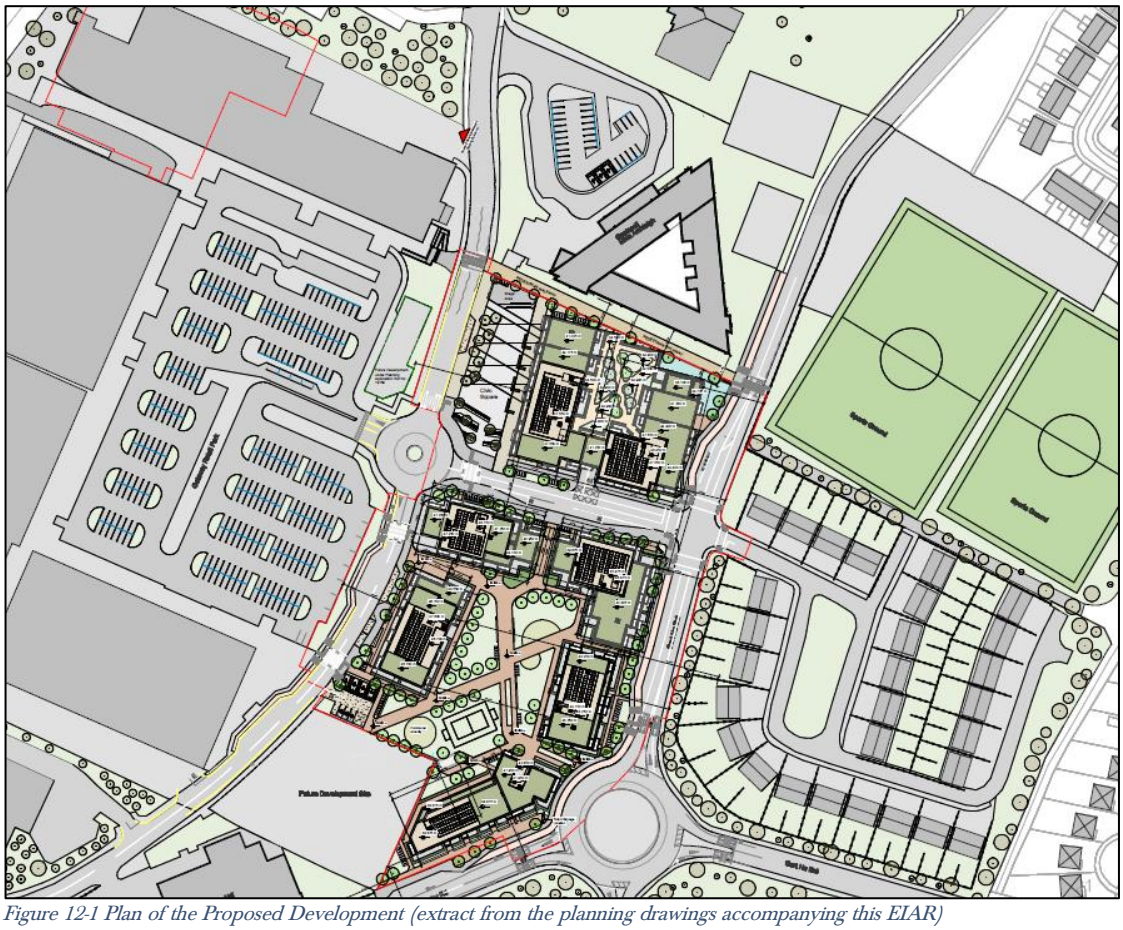


Figure 12-1 Plan of the Proposed Development (extract from the planning drawings accompanying this EIAR)

Figure 12-2 Computer Generated Imagery (CGI) render of the Proposed Development.

Figure 12-3 CGI aerial view of the Proposed Development of varied massing and heights

Figure 12-4 CGI Render of the Proposed Development.

As seen in Figure 12-5 below, the Proposed Development is located in Knocknacarra, Galway approximately 3.1km west of Galway City Centre. The surrounding area is characterised by the established residential suburb of Knocknacarra, a large and rapidly growing western suburb of the city. The lands adjoining the site to the west contains the Gateway Retail Park which is the primary district retail centre serving the surrounding area. To the north, the Proposed Development borders the Gaelscoil Mhic Amhlaigh. To the south and east of the site a number of residential housing estates, Gort na Bró and An Logan.

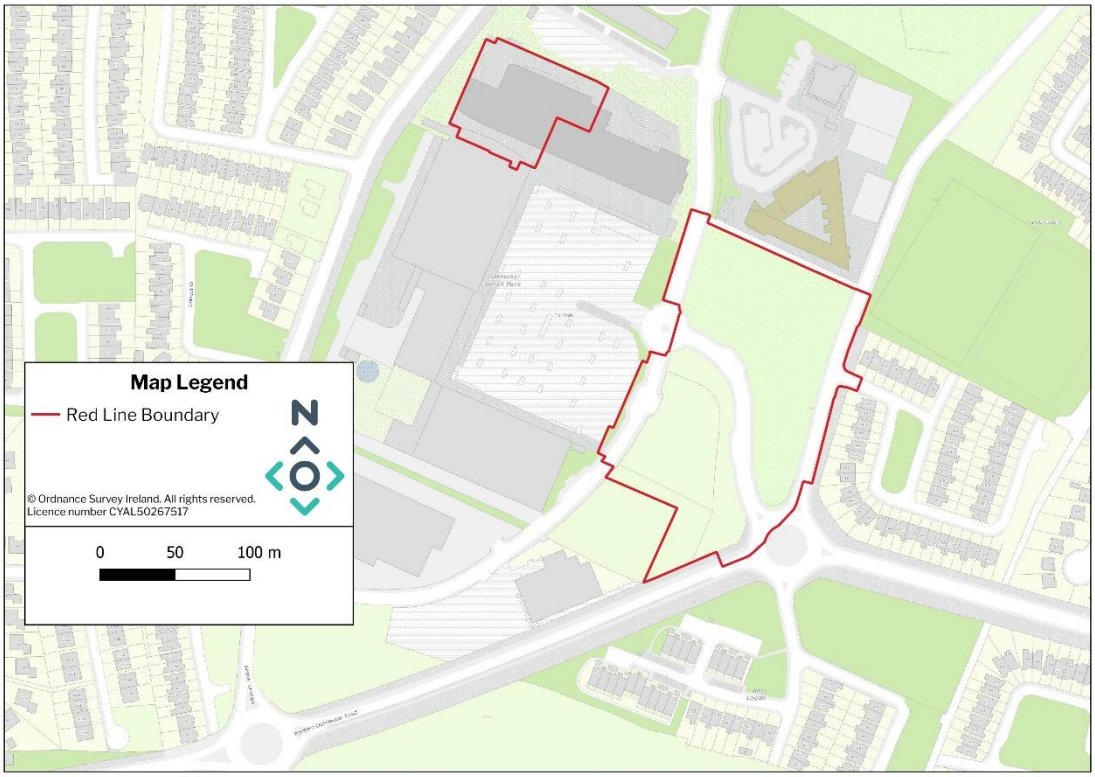


Figure 12-5 Proposed Development Location

12.2 Methodology

In 2000, the Department of the Environment and Local Government (DoEHLG) published 'Landscape and Landscape Assessment: Consultation Draft of Guidelines for Planning Authorities', which recommended that all local authorities adopt a standardised approach to landscape assessment for incorporation into development plans and consideration as part of the planning process. This document remains in Draft.

In 2002, Ireland signed and ratified the European Landscape Convention (ELC). This introduced a pan-European concept that centres on the quality of landscape protection, management and planning. The Department of Arts, Heritage and the Gaeltacht published a National Landscape Strategy for Ireland in 2015. The strategy aims to ensure compliance with the ELC and contains six main objectives, including undertaking a National Landscape Character Assessment and developing landscape policies.

Although the DoEHLG 2000 guidance remains in draft form, this section of the LVIA has been informed by the landscape assessment guidelines presented in the DoEHLG document as well as a range of other guidelines, which include:

- Guidelines on the Information to be contained in Environmental Impact Assessment Reports (EPA, 2022).
- Guidelines for Landscape and Visual Impact Assessment Third Edition (GLVIA3) (The Landscape Institute/Institute of Environmental Management and Assessment, UK, 2013) - also referred to as GLVIA3 (LI & IEMA, 2013).
- Visual Representation of Development Proposals (Landscape Institute Technical Guidance Note 06/19, 2019)
- Galway City Development Plan 2017-2023 and the Draft Galway City Development Plan.

12.2.1 Scope and Definition of the LVIA Study Area for Baseline Landscape and Visual Investigations

The GLVIA3 (LI & IEMA, 2013) guidance refers to the identification of the area of landscape that is to be covered while assessing landscape and visual effects. The guidelines state:

> *"The study areas should include the site itself and the full extent of the wider landscape around it which the Proposed Development may influence in a significant manner."*

For the purposes of this LVIA, where the 'Proposed Development Site' or 'the site' is referred to in this chapter, this relates to the primary study area for the Proposed Development, as delineated in red as the 'Red Line Boundary' within mapping figures in this report and EIAR. This total area measures approximately 2.4 hectares. However, the landscape and visual baseline mapping and viewpoint selection are based on a wider study area. In this case, the wider study area constitutes all the areas within 1 kilometres from the Proposed Development Site. This area is referred to as the Landscape and Visual Impact Assessment (LVIA) Study Area or 'LVIA Study Area'. Considering the scope and scale of the Proposed Development and its existing landscape setting, it is considered that landscape and visual effects will not be significant beyond the 1 km LVIA Study Area, therefore assessment of landscape and visual effects from locations beyond 1km are scoped out of this assessment.

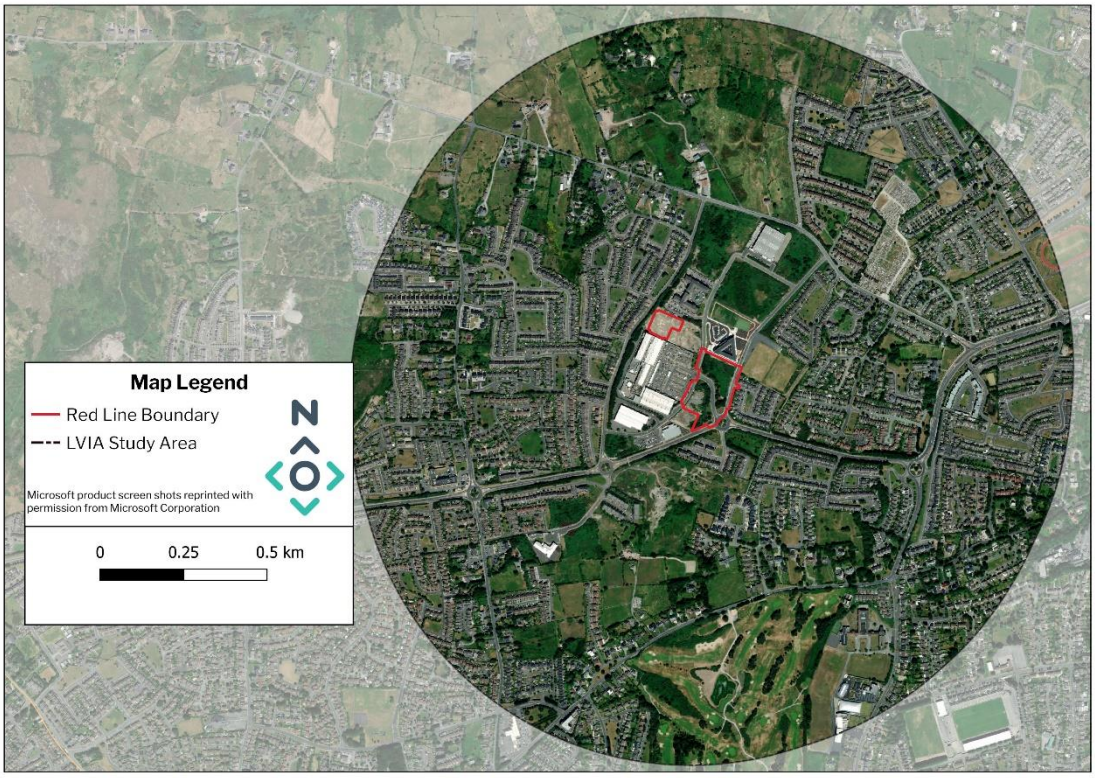


Figure 12-6 LVIA Study Area

12.2.2 Assessing Landscape Effects

The methodology uses qualitative methods in order to arrive at an assessment, which is based on the Landscape and Landscape Assessment (DoEHLG, 2000) Guidelines as well as the GLVIA3 (LI and IEMA, 2013).

Landscape effects can be described as changes which affect the landscape as a resource. This includes how the proposal will affect the elements that make up the landscape, the aesthetic and perceptual aspects and its landscape character. Landscape effects also relate to changes in the structure of the landscape. Under the GLVIA3 (2013) guidance, the assessment of likely significant effects on landscape receptors includes a judgement on both the sensitivity of the receptor as well as magnitude of the change.

12.2.2.1 Assessing Landscape Sensitivity

Landscape Sensitivity, which is described in the GLVIA3 (2013) as a combination of the landscape's susceptibility to change as well as the value attached to the landscape.

Susceptibility to change can be described as the ability of the landscape receptor (either the overall character, quality of the landscape or a particular landscape feature) to accommodate the Proposed Development without undue consequences for the maintenance of the baseline (existing) landscape and/or the aims of landscape planning policies and strategies.

Landscape value is the importance attributed to a specific landscape receptor or feature. Landscape value is determined through baseline assessments considering a combination of criteria such as designations and local characteristics.

Table 12-1 Assessing Landscape Sensitivity

Susceptibility of landscape to change	Description and example criteria
High	Landscapes where the overall landscape character or condition is highly susceptible to change and where the landscape receptor has a low ability to accommodate the proposed development without undue consequences for the maintenance of the landscape character and achieving planning policies/strategies. Other susceptible landscapes include those or areas with highly distinctive landscape features and clear cultural associations. Landscapes and landcover which shows low evidence of human influence can be more susceptible.
Medium	Landscapes where the overall landscape character has a moderate ability to accommodate the proposed development without undue consequences for the maintenance of the landscape character and the achievement of planning policies/strategies. These landscapes may have locally distinctive landscape features and have local cultural or heritage associations. These landscapes tend to have some clear evidence of human influence and include land uses which result in variation and changes to the landcover.
Low	Landscapes where the overall landscape character has a strong ability to accommodate the proposed development without undue consequences to the maintenance of its landscape character or the achievement of planning policies/strategies. This includes landscapes where human influence is clearly evident, there are not distinctive landscape features, cultural or heritage associations and land uses subject this landscape to a high level of change.
Value attached to Landscape elements	**Description and example criteria**
High	Landscapes deemed as high value or forming part of designations (e.g. areas of amenity, scenic routes/views) in the development plan, at a national or international level.
Medium	Landscapes where value is not formally designated but are of value as good examples of high quality, intact landscapes and are areas deemed to be of relatively high scenic quality. Landscapes that contain some rare elements, include areas which are wild or have a sense of naturalness, strong cultural associations or which have recreational value.
Low	Landscapes that are not formally designated and considered as modified. Areas which do not have particularly scenic qualities, do not include rare elements or landscape features and do not have strongly evident cultural or heritage associations.

For the purposes of this LVIA and the assessment of landscape sensitivity, the following landscape sensitivity ratings are assigned to receptors on site and in the LVIA Study Area based on designations in the Galway County Development Plan and Galway City Development Plan, and findings from on-site appraisals during site investigations:

- Very High
- High
- Medium
- Low

12.2.2.2 Assessing Magnitude of Change in the Landscape

The magnitude of change occurring within a landscape is a combination of the visual presence - size and scale - of the change, the extent of the area to be affected, and the duration and reversibility of the effect. The magnitude of change for differing landscape receptors was assessed using the definitions outlined in Table 12-2 below.

Table 12-2 Magnitude of Landscape Change Assessment Criteria

Magnitude of Change	Description
Substantial	Where a landscape will experience the loss of key landscape features or the introduction of uncharacteristic additions over a large area. The changes to the landscape are prominent and large in scale. The level of change has an effect on the overall landscape character. The effects are likely long term and may be irreversible.
Moderate	A more limited loss of or change to landscape features over a medium extent which will result in some change to landscape features and aesthetics. Could include the addition of some new uncharacteristic features or elements that would lead to the potential for change in landscape character in a localised area or part of a landscape character area. Would include moderate effects on the overall landscape character that do not affect key characteristics. The effects could be long to medium term and/or partially reversible.
Slight	The loss of or change to landscape features of limited extent, or changes to landscape character in smaller areas. Changes would not affect key characteristics. The addition of any new features or elements to the landscape would only result in low-level changes to the overall aesthetics of the landscapes. Changes to the landscape are more evident at a local level and not over a wide geographical area. The effects could potentially be medium to short term and/or reversible.
Negligible	A change affecting smaller areas of landscape character including the loss of some landscape elements or the addition of features or elements which are either of low value or hardly noticeable. The effects could be short term and/or reversible.

12.2.2.3 Landscape Effects Assessment Matrix

The significance of landscape effect was arrived at by combining the magnitude and sensitivity classifications, using the assessment matrix in Table 12-3 below, where landscape sensitivity is shown in the left-hand first column and magnitude of change is shown in the first row at the top of the table.

Table 12-3 Landscape Effects Significance Assessment Matrix

	Substantial	Moderate	Slight	Negligible
Very High	Major	Major/Moderate	Moderate	Moderate/Minor
High	Major/Moderate	Moderate	Moderate/Minor	Minor
Medium	Moderate	Moderate/Minor	Minor	Minor/Negligible
Low	Moderate/Minor	Minor	Minor/Negligible	Negligible

The determination of significance uses a seven-point scale, ranging from Major to Negligible. This seven-point scale is translated to the EPA impact assessment classifications of significance, as outlined in Table 12-7 below in Section 12.2.3.

12.2.2.4 Residual Landscape Effects

After determining the significance of the landscape effect using the above visual effects assessment matrix, mitigating factors are taken into consideration to arrive at the final residual effect.

12.2.3 Assessing Visual Effects

Visual effects relate to changes in views and visual amenity of the surroundings of individuals or groups of people – termed 'visual receptors'. These may result from changes in content and character of views as a result in changes to the landscape. The assessment of visual effects is based on views shown in the photomontage imagery as well as actual visibility on the ground.

It should be noted that in assessing visual effects, there are different types of visual effects:

- Visual obstruction: This occurs when there is an impact on a view which blocks the view.
- Visual intrusion: This occurs when there is an impact on a view but which does not block the view.

The significance of the effect on visual amenity is a combination of the sensitivity of the receptor balanced with the magnitude of the change occurring within a view. The likely significant effects of the Proposed Development in terms of visual effects are informed by on site visibility appraisals and the assessment of visual effects at specific viewpoints using Photomontages (Type 4 - *Visual Representation of Development Proposals - Technical Guidance Note 06/19).*

12.2.4 Viewpoint Selection

A step-by-step process is followed when selecting appropriate viewpoint locations. The first step is to select a number of representative locations following a detailed desk top study. These locations are based on the following criteria:

- Potential visibility of the development site;
- Sensitive landscape designations e.g. views and prospects, scenic routes, areas classed as sensitive;
- Proximity to receptors such as settlements, groups of residential dwellings or recreational routes or amenity areas;
- Within publicly accessible areas or on public roads, particularly more trafficked routes;
- Views that cover a wide area in terms of geographical location, elevation and varying distance from the site.

Finally, following a site visit, to assess visibility on the ground (see Section 12.4 – *Visual Baseline*), locations were identified as suitable viewpoints. The selected locations provide a representative range of local views towards the Proposed Development using Photomontages (Type 4 - *Visual Representation of Development Proposals - Technical Guidance Note 06/19).*

12.2.5 Photomontage Production

Photomontages are photorealistic visualisations that superimpose an image of the Proposed Development upon a photograph or series of photographs. They are intended as graphical representations of how a Proposed Development will appear in the existing landscape and are used as a tool to inform the LVIA process.

Verified photomontage imagery has been produced by GNET-3D using a methodology outlined on the opening pages of the photomontage booklet accompanying this application.

The following images are shown in the Photomontage Booklet for each viewpoint location (1-6):

- **Existing View:** Shows the baseline landscape conditions as it currently exists in a do-nothing scenario.
- **Proposed Photomontage** (labelled 'Proposed View' in the images): Shows a scaled verified render of the Proposed Development within the current landscape.

Photomontage images have been produced with reference to best practice and the following industry guidelines:

- Visual Representation of Development Proposals', Landscape Institute, Technical Guidance Note 06/19, 17 September 2019; and
- Guidelines for Landscape and Visual Impact Assessment, Third Edition (GLVIA3), (Landscape Institute and Institute of Environmental Management and Assessment, 2013).

Photomontages are displayed in the photomontage booklet accompanying this planning application. An assessment of the visual effects of the Proposed Development from each of the six photomontages is included in Section 12.7 of this chapter.

12.2.5.1 Visual Receptors Sensitivity

Visual sensitivity balances the sensitivity and susceptibility of the receptor (people or groups of people) as well as the amenity value of the view on offer at a particular location. Visual receptor sensitivity depends on the occupation or activity of the people, as well the extent to which the attention is focused on views and visual amenity, according to the GLVIA Guidelines (2013). Visual receptor sensitivity is assessed as either being Very High, High, Medium or Low, based on the definition of descriptions and examples set out in Table 12-4 below.

Table 12-4 Visual Receptor Sensitivity Assessment Criteria

Sensitivity of Visual Receptor(s)	Description
Very High	Included in this category are viewers that are primarily focused on views from this particular location, such as visitors to popular destinations identified for their outstanding views. Residents in close proximity who have primary views of a scenic quality in the direction of the Proposed Development.
High	Includes viewers at designated views or landscapes. Viewers such as residents in close proximity to the viewpoint who have primary views that will be in the direction of the development that may not necessarily be of a particularly scenic quality; viewers at well-known heritage or popular tourist or recreational areas, viewers along scenic or tourist routes.
Medium	Includes viewers who may have some susceptibility to a change in view. Viewers such as residents in medium proximity but who do not have views focused in the direction of the Proposed Development or whose views are not of a particularly scenic quality; those from views which are not designated but may have local recreational uses or those travelling along routes or at view which are considered moderately scenic.
Low	Includes viewers engaged in activities where the focus is not on the landscape or view. These including those travelling along a busy route, viewers at work or engaged in sport not related to views or experience of the landscape.

Viewpoints are specific locations which are representative of key visual receptors. The viewpoint assessments below in Section 12.6 consider all receptors represented in the determination of the visual receptor sensitivity rating for each viewpoint. This determination takes a balanced approach considering the types, sensitivities, and quantities of visual receptors represented. The sensitivity rating given to each viewpoint in Section 12.6 below considers both the susceptibility of the visual receptors represented as well as the value attached to the available views at that particular location.

12.2.5.2 Magnitude of Visual Change

The magnitude of the visual change resulting at each viewpoint is a combination of scale of the change, the extent of the area to be affected and the duration and reversibility of the effect, determined by reviewing the images for each viewpoint. The magnitude of change is determined in accordance with the definitions and descriptions included in Table 12-5 below.

Table 12-5 Magnitude of Visual Change Assessment Criteria

Magnitude of Change	Description
Substantial	Substantial change, where the proposals would result in large-scale, prominent or very prominent change, leading to substantial obstruction of existing view or complete change in character and composition of the baseline though removal of key elements or addition of uncharacteristic elements which may or may not be visually discordant. This includes viewpoints where the Proposed Development is fully or almost fully visible over a wide extent, at close proximity to the viewer. This change could be long term or of a long duration.
Moderate	The change in the view may involve partial obstruction of existing view or partial change in character and composition of the baseline through the introduction of new elements or removal of existing elements. Likely to occur at locations where the development is partially visible over a moderate or medium extent, and which are not in close proximity to the development. Change may be readily noticeable but not substantially different in scale and character from the surroundings and wider setting.
Slight	The proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view and its composition and a low degree of contrast. The character of the view may be altered but will remain similar to the baseline existing situation. This change could be short term or of a short duration.
Negligible	Any change would only be barely distinguishable from the status quo "do-nothing scenario" in the surroundings. The composition and character of the view would be substantially unaltered, approximating to little or no change.

12.2.5.3 Visual Effects Assessment Matrix

Table 12-6 below shows the significance of visual effects, arrived at by combining the visual receptor sensitivity and the magnitude of change classifications. Visual receptor sensitivity is shown in the left-hand first column and magnitude of visual change is shown in the first row at the top of the table. This table is used as an indicative tool to assist in determining the significance of visual effects. In different circumstances differing levels of mitigating factors may ultimately result in a different determination of the level of significance (see below). The significance of a visual effect is based on a balance between the sensitivity of the receptor and the magnitude of effect. The significance of visual effect is arrived at using a combination of the matrix shown in Table 12-6 as well as Figure 12-7 shown in Section 12.2.4 - *Determination of Residual Landscape and Visual Effects*, seen below.

Table 12-6 Visual effects significance assessment matrix

	Substantial	Moderate	Slight	Negligible
Very High	Major	Major/Moderate	Moderate	Moderate/Minor
High	Major/Moderate	Moderate	Moderate/Minor	Minor
Medium	Moderate	Moderate/Minor	Minor	Minor/Negligible
Low	Moderate/Minor	Minor	Minor/Negligible	Negligible

The determination of significance uses a seven-point scale, ranging from Major to Negligible. This seven-point scale is translated to the EPA impact assessment classifications of significance, as outlined in Table 12-7 below.

Table 12-7 EPA Impact Assessment Significance Classification for Landscape and Visual Effects

Matrix Classification Significance	EPA Significance Classification	EPA (2022) Definition of Significance
Major	Profound	An effect which obliterates sensitive characteristics
Major/Moderate	Very significant	An effect, which by its character, magnitude, duration or intensity alters most of a sensitive aspect of the environment
Moderate	Significant	An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Moderate/Minor	Moderate	An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends
Minor	Slight	An effect which causes noticeable changes in the character of the environment without affecting its sensitivities
Minor/Negligible	Not Significant	An effect which causes noticeable changes in the character of the environment but without significant consequences.
Negligible	Imperceptible	An effect capable of measurement but without significant consequences

12.2.5.4 Residual Visual Effect

After determining the significance of the visual effect using the above visual effects assessment matrix, mitigating factors are taken into consideration to arrive at the final residual effect.

12.2.6 Determination of Residual Landscape and Visual Effects

The matrices and tables above are excellent tools to aid professional judgement in the determination of the significance of an effect. They are useful in that they provide a transparent, objective structure to the process of balancing sensitivity and magnitude of change. In the context of the determination of landscape and visual effects, the formulaic process created by the use of the matrices above provides an indicative initial assessment, which is clearly demonstrated in the photomontage assessment tables in in Section 12.6 below.

However, over-reliance on the formulaic process, which is heavily influenced by the definitions of sensitivity and magnitude of change (e.g. Table 12-4 and Table 12-5 above), can lead to a failure to properly account for the full range of circumstances and factors at play in the determination of the significance of an effect (see section 3.35, GLVIA3, 2013). A wide range of factors, mitigating or otherwise, can factor into such a determination, and it is not possible to capture the complexity involved in balancing all considerations within the necessarily limited definitions contained in these

tables. This then naturally results in circumstances whereby the process of the determination of significance using the mechanistic method involved with the matrix shown in Table 12-6 can result in misrepresentations of the significance of landscape and visual effects. It is only with professional judgement, and narrative descriptions of effect, that such complexity can be integrated into the determination of significance. Therefore, the formulaic methods based upon the matrix presented above is combined with professional judgement in the determination of significance. This is illustrated in Figure 12-7 below where the professional judgment of the competent expert is used to properly determine the significance of an effect taking all considerations into account.

A focus is placed upon the narrative description of effects (see section 3.36, GLVIA3, 2013) given the naturally subjective nature of the significance determination process, ensuring that the rationale for the overall judgement is clear (see sections 3.28-3.29, GLVIA3, 2013). The comprehensive assessment of effects included in Section 12.7 aims to provide a transparent and robust determination of residual landscape and visual effects utilising the graph in Figure 12-7 below in combination with a clear and logical narrative.

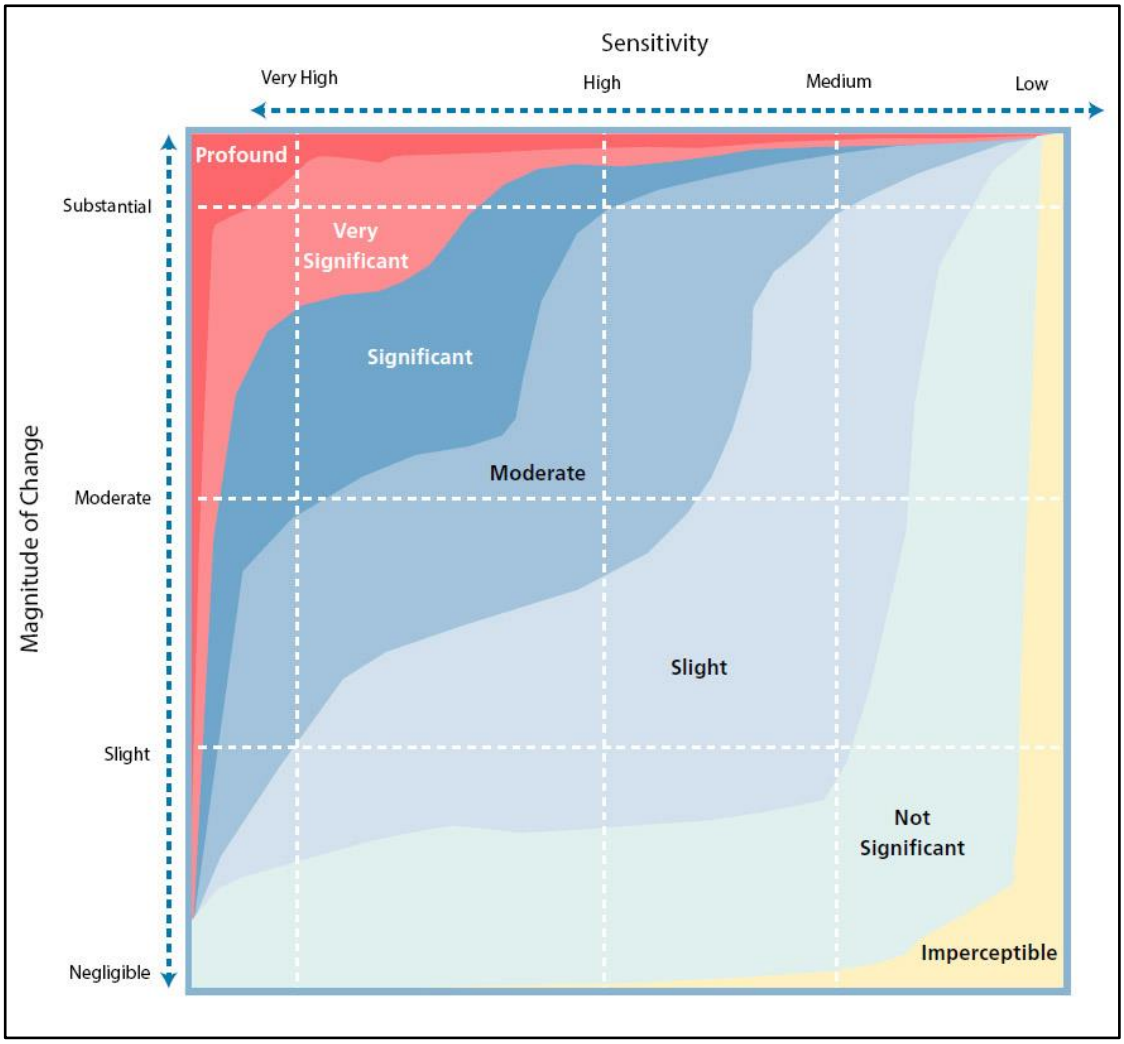


Figure 12-7 Visual Effect Significance Graph (adapted from EPA Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, 2022)

12.3 Landscape Baseline

This section of the chapter establishes the baseline landscape condition of the Proposed Development site and wider landscape setting. This includes identification and description of relevant landscape policy designations and sensitive landscape receptors located in the LVIA Study Area (within 1km from the Proposed Development Red Line Boundary). The receiving landscape of the Proposed Development Site and surrounding areas are also described in terms of their landscape character, landscape value and landscape sensitivity.

12.3.1 Landscape Policy Context

12.3.1.1 Galway City Development Plan 2017-2023 (GCDP)

The Proposed Development and LVIA Study Area are located in Galway City, therefore, the Galway City Development Plan 2017-2023 (GCDP) was consulted to identify relevant landscape designations and policies. Policy and designations pertinent to the Proposed Development and its wider landscape setting are reported in this section of the LVIA.

It is noted that the GCDP is currently under review, with draft versions of the new city development plan available. In order to be cognisant of upcoming changes or potential alterations to planning and development policy within the LVIA Study Area, the draft Galway City Development Plan 2023-2029 (DGCDP) has also been consulted.

12.3.1.1.1 *Land Use Zoning*

Chapter 11 of the GCDP sets out land use zoning of the city of Galway and acknowledges:

> *"Objectives for different areas within the city and indicates examples of uses that may or may not be acceptable within each use zone. Zoning seeks to promote the development of uses that achieve the objectives for the area concerned and to prevent development of incompatible uses."*

Section 11.2 of the GCDP sets out different objectives for different areas and indicates examples of uses that may or may not be acceptable within each use zone. In *Table 11.1* of the GCDP the Proposed Development is designated as *CI,* which objective is stated to be:

> *"To provide for enterprise, light industry and commercial uses other than those reserved to the CC zone"*

Land bordering the site on the north, west and south-west has the same zoning. To the east and south land is mainly zoned as 'Residential' and interspersed with 'Recreational and Amenity'.

Section 11.2.6 of the GCDP, regarding *Commercial/Industrial CI Land Use Zoning Objective,* notes that:

> *"Uses that may contribute to the zoning objectives, dependant on the CI location and scale of development, for example:*
>
> *Residential content of a scale that would not unduly interfere with the primary use of the land for CI purposes and would accord with the principles of sustainable neighbourhoods outlined in Chapter 2"*

In the same section, the GCDP points out specific development objectives of CI zones. The Proposed Development falls within the Northern Portion of the Western Distributor Road CI lands at Rahoon with the following specific development objective is describe as:

> *"The site shall include for a minimum of residential/residential commercial development of a scale equivalent to 20% of the proportion of all likely future floor space proposals. This residential development shall be integrated within the overall scheme."*

As discussed in greater detail elsewhere in the planning application, the Proposed Development is aligned with this specific development objective.

In relation to any potential updates or changes to land use zoning in the DGCDP, it is apparent from a review of the City Map from the current iteration of that draft plan, that there is no change to the zoning of lands proximate to the Proposed Development Site.

In relation to any potential updates or changes to land use zoning in the DGCDP, it is apparent from a review of the City Map from the current iteration of that draft plan, that there is no change to the zoning of lands proximate to the Proposed Development Site.

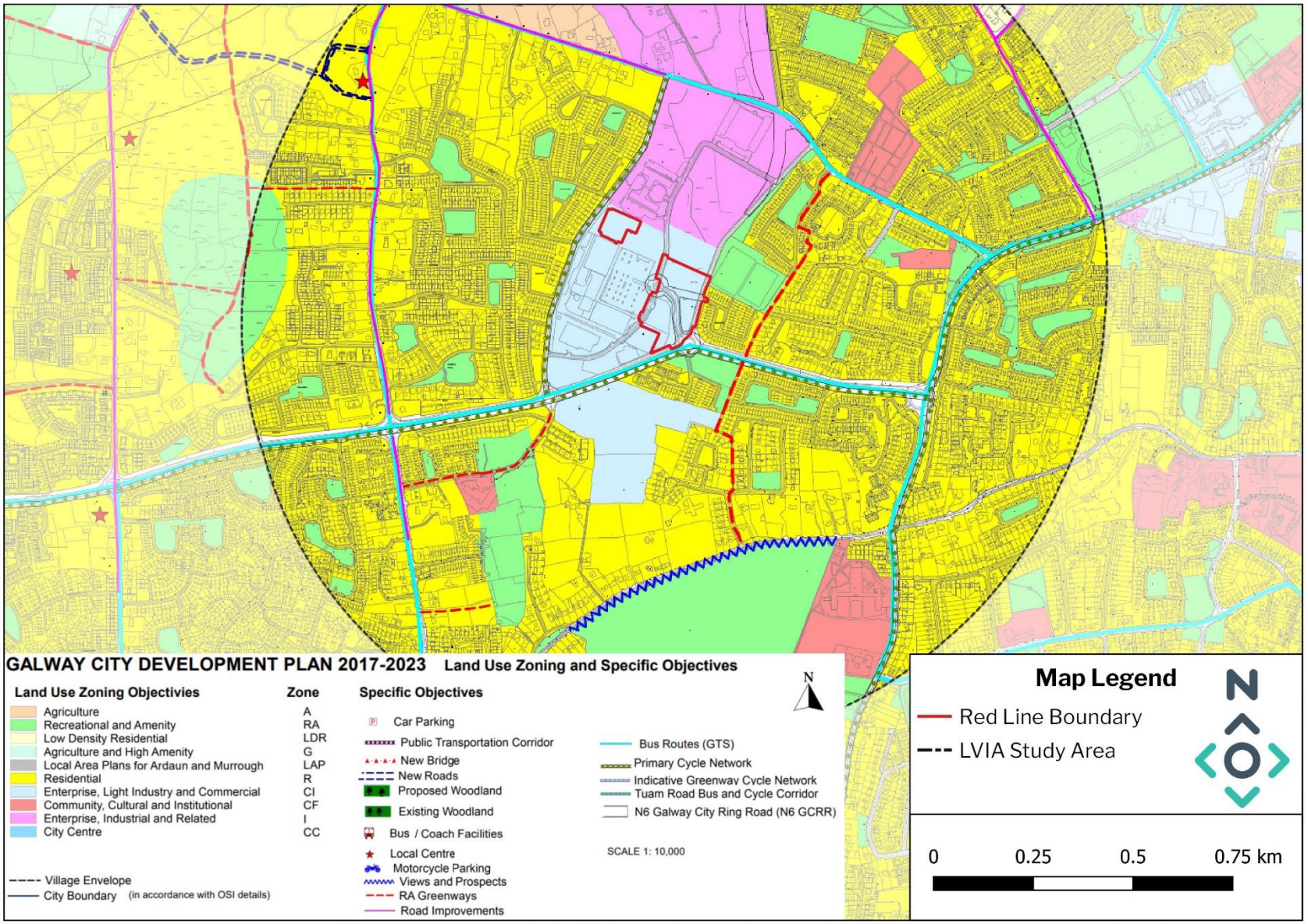


Figure 12-8 GCDP Land Use Zoning within the LVIA Study Area

12.3.1.1.2 Green Network

Chapter 4 of the CDP states that the aim is *"to provide a green network for the city that will allow for sustainable use, management and protection of natural heritage, recreation amenity areas, parks and open spaces in an integrated manner"*. The plan goes on to list the spaces in the city which make up this green network, and these are reproduced below:

- Blue Space of the city's coastal areas, rivers, lakes and canals
- Protected Spaces of ecological and biodiversity importance
- Green spaces of woodland parks
- Open Spaces including recreational and amenity and agricultural zoned lands and
- Community Spaces, which afford direct access by the community to nature and amenity e.g. greenways.

A map of the Green Network (*Figure 4.1 of the GCDP*) is reproduced below in Figure 12-9. The Proposed Development does not fall within any of the listed Green Network spaces in the GCDP.

The Galway City Council published the Recreation and Amenity Needs Study in 2008, conclusions of which have since been adopted into the current CDP. This study established a hierarchy of parks provision of Citywide Parks, Neighbourhood Parks and Local Parks. There are no Citywide Parks located within the LVIA Study Area. The nearest Neighbourhood Park is Westside Park which is located 0.9 km north-east of the Proposed Development Site boundary. There will be no visibility of the Proposed Development from this park.

Another important open space identified in the CDP are Greenways. These are established or potential amenity corridors for non-motorised travel (pedestrian and cyclists). There are four designated Recreation and Amenity (RA) Greenways within the LVIA Study Area, as shown in Figure 12-8 above. The closest runs parallel to the east of the site (approx. 150m from the site at its nearest point along the route) through residential areas to the east of Gort na Bró while the other one runs from Clybaun road, south-west of the site, linking the Knocknacarra National School with the Western Distributor Road.

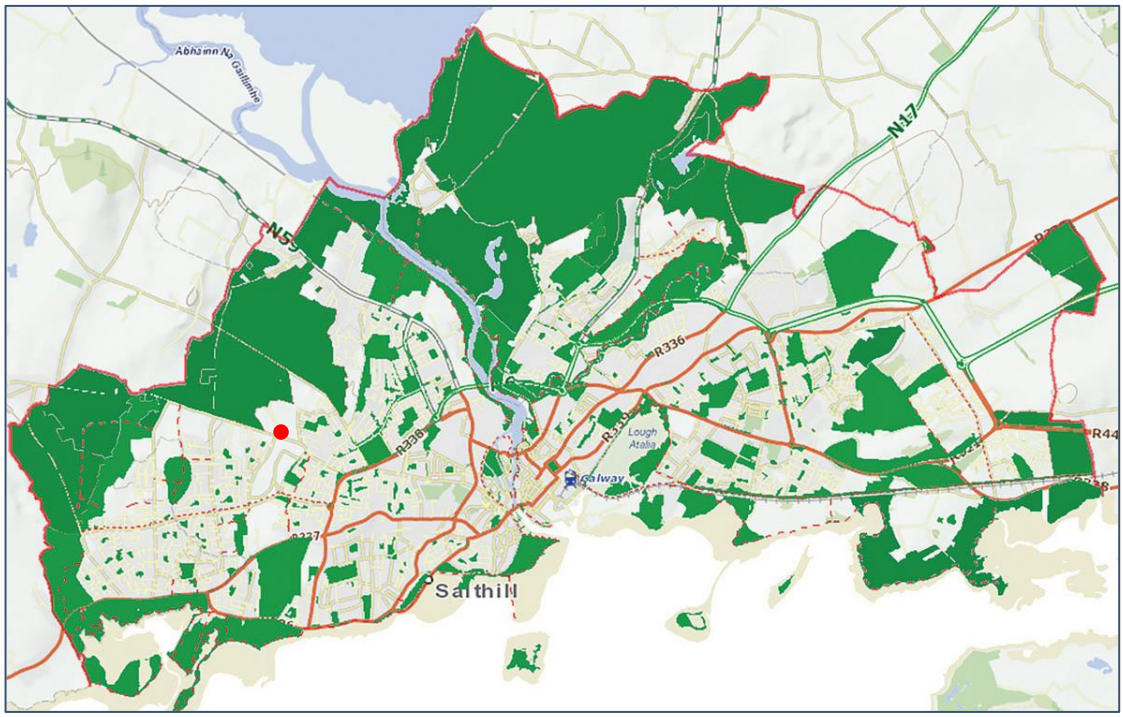


Figure 12-9 GCDP Green Network

In relation to any potential updates or changes to land use zoning in the DGCDP, it is apparent from a review of *Section 5.2* and *Figure 5.1* of the DGCDP, that there is no change planned to the Green Network within the LVIA Study Area.

12.3.1.1.3 Protected Views

Section 4.5.3 of the GCDP is dedicated to the protection of views *"due to their distinctive scenic amenity, aesthetic or cultural value"*, although it is acknowledged *"that views are not static and some changes in a view can be absorbed without visually depreciating the integrity of the view"*. *Policy 4.5.3* of the GCDP relating to Protected Views of Special Amenity Value and Interest of the CDP states:

> *"Protect views and prospects of special amenity value and interest, which contribute significantly to the visual amenity and character of the city through the control of inappropriate development.*
>
> *Require landscaping schemes as part of planning applications to have regard to such views and limit any planting which could have a detrimental impact on the value of protected views."*

Galway City Council identifies two categories of protected views, linear and panoramic. There is one linear protected view located within the LVIA Study Area as shown on Figure 12-8 above, V12, which is described as *"seascape views of Galway Bay from Kingston Road"*. The Proposed Development Site will not be visible from this view and the focus of this view is in the opposite direction.

In relation to any potential updates or changes to land use zoning in the DGCDP, it is apparent from a review of the City Map from the current iteration of that draft plan, and *Section 5.7.3* of the DGCDP itself, that there is no change planned to the protected views of special amenity value within the LVIA Study Area, although, it is noted that the protected view V12 in the adopted GCDP is now numbered as V3 in the DGCDP. The description of the view has not changed.

12.3.2 Landscape Character of the Proposed Development Site

Landscape character refers to the distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how people perceive this. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement, and creates the particular sense of place found in different areas. The identification of landscape character as outlined in the DoEHLG Guidelines (2000) comprises the identification of primarily physical units (areas defined by landform and landcover) and, where appropriate, of visual units.

12.3.2.1 Landcover and Land Use

Landcover is the term used to describe the combinations of vegetation and land-use that cover the land surface. It comprises the more detailed constituent parts of the landscape and encompasses both natural and man-made features.

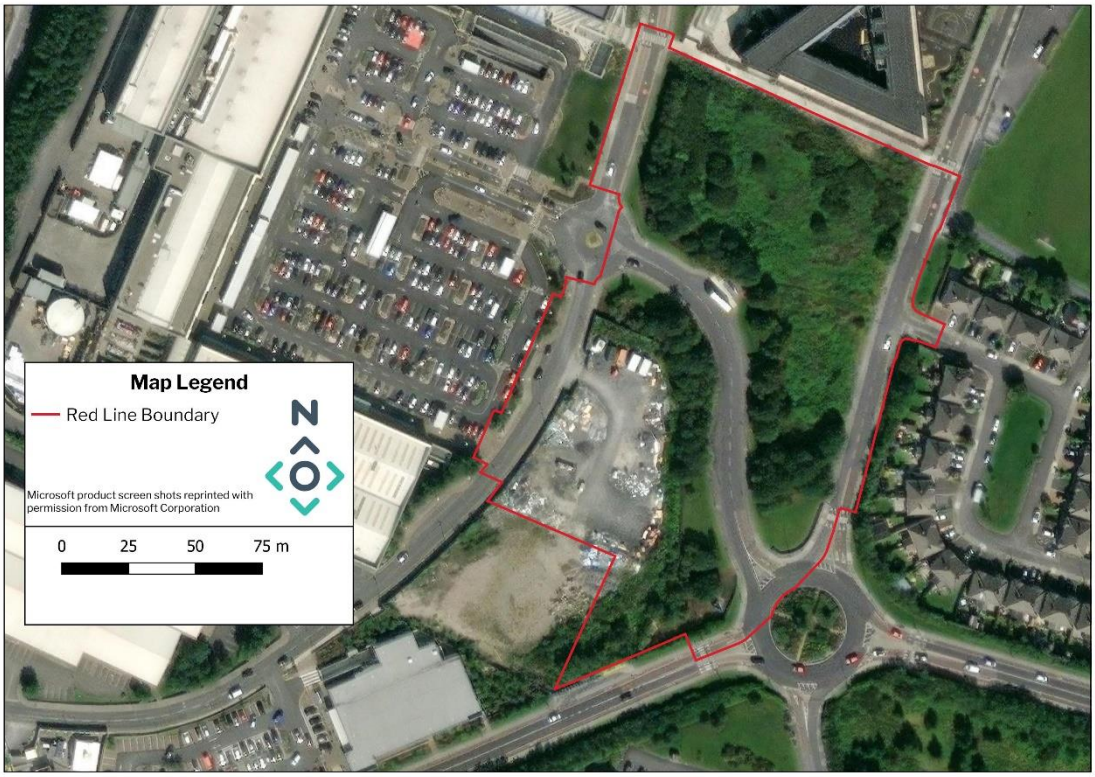


Figure 12-10 Aerial View of the Proposed Development Site

Figure 12-11 Aerial View of the Proposed Development Site

As seen from Figure 12-10 and Figure 12-11 above, the Proposed Development Site is split in two by an existing public road, which contains a bus stop and footpaths. Grassy areas and scattered trees are found along the border of this road, as seen in Plate 12-1 below. The landcover of the Proposed

Development Site is a mixture of well-established planting along the road in the centre of site and to the north-west of site as seen in Figure 12-10 above and Plate 12-1 below. There are also areas of scrub and rubble in the south-west of the site.

Plate 12-1 View south from the Galway Retail Park towards the public road dissecting the site

The majority of the Proposed Development Site is covered by grasses, scrub vegetation, and semi-mature trees. Immediately adjacent to the northern border of the site, a pedestrian walkway runs along the southern façade of the Gaelscoil as shown in Plate 12-2 below.

Plate 12-2 View from outside the Gaelscoil (seen to the right-hand side) towards the Proposed Development Site

The northern portion of the Proposed Development Site is dominated by scrub and semi-mature trees as seen as in Plate 12-2 above and Plate 12-3 below, along with a section of managed grassland and adjacent tree line.

Plate 12-3 Northern border of the Proposed Development

The section of the Proposed Development south of the road is covered in gravel, rubble and stored materials, as seen in Plate 12-4 below. In addition, large portions of the southern part of the Proposed Development are also covered in grasses, scrub and semi mature trees, seen in the background of Plate 12-4.

Plate 12-4 Southern section of the Proposed Development Site

12.3.2.2 Topography and Drainage

The Proposed Development Site and its surrounds are, in general, relatively flat, although the landscape slopes down to the south-west along Western Distributor Road beyond the south-western boundary of the site. The elevation levels on the Proposed Development Site range from approximately 27.50m Above Ordnance Datum (AOD) in the southern tip of the site to 31.60m in the northern part of the site. The difference in elevation equates to approximately 4 metres on account of artificial embankments evident throughout the site. The road separating the northern and southern parts of the site is level at approximately 29m Above Ordnance Datum (AOD) with banks rising either side of the road.

There are no water courses on site and the ground is currently mostly permeable with some areas of impermeable surfaces associated with existing roads and the construction compound in the southern portion of the site (see Plate 12-4 above). At present, water falling on the site either percolates into the ground or runs off naturally onto the surrounding roads. There is surface water drainage infrastructure on the roads, but none in other areas of the site. Further information relating to drainage can be found in Chapter 8 of this EIAR.

12.3.2.3 Views from within the site

The Proposed Development is located in a predominantly urban area with surrounding residential and commercial buildings. Views from the Proposed Development Site are limited to these types of urban developments. Views to the north from the northern boundary of the Proposed Development Site are limited by the Gaelscoil, which extends along the majority of this northern boundary as seen in Plate 12-5 below. Views to the west from the Proposed Development Site are primarily limited to the Gateway Retail Park commercial buildings as seen in Plate 12-6 below.

Plate 12-5 View west from the north-eastern corner of the Proposed Development Site

Plate 12-6 View from the western border of the Proposed Development

Views to the south from the southern section of the Proposed Development Site are limited to the commercial buildings along the Western Distributor Road, as seen in Plate 12-7 below, where the semi mature trees present on the Proposed Development Site screen other views in this direction.

Plate 12-7 View from the southern border of the Proposed Development

Views to the east from the northern section of the Proposed Development are mostly limited to the Gort na Bró residential estate, such as the view seen in Plate 12-8 below.

Plate 12-8 View from the eastern border of the Proposed Development

As shown by the images above, only short distance views are available from the Proposed Development Site. Longer ranging views are restricted in all directions by existing development which enclose the site within its immediate landscape setting, which is, in general, relatively flat.

12.3.3 Wider Landscape Setting

As shown in Figure 12-12 below, the LVIA Study Area is at a relatively higher level of elevation than the centre of Galway City and is a relatively flat landscape with some slopes and undulations. Landform gently slopes to the south, down towards the coast, from almost all areas of Knocknacarra. There are two relative high points within the LVIA Study Area. Firstly, approximately 500m to the south-east of the Proposed Development Site a small rise in elevation can be seen, Taylor's Hill. The built infrastructure on and surrounding this small rise in elevation restricts long-ranging views and the Proposed Development Site cannot be seen from the public realm. To the north of the LVIA Study Area, the level of elevation rises again, further from the coastline. Again, visibility towards the Proposed Development Site from these areas is screened by built infrastructure and existing vegetation.

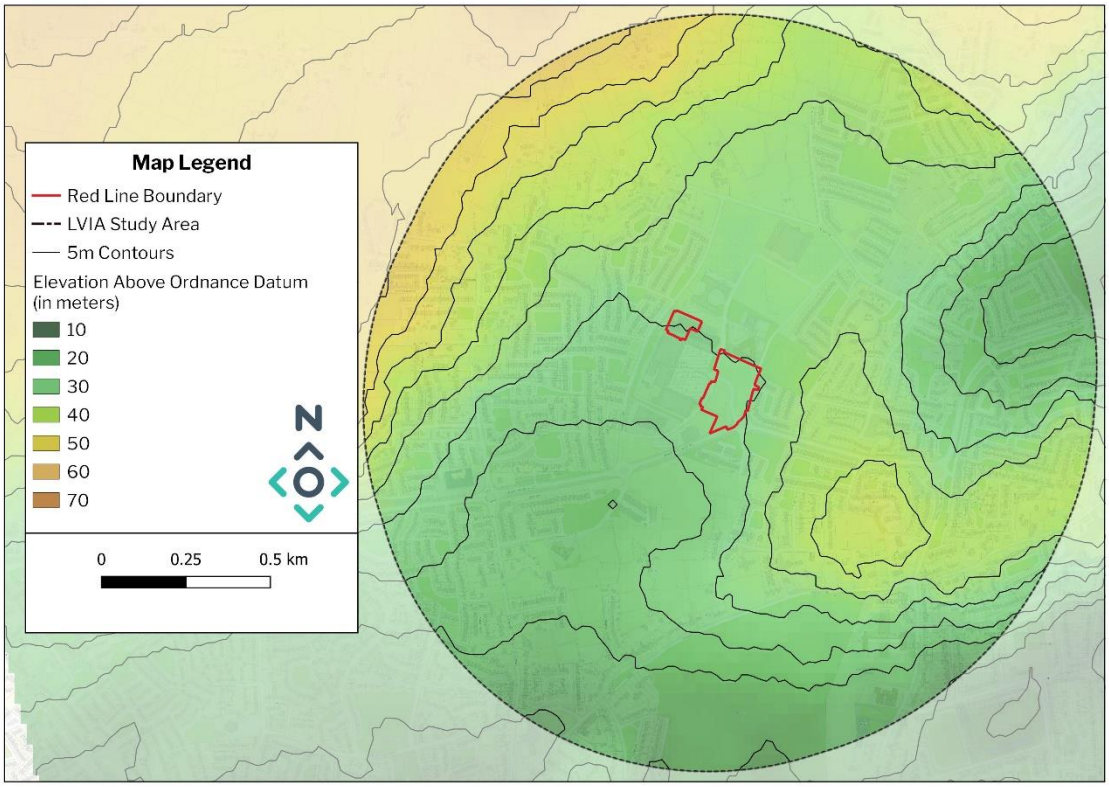


Figure 12-12 Topography of the LVIA Study Area

12.3.4 Landscape Value and Sensitivity

Landscape Values were assessed in order to determine the landscape sensitivity of the Proposed Development Site and its wider landscape setting. Determination of landscape value considers scenic amenity designations, sensitivity and value designations found in local landscape policy, as well as other indications of landscape value attached to undesignated landscapes.

Table 12-8 (below) describes various features and attributes of the landscape that indicate landscape value. These then contribute to the assessment of landscape sensitivity.

Table 12-8 Indications of Landscape Value

Features & Attributes of Landscape Value	Description
Landscape Designations	The Proposed Development is located within Galway City and is zoned as 'Commercial/Industrial (CI)' within the GCDP, the objectives of which align with the Proposed Development (see Section 12.3.1). There are no protected views within the Proposed Development Site itself. The closest protected view is linear protected view, V12, which is directed away from the Proposed Development. There are four RA Greenways within the LVIA Study Area. The closest runs parallel to the east of the site (approx. 150m from the site at its nearest point along the route). There are no Citywide Parks located within the LVIA Study Area. The nearest Neighbourhood Park is Westside Park which is located 0.9 km north-east of the Proposed Development Site Boundary. There will be no visibility of the Proposed Development from this park.
Landscape Elements Quality/Condition	This refers to the physical condition of individual elements. The landcover of the Proposed Development Site is mainly comprised of scrub and semi-

Features & Attributes of Landscape Value	Description
	mature trees, along with areas of rubble, gravel and material storage, with a public road splitting the site in two. The wider landscape is a combination of commercial, educational and residential uses with the Gateway Retail Park and the Gaelscoil Mhic Amhlaigh as the main built features adjacent to the site.
Aesthetic Qualities	The Proposed Development site is an undeveloped site populated by scrub and scattered trees and spoil and bare ground. The highest aesthetic qualities are limited to the public road crossing the site and its urban borders with a buffer of managed grass where the bus station is located. Some areas of the site is in an unmanaged or unvegetated state with aesthetic qualities limited to the vegetational elements located primarily along the borders of the site.
Wildness/naturalness	There is some sense of wildness associated with certain parts of the site at present given its overgrown nature, but in general the site is characterised by its urban surroundings.
Rarity/Conservation Interests	The habitats found within the site boundary are spoil and bare ground (ED2), Buildings and Artificial Surfaces (BL3), Scattered trees and Parkland (WD5), Amenity grassland (GA2), and Scrub (WS1).
Cultural Meaning/Associations	No sensitive features from a heritage or cultural point of view were found within the Proposed Development Site.
Recreation Value	Excepting the pedestrian access along the existing road network dissecting the site, the Proposed Development Site is currently undeveloped with limited or no recreational value.

The Proposed Development Site is currently an undeveloped site populated primarily by scrub and scattered trees. The site has limited aesthetic and recreational value. There are no rare landscape features on site or cultural or heritage associations on site. Therefore, in consideration of the indicators detailed in Table 12-8 above, the landscape value of the site is deemed to be **Low**.

As stated in Section 12.2.2 above, 'Susceptibility to change' can be described as the ability of the landscape receptor (either the overall character or quality of the landscape, or a particular landscape feature) to accommodate the Proposed Development without undue consequences for the maintenance of the baseline (existing) landscape situation, and/or the achievements of landscape planning policies and strategies. The Proposed Development Site is considered to have a strong ability to accommodate the Proposed Development without undue consequences to the maintenance of the landscape character and in compliance with planning policies/strategies. As discussed in Section 12.3.1, the Proposed Development is aligned with the land use zoning objectives for the site. In consideration of this factor, the susceptibility to change is deemed to be **Low**.

As stated in Section 12.2.2 above, landscape sensitivity is described in the GLVIA (2013) as a combination of the landscape's susceptibility to change as well as the value attached to the landscape. On the ground of the aforementioned points the landscape sensitivity of the Proposed Development Site, and the wider landscape area, to the Proposed Development, is deemed to be **Low**.

12.4 Visual Baseline

This section of the LVIA establishes the likely visibility of the Proposed Development from visual receptors located in the LVIA Study Area (area within 1 km of the Proposed Development boundary). This includes a description of views towards the Proposed Development from a variety of perspectives which has informed the selection of photomontage viewpoints. Certain areas were screened out from assessment where it is very unlikely that any visibility will occur due to factors such as screening from localised topography, built form or vegetation.

12.4.1 Visibility of the Proposed Development – Views towards the site

A site visit was conducted during August 2022. The likely visibility of the Proposed Development was appraised from sensitive receptors and landscape policy designations identified in the previous section of this chapter - *Landscape Baseline*. Photos are used to show views towards the site from prominent visual receptors and the local road network in the LVIA Study Area. The location of photos used in the following section are illustrated below in Figure 12-13.

Figure 12-13 Photo Locations Map

12.4.1.1 Visibility from Prominent Visual Receptors

Baseline investigations identified a number of sensitive visual receptors within the LVIA Study Area. As described in Section 12.3.1 above, the only protected view identified within the LVIA Study Area is directed away from the Proposed Development and is screened out from further assessment. However, several other prominent visual receptors were identified and the likely visibility of the Proposed Development from these receptors (including the local road network) is discussed below. These prominent visual receptors are generally located within close proximity to the site given the

considerable screening provided by built infrastructure in the LVIA Study Area at locations further from the site.

The visibility appraisal below outlines the likely visibility of the Proposed Development from these visual receptors.

12.4.1.1.1 *Local Road Network*

Western Distributor Road

The Western Distributor Road runs perpendicular towards the southern border of the Proposed Development and continues through a roundabout adjacent to the south-east side of the site. As seen in Plate 12-9 below, taken 400m south-east of the site, the topography allows for horizontally limited but clear and open views towards the Proposed Development, framed by roadside vegetation and treelines. Visual receptors (cyclists, pedestrians and motorists) will have visibility towards the Proposed Development.

Plate 12-9 View to the north-west from Western Distributor Road.

Plate 12-10 below, was captured further along the section of the Western Distributor Road seen above, close to the roundabout south-east of the site. The Gateway Retail Park is seen in the background, above the roundabout. The Proposed Development Site is located in the intervening space between the roundabout and the Gateway Retail Park in the centre of the image. There will be substantial views of the Proposed Development from this location as a large-scale feature in the view.

Plate 12-10 View to the west from the Western Distributor Road adjacent to the roundabout south-east of the site

Further south along the Western Distributor Road open views towards the Proposed Development Site remain available until visual receptors are located far enough along the road so that the built form of the ALDI Supermarket provides substantial screening in that direction, which occurs approximately 200m south-west of the Proposed Development Site, near the roundabout created by the intersection of the Western Distributor Road and Bóthar Stiofáin. It is noted that there may still be potential views of the highest portions of the Proposed Development from here but the majority of the built form of the Proposed Development will be substantially screened from view from this location and further to the south-west. Plate 12-11 shows a view north from the Western Distributor Road beside the ALDI Supermarket, with the Proposed Development Site located in the right background, behind the ALDI.

Plate 12-11 View north from the Western Distributor Road beside the ALDI Supermarket

Gateway Retail Park Approach Road

To the north-west of the Western Distributor Road (on the other side of the ALDI Supermarket shown in Plate 12-11 above) a local road off Bóthar Stiofáin acts as an approach road for the Galway Retail Park and the Proposed Development Site. Plate 12-12 below shows a view from this local road approximately 120m south-west of the Proposed Development Site, which is located to the left background of the image. There is unlikely to be substantial visibility of the Proposed Development

south-west of this point along the road, given the presence of screening elements in the form of built infrastructure in the streetscape.

Plate 12-12 View to the north-east towards the Proposed Development Site from the local road approaching the western site boundary

Further north-east along this local road (with some stretches of this section of the road within the Red Line Boundary) towards the Galway Retail Park there will be substantial views of the Proposed Development considering its scale. Plate 12-13 below shows a view from the entrance to the Galway Retail Park which is immediately adjacent to the Red Line Boundary.

Plate 12-13 West view from the Gateway Retail Park entrance

The Proposed Development is likely to be visible from locations along this local road as it extends north beyond the Galway Retail Park and the Gaelscoil Mhic Amhlaigh (seen below in Plate 12-14). The Retail Park and Gealscoil will provide some screening of the lower elements of the Proposed Development, until this local road reaches the Abbvie Pharmaceuticals buildings approximately 300m north of the Proposed Development Site.

Plate 12-14 View north-west towards Gaelscoil Mhic Amhlaigh from the local road approaching the Galway Retail Park

Bóthar Stiofáin

Bóthar Stiofáin is a local road to the west of the Galway Retail Park and Proposed Development Site. There is unlikely to be any visibility of the Proposed Development from this road. Plate 12-15 below was captured at the entrance of the Caiseal Úr housing estate adjacent to the western border of the Gateway Retail Park. The existing tall mature treeline seen in the background of Plate 12-15 will screen the Proposed Development from view from this location. This vegetated screening is a tall, linear, roadside buffer limiting visibility in the direction of the Proposed Development along Bóthar Stiofáin, as well as the built form of the Galway Retail Park which may be visible through the vegetation in winter months.

Plate 12-15 View to the east from Caiseal Ur residential road

12.4.1.1.2 *Social and community areas*

Knocknacarra National School

The Knocknacarra National School is located approximately 500m south-west of the Proposed Development within a residential area dominated by low rise buildings and low maintenance green spaces. Lack of tall vegetation, flat topography and a gap between buildings will allows for open views towards Proposed Development Site, as seen in Plate 12-16 below. There is some screening provided by the existing commercial buildings seen in the centre background of the picture. Although, this will only result in partial screening of the Proposed Development given the lower height of these buildings compared to the heights of the Proposed Development.

Plate 12-16 View south-west from the Knocknacarra National School entrance

Gaelscoil Mhic Amhlaigh

The Gaelscoil Mhic Amhlaigh is located adjacent to the northern border of the site. It is a triangular-shaped building with its south-west façade parallel to a pedestrian walkway physically dividing the school from the Proposed Development Site. Visual receptors in various parts of the building will have open views towards the Proposed Development especially from the south-west façade and the parallel walkway. There is also likely visibility of the Proposed Development approaching the site from the local road to the north-west of the school as seen in Plate 12-14 above.

Plate 12-17 below was captured from a local road north-east of the Proposed Development Site. This road connects the Gaelscoil with Rahoon Road to the north. The rear of several residential buildings are seen alongside the road and the Gaelscoil Mhic Amhlaigh can be seen in the background of the image, at the far end of the road. The Proposed Development will likely be visible from this road above the roadside screening and the school seen in the centre background, approximately 300m away. The height of the school is lower than the Proposed Development so it will only provide partial screening from this orientation. The Proposed Development will be at least partially visible from this entire section of road, up to where it joins the Rahoon Road to the north, where the Proposed Development will be screened from view by the intervening built form.

Plate 12-17 View to the north-east, towards the Proposed Development from a local road north-east of the Proposed Development Site

Plate 12-18 below, was captured approximately 200m further south-west along this local road. The Proposed Development will be visible from the Gaelscoil Mhic Amhlaigh, seen to the right of the image, as well as from the sports pitch seen to the left.

Plate 12-18 View to the north-east from the Gort na Bró Road towards the Gaelscoil Mhic Amhlaigh

Plate 12-19 below shows the pedestrian walkway between the Gaelscoil Mhic Amhlaigh and the Proposed Development with the Gateway Retail Park at the back of the image. The Proposed Development will appear as a large feature within this view given its proximity. Locations further south along this road are within the Red Line Boundary for the Proposed Development and there will be substantial visibility of the Proposed Development from these locations.

Plate 12-19 View to the north-east from the Gort na Bró Road towards the Gaelscoil Mhic Amhlaigh

Plate 12-20 below shows a view over Knocknacarra and the Galway Retail Park from the designated RA greenway shown on Figure 12-8 above. The Proposed Development Site is visible to the left-hand side of the Gaeilscoil, which is seen to the right of the image.

Plate 12-20 View to the west from the RA Greenway to the east of the Proposed Development Site

Gateway Shopping Park

Plate 12-21 below was taken from the west side of the Gateway Retail Park parking, looking east towards the Proposed Development. There will be substantial views of the Proposed Development from the Retail Park.

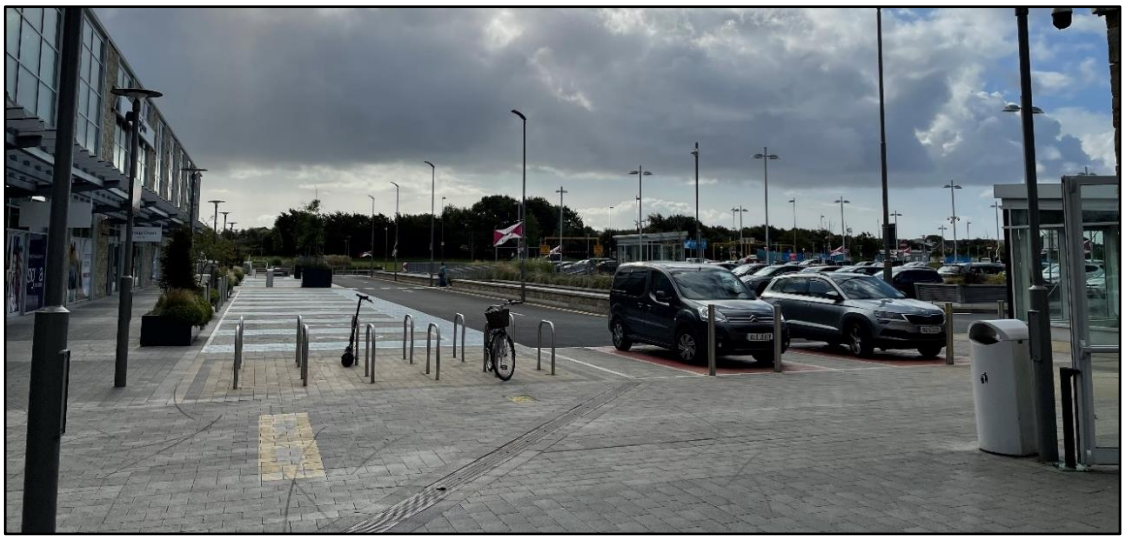


Plate 12-21 View from the west side of the Gateway Shopping Park parking

12.4.1.1.3 Housing Estates

There are several housing estates in close proximity to the Proposed Development Site, with low rise buildings and facades oriented towards the site. Potential visibility is likely to occur from courtyards and backyards of existing residential units due the height of the Proposed Development.

An Logan Housing Estate

Plate 12-22 below was captured at the entrance to the An Logan Road housing estate, located 70m from the south-eastern side of the Proposed Development. Several of the residential buildings have facades facing towards the site and due to the close proximity and heights of the Proposed Development, multiple visual receptors within this housing estate will likely have visibility.

Plate 12-22 View to the north-west from An Logan Road

Gort na Bró Housing Estate

Plate 12-23 below was captured at the entrance of the Gort na Bró housing estate, adjacent to the eastern border of the site, with works extending to the intersection seen in the image below. The

perpendicular access road gives clear views towards the site. The Proposed Development will be visible from this location due to its close proximity and height.

Plate 12-23 View to the east from Gort na Bró housing estate

Visibility Appraisal Summary

Visibility of the Proposed Development is limited to locations within 500m of the Proposed Development Site along the public road network. There is also likely to be some visibility from other parts of the LVIA Study Area, for example the upper stories of residential dwellings (see VP1 below). The Proposed Development is not likely to be visible within any scenic views and there is an absence of highly sensitive receptors which will experience any visibility of the Proposed Development. Most visibility of the Proposed Development occurs from local residents and along the local road network, which primarily comprises local traffic, residents and commuters.

12.5 Photomontage Viewpoint Locations

6 No. viewpoint locations were selected for production of photomontages and assessment of visual effects. The location specific details of the viewpoints and the receptors they represent are described in Table 12-9 and their locations are illustrated in Figure 12-14 below. Assessment of the views and visual effects of the Proposed Development from these locations are described in the following section of this report – *Photomontage Assessment.*

It is not possible to present every view and every location by means of viewpoints. The choice of viewpoint locations is influenced by both the views available and the type of viewer. Care was taken to provide a range of views from various geographic perspectives (distance, orientation and elevation). It is to be noted that the photomontages are tools to assist the visual assessment and are not representative of visibility of the Proposed Development in the entirety of the LVIA Study Area.

The choice of viewpoint locations should cover locations where the development will be completely visible as well as partially visible. All photomontages were captured within 100m of the site, where visual effects are likely to be greatest. The only exception to this is VP 3 which shows a view from Knocknacarra National School, approximately 490m from the Proposed Development Site.

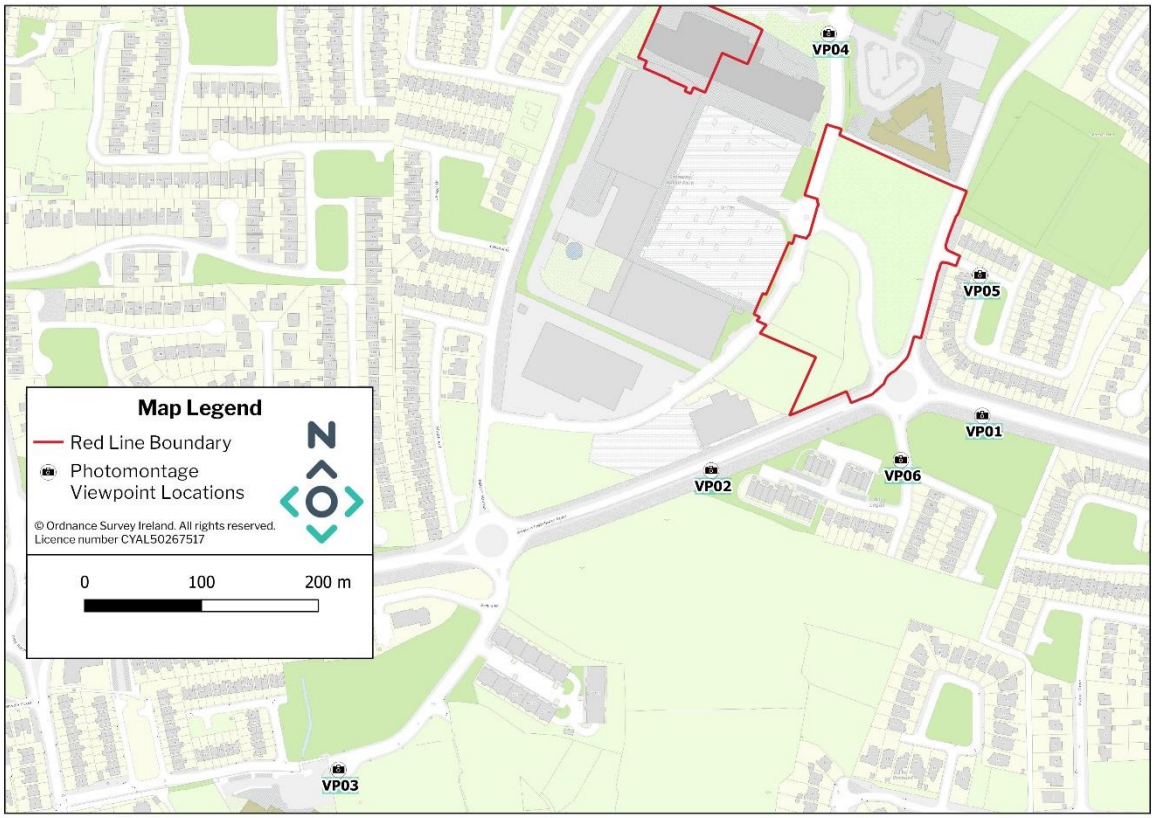


Figure 12-14 Photomontages Viewpoints Location Map

Table 12-9 Photomontage Viewpoint Locations

Table of Viewpoints.		
VP No.	**Description**	**Grid Ref. (ITM)**
1	View to the west from the section of the Western Distributor Road to the east of the Proposed Development Site. This viewpoint is located approximately 85m from the Proposed Development Site and is located adjacent to a designated RA Greenway in the GCDP.	E 526,959 N 725,068
2	View to the north from the section of the Western Distributor Road to the south of the Proposed Development Site, beside the ALDI Supermarket, approximately 80m from the Proposed Development Site.	E 526,730 N 725,020
3	View to the north-east from outside Knocknacarra National School. This viewpoint is located approximately 490m to the south-west of the Proposed Development Site.	E 526,410 N 724,760
4	View to the south-east from outside the Gaelscoil Mhic Amhlaigh. This viewpoint is located approximately 85m to the north of the Proposed Development Site.	E 526,831 N 725,398
5	View to the west from the entrance to Gort na Bró Housing Estate. This viewpoint is located approximately 25m from the Proposed Development Site Boundary.	E 526,963 N 725,190

Table of Viewpoints.		
6	View to the north-west from the entrance to An Logan Housing Estate. This viewpoint is located approximately 60m from the Proposed Development Site Boundary.	E 526,890 N 725,021

The photomontages can be seen in more detail in the high-resolution photomontage booklet accompanying this planning application. It is recommended that the following section should be read in conjunction with the photomontage booklet. In order to aid descriptions, smaller images of photomontages are also included within this document followed by a description of the 'existing view' (existing baseline conditions at each viewpoint) and its sensitivity in consideration of local receptors. The proposed photomontage is then described with a focus on determining the magnitude of change that will occur at each viewpoint. Factors that mitigate the visual impact are also noted and considered into the assessment process to give a residual visual effect.

12.6 Photomontage Assessment

12.6.1 Viewpoint 01

VP01 – Existing View

Plate 12-24 Viewpoint 1 – Existing View

VP01 – Proposed View

Plate 12-25 Viewpoint 1 – Proposed View

Viewpoint 1 – Western Distributor Road (east)	
Viewpoint Description & Details	› View to the west from the section of the Western Distributor Road to the east of the Proposed Development Site. › This viewpoint is located approximately 85m from the Proposed Development Site and is located adjacent to a designated RA Greenway in the GCDP. › Grid Reference: E 526,959 N 725,068
Description of 'Existing View'	The view looks down the local road towards a roundabout. Various vegetational elements can be seen on the roundabout itself and throughout the view, providing screening and limiting views to a medium-distance, with the exception of longer-distance views of the Galway Retail Park in the centre of the image, as well as some residential housing seen above the retail park. Various road infrastructure elements can be seen and the view is suburban in character.
Description of 'Proposed View'	The built form of the apartment blocks can be seen as substantial features behind the roundabout within the view. The four storey buildings raise the skyline, restricting long and medium range views, including visibility of Galway Retail Park which is now obstructed, although a portion of the longest ranging views of the residential dwellings in the background are still available. The Proposed Development alters the character of the landscape as less vegetation is visible compared with the Existing View.
Sensitivity of Visual Receptor(s) (See	**Medium** – Visual Receptors will be motorists travelling along the local road and recreational users of the designated RA greenway.

definitions in Section 12.2.3)	
Magnitude of Change (See definitions in Section 11.2.3)	**Moderate** – *"The change in the view may involve partial obstruction of existing view or partial change in character and composition of the baseline through the introduction of new elements or removal of existing elements. Likely to occur at locations where the development is partially visible over a moderate or medium extent, and which are not in close proximity to the development. Change may be readily noticeable but not substantially different in scale and character from the surroundings and wider setting."*
Significance of Effect (See Section 11.2.3)	**Medium x Moderate = Moderate/Minor = Moderate (EPA, 2022)** An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends
Mitigating Factors	› The existing view is not of a high scenic quality, and while there is the loss of some vegetation in the view the scenic quality of the proposed view remains broadly consistent, with both views having limited scenic qualities. › The landscaping elements in front of the proposed buildings provide a noticeable softening of the edge of the Proposed Development and visually highlight the extent to which the buildings are set-back from the road. In addition, these vegetational elements serve to keep the sense of vegetation present throughout the view broadly similar to the Existing View. › Some of the longest-distance views are still available in the proposed view. › The Proposed Development appears appropriately scaled within the suburban streetscape where it is located given that this is a view towards the Galway West District Centre and the character of the view has not fundamentally changed. This is in accordance with the planning policy and land use zoning.
Residual Effect (incl. mitigating factors)	**Slight (EPA, 2022)** An effect which causes noticeable changes in the character of the environment without affecting its sensitivities

12.6.2 Viewpoint 02

VP02 – Existing View

Plate 12-26 Viewpoint 2 – Existing View

VP02 – Proposed View

Plate 12-27 Viewpoint 2 – Proposed View

Viewpoint 2 – Western Distributor Road (south)	
Viewpoint Description & Details	› View to the north from the section of the Western Distributor Road to the south of the Proposed Development Site, beside the ALDI Supermarket, approximately 80m from the Proposed Development Site. › Grid Reference: E 526,730 N 725,020
Description of 'Existing View'	The view looks down the local road towards a roundabout, seen in the background. Various vegetational elements can be seen on the roundabout itself and throughout the view lining the road, providing screening and limiting views to a medium-distance. Various road infrastructure elements can be seen along the roadside. The rooves of residential dwellings in the Dort na Bró housing estate can be seen to the right-hand side of the image and the ALDI supermarket is seen to the left-hand side, being the largest building in view from this location. The view is suburban in character.
Description of 'Proposed View'	The built form of the apartment blocks can be seen as substantial features to the left-hand side of the road within the view. Where it can be seen a stretch of the roadside vegetation has also been removed, although this is a relatively small stretch given the proposed landscaping elements. The Proposed Development is now the largest building within the view, although it is partially screening by the intervening roadside vegetation. The Proposed Development is viewed on the same side of the road as the large commercial building (ALDI Supermarket) in view.

Sensitivity of Visual Receptor(s) (See definitions in Section 12.2.3)	**Low** – Visual Receptors will be motorists travelling along the local road.
Magnitude of Change (See definitions in Section 11.2.3)	**Slight** – *"The proposals would be partially visible or visible at sufficient distance to be perceptible and result in a low level of change in the view and its composition and a low degree of contrast. The character of the view may be altered but will remain similar to the baseline existing situation. This change could be short term or of a short duration."*
Significance of Effect (See Section 11.2.3)	**Low x Slight = Minor/Negligible = Not Significant (EPA, 2022)** An effect which causes noticeable changes in the character of the environment but without significant consequences.
Mitigating Factors	› There is a high level of screening of the Proposed Development from the existing and proposed roadside vegetation and landscaping. › The existing view is not of a high scenic quality, and while there is the loss of some vegetation in the view the scenic quality of the proposed view remains broadly consistent. › The landscaping elements in front of the proposed buildings provide a noticeable softening of the edge of the Proposed Development and visually highlight the extent to which the buildings are set-back from the road. In addition, these vegetational elements serve to keep the sense of vegetation present throughout the view broadly similar to the Existing View. › The longest-distance views are still available in the proposed view. › The Proposed Development appears appropriately scaled within the view of the Galway West District Centre where it is located, and the character of the view has not fundamentally changed. This is in accordance with the planning policy and land use zoning. › The Proposed Development is visible in the background of the view and does not obscure any existing element of the landscape from view.
Residual Effect (incl. mitigating factors)	**Not Significant (EPA, 2022)** An effect which causes noticeable changes in the character of the environment but without significant consequences.

12.6.3 Viewpoint 03

VP03 – Existing View

Plate 12-28 Viewpoint 3 – Existing View

VP03 – Proposed View

Plate 12-29 Viewpoint 3 – Proposed View

Viewpoint 3 – Knocknacarra National School	
Viewpoint Description & Details	› View to the north-east from outside Knocknacarra National School. › This viewpoint is located approximately 490m to the south-west of the Proposed Development Site. › Grid Reference: E 526,410 N 724,760
Description of 'Existing View'	This view looks across a local road leading to the National School located behind the viewpoint. On the opposite side of the road a line of low scrub vegetation can be seen, behind which the upper regions of a residential dwelling and a LIDL supermarket can be seen. The right of the LIDL a gap in the buildings can be seen and the skyline drops where a treeline is seen. To the right background two apartment blocks are seen as the largest built element within the view. The view is suburban in character.
Description of 'Proposed View'	The built form of the apartment blocks can be seen as small features to fill the gap between buildings in the skyline from the existing view. The built form of the Proposed Development is seen as a small background feature within the view. The character of the view is fundamentally unchanged.
Sensitivity of Visual Receptor(s) (See definitions in Section 12.2.3)	**Medium** – Visual Receptors will be motorists travelling along the local road, as well as parents and children attending the national school, as well as residential receptors located nearby the viewpoint, who are in medium proximity to the Proposed Development.
Magnitude of Change (See definitions in Section 11.2.3)	**Negligible** - Any change would only be barely distinguishable from the status quo "do-nothing scenario" in the surroundings. The composition and

	character of the view would be substantially unaltered, approximating to little or no change.
Significance of Effect (See Section 11.2.3)	**Medium x Negligible = Minor/Negligible = Not Significant (EPA, 2022)** An effect which causes noticeable changes in the character of the environment but without significant consequences.
Mitigating Factors	› The Proposed Development is a relatively small background element within the view. › The Proposed Development does obstruct or interfere within any views of a scenic quality. › The addition of the Proposed Development to the skyline increases the alignment of rooftops throughout the view and the visual coherency of the skyline. › The Proposed Development appears appropriately scaled within the suburban streetscape where it is located and the character of the view has not fundamentally changed.
Residual Effect (incl. mitigating factors)	**Not Significant (EPA, 2022)** An effect which causes noticeable changes in the character of the environment but without significant consequences.

12.6.4 Viewpoint 04

VP04 – Existing View

Plate 12-30 Viewpoint 4 – Existing View

VP04 – Proposed View

Plate 12-31 Viewpoint 4 – Proposed View

Viewpoint 4 – Gaelscoil Mhic Amhlaigh	
Viewpoint Description & Details	› View to the south-east from outside the Gaelscoil Mhic Amhlaigh. › This viewpoint is located approximately 85m to the north of the Proposed Development Site. › Grid Reference: E 526,831 N 725,398
Description of 'Existing View'	This view looks down a local road leading to the Galway Retail Park, the edge of which is seen to the right-hand side of the image. The Gaelscoil Mhic Amhlaigh can be seen to the left of the view. The road curves to the right in the background of the view, where the Proposed Development Site can be seen, with a line of semi-mature trees and other scrub vegetation makes up the landcover. The character of the view is suburban, although with no residential dwellings located near the viewpoint, there is also a commercial/retail aspect to the view, given the presence of the commercial buildings to the right-hand side – the Galway Retail Park, and the large built form of the school.
Description of 'Proposed View'	The site of the Proposed Development has changed from an undeveloped area covered in vegetation to one occupied by large built form of the residential apartment blocks, set back from the road by the civil square located adjacent to the road. The built form of the Proposed Development is seen as a large background feature within the view. The Proposed Development is viewed as the largest building within the view, although the skyline created by the Proposed Development is scaled proportionately with the Gaelscoil. The character of the view is fundamentally unchanged but is noticeably more developed than previously.

Sensitivity of Visual Receptor(s) (See definitions in Section 12.2.3)	**Medium** – Visual Receptors will be motorists travelling along the local road, as well as parents and children attending the national school, there are no residential receptors represented by this viewpoint.
Magnitude of Change (See definitions in Section 11.2.3)	**Moderate** – *"The change in the view may involve partial obstruction of existing view or partial change in character and composition of the baseline through the introduction of new elements or removal of existing elements. Likely to occur at locations where the development is partially visible over a moderate or medium extent, and which are not in close proximity to the development. Change may be readily noticeable but not substantially different in scale and character from the surroundings and wider setting."*
Significance of Effect (See Section 11.2.3)	**Medium x Moderate = Moderate/Minor = Moderate (EPA, 2022)** An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends
Mitigating Factors	› The Proposed Development does obstruct or interfere within any views of a scenic quality. › The Proposed Development is visible in the background of the photomontage and does not obscure any existing element of the landscape from view. › The Proposed Development increases the sense that the streetscape in view is a district centre, and the Proposed Development combined with the Galway Retail Park is experienced as the largest buildings within this suburb. This is in accordance with the planning policy and land use zoning. › The landscaping elements included as part of the Proposed Development serve to visually soften the appearance of the proposed buildings in this view. › The Proposed Development appears appropriately scaled within the view of the Galway West District Centre where it is located, and the character of the view, while subject to greater levels of urban development, has not fundamentally changed.
Residual Effect (incl. mitigating factors)	**Slight (EPA, 2022)** An effect which causes noticeable changes in the character of the environment without affecting its sensitivities

12.6.5 Viewpoint 05

VP05 – Existing View

Plate 12-32 Viewpoint 5– Existing View

VP05 – Proposed View

Plate 12-33 Viewpoint 5 – Proposed View

Viewpoint 5 – Gort na Bró	
Viewpoint Description & Details	› View to the west from the entrance to Gort na Bró Housing Estate. › This viewpoint is located approximately 25m from the Proposed Development Site Boundary. › Grid Reference: E 526,963 N 725,190
Description of 'Existing View'	The view looks down a local road leading to the entrance of the Gort na Bró Housing Estate, which is the intersection seen in the midground. The front driveways and gardens of various residential properties are seen on the right-hand side of this road. The outside of another residential building is seen on the left-hand side of the view. Beyond the intersection seen in the midground, a line of semi-mature trees, shrubs and scrub is seen along the far side of the road. Views are restricted to short-range views and the character of the views is suburban. The views are not of a high-scenic quality.
Description of 'Proposed View'	The site of the Proposed Development has changed from an undeveloped area covered in vegetation to one occupied by large built form of the residential apartment blocks. The built form of the Proposed Development is seen as a large background feature within the view. The Proposed Development is viewed as the largest building within the view and the character of the view has undergone a large degree of change and is noticeably more developed than previously. The road structure has also changed with the main connecting road between the Gort na Bró Housing Estate and the Galway Retail Park now seen in the centre of the view, with a longer-range view of the Retail Park itself now available in the background. The character of the view has changed from a heavily suburban one, to one where the views give a sense of the Gort na Bró Housing Estate being located on the edge of a suburban district centre. Although, both types of views could be classed as suburban in character.
Sensitivity of Visual Receptor(s) (See definitions in Section 12.2.3)	**Medium** – Visual receptors will be residential receptors in the Gort na Bró housing estate, who are located in close proximity to the Proposed Development Site. However, the residential receptors within the housing estate located closest to the Proposed Development have their views restricted in a number of ways. The houses seen to the right-hand side of the views above are oriented so that the views from the fronts and rear of these houses are directed away from the Proposed Development and there will be limited views in the direction of the Proposed Development as a result. For the house seen to the left-hand side of the view, which are lined along the road and the border of the Red Line Boundary, there is a substantial level of screening provided by a tall treeline located at the rear of the houses, this will substantially limit views towards the Proposed Development from these receptors which are located closest to the Proposed Development Site.
Magnitude of Change (See definitions in Section 11.2.3)	**Substantial** – *"Substantial change, where the proposals would result in large-scale, prominent or very prominent change, leading to substantial obstruction of existing view or complete change in character and composition of the baseline though removal of key elements or addition of uncharacteristic elements which may or may not be visually discordant. This includes viewpoints where the Proposed Development is fully or almost fully visible over a wide extent, at close proximity to the viewer. This change could be long term or of a long duration."*

Significance of Effect (See Section 11.2.3)	**Medium x Substantial = Moderate = Significant (EPA, 2022)** An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Mitigating Factors	› Views of the Proposed Development from the visual receptors (residential receptors) located closest to the Proposed Development will be substantially screened by the treeline seen in the view. › The Proposed Development does obstruct or interfere within any views of a scenic quality. › The Proposed Development is visible in the background of the photomontage and does not obscure any existing element of the landscape from view. › The landscaping elements in front of the proposed buildings provide a noticeable softening of the edge of the Proposed Development and visually highlight the extent to which the buildings are set-back from the road. In addition, these vegetational elements serve to keep the sense of vegetation present throughout the view broadly similar to the Existing View. › The Proposed Development increases the sense that the streetscape in view is a suburban district centre, and the Proposed Development is experienced as the largest buildings within this suburb. This is in accordance with the planning policy and land use zoning. › There is screening and visual softening of the Proposed Development from the proposed landscaping elements.
Residual Effect (incl. mitigating factors)	**Moderate (EPA, 2022)** An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends

12.6.6 Viewpoint 06

VP06 – Existing View

Plate 12-34 Viewpoint 6 – Existing View

VP06 – Proposed View

Plate 12-35 Viewpoint 6 – Proposed View

Viewpoint 6 – An Logan	
Viewpoint Description & Details	› View to the north-west from the entrance to An Logan Housing Estate. › This viewpoint is located approximately 60m from the Proposed Development Site Boundary. › Grid Reference: E 526,890 N 725,021
Description of 'Existing View'	The view looks down a local road leading to the entrance of the An Logan Housing Estate, towards the roundabout along the Western Distributor Road to the south-east of the Proposed Development Site. Beyond the roundabout seen in the midground, a line of semi-mature trees, shrubs and scrub is seen along the far side of the road which is the Proposed Development Site itself. The corner of the Gaelscoil Mhic Amhlaigh is seen in the right background. Views are restricted to short-range views and the character of the views is suburban. The views are not of a high-scenic quality.
Description of 'Proposed View'	The site of the Proposed Development has changed from an undeveloped area covered in vegetation to one occupied by large built form of the residential apartment blocks. The built form of the Proposed Development is seen as a large background feature within the view. The Proposed Development is viewed as the largest building within the view and the character of the view has undergone a large degree of change and is noticeably more developed than previously. The character of the view has changed from a heavily suburban one, to one where the views give a sense of the An Logan Housing Estate being located on the outskirts of a suburban district centre with residential apartment blocks seen visually separated from the housing estate by a number of intervening features such as hedgerows, various semi-mature trees and an intervening road. Although, both types of views could be classed as suburban in character.
Sensitivity of Visual Receptor(s) (See definitions in Section 12.2.3)	**Medium** – Visual receptors will be residential receptors in the An Logan housing estate, who are located in close proximity to the Proposed Development Site. However, the residential receptors within the housing estate located closest to the Proposed Development have their views restricted in a number of ways. The majority of the residential receptors within the housing estate will have their views substantially screened by the built form of the north-westernmost buildings in the housing estate, as well as a line of tall trees and hedgerows located alongside the edge of the housing estate. For the residential receptors located within north-westernmost buildings in the estate there are a number of intervening screening elements that will limit views in the direction of the Proposed Development and which serve to provide a sense of separation from the site of the Proposed Development from these receptors. An example of these can be seen to the very right-hand side of the view above, where the edge of the treeline surrounding the housing estate can be seen.
Magnitude of Change (See definitions in Section 11.2.3)	**Substantial** – *"Substantial change, where the proposals would result in large-scale, prominent or very prominent change, leading to substantial obstruction of existing view or complete change in character and composition of the baseline though removal of key elements or addition of uncharacteristic elements which may or may not be visually discordant. This*

	includes viewpoints where the Proposed Development is fully or almost fully visible over a wide extent, at close proximity to the viewer. This change could be long term or of a long duration."
Significance of Effect (See Section 11.2.3)	**Medium x Substantial = Moderate = Significant (EPA, 2022)** An effect, which by its character, magnitude, duration or intensity alters a sensitive aspect of the environment.
Mitigating Factors	› Views of the Proposed Development from the visual receptors (residential receptors) located closest to the Proposed Development will be substantially screened by the treeline seen in the view (and beyond the left-hand side of the image). › The Proposed Development does obstruct or interfere within any views of a scenic quality. › The Proposed Development is visible in the background of the photomontage and does not obscure any existing element of the landscape from view. › The landscaping elements in front of the proposed buildings provide a noticeable softening of the edge of the Proposed Development and visually highlight the extent to which the buildings are set-back from the road. In addition, these vegetational elements serve to keep the sense of vegetation present throughout the view broadly similar to the Existing View. › The Proposed Development increases the sense that the streetscape in view is a suburban district centre, and the Proposed Development is experienced as the largest buildings within this suburb. This is in accordance with the planning policy and land use zoning. › There is screening and visual softening of the Proposed Development from the proposed landscaping elements.
Residual Effect (incl. mitigating factors)	**Moderate (EPA, 2022)** An effect that alters the character of the environment in a manner consistent with existing and emerging baseline trends

12.7 Likely Significant Landscape and Visual Effects

12.7.1 'Do-Nothing' Scenario

If the Proposed Development were not to proceed, there would be no change to the existing environment. No further activity will take place on the subject site. The impact associated with the do-nothing scenario is neutral as the existing disturbed ground and scrub would not change significantly.

12.7.2 Construction Phase Effects

During the construction phase, potential landscape and visual effects will result as the site changes from its current state to a construction site of considerable size. Potential landscape effects include vegetation removal, earthworks and a subsequent change in character. These effects will include permanent negative effects, where vegetation is removed, and the land is re-graded, and Short-Term effects such as the activities of machinery, resulting in noise and dust in the landscape. Construction phase visual effects include potential negative effects on the nearby visual receptors as a result of the vegetation removal, earthworks and operation of machinery. These visual effects will be most pronounced in the immediate vicinity of the site. Cranes may be required to facilitate construction of the taller buildings of the Proposed Development and these are likely to be visible from greater distances than other components of the construction phase and are accounted for in the determination of visual effects. The construction phase effects will be Short-Term in duration.

12.7.2.1 Landscape Effects (Construction Phase)

The predicted direct impacts upon the landscape arising from the construction phase will include the transformation of the landscape from requisite earthworks and construction activities, as well as the noise and dust from construction operations, material transport, and increased site traffic.

The mitigation measures proposed include the implementation of appropriate site management procedures – such as the control of site lighting, storage of materials, placement of compounds, delivery of materials and appropriate car parking (see the Construction and Environmental Management Plan – Appendix 4-2).

Overall, the Proposed Development will have a localised Moderate, Short-Term Negative Effect on the landscape during the construction phase. The effect on the landscape is localised and will have a minor impact upon the wider character of the landscape surrounding the site. The Proposed Development site is located in an area of existing suburban development and the construction activities related to the Proposed Development will be appropriate within the context of the development and construction of residential and commercial buildings within this streetscape.

12.7.2.2 Visual Effects (Construction Phase)

The visual impact of the site compound and scaffolding visible during the construction phase are short-term in nature. As tall slender features, cranes will cause the greatest and far-reaching visual impact during the construction phase, however, visibility will be limited by the screening elements within the surrounding landscape. There is likely to be Short-term Moderate Negative Visual Effect associated with the construction works. This will be due to the process of substantial site clearance, earthworks and building processes required to construct the Proposed Development.

12.7.3 Operational Phase Effects

The operational phase commences following completion of construction works. Mitigation, remedial and avoidance measures have been integral in the design of the Proposed Development. Strategic siting

in appropriately zoned lands and design of infrastructure components (such as the stepped design of the apartment blocks) reduce the potential landscape and visual effects of the Proposed Development and are therefore factored into the following assessments of the Proposed Development. The Proposed Development has been designed with the intention of becoming a lasting benefit to the local area, and in this regard, all operational effects will be Long-Term.

A dedicated Landscape Design Report is included as part of this planning application, which demonstrates that the Proposed Development provides the following relevant elements in relation to the surrounding streetscape:

1. *Create a pedestrian & cycle path network through the site which can be extended over time.*
2. *Provide communal open space that is overlooked and framed by the residential units providing an attractive setting and passive surveillance.*
3. *Civic square with high amenity and aesthetic values. designed to be a flexible space with infrastructure to cater for a wide range of uses, including outdoor cultural events.*
4. *Roof garden over ground level car park. communal open space defined by the surrounding residential units. Tree planting in raised planters to provide filtered screening and to 'soften' the built elements.*
5. *Landscaped buffer zone between the private open space of ground floor residential units and adjacent public paths.*

The planting included in this Landscape Design Report will naturally mitigate the effects of the Proposed Development through partial replacement of green spaces and biodiversity which will be lost during the construction phase, as well as providing some additional visual screening and softening of the Proposed Development from visual receptors, and in particular those receptors located in close proximity to the Proposed Development Site.

12.7.3.1 Landscape Effects (Operational Phase)

A desktop study of landscape policy did not identify any designated landscape receptors pertaining to the lands of the Proposed Development Site itself. The Proposed Development Site is currently an undeveloped infill site populated primarily by scrub and scattered trees, as well as a large materials storage area. The site has limited aesthetic and recreational value. There are no rare landscape features or cultural or heritage associations on site. As outlined above in Section 12.3.4, the landscape value of the site is deemed to be Low.

The Proposed Development Site is considered to have a strong ability to accommodate the Proposed Development without undue consequences to the maintenance of the landscape character and in compliance with planning policies/strategies. As discussed in Section 12.3.1, the Proposed Development is aligned with the land use zoning objectives for the site and is essentially an additional development to the Galway West District Centre, and is thus appropriately sited. In consideration of this factor, the susceptibility to change is deemed to be Low.

As discussed in greater detail above in Section 12.3.4, the landscape sensitivity of the Proposed Development Site, and the wider landscape area, to the Proposed Development, is deemed to be Low.

During the operational phase, the Proposed Development will result in a substantial change to the physical fabric of the landscape of the site, as well as its landscape character within its immediate vicinity. Although, the development type is consistent with the zoning and planning of the lands at Galway West District Centre. The magnitude of change within the site is deemed to be Substantial. This amounts to a **Moderate, Direct, Permanent, landscape effect on the Proposed Development Site.**

The landscape character of the wider LVIA Study Area is heavily suburban. There are limited designated landscape receptors within the wider LVIA Study Area that are particularly sensitive to the Proposed Development. Section 12.3.1.1.1 above identified the land use zoning relating to the site of

the Proposed Development, which is aligned with proposed use. To the east and south land is mainly zoned as 'Residential' and interspersed with 'Recreational and Amenity'. In this sense the Proposed Development is an appropriate addition to the streetscape, with the photomontage assessments conducted above noting the landscaping elements and a noticeable softening of the edge of the Proposed Development and the extent to which the buildings are set-back from the road. This is the case for views from areas zoned as 'Residential' and 'Recreational and Amenity' in close proximity to the site, giving the Proposed Development an appropriate sense of separation from these zoned lands with views towards a district centre.

The landscape sensitivity of these areas zoned as 'Residential' and 'Recreational and Amenity' is considered to be Medium, with the magnitude of change associated with the Proposed Development considered to be Moderate as a result of the change in landcover of the site, and the large built form now present close to the edges of these zoned lands. This amounts to a Moderate, Direct, Permanent, landscape effect on the character of the surrounding streetscape. Although it is emphasised that this change is aligned with the envisioned planning and policy for the area, and visibility of this change is limited to a relatively small area. Considering these mitigating factors, **a Slight, Direct, Permanent residual landscape effect on the character of the surrounding streetscape is deemed to arise.**

12.7.3.2 Visual Effects

Views of the Proposed Development Site are outlined in detail above in Section 12.4. The Proposed Development is in essence an infill development, enclosed by other existing infrastructure and development, which largely restricts visibility of the proposed buildings within the wider landscape. Visibility of the Proposed Development is limited to locations within 500m of the Proposed Development Site along the public road network. There is also likely to be some visibility from other parts of the LVIA Study Area, for example the upper stories of residential dwellings (see VP1 above), and from certain locations within the LVIA Study Area where local topographical undulations offer longer-range views in the direction of the Proposed Development (see Plate 12-20 above for example), although these locations are very limited due to the substantial presence of built form and infrastructure within the streetscape surrounding the Proposed Development Site. There are no designated protected views with visibility of the Proposed Development. Overall, the Proposed Development will not be visible within any scenic views and there is an absence of highly sensitive receptors which will experience any visibility of the Proposed Development. Most visibility of the Proposed Development occurs from local residents and along the local road network, which primarily comprises local traffic, residents and commuters.

Summary of Viewpoint Assessment

An assessment of the visual effect of the Proposed Development was undertaken from 6 no. viewpoint locations. All photomontages were captured within 100m of the site, where visual effects are likely to be greatest. The only exception to this is VP 3 which shows a view from Knocknacarra National School, approximately 490m from the Proposed Development Site. The assessment of visual effects determined the residual significance of the visual effects to range from 'Moderate to 'Not Significant'. The significance of the residual visual effect was not considered to be 'Profound', 'Very Significant' or 'Significant' at any of the 6 no. viewpoint locations. A residual effect of 'Moderate' was deemed to arise at 2 no. of the viewpoint locations, both of these representing residential receptors located adjacent to the Proposed Development Site. A residual visual effect of 'Slight' was deemed to arise at 2 of the viewpoint locations, with both of these representing locations along the approach roads to the Proposed Development Site and the Galway Retail Park. The other 2 no. viewpoint resulted in a 'Not Significant' residual visual effect, with these viewpoints representing also representing views from the local road network, but with substantial levels of screening occurring in both locations. There are no Significant visual effects envisioned as a result of the Proposed Development.

12.7.4 Cumulative Landscape and Visual Effects

The projects to be considered in the cumulative assessment of effects in this EIAR are set out in Chapter 2 (Section 2.2.3). These include projects relevant to the assessment of Significant cumulative landscape and visual effects which mainly relate to the continued commercial development of the Galway West District Centre. It is also noted that there are a number of projects within the wider LVIA Study Area, such as residential housing developments, that will also contribute to the continued development of Knocknacarra as a suburb with its own commercial district centre. These developments, along with the Proposed Development, are in line with the planning policy and land use zoning for the Proposed Development Site and its surrounds. While it is the case the Proposed Development in combination with the other projects listed in Section 2.2.3 of Chapter 2 will contribute cumulatively to a change in landscape character within the study area, and particularly within the Galway West District Centre, as increased levels of development have an effect on the character of the streetscape. This is considered to be aligned with the planning policy in the GCDP and as such is considered appropriate. Considering this fact, there are no cumulative landscape effects envisioned that could amount to a Significant effect, given the baseline status of the landscape as a suburban area with a commercial district centre.

In terms of cumulative effects on visual amenity, the Proposed Development, viewed in combination or sequentially with the cumulative projects within the LVIA Study Area will not cause any Significant cumulative visual effects. Again, the increased levels of development in the Galway West District Centre, including the Proposed Development, will amount to views of larger built form and infrastructure than the surrounding residential housing estates. However, this again is in line with the planning policy and there are no Significant cumulative visual effects envisioned as a result of the Proposed Development considered cumulatively with other developments where visual connectivity exists between them. There are limited numbers of highly sensitive visual receptors in the LVIA Study Area, and the cumulative impact on visual amenity is considered to be minor.

12.8 Conclusion

Overall, the highest negative landscape effects associated with the Proposed Developmentare are localised and are limited to the Proposed Development Site itself which is not highly valued or sensitive in relation to the wider landscape area, given its baseline status. The addition of the Proposed Development will not fundamentally change the character of the landscape area (suburban streetscape) within which it is viewed. There is generally a suburban character to the landscape area which the Proposed Development will somewhat alter as it represents an increased level of development of the Galway West District Centre. However, it is noted that there are already a number of pre-existing and permitted developments located in the immediate vicinity of the Proposed Development (i.e. the Galway Retail Park). The continued development of this district centre is plan-lead and is aligned with the planning policy and land-use zoning. A Moderate, Direct, Permanent, landscape effect was deemed to arise on the Proposed Development Site during the Operational Phase. In relation to the operational landscape effects on the character of the surrounding streetscape, a Slight, Direct, Permanent residual landscape effect on the character of the surrounding streetscape is deemed to arise.

Overall, visual effects as a result of the Proposed Development are not considered to be Signficant from sensitive locations in the LVIA Study Area (i.e. the local road network, amenity deisgnations, and nearby residential receptors), with the greatest visual effects occuring in relaiton to the nearby An Logan and Gort na Bró housing estates which were deemed to experience a residual visual effect of Moderate signifcance. There are no Significant visual effects envisioned as a result of the Proposed Development.

The greatest landscape and visual effects are likely to be very localised (with most visibility occuring within 500m of the Proposed Devleopment given the level of screening in the suburban streetscape), and considering scale and aesthetic of the Proposed Development, it will not have any Signifcant impact on any key landscape sensitivities or visual amenity.

13. MATERIAL ASSETS

Material Assets are defined in the '*Advice Notes for Preparing Environmental Impact Statements'* (EPA, Draft 2015) as "*resources that are valued and that are intrinsic to specific places"* and in the 'Guidelines on the Information to be contained in Environmental Impact Assessment Reports' (EPA, 2022) as "*built services and infrastructure. Traffic is included because in effect traffic consumes roads infrastructure.*" They may be either of human or natural origin. The cultural assets of Archaeology and Cultural Heritage are addressed in Chapter 11 of this Environmental Impact Assessment Report (EIAR). Economic assets of natural heritage include non-renewable resources such as minerals or soils, and renewable resources such as wind and water. These assets are addressed in Chapter 7: Land, Soils and Geology, Chapter 8: Hydrology and Hydrogeology, and Chapter 9: Air and Climate. Tourism and amenity resources, which are also considered material assets, are addressed in Chapter 5: Population and Human Health.

This chapter of the EIAR addresses the likely significant effects of the proposed development on transportation infrastructure (Section 13.1 Traffic and Transport) and on Water and Other Services (Section 13.2), which are economic assets of human origin. This chapter of the EIAR has been prepared in accordance with the requirements of the EIA legislation and guidance outlined in Chapter 1: Introduction.

13.1 Traffic and Transport

13.1.1 Introduction

13.1.1.1 Purpose of Section

This Section of the EIAR assesses and evaluates the likely impact of the proposed residential development on the existing transportation system in the vicinity of the site, as well as identifying proposed mitigation measures to minimise any identified impacts arising from the proposed Large-scale Residential (LRD) development at Knocknacarra, Rahoon, Galway. The material assets considered in the traffic section include pedestrian, bicycle, public transport infrastructure and associated services in addition to the local road network and associated junction nodes.

A formal Traffic and Transportation Assessment (TTA) and Mobility Management Plan (MMP) has also been prepared and submitted by DBFL Consulting Engineers as part of the overall application and underpin this chapter of the EIAR.

This section is written as a concise summary of the Traffic and Transport Assessment (TTA). Rather than repeat the detailed traffic assessments carried out within this Traffic and Transport Assessment, it is referred to throughout this chapter, with the impact assessment findings discussed below.

13.1.1.2 Statement of Authority

This chapter was prepared by DBFL Consulting Engineers - Aimee Dunne CEng MEng BEngTech MIEI MIHE and Elena Cuena BEng Meng of DBFL Consulting Engineers.

Aimee is a Chartered Transport Engineer with 11 years' post graduate experience in the areas of traffic engineering and transport planning and has worked within transportation consultancies in the UK, New Zealand and Ireland. Aimee graduated from Heriot-Watt University, Edinburgh in 2010 with an MEng in Civil & Environmental Engineering. Aimee's relevant environmental impact assessment project experience includes the Grand Canal Harbour Mixed Use Development in Dublin 8, Castleforbes Mixed Use Development off Sheriff Street in Dublin 1, Parkside Phase 4 and Parkside 5B at Belmayne.

Elena is a Graduate Transportation Engineer with DBFL Consulting Engineers and has over two years of experience within the industry. She has gained considerable knowledge and experience in transport planning and design within DBFL. Elena graduated from University of Seville with an BEng in Civil Engineering and from the Polytechnical University of Madrid with a MSc in Civil Engineering, both specialising in Transport, Territory and Urbanism.

13.1.1.3 Assessment Methodology

The purpose of this assessment is to quantify the existing transport environment and to detail the results of assessment work undertaken to identify the potential level of transport impact generated as a result of the proposed residential development. The scope of the assessment covers transport and sustainability issues including vehicular access and pedestrian, cyclist and public transport connectivity. Recommendations contained within this report are based on existing and proposed road layout plans, site visits, traffic observations and junction vehicle turning count data. Our methodology incorporated a number of key inter-related stages, including:

- **Site Audit:** A site audit was undertaken to quantify existing road network characteristics and identify local infrastructure management arrangements, in addition to establishing the level of accessibility to the site in terms of walking, cycling and public transport. An inventory of the local road network was also developed as this stage of the assessment.
- **Preplanning Meeting:** A preplanning meeting and a Stage 2 LRD meeting was undertaken with officers of Galway City Council including representatives of the Transport Planning Department.
- **Traffic Counts:** Junction Turning Counts (JTCs) and Queue Length Surveys (QLS) were undertaken and analysed with the objective of establishing local traffic characteristics in the immediate area of the proposed residential development.
- **Trip Generation:** A trip generation exercise has been carried out to establish the potential level of vehicle trips generated by the proposed residential development.
- **Trip Distribution:** Based upon existing traffic characteristics and anticipated travel patterns of the proposed residential development, a trip distribution exercise has been undertaken to assign site generated trips across the local network.

The assessment of effects of the proposed development on material assets have been assessed in terms of quality (positive, neutral or negative effects), significance (imperceptible, not significant, slight, moderate, significant, very significant or profound effects), extent, context, probability (likely, unlikely effects) and duration (temporary, short term, long term or permanent effects).

This is in line with the criteria set out in Table 3.4 Description of Effects of the Environmental Protection Agency Guidelines on the Information to be Contained in Environmental Impact Statements (2022) (EPA, 2022) (the EPA Guidelines) and guidance on the preparation of Environmental Impact Assessment Report (Directive 2011/92/EU as amended by 2014/52/EU) (European Commission, 2017) (the EU EIAR Guidance).

13.1.2 Receiving Environment

13.1.2.1 Location and Network Summary

The subject site will form part of the Knocknacarra District Centre, Rahoon, Galway. It is located in Knocknacarra north of the Western Distributor Road, approximately 3km west from Galway City Centre. The general location of the subject site in relation to the surrounding suburbs is illustrated in Figure 13 1, while the extents of the subject site boundary and neighbouring lands are indicatively shown in Figure 13 2.

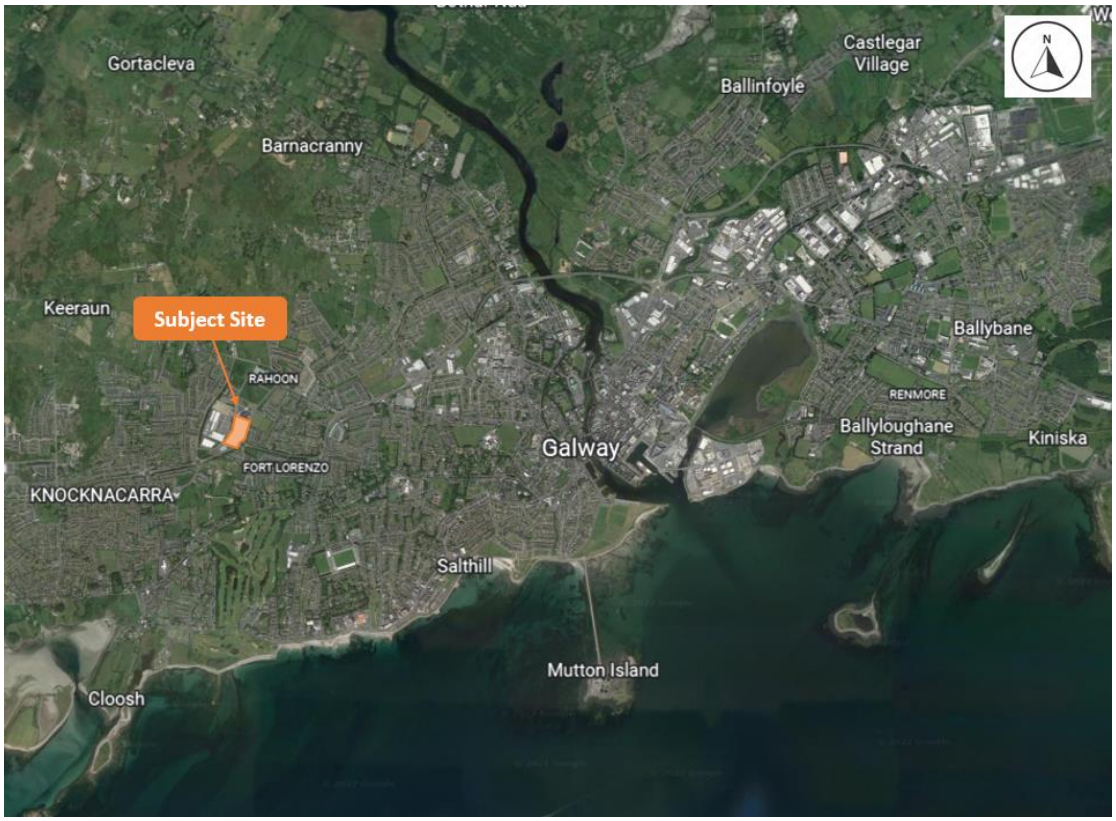


Figure 13-1 Site Location

The Knocknacarra District Centre is split in four phases, including the existing, proposed and future development as illustrated in Figure 13-2 below.

- Phase 1 and Phase 2 – Operational
- Phase 3 – Proposed Development.
- Phase 4 – Future District Centre Use Site.

Figure 13-2 Knocknacarra Proposed Development within the District Centre

13.1.2.1.1 Existing Transport Infrastructure

The local road network in vicinity of the existing and proposed development site is made up of single carriageway local and connector roads. The Western Distributor Road is a major link, connecting Knocknacarra North and South with Galway City Centre through Bishop O'Donnell Road. The junctions in vicinity of the site are uncontrolled with roundabout junctions along the Western Distributor Road. There is a 50km/h speed limit on the roads adjacent to the site.

The existing Gateway Retail Park can be accessed from the Western Distributor Road from the south and the Rahoon Road from the north. The existing road network is illustrated in Figure 13-3 below.

- From the Western Distributor Road, there are two access points:
  - The main access point is through the Gort Na Bró Roundabout, from which one arm connects directly to a mini roundabout via a link road providing access to the existing Gateway Retail Park.
  - The second access point is from the Bóthair Stiofáin roundabout, via an uncontrolled T-junction which connects to the local road (Gateway Retail Park) which in turns connects to the mini roundabout at the access to the existing Gateway Retail Park.
- Access from the north is via the uncontrolled the Rahoon Road T-junction which leads to another uncontrolled T junction with a local road (Gateway Retail Park) which in turn links to the mini roundabout at the access to the existing Gateway Retail Park.

Figure 13-3 Existing Road Network

There are footpaths on both sides of the roads which bound the proposed development site. These connect to a number of existing crossing facilities, including two raised zebra crossings provided at Gaelscoil Mhic Amhlaigh. These crossings connect to the shared path which runs along the southern side of the school (northern side of the development site).

There are limited dedicated cycling facilities. On-road cycle lanes are in place on the Western Distributor Road, whilst a raised cycle track is in place on both sides of the road that links Bóthair Stiofáin to the mini roundabout at the access to the retail park. A full description of the existing transportation infrastructure is contained in the TTA.

13.1.2.1.2 Proposed Transportation Infrastructure

The Galway Transport Strategy (GTS) sets out the proposals for cycle and public transport network improvement across the city of Galway over 20 years. In terms of the proposed development, the most relevant upgrades are the upgrade to cycling facilities on the Western Distributor Road, Bóthair Stiofáin and Rahoon Road. The Millars Lane scheme proposes an off-road shared pedestrian / cyclist route extending from Manor Avenue / Manor Drive to Rahoon Road and will be easily accessible from the proposed development. In terms of public transport improvements, the GTS the Western Distributor Road is identified for bus priority measures with bus lanes proposed on both sides of the road.

It is noted that at the time of writing preparing this chapter the N6 Galway City Ring Road (GCRR) scheme had been granted permission by An Bord Pleanála in December 2021, although has subsequently been quashed following An Bord Pleanála accepting that they had failed to consider the 2021 Climate Action Plan. A full description of the emerging transportation infrastructure is contained in the TTA.

13.1.3 Proposed Development

The proposed development comprises the provision of a total of 227 no. apartment units across seven blocks, comprising 84 no .1-bed, 139 no. 2-bed and 4 no. 3-bed apartments. The development will also

include commercial floor space over 1,019 sqm, along with a 561.3 sqm childcare facility which will all be within accessible walking distances for local residents.

The provision also includes for 450 no. cycle parking spaces (comprising 114 no. short stay and 436 no. long stay spaces). In terms of car parking, a total of 230 no. car park spaces will be provided, comprising 49 no. surface car parking spaces on site and 181 spaces no. within the basement car park in Phase 2. This includes 53 no. EV car park spaces.

The development also includes for the realignment of the road between Gort Na Bró and the Gateway Retail Park Road. The vehicular access arrangements for the proposed development will include the following new features:

- Closure of the existing link road connecting the Western Distributor Road/ Gort Na Bró roundabout and Gateway Retail Park roundabout
- Provision of a new four-arm signalised junction on Gort Na Bró to provide access to both the Gateway Retail Park and subject development site
- New link road connecting the signalised junction and Gateway Retail Park roundabout

Consequently, these proposed changes result in converting the Gort Na Bró Roundabout from a 5-arm to a 4-arm roundabout and the Gort Na Bró T-junction from a 3-arm priority T-junction to a 4-arm signalised junction.

13.1.4 Potential Impacts

The potential impact of the proposed development with regard of Traffic and Transport are assessed below for both the construction and operational phases of the proposed scheme.

13.1.4.1 Construction Phase

All construction activities will be governed by the traffic management measures outlined in the Construction & Environmental Management Plan (CEMP), produced by DBFL, which seek to ensure that the impacts of all building activities generated during the construction phase upon the public (off-site), visitors to the subject site (on-site) and internal (on-site) workers environments, are fully considered and proactively managed/programmed thereby ensuring that safety is maintained at all times, disruption is minimised and undertaken within a controlled hazard free/minimised environment.

The mitigation measures detailed in the CEMP submitted as part of the planning application will be implemented through a Construction Traffic Management Plan (CTMP), the details of which will be agreed with Galway City Council prior to the commencement of construction activities on site. As noted in the CEMP it is proposed to construct the development in two stages, as shown in Figure 13-4 below.

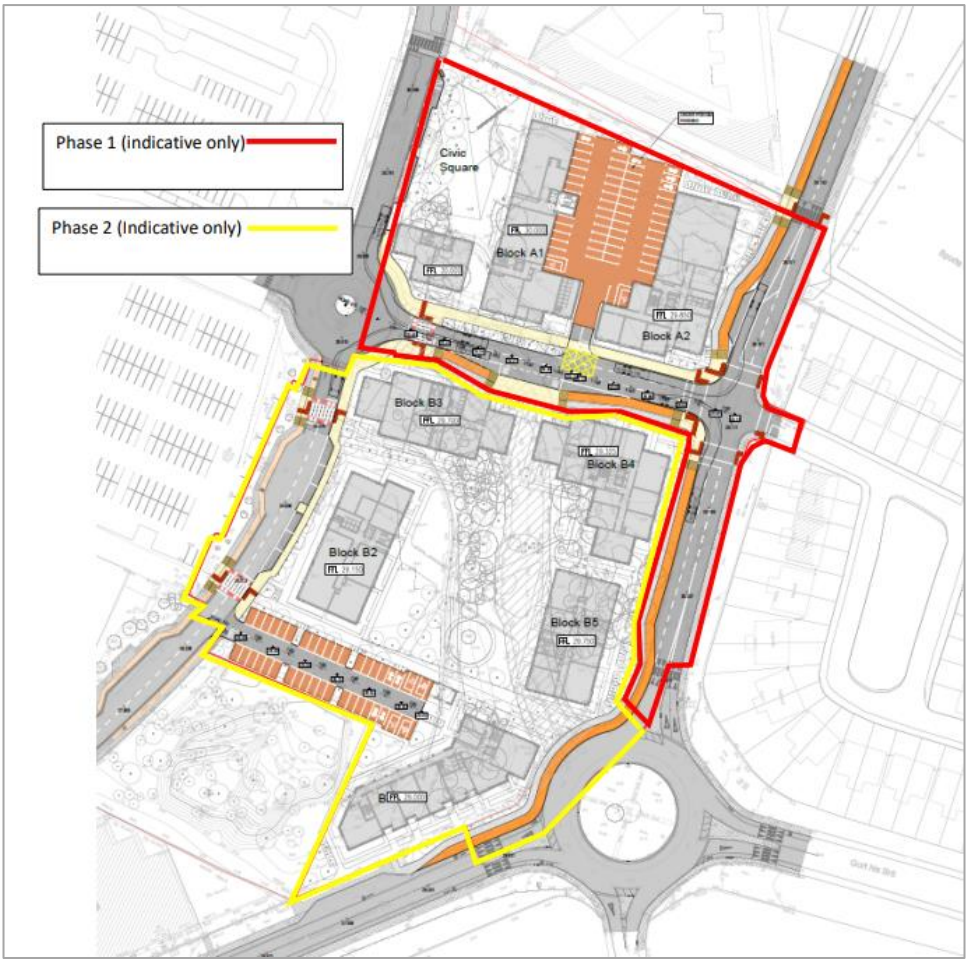


Figure 13-4 Construction staging

In general, the impact of the construction period will be temporary in nature and less significant than the operational stage. During the construction of the proposed development, all excavated suitable material will be used for construction and fill activities where possible and appropriate. All unsuitable material will be disposed of at an approved tip, location to be agreed with the local authority.

In addition to the traffic generated by the disposal of surplus subsoil from the site, there will be traffic generated from deliveries of construction materials and equipment. It should be pointed out that construction traffic generated during the development works tends to be off-peak. Such trips would generally be spread out over the full working day and are unlikely to be higher than the peak hour predicted for the operational stage. The proposed site access is via Gort Na Bró, which can be accessed from the roundabout to the southeast of the subject site via the Western Distributor Road. The existing access Link Road to the existing retail park shall be kept open to traffic until the proposed new Link Road is fully completed.

Construction traffic will consist of private vehicles owned and driven by site construction and supervisory staff in addition to excavation plant, dumper trucks and materials delivery vehicles involved in site development works. On-site employees will generally arrive before 07:00, thus avoiding the morning peak hour traffic. These employees will generally depart after 17:00.

Based upon experience of similar developments, a development if this type and scale is anticipated to require an overall average of 80 operatives across the programme with a peak of 160, subsequently generation on average no more than 20 two-way vehicle trips during the AM and PM periods over the period of the phased construction works. The peak requirement of 160 operatives on site is expected to occur relatively short period of the programme, potentially generating up to 40 two-way vehicle movements in the peak AM and PM periods.

It is anticipated that the proposed development would be constructed over a period of 104 weeks (24 months). Following the competition of the initial site clearance works, the generation of HGV movements during the build period will be evenly spread throughout the day and as such will not impact significantly during the peak traffic periods. For this scale of development, we would expect a maximum of 4 no. HGV movements per hour during the busiest period of construction 'build' works.

Based on a preliminary review of existing survey data and proposed site levels, it is estimated that approximately 14,000 m^3 of topsoil will be removed and 24,000m^3 subsoil material will require excavation and removal to a licenced facility (total 38,000m^3 for disposal off site). It is estimated 778 truckloads based on a tipper capacity of 18m^3. Maximum loads per day will be 20. Estimated duration of earthmoving works activity is 2 months as part of the worst-case assessment to clear the entire site in one single activity.

The increase in traffic volumes as a result of construction vehicles visiting the site is not considered to be excessive and will be spread out over the duration of the construction phases of the development. Due to the designated access points off the existing Gort na Bro roundabout and the Local Road, allowing delivery vehicles to pull off onto the site, there will be no significant disruption on the traffic flows as a result of the construction of the development.

The Construction Traffic Management Plan will be prepared prior to the commencement of construction work in accordance with the principles set out in the CEMP submitted with this application. The Construction Traffic Management Plan will include details of haul routes, working times and offsite disposal sites. This plan will be prepared in consultation with Galway City Council in order to reach full agreement upon the traffic management mitigation measures and monitoring measures to be adopted during the entire programme of construction activities on-site.

Considering the site's proximity to the strategic road network and following the implementation of the mitigation measures detailed in the CEMP through an appropriately detailed CTMP, it is concluded that construction traffic will not give rise to any significant traffic concerns or impede the operational performance of the local road network and its surrounding junctions.

13.1.4.1.1 *Mitigation Measures During Construction Phase*

A Construction and Environmental Management Plan (CEMP) has been prepared as part of this planning application which includes the traffic management measures to be implemented to ensure the impacts of all building activities generated during the construction phase are fully considered and proactively managed/programmed thereby ensuring that safety is maintained, disruption is minimised and undertaken in a controlled hazard free/minimised environment. The mitigation measures detailed in the CEMP will be implemented through a Construction Traffic Management Plan (CTMP).

Stage 1 of the construction includes the proposed Link Road realignment with upgrades to the pedestrian and cyclist facilities along the western side of Gort na Bró and construction of the proposed signalised junction. The existing Link Road to the Gateway Retail Park will be kept open to traffic until the proposed new realigned Link Road is complete. The old Link Road would be decommissioned in Stage 2 following the opening of the new Link Road.

The following mitigation measures will be implemented to avoid, minimise and / or mitigate against the anticipated construction period impacts:

- Specific control measures will be implemented to fully segregate construction traffic from pedestrian and cyclists, taking into consideration the close proximity of a primary school. There will also be a requirement for a site marshal in particular during the school pick up / drop off.
- Construction traffic for the works in the basement of Phase 2 carpark will be provided through the basement access ramp off local road. This access will be available outside of the school hours.

- Temporary pedestrian routes will be maintained within the basement carpark with positive traffic management during retail opening hours.
- All deliveries will be provided with instructions/directions on accessing the site from Gort na Bro roundabout and Local Road.
- Construction traffic will not be permitted to park on the public roads or within the general area outside the main site. Restricted parking facilities will be provided by the contractor. Due to proximity of site to Gaelscoil Mhic Amhlaigh school the construction traffic adjacent to school will be limited to the outside of the school hours. Additionally, a temporary pedestrian/cycle routes will be required at the proposed site access locations to fully segregate construction traffic from pedestrian traffic.
- Appropriate on-site parking and compound area will be provided to prevent overflow onto the local network.
- Temporary warning signs;
- Banksmen controlling access and egress from the site;
- All marshalling areas and site offices will be contained within the site boundary and will therefore have little impact on external roads;
- Dedicated road sweeper will be put in place if site conditions require.
- All loads to be properly stowed and secured with a tarpaulin, where appropriate;
- Routine sweeping/cleaning of the road and footpaths in front of the site;
- No uncontrolled runoff to the public road from dewatering/pumping carried out during construction activity.
- Hoarding will be provided along the site frontage to protect pedestrians using the footpaths.
- A regular programme of site tidying to be established to ensure a safe and orderly site; and
- Mud spillages on roads and footpaths outside the site to be cleaned regularly and will not be allowed to accumulate.

13.1.4.1.2 Predicted & Residual Impact

Implementation of the measures outlined above in Section 13.1.4.1.1 will ensure that the potential impacts of the proposed development on the local transport network are minimised during the construction phase and that any residual impacts on the local receiving environment will be temporary in nature and neutral in terms of quality and effect.

The significance of each of the projected impacts are detailed in Table 13-1 for the following key junctions:

- Junction 1: Gateway Retail Park Roundabout
- Junction 2: Gort Na Bró Signalised Junction
- Junction 3: Western Distributor Road / Gort Na Bró Roundabout

The significance of the impacts have been determined in accordance with the classifications stipulated within the Environmental Protection Agency Guidelines on the Information to be Contained in Environmental Impact Statements (2022) (EPA, 2022).

Table 13-1: Scale, Significance and Duration of Junction Impacts Construction Phase

Junction		Quality / Scale of Impact	Impact Significance	Duration
1	Gateway Retail Park Roundabout	Neutral Effects	Not Significant	Temporary
2	Gort Na Bró Signalised Junction	Negative – Low	Not Significant	Temporary

3	Western Distributor Rd / Gort Na Bró Roundabout	Negative - Low	Not Significant	Temporary

13.1.4.2 Operational Phase

Access to the proposed development is to be facilitated via the new four-arm signalized junction, inclusive of pedestrian and toucan crossings, at the Link Road / Gort Na Bró. Access to the development will also be possible via the local access road which currently serves the Gateway Retail Park. In response to the proposed developments and neighbouring lands specific land uses, the impact generated during the operational phase of the proposed development will be focused upon the local road network's weekday and weekend peak hours.

Traffic count surveys were undertaken at three key junctions on the surrounding road network in vicinity of the site to gain an understanding of the current traffic conditions and current traffic flows. These were undertaken on Saturday 1st October 2022 and Tuesday 4th October 2022. These traffic surveys were undertaken by TRACSIS and included Junction Turning Counts (JTCs) and Queue Length Surveys (QLS), the location of which are shown in Figure 13-5. Both surveys were undertaken during a 12-hour period, from 07.00 am to 19.00 pm.

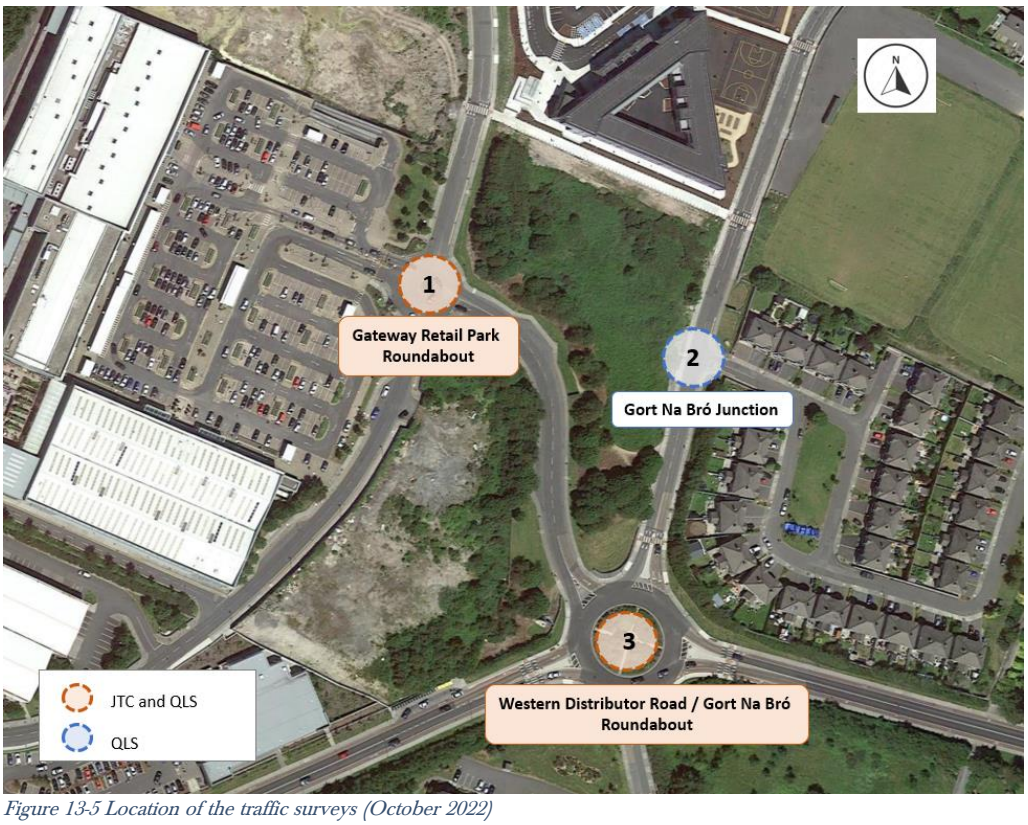


Figure 13-5 Location of the traffic surveys (October 2022)

Based on the JTC survey data following time periods were identified as the peak hour periods:

- Weekday AM Peak (08:15 to 09:15 hours)
- Weekday Interpeak (13:45 to 14:45 hours)
- Weekday PM Peak (16:45 to 17:45 hours)
- Weekend Peak (15:15 to 16:15 hours)

In addition to the above, historical traffic survey data undertaken in 2018 was also analysed which included a number of junctions on the wider network. This data was used to supplement the recent traffic survey data and determine wider traffic distribution proportions on the surrounding road

network. The network diagrams showing the peak hour baseline traffic flow conditions are shown in Appendix C of the TTA.

The analysis established that the greatest level of potential impact will be generated at the following three junctions:

- Junction 1: Gateway Retail Park Roundabout
- Junction 2: Gort Na Bró Signalised Junction
- Junction 3: Western Distributor Road / Gort Na Bró Roundabout

13.1.4.2.1 Trip Generation of Proposed Development

Table 13-2 summarises the predicted vehicle trip rates of the potential traffic flows in and out of the proposed development during the weekday peak hour periods and weekend peak hour using data from TRICS. Details of the TRICS data utilized are included in Appendix B of the Traffic and Transport Assessment.

Table 13-2 Proposed Development Trip Rates

TRICS Rates	AM (08:15-09:15)			Interpeak (13:45-14:45)			PM (16:45-17:45)			Weekend (15:15-16:15)		
	Arrival	Departure	Two-Way	Arrival	Departure	Two-Way	Arrival	Departure	Two-Way	Arrival	Departure	Two-Way
Private Apartments	0.06	0.156	0.216	0.094	0.078	0.155	0.152	0.084	0.236	0.118	0.07	0.173
Retail	0.905	0.453	1.359	2.369	2.363	4.731	1.306	1.831	3.137	2.148	2.353	4.501

Based on the above trip rates, potential peak hour vehicle traffic flows have been calculated for the proposed development.

Unit Type	AM (08:15-09:15)			Interpeak (13:45-14:45)			PM (16:45-17:45)			Weekend (15:15-16:15)		
	Arrival	Departure	Two-Way	Arrival	Departure	Two-Way	Arrival	Departure	Two-Way	Arrival	Departure	Two-Way
Private Apartments	14	35	49	21	18	35	34	19	54	27	16	39
Retail	10	5	15	26	26	53	15	20	35	24	26	50
Total	**24**	**40**	**64**	**47**	**44**	**88**	**49**	**39**	**89**	**51**	**42**	**89**

Table 13-3 summarises the predicted AM, Interpeak, PM and Weekend peak hour trip generation by the subject development.

It is noted that some of the trips from the residential units may be internal trips, i.e. trips between the retail park and the residential units, meaning they would not create additional vehicle trips on the network. Therefore, these trip rates applied are likely to represent a conservative, worst-case scenario in terms of trip generation. They are considered to be in excess of likely trip generation particularly when considering current trends relating to car ownership, car sharing and a wider general increase in sustainable modal shares.

Table 13-3 Proposed Development Trip Generation

Unit Type	AM (08:15-09:15)			Interpeak (13:45-14:45)			PM (16:45-17:45)			Weekend (15:15-16:15)		
	Arrival	Departure	Two-Way	Arrival	Departure	Two-Way	Arrival	Departure	Two-Way	Arrival	Departure	Two-Way
Private Apartments	14	35	49	21	18	35	34	19	54	27	16	39
Retail	10	5	15	26	26	53	15	20	35	24	26	50
Total	**24**	**40**	**64**	**47**	**44**	**88**	**49**	**39**	**89**	**51**	**42**	**89**

13.1.4.2.2 Trip Distribution of Proposed Development

In order to analyse and assess the impact of the proposed development on the surrounding road network, a traffic generation and distribution model (excel based) of the surrounding network was created. The assignment of the predicted vehicle trips generated by the subject development across the local road network is distributed as per the following assumptions;

- For both the arrival and departure profile, it is estimated that 75% of the trips will have their origin/destination in the basement car park located within the Gateway Retail Park, as 75% of the residential car spaces will be located there. The 20% and 5% trips remaining are forecast to have their origin/destination in the proposed podium and surface car park areas located to the north and south of the new Link Road respectively.
- From analysing the distribution of traffic movements exiting from the existing surrounding residential development, it was estimated that 63% of the outbound traffic will head eastward from the proposed development. Given the fact that many trip attractors like offices, colleges, schools etc are located east of the proposed development, it is feasible that residential trips from the proposed development will follow a similar distribution. The remaining 37% of the outbound traffic was assumed to travel westwards.
- Conversely, 63% of the vehicles coming into the residential car parking were assumed to be coming from the east and the remaining 37% of the traffic approaching from the west.

The proposed vehicle trip distribution through the network for the arrival and departing vehicles are demonstrated in Figure 7 in Appendix C of the Traffic and Transport Assessment (Appendix 13-1 of this EIAR).

13.1.4.2.3 Traffic Growth

To ensure a robust analysis of traffic upon the local road network, growth rates using the TII Project Appraisal Guidelines for National Roads (PAG) were adopted to determine the traffic growth forecast rates. The traffic growth forecast rates within the PAG ensures local and regional variations and demographic patterns are accounted for.

Although traffic growth may not increase at the rates once predicted, to ensure a robust analysis of the impact of traffic upon the local road network we have adopted growth rates using the Transport Infrastructure Ireland (TII) traffic projections. Table 6.1 (Unit 5.3 – Travel Demand Projections) within the TII Project Appraisal Guidelines provides Annual Growth Factors for the different regions within Ireland. The subject site lies within 'Galway Metropolitan Area'.

Applying the annual factors for the adopted Opening Year of 2024 and the Future Design Years of 2029 (+5 years) and 2039 (+15 years), the following growth rates have been adopted to establish the corresponding 2024, 2029 and 2039 baseline network flows: -

- 2024 – 1.0341 (or 3.4%)
- 2029 – 1.1245 (or 12.4%)
- 2039 – 1.2384 (or 23.8%)

13.1.4.2.4 Assessment Scenarios and Network Impact

Two different traffic scenarios have been assessed, namely (a) the 'Base' (Do-Minimum) traffic characteristics and (b) the 'Post Development' (Do-Something) traffic characteristics. The 'Do Minimum' traffic scenario takes into account the potential level of traffic that could be generated by the 'committed development' in addition to the existing flows (with TII growth rates applied) travelling across the network. The proposed development traffic flows are then added to the network's 'Do Minimum' traffic flows to establish the new 'Do Something' traffic flows.

In summary the following scenarios are considered:

- Do Minimum

- A1 – 2024 Base Flows
- A2 - 2029 Base Flows
- A3 – 2039 Base Flows

- Do Something

  - B1 – 2024 Do Minimum (A2) + Proposed Development Flows
  - B2 – 2029 Do Minimum (A2) + Proposed Development Flows
  - B3 – 2039 Do Minimum (A2) + Proposed Development Flows

The TII document 'Guidelines for Traffic Impact Assessments' states that the impact of any specific development upon the local road network is considered material when the level of traffic it generates surpasses 10% and 5% on normal and congested networks respectively. When such levels of impact are generated a more detailed assessment should be undertaken to ascertain the specific impact upon the network's operational performance. An assessment was therefore undertaken for the relevant links surrounding the site, to determine the percentage level of impact generated by the proposed development as presented in the table below.

Table 13-4: Network Impact Through Key Off Site Junctions

Junction		Design Year	Percentage Impact			
			AM	Interpeak	PM	Weekend
1	Gateway Retail Park Roundabout	2024	5.79%	5.98%	5.64%	4.56%
		2029	5.32%	5.50%	5.19%	4.19%
		2039	4.83%	4.99%	4.71%	3.81%
2	Gort Na Bró Junction	2024	5.31%	5.91%	6.01%	5.57%
		2029	4.88%	5.43%	5.52%	5.12%
		2039	4.43%	4.93%	5.01%	4.65%
3	Western Distributor Rd / Gort Na Bró Roundabout	2024	2.78%	4.76%	4.26%	5.01%
		2029	2.55%	4.38%	3.91%	4.61%
		2039	2.32%	3.97%	3.55%	4.18%

It was determined that for this proposed development, the percentage level of impact generated by the development traffic on the adjoining network, that none of the junctions would exceed the 10% threshold. Junction 1 and Junction 2 slightly exceed the 5% threshold during the AM, Interpeak and PM peak hours, with Junction 2 also exceeding the threshold in the Weekend peak. Junction 3 only just exceeds the 5% threshold during the Weekend peak. Therefore, for the purpose of a robust assessment of the future traffic impacts, both Junctions 1, 2 and 3 were analysed further.

For Junction 1, an operational assessment of the Gateway Retail Park roundabout was undertaken using TRL computer package ARCADY. Under the 'Do-Something' Scenario the results of the analysis found that:

- **In the 2024 Design Year**: a maximum RFC value of 0.63 was observed on the western arm during the Weekend peak period. This corresponded to a queue of 1.8pcu's and a delay of 9.94 seconds.

- **In the 2029 Interim Year**: a maximum RFC value of 0.68 was observed on the western arm during the Weekend peak period. This corresponded to a queue of 2.3pcu's and a delay of 11.76 seconds.

- **In the 2039 Future Year**: a maximum RFC value of 0.69 was observed on the western arm during the Weekend peak period. This corresponded to a queue of 2.4pcu's and a delay of 19.68 seconds.

All of the results of the analysis show this junction operates within capacity for all peak hours for all assessment scenarios.

For Junction 2, an operational assessment of the Link Road / Gort na Bró signalised junction was undertaken using TRL computer package TRANSYT. Under the 'Do-Something' Scenario the results of the analysis found that:

- **In the 2024 Design Year**: the highest Degree of Saturation (78%) and Queue (9.49 pcu's) is observed in the Interpeak along the straight/right turn lane on the New Link Road (western arm).

- **In the 2029 Interim Year**: the highest Degree of Saturation (85%) and Queue (11.02 pcu's) is observed in the Interpeak along the straight/right turn lane on the New Link Road (western arm).

- **In the 2039 Future Year**: the highest Degree of Saturation (93%) and Queue (14.28 pcu's) is observed in the Interpeak along the straight/right turn lane on the New Link Road (western arm).

The results for Junction 2 indicate that the junction operates within capacity for all peak hours in both the 2024 and 2029 scenarios. During the Interpeak in the 2039 Future Year, the New Link Road arm is approaching capacity. However, it is noted that even without the proposed development traffic this arm is observed to be operating approaching capacity.

For Junction 3, an operational assessment of the Western Distributor Road / Gort Na Bró roundabout was undertaken using TRL computer package ARCADY. Under the 'Do-Something' Scenario the results of the analysis found that:

- **In the 2024 Design Year**: a maximum RFC value of 0.66 was observed on the western arm during the AM peak period. This corresponded to a queue of 1.9 pcu's and a delay of 13.87 seconds.

- **In the 2029 Interim Year**: a maximum RFC value of 0.72 was observed on the western arm during the AM peak period. This corresponded to a queue of 2.5 pcu's and a delay of 16.89 seconds.

- **In the 2039 Future Year**: a maximum RFC value of 0.79 was observed on the western arm during the AM peak period. This corresponded to a queue of 3.6 pcu's and a delay of 22.76 seconds.

The ARCADY results for the Western Distributor Road / Gort Na Bró roundabout junction therefore indicate that the junction will continue to operate within capacity for all peak hours for all assessment scenarios.

13.1.4.2.5 Predicted and Residual Impact

In reference to Table 13-5 the analysis predicts the scale of residual impact during the 2024, 2029 and 2039 design years, as largely being below 5% on the surrounding junctions, with the exception of the following junctions as shown in Table 13-5

Table 13-5: Junctions with Impact >5%

Junction		Design Year	Percentage Impact			
			AM	Interpeak	PM	Weekend
1	Gateway Retail Park Roundabout	2024	5.79%	5.98%	5.64%	-
		2029	5.32%	5.50%	5.19%	-
2	Gort Na Bró Junction	2024	5.31%	5.91%	6.01%	5.57%
		2029	-	5.43%	5.52%	5.12%
		2039	-	-	5.01%	-
3	Western Distributor Rd / Gort Na Bró Roundabout	2024	-	-	-	5.01%

With regards to the TII thresholds, the analysis for the surrounding off site key junctions demonstrates that the proposed development will not generate an impact greater than 10% on any of the surrounding junctions. Whilst not congested, the impacts at Junction 1, 2 and 3 were slightly >5%, and for a robust analysis were assessed further.

The results of this analysis found that the junctions continue to operate within capacity with the additional development traffic, whilst also taking into account the cumulative impact of Committed Development on the surrounding network.

The significance of each of the projected impacts at each of the key junctions is detailed within the following tables for the worst case (i.e. peak hours) 2039 Future Year scenarios.

Table 13-6: Impact Significance – 2039 Design Year (AM)

Junction		Quality / Scale of Impact	Impact Significance	Duration
1	Gateway Retail Park Roundabout	Negative - Low	Not Significant	Long Term
2	Gort Na Bró Signalised Junction	Negative - Low	Not Significant	Long Term
3	Western Distributor Rd / Gort Na Bró Roundabout	Neutral	Not Significant	Long Term

Table 13-7: Impact Significance – 2039 Design Year (Interpeak)

Junction	Quality / Scale of Impact	Impact Significance	Duration

1	Gateway Retail Park Roundabout	Negative - Low	Not Significant	Long Term
2	Gort Na Bró Signalised Junction	Negative - Low	Not Significant	Long Term
3	Western Distributor Rd / Gort Na Bró Roundabout	Neutral	Not Significant	Long Term

Table 13-8: Impact Significance – 2039 Design Year (PM)

Junction		Quality / Scale of Impact	Impact Significance	Duration
1	Gateway Retail Park Roundabout	Negative - Low	Not Significant	Long Term
2	Gort Na Bró Signalised Junction	Negative - Low	Not Significant	Long Term
3	Western Distributor Rd / Gort Na Bró Roundabout	Neutral	Not Significant	Long Term

Table 13-9: Impact Significance – 2039 Design Year (Weekend)

Junction		Quality / Scale of Impact	Impact Significance	Duration
1	Gateway Retail Park Roundabout	Negative - Low	Not Significant	Long Term
2	Gort Na Bró Signalised Junction	Negative - Low	Not Significant	Long Term
3	Western Distributor Rd / Gort Na Bró Roundabout	Neutral	Not Significant	Long Term

13.1.4.2.6 Mitigation Measures During Operational Phase

A package of integrated mitigation measures has been prepared to off-set the additional local demand that the proposed residential development at the subject site could potentially generate as a result of the forecast increase in vehicle movements by residents of the scheme. These measures and associated timescale for their implementation are described below.

Management – A Mobility Management Plan (MMP) has been compiled by DBFL with the aim of guiding the delivery and management of coordinated initiatives by the scheme promotor to be implemented upon occupation of the site. The MMP will ultimately seek to encourage sustainable travel practices for all journeys to and from the proposed development through mode specific measures including:

- ***Marketing & Promotion Measures***: Providing a 'Welcome Pack' to all new residents when they move in with information on all modes of transport to/from the site, details of safe pedestrian and cycle routes, car share facilities and contact details of mobility manager, develop a dedicated MMP website/app

- ***Walking/cycling:*** providing high quality walking & cycling infrastructure, including secure cycle parking for residents, and connections to the wider network, develop a walking/cycling accessibility sheet for the site, discounted cycle purchase, bike service workshops, encouraging cycle trains to schools

- ***Public Transport***: Provide information to residents on annual/monthly TaxSaver tickets, develop a public transport accessibility sheet for the site, create a calendar of public transport events and incentives

Car Parking Management Strategy - A management regime will be implemented and enforced by the development's management company to control and actively manage the availability of on-site car parking for residents. Furthermore, the development includes the provision of XX no. Electric Vehicle (EV) charging points with ducting provided to the remaining spaces to enable easy retrofitting of charging points in the future as and when required.

Infrastructure – Measures to reduce reliance of private vehicles are the provision of ample secure cycle parking on site and ensuring a design which promotes permeability for pedestrians and cyclists to, through and from the development. The level of parking provision for the development (comprising 227 no. car parking spaces allocatable to residential units, equating to a car parking ratio of 0.80 spaces per unit) will also act as a powerful mobility management measure, ensuring against an overprovision of parking and a resultant over reliance on the private vehicle. The development also proposes provision of high-quality dedicated pedestrian footpaths and cycle paths throughout the development site and upgrades to crossing facilities along desire lines on the adjacent road network.

13.1.4.3 Cumulative Assessment

The analysis detailed above in Section 13.1.4.2.5 (Predicted and Residual Impacts) represents an appraisal in terms of potential cumulative impacts for a typical weekday, focusing upon the busiest periods of the day (i.e. AM, Interpeak and PM peak hours). During the other 21 hours of the day, traffic flows are predicted to be significantly lower resulting in the network operating with additional reserve capacity to that forecast for the peak hour periods.

Similarly, over the weekend period both the site generated traffic and the external road network traffic flows have been assessed for the peak hour on a Saturday. Outside of this time, traffic flows are lower resulting in the network operating with additional reserve capacity to that forecast during the peak hour.

A review of the Galway City Council planning map was undertaken to determine if there were any committed development schemes in the vicinity of the scheme which could have an influence on the operation of the local road network. There were no notable committed developments to be included. Furthermore, the utilisation of TII's growth rates also takes some account of the potential additional traffic that third party sites could generate.

The results of the TRANYST and ARCADY analysis on the key off site junctions (Junction 1, 2 and 3) detailed in previous sections, indicate that the junctions will still continue to operate within capacity in the peak hours for all assessment scenarios. It is noted, that the Gort Na Bró signalised junction is approaching capacity in the Interpeak in the 2039 Future Year only, although even without the development traffic this would also be approaching capacity.

The resulting cumulative impact is therefore expected to have a negative but low impact on the performance of Junction 1 and Junction 2 and a neutral impact on Junction 3. The impact generated by the development on the remaining off-site junctions did not exceed the 10% thresholds in any of the identified scenarios. Consequently, it is expected that the traffic generated from the proposed development will not have a significant impact on the surrounding road network as the percentage impact is low.

13.1.5 Do Nothing Scenario

In the absence of the proposed development, the overall operational performance of the existing junctions on the surrounding road network will be affected by the impact caused by the forecast background network traffic growth (should that growth arise).

13.1.6 Worst Case Scenario

As stated previously, the analysis carried out represents a worst-case appraisal of typical weekday and weekend peak periods focused upon the busiest periods of the day (i.e. AM, Interpeak, PM peak and Weekend peak hours). On weekdays outside of these peak hours of the day, traffic flows are predicted to be notably lower resulting in the network operating with additional reserve capacity to that forecast for the peak hour periods.

Similarly, over the weekend period both the site generated traffic and the external road network traffic flows have been assessed for the peak hour on a Saturday. Outside of this time, traffic flows are lower resulting in the network operating with additional reserve capacity to that forecast during the peak hour.

13.1.7 Monitoring and Reinstatement

13.1.7.1 Construction Phase

During the construction stage, the following monitoring exercises are proposed:

- If issues with regards to the routing of construction vehicles occurs – then compliance with construction vehicle routing practices will be undertaken
- If issues with regards the parking of construction vehicles on the surrounding network occurs - then compliance with construction vehicle parking practices will be undertaken
- If issues with regards the condition of the surrounding road network occur – then internal and external road conditions will be monitored
- If issues with regards the timing or programming of construction activities occur – then timing of construction activities will be monitored

The construction works areas will be reinstated following completion of development with landscaped areas provided where proposed. The works will be restricted to the footprint of the site for the proposed development. Excavated topsoil and subsoil will be reused in reinstatement and landscaping where appropriate or dealt with in the appropriate manner i.e. sent for soil recovery as appropriate.

13.1.7.2 Operational Phase

As part of the MMP process, bi-annual post occupancy surveys are to be carried out in order to determine the success of the measures and initiatives as set out in the proposed MMP document. The information obtained from the monitoring surveys will be used to identify ways in which the MMP measures and initiatives should be taken forward in order to maintain and further encourage sustainable travel characteristics.

No reinstatement requirements have been identified in relation to the operational phase of the proposed development.

13.1.8 Difficulties In Compiling Information

There were no material difficulties encountered in compiling and assessing the data for this EIAR sufficient to prevent modelling of the likely transport effects of the proposed development. The analysis reported within this chapter is based upon the traffic survey data obtained for this appraisal and undertaken in October 2022.

13.2 Water and Other Services

13.2.1 Statement of Authority

This section of the EIAR has been prepared by Tom Madden and reviewed by Thomas Blackwell, both of MKO. Tom Madden is an Environmental Scientist and Thomas Blackwell is a Senior Environmental Scientist with MKO; with over 3 and 16 years of experience in the environmental sector respectively. Their environmental experiences involves report writing of Environmental Reports (ER), Environmental Impact Statements/Environmental Impact Assessment Reports (EIS/EIAR) & Strategic Environmental Assessments (SEA) as well as project management of a variety of small and large scale jobs, including residential and commercial development projects.

13.2.2 Consultation

The relevant national and regional authorities and bodies listed in Section 2.7 were consulted to identify any potential impact on material assets. Transport Infrastructure Ireland (TII) made a number of recommendations which can be viewed in Appendix 2-1 of this EIAR. The scoping responses are discussed in further detail in Section 2.7.2 of this EIAR.

13.2.3 Construction Methodology

The construction methodology detailed in Chapter 4 of this EIAR describes the manner in which the proposed development will be constructed, including excavations and installation of services. Prior to works, the area where excavations are planned will be surveyed and all existing services will be identified. All relevant bodies i.e. ESB, Bord Gáis, Eir, Galway City Council etc. will be contacted and all drawings for all existing services sought.

Any underground services encountered during the works will be surveyed for level and where possible will be left in place. If there is a requirement to move the service, then the appropriate body (ESB, Gas Networks Ireland, etc.) will be contacted, and the appropriate procedure put in place. Back fill around any utility services will be with dead sand/pea shingle where appropriate. All works will be in compliance with required specifications. Construction methodologies are described in further detail in Chapter 4 of this EIAR.

13.2.4 Receiving Environment

The existing site is bisected by an off shoot of the Gort na Bró road, which effectively splits the site north and south. The northern section of the site is currently comprised of an area of overgrown scrub. The southern section of the site could be described as being brownfield in nature with native and non-native flora species recolonising a gravel hardcore area. The southern section of the site is entirely enclosed by timber hoarding. Due to the undeveloped nature of the site the presence of underground services will be limited in extent, if present at all. It is not proposed to do any significant excavation works at the site boundary. With this in mind, the proposed development could have the potential to impact the following:

- Electricity Network
- Telecommunications Networks (including phone and broadband)
- Gas Distribution Networks
- Water Supply Networks
- Wastewater Networks
- Waste Management

13.2.4.1 Electricity

There are no major overhead electricity cables on the site of the proposed site. A number of low and medium voltage underground electrical services exist within the proposed site. The striking of an underground electricity cable during construction operations could potentially result in serious injury or death of site staff.

A detailed map of all existing electrical cables in the vicinity of the site is provided in Appendix A of the Mechanical and Electrical Basis of Design Report (Appendix 13-2 of this EIAR). Relocation of the underground electrical services that cross the site will be required.

13.2.4.2 Telecommunications

Existing telecommunication services exist within the roadways to the east, west, and south of the site. While it is unlikely that there will be any further underground telecommunications services encountered during the construction works, there is still a possibility that an issue may occur while carrying out works at the site boundaries. The breaking of an underground telecommunications cable during construction operations could potentially result in disruption to businesses and homes in the area.

A detailed map of all existing telecommunication cables in the vicinity of the site is provided in Appendix A of the Mechanical and Electrical Basis of Design Report (Appendix 13-2 of this EIAR). All proposed works for the project have been designed to avoid these services as much as possible.

13.2.4.3 Gas Distribution Networks

A medium pressure gas distribution pipe runs along the existing Gateway Retail Park access road through the centre of the site. This pipe connects with a gas main that runs along the Western Distributer Road on the south-eastern side of the site. On the western side of the site, medium pressure gas distribution lines run north and south along the site boundary and provide service to the commercial development to the west of the site and to the school to the north of the site. The gas line that currently bisects the site will be relocated to align with the new access road. While it is unlikely that there will be any additional underground gas services encountered during the construction works (as the site is already almost entirely excavated), there is still a possibility that an issue may occur while carrying out works at the site boundaries. Rupturing an underground gas line during construction operations could potentially result in serious injury or death of site staff, and/or disruption to local services.

A detailed map of all existing gas services in the vicinity of the site is provided in Appendix A of the Mechanical and Electrical Basis of Design Report (Appendix 13-2 of this EIAR). All proposed works for the project have been designed to avoid these services as much as possible.

13.2.4.4 Water Supply Networks

A 150 mm diameter watermain runs along the existing Gateway Retail Park access road through the centre of the site and connects with the 150mm diameter watermain in the Western Distributor. A 150 mm watermain runs along the eastern boundary of the site and services the adjacent residential developments. A watermain of unknown diameter runs along the west of the site and provides service

to the Gateway Retail Park. A detailed map of the existing water supply network in the vicinity of the site is provided in the Infrastructure Design Report (Appendix 4-6 of this EIAR).

As part of the proposed development, it is proposed to divert the existing watermains within the site, and utilise the existing 150mm diameter watermain to the north-west of the site to supply the development. The proposed watermain layout will connect to the existing 150mm watermain located in the 'Gort Ná Bró' road to the east of the site. The residential blocks will be pumped from a storage tank at ground floor level, while the commercial units will have individual connections. Hydrants will be located within the network, refer to DBFL drawing 180191-1-93-X-XXX-DR-DBFL-CE-1311 (Appendix 4-1 of this EIAR)

An Irish Water Pre-Connection Enquiry form has been submitted to Irish Water and an Irish Water Feedback form has been received outlining that a water connection can be facilitated for the proposed development.

13.2.4.5 Wastewater Networks

A 225 mm diameter foul sewer runs to the crosses the subject site along the existing retail park access road before it discharges into a 300mm diameter foul sewer. This 300mm diameter foul sewer is located in the Gort Ná Bró road to the east of the site and flows towards the Western Distributor Road. In addition, a 225mm diameter foul sewer runs to the west of the site and appears to enter the southwestern corner of the site and run beneath the Aldi Supermarket. It is likely that the foul sewer was diverted as part of the Aldi Supermarket construction, and it is not as shown on the records. An extract from the Irish Water record map is provided in the Infrastructure Design Report (Appendix 4-6 of this EIAR).

It is proposed to divert the existing foul water sewers within the site to align the drainage layout with the proposed diversion of the existing access road to the Gateway Retail Park. The development will be provided with a foul drainage network to collect foul flows from the apartment blocks and commercial units. The foul drainage from the northern portion of the site will connect with the existing 225mm diameter sewer to the north-west of the site. The foul drainage from the southern portion of the site will discharge to the existing 225mm sewer to the south-west of the site.

An Irish Water Pre-Connection Enquiry form has been submitted to Irish Water and an Irish Water Feedback form has been received outlining that a Wastewater connection can be facilitated for the proposed development.

13.2.4.6 Waste Management

As with any project of this scale, there will be significant volumes of waste produced, both during the construction and operational phases. For the construction phase, a project specific Construction and Demolition Waste Management Plan (CDWMP) will be adhered to by all Subcontractors / Specialists and all other site personnel involved in the project. The CDWMP which will be explained during the induction process for all site personnel. The waste hierarchy will always be employed to ensure that the least possible amount of waste is produced during the construction phase. Reuse of certain types of construction wastes such as broken rock will cut down on the cost and requirement of raw materials therefore further minimising waste levels. The WMP outlines the methods of waste prevention and minimisation by recycling, recovery and reuse at each stage. Recycling of waste will be the preferred option with disposal of waste to landfill minimised as much as possible. Further details on waste management for the project are provided in Section 4.5.1 and in the CDWMP which is included as Appendix 4-9 of this EIAR.

13.2.5 Potential Impacts and Associated Mitigation Measures

13.2.5.1 Do-Nothing Impact

The site currently comprises an area of hardcore with recolonising flora to the south and an overgrown greenfield site to the north. Should the proposed development not proceed, the current state of the site will not change materially. The potential impacts are considered imperceptible.

13.2.5.2 Construction Phase

The construction of the proposed development will have no impact on above ground or underground telecommunications networks. There are no known telecommunication services existing beneath the proposed development main structures, however, there is the potential for brief nuisance to users of local networks and services that may be accommodated underground along the site boundary. It is known that communication cabling runs in an underground duct along the eastern boundary of the site, and the proposed development has been designed to minimise the risk to this.

Mitigation

Specific measures are incorporated into the Construction and Environmental Management Plan, included as Appendix 4-2 of this EIAR, to ensure that the construction of the proposed development will not have any adverse effect on any service networks in the vicinity. The mitigation measures include the following:

- Any area where excavations are planned will be surveyed and all existing services will be identified prior to commencement of any works.
- Existing site services will be isolated including the decommissioning of any existing power supplies in conjunction with the ESB and the provision of a temporary builder's power supply.
- Liaison will be had with the relevant sections of the Local Authority including all the relevant area engineers to ensure all services are identified.
- Excavation permits will be completed and all plant operators and general operatives will be inducted and informed as to the location of any services.

Residual Impacts

There will be an overall short term, imperceptible, neutral impact on telecoms and other services.

13.2.5.3 Operational Phase

There will be no operational phase impacts or associated effects on telecoms or other services associated with the proposed development. Wastewater will be accommodated by new connections to the existing public waste system which has the capacity to treat wastewater from the development. Therefore, there will be no operational phase impacts on wastewater infrastructure.

13.2.5.4 Decommissioning Phase

The proposed housing development will become a permanent part of the local housing supply, and therefore the requirement for decommissioning is not foreseen. Therefore, there will be no potential for impacts on telecoms and other services as a result of decommissioning.

13.2.5.5 Cumulative Effects Resulting from Interactions between Various Elements of the Proposed Development

The interaction of the various elements of the proposed development was considered and assessed in this EIAR with regards material assets. The potential for each individual element of the proposed development on its own to result in significant effects on material assets was considered in the impact assessment. The entire project including the interactions between all its elements was also considered and assessed for its potential to result in significant effects on material assets in the impact assessment presented.

All interactions between the various elements of the project were considered and assessed both individually and cumulatively within this chapter. Where necessary, mitigation was employed to ensure that no cumulative effects will arise as a result of the interaction of the various elements of the development with one another.

13.2.5.6 Cumulative In-Combination Effects

The potential cumulative impacts and associated effects between the proposed development and the projects described in Section 2 of this EIAR, hereafter referred to as the other projects, have been considered in terms of telecoms and other services. Where appropriate the application documentation, EIAR and NIS associated with the other projects have been reviewed to inform the assessment.

The measures outlined above and, in the Construction, and Environmental Management Plan (CEMP), included as Appendix 4-2 of this EIAR, will eliminate any potential for cumulative effects in relation to telecommunications and other services during the construction phases of the proposed development and the other projects.

There will be no cumulative operational phase effects in relation to telecommunications and other services.

BIBLIOGRAPHY

The following documents have been referenced in preparation of this Traffic and Material Assets Chapter.

Department of Transport's Traffic Signs Manual "Chapter 8 Temporary Traffic Measures and Signs for Roadworks"

Department of Transport's "Guidance for the Control and Management of Traffic at Roads Works – 2nd Edition" (2010)

Galway City Development Plan 2017–2023

Draft Galway City Development plan 2023-2029

'Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities' The Department of Housing, Planning and Local Government (DHPLG) (2020)

Environmental Protection Agency Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (May 2022)

Galway Transport Strategy

NRA 'Traffic and Transport Assessment Guidelines' (2014)

Ordnance Survey Ireland (www.osi.ie)

The Institution of Highways and Transportation 'Guidelines for Traffic Impact Assessments' (1994)

Transport for Ireland (www.transportforireland.ie)

Transport Infrastructure Ireland (www.tii.ie)

14. MAJOR ACCIDENTS AND NATURAL DISASTERS

14.1 Introduction

This section of the Environmental Impact Assessment Report (EIAR) describes the likely significant adverse effects on the environment arising from the vulnerability of the Proposed Development as detailed in Chapter 4 to risks of major accidents and/or natural disasters, as well as the potential of the Proposed Development itself to cause potential major accidents and/or natural disasters. It has been completed in accordance with the guidance set out by the Environmental Protection Agency (EPA) in '*Guidelines on Information to be contained in Environmental Impact Statements'* (EPA, 2022) and the European Commission in relation to Environmental Impact Assessment of Projects (Directive 2011/92/EU, as amended by 2014/52/EU), namely '*Guidance on the preparation of the Environmental Impact Assessment Report'.*

The assessment of the vulnerability of the Proposed Development to major accidents and natural disasters, as well as the risk of the Proposed Development itself causing accidents or disasters is carried out in compliance with the EIA Directive (2014/52/EU) which states the need to assess:

> *"the expected significant adverse effects of the project on the environment deriving from the vulnerability of the project to risks of major accidents and/or natural disasters which are relevant to the project concerned."*

The objective of this assessment is to ensure that appropriate precautionary actions are taken for those projects.

> *"because of their vulnerability to major accidents and/or natural disasters, are likely to have significant adverse effects on the environment".*

Based on the requirements of the EIA Directive, this chapter seeks to determine:

- The relevant major accidents and/or natural disasters, if any, that the Proposed Development could be vulnerable to or could cause;
- The potential for these major accidents and/or natural disasters to result in likely significant adverse environmental effect(s); and
- The measures that are in place, or need to be in place, to prevent or mitigate the likely significant adverse effects of such events on the environment.

14.1.1 Statement of Authority

This section of the EIAR has been prepared by Tom Madden and reviewed by Thomas Blackwell and Michael Watson, all of MKO. Tom is an Environmental Scientist and has over three years working in various Environmental Consultancies throughout Ireland. He holds a BSc (Hons) in Environmental Science from the University of Limerick. Thomas has over 15 years of progressive experience in environmental consulting in Ireland and the USA. Thomas holds a BA (Hons) in Geography from Trinity College Dublin and a M.Sc. in Environmental Resource Management from University College Dublin. Michael has over nineteen years' experience in the environmental sector and had worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy prior to joining MKO in 2014. Michael completed an MA in Environmental Management at NUI, Maynooth in 1999. Michael is a professional geologist (PGeo) and full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv).

14.2 Assessment Methodology

14.2.1 General

Major accidents or natural disasters are hazards which have the potential to affect the Proposed Development and lead to environmental effects directly and indirectly. These include accidents during construction and operation caused by operational failure and/or natural hazards. The assessment of the risk of major accidents and/or disaster is considered in relation to the information required to be provided in the EIAR, i.e. population and human health, biodiversity, land, soil, water, air and climate and material assets, cultural heritage and the landscape.

14.2.2 Legislative Context

14.2.2.1 Legislation

An assessment of the following key elements was undertaken in accordance with the EIA Directive (2014/52/EU):

- The vulnerability of the proposed Scheme to potential accidents and disasters
- The proposed Scheme's potential to cause major accidents or disasters which pose a risk to human health, cultural heritage and/ or the environment

The information relevant to major accidents and/or disasters to be included in the EIAR is set out in Section 8 of Annex IV of the EIA Directive as follows:

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

14.2.2.2 Guidance Documents

The following guidance documents have been consulted in the preparation of this section:

- European Commission. (2017). Environmental Impact Assessment of Projects – Guidance on the preparation of Environmental Impact Assessment Reports
- Environmental Protection Agency (2022), Guidelines on the Information to be Contained in Environmental Impact Assessment Reports
- Department of Environment, Heritage and Local Government (2010) *A Guide to Risk Assessment in Major Emergency Management*
- Environmental Protect Agency (2014) Guidance on Assessing and Costing Environmental Liabilities
- Department of Defence (2020) A National Risk Assessment for Ireland
- Galway County Council (2021) – Major Emergency Plan

14.2.3 Categorisation of the Baseline Environment

A desk-study has been completed to establish the baseline environment for which the proposed risk assessment is being carried out. This will influence both the likelihood and the impact of a major accident or natural disaster. Local and regional context has been established prior to undertaking the risk assessment to develop an understanding of the vulnerability and resilience of the area to emergency situations.

Further detail on the baseline environment is provided in Section 14.3

14.2.4 Impact Assessment Methodology

14.2.4.1 Introduction

A modern residential development is not a recognised source of pollution. It is not subject to Industrial Emissions Directive regulation or any other Environmental Protection Agency environmental regulatory consent. Should a major accident or natural disaster occur the potential sources of pollution onsite during the construction and operational phases are limited and of low environmental risk. Sources of pollution with the potential to cause significant environmental pollution and associated negative effects such as bulk storage of hydrocarbons or chemicals, storage of wastes, management of flammable materials etc. are limited and so there is an inherent low level of environmental risk associated with major accident or natural disaster impacting the Proposed Development and causing environmental damage.

There is low potential for significant natural disasters to occur at the proposed development site. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters that may occur are therefore limited to issues such as flooding and fire and are described in the Sections below.

Major industrial accidents involving dangerous substances pose a significant threat to humans and the environment; such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident. The proposed site is not regulated or connected to or close to any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e. SEVESO sites and so there are no potential effects from this source. The closest SEVESO site is located approximately 3.6km to the south-east at Galway Harbour Enterprise Park, New Docks, Galway.

The Proposed Development has low potential to cause natural disasters or major accidents. The site is relatively flat and is not a peatland site and so there is no potential for peatslides or landslides. Any risks associated with flooding, impacts on infrastructure, accidents etc are addressed in the Sections below.

Current EIA practice already includes an assessment of some potential accidents and disaster scenarios such as pollution incidents to ground and watercourses as well as assessment of flooding events. These are described in detail in the relevant EIAR assessment chapters (Refer to Chapters 5 to 13 for further detail).

14.2.4.2 Site-Specific Risk Assessment Methodology

A site-specific risk assessment identifies and quantifies risks focusing on unplanned, but possible and plausible events occurring during the construction and operational phase of the Proposed Development. The approach to identifying and quantifying risks associated with the Proposed Development by means of a site-specific risk assessment is derived from the EPA '*Guidance on*

Assessing and Costing Environmental Liabilities' document[1]. The following steps were taken as part of the site-specific risk assessment:

- Risk identification
- Risk classification, likelihood and consequence; and
- Risk evaluation

14.2.4.2.1 Risk Identification

Risks have been reviewed through the identification of reasonably foreseeable risks in consultation with relevant contributors to this EIAR. The identification of risks has focused on non-standard but plausible incidents that could occur at the Proposed Development during construction and operation.

In accordance with the European Commission EIAR Guidance, risks are identified in respect of the projects:

1. *Potential to cause accidents and/or disasters,*
2. *Vulnerability to potential disaster/accident*

14.2.4.2.2 Risk Classification

Classification of Likelihood

After identifying the potential risks, the likelihood of occurrence of each risk has been assessed. An analysis of safety procedures and proposed environmental controls was considered when estimating likelihood of identified potential risks occurring. Table 16-1 defines the likelihood ratings that have been applied.

The approach adopted has assumed a 'risk likelihood' where one or more aspects of the likelihood description are met.

Table 14-1 Classification of Likelihood (Source: DoEHLG, 2010)

Ranking	Likelihood	Description
1	Extremely Unlikely	May occur only in exceptional circumstances; once every 500 or more years.
2	Very Unlikely	Is not expected to occur; and/or no recorded incidents or anecdotal evidence; and/or very few incidents in associated organisations, facilities or communities; and / or little opportunity, reason or means to occur; may occur once every 100-500 years.
3	Unlikely	May occur at some time; and /or few, infrequent, random recorded incidents or little anecdotal evidence; some incidents in associated or comparable organisation's worldwide; some opportunity, reason or means to occur; may occur once per 10-100 years.

[1] *EPA (2014) Guidance on assessing and costing environmental liabilities. Available at https://www.epa.ie/publications/compliance--enforcement/licensees/reporting/financial-provisions/EPA_OEE-Guidance-and-Assessing-WEB.pdf*

4	Likely	Likely to or may occur; regular recorded incidents and strong anecdotal evidence and will probably occur once per 1-10 years.
5	Very Likely	Very likely to occur; high level of recorded incidents and/or strong anecdotal evidence. Will probably occur more than once a year.

Classification of Consequence

The consequence rating assigned to each risk has assumed that all proposed mitigation measures and/or safety procedures have failed to prevent the major accident and/or disaster. Furthermore, the Galway County Council Major Emergency Plan, will work to reduce the consequence of any major accident or disaster. The consequence of the impact if the event occurs has been assigned as described in Table 14-2.

The consequence of a risk to/from the Proposed Development has been determined where one or more aspects of the consequence description are met, i.e. risks that have no consequence have been excluded from the assessment.

Table 14-2 Classification of Impact (Source: DoEHLG, 2010)

Ranking	Likelihood	Impact	Description
1	Minor	Life, Health, Welfare Environment Infrastructure Social	Small number of people affected; no fatalities and small number of minor injuries with first aid treatment. No contamination, localised effects <€0.5M Minor localised disruption to community services or infrastructure (<6 hours).
2	Limited	Life, Health, Welfare Environment Infrastructure Social	Single fatality; limited number of people affected; a few serious injuries with hospitalisation and medical treatment required. Localised displacement of a small number of people for 6-24 hours. Personal support satisfied through local arrangements. Simple contamination, localised effects of short duration €0.5-3M Normal community functioning with some inconvenience.
3	Serious	Life, Health, Welfare Environment Infrastructure	Significant number of people in affected area impacted with multiple fatalities (<5), multiple serious or extensive injuries (20), significant hospitalisation.

Ranking	Likelihood	Impact	Description
		Social	Large number of people displaced for 6-24 hours or possibly beyond; up to 500 evacuated. External resources required for personal support. Simple contamination, widespread effects or extended duration €3-10M Community only partially functioning, some services available.
4	Very Serious	Life, Health, Welfare Environment Infrastructure Social	5 to 50 fatalities, up to 100 serious injuries, up to 2000 evacuated Heavy contamination, localised effects or extended duration €10-25M Community functioning poorly, minimal services available
5	Catastrophic	Life, Health, Welfare Environment Infrastructure Social	Large numbers of people impacted with significant numbers of fatalities (>50), injuries in the hundreds, more than 2000 evacuated. Very heavy contamination, widespread effects of extended duration. >€25M Serious damage to infrastructure causing significant disruption to, or loss of, key services for prolonged period. Community unable to function without significant support.

Risk Evaluation

Once classified, the likelihood and consequence ratings have been multiplied to establish a 'risk score' to support the evaluation of risks by means of a risk matrix.

The risk matrix sourced from the DoEHLG *Guide to Risk Assessment in Major Emergency Management* and as outlined in Table 16-3) indicates the critical nature of each risk. This risk matrix has therefore been applied to evaluate each of the risks associated with the proposed development. The risk matrix is colour coded to provide a broad indication of the critical nature of each risk:

- The red zone represents 'high risk scenarios';
- The amber zone represents 'medium risk scenarios'; and
- The green zone represents 'low risk scenarios'.

Table 14-3 Classification of Impact (Source: DoEHLG, 2010)

		Consequence Rating				
		1.Minor	2.Limited	3. Serious	4.Very Serious	5.Catastrophic
Likelihood Rating	5.Very Likely					
	4. Likely					
	3. Unlikely					
	2. Very Unlikely					
	1. Extremely Unlikely					

14.3 Baseline Conditions

The Major Emergency Plan prepared by Galway County Council (2021) outlines the following potential major emergency scenarios in County Galway:

1. Hazardous Sites Emergencies:

   - The European Communities Control of Major Accident Hazards Involving Dangerous Substance Regulations, 2000, applies to sites where certain quantities of specified dangerous substances are present. These sites (SEVESO Sites) are classified as upper tier and lower tier.
   - There are **two** SEVESO III / COMAH sites in Galway County Council's functional area (one site is upper tier and one site is lower tier). There is also **one** SEVESO III / COMAH upper tier site in Galway City Council's functional area located in the Galway Harbour Enterprise Park, Galway Docks. These are listed in the table below:

Table 14-4 SEVESO/COMAH Sites in County Galway

Name	Address	Classification	Activity
Colas Bitumen Emulsion (West)	Oranmore, Co. Galway	Upper Tier	Chemical Plant
Circle K	Galway Harbour	Upper Tier	Fuel Terminal
Tynagh Energy	Tynagh, Co. Galway	Lower Tier	Power Station

As stated above, the closest SEVESO site to the proposed development site is the Circle K depot which is located approximately 3.6km to the south-east.

2. Transport Emergencies:

   - M6, M17 and M18 Motorways,

- National Primary Routes N6, N17 & N18,
- Iarnród Éireann: Galway – Athlone, Galway – Ennis Rail Lines,
- Airports, including Island Airports,
- Galway Harbour,
- Rossaveel Harbour
- Offshore Inhabited Islands and Ferries

3. Natural Emergencies:

    - Flooding,
    - Severe Weather,
    - Landslides,
    - Tsunami.

4. Technological Emergencies

    - COMAH Sites,
    - Large Fires/Leaks,
    - Hazardous Materials Incidents,
    - Environmental Pollution.

5. Civil Emergencies

    - Terrorism,
    - Large Crowd Events,
    - Loss of Critical Infrastructure,
    - Pollution of Water Supplies,
    - Communicable Diseases/Public Health Emergencies

6. Utility company emergencies:

    - Bord Gáis,
    - ESB,

The risks from which are most relevant to this assessment are described below:

Critical Infrastructure Emergencies

It is anticipated that the Proposed Development will make use of the M6, M17 and M18 Motorways for delivery of construction materials and other infrastructure to the site. Potential impacts that may occur on these motorways could be caused by an accident during the delivery of the materials or damage to infrastructure caused by severe weather, natural disaster, etc.

Severe Weather

The Proposed Development is located approximately 1.6km from the Atlantic Ocean and therefore is likely to be impacted by low pressure systems or extreme wind speeds. Potential severe weather effects are assessed below. As is standard practice, construction phase works will be paused in the event of a Status Red weather warning issued by Met Eireann. This mitigates significantly the potential for effects associated with severe weather events during these phases.

Flooding

As detailed in Chapter 9, no recurring flood incidents within the Proposed Development site were identified from OPW's indicative river and coastal flood map.

The available Preliminary Flood Risk Assessment (PFRA) mapping shows the extent of the indicative 100-year flood zone which relates to fluvial (i.e., river) and pluvial (i.e. rainfall) flood events. The flood extents map attached in Appendix B of the Site-Specific Flood Risk Assessment indicates that the eastern area of the subject site could be impacted by a potential fluvial flood risk zone. No risk of pluvial or coastal flooding is highlighted on the subject site.

Tidal flooding is not relevant as the subject site is approximately 1.8km from the coast and more than 28m above sea level The closest recorded tidal flood event occurred approximately 1.5km to the south at Salthill.

According to EPA Website Watercourse Data, there are two watercourses adjacent to the proposed development site. One watercourse flows within the site boundary and the other flows to the east of the site. The location and extents of these watercourses correlate with the fluvial flood risk represented in the PFRA Maps.

The Flood Risk Assessment for the N6 Galway City Ring Road was also consulted during the compilation of the Site-Specific FRA.

A link road from the proposed ring road is proposed adjacent to the site therefore the flood risk assessment encompasses the potential fluvial flood risk identified in the PFRA Maps. The study concludes that this fluvial flood risk is not realistic as the EPA historic watercourses no longer exist having been replaced and realigned by a surface water network as part of development in 1996. As a result of the modelling carried out for the Galway City Ring Road Study, the study concluded that the surface water sewer installations have a broad capacity for the 100-year event and there is no existing risk of flooding in the area.

Utility company emergencies

The proposed development will be constructed on a site that is comprised of an area of scrub, existing hardcore and bisected by an existing road. Local utilities and services are currently in place the vicinity of the site. Excavations and all other construction works will be undertaken by the developer and all services and utilities will be identified during construction.

14.3.2 Additional Risks

In addition, risks identified in the EIAR which are relevant to the Proposed Development are detailed below:

14.3.2.1 Traffic

The Proposed Development will utilise the existing road network during the construction phase. Construction related traffic will originate from the delivery of materials to site and transport of employees to, from and throughout the site. The localised traffic disruptions as a result of other proposed works will be mitigated through the use of industry standard traffic management measures. These traffic management measures will be designed in accordance with the Department of Transport's '*Guidance for the Control and Management of Traffic at Roadworks – Second Edition (2010)*'.

14.3.2.2 Contamination

The Proposed Development has the potential to cause contamination and pollution of groundwater and surface water from potential release of hydrocarbons, earthworks and excavations on site. These impacts are addressed in detail in the Hydrology chapter as they are not related to either the vulnerability of the project to natural disasters or major accidents nor the potential for the project to

cause natural disasters or accidents. Indirect impacts associated with major accidents and / or natural disasters on contamination are considered in this chapter.

14.4 Risk Assessment

This section outlines the possible risks associated with the Proposed Development for the construction, and operational phases.

These risks have been assessed in accordance with the relevant classification as outlined in Table 14-1 and 14-2.

As outlined in Section 14.2.4.2.2, the consequence rating assigned to each potential risk assumes that all proposed mitigation measures and safety procedures have failed to prevent the major accident and/or disaster i.e. pre-mitigation.

14.4.1.1 Likely Significant Effects

14.4.1.1.1 *Do-Nothing Scenario*

If the Proposed Development were not to proceed, the existing condition of the site would not change.

If the Proposed Development were not to proceed, the opportunity to provide much needed residential dwellings to Galway City and alleviate the severity of the current housing crisis would be lost.

The opportunity to generate local employment and investment would also be lost as would the opportunity to expand and diversify the local economy with the provision of new commercial outlets.

14.4.1.1.2 *Identification of Effects During Construction*

A risk register has been developed which contains all potentially relevant risks identified during the construction phase of the Proposed Development. Seven risks specific to the construction of the Proposed Development have been identified and are presented in Table 14-5.

Table 14-5 Risk Register - Construction Phase

Risk ID	Potential Risk	Possible Cause
Potential vulnerability to disaster risks		
A	**Critical Infrastructure Emergencies** Risk of delivery of materials and equipment to site.	Traffic accident during construction materials or equipment delivery or extreme weather periods of heavy rainfall, taking into account climate change and strong winds
B	**Severe Weather** Risk to construction activity on site	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds
C	**Flooding** Risk of fluvial flooding in areas surrounding the site impacting the	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds

	construction phase and leading to environmental emissions	
Potential to cause accidents and / or disasters.		
D	**Utility emergencies** Risk of construction activity at the proposed development site	Construction activity at the proposed development site impacting on local services and utilities
E	**Traffic Incident** Collisions onsite and offsite with vehicles involved in construction of the Proposed Development	Driver negligence or failure of vehicular operations on site roads. Traffic Management not implemented
F	**Contamination** Discharge or spillage of fuel, chemical solvents into watercourse or percolated to groundwater.	Accidental fuel spillage during delivery to site. Failure of fuel storage tank or tanks in plant and machinery and vehicles leading to uncontrolled emissions. Drainage and seepage water resulting from accident during infrastructure excavation; Stockpiled excavated material becoming unstable and providing a point source of exposed sediment; Excavation works during the construction of the Proposed Development which may result in entrainment of sediment from the excavations during construction.
G	**Fire / Gas Explosion**	Equipment or infrastructure failure; Electrical problems; and Employee negligence.

14.4.1.1.3 *Identification of Effect During Operation*

Five risks specific to the operation of the Proposed Development have been identified and are presented in Table 14-6.

Table 14-6 Risk Register – Operational Phase

Risk ID	Potential Risk	Possible Cause
Potential vulnerability to disaster risks		
H	**Severe Weather** Risk to operational activity on site, damage to buildings	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds.
I	**Contamination** Discharge or spillage of fuel, chemical solvents, sewage or wastewater into watercourse or percolated to groundwater	A vehicular incident on the public road involving fuel, wastewater or sewage transportation in the operational phase. Spill or leak of oil during operational maintenance.
Potential to cause accidents and / or disasters.		
J	**Fire / Gas Explosion**	Equipment or infrastructure failure; Electrical problems; and Employee/resident negligence.
K	**Collapse / damage to structures**	Earthquake, extreme weather events; and Vehicular collisions due to driver negligence on public roads.
L	**Traffic Incident** Collisions onsite and offsite with vehicles involved in operation of Proposed Development	Driver negligence or failure of vehicular operations on site roads. Traffic Management not implemented

The risk register is based upon possible risks associated the Proposed Development. As outlined in Section 16.2.4.2, the consequence rating assigned to each potential risk assumes that all proposed mitigation measures and safety procedures have failed to prevent the major accident and/or disaster.

14.4.1.1.4 *Assessment of Effect – Summary*

Table 14-7 Risk Assessment

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
Construction Phase								
A	**Critical Infrastructure Emergencies**	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds	Illness or loss of life;	1	The risk of traffic accident during materials or equipment delivery severe weather conditions impacting the M6, M17 and M18 is unlikely when considering the assessment in Chapter 10 (weather conditions recorded over the last 30 years within the area) and Chapter 13.1 – Traffic Assessment	1	The risk of a traffic accident due to severe weather conditions during the construction phase will result in a minor consequence in that 'small number of people would be affected' should a severe weather occur, with 'no fatalities and a small number of minor injuries with first aid treatment'.	1
B	**Severe Weather**	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds	Illness or loss of life;	2	The risk of severe weather is unlikely when considering the weather conditions recorded over the last 30 years within the area. The works programme for the groundworks part of the construction phase of	1	The risk of severe weather conditions during the construction phase will result in a minor consequence in that 'small number of people would be affected' should a severe weather occur, with 'no fatalities and a small	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					the project will take account of weather forecasts and predicted rainfall in particular and construction will be paused if required.		number of minor injuries with first aid treatment'. Severe weather may cause increased mobilisation of sediment which will be controlled via the project design and mitigation measures.	
C	**Flooding**	Extreme weather-periods of heavy rainfall, taking into account climate change and strong winds	Illness or loss of life; Groundwater Flooding Flooding to surrounding properties	2	The risk of flooding is considered very unlikely when taking into account the baseline assessment in Chapter 8 of the EIAR and due to no recurring or historic flood incidents are recorded within the proposed development site.	1	The risk of flooding during the construction phase will result in a minor consequence in that 'small number of people would be affected' should a severe weather occur, with 'no fatalities and a small number of minor injuries with first aid treatment' Flooding has the potential to cause increased sediment mobilisation however flooding is not anticipated and should any flooding occur it would be localised.	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
D	**Utility emergencies**	Construction activity along road network during excavation works impacting on local services and utilities	Illness or loss of life; Disruption to services	2	The proposed development has been designed to take into consideration any services and utilities within the site and adjacent road network.	1	The risk of impact on utilities and services during the construction phase will result in a minor consequence in that 'small number of people would be affected, with 'no fatalities and a small number of minor injuries with first aid treatment'	2
E	**Traffic Incident**	Driver negligence or failure of vehicular operations on site roads. Traffic Management not implemented	Injury or loss of life.	3	A limited number of vehicles will be permitted on the site as part of the construction phase As such, it can be determined that there is some 'opportunity, reason or means' for a vehicle collision to occur on site, 'at some time.' An unlikely risk is therefore predicted.	1	A minor consequence is predicted. Having regard to on-site speed limits and vehicular movements, a 'small number of people would be affected' should a vehicular collision occur, with 'no fatalities and small number of minor injuries with first aid treatment.'	3

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
F	**Contamination – Fuel storage and handling** **-General Construction**	An accident causing failure of fuel storage tank or tanks in plant and machinery and vehicles.	Contamination of local drinking water supplies, surface waters and groundwater aquifers.	2	As outlined in Chapter 4, fuel will be stored on-site but in a bunded area to ensure containment and prevent spillages of fuel. No fuels, chemicals or solvents will be stored outside of the confines of the site. Setback distances from sensitive hydrological features means that adequate room is maintained for the proposed drainage mitigation measures as detailed in Chapter 8. Standard and specific mitigation to prevent accidents and indirect effects of accidents are included in the project design and will be implemented.	2	The risk of a fuel spillage or impact on surround drainage as a result of an accident during the construction phase will result in a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration' on environmental receptors through the use of bunded containment areas during construction. The potential residual environmental effects are described in detail in Chapter 8 which concludes that there will be no significant environmental effects.	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
G	**Fire / Gas Explosion**	Equipment or infrastructure failure; Fuel spillage/storage Electrical problems; and Employee negligence causing an accident	Illness or loss of life; Damage to, or depletion of habitats and species; and Impacts on ambient air quality.	2	As outlined in Chapter 4, limited volumes of fuel will be stored on site during construction therefore fuel is not considered to be a significant fire risk. In accordance with Chapter 19 of the Safety, Health and Welfare at Work Act 2005 (the 2005 Act), the development shall be subject to a fire safety risk assessment which would assist in the identification of any major risks of fire on site, and mitigation of the same during operation.	2	Should a fire/explosion occur at the site, a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration' on people and environmental receptors due to the nature of the project and the lack of infrastructure or fuel storage during operation that would result in any such incident. There will be 'normal community functioning' in the area with 'some inconvenience' The 'generic command, control & co-ordination systems' as well as the 'common elements of response' detailed in the Galway County Council Major Emergency Plan will work to reduce the consequence (both on people and the	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
							environment) of potential fire/explosions at the site.	
Operational Phase								
H	**Severe Weather**	Extreme weather- periods of heavy rainfall, taking into account climate change and strong winds	Illness or loss of life;	2	The risk of severe weather is unlikely when considering weather conditions recorded over the last 30 years within the area.	1	The risk of severe weather conditions during the Operational phase will result in a minor consequence in that 'small number of people would be affected' should a severe weather occur, with 'no fatalities and a small number of minor injuries with first aid treatment'.	2
I	**Contamination**	A vehicular incident on the public road or Proposed Development road network involving fuel, in the	Damage to, or depletion of aquatic habitats and species Contamination of local drinking water supplies and groundwater aquifers.	2	As outlined in Chapter 4, fuel will not be stored on-site post construction. therefore fuel is not considered to be a contamination risk in the operational phase.	1	The risk of a fuel spillage or impact on surround drainage during the operational stage will result in a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration' through the use of bunded	2

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
		operational phase					containment areas during operation. The potential residual environmental effects are described in detail in Chapter 8 which concludes that there will be no significant environmental effects.	
J	**Fire / Gas Explosion**	Equipment or infrastructure failure; Fuel spillage/storage Electrical problems; and Employee negligence	Illness or loss of life; Damage to, or depletion of habitats and species; and Impacts on ambient air quality.	2	As outlined in Chapter 4, fuel will not be stored on-site post construction therefore fuel is not considered to be a significant fire risk. In accordance with Chapter 19 of the Safety, Health and Welfare at Work Act 2005 (the 2005 Act), the development shall be subject to a fire safety risk assessment which would assist in the identification of any major risks of fire on site, and mitigation of the same during operation.	2	Should a fire/explosion occur at the site, a limited consequence in that there would be 'a limited number of people affected' with 'localised effects of short duration' on people and environmental receptors due to the nature of the project and the lack of infrastructure or fuel storage during operation that would result in any such incident. There will be 'normal community functioning' in the area with 'some inconvenience' The 'generic command, control & co-ordination systems' as well as the 'common	4

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
							elements of response' detailed in the Galway County Council Major Emergency Plan will work to reduce the consequence (both on people and the environment) of potential fire/explosions at the site.	
K	**Collapse/ damage to structures**	Earthquakes, extreme weather events; and Vehicular collisions due to driver negligence on public roads.	Injury or loss of life.	1	According to the Irish National Seismic Network (INSN), earthquakes measuring ~2 on the Richter Scale are "normal" in terms of seismicity in Ireland. These are known as microearthquakes; they are not commonly felt by people and are generally recorded only on local seismographs. As such, buildings in Ireland are extremely unlikely to be damaged or collapse due to seismic activity. Having regard to public speed limits within the site, it is not predicted that any	1	The risk of infrastructure collapse during the operational phase will result in a minor consequence in that 'small number of people would be affected' and no real likelihood of any impact on any environmental receptors.	1

Risk ID	Potential Risk	Possible Cause	Environmental Effect	Likelihood Rating	Basis of Likelihood	Consequence Rating	Basis of Consequence	Risk Score (Consequence x Likelihood)
					collision of vehicles and any infrastructure would result in significant damage/collapse.			
L	**Traffic Incident**	Driver negligence or failure of vehicular operations on site roads. Traffic Management not implemented	Injury or loss of life.	3	A limited number of vehicles will be permitted on the site as part of the operation phase As such, it can be determined that there is some 'opportunity, reason or means' for a vehicle collision to occur on site, 'at some time.' An unlikely risk is therefore predicted.	1	A minor consequence is predicted. Having regard to on-site speed limits and vehicular movements, a 'small number of people would be affected' should a vehicular collision occur, with 'no fatalities and small number of minor injuries with first aid treatment.'	3

The risk assessment for each of the potential risks identified are consolidated in Table 14-8 which provides their 'risk score.' A corresponding risk matrix is provided in Table 14-9, which is colour coded in order to provide an indication of the critical nature of each risk. As outlined in Section 14.2.4.2, the red zone represents 'high risk' scenarios', the amber zone represents 'medium risk scenarios' and the green zone represents 'low risk scenarios.

Table 14-8 Risk Scores

Risk ID	Potential Risk	Likelihood Rating	Consequence Rating	Risk Score
Construction Phase				
A	Critical Infrastructure Emergencies	1	1	1
B	Severe Weather	2	1	2
C	Flooding	2	1	2
D	Utility company emergencies	2	1	2
E	Traffic Incident	3	1	3
F	Contamination	2	2	4
G	Fire / Gas Explosion	2	2	4
Operational Phase				
H	Severe Weather	2	1	2
I	Contamination	2	1	2
J	Fire / Gas Explosion	2	2	4
K	Collapse/ damage to structures	1	1	1
L	Traffic Incident	3	1	3

Table 14-9 Risk Matrix

		Consequence Rating				
		1.Minor	2.Limited	3. Serious	4.Very Serious	5.Catastrophic
Likelihood Rating	5.Very Likely					
	4. Likely					
	3. Unlikely	E,L				
	2. Very Unlikely	B,C,D,H,I,	F,G,J			
	1. Extremely Unlikely	A,K				

Table 14-9 presents the potential risks identified during the construction and operational phases of the Proposed Development all of which can be classified as 'low risk scenarios.'

The scenario with the highest risk score in terms of a major accident and/or natural disaster during the construction phase of the Proposed Development is identified below.

14.4.1.2 Contamination During Construction

There is a potential risk of contamination from site activities during the construction phase as a result of potential release of hydrocarbons. The risk of contamination was given a risk score of 4 on a very precautionary basis. However, as outlined in Chapter 4 Section 4.5.8 and Chapter 8, Section 8.5.3, measures will be put in place to reduce the risk of accidental spillage and contamination of pollution risk to groundwater, surface water and associated ecosystems, and to terrestrial ecology.

The risk of contamination is 'very unlikely' to occur and will have 'limited' consequences should it do so, representing a **'low-risk scenario'** during the construction and operational phases.

The conclusions in the relevant chapters of the EIAR conclude that there will be no significant residual effects associated with this potential impact.

14.4.1.3 Fire/Explosion During Construction and Operation

There is a potential risk of fire/explosion at the Proposed Development site. However, as outlined in Section 14.2.1, the scope of this assessment has been based on the understanding that the Proposed Development will be designed, built and operated in line with current best practice. Further, in accordance with Chapter 19 of the Safety, Health and Welfare at Work Acts 2005 to 2014, the Proposed Development shall be subject to a fire safety risk assessment which will assist in the identification of any major risks of fire on site, and mitigation of the same during the operational phase.

Therefore, the risk of fire/explosion occurring at the Proposed Development resulting in a major accident and/or disaster was given a risk score of 4 on a very precautionary basis. This indicates a scenario that is 'very unlikely' to occur and having 'limited' consequences should it do so, representing a '**low-risk scenario**' during the construction and operational phase.

14.4.2 Mitigation Measures

As outlined in Section 14.4.1, the scenario with the highest risk score in terms of the occurrence of major accident and/or disaster during construction was identified as 'Contamination' of the Proposed Development site and risk of 'Fire/Explosion' during operation.

The Proposed Development will be designed and built in line with current best practice and, as such, mitigation against the risk of major accidents and/or disasters will be embedded through the design. In accordance with the provision of the European Commission '*Guidance on the preparation of Environmental Impact Assessment Reports'*, a Risk Management Plan will be prepared and implemented on site to ensure an effective response to disasters or the risk of accidents. The plan will include sufficient preparedness and emergency planning measures.

A CEMP has been prepared for the Proposed Development and is included in Appendix 4-2 of this EIAR. Upon a grant of planning permission for the Proposed Development, the CEMP will be updated prior to the commencement of the development. The CEMP will be a live document maintained by the contractor that will work to ensure that potential risks of major accident and/or disaster are identified, avoided and mitigated, as necessary.

14.4.2.1 Mitigation - Fire/Explosion During Operation

The proposed development will also be subject to a fire safety risk assessment in accordance with Chapter 19 of the Safety, Health and Welfare at Work Acts 2005 to 2014, which will assist in the identification of any major risks of fire on site, and mitigation of the same during operation.

As outlined in Section 4.4 of the EIAR, a detailed Construction Environmental Management Plan (CEMP) will be prepared prior to the commencement of any works. The CEMP will be a live document maintained by the contractor that will work to ensure that potential risks of major accident and/or disaster are identified, avoided and mitigated, as necessary.

14.4.3 Residual Effects

The risk of a major accident and/or disaster during the construction of the Proposed Development is considered 'low' in accordance with the '*Guide to Risk Assessment in Major Emergency Management'* (DoEHLG, 2010).

It is considered that when the above mitigation is implemented, and all mitigation detailed in the EIAR is implemented, there will not be significant residual effect(s) associated with the construction and operation of the Proposed Development.

14.4.4 Monitoring

14.4.4.1 Monitoring During Construction

A detailed Construction Environmental Management Plan (CEMP) will be prepared prior to the commencement of any works. The CEMP will be a live document maintained by the contractor that will work to ensure that potential risks of major accident and/or disaster are identified, avoided and mitigated, as necessary. Refer to Appendix 4-2 for an outline CEMP that sets out the minimum standards to be employed by the contractor.

14.4.4.2 Monitoring During Operation

The operator of the Proposed Development will continue to assess the risk of major accidents and/or disasters on site on an on-going basis during operation.

The maintenance programme, record of reported incidents, as well as general site activities will be monitored on an on-going basis to ensure risk of major accidents does not increase over time.

14.4.5 Assessment of Cumulative and In Combination Impacts

14.4.5.1 Cumulative Impact Assessment

All elements of the Proposed Development were assessed in order to identify any cumulative effects.

A modern residential development including all of its various components is not a recognised source of pollution. It is not subject to Industrial Emissions Directive regulation or any other Environmental Protection Agency environmental regulatory consent. Should a major accident or natural disaster occur, the potential sources of pollution onsite during the construction and operational phases are limited and of low environmental risk. Sources of pollution with the potential to cause significant environmental pollution and associated negative effects such as bulk storage of hydrocarbons or chemicals, storage of wastes, management of flammable materials etc. are limited and so there is an inherent low level of environmental risk associated with major accident or natural disaster impacting the Proposed Development and causing environmental damage.

There is low potential for significant natural disasters to occur at the proposed development site. Ireland is a geologically stable country with a mild temperate climate. The potential natural disasters the may occur are therefore limited and these have been assessed in the context of the whole project, cumulatively in this chapter and in the wider EIAR.

Major industrial accidents involving dangerous substances pose a significant threat to humans and the environment. Such accidents can give rise to serious injury to people or serious damage to the environment, both on and off the site of the accident. The proposed development site is not regulated or connected to or close to any site regulated under the Control of Major Accident Hazards Involving Dangerous Substances Regulations i.e. SEVESO sites and so there are no potential effects from this source. There is no real likelihood of significant environmental effects cumulatively associated with major accidents.

The Proposed Development has low potential to cause natural disasters or major accidents. The site is relatively flat and is not a peatland site and so there is low/no potential for peatslides or landslides. Any risks associated with flooding, impacts on infrastructure, accidents etc are addressed in the Sections above. There is no real likelihood of significant environmental effects cumulatively associated with the Proposed Developments potential to cause accidents or natural disasters.

14.4.5.2 In Combination Impact Assessment

A search in relation to projects that may have the potential to result in a cumulative impact with the project on the environment was carried out as part of the EIAR. The Proposed Development has been considered, in combination with the projects set out in Chapter 2 of the EIAR.

Following a detailed assessment of the potential for any further impact when considered in combination with any or all of the projects set out in set out in Chapter 2, Section 2.6, the Proposed Development, with mitigation measures in place, was found to have no potential for significant in-combination or cumulative effects associated with the potential for the project to be impacted by major accidents or

natural disasters or the Proposed Developments potential to cause major accidents or natural disasters. This is based on the low risk associated with the Proposed Development described in this Chapter of the EIAR and a review of the nature of the surrounding landuses and projects existing or intended in the surrounding area.

15. INTERACTION OF THE FOREGOING

15.1 Introduction

The preceding sections of this Environmental Impact Assessment Report (EIAR) identify the potential environmental impacts that may occur in terms of Population and Human Health, Biodiversity, Land Soils and Geology, Water, Air and Climate, Noise & Vibration, Landscape & Visual, Cultural Heritage and Material Assets (including Traffic), as a result of the proposed development. All of the potential impacts of the proposed development and the measures proposed to mitigate them have been outlined in the preceding sections of this report. However, for any development with the potential for significant environmental impact there is also the potential for interaction amongst these impacts. The result of interactive impacts may either exacerbate the magnitude of an impact or ameliorate it.

A matrix is presented in Table 15-1 to identify interactions between the various aspects of the environment already discussed in this report. The matrix highlights the occurrence of potential positive or negative impacts of the proposed development. The matrix is symmetric, with each environmental component addressed in the previous sections of this report being placed on both axes of a matrix, and therefore, each potential interaction is identified twice. Interaction in the matrix does not imply a cumulative impact.

Table 15-1 Interaction Matrix

	Population, Human Health	Flora & Fauna	Soils & Geology	Hydrology & Hydrogeology	Air & Climate	Noise & Vibration	Landscape	Cultural Heritage	Material Assets	Major Accidents
Population, Human Health										
Biodiversity, Flora & Fauna										
Land, Soils & Geology										
Hydrology & Hydrogeology										
Air & Climate										
Noise & Vibration										
Landscape & Visual										
Cultural Heritage										
Material Assets										
Major Accidents										

Legend:	
	Potential Positive Effect:
	Potential Neutral Effect:
	Potential Negative Effect:
	No Interacting Effect:

The potential for interaction of effects, where it exists, has been assessed as part of the Impact Assessment process. This EIAR was edited and collated by MKO as an integrated report of findings from the impact assessment process, rather than a collection of individual assessments carried out in isolation and impacts that potentially interact have been discussed in the individual chapters of the EIAR above.

15.2 Impact Interactions

Where any potential negative effects have been identified during the assessment process, these impacts have been avoided by design or reduced by the proposed mitigation measures.

15.2.1 Population & Human health

Population & Human health and Noise & Vibration

The proposed development has the potential to create noise and some vibration during the construction phase, which could give rise to nuisance for occupants of nearby dwellings. Mitigation measures are presented in Chapter 10 to minimise the risk of any such issues. With the implementation of these mitigation measures the residual impact on Population and Human Health will be slight, negative in the short term.

The construction phase of the proposed development has the potential to create noise and some vibration, which could give rise to nuisance for occupants of nearby dwellings. Mitigation measures are presented in Chapter 10 to minimise the risk of any such issues. With the implementation of these mitigation measures the residual impact on Population and Human Health will be slight, negative in the short term. The operation phase of the proposed development will result in negligible neutral impacts. As discussed in chapter 10, the implementation of mitigation measures will ensure that there will be no adverse noise impact on the local population or on human health.

Population & Human health and Air & Climate

The proposed development has the potential to create dust and other less noticeable air pollutants, which could give rise to nuisance for occupants of nearby dwellings. Mitigation measures are presented in Chapter 9 to minimise the risk of any such issues. Dust and general emissions mitigation measures will be implemented on site and as such impacts to population and human health are predicted to be imperceptible and short-term. Such measures are outlined in the accompanying Construction Environmental Management Plan as prepared by DBFL Consulting.

Population & Human health and Hydrology & Hydrogeology (Water)

Any impacts associated with any development on water has the potential to impact on human health in particular where water abstraction sources are present. The proposed development has limited potential to give rise to water pollution as a result of site activities due to the construction methodologies being used. Also, there are no water abstraction points in the vicinity of the site. Mitigation measures are presented in Chapter 8 to minimise the risk of any such issues. Residual impacts on Population and Human Health are predicted to be imperceptible.

Population & Human health and Landscape

Overall, the highest negative landscape effects associated with the Proposed Developmentare are localised and are limited to the Proposed Development Site itself which is not highly valued or sensitive in relation to the wider landscape area, given its baseline status. The continued development of this district centre is plan-lead and is aligned with the planning policy and land-use zoning. A Moderate, Direct, Permanent, landscape effect was deemed to arise on the Proposed Development Site during the Operational Phase. In relation to the operational landscape effects on the character of the surrounding streetscape, a Slight, Direct, Permanent residual landscape effect on the character of the surrounding streetscape is deemed to arise.

Overall, visual effects as a result of the Proposed Development are not considered to be Signficant from sensitive locations in the LVIA Study Area (i.e. the local road network, amenity deisgnations, and nearby residential receptors), with the greatest visual effects occuring in relaiton to the nearby An Logan and Gort na Bró housing estates which were deemed to experience a residual visual effect of Moderate signifcance. There are no Significant visual effects envisioned as a result of the Proposed Development.

Population & Human health and Material Assets (Traffic)

Construction phase vehicle emissions have the potential to impact human health, however, as set out in section 9.3.3.4 it is considered that the risk to human health arising from construction activities is low. Traffic emissions mitigation measures will be implemented on site and as such impacts to human health are predicted to be imperceptible and short-term.

Population & Human health and Major Accidents

There is a potential risk of contamination from site activities during the construction phase as a result of potential release of hydrocarbons. Any impacts associated with any development on water has the potential to impact on human health in particular where water abstraction sources are present. The proposed development has limited potential to give rise to water pollution as a result of site activities due to the construction methodologies being used. Also, there are no water abstraction points in the vicinity of the site. Mitigation measures are presented in Chapter 8 to minimise the risk of any such issues. Residual impacts on Population and Human Health are predicted to be imperceptible.

The risk of contamination was given a risk score of 4 on a very precautionary basis. However, as outlined in Chapter 4 and Chapter 8, measures will be put in place to reduce the risk of accidental spillage and contamination of pollution risk to groundwater, surface water and associated ecosystems, and to terrestrial ecology.

The risk of contamination is 'very unlikely' to occur and will have 'limited' consequences should it do so, representing a 'low-risk scenario' during the construction phases. The conclusions in the relevant chapters of the EIAR conclude that there will be no significant residual effects on population and human health associated with this potential impact.

15.2.2 Biodiversity

Biodiversity and Hydrology & Hydrogeology (Water)

Site activities have the potential to give rise to some water pollution (although this is limited), and consequential impacts on flora and fauna that rely on or use that water within the same catchment. These potential impacts have been assessed, and the relevant measures will be in place to avoid any water pollution and subsequent effect on flora and fauna. Residual impacts on Biodiversity are predicted to be not significant.

Biodiversity and Noise & Vibration

Site activity during the construction of the proposed development has the potential to give rise to noise and some vibration that could disturb fauna. This will occur only during the construction phases which will be temporary. The site is located adjacent to areas of existing development so potential effects are limited. The implementation of the mitigation measures presented in this chapter will ensure that there will be no significant impacts on biodiversity as a result of noise and vibration. Residual impacts on Biodiversity are predicted to be not significant, short term, and negative.

Biodiversity and Land, Soils & Geology

The disturbance of soils and potentially bedrock within the proposed development area will result in habitat loss and some disturbance of fauna in the areas surrounding the works area. Where possible, the excavated soil will be used for reinstatement and landscaping works around the site Residual impacts on Biodiversity are predicted to be not significant.

15.2.3 Land, Soils and Geology

Land, Soils & Geology and Hydrology & Hydrogeology

The movement and/or removal of soils, overburden and rock as part of the construction activity has the potential to have secondary impacts on water quality in the absence of mitigation. Mitigation measures are presented in Chapter 7. Residual impacts on Hydrology and Hydrogeology are predicted to be not significant.

15.2.4 Hydrology & Hydrogeology (Water)

Hydrology & Hydrogeology (Water) and Major Accidents

There is a potential risk of contamination from site activities during the construction phase as a result of potential release of hydrocarbons. Any impacts associated with any development on water has the potential to impact on hydrology and hydrogeology. The proposed development has limited potential to give rise to water pollution as a result of site activities due to the construction methodologies being used. Also, there are no water abstraction points in the vicinity of the site. Mitigation measures are presented in Chapter 8 to minimise the risk of any such issues. Residual impacts on hydrology and hydrogeology are predicted to be imperceptible.

15.2.5 Air and Climate

Air Quality and Climate has a limited number of interactions with other parameters. The most important interaction, in the context of this proposed development, is between air quality and human beings (Population and Human Health). Potential interactions also exist between air quality and traffic.

Air & Climate and Population and Human Health

Construction phase dust emissions and emissions of other less noticeable air pollutants have the potential to impact human health, however, as set out in section 9.5 it is considered that the risk to human health arising from construction activities is low. Dust and general emissions mitigation measures will be implemented on site and as such impacts to human health are predicted to be imperceptible and short-term.

Air & Climate and Material Assets (Traffic)

Traffic related vehicle exhaust emissions have the potential to impact air quality and produce greenhouse gases during both the construction and operational phases of the proposed development, however as set out in sections 9.2.5 and 9.3.3 of this EIAR mitigation measures will be implemented on site and as such impacts to Air and Climate are predicted to be imperceptible, negative in the short term and imperceptible, neutral in the long term.

Air & Climate and Major Accidents

There is a potential risk of fire/explosion at the Proposed Development site. However, as outlined in Section 16.2.1, the Proposed Development will be designed, built and operated in line with current best practice. Further, in accordance with Chapter 19 of the Safety, Health and Welfare at Work Acts 2005 to 2014, the Proposed Development shall be subject to a fire safety risk assessment which will assist in the identification of any major risks of fire on site, and mitigation of the same during the operational phase. Therefore, the risk of fire/explosion occurring at the Proposed Development resulting in a major accident and/or disaster was given a risk score of 4 on a very precautionary basis. This indicates a scenario that is 'very unlikely' to occur and having 'limited' consequences should it do so, representing

a 'low-risk scenario' during the operational phase. In the unlikely event of a major fire at the Proposed Development the impacts to air quality are predicted to be moderate, negative, and temporary.

15.3 Mitigation and Residual Impacts

Where any potential interactive negative impacts have been identified in the above, a full suite of appropriate mitigation measures has already been included in the relevant sections (Chapters 5-13) of the EIAR. The implementation of these mitigation measures will reduce or remove the potential for these effects. Information on potential residual effects, and their significance, is also presented in each relevant chapter. Based on the implementation of the mitigation measures set out in chapter 5-13 there will be no significant residual interactive impacts.

16. SCHEDULE OF MITIGATION

16.1 Introduction

All mitigation measures relating to the pre-commencement and construction phases of the proposed development are set out in the relevant chapters of the EIAR and Construction Environmental Management Plan (CEMP) submitted as part of this Large-Scale Residential Development (LRD) application.

It is intended that the CEMP will be updated where required prior to the commencement of the development, to include all mitigations measures, conditions and or alterations to the EIAR and application documents should they emerge during the course of the planning process and would be submitted to the Planning Authority (Galway City Council) for written approval.

All mitigation measures proposed for the project are outlined in Table 16-1. The mitigation measures have been grouped together according to their environmental field/topic and are presented under the following headings:

- Construction Management
- Drainage and Surface Water Quality
- Biodiversity
- Air Quality and Dust Control
- Noise and Vibration
- Material Assets including Traffic
- Cultural Heritage
- Waste Management

The mitigation and monitoring proposals are set out in separate tables in the CEMP (Appendix 4-2) for clarity and tracking of the pre-commencement survey requirements. Where particular monitoring proposed is considered to be a measure of mitigation, it has been included in the consolidated table for all mitigation measures proposed (Table 16-1)

The mitigation proposals in the below format provides an easy to audit list that can be reviewed and reported on during the future phases of the project. The proposal for site inspections and environmental audits are also set out in the Construction and Environmental Management Plan (CEMP) which is included as Appendix 4-2 of this EIAR.

Table 16-1 Mitigation Measures

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
Pre-Commencement Phase			
1	A Traffic Management Plan (TMP) shall be issued to Galway City Council for approval prior to works commencing on site. The approved TMP and any revisions thereof shall be set up and implemented on site. All necessary signage shall be erected in the weeks prior to any works commencing along and on adjacent roads to the proposed development giving advance warning to traffic, pedestrians / members of the public. Every effort shall be made to minimize the impact of the above works on local residence and traffic		
2	The Contractor shall provide arrangements to provide for vehicular traffic to the site with control measures where crossing the public footpath.		
3	The site will be secured with painted timber hoarding circa 2.4m high including supports and appropriate anchoring (Designed by Temporary Works Engineer), external lighting and Safety signage. Site hoarding will include Health and Safety warnings at appropriate intervals.		
4	Site security will be provided by way of a monitored infrastructure systems such as site lighting and CCTV cameras, when deemed necessary		
5	Communication with the public, local residents and businesses adjacent the development will be an important responsibility of the Senior Project Manager and delegated persons. All parties will be always kept up to date and informed both shortly prior and during the construction period.		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
Construction Phase			
Construction Management			
6	The Contractor shall communicate with the public, local residences and businesses adjacent the development. All parties shall be kept up to date during the construction period at all times		
7	All personnel shall be inducted and made familiar with Risk Assessments / Method Statements (RAMS) and Traffic Management Plans.		
8	All site-specific safety rules shall be adhered to		
9	All plant operators to have appropriate CSCS training.		
10	All personnel to have SOLAS Safe Pass training		
11	Fire extinguishers and first aid supplies to be available in the work area.		
12	All adjacent roadways will be maintained in clean condition at all times.		
13	Appropriate PPE to be worn at all times		
14	Biometric turnstiles to be used to prevent unauthorized access to the site		
15	Competent foremen will be on site at all times		
16	Deliveries of material to site will be planned to avoid high volume periods. There may be occasions where it is necessary to have deliveries within these times. The Contractor		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
	will develop, agree and submit a detailed Traffic Management Plan for the project prior to commencement.		
17	As part of the Construction Stage Safety Plan for the works a Traffic Management Plan (TMP) will be prepared in accordance with the principles outlined below and held on site		
18	All deliveries and vehicles into site will access the site from the designated site entrances which will be located along the Gort Na Bró and Western Distributor Road.		
19	During the construction of the proposed infrastructure works, any unsuitable material or unusable material will be disposed offsite to a suitably licensed landfill facility in accordance with the regulations for same and the project Construction Waste Management Plan.		
20	The location of the vehicular entrance and access will be regularly reviewed during the construction to ensure that the pedestrian and vehicular access points are located and maintained appropriately		
21	Construction traffic will not be permitted to park on the public roads or within the general area outside the main site. Restricted parking facilities will be provided by the contractor.		
22	Construction vehicle movements and their impact will be minimised through; › Consolidation of delivery loads to / from the site and management of large deliveries on site to occur › outside of peak periods; › Use of precast / prefabricated materials where possible; › Adequate storage space on site to be provided where possible;		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
	› Scheduling of movements to outside peak traffic times and school pick-up / drop-off times. › All vehicles to switch off engines when not in use – no idling vehicles › Vehicle cleaning and wheel washing to take place on leaving site. › On-road vehicles to comply to set emission standards. › All non-road mobile machinery (NRMM) to be fitted with appropriate exhaust system and be regularly › serviced. › Haul routes to be hard surfaced and cleaned and appropriate speed limits applied around the site.		
23	The aggregates required for the construction of the proposed development will be sourced, as much as is possible and practicable, from quarries and suppliers located as near as possible to the proposed development. This will reduce the potential for any negative impacts associated with the haulage of the materials to the site of the proposed development. Existing soils and subsoils located on the site will be used where possible to reduce the amount of such materials required for import onto the site.		
24	The following measures will be taken to ensure that the site and surroundings are kept clean and tidy: › A regular programme of site tidying to be established to ensure a safe and orderly site; › Mud spillages on roads and footpaths outside the site to be cleaned regularly and will not be allowed to › accumulate; › Dedicated road sweeper will be put in place if site conditions require		
25	The site will not be open to members of the public. When vehicles are entering the construction site, or leaving the site, these movements should be supervised by road		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
	marshals. The construction site gates will be kept closed when not in use and monitored by security. Traffic cones and set-back signage should be put in place to warn and safely direct cyclists around obstructions.		
26	Working hours will be strictly in accordance with the granted planning conditions with no works on Sundays or Bank Holidays. If work is required outside of these hours, written approval will be sought by the contractor from the Local Authority.		
27	A "Just in Time" approach will be implemented for the delivery of particular building materials such as concrete formwork and large structural steels. The location of this materials storage facility will be within the site boundary		
28	Access to the compound will be security controlled and all site visitors will be required to sign in on arrival and sign out on departure.		
29	The proposed development will be constructed in two phases as indicated in the proposed development phasing plan included in Appendix A of the CEMP. Site 2 and the proposed access road realignment will be constructed in Phase 01. The existing access road to the existing retail park will be kept open to traffic until the proposed road diversion is complete. The existing access road will be decommissioned in Phase 2 after the new road diversion is complete. Specific control measures will be implemented to fully segregate construction traffic from external pedestrian traffic such as a site marshal.		
30	During these works, topsoil from the development area of the site will be stripped and stored in a designated storage area for reuse. Where these works occur, the following will apply: › The area where excavations are planned will be surveyed and all existing services will be identified.		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
	› All relevant bodies i.e. ESB, Bord Gáis, Eircom, Galway City Council etc. will be contacted and all drawings for all existing services sought. › All plant operators and general operatives will be inducted and informed as to the location of any services. › All plant operators and general operatives will be inducted and informed as to the identification of invasive species. › A tracked 360-degree excavator will be used to strip the topsoil, and a dumper will be used to move the excavated materials to the temporary stockpile location. › All excavated material which is not required for future landscaping works or for backfill of excavations will be removed to an authorised waste recovery facility. This will also apply to material which is not suitable for reuse on site. › All stockpiles will be damped down or covered in a sheet of polythene, as required, which will prevent the creation of nuisance dust, and will also prevent sediment runoff in times of heavy precipitation.		
31	Excavated (existing) overburden material will be reused on site, where possible;		
32	A minimal volume of topsoil and subsoil will be removed to allow for infrastructural work to take place due to optimisation of the layout by mitigation by design (no basement structures are proposed); and, Construction of service trenching, pumping station and surface water attenuation features will generate excess material. All excess material will be sent to an authorised soil and stone or waste recovery facility.		
Drainage and Surface Water Quality			
33	Identified risks include spillages into drainage systems and unprotected ground, allowing pollutants to enter watercourses or ground water. The measures proposed to be put in		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
	place to mitigate this risk would be the use of exclusion zones around drainage systems where practicable.		
34	Sediment and Erosion – Similar to the above, adjacent drainage systems/groundwater need to be protected from sedimentation and erosion due to direct surface water runoff generated onsite during the construction phase. To prevent this from occurring surface water discharge from site will be managed and controlled for the duration of the construction works until the permanently surface water drainage system of the proposed site is complete.		
35	A temporary drainage system shall be installed prior to the commencement of the construction works to collect surface water runoff from the site during construction.		
36	All works shall be undertaken in accordance with the CIRIA document, 'Control of Water Pollution from Construction Sites, guidance for consultants and contractors',		
37	Accidental Spills and Leaks – All oils, fuels, paints and other chemicals will be stored in a secure bunded construction hardstand area. Refuelling and servicing of construction machinery will take place in a designated hardstand area which is also remote from any drainage systems. A response procedure will be put in place to deal with any accidental pollution events and spillage kits will be available and construction staff will be familiar with the emergency procedures and use of the equipment.		
38	Concrete – Concrete batching will take place off site, wash down and wash out of concrete trucks will take place off site and any excess concrete is not to be disposed of on site. Pumped concrete will be monitored to ensure there is no accidental discharge. Mixer washings are not to be discharged into surface water drains/sewers.		
39	Disposal of Wastewater from Site – Discharge from any vehicle wheel wash areas is to be directed to on-site settlement tanks/ponds, debris and sediment captured by vehicle wheel washes are to be disposed off-site at a licensed facility.		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
40	Foul drainage discharge from the construction compound will be tankered off site to a licensed facility until a connection to the public foul drainage network has been established.		
41	All plant and machinery will be serviced before being mobilised to site;		
42	No plant maintenance will be completed on site, any broken down plant will be removed from site to be fixed;		
43	Refuelling will be completed in a controlled manner using drip trays at all times;		
44	Mobile bowsers, tanks and drums will be stored in secure, impermeable storage areas away from open water;		
45	Fuel containers will be stored within a secondary containment system, e.g. bunds for static tanks or a drip tray for mobile stores;		
46	Containers and bunding for storage of hydrocarbons and other chemicals will have a holding capacity of 110% of the volume to be stored;		
47	Ancillary equipment such as hoses and pipes will be contained within the bund;		
48	Taps, nozzles or valves will be fitted with a lock system;		
49	Fuel and chemical stores including tanks and drums will be regularly inspected for leaks and signs of damage;		
50	Drip-trays will be used for fixed or mobile plant such as pumps and generators in order to retain oil leaks and spills;		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
51	Only designated trained operators will be authorised to refuel plant on site;		
52	Procedures and contingency plans will be set up to deal with emergency accidents or spills; and,		
53	An emergency spill kit with oil boom, absorbers etc. will be kept on-site for use in the event of an accidental spill. A specific team of staff will be trained in the use of spill containment.		
54	The following guidelines and documents will inform the detailed planning of the works phase: - ○ Good practice guidelines on the control of water pollution from construction sites developed by the Construction Industry Research and Information Association (CIRIA) in particular; ○ C532 Control of water pollution from construction sites: guidance for consultants and contractors (Masters-Williams et al, 2001); and ○ SP156 Control of water pollution from construction sites - guide to good practice (Murnane et al, 2002). ○ Requirements for the protection of fisheries habitat during construction and development works at river sites developed by the ERFB. http://www.fisheriesireland.ie/Research/recent-publications.html.		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
55	Existing soils and subsoils located on the site will be used where possible to reduce the amount of such materials required for import onto the site. Aggregates will be transported to the site in covered trucks.		
56	A summary of surface water controls that can be employed during the earthworks and construction phase are as follows: **Source controls:** Interceptor drains, vee-drains, diversion drains, flume pipes, erosion and velocity control measures such as use of sandbags, oyster bags filled with gravel, filter fabrics, and other similar/equivalent or appropriate systems. Small working areas, covering stockpiles, weathering off stockpiles, cessation of works in certain areas or other similar/equivalent or appropriate measures. **In-Line controls:** Interceptor drains, vee-drains, oversized swales, erosion and velocity control measures such as check dams, sandbags, oyster bags, straw bales, flow limiters, weirs, baffles, silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriates systems. **Treatment systems:** Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems. **Silt Fences:** Silt fences will be placed up-gradient of all drains where construction is proposed. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to watercourses of sand and gravel sized sediment, released from excavation of mineral sub-soils of glacial and		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
	glacio-fluvial origin, and entrained in surface water runoff. Inspection and maintenance of these structures during construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase. **Silt Bags:** Silt bags will be used where small to medium volumes of water need to be pumped from excavations or swales. As water is pumped through the bag, most of the sediment is retained by the geotextile fabric allowing filtered water to pass through. Silt bags will be used with natural vegetation filters.		
57	**Shallow Excavation Dewatering** › Appropriate interceptor drainage, to prevent upslope surface runoff from entering excavations will be put in place if required; › The interceptor drainage will be discharged to the site constructed drainage system or onto natural vegetated surfaces and not directly to surface waters; › If required, pumping of excavation inflows will prevent build-up of water in the excavation; › The pumped water volumes will be discharged via volume and sediment attenuation ponds adjacent to excavation areas, or via silt bags. › There will be no direct discharge to the on-site main drains, and therefore no risk of hydraulic loading or contamination will occur; and, › Daily monitoring of excavations by a suitably qualified person will occur during the construction phase. If high levels of seepage inflow occur, excavation work should immediately be stopped and a geotechnical assessment undertaken.		
58	**Cement-Based Products** › Concrete batching will take place off site › Wash down and wash out of concrete trucks will take place off site		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
	› Any excess concrete is not to be disposed of on -site › Pulped concrete will be monitored to ensure that there is no accidental discharge. › Mixer washings are not to be discharged into surface water drains or sewers		
59	A self-contained port-a-loo with an integrated waste holding tank will be used at the site compounds, maintained by the providing contractor, and removed from site on completion of the construction works		
Biodiversity			
60	The following control measures are proposed to mitigate the risk of spreading invasive species, such as Japanese Hogweed, Himalayan Knotweed, Himalayan Balsam, Gunnera and Giant Hogweed: › All earthworks machinery shall be thoroughly pressure-washed prior to arrival on site and prior to their further use elsewhere › Care should be taken not to disturb or cause the movement of invasive species fragments, either intentionally or accidentally. › If any existing stands of invasive species are found on site, they should be clearly demarcated by temporary fencing and tracking within them should be strictly avoided. A minimum buffer of seven metres should be applied to avoid disturbance of lateral rhizomes. › If any excavations must be carried out in areas of Japanese Knotweed, the excavated material should not be moved from the location. The machinery must be thoroughly pressure-washed in a designated area at least 25 metres from any watercourse before moving on to an area that is not yet infected. › All contractors and staff should be briefed about the presence, identification and significance of Japanese Knotweed before commencement of works › Good construction site hygiene should be employed to prevent the spread of these species with vehicles thoroughly washed prior to leaving any site with the		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
	potential to have supported invasive species. All plant and equipment employed on the construction site (e.g. excavator, footwear, etc.) should be thoroughly cleaned down using a power washer unit prior to arrival on site to prevent the spread of invasive plant species such as Japanese Knotweed and Rhododendron. All washing must be undertaken in areas with no potential to result in the spread of invasive species. › When working at locations in proximity to natural watercourses, a suitable barrier should be erected between the watercourse and the stand of invasive species. This will assist in preventing the spread of any invasive species into the watercourse during their removal. There are no watercourses on the proposed development site, but cognizance should be had of any watercourses on neighbouring sites. › Any material that is imported onto any site to be verified by a suitably qualified ecologist to be free from any invasive species listed on the 'Third Schedule' of Regulations 49 & 50 of Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011). This will be carried out by searching for rhizomes and plant material. › Any soils or subsoils contaminated with invasive species will be sent for disposal to an authorized waste facility. › The treatment and control of invasive alien species will follow guidelines issued by the National Roads Authority – The Management of Noxious Weeds and Non-native Invasive Plant Species on National Roads (NRA 2010) and the Environment Agency (2013) – The Knotweed Code of Practice: Managing Japanese Knotweed on Development Sites (Version 3, amended in 2013). › The measures set out in the ISMP shall be implemented.		
Air Quality and Dust Control			
61	The Contractor shall put in place a regime for monitoring dust levels in the vicinity of the site during the works. The level of monitoring and adoptions of mitigation measures		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
	will vary throughout the construction works depending on the type of activities being undertaken and the prevailing weather conditions at the time. The minimum criteria to be maintained shall be the limit for Environmental Protection Agency (EPA) specification for licensed facilities in Ireland, which is 350mg/m2/day. The construction team will monitor the contractors regime on an ongoing basis throughout the project to endeavour to minimise impact on a surrounding community.		
62	› If dust levels become an issue, then all dust generating activities on site will cease until such time as weather conditions improve (e.g. wind levels drop or rain falls) or mitigation measures such as damping down of the ground are completed. › During peak vehicle movements, where there is a likelihood of dirt on construction vehicles exiting the site, a dedicated road sweeper will be put in place until these works are competed. › If dirt generation extends onto public roads, road sweeping will be carried out as well, including if necessary cleaning of silt from road gullies. › Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods. Material stockpiles containing fine or dusty elements shall be covered with tarpaulins. Aggregates will be transported to and from the site in covered trucks. › Where drilling or pavement cutting, grinding or similar types of stone finishing operations are taking place, measures to control dust emissions will be used to prevent unnecessary dust emissions by the erection of wind breaks or barriers. All concrete cutting equipment shall be fitted with a water dampening system › A complaints log shall be maintained by the construction site manager and in the event of a complaint relating to dust nuisance, an investigation shall be initiated › A dedicated road sweeper shall be put in place during peak vehicle movements. › Site roadways shall be maintained in a stoned hardcore condition not allowing soil to accumulate that may create dust.		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
	› Wheel wash equipment shall be set up at the site exit gate for all construction vehicles to pass through prior to leaving the site thus ensuring that no dirt etc. is transported outside the site onto the roadways.		
63	› All vehicles to switch off engines when not in use, › No idling vehicles, › On-road vehicles to comply to set emission standards, › All non-road mobile machinery (NRMM) to be fitted with appropriate exhaust system and to be regularly serviced, › Haul routes to be hard surfaced and cleaned and appropriate speed limits applied around the site, › Aggregate materials for the construction infrastructure will be sourced onsite from the proposed cut areas, where possible, which further reduced potential emissions.		
Noise and Vibration			
64	The Contractor shall ensure that the level of noise and vibration resulting from the construction of the works does not constitute a nuisance, and that noise and vibration emissions conform to the requirements of BS 5228: 2009 Code of Practice for Noise and Vibration Control on Construction Sites, Part 1 and Part 2. All plant shall be adequately silenced to conform to the requirements of BS 5228. Short-term vibration levels and continuous vibration guideline levels as measured in buildings shall be less that the guideline values in BS 5228. Vibration limits to be applied for infrastructure works are those specified in the NRA document Guidelines for the Treatment of Noise and Vibration in National Road Schemes (NRA, Revision 1, 2004).		
65	› If significant noise and vibration activities are to be carried out on site, the contractor will ensure that there is prior liaison with other resident / local business		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
	etc. with a view to ensuring that excess noise is not generated by the works beyond the site curtilage and that contract details are available along with agreed protocols › Contractor to use the Best Management Practice and mitigation measures to prevent or minimise noise levels from the works through the provision and proper maintenance, use and operation of all machinery. Contractor shall operate in accordance with the Safety, Health and Welfare at Work (General Application) Regulations 2007, part 5 Noise and Vibration. › The contractor shall appoint a designated person to manage all environmental complaints including noise. A noise complaint procedure shall be implemented in which the details of any noise related complaint are logged, investigated and where required; measures are taken to ameliorate the source of the noise complaint. A strictly enforced noise management programme shall be implemented at the site from the outset of construction activities. › Appropriate signage shall be erected in the vicinity of the site to inform HGV drivers that engines shall not be left idling for prolonged periods and that the use of horns shall be banned at all times. HGV's queuing on any local or public road shall not be permitted and it shall be the responsibility of site management to ensure this policy is enforced. › All onsite generator units (if required) used to supply electricity to the site shall be super silenced or enclosed and located away from any receptor. › The principal of controlling noise at source shall be implemented at the site. Best practice mitigation techniques as specified in *BS 5228:2009+A1 2014 – Noise and Vibration Control on Construction and Open Sites* shall be implemented during the construction phase and are detailed in this Section. › Construction operations shall be confined to the period Monday-Friday 0700-1900 h, and Saturday 08:00-17:00 h. › Plant used onsite during the construction phase shall be maintained in a satisfactory condition and in accordance with manufacturer recommendations. In particular, exhaust silencers shall be fitted and operating correctly at all times. Defective silencers will be immediately replaced.		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
	› Where it is proposed to operate plant during the period 0700-0800 h, standard 'beeper' reversing alarms shall be replaced with flat spectrum alarms › Solid barriers (hoarding) shall be erected to site boundary		
66	The best practice measures set out in BS 5228-1 and BS 5228-2 includes guidance on several aspects of construction site mitigation measures, including, but not limited to: › selection of quiet plant; › noise control at source; › screening; and, › liaison with the public.		
67	**Noise Control at Source** › The lifting of bulky items, dropping and loading of materials will be restricted to normal working hours. › Mobile plant should be switched off when not in use and not left idling. › For piling plant, noise reduction can be achieved by enclosing the driving system in an acoustic shroud. › For concrete mixers, control measures will be employed during cleaning to ensure no impulsive hammering is undertaken at the mixer drum. › For all materials handling ensure that materials are not dropped from excessive heights, lining drops chutes and dump trucks with resilient materials. › Demountable enclosures can also be used to screen operatives using hand tools and will be moved around site as necessary. › All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures.		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
68	**Screening** › Screening is an effective method of reducing the noise level at a receiver location and can be used successfully as an additional measure to all other forms of noise control. › In addition, careful planning of the site layout will also be considered. The placement of site buildings such as offices and stores will be used, where feasible, to provide noise screening when placed between the source and the receiver.		
69	**Liaison with Public** › A designated environmental liaison officer will be appointed to site during construction works. Any noise complaints will be logged and followed up in a prompt fashion by the liaison officer. In addition, where a particularly noisy construction activity is planned or other works with the potential to generate high levels of noise, or where noisy works are expected to operate outside of normal working hours etc., the liaison officer will inform the nearest noise sensitive locations of the time and expected duration of the noisy works		
70	**Monitoring** › Construction noise monitoring will be undertaken at periodic sample periods at the nearest noise sensitive locations to the development works to check compliance with the construction noise criterion. Noise monitoring should be conducted in accordance with the International Standard ISO 1996: 2017: Acoustics – Description, measurement and assessment of environmental noise.		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
	› Vibration monitoring stations should continually log vibration levels using the Peak Particle Velocity parameter (PPV, mm/s) in the X, Y and Z directions, in accordance with BS ISO 4866: 2010: Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures.		
Material Assets			
71	› Specific control measures will be implemented to fully segregate construction traffic from pedestrian and cyclists, taking into consideration the close proximity of a primary school. There will also be a requirement for a site marshal in particular during the school pick up / drop off. › Construction traffic for the works in the basement of Phase 2 carpark will be provided through the basement access ramp off local road. This access will be available outside of the school hours. › Temporary pedestrian routes will be maintained within the basement carpark with positive traffic management during retail opening hours. › All deliveries will be provided with instructions/directions on accessing the site from Gort na Bro roundabout and Local Road. › Construction traffic will not be permitted to park on the public roads or within the general area outside the main site. Restricted parking facilities will be provided by the contractor. Due to proximity of site to Gaelscoil Mhic Amhlaigh school the construction traffic adjacent to school will be limited to the outside of the school hours. Additionally, a temporary pedestrian/cycle routes will be required at the proposed site access locations to fully segregate construction traffic from pedestrian traffic. › Appropriate on-site parking and compound area will be provided to prevent overflow onto the local network. › Temporary warning signs; › Banksmen controlling access and egress from the site;		

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
	› All marshalling areas and site offices will be contained within the site boundary and will therefore have little impact on external roads; › Dedicated road sweeper will be put in place if site conditions require. › All loads to be properly stowed and secured with a tarpaulin, where appropriate; › Routine sweeping/cleaning of the road and footpaths in front of the site; › No uncontrolled runoff to the public road from dewatering/pumping carried out during construction activity. › Hoarding will be provided along the site frontage to protect pedestrians using the footpaths. › A regular programme of site tidying to be established to ensure a safe and orderly site; and › Mud spillages on roads and footpaths outside the site to be cleaned regularly and will not be allowed to accumulate.		
Cultural Heritage			
72	A potential direct impact to sub-surface archaeological features which may exist within the northern half of the eastern portion of the proposed development site may occur as a result of ground works. In this regard the following mitigation measure is recommended: › Archaeological monitoring of all topsoil removal should be undertaken by a suitably qualified archaeologist. A report on the monitoring should be compiled on completion of the works and submitted to the relevant authorities. ›		
Waste Management			

Mitigation Measure	Mitigation Measure	Audit Result	Action Required
73	The treatment of waste is to be employed by the contractor or a specialist waste management contractor as a trade package. This contractor will be responsible for: › Ensuring the site is kept clean and safe. › The collection of waste from a central point › Segregation of waste on site › The waste management contractor shall ensure that all access routes, fire escapes and staircases are swept and kept clear of debris on a regular basis to maintain high standards of health and safety on the project. No fires will be permitted on-site. › The contractor shall adhere to the Construction and Demolition Waste Management Plan (CDWMP) for the project to ensure that all material is disposed of at an appropriately licensed landfill site. › The contractor shall ensure maximum recycling, reuse and recovery of waste with diversion from landfill, where possible. › In order to ensure appropriate segregation of waste on-site, a material storage zone shall be provided in the compound area. This storage zone will include material recycling and facilities. A series of 'way finding' signage will be provided to route staff and deliveries into the site and to designated compound or construction areas, as appropriate.		
74	A dedicated waste management area will be located within the compound, with waste to be sorted and collected from site by permitted collectors		

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