

Environmental Impact Assessment Report

Strategic Housing
Development, Lands at
Rosshill, Galway





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Volume 1: Non- Technical Summary &
Environmental Impact Assessment Report

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1. NON-TECHNICAL SUMMARY

2. INTRODUCTION

This Environmental Impact Assessment Report ('EIAR') has been prepared by McCarthy Keville O'Sullivan Ltd. (MKO) on behalf of Kegata Limited, which intends to apply to An Bord Pleanála (ABP) under the Planning and Development Act 2000 (as amended by the Residential Tenancies Act 2016) for a strategic housing scheme located in the townlands of Roscam, Merlin Park and Murrough, Co. Galway. The application is being made under the Strategic Housing Provisions of the Planning and Development (Housing) and Residential Tenancies Act, 2016.

The site area comprises 10.069ha of land located within the townlands of Roscam, Merlin Park and Murrough to the south east of Galway City. It is located on the Rosshill Road, which connects to the Old Dublin in the west and the Coast Road in the east. The general area is rural in character and is surrounded by a number of small residential developments and individual houses. A number of individual houses and the Rosshill Stud Farm lie to the south, with agricultural lands to the east. The Merlin Park Hospital lies to the north to the south, Galway bay and agricultural lands to the west. The Galway to Dublin trainline runs along the northern border of the site.

The applicant, Kegata Limited (T/A Alber Homes) is a national house building company set up in 2017. Kegata's senior management team has over 30 years of construction experience and has developed major commercial and residential projects both in Ireland and the UK. Kegata Limited 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 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 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.

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 this 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, in accordance with the requirements of the EIA Directive. The compilation of this document served to highlight any areas where mitigation measures may be necessary in order to protect the surrounding environment from the possibility of any negative impacts arising from the proposed development.

It is important to distinguish the Environmental Impact Assessment (EIA) to be carried out by Galway City Council, 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)*

The EIAR submitted by the applicant provides the relevant environmental information to enable the EIA to be carried out by the competent authority. The information to be contained in the EIAR is prescribed by statutory regulation

3. **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 site comprises agricultural land in rough grazing. It previously formed a par-3 golf course however the old greens and fairways are now fallow and overgrown. The subject site is zoned for Low Density Residential (LDR) and Agriculture and Amenity (G) development under the Galway City Development Plan 2017-2023.

A review of the Galway City Council online map-based planning search indicates that there have been a number of planning applications on the subject lands, with the most notably development being outlined.

A scoping letter providing details of the application site and the proposed development, was prepared by McCarthy Keville O'Sullivan Ltd. and circulated on 19th July 2019 to statutory 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.

4. **DESCRIPTION OF THE PROPOSED DEVELOPMENT**

A preliminary masterplan for the entire site has been developed, setting out proposals for buildings, spaces and a movement and land use strategy. The proposed development will consist of the following:

1. *Construction of 342 no. residential units comprising:*
 - 36no. Four Bed Semi-Detached Houses
 - 2 no. Four Bed Detached Houses

- 68 no. Three Bed Semi-Detached Houses
- 63 no. Three Bed Terrace
- 6 no. Two Bed Terrace
- 5 no. Three Bed Long Semi-Detached Houses
- 5 no. Four Bed Long Semi-Detached Houses
- 38 no. One Bed Apartments
- 119 no. Two Bed Apartments

Provision of a Ground-floor community space, Office, Cafe and Retail units and Two-Storey Childcare Facility. The provision of public realm landscaping including shared public open space and play areas, public art, public lighting, resident and visitor parking including car rental bays, electric vehicle charging points and bike rental spaces. Pedestrian, cyclist and vehicular links throughout the development. Access road and junction improvements at Rosshill Road/Old Dublin Road. Provision of all associated surface water and foul drainage services and connections including pumping station. All associated site works and ancillary services.

It is anticipated that the development will be completed over 4 separate phases and the access and egress routes will change for the various phases. As some of the houses will be occupied during the later phases, Traffic Management procedures will be implemented to ensure the safety of the users of the access routes, for both the residential access and the construction access. The construction phase of the proposed development is expected to last approximately 7 years in total.

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 7:00am to 2:00pm 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.

5. POPULATION & HUMAN HEALTH

One of the principle 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 regarding human beings and general socio-economic data were sourced from the Central Statistics Office (CSO), the Galway City Development Plan 2017 – 2023, 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.

Galway City, where the proposed development is located has a host of amenities and community facilities, including GAA, Rugby and other sports clubs, youth clubs and recreational areas. The closest church to the proposed development site is 2 kilometres to the west in Renmore.

There are a wide range of services available in the area. Retail and personal services are centred in Galway city centre, and there are further shops and businesses located in the surrounding area such as Roscam and Doughiska. Galway City Council has a public library located nearby in Ballybane.

Within the proposed development site, the provision and maintenance of pedestrian and cycle infrastructure is intended, 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.

The primary school located closest to the proposed development site is the Merlin Woods Primary School, located in Doughiska, approximately 1.2 kilometres northeast of the proposed development site. The secondary school located closest to the proposed development site is Colaiste Mhuirlinne, which lies adjacent to the Merlin Woods Primary school and is also approximately 1.2 kilometres northeast of the site.

The third-level institution of Galway-Mayo Institute of Technology (Cluain Mhuire Campus) is located approximately 1.5 kilometres northwest of the proposed development site. The National University of Ireland (NUI) Galway main campus is located 4.8 kilometres to the west of the site. It is estimated that approximately 20% of the population of Galway city are students.

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 (Eamon Deacy Park, The Sportsground, Galway Racecourse, Pierce Stadium, etc.).

6. BIODIVERSITY

Between April and September 2019, 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 a former golf course. The majority of the site comprises a network of semi-improved, species poor Dry neutral grassland (GS1), with a small area of poorly-drained grassland at the north-west of the site was classified as *Wet grassland (GS4)*. The north-eastern corner of the site consists of a relatively disturbed area with imported rock and rubble. Scattered native and non-native trees are present throughout the site. A number of relatively immature trees are located to the southeast of the site. Treelines (WL2), comprised predominantly of mature and immature ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*) and beech (*Fagus sylvatica*) demarcate the southern, eastern and part of the northern boundaries of the development site. None of the habitats within the works areas correspond to those listed on Annex I of the EU Habitats Directive. No watercourses were recorded within or adjacent to the development site.

The development has been designed to minimise the loss of treelines delineating the site boundaries. While it is proposed to maintain the majority of these treelines, including the mature beech treeline delineating the site's western boundary. In addition, A landscaping plan has been prepared for the proposed development and provides for the retention of existing treelines and woodland within and around the site periphery, or for the recreation of similar features through tree, hedge and native woodland planting in the new development in order to ameliorate any tree loss. Therefore connectivity with the woodland to the west of the development site and the wider landscape will be maintained.

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

Potential impacts on European Designated Sites (SACs and SPAs) are assessed within a separate Screening for Appropriate Assessment report and Natura Impact Statement. The NIS states that: “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”.

7. LAND, SOILS AND GEOLOGY

The elevation of the site ranges between approximately 9 and 20m OD (metres above Ordnance Datum) The overall local topography generally slopes from east to west, towards the shoreline located ~ 500m southeast of the proposed site.

The topography of the site was further investigated during a site visit on 10th September/2019. Within the site itself, a topographically high area is located toward the centre of the site, the ground slopes steeply to the west of this section, before becoming relatively flat. The ground generally slopes steadily east and northeast of this section, towards a topographical low point at the northeast of the site. The dominant land use on the bordering land is agricultural, with Rosshill Farm Stud located ~ 200m south of the site.

The Proposed Development site is underlain by the Burren Formation which is described as pale grey clean skeletal limestone. The limestones are classified by the GSI as a Regionally Important Aquifer – Karstified (conduit) (Rkc).

The site is dominated by deep, well drained, mainly basic mineral soils (BminDW) with areas of shallow, well drained, mainly basic soils (BminSW) located towards the northwest of the site. The areas surrounding the site are all mapped as having similar soils, with the exception of smaller areas at the shoreline to the south and southwest, which are mapped as peaty gleys.

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 subsoil/rock type material. There are no recorded Geological Heritage sites within the proposed development area.

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 the land, soil and geology of the site will occur.

8. HYDROLOGY AND HYDROGEOLOGY

Hydro-Environmental Services (HES) was engaged by MKO, to carry out an assessment of the potential impacts of a proposed housing development at Rosshill, Galway City, Co. Galway on water aspects (hydrology and hydrogeology) of the receiving environment.

The Proposed Development site does not contain field drains or natural watercourses and it is likely that much of the rainfall that falls on the site drains through the soils i.e. percolates to ground.

A Flood Risk Assessment was completed by Tobin Engineers in August 2019 and it is estimated that the risk of flooding at the proposed residential development will be minimal, and it is predicted that the development will not increase the risk of flooding elsewhere.

The Burren Formation limestones, which are mapped to underlie the Proposed Development site are classified by the GSI (www.gsi.ie) as a Regionally Important Aquifer – Karstified (conduit). This bedrock type has typically high transmissivity and low storativity with lower gradients closer to the coast. The vulnerability rating of the aquifer within the overall site is classified as “Extreme (X –rock at/near surface)”.

There are no groundwater protection zones mapped within the proposed development site or study area. There is 1 no. mapped private well (GSI database to accuracy of <50m) located ~0.5km at Murrough House, which was obtained from the GSI well database (www.gsi.ie). This is a shallow dug well and likely intercepts shallow water draining from the surrounding soils, rather than the bedrock aquifer.

No groundwater wells would be expected in the area, given the proximity to the sea. Notwithstanding this, an assessment of groundwater resources relative to the proposed development is completed.

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 are anticipated 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.

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 ground via soakaways, thereby avoiding changes to surface water flow volumes leaving the site.

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

9. 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.

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 urban areas with a population of greater than 15,000.

The ambient air quality monitoring carried out closest to the subject site is at Bohermore in Galway City. This monitoring location also lies within Zone C which comprises urban areas with populations greater than 15,000. The air quality in the vicinity of the proposed development site is likely to be quite similar in nature and composition.

Dust is a common emission from construction sites and requires management. 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.

10. NOISE AND VIBRATION

The proposed development site consists of an approximately rectangular 9.9 ha plot on the southeast fringes of Galway City (Figure 9-1). The northern boundary adjoins the railway line into the city, although at the northeast corner of the site, the railway line is separated from the site by Rosshill Road. The road veers north underneath the railway line 200 m from the northeast corner, and the railway directly adjoins the boundary over a distance of 300 m to the northwest corner. The eastern boundary of the site is formed by Rosshill Stud Farm Road which meets Rosshill Road at the northeast corner. The western boundary adjoins a wooded scrubland area. The southern boundary, 470 m in length, adjoins pasture.

The site is currently under a mixture of pasture, hedgerows and scattered trees. The surrounding area is also under pasture, with extensive proliferation of one-off dwellings along the local road network. Being within 1 km of the shore, Rosshill Stud Farm Road and its tributaries are cul de sacs, and there is no through-traffic. Rosshill Road is, however, a through-road, and sees heavy traffic at commuting times between Oranmore and the city.

The soundscape in the vicinity of receptors surrounding the proposed development site was characterized through both attended and unattended noise surveys undertaken over the period 15.09.19–17.09.19. Monitoring was carried out at four on-site locations. Recorded data indicate that local and distant road traffic dominates the soundscape.

Noise impacts associated with onsite sources at the proposed commercial units will be neutral. With respect to traffic, the proposed development will result in a slight increase in local noise levels. Impacts will be permanent and slight adverse at the nearest receptors close to the Rosshill Road – Rosshill Stud Farm Road junction.

The construction phase is expected to last five years. Construction will be undertaken in stages, and is unlikely to extend beyond 18 months in any particular zone. Several mitigation measures are proposed. Noise impacts will be short term and slight adverse at worst. No vibration impacts are expected.

11. LANDSCAPE AND VISUAL

The Landscape & Visual assessment is based on desk study of the study area, field surveys of the site and surrounds and the use of photographs and photomontages from representative viewpoints of the site. The landscape of the area is described in terms of its existing character, which includes a description of the physical and visual character, landscape values and the landscape's sensitivity to

change. The potential impacts in both landscape and visual terms are then assessed, including cumulative impact.

Although the area surrounding the proposed development site can be described as generally flat or gently undulating there is significant height variation from south-east to north-west of the site. The lowest point can be found in the north-western site area at approx. 6.70 metres O.D. (Ordnance Datum) and the highest point is along the south-eastern boundary at approx. 22.40 O.D. While gradients generally are quite steady on site there is a steep slope running approx. north to south just west of the centre of site with a gradient of up to 31.25% or 1 in 3.2.

The landcover in the proposed site is primarily grassland, with vegetation and hedgerow lining the site boundary, with many individual vegetation, such as trees and shrubs existing within the site itself. There is an area within the north west of the site which has remnants of gravel which indicates past use. There are mature trees within the site which appear to be a mixture of both deciduous and coniferous trees. There is woodland which borders the site to the east of the development and on the northern border. The vegetation within and around the site is a key landcover feature

Landcover in the surrounding landscape is predominantly residential and agricultural. This pattern is replicated throughout the outskirts of the city environs. To the north, the site is bound by the Old Dublin Road and the railway line. There is a stud farm in operation to the south. Also, to the south of the site there are low density residential developments. These are in the pattern of ribbon development. A stone walled folly can also be found to the south of the proposed development.

There are no cultural associations on the development site. There is a round tower and the ruins of Roscam Abbey Church approximately 667 metres away from the proposed site boundary, which holds cultural and historical meaning and associations.

As part of the assessment, 3 no. photomontage locations were selected so as to represent a variety of views of the site. These include a number of close up views of the proposed development, as well as some more distant views. The most sensitive receptors in the vicinity of the proposed development are residential receptors, and therefore the photomontages include a number of views close to houses and housing estates which may have views of the proposed development.

A dedicated landscape design has been completed by CSR and is included in Appendix 3-4. An overriding principle of the proposed scheme's landscape design philosophy is to retain the best of the existing trees present on the site to help create a high-quality external setting an environment for the proposed development. As such a BS5837:2012 tree survey was undertaken at the project outset and used to inform the project design during the layout development process. The tree survey identified the exceptionally high value of the beech trees along the site's western boundary and made their retention and protection a project priority. Other areas prioritised for retention include native boundary trees and areas of contiguous woodland scrub with ecological value.

Landscape Effects

As stated above, it is expected that immediately post-construction, the landscape effects in the site and immediate vicinity are likely to be Slight, negative effects. However once mitigation measures, particularly the additional planting, have become established in the medium to long-term landscape effects are expected to be ameliorated. While some of the landscape effects will remain negative, the proposed landscape and offsetting measures will have a neutral to positive effect as the development will be better assimilated into the landscape once the vegetation establishes.

The residual effects on the wider landscape character are considered Slight and neutral. Therefore, based on the assessment above there are no significant effects at the level of the wider landscape character area.

Visual Effects

Once mitigation measures have established in the medium to long-term, and the landscape measures become established, visual effects are expected to improve in quality.

Due to the screening by local topography and vegetation the proposed developments will not have significant visibility within the study area. Overall the visual effects will be Long-Term, Imperceptible to Slight visual effect.

To conclude there is a Low landscape visual impact anticipated from the proposed development of the Strategic Housing Development at Rosshill due to very effective screening of the proposed development by landform and existing vegetation resulting in minimal significant visual changes in the landscape from the development. Much of the visual change is not deemed negative

12. **ARCHAEOLOGICAL & CULTURAL HERITAGE**

There are six protected structures in Roscam townland, one of which, Roscam Folly, is located immediately to the south of the proposed development site. Rosshill Railway Bridge is located to the north c. 32m to the north. The remaining four protected structures are not within or in the immediate vicinity of the proposed development site

The nearest Recorded Monument/protected structure, a nineteenth century folly, RMP No. GA094-070/RPS 8803, borders the site to the south-east. Ruined farm building associated with Rosshill House are located centrally in the development site, where a dovecote/pigeon house is known to exist in one gable.

The proposed development will not have a direct physical impact on any Recorded Monuments or protected structures. It will see the removal of the ruined farm buildings within the site.

In terms of visual impact, the nineteenth century folly, RPS 8803, is located along the southern boundary of the site. The proximity of the folly to the proposed development site has resulted in the low-level development proposals within a buffer zone, mainly comprising a play area and landscaped green space. The buffer zone extends beyond the Zone of Notification from the Record of Monuments and Places (RMP) and it will preserve the character and setting of the protected structure.

13. **MATERIAL ASSETS**

The proposed development site is an existing greenfield site located immediately to the south of the Galway-Dublin Rail Line at Rosshill, Co. Galway. The site is situated approximately 4km from Galway City. The land surrounding the immediate site is mixed low-density residential, consisting primarily of one-off housing. Rosshill Farm Stud is located to the south of the proposed development site, with the Galway-Dublin Rail line bounding the north of the site. The proposed development is bounded to the north by the Rosshill Road and the Galway Dublin Rail Line, and to the East by the Rosshill Farm Stud Road.

It is proposed to access the development via a new entrance on the existing Rosshill Farm Stud/Rosshill Road. This will involve construction of new carriageway from the proposed entrance to the development to the intersection with the Rosshill Road. A footway and cycleway will be provided along this new section of roadway.

Relative to the operation stage, the construction period will be temporary in nature. 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 phase of the development.

The residential elements of the development are expected to be the primary trip generator in the operational phase and form the basis of the development trip generation estimates. Modelling has been carried out on the road network in the area which shows a number of the junctions assessed will be above capacity before the design year. These junctions are predicted to be above capacity in any case without the development, but one will occur earlier with the inclusion of the Development traffic. Whilst the Dublin Road / Doughiska Road traffic signal junction is over capacity in the AM peak period, only 7 trips are added to it from the development and those are all travelling away from the City. As they are going against the traffic entering the City they do not decrease the capacity. The Dublin Road/Rosshill Road priority junction will be above capacity earlier due to the development.

There are a number of services located in the area surrounding the site including electricity, gas, water, sewage and telecommunications networks. An electricity line runs through the site and it is planned to reroute this subject to ESNB recommendations. Best practices will be implemented to ensure that there are no impacts on these services, and to ensure safety of the site workers. Increased public access to the site facilities and amenities benefit both the local community and wider town. Site specific Waste Management Plans will be in operation through the construction and operational phases.

Based on this assessment it is considered that in general, the traffic generated by the proposed development in Rosshill, Co. Galway will be adequately accommodated on the local highway network in the vicinity. The Dublin Road junctions are predicted to be above capacity without the development traffic in the future design years. The analysis shows that the inclusion of the development traffic will result in a slight increase in the degree of saturation for the junctions.

The proposed Galway Bypass will ultimately reduce traffic flow at these junctions. The development is being phased and this will allow some additional time towards implementation of the bypass. Also, with the implementation of the Operational Phase mitigation measures, such as the pedestrian, public transport and cycling measures, a shift in the modal split can be accomplished resulting in a reduction in the impact on the junction capacities.

14.

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, Hydrology and Hydrogeology, 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 13-1 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 during both the construction (C) and operational (O) phases. 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.

Environmental Impact Assessment Report

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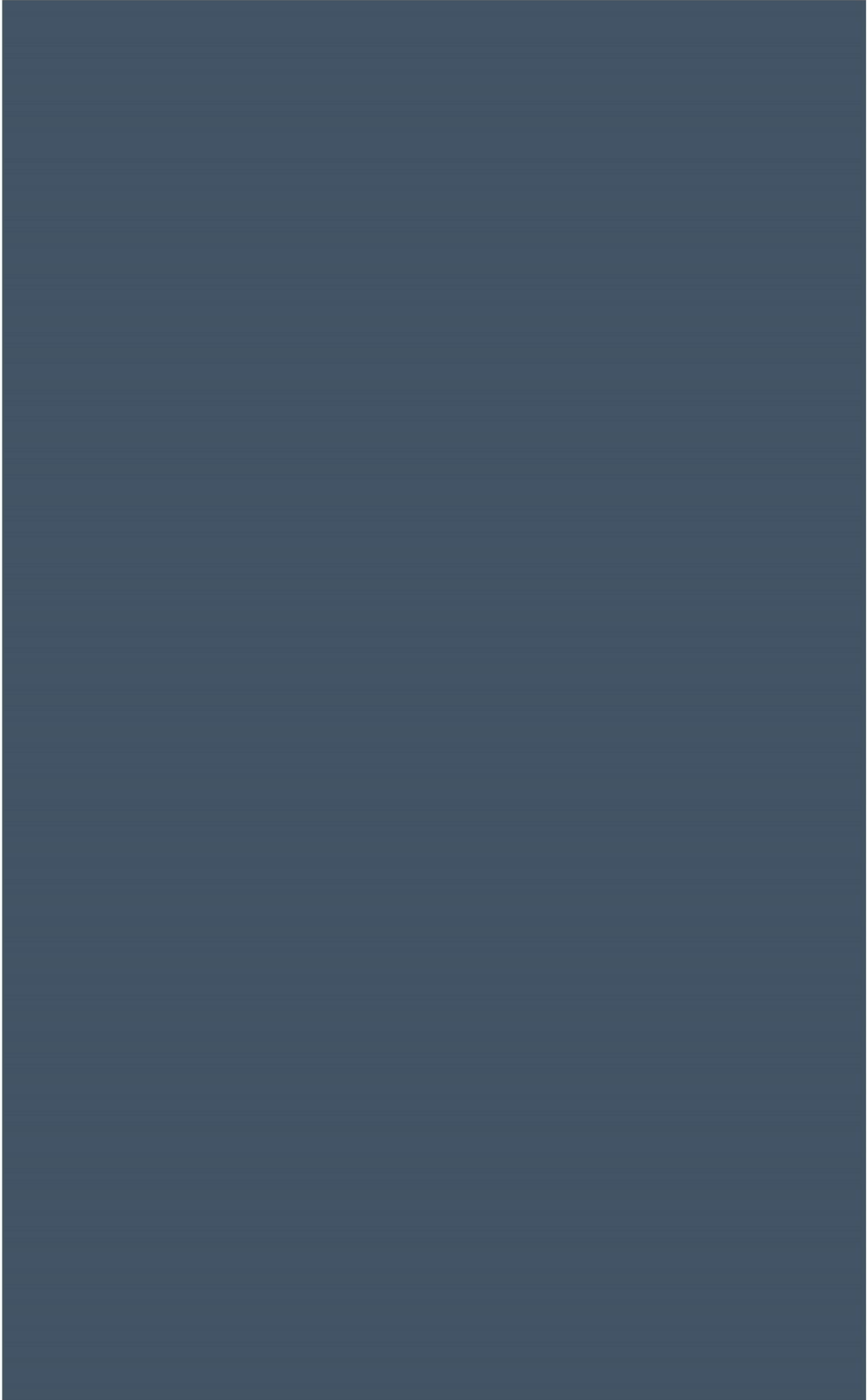
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Environmental Impact Assessment Report

Strategic Housing
Development, Land at
Rosshill, Galway.

Volume 1: Non-Technical
Summary & Environmental
Impact Assessment Report



1. INTRODUCTION

1.1 Introduction

This Environmental Impact Assessment Report ('EIAR') has been prepared by McCarthy Keville O'Sullivan Ltd. (MKO) on behalf of Kegata Limited, which intends to apply to An Bord Pleanála (ABP) under the *Planning and Development Act 2000* (as amended by the *Residential Tenancies Act 2016*) for a strategic housing scheme located in Galway City in the townlands of Roscam, Merlin Park and Murrrough. The application is being made under the Strategic Housing Provisions of the *Planning and Development (Housing) and Residential Tenancies Act, 2016*.

The site area comprises 10.0693ha of land. It is located on the Rosshill Road, which connects to the Old Dublin in the west and the Coast Road in the east. The general area is rural in character *and is surrounded by a number of small residential developments and individual houses*. A number of individual houses and the Rosshill Stud Farm lie to the south, with agricultural lands to the east. The Merlin Park Hospital lies to the north to the south, Galway bay and agricultural lands to the west. The Galway to Dublin trainline runs along the northern border of the site.

1.2 The Applicant

The applicant, Kegata Limited (T/A Alber Homes) is a national house building company set up in 2017. Kegata's senior management team has over 30 years of construction experience and has developed major commercial and residential projects both in Ireland and the UK.

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

1.3 Legislative Context

European Union Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (the 'EIA Directive'), is currently transposed into Irish planning legislation by the Planning and Development Act 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 with the recent European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

Accordingly, this EIAR complies with the EIA Directive as amended by Directive 2014/52/EU, the Planning and Development Act 2000 (as amended) and the Planning and Development Regulations 2018 insofar as they transpose the EIA Directive.

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's, 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.

Article 5 of the EIA Directive as amended by Directive 2014/52/EU provides 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.

McCarthy Keville O’Sullivan Ltd. (MKO) was appointed as environmental consultants 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.

1.4 EIA Screening

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

Section 172 of the Planning & Development Act 2000, as amended, provides the legislative basis for mandatory 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,*

Further to the above, 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 require an EIA to be undertaken where it is proposed to carry out the following - *“Construction of more than 500 dwelling units”*, as per Item 10 (b)(i) of the Schedule and (iv) urban development which would involve an area greater than either 10 ha (built up area) or 20ha (elsewhere),

The proposed residential development does not exceed the 500 unit threshold but does propose urban development of an area greater than 10 hectares and therefore is subject to mandatory EIA.

Section 172 of the Planning & Development Act 2000, as amended, also sets out the basis for EIA for developments which may not be of a scale included in Schedule 5 of the Planning & Development Regulations 2001, as amended. This allows a consenting authority to require EIA where it is of the opinion that a development (although sub-threshold) is likely to have significant effects on the environment and therefore should be subject to EIA. In this context, the consideration of ‘significant effect’ should not be determined by reference to size only and the nature and location of a project must also be taken into account.

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.

1.4.1 EIAR Guidance

The Environmental Protection Agency (EPA) recently published its ‘*Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports*’ (EPA, August 2017), which are intended to guide practitioners preparing an EIAR during the transition to new Regulations transposing the revised EIA Directive. These draft guidelines have been used in the compiling of this EIAR.

In preparing this EIAR regard has also been taken of the provisions of ‘*Advice Notes on Current Practice in the Preparation of Environmental Impact Statements*’ (EPA, 2003) and the ‘*Guidelines for Planning Authorities and An Bord Pleanála on Carrying out Environmental Impact Assessment*’, published by the Department of the Environment, Community and Local Government (DECLG) in March 2013 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 carried out the EIA process and prepared the EIAR with regard to these draft guidelines also.

1.5 Brief Description of the Development

The proposed development will consist of the following:

1. *Construction of 342 no. residential units comprising:*

- *36no. Four Bed Semi-Detached Houses*
- *2 no. Four Bed Detached Houses*
- *68 no. Three Bed Semi-Detached Houses*
- *63 no. Three Bed Terrace*
- *6 no. Two Bed Terrace*
- *5 no. Three Bed Long Semi-Detached Houses*
- *5 no. Four Bed Long Semi-Detached Houses*
- *38 no. One Bed Apartments*
- *119 no. Two Bed Apartments*

1.6 Need for the Development

There is currently a significant shortage of housing units available for sale and occupancy 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 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.

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.

1.7 Purpose and Scope of the EIAR

The purpose of this 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, in accordance with the requirements of the EIA Directive. The compilation of this document served to highlight any areas where mitigation measures may be necessary in order to protect the surrounding environment from the possibility of any negative impacts arising from the proposed development.

It is important to distinguish the Environmental Impact Assessment (EIA) to be carried out by An Bord Pleanála, 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:

- f) population and human health*
- g) biodiversity, with particular attention to species and habitats protected under Directive 92/43/EEC and Directive 2009/147/EC*
- h) land, soil, water, air and climate*
- i) material assets, cultural heritage and the landscape*
- j) the interaction between the factors referred to in points (a) to (d)*

The EIAR submitted by the applicant provides the relevant environmental information to enable the EIA to be carried out by the competent authority. The information to be contained in the EIAR is prescribed by statutory regulation, as described in Section 1.3 above.

1.8 Structure and Content of the EIAR

1.8.1 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, scoping and 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, 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
- > Description of the Proposed Development
- > Human Beings. 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
- > Interaction of the Foregoing

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.

1.8.2

Description of Likely Significant Effects and Impacts

An assessment of the likely impacts of a proposed development is a statutory 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 Environmental Protection Agency (EPA):

Guidelines on the Information to be contained in Environmental Impact Assessment Reports – Draft August 2017 (EPA 2017).

‘Advice Notes on Current Practice in the Preparation of Environmental Impact Statements’ (EPA, 2003).

‘Guidelines on the Information to be contained in Environmental Impact Statements’ (EPA, 2002).

Revised Guidelines on the Information to be contained in Environmental Impact Statements – Draft September 2015 (EPA 2015).

‘Advice Notes for Preparing Environmental Impact Statements – Draft September 2015’ (EPA 2015).

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, 2017)

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

Impact Characteristic	Term	Description
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
	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,

Impact Characteristic	Term	Description
		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, duration 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. The remaining impact types are presented as required or applicable throughout the EIAR.

Project Team

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 Eoin Gilson Meabhann Crowe Owen Cahill Pat Roberts John Hynes Sarah Mullen Joanna Mole Megan Geany 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. Description of the Proposed Development 4. Population & Human Health 5. Biodiversity. Flora & Fauna. 8. Air & Climate 10. Landscape & Visual 13. Interaction of the Foregoing
Hydro Environmental Services 22 Lower Main Street Dungarvan Co. Waterford	Michael Gill David Broderick	Drainage Design, Preparation of EIAR Sections: 6. Land, Soils & Geology 7. Hydrology & Hydrogeology
Tobins Consulting Engineers Fairgreen House, Fairgreen Road, Co. Galway	Brendan Heany, Richard Daly	Preparation of EIAR Section 12. Material Assets - Traffic and Transport
Damian Brosnan Acoustics	Damian Brosnan	Baseline Noise Survey and preparation of Report Section 9: Noise and Vibration
Anne Carey, Archaeological Consultant	Anne Carey	Preparation of Section 11: Cultural Heritage

Project Team Members

MKO

Michael Watson, MA; MIEMA, CEng, PGeo

Michael Watson has over 19 years' experience in the environmental sector. Following the completion of his Master's Degree in Environmental Resource Management, Geog from National University of Ireland, Maynooth he worked for the Geological Survey of Ireland and then a prominent private environmental & hydrogeological consultancy. Michael's professional experience includes managing Environmental Impact Assessments on behalf of clients in the renewable energy, waste management, commercial and industrial sectors nationally. These projects have required liaising with the relevant

local authorities, Environmental Protection Agency (EPA) and statutory consultees as well as coordinating the project teams and sub-contractors. Michael has significant experience in the EPA Industrial Emissions, IPPC and Waste licensing regimes managing licence applications and subsequent regulatory compliance on behalf of clients in the waste and industrial sectors. Michael also has a Bachelor of Arts Degree in Geography and Economics from NUI Maynooth, is a Member of IEMA, a Chartered Environmentalist and Professional Geologist.

Meabhann Crowe BA (Hons), M.Sc.

Meabhann Crowe is a Project Planner with McCarthy O’Sullivan Ltd with over 10 years private sector experience. She is a fully chartered member of the Royal Town Planning Institute (MRTPI). Meabhann holds a BA (Hons) in Geography, Sociological and Political Science and a Masters in Urban and Regional Planning. Prior to taking up her position with McCarthy Keville O’Sullivan in October 2018, Meabhann was employed as an Associate Director with Colliers International in their Edinburgh office, prior to which she was employed for several years with Halliday Fraser Munro. In her time in the industry Meabhann has been active on a number of instructions across a broad spectrum of mixed-use, residential, commercial, renewable energy and retail projects.

Meabhann brings particular expertise in initial development feasibility appraisals and development strategies. Her experience in managing large multi-disciplinary teams in the preparation of local and major planning applications across residential and mixed-use and retail developments means she has a wealth of knowledge to draw on in the early stages of development. She has particular experience in preparing and managing site strategies which include both responding to emerging planning policy whilst also preparing and progressing planning applications and appeals.

Owen Cahill B.Sc., M.Sc.

Owen is an Environmental Engineer with McCarthy O’Sullivan Ltd. with over 10 years of experience in the environmental management and construction industries. Owen holds BSc. (Hons) and MSc. in Construction Management and a master’s in environmental engineering. Prior to taking up his position with MKO in October 2013, Owen worked as an Environmental Officer with Kepak and prior to which he held a post with Pentland Macdonald Contaminated Land & Water Specialist in Northern Ireland. Prior to working in planning and environmental consultancy, Owen was employed within the construction industry where he gained significant experience on a variety of civil, residential and commercial projects. Owen’s wide ranging multi sector experience has provided him with specialist knowledge and understanding of the challenges in the planning and delivery of developments with the minimum environmental impact and with practicality and constructability in mind. Owen’s key strengths and areas of expertise are in project management, environmental impact assessment, wind energy & solar energy construction & environmental management planning and waste permit management. Since joining MKO Owen has been involved as a Project Manager on a range of energy infrastructure, commercial, residential, waste facility and quarry projects as well as managing the licensing requirements of a number of EPA licensed facilities. Within MKO Owen 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. Owen has project managed the Environmental Impact Assessment of a range of development projects across the Ireland and holds Affiliate Membership with the Institute of Environmental Management & Assessment and is currently awaiting interview and assessment to become a Full Member and Chartered Environmentalist.

Pat Roberts B.Sc. (Env.)

Pat Roberts is a Senior Ecologist and director of the Ecology team with McCarthy O’Sullivan Ltd. with over 12 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. Pat's 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 currently manages the ecological team within MKO and ensures that the outputs from that team are of a very high standard and meet the requirements of the clients and relevant legislation and guidelines. He is a full member of the Chartered Institute of Ecologists and Environmental Managers (CIEEM),

John Hynes M.Sc. (Ecology), B.Sc.

John Hynes is a Senior Ecologist with McCarthy O'Sullivan Ltd. with over 5 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 MKO 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.

Eoin Gilson B.Sc., M.Sc.

Eoin is a Graduate Environmental Scientist with MKO who took up his position in October 2018. Eoin holds a BSc (Hons) in Microbiology and a MSc (Hons) in Applied Environmental Science. Eoin has specialist knowledge in environmental field surveys, data analysis and renewable energy systems. Eoin's key strengths and areas of expertise are in data management, report writing and environmental monitoring and management. On joining MKO Eoin has been involved on a range of renewable energy infrastructure projects, working as part of a large multi-disciplinary team to produce EIA Reports.

Joanna Mole BSc PGDipLA MSc CMLI

Joanna Mole is a Landscape and Visual Impact Assessment Specialist and Chartered Landscape Architect with McCarthy O'Sullivan Ltd. with over 15 years of experience in both private practice and local authorities. Joanna holds a BSc (Hons) in Landscape Design & Plant Science from Sheffield University, a Postgraduate Diploma in Landscape Architecture from Leeds Beckett University, and a MSc in Renewable Energy Systems Technology from Loughborough University. Prior to taking up her position with MKO in October 2017, Joanna worked as a Landscape Architect with Kav-Banof in Israel and held previous posts with CSR in Cork, LMK in Limerick, Geo Architects in Israel and Groundwork Bridgend in South Wales. Joanna is a Chartered Landscape Architect with specialist knowledge in Landscape and Visual Impact assessments for projects ranging from individual houses to large windfarms, cycle route design and landscape contract management. Since joining MKO Joanna has been involved in projects such as energy infrastructure, extraction industry and residential projects. Joanna holds chartered membership of the British Landscape Institute since 1998 and has been an examiner for British Landscape Institute professional practice exam.

Joseph O'Brien

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.

1.9.1.2 **Hydro Environmental Services Ltd**

Michael Gill

Michael Gill is an Environmental Engineer with over ten years' environmental consultancy experience in Ireland. Michael has completed numerous hydrological and hydrogeological impact assessments of wind farms in Ireland. He has also managed EIA/EIS assessments for infrastructure projects and private residential and commercial developments. In addition, he has substantial experience in wastewater engineering and site suitability assessments, contaminated land investigation and assessment, wetland hydrology/hydrogeology, water resource assessments, surface water drainage design and SUDs design, and surface water/groundwater interactions.

David Broderick

David Broderick is a hydrogeologist with over seven years' experience in both the public and private sectors. Having spent two years working in the Geological Survey of Ireland working mainly on groundwater and source protection studies. David moved into the private sector. David has a strong background in groundwater resource assessment and hydrogeological/hydrological investigations in relation to developments such as quarries and wind farms. David has completed numerous geology and water sections for input into EIAs for a range of commercial developments.

1.9.1.3 **Damian Brosnan Acoustics**

Damian Brosnan

Damian Brosnan has been working in acoustics since 1996. He holds a Postgraduate Diploma in Acoustics & Noise Control from the Institute of Acoustics, and an MSc in Applied Acoustics from the University of Derby. Damian is a member of the Institute of Acoustics (MIOA), and is secretary of their Irish branch. He is also a member of Engineers Ireland, and a member of ACASITI, a recently formed association of Irish professional acoustic consultants. Damian has worked on several hundred noise projects to date, including a number of large scale residential and commercial developments.

1.9.1.4 **Tobin Consulting Engineers – Traffic**

Richard Daly

Richard joined TOBIN Consulting Engineers in Feb 2016 having returned back to Ireland from London where he had been employed as a Civil Engineer between 2011 and 2016 with Barhale PLC. Richard has worked on a wide variety of projects throughout the UK and Ireland from large scale utility works to Sports Campus developments and Strategic Housing Developments. He has worked on projects at numerous stages from initial concept stage right through to Contract completion. Tasks undertaken by Richard include: preparation and submission of planning applications, preparation of tender documents, coordination of site works, design and development of civil design for developments including services, roads etc..

1.9.1.5 **Anne Carey Consultant Archaeologist**

Anne Carey is an archaeologist with over 24 years' experience in Archaeological consultancy in Ireland. She holds a Master of Arts, in Archaeology from NUIG, an M.U.B.C in Urban and Building Conservation from UCD and a Certificate in World Heritage from UCD. Anne has worked on a wide

range of development-led projects working, providing archaeological services which include excavation, pre-development testing, monitoring, EIAR, Field and Desk studies and Impact Assessments.

1.10

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.

2. BACKGROUND TO THE PROPOSED DEVELOPMENT

2.1 Site of the Proposed Development

2.1.1 Site Location

The site area is comprised of 10.069a of land located at Rosshill, to the east of Galway City. The application site is located approximately 400m south of the Old Dublin Road which connects Galway City to the N67 and beyond. The site is 5km from Eyre Square, the perceived centre of Galway City and 4.1km from Main Street, Oranmore. The development site is accessed from the Rosshill Road just south of the existing railway bridge. Rosshill Road itself is accessed from the Old Dublin Road (R338) to the north.

In terms of neighbouring housing in the immediate area surrounding the site several one-off residential dwellings are scattered, this is predominately to the East and to the South of the site. The dwellings vary in type, form, design and size with the majority being single dwellings located on large plots.

The proposed development site is greenfield in nature however was previously in use as a par 3 golf course, which ceased operation in the early 2000's. There are now a number of tree lines and hedgerows present within the site. A mixture of hedgerows and stone walls enclose the site creating a hard boundary. There are no watercourses on site. There are no ecological or environmental designations on site.



Plate 2-1 Site Location – Aerial (Source – Bing Maps).

2.1.2 Physical Characteristics of Site and Surrounding Lands

The site comprises agricultural land in rough grazing. It previously formed a par-3 golf course however the old greens and fairways are now fallow and overgrown.

Hedgerows are present on site along with several mature and semi-mature trees and tree groupings.

There are no watercourses on site.

The site is undulating, falling to the west.

The site boundaries (Refer to Plates 2-2 to 2-4 below) comprise in the main agricultural hedgerows and stone walls. To the north, the site is bound by the Old Dublin Road and the railway line. To the south lies private residences and associated operations including a stud farm. The boundary in this location comprises a mix of hedgerows, trees and wire fencing with some remnants of stone walls in place. The western boundary is formed by a robust tree. To the east, Rosshill Road runs in a north-south fashion. The eastern site boundary has extensive broadleaf trees as does some of the south boundary and part of the eastern boundary. A triangular copse of trees are located to the northeast but are of a lower quality.



Plate 2-2 Northern Boundary

The topology is generally flat except for where the site falls in level forming a ridge generally running north to south, located to the west of the ruined farmstead.



Plate 2-3 Eastern Boundary



Plate 2-4 Southern Boundary

The south of the site is bounded mainly by undeveloped zoned low density residential land. These lands are backed onto by ribbon development of one off houses. To the southeast of the site is a stone walled folly. Adjacent is a large dwelling which had been converted to a number of apartments.

A single point of access currently exists into the site from Rosshill Road to the east.

There are no archaeological records or protected structures located on the site however the folly mentioned above is a Recorded Monument and protected structure (RMP No. GA094-070/RPS 8803). The Rosshill Railway Bridge (RPS 8806, NIAH 30409423) is located to the north of the site. Further detail can be found in the accompanying Archaeological Assessment (Anne Carey, March 2019).

2.1.3 Site Access

The development site is accessed from the Rosshill Road (located to the East of the development site) just south of the existing railway bridge. The Rosshill Road itself is accessed from the Old Dublin Road (R338) to the north. A single point of access currently exists into the site from Rosshill Road to the east.

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

A review of the Galway City Council online planning application mapping system indicates the following planning applications have been made in respect of the subject site.

The site of the proposed development was previously in use as an 18 hole par 3 golf course which has since ceased all operations on the site in the early 2000's. The club house was located to the south east of the development site with the old greens and fairways now overgrown and unidentifiable. A number of applications of a residential nature have also been submitted for the site; these are discussed in greater detail in table 2-1 below;

Table 2-1 Planning Applications within the Application Boundary

Application Reference	Description	Decision
05/352	Permission for the construction of a 137 unit residential development consisting of 16 no. 4-bed detached houses, 15 no. 5-bed detached houses, 26 no. 2-bed townhouses, 73 no. 3-bed townhouses, 7 no. 4-bed townhouses, a creche (215 sq. m.) a shop (215 sq. m.), a new access to Old Dublin Road and all associated external and site development works.	Refusal
06/816	Permission for the construction of (i) a 99 unit residential development (18,871 sqm) consisting of 43 no. 5-bed detached houses, 16 no. 4-bed detached houses, 25 no. 2-bed apartments, 2 no. 3-bed apartments, 12 no. 2-bed duplexes, 1 no. 3-bed end terrace house, (ii) a creche (350 sqm), (iii) a new access to the Rosshill Road, (iv) an upgraded junction onto the Old Dublin Road, (v) ESB Substation, (vi) Pumping house, (vii) Car parking (225 no. spaces at surface level and 60 no. spaces underground) and (viii) all associated external and site development works.	Grant

2.2.2 Planning Applications within the Vicinity of the Application Site

Those applications from the Register and within approximately a 200m radius of the site are included below. The majority of these applications constitute planning applications for the erection of single private dwellings, or alterations to same.

Table 2-2 Planning Applications within the Vicinity of the Application Boundary

Application Reference	Description	Decision
94/70	Permission for alterations to previously approved house plan.	Grant
94/494	Permission to extend bathroom and erection of domestic garage.	Grant
96/201	Permission for extension to dwellinghouse (kitchen, utility and 2 bedrooms).	Grant
96/851	Permission for a front extension comprising a bay window and retention of garage-shed at rear.	Grant
97/66	Permission to erect dwellinghouse and septic tank.	Grant
97/276	Permission for serviced dwellinghouse	Grant
97/326	Permission for dwellinghouse and septic tank.	Grant
98/224	Outline Permission to erect dwellinghouse with septic tank on lands.	Grant
98/469	Permission for Garden Sheds.	Refused
98/471	Permission for granny flat extension.	Grant
98/812	Permission for construction of a dwellinghouse and septic tank	Grant
98/834	Approval for construction of dwellinghouse and associated garage and septic tank (Outline Ref. 224/98).	Grant
99/120	Outline permission to construct dwellinghouse and a septic tank.	Grant
99/766	Outline permission for revised layout to previously approved 4 no. sites and access road (Ref. No. 744/98) for erection of entrance gate to existing yard.	Grant
00/361	Permission for extension to house.	Grant
00/606	Permission for new dwellinghouse and septic tank.	Grant
00/768	Permission to construct a dwellinghouse with garage, septic tank, percolation area and associated site works.	Grant
00/816	Permission for change of houseplan (276/97).	Grant
00/872	Permission for dormer dwelling and septic tank with percolation area	Grant

Application Reference	Description	Decision
01/120	Permission for approval for 6m wide entrance roadway for 4 number sites	Grant
01/318	Permission to construct a dwelling house, septic tank and percolation area.	Grant
02/801	Outline permission for the construction of a dwellinghouse and septic tank.	Grant
02/1033	Permission for planning approval for a dwellinghouse and domestic garage with a septic tank and percolation area. (Outline planning permission reference no. 120/99 applies)	Grant
03/624	Permission for a multipurpose amenity development to include for 8 five a side synthetic soccer pitches, 8 tennis courts, putting greens/bowls associated lighting and dressing rooms / club house.	Grant
03/982	Permission to construct a private garage at the rear of house.	Refused
04/546	for the proposed demolition of the existing rear structure, provision of new two storey extension to rear of dwelling, provision of covered vehicular structure, revisions to layout of ground floor and first floor layouts and all ancillary works in relation to the development.	Grant
04/868	Permission for 1) the change of use from the basement garage to a proposed playroom area of the existing dwelling house 2) the erection of a proposed garage, exercise room and first floor gymnasium 3) alterations to the rear elevations at the above address.	Grant
06/293	Permission for the restoration and change of use of existing out houses and stables to use as a single residential unit, the construction of a single storey extension to same, and the provision of an effluent treatment plant and all associated site works and services.	Grant
06/293	Retention permission to (1) Retain kitchen dining area to east side of dwelling house (2) Retain garage conversion to play area/bedroom (3) Build new conservatory to west site of dwellinghouse. (4) Extend existing cloaks/lobby area to provide new dining room (5) Replace kitchen window and build in new patio doors in kitchen dining area on south elevation	Grant

Application Reference	Description	Decision
07/27	Permission for retention and completion of all works in conjunction with existing dwelling house and all ancillary works in relation to the development (As per previous Planning approval file Ref. No. 04/546).	Grant
08/144	Permission for the demolition of an existing detached single-storey dwelling house and garden shed, and the construction of a detached two-storey dwelling house, septic tank and Bord na Mona Puraflo treatment system, with new relocated site entrance from the public road and associated site works.	Grant
10/116	Permission for the construction of a farm shed and internal farm roadway.	Grant
11/6	Permission to construct a domestic garage, also to extend and renovate existing dwelling.	Grant
14/74	Permission to (1) demolish existing shed and rear porch of existing dwellinghouse (2) to construct new extension to side and rear of dwellinghouse (3) to make alterations to existing dwelling house and (4) install new treatment system and percolation with all associated services	Grant
16/187	Permission to construct a garage with all associated services	Grant

2.3

Cumulative Projects

The following table lists the projects within the vicinity of a similar nature and of a similar scale:

Table 2-3 Planning Applications of a Similar Nature in the Vicinity of the Site

Application Reference	Description	Decision
16/228	Permission for a new residential development. The development consists of 16 no. 2-storey, five-bedroom, detached houses, together with individual garages, as applicable, new vehicular site accesses and roads with all ancillary site works, landscaping and service connections	Grant
17/283	Permission to construct 23 two storey Dwellinghouses consisting of Detached, Semi-detached and terrace including access/egress off the old coast road to Oranmore with sewer connection to adjacent sewer pumping station adjacent the Dublin Road and all associated services.	Grant

Application Reference	Description	Decision
18/187	Permission for a change of house type to previously granted planning permission (reference 16/228). These amendments consist of a change of house type C (on site 6 only) which is a 5-bedroom two storey detached house	Grant
19/95	Permission for development which consists of the constructing 51 No. one, two and three bedroom apartments and two one bedroom Town Houses in 6 no. Blocks ranging in height from one storey up to four storey, with sewer connection to adjacent pumping station adjacent Dublin road, together with access/egress off the old coast road to Oranmore and all associated services at Doughiska and Merlin Park Townlands. (Previous Planning Ref No. 17/283)	Grant

2.4 Planning Policy

This section of the report sets out the relevant national, regional and local planning policies of relevance to the planning application. Relevant material considerations are also set out, as appropriate.

2.4.1 National Planning Policy Context

2.4.2 National Planning Framework

The National Planning Framework (2018) ('NPF'), for housing delivery including that the location of new housing should be prioritised in existing settlements and new homes should be provided in sustainable locations.

The National Planning Framework includes ten National Strategic Outcomes implemented through the Strategic Investment Priorities, and includes:

- > *Compact growth*
- > *Enhanced regional accessibility*
- > *Strengthened rural economics and communities*
- > *Sustainable mobility*
- > *A strong economy supported by enterprise, innovation and skills*
- > *Sustainable management of water and other environmental resources*

In terms of Ireland's future population, circa one million additional people are expected to be living in Ireland by 2040, and National Objective 1b seeks to ensure this growth is felt across all the regions. Under table 4.1 of the NPF Targeted Pattern of City Population Growth a population growth range of 50-60% is noted leading to a minimal target population of 120,000 people for Galway City and Suburbs by 2040. This leads to an estimated growth of between 40,000 to 48,000 additional people when measured against the 2016 levels. The following pertinent objectives are noted:

National Policy Objective 1b
Northern and Western Region: 160,000 - 180,000 additional people i.e. a population of just over 1 million

National Policy Objective 3a

Deliver at least 40% of all new homes nationally, within the built-up footprint of existing settlements.

National Policy Objective 32

To target the delivery of 550,000 additional households to 2040.

Central to meeting Objective 32 is guiding the delivery of future housing. In that vein the NPF sets out a range of national core principles, including:

National core principles are set out to guide the delivery of future housing, at every level of governance:

- *Ensure a high standard quality of life to future residents as well as environmentally and socially sustainable housing and placemaking through integrated planning and consistently excellent design.*
- *Allow for choice in housing location, type, tenure and accommodation in responding to need.*
- *Prioritise the location of new housing provision in existing settlements as a means to maximising a better quality of life for people through accessing services, ensuring a more efficient use of land and allowing for greater integration with existing infrastructure.*

Tailor the scale and nature of future housing provision to the size and type of settlement where it is planned to be located.

National Policy Objective 33

The provision of new homes at locations that can support sustainable development and at an appropriate scale of provision relative to location.

National Policy Objective 34

Support the provision of lifetime adaptable homes that can accommodate the changing needs of a household over time.

The NPF calls for higher densities to avoid urban sprawl: “*Historically, low-density housing development has been a feature of Ireland’s housing landscape in cities, towns, villages and the countryside. To avoid urban sprawl and the pressure that it puts on both the environment and infrastructure demands, increased residential densities are required in our urban areas.*” The relevant National Policy Objective in relation to density states:

National Policy Objective 35

Increase residential density in settlements, through a range of measures including reductions in vacancy, re-use of existing buildings, infill development schemes, area or site-based regeneration and increased building heights.

In creating successful communities, National Policy Objective 4 states:

National Policy Objective 4

Ensure the creation of attractive, liveable, well designed, high quality urban places that are home to diverse and integrated communities that enjoy a high quality of life and well-being

The NPF gives significant weight to quality of life and in that vein states “*place is intrinsic to achieving good quality of life - the quality of our immediate environment, our ability to access services and amenities, such as education and healthcare, shops and parks, the leisure and social interactions available to us and the prospect of securing employment, all combine to make a real difference to people’s lives.*”

National Policy Objective 27

Ensure the integration of safe and convenient alternatives to the car into the design of our communities, by prioritising walking and cycling accessibility to both existing and proposed developments and integrating physical activity facilities for all ages

2.5 Section 28 Ministerial Guidelines

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

2.5.1 Planning Policy Statement 2015

The Government prepared the non-statutory Planning Policy Statement (‘PPS’) to set out the key principles of what it expects of planning authorities, public bodies and those engaged with the planning process and high-level priorities for the continued enhancement of the planning system.

Key principles of the PPS include:

- › *Planning must proactively drive and support sustainable development*
- › *Planning is about creating communities and further development existing communities in a sustainable manner*
- › *Planning will enhance a sense of place*
- › *Planning will support the protection and enhancement of environmental quality*

To ensure these and other Key Principles are met, Key Priorities are set out, including:

- › *Quality in Planning Outcomes*
 - *“The success of our planning process will be judged by the quality of places that result variously from, the development of new places, the regeneration of existing places and the protection or enhancement of places that are particularly sensitive because of the natural and/or cultural heritage or environment they contain.”*
 - *“Government wants to see planning authorities encourage high standards of development in their areas informed by an understanding of the qualities of their places and the underlying economics of development...”*
 - *“Quality of place is not just determined by buildings, but how the streets and spaces between buildings work...”*

The development proposed creates a new community at Rosshill which incorporates local service/facility provision. Distinct character areas create a sense of place, assisted by a detailed landscape approach which works with the existing landscape features of the site. Consideration has been given to how each area functions for residents, pedestrian and vehicular users and how strong connectivity and access across and through the site and its surrounds can be achieved. Enhancement of the landscape is provided for which in turn has benefits for the local biodiversity on site.

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

The role of the Guidelines is to ensure the sustainable delivery of new development throughout the country.

The Guidelines seek to inform the core principles of urban design when designing places of high quality and distinct identity. The Guidelines recommend that planning authorities promote high quality design in their policy documents and in their development management process. In this regard, the Guidelines are accompanied by a Design Manual which demonstrates how design principles can be applied in the design and layout of new residential developments, at a variety of scales of development and in various settings. The Manual sets out 12no. design criteria which should be used to guide good design as detailed below in Table 2.4.

Table 2-4 Best Practice Design Manual Criteria

Design Criteria	Wording
1	Context: How does the development respond to its surroundings?
2	Connections: How well is the new neighbourhood/site connected?
3	Inclusivity: How easily can people use and access the development?
4	Variety: How does the development promote a good mix of activities?
5	Efficiency: How does the development make appropriate use of resources, including land?
6	Distinctiveness: How do the proposals create a sense of place?
7	Layout: How does the proposal create people-friendly streets and spaces?
8	Public realm: How safe, secure and enjoyable are the public areas?
9	Adaptability: How will the buildings cope with change?
10	Privacy/amenity: How do the buildings provide a high quality amenity?
11	Parking: How will the parking be secure and attractive?
12	Detailed design: How well thought through is the building and landscape design?

These Guidelines support a plan-led approach to development as provided for in the Planning and Development Act 2000. Section 2.1 of the Guidelines note that *‘the scale, location and nature of major new residential development will be determined by the development plan, including both the settlement strategy and the housing strategy’*.

2.5.3 Childcare Facilities Guidelines for Planning Authorities (2001)

The Childcare Facilities - Guidelines for Planning Authorities, published in June 2001 define childcare as:

“childcare” is taken to mean “full day-care and sessional facilities and services for pre-school children and school-going children out of school hours. It includes services involving care, education and socialisation opportunities for children, services such as pre-schools, naíonraí (Irish language playgroups), day-care services, crèches, playgroups, and after-school groups are encompassed by these Guidelines”.

The Childcare Facilities Guidelines for Planning Authorities state that for new residential schemes, one childcare facility will be required unless there are significant reasons to the contrary. A benchmark provision of one childcare facility per 75 dwellings is recommended (and a pro rata increase for developments in excess of 75 houses). Regard shall be given to the existing geographical distribution of childcare facilities and the emerging demographic profile of areas.

In relation to location, the Guidelines state *“The threshold for provision should be established having regard to the existing geographical distribution of childcare facilities and the emerging demographic profile of areas.”*

The Guidelines stipulate criteria for suitable sites for full day care facilities in new/existing residential areas:

- *Detached houses/sites with space for off-street parking and/or suitable drop-off and collection points and also space for outdoor play*
- *Neighbourhood centres provided that the premises can accommodate open space*
- *Premises/sites on primary traffic routes close to public transport nodes and which can provide safe pull in/parking areas for customers and staff*

“Applications for full day-care facilities in premises other than those listed above (e.g terraced houses or houses located on a cul-de-sac) should be treated on their merits having regard to the principles outlined above in relation to parking/drop-off points, layout and design of the housing area and the effect on the amenities of adjoining properties.”

2.5.4

Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities 2018

The Guidelines provide for updated guidance on apartment developments in response to the ‘*National Planning Framework*’ and ‘*Rebuilding Ireland*’. These guidelines supersede the 2015 ‘*Sustainable Urban Housing: Design Standards for New Apartments; Guidelines for Planning Authorities*’.

As part of the Ministers forward it was noted that:

“Apartments are a key and growing part of the way in which we live in various parts of our country and particularly in our cities and towns. A move towards a much greater level of apartment living is essential in ensuring our major urban areas develop sustainably rather than sprawling inexorably outwards as has been highlighted in the Government’s National Planning Framework.”

The guidelines (which have taken account the provisions of the NPF) acknowledge that in the short term to 2020, the Housing Agency has identified a need for at least 45,000 new homes in Ireland’s five cities; Dublin, Cork, Limerick, Galway and Waterford. Further to this in the longer term to 2040, the National Planning Framework (NPF) projects a need for a minimum of 550,000 new homes, at least half of which are targeted for provision in Ireland’s five cities. The guidelines further go on to recognize that the NPF also signals a shift in Government policy towards securing more compact and sustainable urban development. In relation to the above the guidelines detail that:

“It is therefore critical to ensure that apartment living is an increasingly attractive and desirable housing option for a range of household types and tenures, building on and learning from experience to date, and that the economic and regulatory conditions are such that apartment

development attracts both the investment and the seeking out of this crucial form of housing by households, that will then result in greater delivery of apartments in Ireland’s cities and towns and other appropriate locations.”

The focus of this guidance is on the apartment building itself and on the individual units within it. The 2018 Guidelines specify planning policy requirements for:

- Internal space standards for different types of apartments, including studio apartments;
- Dual aspect ratios;
- Floor to ceiling height;
- Apartments to stair/lift core ratios;
- Storage spaces;
- Amenity spaces including balconies/patios; and
- Room dimensions for certain rooms

Further to the above the Guidelines also list a number of Specific Planning Policy Requirements (‘SPPR’) which are detailed in Table 2-5 below:

Table 2-5 SPPR Detail

SPPR	Wording
1	Apartment developments may include up to 50% one-bedroom or studio type units (with no more than 20-25% of the total proposed development as studios) and there shall be no minimum requirement for apartments with three or more bedrooms. Statutory development plans may specify a mix for apartment and other housing developments, but only further to an evidence-based Housing Need and Demand Assessment (HNDA), that has been agreed on an area, county, city or metropolitan area basis and incorporated into the relevant development plan(s).
2	For all building refurbishment schemes on sites of any size, or urban infill schemes on sites of up to 0.25ha: <ul style="list-style-type: none"> ▪ Where up to 9 residential units are proposed, notwithstanding SPPR 1, there shall be no restriction on dwelling mix, provided no more than 50% of the development (i.e. up to 4 units) comprises studio-type units; ▪ Where between 10 to 49 residential units are proposed, the flexible dwelling mix provision for the first 9 units may be carried forward and the parameters set out in SPPR 1, shall apply from the 10th residential unit to the 49th; ▪ For schemes of 50 or more units, SPPR 1 shall apply to the entire development.
3	Minimum Apartment Floor Areas: <ul style="list-style-type: none"> ▪ Studio apartment (1 person) 37 sq.m ▪ 1-bedroom apartment (2 persons) 45 sq.m ▪ 2-bedroom apartment (4 persons) 73 sq.m ▪ 3-bedroom apartment (5 persons) 90 sq.m
4	In relation to the minimum number of dual aspect apartments that may be provided in any single apartment scheme, the following shall apply: <p>(i) <i>A minimum of 33% of dual aspect units will be required in more central and accessible urban locations, where it is necessary to achieve a quality design in response to the subject site characteristics and ensure good street frontage where appropriate.</i></p>

SPPR	Wording
	<p>(ii) <i>In suburban or intermediate locations it is an objective that there shall generally be a minimum of 50% dual aspect apartments in a single scheme.</i></p> <p>(iii) <i>For building refurbishment schemes on sites of any size or urban infill schemes on sites of up to 0.25ha , planning authorities may exercise further discretion to consider dual aspect unit provision at a level lower than the 33% minimum outlined above on a case-by-case basis, but subject to the achievement of overall high design quality in other aspects.</i></p>
5	<p>Ground level apartment floor to ceiling heights shall be a minimum of 2.7m and shall be increased in certain circumstances, particularly where necessary to facilitate a future change of use to a commercial use. For building refurbishment schemes on sites of any size or urban infill schemes on sites of up to 0.25ha , planning authorities may exercise discretion on a case-by-case basis, subject to overall design quality.</p>
6	<p>A maximum of 12 apartments per floor per core may be provided in apartment schemes. This maximum provision may be increased for building refurbishment schemes on sites of any size or urban infill schemes on sites of up to 0.25ha , subject to overall design quality and compliance with building regulations.</p>
7	<p>BTR development must be:</p> <p>(a) Described in the public notices associated with a planning application specifically as a ‘Build-To-Rent’ housing development that unambiguously categorises the project (or part of thereof) as a long-term rental housing scheme, to be accompanied by a proposed covenant or legal agreement further to which appropriate planning conditions may be attached to any grant of permission to ensure that the development remains as such. Such conditions include a requirement that the development remains owned and operated by an institutional entity and that this status will continue to apply for a minimum period of not less than 15 years and that similarly no individual residential units are sold or rented separately for that period;</p> <p>(b) Accompanied by detailed proposals for supporting communal and recreational amenities to be provided as part of the BTR development. These facilities to be categorised as:</p> <ol style="list-style-type: none"> i. Resident Support Facilities - comprising of facilities related to the operation of the development for residents such as laundry facilities, concierge and management facilities, maintenance/repair services, waste management facilities, etc. ii. Resident Services and Amenities – comprising of facilities for communal recreational and other activities by residents including sports facilities, shared TV/lounge areas, work/study spaces, function rooms for use as private dining and kitchen facilities, etc.
8	<p>For proposals that qualify as specific BTR development in accordance with SPPR 7:</p> <p>(i) <i>No restrictions on dwelling mix and all other requirements of these Guidelines shall apply, unless specified otherwise;</i></p> <p>(ii) <i>Flexibility shall apply in relation to the provision of a proportion of the storage and private amenity space associated with</i></p>

SPPR	Wording
	<p><i>individual units as set out in Appendix 1 and in relation to the provision of all of the communal amenity space as set out in Appendix 1, on the basis of the provision of alternative, compensatory communal support facilities and amenities within the development. This shall be at the discretion of the planning authority. In all cases the obligation will be on the project proposer to demonstrate the overall quality of the facilities provided and that residents will enjoy an enhanced overall standard of amenity;</i></p> <p><i>(iii) There shall be a default of minimal or significantly reduced car parking provision on the basis of BTR development being more suitable for central locations and/or proximity to public transport services. The requirement for a BTR scheme to have a strong central management regime is intended to contribute to the capacity to establish and operate shared mobility measures;</i></p> <p><i>(iv) The requirement that the majority of all apartments in a proposed scheme exceed the minimum floor area standards by a minimum of 10% shall not apply to BTR schemes;</i></p> <p><i>(v) The requirement for a maximum of 12 apartments per floor per core shall not apply to BTR schemes, subject to overall design quality and compliance with building regulations.</i></p>
9	<p>Shared Accommodation may be provided and shall be subject to the requirements of SPPRs 7 (as per BTR). In addition,</p> <p><i>(i) No restrictions on dwelling mix shall apply;</i></p> <p><i>(ii) The overall unit, floor area and bedroom floorspace requirements of Appendix 1 of these Guidelines shall not apply and are replaced by Tables 5a and 5b;</i></p> <p><i>(iii) Flexibility shall be applied in relation to the provision of all storage and amenity space as set out in Appendix 1, on the basis of the provision of alternative, compensatory communal support facilities and amenities. The obligation will be on the project proposer to demonstrate the overall quality of the facilities provided and that residents will enjoy an enhanced overall standard of amenity;</i></p> <p><i>(iv) A default policy of minimal car parking provision shall apply on the basis of shared accommodation development being more suitable for central locations and/or proximity to public transport services. The requirement for shared accommodation to have a strong central management regime is intended to contribute to the capacity to establish and operate shared mobility measures;</i></p>

2.5.5 Urban Development and Building Heights Guidelines for Planning Authorities December 2018

These Guidelines, published by the Minister under Section 28 of the Planning and Development Act 2000 (as amended), 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.

In regard to building heights in suburban/edge locations the Guidelines note that newer housing developments outside city and town centres and inner suburbs, (i.e. the suburban edges of towns and cities), typically now include town-houses (2-3 storeys), duplexes (3-4 storeys) and apartments (4 storeys)

upwards). It is judged that developments of this form have the ability to deliver medium densities within the range of 35-50 dwellings per hectare net. The Guidelines also conclude that that developments of this style aid in addressing the need for further development of 1 and 2 bedroom units while at the same time providing for 3 and 4 bedroom units. This allows for a wider variety and wider housing demographic giving a variety of building typology and tenure options allowing households to ‘meet changing accommodation requirements over longer periods of time without necessitating relocation’.

The Guidelines detail that developments should include an effective mix of 2,3 and 4 storey developments which integrate well into the existing historical neighbourhoods. It notes that 4 storeys or more can be accommodated alongside existing larger buildings, trees, parkland, river/sea frontage or along wider streets. Specific Planning Policy Requirements (‘SPPR’) 2 Details the following:

“In driving general increases in building heights, planning authorities shall also ensure appropriate mixtures of uses, such as housing and commercial or employment development, are provided for in statutory plan policy. Mechanisms such as block delivery sequencing in statutory plans² could be utilised to link the provision of new office and residential accommodation, thereby enabling urban redevelopment to proceed in a way that comprehensively meets contemporary economic and social needs, such as for housing, offices, social and community infrastructure, including leisure facilities.”

Specific Planning Policy Requirement 4 details the following:

“It is a specific planning policy requirement that in planning the future development of greenfield or edge of city/town locations for housing purposes, planning authorities must secure:

- 1. the minimum densities for such locations set out in the Guidelines issued by the Minister under Section 28 of the Planning and Development Act 2000 (as amended), titled “Sustainable Residential Development in Urban Areas (2007)” or any amending or replacement Guidelines;*
- 2. a greater mix of building heights and typologies in planning for the future development of suburban locations; and*
- 3. avoid mono-type building typologies (e.g. two storey or own-door houses only), particularly, but not exclusively so in any one development of 100 units or more.”*

2.5.6 Design Manual for Urban Roads and Streets (2019)

The DMURS sets out design guidance and standards for constructing new and reconfiguring existing urban roads and streets in Ireland. It also outlines practical design measures to encourage more sustainable travel patterns in urban areas.

It aims to end the practice of designing streets as traffic corridors, and instead focus on the needs of pedestrians, cyclists, and public transport users.

2.5.7 Guidelines for Planning Authorities on The Planning System and Flood Risk Management (November 2009)

The Planning System and Flood Risk Management Guidelines were published by the Minister for the Environment, Heritage & Local Government in November 2009 under Section 28 of the Planning & Development Act 2000 (as amended). The Guidelines require the planning system at all levels to avoid development in areas at risk of flooding, particularly floodplains, unless there are proven wider

sustainability grounds that justify appropriate development and where the flood risk can be reduced or managed to an acceptable level without increasing flood risk elsewhere; adopt a sequential approach to flood risk management when assessing the location for new development based on avoidance, reduction and mitigation of flood risk; and incorporate flood risk assessment into the process of making decisions on planning applications and planning appeals.

The purpose of the Guidelines is to introduce “*comprehensive mechanisms for the incorporation of flood risk identification, assessment and management into the planning process.*” The document goes on to state that:

“Planning authorities will ensure that only developments consistent with the overall policy and technical approaches of these Guidelines will be approved and permission will be refused where flood issues have not been, or cannot be, addressed successfully and where the presence of unacceptable residual flood risks to the development, its occupants or users and adjoining property remains.”

The Guidelines introduce comprehensive mechanisms for the incorporation of flood risk identification, assessment and management into the planning process. The guidelines require the planning system to:

- › *Avoid development in areas at risk of flooding unless proven wider sustainable*
- › *development grounds and risk can be mitigated without increasing risk elsewhere.*
- › *Adopt a sequential approach to flood risk management for new development*
- › *location based on avoidance, reduction and mitigation of flood risk.*
- › *Incorporate flood risk assessment into decision making on planning applications.*

2.6 Regional Planning Policy Context

2.6.1 Regional Planning Guidelines for the West 2010 – 2022

The Regional Planning Guidelines (RPGs) for the West Region 2010 – 2022 provide 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 current RPGs were adopted in October 2010 and are set within the context of national planning policy, including the National Spatial Strategy, providing a statutory link between national and local planning policy and objectives. The aim of the Guidelines is to provide a framework for long term strategic development of the West Region for the period 2010 – 2022 which is consistent with the National Spatial Strategy (NSS) 2002 – 2020 and which ensures the successful implementation of the NSS at regional, county and local level.

The Guidelines set out the vision for the West Region through the formulation of strategic goals, policies and objectives. The physical planning context of the region is set out with a number of future development options explored. The development of the region will be measured against targets for population, housing, infrastructure, economic and social trends, large scale development, National Spatial Strategy (NSS) designations and the preservation of the environment.

Chapter 4 of the RPG’s sets down objectives for Settlement Strategy, Population & Housing and it is intended to provide spatial guidance on population distribution, settlement hierarchy, settlement role, settlement size and housing requirements within the West Region for the local authority areas of Galway City, Galway County, Mayo County and Roscommon County. The vital role which Galway City has to play is referenced within the RPG’s:

“Within the National Spatial Strategy (2002), it is expected that Galway City with its population catchment, quality of life attractions, transport connections and capacity to innovate with the support of its third-level institutions, will continue to play a critical role which is essential in activating the potential of the region.”

The following objectives are set out within the Regional Planning Guidelines:

- **SPG1:** *Building on the dynamic role of Galway as a gateway and expanding its influence in promoting economic activity in the West Region achieving a critical mass of 98,700 over the next 12 years. Support the Gateway through investment in critical infrastructure of road, rail, water, waste water, electricity and gas investment. This will be achieved through proper planning and sustainable development, ensuring minimal environmental impact, and taking full account of the presence of Natura 2000 sites in the Galway area and the requirement to protect these by subjecting all plans and projects to Habitats Directive Assessment and/or other relevant environmental assessment, where necessary.*

- **SPG6:** Support an emphasis on quality of life through sustainable urban design, diversity and quality of housing stock, employment and recreational facilities.

2.6.2

Draft Regional Spatial and Economic Strategy (Northern & Western Regional Assembly) 2018

The Northern & Western Regional Assembly (NWRA) recently published the Draft Regional Spatial and Economic Strategy (RSES) (19th November 2018). The dRSES outlines arrangements for a co-ordinated metropolitan area strategic plan (MASP) for the Galway Metropolitan Area. 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.

Section 1.5 ‘spatial impact’ offers clear support for the continued growth of Galway as one of the four cities, each of which are expected to grow “*by at least 50% to 2040*” and to become “*cities of scale.*”

The RSES notes that for half a century Galway has been Ireland’s most rapidly developing area and is a ‘key driver for the West of Ireland’. The Galway Metropolitan area (detailed in Table 7) shares many of the challenges arising from growth and economic success with much larger cities. Common with Dublin Galway needs to “*accommodate a greater proportion of the growth it generates within its metropolitan boundaries*” in this regard the associated challenges associated include both housing choice and housing affordability.

The RSES sets out a vision for the Galway 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. A Metropolitan area that is environmentally responsible, resilient to change and that attracts and retains talent and skills and fosters innovation and creativity. An Area that offers sustainable choices in housing, work, transport and lifestyle opportunities for its communities, while supporting the health and wellbeing of its people.”

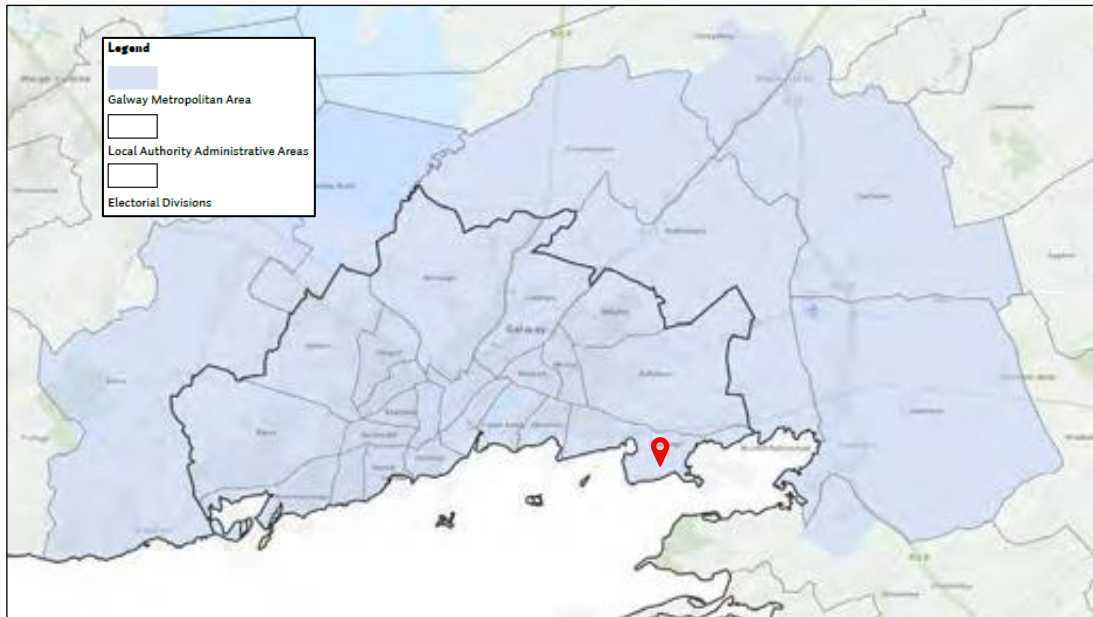


Plate 2-5 Galway Metropolitan Area (development site indicated)

It is considered within the RSES that the Galway Metropolitan area has considerable land capacity that can significantly contribute to meeting the housing demands based on population targets set out within the RSES. Under section 3.6(a) the following targets are listed for population and city homes:

1. Population of Galway MASP to grow by 25,000 to 2026 and by 38,300 to 2031 with the population of the City and Suburbs accommodating 19,200 to 2026 and 28,000 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.

2.6.3 Galway City Development Plan 2017-2023

The current statutory planning policy document for the subject site is the Galway City Development Plan 2017-2023 (GCDP), which was adopted by the City Council in December 2016 and came in to effect on the 7th January 2017. The GCDP includes a Core Strategy and Settlement Strategy that notes the need to accommodate continued population growth, in line with the City’s designation as a ‘Gateway’, in a sustainable manner. In this regard, the adopted Settlement Strategy is primarily based on consolidating the urban form of the City. The strategic goals of the GCDP include the following:

- *Promote balanced and sustainable economic development that will enable Galway City to fulfil its role as a National Gateway and a Regional Centre, providing sufficient employment opportunities and appropriate services.*
- *Use the role of the Gateway to harness the strengths and maximise the economic development of the region.*
- *Provide for a built and natural environment that is of high quality and that contributes to providing a good quality of life for residents and visitors and affords sustainable transportation opportunities.*

It is estimated that within Galway City as per the Regional Planning Guidelines for the West 2010-2022 that the number of households in Galway City from 2011 to 2022 will be in the order of 8,510.

Within the extant Plan, the subject site is zoned for Low Density Residential (LDR) and Agriculture and Amenity (G) development. This is shown in the below extract from the Development Plan, with the approximate site boundary outlined in red.

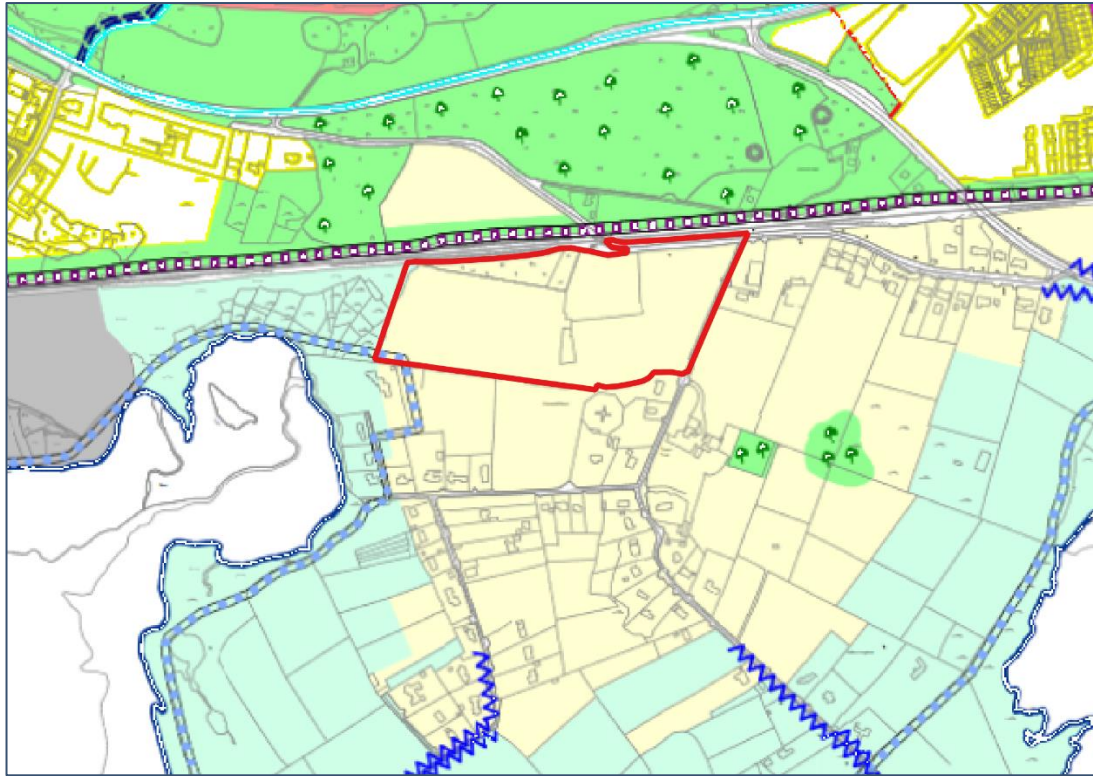


Plate 2-6 Development Plan Zoning and Site Boundary

Figure 4 overleaf replicates Figure 11.13 of the Development Plan which applies specific controls to the land as outlined in red, the former Roscam Pitch and Putt (and adjacent lands).



Plate 2-7 LDR Roscam Pitch and Putt and adjacent lands

The following specific development objectives for the site are noted in the Plan:

- The maximum plot ratio density of 0.2:1 shall only be considered following agreement on an overall layout of the area.

- This layout will have regard to the sylvan character of the site and where appropriate the protection of existing trees and the Roscam Folly.
 - Development will only be considered where it accords with strategic main drainage proposals.
- Section 2.9 of the Plan details that the prescribed residential densities in these LDR areas are considered appropriate due to the established residential pattern, deficiency in service provision and significance of landscape. Associated Policy 2.9 – Low Density Residential Areas states:

- *Protect the character of these areas by ensuring new development has regard to the prevailing pattern, form and density of these areas.*
- *Protect the characteristics of these areas through development standards and guidelines.*

Chapter 11 - Land Use Zoning Policies and Objectives sets out in detail uses considered compatible with zonings. This is copied below in Tables 2-6 and 2-7:

Table 2-6 Zoning Objective LDR

Zoning Objective LDR - To provide for low-density residential development which will ensure the protection of existing residential amenity.	
Uses which are compatible with and contribute to the zoning objective, for example:	<ul style="list-style-type: none"> ▪ <i>Residential</i> ▪ <i>Residential institution</i> ▪ <i>Outdoor recreational use</i> ▪ <i>Accommodation for Travellers</i> ▪ <i>Local shops, local offices, licensed premises, banks and other local services</i> ▪ <i>Buildings for education</i> ▪ <i>Childcare facilities</i> ▪ <i>Buildings for the care of the health, safety or welfare of the public</i> ▪ <i>Buildings for the community, cultural or recreational use</i>
Uses which may contribute to the zoning objective, dependent on the R and LDR location and scale of development for example:	<ul style="list-style-type: none"> ▪ <i>Hotel, Guesthouses and B&B's</i> ▪ <i>Part conversion or extension of private residence to studio, office, childcare facility or small enterprises by the occupier of the dwelling, at a scale as would not unduly interfere with the primary use of the dwelling</i> ▪ <i>Places of worship</i> ▪ <i>Public utilities</i>

Table 2-7 Zoning Objective G

Zoning Objective G - To provide for the development of agriculture and protect areas of visual importance and/or high amenity	
Uses which are compatible with and contribute to the zoning objective, for example:	<ul style="list-style-type: none"> ▪ <i>Agriculture development</i>
Uses which may contribute to the zoning objectives, dependant on the G development, for example	<ul style="list-style-type: none"> ▪ <i>Burial grounds and associated services</i> ▪ <i>Public utilities</i> ▪ <i>Outdoor recreation with small scale associated facilities</i>

It is a stated aim of the Council “*To provide for good quality housing for all sectors of the community in sustainable neighbourhoods that are attractive places to live and are within easy access to a range of local services, amenities, community facilities and public transport networks. To ensure that these neighbourhoods have a sense of identity and foster sustainable living and movement patterns.*”

The Council have set out in Chapter 2 of the Plan their housing strategy, which includes: (inter alia)

- *Implement the recommended settlement strategy for the city ensuring that sufficient land is zoned to meet future demand, in the interests of sustainability and to achieve the optimal integration of land use and transportation.*
- *Accommodate through land use zoning the requirements of the Housing Strategy.*
- *Encourage sustainable neighbourhoods of high-quality residential development, with a mix of house types and tenures with a strong identity and sense of place.*
- *Promote sustainable neighbourhoods where community facilities and services of an appropriate nature are easily accessible.*
- *Enable each household to have access to housing suitable to their needs and promote the provision of social housing, housing for persons with special needs and the provision of homeless and emergency accommodation.*
- *Promote climate adaptation measures as part of the development of sustainable neighbourhoods.*
- *Protect and enhance existing residential areas and explore opportunities for environmental improvements in particular in city centre residential areas.*

Policy 2.2 of the Plan sets out the Council's **Housing Strategy** which includes:

- *Secure implementation of the Housing Strategy 2017-23, which has been informed by the Core Strategy, by ensuring that sufficient suitable lands are zoned to meet the extent of housing needs identified in the strategy in accordance with the NSS and RPGs targeted population for Galway City*
- *Require as provided for under Section 95 of the Planning and Development Act 2000 (as amended) that 10% of all housing developments in excess of 9 units, on lands zoned for residential use or for a mixture of residential and other use be reserved for the purposes of social housing.*
- *Have regard to all Government policies on housing and specifically include for consultation, support and assistance to all Approved Housing Bodies (AHB) in their role as social housing providers.*
- *Support a diverse range of housing types, size and tenures within housing developments in the interests of countering undue segregation and to allow for choice of community, for all persons irrespective of age, culture, social background and ability.*
- *Planning applications for multiple housing units will be required to submit a Statement of Housing Mix detailing the proposed mix and demonstrating that it provides a sufficient minimum in house sizes and types to satisfy the demands of the emerging reduction in household sizes. The needs of special groups such as the elderly and disabled will be required to be considered as part of this process.*
- *Support the development of sustainable communities and ensure that all new housing developments – private, public and voluntary are carried out in accordance with the DECLG guidelines Sustainable Residential Developments in Urban Areas (2008) and Section 28 Ministerial guidelines – Sustainable Urban Housing: Design Standards for New Apartments Guidelines for Planning Authorities, (2015).*

The Plan emphasises that the successful integration of a new housing development within its surrounding context is an important element in the design process. It can include the natural environment, the form of settlement, buildings and spaces, landscape features, contours, historical/archaeological features and local biodiversity. The following factors are noted:

- Local facilities and community infrastructure;
- The public transport network and network of walking and cycling routes;
- The green network.

Policy 2.4 Neighbourhood Concept sets out to:

- *Encourage the development of sustainable residential neighbourhoods, which will provide for high quality, safe, accessible living environments which accommodates local community needs.*
- *Encourage sustainable neighbourhoods, through appropriate guidelines and standards and through the implementation of local area plans, framework plans/masterplans.*
- *Protect and enhance new/existing residential neighbourhoods through appropriate guidelines and standards, preparation of framework plans, development briefs and design statements.*
- *In the design of residential developments regard shall be had to the Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas (2009) and the accompanying Urban Design Manual–A Best Practice Guide and the Design Manual for Urban Roads and Streets (2013).*

The Plan supports sustainable neighbourhoods which include a mix of uses (Section 2.5 Neighbourhoods: Outer Suburbs).

As per the *Guidelines for Planning Authorities on Sustainable Residential Development in Urban Areas Cities, Towns and Villages* the promotion of higher residential densities in appropriate locations is acceptable. In assessing high density developments regard shall be had to these guidelines and the accompanying design manual which sets out certain criteria including the following:

- *Acceptable building heights;*
- *Avoidance of overlooking and overshadowing;*
- *Provision of adequate private and public open space;*
- *Landscaping where appropriate and provision of safe play spaces;*
- *Adequate internal space standards;*
- *Suitable parking provision;*
- *Provision of ancillary facilities such as community facilities and local services.*

The Development Plan encourages development proposals to consider a range of design principles including:

- *Connectivity and Permeability:* provide convenient access to places, particularly to schools and places of work. Routes within the area should be accessible for everyone and as direct as possible.
- *Sustainability:* prioritise the needs of walking, cycling, public transport and the need for car-borne trips to be minimised.
- *Safety:* provide for safe access on streets, paths and cycle routes for users of all ages and degrees of personal mobility.
- *Legibility:* ensure residents and visitors can easily find their way around the area.
- *Sense of Place:* ensure streets contribute to the creation of attractive and lively mixed-use places. Streets should not just serve a movement function, their design should include consideration of appropriate opportunities for events and social interaction. The use of street names with a connection to the area can also reinforce a sense of place and evocation of the past in new buildings.

Policy 7.4.3 Childcare sets out to:

- *Facilitate the development of childcare facilities, including after school services, at a number of suitable locations, such as, within residential areas, places of employment, city centre, neighbourhood and district centres, schools, in the vicinity of educational and community establishments and adjacent to public transport nodes.*
- *Contribute to the provision of childcare facilities by requiring that such facilities be provided in conjunction with residential developments over 75 dwelling units.*
- *Consider alternative arrangements where it can be clearly established that adequate childcare facilities exist.*

2.6.4 Galway Transportation Strategy, 2016

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.

2.7 Alternatives

2.7.1 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 consideration of alternatives typically refers to alternative sites, designs and processes.

This section of the EIAR contains a description of the alternatives that were considered for the optimised development, in terms other land-use options for the site, turbine numbers, design and site layout and transport routes to the site.

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.

2.7.2 Alternative Sites

As outlined above the vast majority of the site is zoned for Low Density Residential (LDR) with a small section zoned for Agriculture and Amenity (G) development within the Galway City Development Plan 2017-2023. As such consideration of alternative sites for the construction of residential units proposed in this development was not considered necessary. It is considered that the proposed site is the only suitably zoned LDR site available to the applicant for the proposed development. During the design process for the proposed development several iterations of the site layout and alternative designs were considered. This planning application demonstrates that the subject site and the surrounding area have the environmental capacity to accommodate the proposed development without any significant risk of impact upon environmental sensitivities due to the site location.

2.7.3 Alternative Layouts

This section provides an overview of how the proposed development has evolved to date. The design process was an iterative process, where findings at each stage of the assessment were used to further refine the design, always with the intention of minimising the potential for environmental impacts.

Alternative Layout 1

An initial design concept was circulated to the Planning Authority as part of the statutory Pre-Application Consultation process of the SHD process. The site layout is indicated below in Figure 2.1. That proposal comprised:

- > 361no. units
- > Overall site area of 10.19ha,
- > Density of 37.41 units per ha
- > 138no. apartments (38.2%) and 223no. houses (61.8%)
- > Public open space of 15.03% across 10no. areas



Figure 2-1 Alternative Layout 1

Alternative Layout 2

Following the Section 247 Stage 1 meeting held with the Authority on the 8th May 2019, a suite of design changes were made:

- > Reduction in number of units on site to 351
- > Density of 36.4 units/ha
- > 165no apartments and 186no houses (47% and 53% respectively)
- > Increased permeability across the site and increased open space provision
- > Cosignage of DMURS and delineation of a roads hierarchy
- > Reorientation and redistribution of apartment blocks on site
- > Reconsideration of parking provision within the site
- > Removal of residential units in the south-east of the site to afford greater protection to the setting of the Recorded Monument
- > Greater open space around the existing trees on the western boundary and the central/northern wooded area

The site layout is indicated below in Figure 2.2:



Figure 2-2 Alternative Layout 2

Alternative Option 3

The draft application pack prepared for Stage 2 of the SHD process – that is, the tripartite meeting with An Bord Pleanála and the Planning Authority – contained the following revisions:

- Reduction in overall unit numbers of 350.
- A reduced site area of 9.85ha.
- A density of 36.2 units per ha
- 165no. apartments and 185no. houses (47.1% and 52.9% respectively)
- An enhanced centralised green space play area
- Pumping station
- Introduction of ramped access to Rosshill Road

The site layout is indicated below in Figure 2.3



Figure 2-3 Alternative Option 3

Proposed Development

The proposed development layout is indicated below in Figure 2.4. In this layout the overall number of units is reduced to 342 and a reduction in the size of the developable area to 9,539 ha. The final configuration is 185 houses and 157 apartments with a residential density of 35.8 units per ha. The public open space provided has been increased from 21.7% to 22.57%.



Figure 2-4 Proposed Development

2.7.4 Alternation 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 local community and city.

The proposed residential development has been prepared in accordance with the requirements of the Galway City Development Plan 2017-2023 and has been the subject of a number of pre-application meetings with the Planning Authority prior to lodgment. A detailed account of the pre-planning discussions is set out in Section 2.5.3 below.

2.7.5 Alternative Land Uses

The proposed development comprises residential units made up of houses and apartments, a ground floor community space, Office, Café, Retail units, a childcare facility, shared public open space and play areas, public art, public lighting, resident and visitor parking. It is proposed as a phased development with each phase comprising residential units in varying numbers. It is considered that the proposed land uses are deemed appropriate for 'LDR' zoned land as outlined in the Galway City Development Plan 2017-2023. As such consideration of alternative land uses were not considered necessary.

2.7.6 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 alternatives considerations through the projects development.

The construction of 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. Where relevant, alternative processes are considered through the EIAR.

2.7.7 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 alternative is to either not propose these measures or propose measures which are not best practice and neither of these options is sustainable.

2.7.8 “Do Nothing” Alternative

If the proposed development was not to proceed, the opportunity to develop 342 no. units comprising a mixture of houses and apartments, childcare facility, associated commercial/retail opportunity space, pumping station, open space, landscaping and ancillary works at this long standing zoned residential site would be lost.

2.8 Scoping and Consultation

2.8.1 Scoping Document

An informal EIAR scoping exercise was undertaken as part of the EIAR process. 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 EIAR and the specific standards of information they require. 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, it also provides a feedback mechanism for the proposed design itself.

A scoping document providing details of the application site and the proposed development, was prepared by MKO and circulated on 19th June 2019 to the agencies, NGOs and other relevant parties listed in **Error! Reference source not found.**8 below.

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

2.8.2 Scoping Responses

The scoping responses received to date are presented in Appendix 2-1.

Table 2-8 Scoping Consultees

No.	Consultee	Response
1.	An Taisce	An Taisce made a number of observations which can be viewed in full under Appendix 2-1 of this report.
2	Department of Agriculture, Food and the Marine	No Response
3	Department of Culture, Heritage and the Gaeltacht	The Department of Culture, Heritage and the Gaeltacht observations/recommendations which can be viewed in full under Appendix 2-1 of this report.
4	Faite Ireland	No Response
5	Geological Survey of Ireland	No Response
6	Health Service Executive	No Response
7	Inland Fisheries Ireland	No Response
8	Galway City Council- Roads and Transportation	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 (TII)	Acknowledgement of receipt. The TII make a number of recommendations which can be viewed in full under Appendix 2-1 of this report.
13	Office of Public Works	No Response
14	The Heritage Council	No Response
15	ESB Networks	Acknowledgement of receipt.
16.	National Transport Authority	Acknowledgement of receipt.

2.8.3 Pre-Planning Meetings

2.8.3.1 Section 247 Pre-Planning Meeting

A formal Stage 1 meeting pursuant to Section 247 of the Planning and Development Act 2000 (as amended) was held with the Planning Authority on the 8th May 2019. The meeting took place in Galway City Council and was attended by representatives of Kegata Ltd, O’Neill-O’Malley Architects, CSR Landscape Architects, Tobin Consulting Engineers, MKO and Galway City Council.

The Planning Authority raised concerns regarding the layout, open space provision, connectivity and permeability of the scheme. The project team confirmed they would consider the points raised at the meeting.

Following the meeting the project team undertook to revise the proposal with the aim of addressing the comments made at the Stage 1 meeting. Having considered the feedback received at that meeting, the project team considered that there were two key matters which warranted further design consideration, namely open space and roads/movement/permeability and connectivity.

A request was subsequently lodged with the Planning Authority on the 9th May 2019 for a follow-up meeting however this was never taken-up.

2.8.3.2 An Bord Pleanála

A tripartite meeting took place between An Bord Pleanála, Galway County Council and the Design team on the 27th of September 2019 in the offices of Galway County Council. Within the meeting detailed discussions were had with regards to the principle of the project including elements surrounding density, transport, urban design and layout, natural and cultural heritage, services (pump station), etc.

2.8.3.3 Consultations with Prescribed Bodies

Consultations were held with the following prescribed bodies with regards to the proposed development:

- Consultations were held with Irish Water
- Consultations were held with the Planning Authority and Roads Section of Galway City Council
- Consultations were held with The Galway County and City Childcare Committee
- Consultations were held with Iarnrod Eireann
- Consultations were held with the Department of Culture, Heritage and the Gaeltacht

2.9 Cumulative Impact Assessment

This EIAR, which 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, cultural heritage and material assets.

The potential for cumulative impacts arising from the proposed development in combination with other projects has therefore been fully considered throughout this EIAR. This section of the EIAR provides an overview of other projects located within the wider area that have been considered within the cumulative impact assessments.

2.9.1 Methodology for the Cumulative Assessment of Projects

The potential for cumulative effects to arise from the proposed development was considered in the subject areas of human beings, flora and fauna, soil, water, climatic factors, landscape, cultural heritage and material assets. To comprehensively consider potential cumulative impacts, the final section of each relevant section within this Environmental Report includes a cumulative impact assessment where appropriate.

The potential cumulative impact of the proposed 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 proposed site.

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 cable connection.*
- 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 Environmental Report.*
- 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 / County Council online Planning Register, reviews of relevant Environmental Report, 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. These projects are summarised in Section 2.9.2 below.

2.9.2 Projects Considered in Cumulative Assessment

The projects considered in relation to the potential for cumulative impacts and for which all relevant data was reviewed (e.g. individual EIS/EIAR's, layouts, drawings etc) include those listed previously above at Section 2.3 summarised below:

- 16/228 - Permission for a new residential development consisting of 16 no. 2-storey, five-bedroom, detached houses, together with individual garages, as applicable, new vehicular site accesses and roads with all ancillary site works, landscaping and service connections
- 17/283 - Permission to construct 23 two storey Dwelling houses consisting of Detached, Semi-detached and terrace.
- 18/187 - Permission for a change of house type to previously granted planning permission (reference 16/228).
- 19/95 - Permission for development which consists of the constructing 51 No. one, two and three bedroom apartments and two one bedroom Town Houses in 6 no. Blocks ranging in height from one storey up to four storey.

The potential for cumulative impacts arising from the proposed development and these projects have been set out in full in the relevant chapters of this EIAR, where appropriate. Detailed consideration of all potential cumulative impacts can therefore be found in the relevant sections of this EIAR.

3. DESCRIPTION OF THE PROPOSED DEVELOPMENT

3.1 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. *Construction of 342 no. residential units comprising:*
 - 36no. Four Bed Semi-Detached Houses
 - 2 no. Four Bed Detached Houses
 - 68 no. Three Bed Semi-Detached Houses
 - 63 no. Three Bed Terrace
 - 6 no. Two Bed Terrace
 - 5 no. Three Bed Long Semi-Detached Houses
 - 5 no. Four Bed Long Semi-Detached Houses
 - 38 no. One Bed Apartments
 - 119 no. Two Bed Apartments
2. *A Ground-floor community space*
3. *Office, Cafe and Retail units*
4. *A Two-Storey Childcare Facility*
5. *The provision of public realm landscaping including shared public open space and play areas, public art, public lighting, resident and visitor parking including car rental bays, electric vehicle charging points and bike rental spaces*
6. *Pedestrian, cyclist and vehicular links throughout the development. Access road and junction improvements at Rosshill Road/Old Dublin Road. Provision of all associated surface water and foul drainage services and connections including pumping station. All associated site works and ancillary services.*

3.2 Existing Site Description

3.2.1 Site Layout

The site area comprises approximately 10ha of land located within the townlands of Roscam, Merlin Park and Murrough to the south east of Galway City. It is located on the Rosshill Road, which connects to the Old Dublin in the west and the Coast Road in the east. The general area is rural in character and is surrounded by a number of small residential developments and individual houses. A number of individual houses and the Rosshill Stud Farm lie to the south, with agricultural lands to the east. The Merlin Park Hospital lies to the north to the south, Galway bay and agricultural lands to the west. The Galway to Dublin trainline runs along the northern border of the site.

There are no protected structures or archaeological monuments located within the application site; however, there is a National Monument Record (Record number GAA094-070) which is described as a 'folly' located circa 40 m south of the proposed site and a National Monument Record (Record number

GA094-122) described as an ‘enclosure’ is located circa 70 m north of the proposed site. The site is also located to the south of a Protected Structure, Rosshill Railway Bridge (RPS 8806, NIAH 30409423)

The lands are not located in any Natura 2000 designated sites (European Ecologically designated sites). However, the site is located approximately 5 metres east of the Galway Bay Complex (SAC) and Special Protection Area (SPA), approximately 4.1 kilometres to the southeast of the Lough Corrib Special Area of Conservation. In this regard, an Appropriate Assessment Screening has been undertaken and a Natura Impact Assessment prepared.

Figure 3.1 provides an overview of the proposed development.

3.2.2 Site Access

Access to the proposed development is to be facilitated via the Rosshill Road as detailed in Figure 3.2.

A network of footpaths throughout the proposed development will provide a high rate of accessibility to the landscaped amenity areas including a playground, outdoor exercise equipment and kickabout 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.

MASTER SITE LAYOUT PLAN

NOTE : PLEASE REFER TO ENGINEERS DRAWINGS & REPORTS FOR SERVICE CONNECTION DETAILS

Overall site Mix:	Mix by type:	
038 no. 1 Bedroom units	157 Apartments	45.9%
125 no. 2 Bedroom units	069 Terraces	20.2%
136 no. 3 Bedroom units	114 Semi-Detached	33.3%
043 no. 4 Bedroom units	002 Detached	00.6%
		100%

LEGEND

Site boundary outlined in red

OVERALL SITE AREA : 100,693 sqm :- 10.069HA :- 24.881 Acre
 Verges to Old Dublin Road & Rosshill Rd. : 3,381 sqm :- 0.338 HA
 Junction area : 628 sqm :- 0.063 HA
 RA zoned Land to west boundary : 1,292 sqm :- 0.129 HA
Developable Area : 95,392 sqm :- 9.539 HA :- 23.572 Acre

Galway City Council Development plan 2017-2023:
 Site zoned Low Density Residential (LDR)

RESIDENTIAL TOTAL NO. OF UNITS = 342

Density:
35.8 Units per Ha - Residential Density (342 total units on 9.539 ha.)
14.5 Units per Acre - Residential Density (342 total units on 23.572 acre)

Plot ratio : 0.37 :1 (max allowable 0.46:1)
 Site Coverage : 15.34%

45.9% Apartments = 157 Units
 54.1% Houses = 185 Units

Residential Dwelling Units:

Type 'A-A6'	- 4 bed Semi-Detached	- Circa 125.4 sqm	TOTAL 36 UNITS
Type 'A2'	- 4 bed Detached	- Circa 125.4sqm	TOTAL 02 UNITS
Type 'B-B7'	- 3 bed Semi-D	- Circa 110.4 sqm	TOTAL 24 UNITS
Type 'C-C8'	- 3 bed Semi-D	- Circa 108.2 sqm	TOTAL 44 UNITS
Type 'C-C10'	- 3 bed Terrace	- Circa 108.2 sqm	TOTAL 63 UNITS
Type 'D'	- 2 bed Terrace	- Circa 84.4 sqm	TOTAL 06 UNITS
Type 'E'	- 3 bed Long semi-D	- Circa 107 sqm	TOTAL 05 UNITS
Type 'F'	- 4 bed Long semi-D	- Circa 129.8 sqm	TOTAL 05 UNITS

TOTAL UNITS ON SITE = 185 UNITS

Apartment Units:

Type '1A- 1D'	- 1 bed Apartment	- Circa 49.2sqm (varies)	TOTAL 038 UNITS
Type '2A - 2N'	- 2 bed Apartment	- Circa 78sqm(varies)	TOTAL 119 UNITS

TOTAL UNITS ON SITE = 157 UNITS

Public open space requirement over developable area: 15% - 14,309sqm
 Public open space provided- Over 21,533sqm - 22.57%
 (above 10m wide/ 200sqm & reasonably level usable space)
 Overall Green and landscaped space across the site: 25,130sqm - 25.8%

FOR 1:500 SCALE - PART SITE PLAN 1 REFER TO SHEET 3003

FOR 1:500 SCALE - PART SITE PLAN 2 REFER TO SHEET 3004



01 Master Site Layout Plan
 Scale: 1:1000

MASTER SITE LAYOUT PLAN

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 9. Proprietary items shall be fixed in strict accordance with manufacturers instructions.
 10. Sizes of proprietary items shall be checked with manufacturer and checked for compliance with design detail.
 11. Contractor is responsible for procuring any proprietary items required/specified with due attention to lead-in times ensuring compliance with programme dates.

No.	Date	Comments	By

REVISIONS

Scale: 1:1000
 Drawing Purpose: PLANNING
 Project: Proposed Development at Rosshill, Galway City
 Client: Kegata Ltd.
 Date: December 2019
 Paper size: A3
 File path: CTB file: L1Scale: Drawn by: SOR Checked by: JOM

File Ref: 3.09 Subject: MASTER SITE LAYOUT PLAN
 Project No: 18128 Drawing No: 3002 Rev: -
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SITE CONNECTIONS & OPEN SPACES

LEGEND

Site boundary outlined in red

OVERALL SITE AREA : 100,693 sqm :- 10.069HA :- 24.881 Acre
 Verges to Old Dublin Road & Rosshill Rd. : 3,381 sqm :- 0.338 HA
 Junction area : 628 sqm :- 0.063 HA
 RA zoned Land to west boundary : 1,292 sqm :- 0.129 HA
 Developable Area : 95,392 sqm :- 9.539 HA :- 23.572 Acre

	Primary Access road/ Main Avenue
	Secondary Access road/ Local Access
	Tertiary Access / Shared surface/ Homezone
	Predestrian links between green spaces
	Shared surface/ Homezone



01 Site Layout Plan
Scale: 1:1000

SITE CONNECTIONS & OPEN SPACES

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REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:1000
 Drawing Purpose: PLANNING
 Project: Proposed Development at Rosshill, Galway City
 Client: Kegata Ltd.
 Date: December 2019
 Drawn by: sor
 Checked by: JOM

File Ref: 3.09
 Subject: SITE LAYOUT CONNECTIONS

Project No: 18128
 Drawing No: 3020

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3.2.3 Site Constraints

There are currently no site constraints which are creating issues for the proposed development

3.3 Proposed Development Construction Operations

The detailed drawings for the proposed development can be seen as Appendix 3-1 to this EIAR. A Construction and Environmental Management Plan (CEMP) can be seen as Appendix 3-2.

3.3.1 Hoarding

The site will be enclosed with a hoarding along the Rosshill road, details of which are to be agreed with Galway City Council. Hoarding panels will be maintained and kept clean for the duration of the project. Internal Phases (1-3) will be enclosed with Heras Fencing. The Contractor will be responsible for the security of the site. The Contractor will be required to undertake the following:

- Operate a Site Induction Process for all site staff,
- Ensure all site staff will have current 'Safe Pass' cards,
- Install adequate site hoarding to the site boundary,
- Maintain Site Security cameras at all times,
- Install access security in the form of gates for staff,
- Separate public pedestrian access from construction vehicular access,
- Ensure restricted access is maintained to the works.

3.3.2 Pedestrian and Cyclist Safety

Until such time as the construction of the first phase is complete, the new access road will not be open to members of the public. However, the general public will have right of way along the existing Rosshill Road. When vehicles are entering the 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.

It is proposed to provide a pedestrian footway from the development to the junction with the Rosshill Road. Pedestrians can then cross this roadway to use the existing Pedestrian Footway along the Northern Boundary of the Rosshill Road. This footway is under the control of Galway City Council. Sections of this footway are in a state of disrepair and some key linkages are missing. Improving this pedestrian footway should be prioritised by Galway City Council. This would provide access to the existing pedestrian facilities provided on the R338 Dublin Road which link to the City Centre and the Roscam/Doughiska residential areas.

It is also proposed to provide a ramped pedestrian link from the development to the existing bus stop on the Rosshill Road. However, this bus stop is not currently in use. Therefore, the setting up of a bus route to service the development at this stop should be prioritised. It is also proposed to provide pedestrian linkages to the proposed railway station situated adjacent to the development.

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.

It is proposed to provide an off-road cycle track from the proposed development to the realigned junction with the Rosshill Road. From this intersection, cyclists travelling along the Rosshill Road will then share the carriageway with vehicular traffic to the intersection of the R338 Dublin Road, where a bus lane is available for cyclists, or the R338 Coast Road, where a hard shoulder is provided.

3.3.3 Proposed Hours in which Vehicles will Arrive and Depart

In general, the hours in which vehicles will arrive and depart will coincide with the expected site working hours of 8.00am to 7.00pm in the evening from Monday to Friday, and 8:00am to 2:00pm on Saturday. The construction phase of the proposed development is expected to last approximately 7 years in total.

3.3.4 Access Arrangements for Vehicles

The access arrangements will be as specified in the statutory publications with reference to the 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 new site entrance which will be located on the south-eastern corner of the site boundary.

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.

3.3.5 Exclusion Zones on Site

The areas of woodland and trees on site being retained are to be protected during the course of construction. An exclusion zone will be put in place around these areas/features, fenced off from site and the contractor will not have any storage, plant, or traffic going inside this exclusion zone during the construction period. Suitable fencing will be erected to ensure the flora and fauna are protected and preserved during the construction period, and regular checks and inspections will be carried out on this by the contractor.

3.3.6 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.

3.3.7 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 highlighted within the Construction Management Plan.

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

3.3.8 Site Compound and Facilities

Site accommodation 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. Any wastewater will be removed by vacuum tanker using an authorized waste collector.

3.3.9 Phasing

It is anticipated that the development will be completed over 4 separate phases as detailed in Figure 3.3 and the access and egress routes will change for the various phases. As some of the houses will be occupied during the later phases, a separate construction entrance will be formed to allow safe access for both construction traffic and new residents. Traffic Management procedures will be implemented to ensure the safety of the users of the access routes, for both the residential access and the construction access. The construction phase of the proposed development is expected to last approximately 7 years in total.

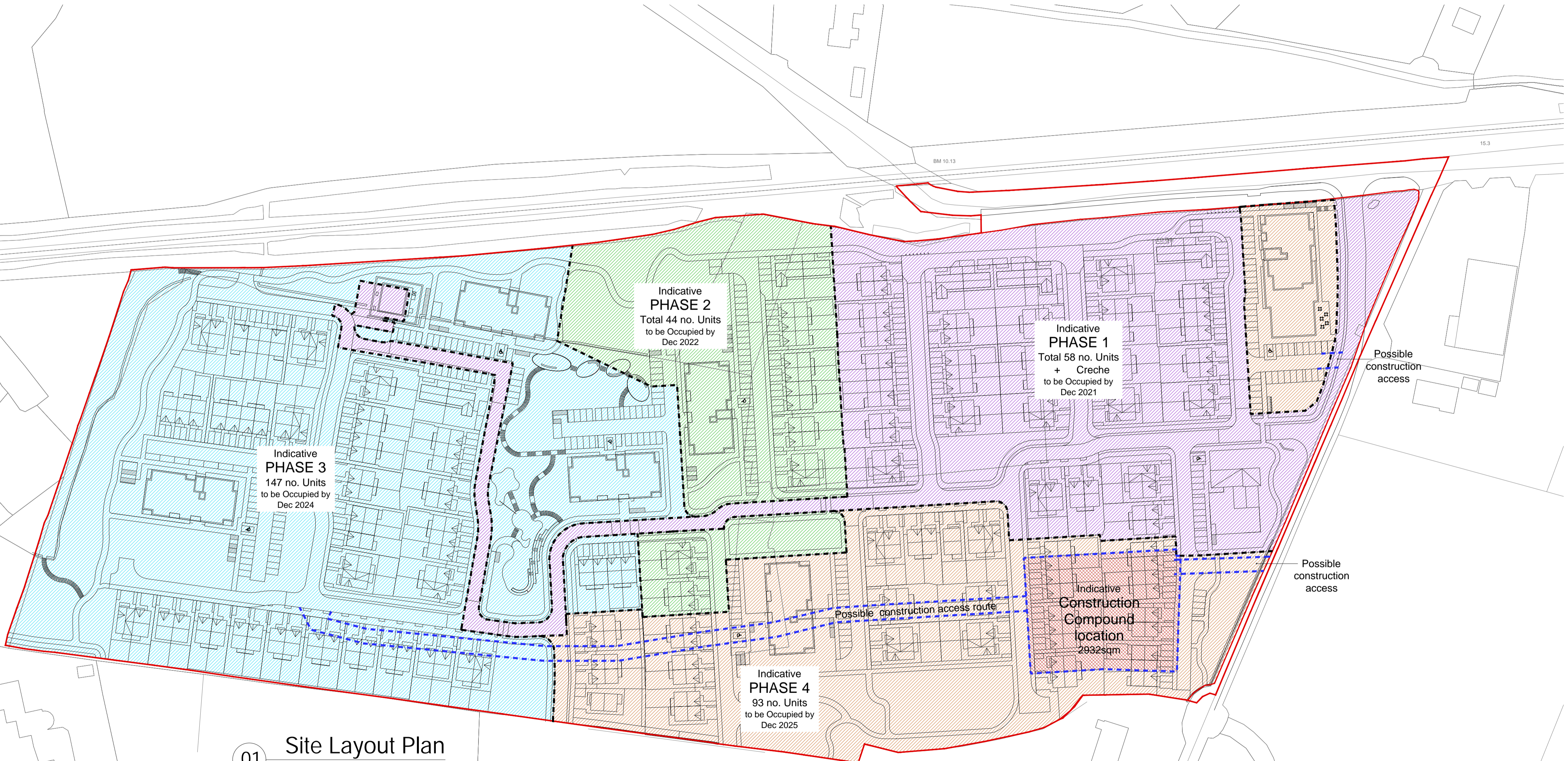
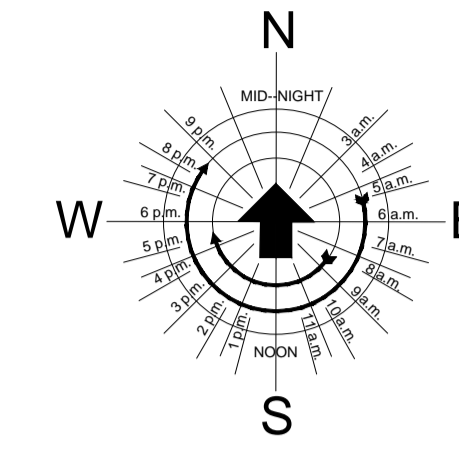
INDICATIVE PHASING PLAN

LEGEND

Site boundary outlined in red

OVERALL SITE AREA : 100,825 sqm :- 10.082 HA :- 24.914 Acre
 Verges to Old Dublin Road & Rosshill Rd. : 3513 sqm :- 0.351 HA
 Junction area : 628 sqm :- 0.063 HA
 RA zoned Land to west boundary : 1292 sqm :- 0.129 HA
Developable Area : 95,392 sqm :- 9.539 HA :- 23.572 AcreAcre

RESIDENTIAL TOTAL NO. OF UNITS = 342



01 Site Layout Plan
Scale: 1:1000

INDICATIVE PHASING PLAN

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No.	Date	Comments	By

REVISIONS

No.	Date	Comments	By

REVISIONS

Scale: 1:1000
 Drawing Purpose: PLANNING
 Project: Proposed Development at Rosshill, Galway City
 Client: Kegata Ltd.
 Date: December 2019
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 Checked by: JOM

File Ref: 3.09
 Subject: INDICATIVE PHASING DIAGRAM
 Project No: 18128
 Drawing No: 3025
 Rev:
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3.3.10 Property Management – Operational Stage

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

The property management company will also have the following responsibilities for the apartments within the development once constructed:

- Formation of an owners management company. The company will be a company limited by guarantee having no share capital. All future purchasers will be obliged to become members of the owners management company.
- Preparation of annual service charge budget for the development common areas.
- Fair and equitable apportionment of the annual operational charges in line with the MUD act.
- Engagement of independent legal representation on behalf of the owners management company in keeping with the MUD act, including completion of the developer - owner management company agreement and transfer of common areas.
- Transfer of documentation in line with schedule 3 of the MUD act.
- Estate management.
- Third party contractors procurement and management.
- Owners management company reporting.
- Accounting services.
- Corporate services.
- Insurance management.
- After hours services.
- Staff administration.

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 in accordance with the Multi User Development Act 2011.

The service charge budget also includes an allowance for a sinking fund and this allowance is determined following the review of the building investment fund report prepared by / for the owners management company. The building investment fund report, once adopted by the owners management company, determines an adequate estimated annual cost provision requirement based on the needs of the development over a 30 year cycle period. The building investment fund report will identify those works which are necessary to maintain, repair and enhance the premises over the 30 year life cycle period, as required by the Multi User Development Act 2011.

In line with the requirements of the Multi User Development Act 2011 the members of the owners management company will determine and agree each year at an AGM of the members the contribution to be made to the sinking fund, having regard to the building investment fund report produced.

3.3.11 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:

- A BER certificate will be provided for each dwelling in the proposed development which will provide detail of the energy performance of the dwellings. It is proposed to target an A2 rating for the houses, equating to the following emissions:
- A2 - 25 to 50 kWh / m² / year with CO₂ emissions c. 10kg CO₂ / m² / year.

- The apartments will be heated by means of exhaust air heat pump systems. It is proposed to utilize exhaust air heat pumps. The unit is A++ rated. Aluminium radiators will be provided in each space
- complete with thermostatic radiator valves (TRVs) as required.
- The ventilation requirements for the houses will be met using a low maintenance Aereco demand control ventilation system. This system utilizes an central house extract fan and passive supply vents with mechanical humidity control around the house.

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 onsite 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 in 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 Heat pumps / PV's.

The building will be constructed to meet the latest building regulations and U-Values

Further information about the proposed energy efficiency proposals can be found in Appendix 8-1, the Mechanical and Electrical Services Planning Report

3.4

Site Landscaping

Before completion of the construction phase of each 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 by CSR Landscape Architects. Drawing No. 19112-3-100 and included in Appendix 5-3 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 Galway City Development Plan 2017-2023.

3.5

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 3-2 of this EIAR.

3.5.1 General Construction Measures

Communication with the public, local residences and businesses adjacent the development will be an important responsibility of the Senior Project Manager and delegated persons. All parties will be kept up to date and informed both shortly prior and during the construction period at all times. Two to three weeks before any work commencing reasonable efforts will be made to inform all parties of the oncoming works.

A Traffic Management Plan (TMP) will be issued to Galway City Council for approval prior to works commencing on site. The approved TMP and any revisions thereof 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.

- 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.
- Competent foremen will be on site at all times.
- Biometric turnstiles will be used to prevent unauthorised access to the site.

3.5.2 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 within the North Eastern section of the site (Phase 1) 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.

3.5.3 Temporary Site Compound

One temporary construction compound is proposed for the construction phase of the proposed development, located in the south-eastern section of the site. The proposed temporary compound area incorporates temporary site offices, staff facilities and car-parking areas.

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 wastewater 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.

3.5.4 Site Roads

The construction methodology for the proposed access road 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.

3.5.5 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 if required for connection works to the existing service network.
- A road opening licence will be obtained where 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.

3.5.5.1 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.

3.5.6 House/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.

3.5.7 Construction Site Management Incorporated into Project Design

The following measures pertaining to water quality and invasive species have been incorporated into the design phase of the project to avoid effects on sensitive ecological receptors.

3.5.7.1 Prevention Pollution 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), which provides guidance. This will ensure that surface water arising during the course of construction activities will contain minimum 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 proposed development site does not contain any mapped watercourses and no watercourses were identified within the site during site visits. Small stream channels can be seen along the Rosshill beach which emerges ~ 100m west of the western boundary of the site. It is likely that runoff is flowing along the field boundaries and discharging to the Galway Bay at this point.

However, 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.

- There will be no release of suspended solids to any watercourse as a direct or indirect result of the proposed works. There is no surface watercourse on the site of the proposed development.
- No watercourse will be interfered with as part of the proposed works. No temporary instream crossings or temporary culverting will take place. Instream works will not take place.
- Any requirement for temporary fills or stockpiles will be damped down or covered with polyethylene sheeting as required to avoid sediment release associated with heavy rainfall.
- Prior to the commencement of earthwork silt fencing will be placed down-gradient of the construction areas where drains or drainage pathways are present. These will be embedded into the local soils to ensure all site water is captured and filtered;
- As construction advances there may be a small requirement to collect and treat surface water within the site. This will be completed using perimeter swales at low points around the construction areas, and if required water will be pumped from the swales into sediment bags prior to overland discharge allowing water to percolate naturally to ground or disperse by diffuse flow into local drainage ditches;
- Discharge onto ground will be via a silt bag which will filter any remaining sediment from the pumped water. The entire discharge area from silt bags will be enclosed by a perimeter of double silt fencing

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.

- On site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site and will be towed around the site by a 4x4 jeep to where machinery is located. The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- 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;

- The plant used should be regularly inspected for leaks and fitness for purpose; and,
- Spill kits will be available to deal with accidental spillages.

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>.

3.5.8 Landscaping works

Prior to completion of works on the development site, the landscaping works will be carried out. The proposed landscaping plan is shown as Drawing No. 19112-3-100 (Landscape Master Plan) in Appendix 3-5. 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.

3.5.9 Invasive Species

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

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.

3.5.9.1 Control Measures for the Management of Invasive Species

Invasive species, such as Japanese Knotweed, Himalayan Knotweed, Himalayan Balsam, *Gunnera*, and Giant Hogweed pose a serious threat to biodiversity and the health of native vegetation types. Construction machinery can act as a vector for the spread of these plants. Machinery that has worked at an infected site is likely to cause the spread of such species by transferring their tiny seeds or plant fragments, in soil trapped in their tyre tread for instance. Equally, they can cause the spread of species within a site. The duration of the impact could be short-term or permanent depending on whether or not an eradication effort is made but once established, eradication is time-consuming and expensive. Himalayan Knotweed, for example, propagates vegetatively, forming a new plant from even very small plant fragments. Thus, there is a high risk of causing the spread of this species to other parts of the site. The UK Environment Agency's *Japanese Knotweed Code of Practice* provides guidance on managing Japanese Knotweed and Himalayan Knotweed on development sites. A number of control measures have been drawn up and included in the design and construction phase of the proposed works to avoid the introduction and spread of invasive plant species. The following project design elements have been devised to avoid such effects. The following measures address potential effects associated with the construction phase of the development:

- Care will be taken not to disturb or cause the movement of invasive species fragments, either intentionally or accidentally.
- There are not believed to be any existing stands of invasive species on site, but should any be found, they will be clearly demarcated by temporary fencing and tracking within them will be strictly avoided. A minimum buffer of seven metres will be applied to avoid disturbance of lateral rhizomes.
- If any excavations must be carried out in areas of Japanese Knotweed, the excavated material will 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 will be briefed about the presence, identification and significance of Japanese Knotweed before commencement of works.
- Good construction site hygiene will 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.) will 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 will 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 will be had of any watercourses on neighbouring sites.
- Any material that is imported onto any site will 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).

3.6 Other Site Details

3.6.1 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 will prepare a Construction Waste Management Plan in accordance with the “Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects” (Department of Environment, Heritage and Local Government, 2006) and ensure that all material is disposed of at an appropriately licensed land fill site. The Contractor will also outline detailed proposals within the Construction Management Plan to accommodate construction traffic.

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.

3.6.2 Dust

Dust prevention measures will be included for control of any site airborne particulate pollution.

Dust control will be achieved by:

- Dampening down the dust at the source
- Sheeting will be used as required for stockpiled materials
- Use of barriers such as debris netting on scaffolding around the building to block dust escaping where the building is within 10m of the site boundary where residential properties exist.
- Site road ways will be maintained in a stoned hard core condition not allowing soil to accumulate which when dry can create dust.
- Wheel wash equipment will 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.
- Plant and equipment that have the potential to create volumes of dust will have appropriate attachments to allow water source to dampen dust to not allow it to get airborne.
- Plant and equipment that have the potential to create volumes of dust will be located away from sensitive receptors where possible.
- Deploy Road Sweeper as required on External Roads.
- Deployment of dust monitors across the site if required

3.6.3 Noise

The Contractor will be required to monitor base noise levels at the site location before commencement of the project. Noise monitoring will be required throughout all phases of the project. Variation of noise levels from those experienced as part of everyday life in an area can result in extreme disruption. The Contractor will implement measures to eliminate where possible and reduce noise levels where not. Noise levels will be kept below those levels specified in the National Roads Authority – “Guidelines for the Treatment of Noise and Vibration in National Roads Schemes” or such further limits as imposed by Galway City Council. The proposed development will comply with BS 5228 “Noise Control on Construction and open sites Part 1: Code of practice for basic information and procedures for noise control.”

Construction equipment for use outdoors will comply with the European Communities Regulations– Noise Emission by Equipment for Use Outdoors – SI 241 - 2006.

Noise emissions arising from construction phase operations at the proposed development site will not exceed the identified 65 dB $L_{Aeq 1h}$ criterion at receptors.

No other specific mitigation measures are warranted. Several general measures are proposed as follows:

- Construction operations will in general be confined to the period Monday-Friday 0800-1900 h, and Saturday 08:00-14:00 h.
- Plant used onsite during the construction phase will be maintained in a satisfactory condition and in accordance with manufacturer recommendations. In particular, exhaust silencers will 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 will be replaced with flat spectrum alarms.
- Erection of solid barriers (hoarding) to site boundary

3.6.4 Road Cleaning and Wheel Washing

The Contractor will make provision 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 on a daily basis during the excavation works and as required thereafter. 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 suitably treated on site and all settled silts disposed offsite to licensed landfill. All road sweeping vehicles will be emptied off site at a suitably licensed facility as per our construction stage environmental waste management document.

3.6.5 Water Supply

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

3.6.6 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.

Any sewage or greywater generated during the operational phase of the proposed development will be directed to the local municipal wastewater treatment plants for treatment via the sewage collection network.

3.6.7 Surface water runoff

All surface water runoff will be generated on site will percolate to ground. Silt fencing will be placed down gradient of works during the construction phase of the proposal to avoid any potential for impact on downstream waterbodies. Water will be allowed to percolate naturally to ground. Where pumping is required, siltbuster bags will be used to prevent the generation of suspended solids. In addition, water will be pumped at rates capable of allowing natural percolation (greenfield rates).

3.6.8 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.

3.6.9 Construction Traffic/Plant

The following mitigation measures will be implemented in relation to construction traffic and plant/machinery:

- All vehicles to switch off engines when not in use – no idling vehicles
- Effective vehicle cleaning and wheel washing on leaving site and damping down of haul routes
- 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.
- Hard surfacing and effective cleaning of haul routes and appropriate speed limit around site

3.7 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 that the development will drain via gravity to 12 no. soakaways proposed on site. Water draining to soakaways will pass through silt traps and hydrocarbon interceptors prior to reaching each soakaway. No surface water from roofs or paved surfaces will be discharge from the site, other than via the soakaways to ground. The proposed on-site foul sewers will discharge by gravity to a pumping station to the northwest of the site, and the foul waste will discharge from this pumping station via pumped rising main to the public (Irish Water) foul sewer network.

3.8 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 as permanent, and will not be decommissioned.

Environmental Impact Assessment Report (EIAR)

Strategic Housing
Development at Rosshill,
Co. Galway





DOCUMENT DETAILS

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4. POPULATION AND HUMAN HEALTH

4.1 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 set out by the Environmental Protection Agency (EPA) in ‘in particular the Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports’ (EPA, August 2017). The full description of the proposed development is provided in Chapter 3 of this EIAR.

One of the principle 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. Ultimately, all the impacts of a development impinge on human beings, directly and indirectly, positively and negatively. 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.

4.2 Statement of Authority

This section of the EIAR has been prepared by Eoin Gilson and reviewed by Michael Watson, both of MKO. Eoin is an experienced Environmental Scientist with over a years’ experience in Environmental Consultancy. Eoin holds a BSc (Hons) in Microbiology and a MSc (Hons) in Applied Environmental Science. Michael has over seventeen 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).

4.3 Methodology

Information regarding human beings and general socio-economic data were sourced from the Central Statistics Office (CSO), the ‘Galway City Development Plan 2017– 2023’, 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, Galway City 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 the 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 eastern 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 4.1. The Human Beings Study Area which is the area of Galway City, has a combined population of 78,668 persons and comprises a total land area of 4915 hectares or 49.15 square kilometres (Source: CSO Census of the Population 2016).

For reference, the proposed development site lies within Murrough DED, as shown in Figure 4.1, which runs alongside Ballybaan DED.

4.4 Receiving Environment

4.4.1 General Site Description

The site area comprises approximately 10ha of land located within the townlands of Roscam, Merlin Park and Murrough to the south east of Galway City. Access to the site is along on the Rosshill Road, which connects to the Old Dublin in the west and the Coast Road in the east. The development site is currently used for rough grazing agriculture.

The proposed development is fully described in Chapter 3 but will consist of the following:

1. Construction of 342 no. residential units comprising:

- 36no. Four Bed Semi-Detached Houses
- 2 no. Four Bed Detached Houses
- 68 no. Three Bed Semi-Detached Houses
- 63 no. Three Bed Terrace
- 6 no. Two Bed Terrace
- 5 no. Three Bed Long Semi-Detached Houses
- 5 no. Four Bed Long Semi-Detached Houses
- 38 no. One Bed Apartments
- 119 no. Two Bed Apartments

4.4.2 Settlement and Land-use

The proposed site is located within the Galway City boundary; however, the general area is rural in character and is surrounded by a number of small residential developments and individual houses

There are numerous existing housing, located within 500m of the proposed development site. Other permitted and proposed developments are also located in the area surrounding the site, with the most significant described in Section 2.9.2 of this EIAR. The nearest residential housing is located along the Rosshill Road to the south east of the site.

The primary land-use in the vicinity of the site comprises a mix of agricultural land and rural housing.

4.4.3 Population

4.4.3.1 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, County Galway and the Study Area have been obtained from the Central Statistics Office (CSO) and are presented in Table 4-1.

Table 4-1 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	75,529	78,668	4.2%



Figure 4-1 District Electoral Divisions

The data presented in Table 4.1 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 both County and 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 rates for both Galway City and the Republic of Ireland for the same time.

4.4.3.2 Population Density

The population densities recorded within the State, County Galway and Galway City during the 2016 Census are shown in Table 4-2.

Table 4-2 Population Density in 2016 (Source: CSO)

Area	Population Density (Persons per square kilometre)	
	2011	2016
State	65.57	68.06
County Galway	41.77	43.00
Galway City	1536.7	1600.6

The population density of Galway City recorded during the 2016 Census was 1600.6 persons per square kilometre. This figure is significantly higher than the national population density of 69.6 persons per square kilometre and the county population density of 29.9 persons per square kilometre.

4.4.3.3 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 4.3.

Table 4-3 Number of Household and Average Household Size 2011 – 2016 (Source: CSO)

Area	2011		2016	
	No. of Households	Avg. Size (persons)	No. of Households	Avg. Size (persons)
State	1,654,208	2.8	1,697,665	2.8
County Cork	62,456	2.8	63,040	2.8
Galway City	27,726	2.7	28,859	2.7

In general, the figures in Table 4.3 show that while the number of households in the Republic of Ireland, County and City 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 less people per house. Average household size recorded within Galway City during the 2011 and 2016 Censuses are in line with that observed at national and County level during the same time periods.

4.4.3.4 Age Structure

Table 4.4 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 4-4 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 there is an expected difference, the highest population percentage occurs within the 25 - 44 age category.

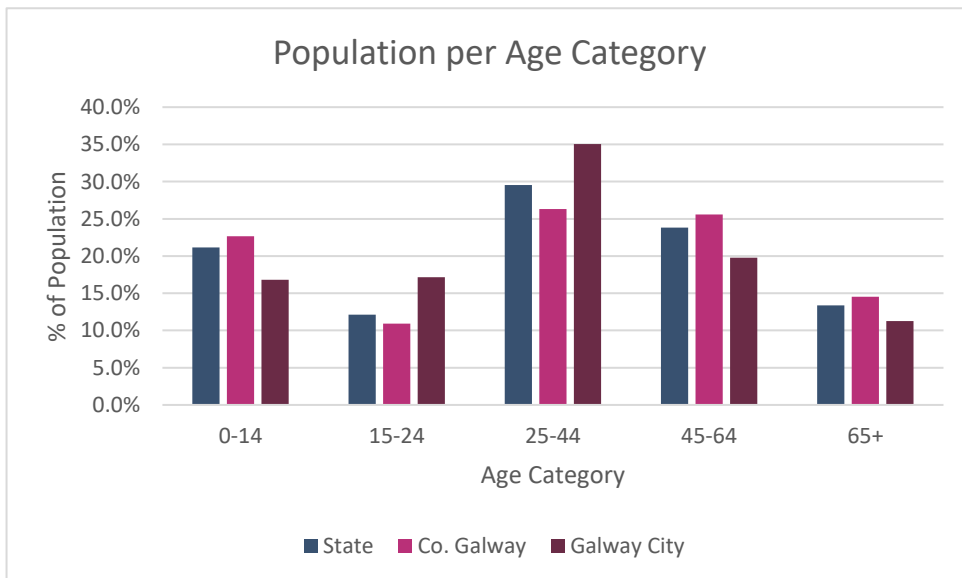


Figure 4-2 Population per Age Category in 2016 (Source: CSO)

4.4.4 Employment and Economic Activity

4.4.4.1 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 4.3 shows the percentages of those employed in each socio-economic group in the Republic of Ireland, Co. Galway and Galway City during 2016.

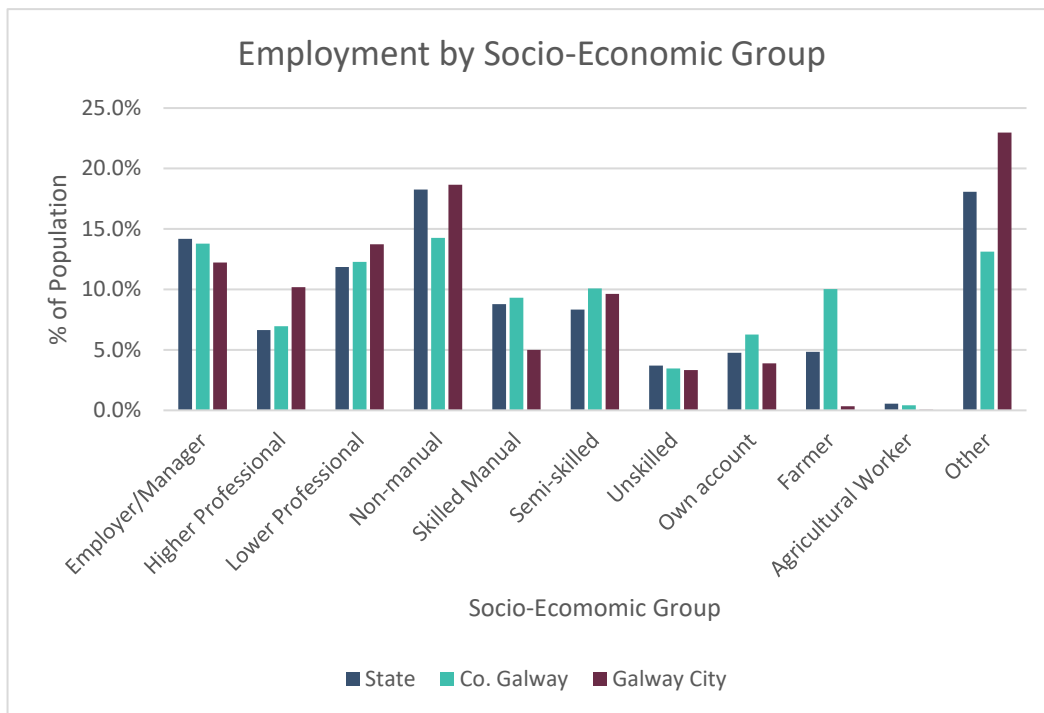


Figure 4-3 Employment by Socio-Economic Group in 2016 (Source: CSO)

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 4.3.

4.4.5 Land-use

The proposed development involves replacing the agricultural/greenfield land with a mixture of buildings and landscaped areas. The proposed development will ensure that all excavations are filled with soil and stone, and the entire site is left in a safe state. Once complete the landscaped areas will offer a useful amenity area for residents and those working within the site as well as for people in the locality. The proposed new development will provide much needed housing stock for the city of Galway.

Within the Galway City Development Plan 2017, the subject site is zoned for Low Density Residential (LDR) and Agriculture and Amenity (G) development. Other land use zoning objectives which are mapped in the area surrounding the site include Residential and Recreational and Amenity. This is shown in Figure 4.4.

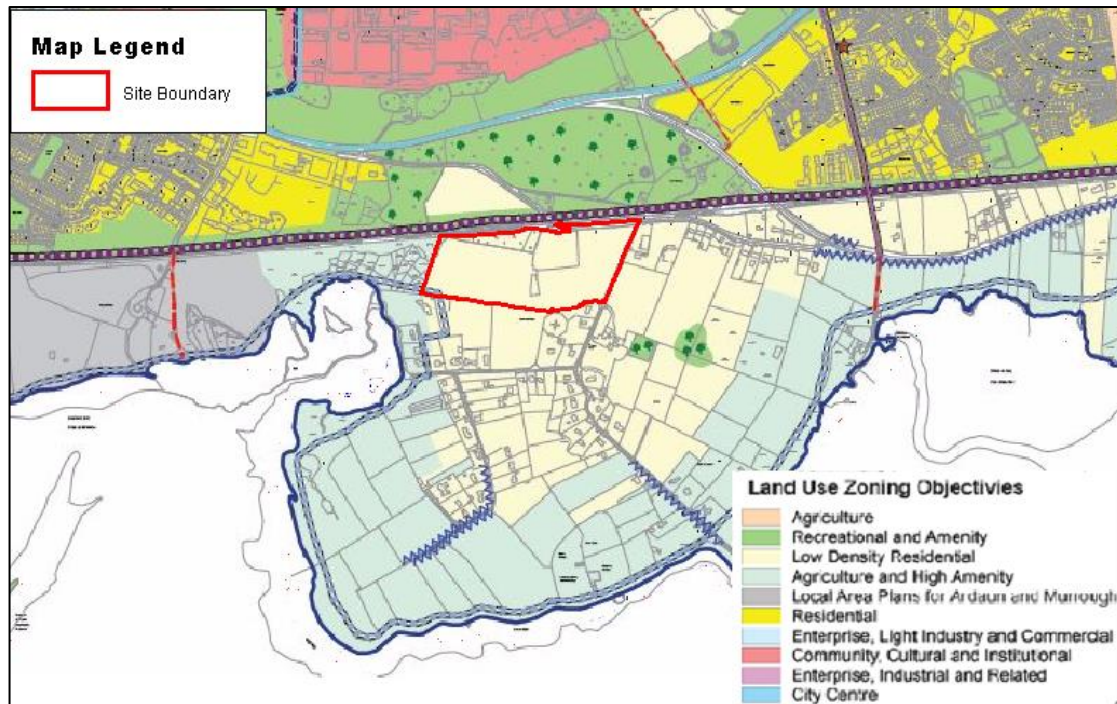


Figure 4-4 Land-use Zoning Map extracted from GCC Development Plan 2007-2023

4.4.6 Tourism

4.4.6.1 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 2017, total tourism revenue generated in Ireland was approximately €8.8 billion, an increase on the €8.3 billion revenue recorded in 2016. Overseas tourist visits to Ireland in 2017 grew by 3.2% to 9.0 million (‘Tourism Facts 2017’, Fáilte Ireland, July 2018).

Ireland is divided into eight tourism regions.

Table 4-5 shows the total revenue and breakdown of overseas tourist numbers to each region in Ireland during 2017 (‘Tourism Facts 2017’).

Table 4-5 Overseas Tourists Revenue and Numbers 2017 (Source: Fáilte Ireland)

Region	Total Revenue (€m)	Total Number of Overseas Tourists (000s)
Dublin	€1,981 m	5,936
Mid East	€207 m	633
Midland	€85 m	218
South-East	€271 m	954
South-West	€968 m	2,439
Mid West	€444 m	1,387
West	€694 m	1,911

Region	Total Revenue (€m)	Total Number of Overseas Tourists (000s)
Border	€271 m	746
Total	€4,921 m	14,244

The West region, in which the proposed residential site is located, comprises Counties Galway, Mayo and Roscommon. This Region benefited from approximately 13% of the total number of overseas tourists to the country and approximately 14% of the associated tourism income generated in Ireland in 2017.

4.4.6.2 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 (Eamon Deacy Park, The Sportsground, Galway Racecourse, Pierce Stadium, etc.). The proposed development does not directly impact on any of these sites of existing tourism attractions. The adjacent Menlo Park Hotel, Nox Hotel, Maldron Hotel and other tourist accommodations in the wider area will attract a significant number of tourists to stay.

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 views within the footprint of the proposed development. There are no protected views within the site boundary of the proposed development. However, there are protected views within the study area, located within 5 km from the proposed development. These are **V8** - Seascape views of Galway Bay from the old Dublin Road to the city boundary, **V9** - Views towards the sea at Roscam., **V13** - Seascape views of Galway Bay at Ballyloughane from south of the railway bridge. For further information on these views, see Landscape and Visual, Chapter 10 of this EIAR.

The potential for visual impacts arising from the proposed development on the wider landscape and scenic roads is assessed in Chapter 10 of this EIAR.

4.4.7 Local Amenities

4.4.7.1 Education

The primary school located closest to the proposed development site is the Merlin Woods Primary School, located in Doughiska, approximately 1.2 kilometres northeast of the proposed development site. The secondary school located closest to the proposed development site is Colaiste Mhuirinne, which lies adjacent to the Merlin Woods Primary school and is also approximately 1.2 kilometres northeast of the site.

The third-level institution of Galway-Mayo Institute of Technology (Cluain Mhuire Campus) is located approximately 1.5 kilometres northwest of the proposed development site. The National University of Ireland (NUI) Galway main campus is located 4.8 kilometres to the west of the site. It is estimated that approximately 20% of the population of Galway city are students.

4.4.7.2 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 4 kilometres west of the site, approximately 60 minutes' walk away or 15 minutes by bicycle. The station provides train services to Dublin, Limerick and Cork and intervening stations.

There are several bus stops along the old Dublin Road which runs parallel to the proposed development. The nearest is located approximately 1km from the site of the proposed development along the Old Dublin Road, approximately 350m from the Rosshill Road Junction. This bus stop is covered by two services with the 404 route and the 409 route. These provide transport to the city centre, and further west to Westside and east to Oranmore. 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, the provision and maintenance of pedestrian and cycle infrastructure is intended, 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.

4.4.7.3 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. Ballybane, Roscam and Doughiska), as well as in the wider Galway City. The main church located closest to the proposed development site is 2 kilometres to the west in Renmore.

There are a wide range of services available in the area. Retail and personal services are found throughout Galway city, with local services in Roscam, Doughiska, and Ballybane. Galway City Council has a branch library in Ballybane.

4.5 Human Health

The consideration of potential impacts on human health are examined separately 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 Sections 4.7.2 and 4.7.3 below. Potential issues relating to health and safety, and amenity concerns are also discussed below.

4.6 Social and Economic Assessment

4.6.1 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 Northern & Western Regional Assembly (NWRA) recently published the Draft Regional Spatial and Economic Strategy (RSES) on the 19th November 2018 which has set out ambitious housing targets specifically for the Galway Metropolitan Area. The draft 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(A) 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:

2. *Population of Galway MASP to grow by 25,000 to 2026 and by 38,300 to 2031 with the population of the City and Suburbs accommodating 19,200 to 2026 and 28,000 to 2031.*
3. *Deliver at least half (50%) of all new homes that are targeted within the MASP to be within the existing built-up footprint.”*

It is anticipated that the RSES will be adopted in the first half of 2019.

4.7 Likely and Significant Impacts and Associated Mitigation Measures

4.7.1 Do-Nothing Effects

If the proposed residential 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 residential site would be lost. It is considered that the ‘Do Nothing’ impact would be permanent, negative and slight as the proposed development site is zoned for residential development and will contribute to the much needed housing stock of Co. Galway.

4.7.2 Construction Phase

4.7.2.1 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 facility. All site staff will be made aware of and adhere to the company Health and Safety Plan.
- Only appropriately qualified and trained personnel will be permitted to operate machinery onsite.
- Appropriate barriers and signage will be used.
- The proposed development site will not be accessible to members of the public.
- The site will also be secure to prevent the risk of trespass through signage and provision of barriers.

Residual Effects

Short-term slight Negative Impact.

Significance of Effects

Based on the assessment above there will be no significant effects

4.7.2.2 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

Short-term Positive impact

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.2.3 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 community.

Residual Effect

No negative impact

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.2.4 Tourism

During the construction phase of the proposed development, there will be no negative impact on tourism, as there are no tourist attractions in the vicinity of the subject site

Residual Effect

No negative impact

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.2.5 Land-use

The construction phase involves a change in land use of the site from a previous agricultural site, which has no current activity, to use as a temporary construction site. These activities will result in a permanent change in land-use to one of residential and commercial use. This is considered to be a permanent positive impact on an area of land that had no current use.

Residual Effect

No negative impact

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.2.6 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

No negative impact

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.2.7 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 described in Section 9 of this EIAR.

Mitigation

Noise emissions arising from construction phase operations at the proposed development site will not exceed the identified 65 dB LAeq 1 h criterion recommended by BS 5228-1:2009+A1:2014, and the 70 dB criterion recommended by the National Roads Authority (now Transport Infrastructure Ireland). At most offsite receptors, LAeq 1 h levels will be lower than 55 dB. The highest level will be received at the dwelling outside the southeast corner, where the received LAeq 1 h level during worst case scenario operations will reach 63 dB.

Best practice measures for noise control 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:

- Construction operations will in general be confined to the period Monday-Friday 0800-1900 h, and Saturday 08:00-14:00 h.

- Plant used onsite during the construction phase will be maintained in a satisfactory condition and in accordance with manufacturer recommendations. In particular, exhaust silencers will 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 will be replaced with flat spectrum alarms.

Residual Effect

Short-term slight Negative Impact

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.2.8 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.

Mitigation

The following measure will be enforced to ensure that dust and vehicle emission nuisance during the construction phase beyond the site boundary is minimised.

- All construction vehicles and plant will be maintained in good operational order while onsite, thereby minimising any emissions that arise.
- Overburden will be progressively removed from the working area in advance of construction.
- Dampening down the dust at the source by the use of barriers such as debris netting on scaffolding around the building to block dust escaping where the building is within 10m of the site boundary where residential properties exist.
- Site road ways will be maintained in a stoned hard core condition not allowing soil to accumulate which when dry can create dust.
- Wheel wash equipment will 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.
- Plant and equipment that have the potential to create volumes of dust will have appropriate attachments to allow water source to dampen dust to not allow it to get airborne.
- Deploy Road Sweeper as required on External Roads.

Residual Effect

Short-term Imperceptible Negative effect.

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.2.9 Traffic

All deliveries and vehicles into site will access the site from the new site entrance which will be located on the eastern side of the site boundary along the Rosshill road.

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.

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 phase of the development. Due to the designated access point off the Rosshill road, allowing delivery vehicles to pull off the road into the site, there will be no significant disruption on the traffic flows on the Rosshill Road as a result of the construction of the development. It is recommended that all deliveries are provided with instructions / directions on accessing the site from the Rosshill Road and surrounding local road network. The potential impacts for traffic and transportation are discussed in detail in Section 12 of this EIAR.

Residual Effect

Short-term Slight Negative Impact.

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.3 Operational Phase

4.7.3.1 Health and Safety

Upon completion, the proposed development is unlikely to have any negative significant impact on human health.

The design, layout and separation distances of the houses and apartment blocks have been designed to optimise the ingress of natural daylight/sunlight and to incorporate passive surveillance, with all units designed to include secure, passively surveyed, own door access.

Residual Effect

No negative impact

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.3.2 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, 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

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.3.3 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.

Residual Effect

No negative impact

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.3.4 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.

Residual Effect

No negative impact

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.3.5 Land-use

The site is currently a greenfield site, past use as agricultural land. The proposed residential development will result in a change of land-use to residential. The total proposed area to be upgraded measures approximately 10 hectares in area. The change in the land-use of this area would be significant in the context of the local and wider area, with resultant permanent moderate positive impact on land-use.

Residual Effect

No negative impact

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.3.6 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 9 of this EIAR.

Residual Effect

No negative impact

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.3.7 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 Section 8 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

No negative impact

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.3.8 Traffic

The Traffic and Transport Assessment, as summarised in Section 12 of the EIAR and presented in Appendix 12-1, calculates that during the operation phase of the proposed residential development, Access to the proposed development is to be facilitated via the existing road infrastructure. TRICS data for similar sized residential developments were obtained in order to inform the trip rate associated with such a development. It is anticipated that a total of 232 trip movements in the AM peak and a total of 188 trip movements in the PM peak are expected to result from the proposed development.. Details of the TRICS data utilised are included in Appendix B of the Traffic and Transport Report included in this submission.

Further details on the traffic and transportation impact assessment are presented in Section 12 of this EIAR

Mitigation

Details on the traffic and transportation mitigation measures are presented in Section 12.1.8.4 of this EIAR.

Residual Effect

Long-term Slight Negative Impact

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.3.9 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 residential development with the potential to cause significant environmental pollution and associated negative effects on health such as bulk storage of hydrocarbons or chemicals, storage of wastes etc. are limited.

Mitigation

There is no site specific mitigation required for the proposed residential development. 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 7 of this EIAR. 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. As described earlier, there are no significant sources of pollution within the proposed residential site with the potential to cause environmental or health effects.

Residual Effect

Unlikely Imperceptible Temporary Negative Impact

Significance of Effects

Based on the assessment above there will be no significant effects.

4.7.4 Cumulative Effect

The potential cumulative effects between the proposed restoration works and the other projects described in Section 2 of this report, hereafter referred to as the other projects, have been considered in terms of impacts on human beings.

4.7.4.1 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.

4.7.4.2 **Dust and Noise**

Potential cumulative effects associated with dust and noise are addressed in Sections 8.3.5 and 9.5.7 of this ER respectively and conclude that there will be imperceptible effects

4.7.4.3 **Traffic**

Potential cumulative effects associated with traffic are addressed in Sections 12.1.8.3 of this ER. The findings of the assessment indicate that there is only one other housing development proposed in the area that would result in potential cumulative traffic impacts with the proposed restoration scheme. However the results of the assessment find that this will result in a long term imperceptible negative cumulative impact on local traffic.

4.7.4.4 **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. This would result in local retailers and businesses experiencing a short-term positive impact on their cash flow.

4.7.4.5 **Population**

Those working within the proposed residential site and the other projects in the area during the construction phase, will travel daily to the site from the wider area. These projects will have no impact on the population of the Study Area in terms of changes to population trends or density, household size or age structure.

4.7.4.6 **Land-use**

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

The impact of the proposed residential site is negligible as the site will have a positive impact on the surrounding area, on a site that previously had no other use. As there will be a negligible impact the potential for cumulative impacts are negligible.

4.7.4.7 **Tourism and Amenity**

There are no tourist attractions in the immediate vicinity of the proposed residential site. Key tourist attractions within the wider area of Galway City include NUI Galway, theatres, Sports facilities, etc as noted above in Section 4.4.6.2

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.



APPENDIX 1

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APPENDIX 2

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5. BIODIVERSITY

5.1 Introduction

This chapter assesses the likely significant effects that the proposed housing development (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 April and September 2019, 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 3 of this EIAR.

The following is a glossary to the technical terms used in this chapter:

- “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 following best available guidance and adopting a precautionary approach.

5.2 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 2017.
- The European Communities (Birds and Natural Habitats) Regulations 2011 (transposes EU Birds Directive 2009/147/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).
- Guidelines for assessment of Ecological Impacts of National Road Schemes, (NRA, 2009).
- EPA (2017). Draft 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.
- 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. Letters of response were received on the 11th of April 2019 and 03rd September 2019 and are included in Appendix 5.1. The recommendations of the DAU have been considered in the preparation of this NIS.

5.3 Statement of Authority

A field assessment and dusk bat survey was undertaken in April 2019 by Sarah Mullen (BSc, PhD) and Claire Stephens (BSc) of MKO. The site was revisited again in July 2019 by Sarah Mullen to undertake relevés of grassland and woodland vegetation within the development site. A second dusk bat survey was undertaken in September 2019 by Sarah Mullen and Julie O’Sullivan (BSc, MSc). MKO ecologists are trained in field ecology and are experts in undertaking surveys to this level. This report has been prepared by Sarah Mullen. This report has been reviewed by John Hynes (B.Sc., M.Sc., MCIEEM) who has over 8 years’ experience in ecological assessment.

5.4 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).

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

5.4.1 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), Teagasc, EPA (Envision), Water Framework Directive (WFD) & Inland Fisheries Ireland (IFI).
- Review of Bird Atlases: (Sharrock, 1976; Lack, 1986; Gibbons *et al.*, 1993; Balmer *et al.*, 2013).
- Review of Irish Wetland Bird Survey (I-WeBs) surveys from proximal survey sites.
- Review of the Bat Conservation Ireland (BCI) Private Database.
- 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

5.4.2 Field Surveys

Initially, multidisciplinary ecological walkover surveys of the development site were undertaken on the 16th of April 2019 by Sarah Mullen (BSc, PHD) and Claire Stephens (BSc) of MKO.

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 site was revisited on the 9th of July by Sarah Mullen. During this visit 2m x 2m relevés were taken in all grassland habitats within the site and a 10m x 10m relevé was taken within woodland habitat. Relevé data was utilized to determine the presence or absence of Annex I habitats within the study area in accordance with Perrin *et al.* (2008) and O’Neill *et al.* (2013) and is included in Appendix 5.2 of this report.

The multi-disciplinary walkover survey was designed to detect the presence, or likely presence, of a range of protected habitats and species. Incidental sightings/observations of additional fauna were noted during

the site visit. Surveys were undertaken in accordance with best practice guidance (TII, 2008: *Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*).

During the multidisciplinary survey 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).

The multidisciplinary survey also included a bird survey of the proposed development site. All species recorded on the site during the April 2019 and July 2019 site visits were recorded.

Otter was considered and surveyed for during the multi-disciplinary walkover surveys with no signs of the species or significant habitat recorded either within or adjacent to the site. Otter surveys were conducted as per NRA (2006) guidelines. This involved a search for otter signs e.g. spraints, scat, prints, slides, trails, couches and holts.

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.

5.4.2.1 Bat Surveys

5.4.2.1.1 Appraisal of Bat Habitat

A bat walkover survey of the study area was carried out during daylight hours on the 16th of April 2019. During the walkover, mature trees within the development site and the ruins of the old building to be demolished were visually assessed for their suitability to support bats. Suitability was assessed according to Collins (2016) which provides a grading protocol for roosting habitats and for commuting and foraging areas. Suitability categories are divided into *High*, *Moderate*, *Low* and *Negligible*.

The survey of the ruin comprised a detailed inspection of the remaining walls to look for evidence of bat use, including live and dead specimens, droppings, feeding remains, urine splashes and fur oil staining and noises (Collins, 2016). The ruins contained no roof, being entirely open in nature.

5.4.2.1.2 Dusk Activity surveys

The walkover survey on the 16th April 2019 was followed by a dusk bat activity survey of the site. Two surveyors were equipped with an active full spectrum bat detector, a Batlogger M (Elekon, Lucerne, Switzerland) and a Heterodyne Pettersson D200x bat detector and walked a transect route within the site focusing on treelines, woodland and hedgerow delineating the site boundaries and internal field boundaries, and the ruins of the old building to be demolished (refer to Figure 5.4 for transect route). Where possible, species identification was made in the field and any other relevant information was also noted, e.g. numbers, behavior, features used, etc. All bat echolocation was recorded for subsequent analysis to confirm species identifications.

The dusk survey commenced 30 minutes before sunset and was completed within 3 hours after sunset. Conditions were suitable for bat survey as per Collins (2016); dry, mild (12 °C at sunset) with only light air (Beaufort Scale Force 1). The moon was almost full, and cloud cover was approximately 30% during the dusk survey.

A second dusk bat activity survey was undertaken on the 17th September 2019. Again, two surveyors were equipped with an active full spectrum bat detector, a Batlogger M (Elekon, Lucerne, Switzerland) and a Heterodyne Pettersson D200x bat detector and walked a transect route within the site focusing on treelines, woodland and hedgerow delineating the site boundaries and internal field boundaries, and the ruins of the old building to be demolished (refer to Figure 5.5). The dusk survey commenced 30 minutes

before sunset and was completed within 2 hours after sunset. Conditions were suitable for bat survey as per Collins (2016); dry, mild (17 °C at sunset) with only light air (Beaufort Scale Force 1). The moon was almost full, and cloud cover was approximately 0% during the dusk survey.

April and September are within the suitable survey period for bat activity surveys, provided weather conditions are favourable (Collins, 2016). No limitations associated with seasonality, timing or weather conditions were identified.

5.4.2.1.3 **Static Detector Survey**

Two full spectrum bat detectors, SM4BAT (Wildlife Acoustics, Maynard, MA, USA), were deployed on site on the 18th September 2019 and collected on the 24th September 2019 to record bat activity at two fixed locations. The two 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.

All data was processed using Kaleidoscope Pro and all bat calls were manually identified. Individual bats of the same species cannot be distinguished by their echolocation alone. Thus, ‘bat passes’ was used as a measure of activity (Collins, 2016). For the purposes of this survey, a bat pass was defined as a recording of an individual species/species group’s echolocation containing at least two echolocation pulses and of maximum 15 seconds length.

Bat activity levels were analysed using the web-based Ecobat tool which allows users to upload activity data and to contrast results with a comparable reference range, allowing objective interpretation. The reference range dataset was stratified to include:

- Only records from within 30 days of the survey date.
- Only records from within 100km² of the survey location.
- Records using any make of bat detector.

5.4.2.1.4 **Static Detector Analysis**

Echolocation signal characteristics (including signal shape, peak frequency of maximum energy, signal slope, pulse duration, start frequency, end frequency, pulse bandwidth, inter-pulse interval and power spectra) were compared to published signal characteristics for local bat species (Russ, 1999). Myotis species (potentially *M. daubentonii*, *M. mystacinus*, *M. nattereri*,) were considered as a single group, due to the difficulty in distinguishing them based on echolocation parameters alone (Russ, 1999). The echolocation of *P. pygmaeus* and *P. pipistrellus* are distinguished by having distinct (peak frequency of maximum energy in search flight) of ~55 kHz and ~ 46 kHz respectively (Jones & van Parijs, 1993).

5.4.3 **Methodology for Assessment of Effects**

5.4.3.1 **Geographical Framework**

Guidance on Ecological Impact Assessment (CIEEM, 2018) 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.

5.4.3.2 Characterising Ecological Impacts and Effects

Effects identified have been described in accordance with (EPA, 2017) impact assessment criteria presented in Table 5.1. The criteria for characterising magnitude and scale of ecological impacts are further contextualised based on CIEEM guidelines (CIEEM, 2019) in Table 5.2.

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 5.1 Criteria for assessing impact quality based on (EPA, 2017)

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 5.2 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.

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

5.4.3.3 Significance of Effect

The criteria for assessing impact significance based on EPA guidelines is outlined in Table 5.3 (EPA, 2017).

Table 5.3 Criteria for assessing impact significance based on (EPA, 2017)

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) 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).

5.4.3.3.1 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.

5.4.3.3.2 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) 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).

5.4.3.4 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 biodiversity are adequately addressed and no significant residual effects are likely to remain following the implementation of mitigation measures / best practice.

5.4.3.5 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 during between April 2019 and September 2019.

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

5.5 Baseline Conditions and Receptor Evaluation

5.5.1 Desk Study

5.5.1.1 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'.

5.5.1.1.1 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.

5.5.1.1.2 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).

5.5.1.1.3 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.

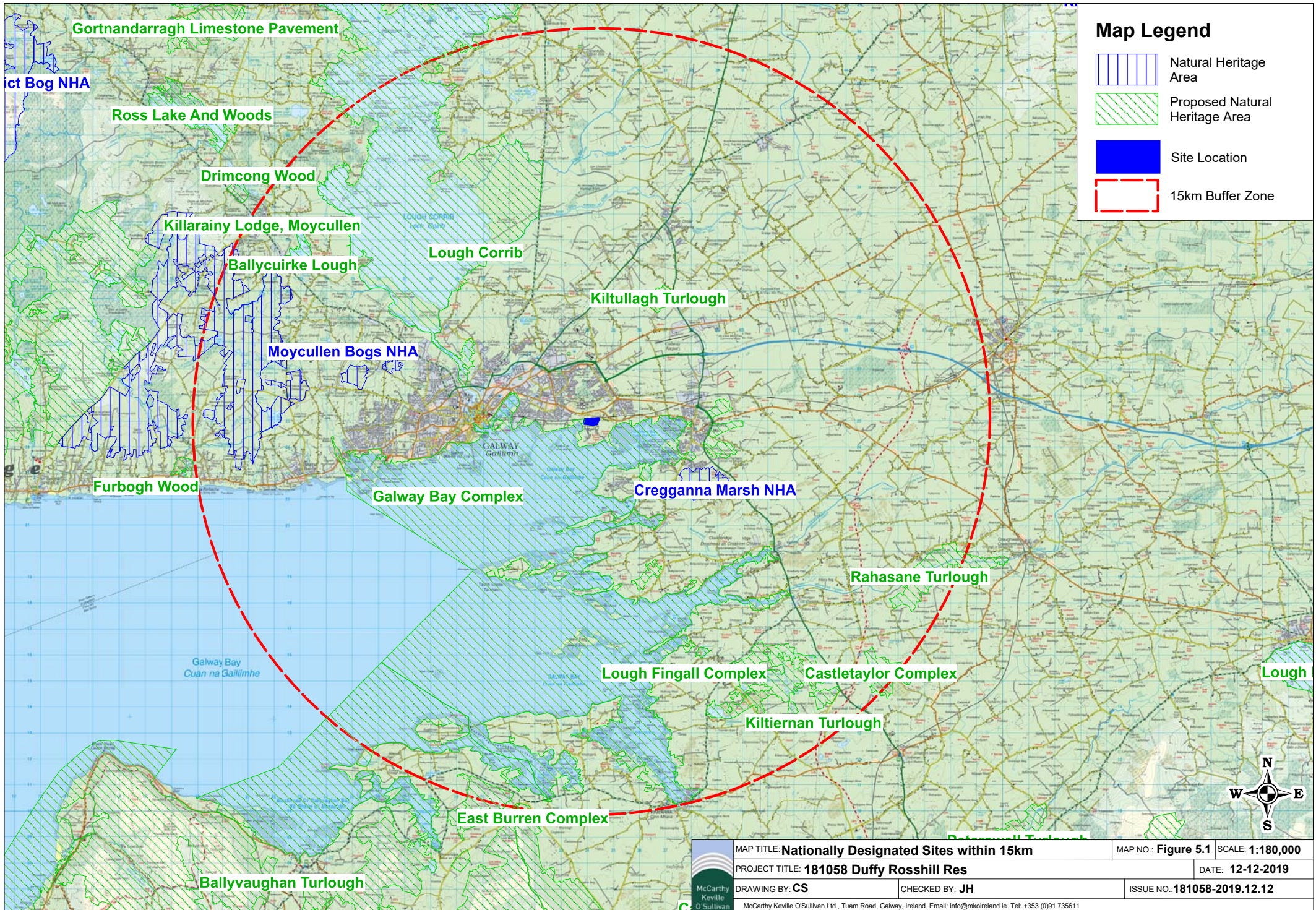
5.5.1.1.4 Identification of the Designated Sites within the Likely Zone of Influence of the Proposed Development

Nationally Designated Sites

Using GIS software (MapInfo v10.0), sites designated for nature conservation within the vicinity of the proposed development were identified. Initially, sites within a 15 km radius of the proposed works were identified. Designated sites located outside the 15km buffer zone were also taken into account and assessed. In this case, no potential for impacts outside the 15km buffer was identified. The potential for the proposed development to result in effects on all these designated sites was considered in the completion of this assessment. The 15km buffer distance was extrapolated from DoEHLG Guidance on Appropriate Assessment (2010). The Nationally designated sites are listed in Table 5.4 and displayed in Figure 5.1.

Table 5.4 Nationally designated sites in the Zone of Influence

Designated Site	Distance from Proposed Development (km)
Natural Heritage Area (NHA)	
Cregganna Marsh NHA [000253]	3.7km
Moycullen Bogs NHA [002346]	7.3km
Proposed Natural Heritage Areas (pNHA)	
Galway Bay Complex	5.0m
Kiltullagh Turlough	4.5km
Lough Corrib	4.7km
Lough Fingall Complex	10.4km
Ballycuike Lough	12.0km
Rahasane Turlough	13.1 km
Kiltiernan Turlough	13.2 km
Castletaylor Complex	13.5km
East Burren Complex	14.2 km
Killarainy Lodge, Moycullen	13.1 km



Map Legend

- Natural Heritage Area
- Proposed Natural Heritage Area
- Site Location
- 15km Buffer Zone



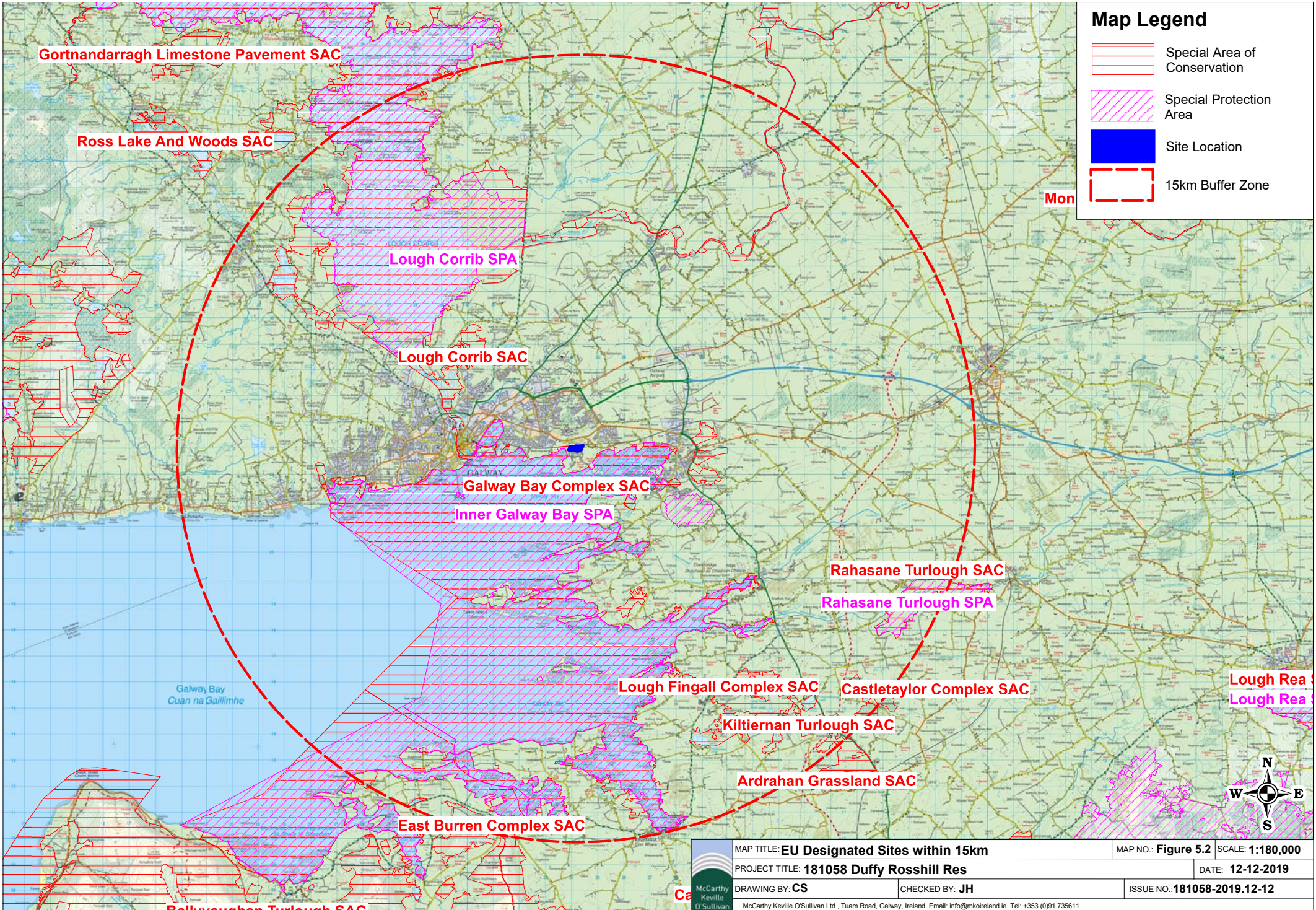
	MAP TITLE: Nationally Designated Sites within 15km	MAP NO.: Figure 5.1	SCALE: 1:180,000
	PROJECT TITLE: 181058 Duffy Rosshill Res	DATE: 12-12-2019	
	DRAWING BY: CS	CHECKED BY: JH	ISSUE NO.: 181058-2019.12.12
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European Sites





Using GIS software, European sites designated for nature conservation within the vicinity of the proposed development were identified. Initially, sites within a 15 km radius of the proposed works were identified as per DoEHLG Guidance (2010). European Sites located outside the 15km buffer zone were also taken into account and assessed. In this case, no potential for impacts outside the 15km buffer was identified. The designated sites are listed in Table 5.5 and displayed in Figure 5.2. The potential for the proposed development to result in effects on all these designated sites was considered in the completion of this assessment.

Table 5.5 European designated sites within 15km of the proposed development

Designated Site	Distance from Proposed Development (km)
Special Areas of Conservation (SAC)	
Galway Bay Complex SAC (000268)	5.0m
Lough Corrib SAC (000297)	4.1km
Lough Fingall Complex SAC (000606)	10.4km
Rahasane Turlough SAC (000322)	13.1km
Kiltiernan Turlough SAC (001285)	13.2km
Castletaylor Complex SAC (000242)	13.5km
East Burren Complex SAC (001926)	14.2km
Ardrahan Grassland SAC (002244)	14.5km
Special Protection Area (SPA)	
Inner Galway Bay SPA (004031)	94.8 m
Cregganna Marsh SPA (004142)	3.7km
Lough Corrib SPA (004042)	6.5km
Rahasane Turlough SPA (004089)	13.0km



Map Legend

-  Special Area of Conservation
-  Special Protection Area
-  Site Location
-  15km Buffer Zone

MAP TITLE: **EU Designated Sites within 15km**

MAP NO.: **Figure 5.2** SCALE: **1:180,000**

PROJECT TITLE: **181058 Duffy Rosshill Res**

DATE: **12-12-2019**

DRAWING BY: **CS**

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5.5.2 Bird Atlases

A number of sources were assessed to determine the likely usage of the site by both breeding and wintering bird species, including Bird Atlases, National Biodiversity Data Centre (NBDC), BirdWatch Ireland and Conservation Objectives Supporting Documents from the National Parks and Wildlife Service (NPWS) for nearby Special Protection Areas (SPAs). The following sub sections provide a breakdown of the sources used and results obtained.

5.5.2.1 Breeding and Wintering Bird Atlases

The *Bird Atlas 2007-11: The breeding and wintering birds of Britain and Ireland* (Balmer *et al.*, 2013) provides the most up-to-date information regarding the distribution and relative abundance of bird species in Britain and Ireland, based on surveys carried out between 2007 and 2011.

The atlases show data for breeding and wintering birds respectively in individual 10 km by 10 km squares (hectads). Table 5.6 shows species that have been recorded within the relevant hectad (M32) that are listed in Annex I of the EU Birds Directive or on the BoCCI Red List. In addition, Table 5.6 shows those species found in the relevant hectad (M32), which are recorded as breeding in the most recent atlas. Birds listed under Annex I are offered special protection by the EU Birds Directive. Those listed on the Birds of Conservation Concern in Ireland (BoCCI) Red List meet one or more of the following criteria:

- IUCN: Global conservation status (Critically Endangered (CE), Endangered (E) or Vulnerable (V), but not Near Threatened. These species are recognised as the highest priorities for action at a global scale and are thus priorities at an all-Ireland level.
- European conservation status. The conservation status of all European species was assessed most recently by Birdlife International (2004), one of the main changes in the revision being to include the IUCN criteria. These species are those of global conservation concern (including those classified as Near Threatened) and are Red-listed.
- The Irish breeding population has undergone significant historical decline since 1800.
- The Irish breeding population or range has declined by 50% or more in the thirteen years from 1998-2011 (BDp1) or the 25 years from 1980-2013 (BDp2).
- The Irish non-breeding population has undergone a significant decline of 50% in the last 25 years.
- The Irish breeding range has undergone a decline of 70% or more in the last 25 years.

Thirteen species listed under Annex I of the EU Birds Directive and 16 red listed-birds of conservation concern have been recorded within the relevant hectad. Two species were listed under both Annex I of the EU Birds Directive and on the BoCCI red- list. It should be noted that many of these species are predominantly associated with coastal and marine habitats and are unlikely to occur within the habitats found on site.

Table 5.6 Bird Atlas and NBDC Bird Data (Hectad M32)

Common Name	Scientific Name	Breeding	Wintering	Designation
Little Egret	<i>Egretta garzetta</i>	Confirmed breeding	Yes	Protected EU Birds Directive Annex I Bird Species
Little Gull	<i>Larus minutus</i>	-	Yes	
Arctic Tern	<i>Sterna paradisaea</i>	Confirmed breeding	-	
Bar-tailed Godwit	<i>Limosa lapponica</i>	-	Yes	
Common Tern	<i>Sterna hirundo</i>	Confirmed breeding	-	
Sandwich tern	<i>Sterna sandvicensis</i>	-	Yes	
Mediterranean Gull	<i>Larus melanocephalus</i>	-	Yes	
Merlin	<i>Falco columbarius</i>	-	Yes	

Peregrine Falcon	<i>Falco peregrinus</i>	Possible breeding	Yes	
Whooper Swan	<i>Cygnus cygnus</i>	-	Yes	
Anser albifrons subsp. flavirostris	White-fronted Goose	-	Yes	
Red-throated Diver	<i>Gavia stellata</i>	-	Yes	
Dunlin	<i>Calidris alpina</i>	-	Yes	Protected EU Birds Directive Annex I Bird Species & Birds of Conservation Concern (BoCCI)-Red List
Golden Plover	<i>Pluvialis apricaria</i>	-	Yes	
Black-headed gull	<i>Larus ridibundus</i>	Confirmed breeding	Yes	Birds of Conservation Concern (BoCCI)-Red List
Confirmed breeding	<i>Melanitta nigra</i>	-	Yes	
Eurasian curlew	<i>Numenius arquata</i>	-	Yes	
Goldeneye	<i>Bucephala clangula</i>	-	Yes	
Grey Wagtail	<i>Motacilla cinerea</i>	-	Yes	
Herring Gull	<i>Larus argentatus</i>	-	Yes	
Barn Owl	<i>Tyto alba</i>	Confirmed breeding	-	
Lapwing	<i>Vanellus vanellus</i>	Confirmed breeding	Yes	
Long-tailed Duck	<i>Clangula hyemalis</i>	-	Yes	
Meadow Pipit	<i>Anthus pratensis</i>	Confirmed breeding	Yes	
Redshank	<i>Tringa totanus</i>	-	Yes	
Pintail	<i>Anas acuta</i>	-	Yes	
Tufted Duck	<i>Aythya fuligula</i>	-	Yes	
Shoveler	<i>Anas clypeata</i>	-	Yes	
Wigeon	<i>Anas Penelope</i>	-	Yes	
Woodcock	<i>Scolopax rusticola</i>	-	Yes	
Knot	<i>Calidris canutus</i>	-	Yes	

5.5.2.2 National Biodiversity Data Centre

A search of the NBDC records for the relevant hectad, M32, provided details on a number of flora and fauna species of conservation concern. These are provided in Table 5.7. Bird species reported in the preceding sections are not included in this Table as the records are from the same database.

Table 5.7 National Biodiversity Data Centre Records

Common Name	Scientific Name	Red List Status	Conservation Status
Otter	<i>Lutra Lutra</i>	NT	Annex II, Annex IV, Wildlife Acts
Lesser Horseshoe Bat	<i>Rhinolophus hipposideros</i>	LC	Annex II, Wildlife Acts
Marsh Fritillary	<i>Euphydryas aurinia</i>	VU	Annex II
Bottle-nosed Dolphin	<i>Tursiops truncatus</i>		Annex II, Annex IV, Wildlife Acts
Brown Long-eared Bat	<i>Plecotus auritus</i>	LC	Annex IV, Wildlife Acts
Lesser Noctule	<i>Nyctalus leisleri</i>	LC	Annex IV, Wildlife Acts
Common Lizard	<i>Zootoca vivipar</i>		Wildlife Acts
Common Pipistrelle	<i>Pipistrellus pipistrellus</i>	LC	Annex IV, Wildlife Acts

Soprano Pipistrelle	<i>Pipistrellus pygmaeus</i>	LC	Annex IV, Wildlife Acts
Pine Marten	<i>Martes martes</i>	LC	Annex V, Wildlife Acts
Common Frog	<i>Rana temporaria</i>	LC	Annex V, Wildlife Acts
Eurasian Badger	<i>Meles meles</i>	LC	Wildlife Acts
Pygmy Shrew	<i>Sorex minutus</i>	LC	Wildlife Acts
Eurasian Red Squirrel	<i>Sciurus vulgaris</i>	NT	Wildlife Acts
Smooth Newt	<i>Lissotriton vulgaris</i>		Wildlife Acts
West European Hedgehog	<i>Erinaceus europaeus</i>	LC	Wildlife Acts
Atlantic White-sided Dolphin	<i>Lagenorhynchus acutus</i>		Annex IV, Wildlife Acts
Common Dolphin	<i>Delphinus delphis</i>		Annex IV, Wildlife Acts
Common Porpoise	<i>Phocoena phocoena</i>		Annex II, Annex IV, Wildlife Acts
Striped Dolphin	<i>Stenella coeruleoalba</i>		Wildlife Acts
Common Seal	<i>Phoca vitulina</i>		Annex II, Annex V, Wildlife Acts
Grey Seal	<i>Halichoerus grypus</i>		Annex II, Annex V, Wildlife Acts
Long-finned Pilot Whale	<i>Globicephala melas</i>		Annex IV, Wildlife Acts
Sperm Whale	<i>Physeter macrocephalus</i>		Annex IV, Wildlife Acts
Minke Whale	<i>Balaenoptera acutorostrata</i>		Annex IV, Wildlife Acts

Annex II, Annex IV, Annex V – Of EU Habitats Directive, Wildlife Acts – Irish Wildlife Acts (1976-2017).
LC - least concern, NT – Near Threatened, VU – Vulnerable, EN – Endangered CR- Critically Endangered.

5.5.2.3 NPWS Records

NPWS online records were searched to see if any rare or protected species of flora or fauna were recorded in the 10 kilometre grid square, M32, 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 5.8 lists the rare and protected species records which lie within hectad M32. All of these species are protected under the Wildlife Act (1976) and the Wildlife (Amendment) Act (2000).

Table 5.8 Records for rare and protected species, NPWS

Common Name	Scientific Name	Red List Status
Cornflower	<i>Centaurea cyanus</i>	Red List (Extinct)
Reindeer Moss	<i>Cladonia portentosa</i>	Annex V
Blue Fleabane	<i>Erigeron acer</i>	Red listed species - Endangered
West European Hedgehog	<i>Erinaceus europaeus</i>	WA 1976/2000
Grey Seal	<i>Halichoerus grypus</i>	Annex II & V, WA 1976/2000
Henbane	<i>Hyoscyamus niger</i>	Red listed species – Near Threatened
Irish Hare	<i>Lepus timidus subsp. hibernicus</i>	WA 1976/2000, Annex V
Otter	<i>Lutra lutra</i>	Annex II, WA 1976/2000
Badger	<i>Meles meles</i>	WA 1976/2000
Irish Stoat	<i>Mustela erminea subsp. hibernica</i>	WA 1976/2000
Common Seal	<i>Phoca vitulina</i>	Annex II & V, WA 1976/2000
Small-White Orchid	<i>Pseudorchis albida</i>	FPO, Red listed species - Vulnerable
Common Frog	<i>Rana temporaria</i>	WA 1976/2000, Annex V
Lesser Horseshoe Bat	<i>Rhinolophus hipposideros</i>	Annex II & IV, RL (Least concern), WA 1976/2000

Bottle-Nosed Dolphin	<i>Tursiops truncatus</i>	Annex II & IV, WA 1976/2000
Barn Owl	<i>Tyto alba</i>	BoCCI RL(Breeding)

5.5.2.4 Bat Records

A search of the Bat Conservation Ireland (BCI) Database for all bat records for the area within and surrounding the proposed development site was conducted prior to commencing field work and again on the 4th of October 2019. The BCI database can be searched in relation to identified *Roosts*, *Survey Transects* and *Other Observations*. Searches can be conducted for refined areas e.g. 1km buffer of a specific location or for wider areas including hectads and entire grid squares. *Roost* data details identified roosts and bat species recorded utilising the roost sites. *Transect* survey data include results of the BCI Car Based Bat Monitoring Scheme, All Ireland Daubenton's Bat Waterways Survey and additional surveys completed by private organisations and individuals.

A search of a 1km buffer from the proposed development site (Grid Reference: IG 134208 224980) yielded results for one ad-hoc observation record for three of Ireland's resident bat species; Whiskered/Brandts Bat (*Myotis mystacinus/brandtii*), Soprano pipistrelle (*Pipistrellus pygmaeus*) and Brown long-eared bat (*Plecotus auratus*). A search of a 10km buffer from the proposed development site resulted in 4 roost records along with records from 11 transects and 28 AD-HOC observations for bats. The roosts contained lesser horseshoe bat (*Rhinolophus hipposideros*), Daubenton's bat (*Myotis daubentonii*) and Leisler's bat (*Nyctalus leisleri*). Ten transect results returned records for Daubenton's bat (*Myotis daubentonii*), soprano pipistrelle (*Pipistrellus pygmaeus*), Leisler's bat (*Nyctalus leisleri*), *Pipistrellus* spp., *Myotis* spp. and unidentified bat species. Records from twenty-eight ad-hoc records included at least eight of Ireland's nine resident bat species; Daubenton's bat (*Myotis daubentonii*), Leisler's bat (*Nyctalus leisleri*), common pipistrelle (*Pipistrellus pipistrellus*), soprano pipistrelle (*Pipistrellus pygmaeus*), whiskered/Brandt's Bat (*Myotis mystacinus/brandtii*), lesser horseshoe bat (*Rhinolophus hipposideros*), natterer's bat (*Myotis nattereri*), brown long-eared bat (*Plecotus auritus*), *Myotis* spp., and *Pipistrellus* spp.

The information gathered in the desk study provides a baseline understanding of bat species in the area and indicates that the region has been previously surveyed for bats. The records identify the wider area of the proposed development as being used by foraging and commuting bat species.

5.5.2.5 Other Taxa

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 11km west of the Study Area and is in a separate water catchment.

NBDC records show that marsh fritillary (*Euphydryas aurinia*), is known to occur within the hectad (M32). However, based on a review of aerial photography it is unlikely that suitable habitat for the species occurs at the development site. Other species, including pine marten, common frog and otter are likely to be recorded in the wider area, based on the results of the NBDC data search.

5.5.2.6 Invasive Species

The NBDC database also contains records of invasive species identified within the relevant grid square M32. Records of invasive species for within the wider area of the site are provided in Table 5.9 NBDC records for Third Schedule invasive species in the hectad M32.

Table 5.9 NBDC records for Third Schedule invasive species in the hectad M32

Common Name	Scientific Name
Wireweed	<i>Sargassum muticum</i>
Japanese Knotweed	<i>Fallopia japonica</i>

Rhododendron	<i>Rhododendron ponticum</i>
American Mink	<i>Mustela vison</i>
Canada Goose	<i>Branta canadensi</i>
Brown Rat	<i>Rattus norvegicus</i>

5.5.2.7 Water Quality

The proposed development is situated entirely within the EPA River Catchment 29, Galway Bay, South East River Catchment (<https://gis.epa.ie/EPAMaps/>). There are no adjacent natural or man-made watercourses within the proposed development boundary. The nearest watercourse, the Carrownmoneash river is situated approximately 1.5km southeast of the proposed site, on the opposite side of Oranmore Bay.

The Water Framework Directive (WFD) Transitional Waterbody risk score for the section of Galway Bay closest to the development site has been assessed as “not at risk” and the water quality is classed as “unpolluted”.

The Clarinbridge GWB (IE_WE_G_0008) which underlies the Proposed Development site is assigned ‘Good’ status under the WFD 2010-2015.

5.5.2.8 Conclusions of the Desk Study

The desktop study has provided information about the existing environment in hectad M32, within which the proposed development is located. The mammal species recorded within the relevant tetrad have widespread range and distributions in Ireland and are likely to be recorded frequently throughout Ireland. Bat records within 10km of the proposed development site revealed that the wider area has been studied for bats and that a number of bat roosts for a variety of species have been recorded in the wider area. This suggests that the area offers potential for foraging and commuting bat species. A number of protected bird species have been previously recorded within the hectad M32. The proposed development is located within close proximity to the Inner Galway Bay SPA (approximately 95m to the west, but is buffered from this site by a woodland, treelines, residential dwellings and agricultural grassland). A number of these species are generalist species and occur throughout a wide range of habitats.

5.5.3 Results of Ecological Surveys

5.5.3.1 Description of Habitats within the Ecological Survey Area

A total of eight habitats were recorded within and directly adjacent to the site of the proposed development (Table 5.10). A habitat map is provided in Figure 5.3.

Table 5.10 Habitats recorded within the proposed development boundary (Fossitt, 2000)

Habitat	Code
Oak-ash-hazel woodland	WN2
Scrub	WS1
Dry calcareous and neutral grassland	GS1
Wet grassland	GS4
Treelines	WL2
Hedgerow	WL1
Stone walls and other stonework	BL1
Buildings and artificial surfaces	BL3



MAP TITLE: Habitat Map	MAP NO.: Figure 5.3	SCALE: 1:2500
PROJECT TITLE: 181058 Duffy Rosshill Res		
DATE: 13-12-2019		
DRAWING BY: SM	CHECKED BY: JH	ISSUE NO.: 181058-2019.12.13
<small>MKO, Tuam Road, Galway, Ireland, H91VW84. Email: info@mkofireland.ie Tel: +353 (0)91 735611</small>		

The proposed development site is a former golf course. The majority of the site comprises a network of semi-improved, species poor *Dry neutral grassland (GS1)* (Plate 5.1). The dominant species was Yorkshire fog (*Holcus lanatus*). Other species present included common bent grass (*Agrostis capillaris*), rough meadow grass (*Poa trivialis*), cock's foot (*Dactylis glomerata*), creeping buttercup (*Ranunculus repens*), common sorrel (*Rumex acetosa*), curled dock (*Rumex crispus*), common mouse-ear (*Cerastium fontanum*), creeping thistle (*Cirsium arvense*) and white clover (*Trifolium pratense*). False oat grass (*Arrhenatherum elatius*), knapweed (*Centaurea nigra*), red clover (*Trifolium pratense*), selfheal (*Prunella vulgaris*), yarrow (*Alchemilla millefolium*) and smooth hawkbeard (*Crepis capillaris*) were recorded close to field boundaries. Evidence of grazing by horses was recorded during the site visit in July 2019. A total of 4 no. relevés were taken within this habitat (refer to Appendix 5.2 of this report for relevé data). The grassland was not found to correspond to Annex I grassland habitat.

A small area of poorly-drained grassland at the north-west of the site was classified as *Wet grassland (GS4)*. Species present included Yorkshire fog, crested dog's tail (*Cynosurus cristatus*) marsh thistle (*Cirsium palustre*) and compact rush (*Juncus conglomeratus*) (Plate 5.2).

The north-eastern corner of the site consists of a relatively disturbed area with imported rock and rubble. Aerial photography was consulted and shows that the site has been subject to disturbance / clearance in this corner in the recent past. The grassland recolonising this area was classified as *Dry calcareous and neutral grassland (GS1)* (Plate 5.3). Species present included red clover, selfheal, glaucous sedge (*Carex flacca*), centaury (*Centaureum erythraea*), medick (*Medicago lupulina*), crested dog's tail, sweet vernal grass (*Anthoxanthum odoratum*), silverweed (*Potentilla anserina*), Yorkshire fog, meadow buttercup (*Ranunculus acris*), common mouse-ear, sheep's fescue (*Festuca ovina*) and tufted vetch (*Vicia cracca*). 1 no. relevé was taken within this habitat (refer to appendix 5.2 for relevé data). The grassland was not found to correspond to Annex I grassland (O'Neill et al. 2013).

Scattered native and non-native trees are present throughout the site. A number of relatively immature trees are located to the southeast of the site and include alder (*Alnus glutinosa*), hawthorn (*Crataegus monogyna*), pine (*Pinus* sp.) and spruce (*Picea* sp.) (Plate 5.4). Three scattered planted *Treelines (WL2)* comprised of immature alder, willow species (*Salix* sp.) and poplar (*Populus* sp.), associated with the former golf course on the site, are present to the west of the development boundary (Plate 5.5).

Treelines (WL2), comprised predominantly of mature and immature ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*) and beech (*Fagus sylvatica*) demarcate the southern, eastern and part of the northern boundaries of the development site. The western boundary of the site is demarcated by a mature beech (*Fagus sylvatica*) treeline (Plate 5.6). Field boundaries within the site are delineated by stone walls classified as *Stonewalls and other stonework (BL1)* and *Treelines (WL2)* comprised predominantly of ash (*Fraxinus excelsior*). *Hedgerows (WL1)* comprised of blackthorn (*Prunus spinosa*) and hawthorn (*Crataegus monogyna*) are also present throughout the development site along former field boundaries. The stone walls were vegetated, predominantly with bramble (*Rubus fruticosus* agg.).

An area of woodland classified as *Oak-ash-hazel (WN2) woodland* (Plate 5.7) is present along the northern boundary of the development site towards the west of the site. Although immature ash is dominant on lower lying ground, sycamore and beech (*Fagus sylvatica*) are also frequent, particularly on more well drained higher ground. Species present in the understorey include hawthorn, hazel (*Corylus avellana*) and occasional holly (*Ilex aquifolium*). Ground flora included lesser celandine (*Ficaria verna*), lords and ladies (*Arum maculatum*), primrose (*Primula vulgaris*) and herb Robert (*Geranium robertianum*). 1 no. 10m x 10m relevé was taken in this habitat (refer to Appendix 5.2 for relevé data). The woodland was not found to correspond to Annex I woodland habitat. An area of *Scrub (WS1)*, comprised of hawthorn, blackthorn and bramble (*Rubus fruticosus* agg.) with treelines to its north and south is present to the west of the woodland area.

The ruins of an old building are present within the centre of the site. The remaining stone walls of the ruined building are categorised as *Stonewalls and other stonework (BL1)*. The site of the ruined building

has been utilised to create a modern silage pit classified as *Buildings and artificial surfaces (BL3)*. Areas of gorse (*Ulex europaeus*) and bramble (*Rubus fruticosus agg.*) *Scrub (WS1)*, and mature ash (*Fraxinus excelsior*) trees, are present in proximity to this area (Plate 5.8).

None of the habitats within the works areas correspond to those listed on Annex I of the EU Habitats Directive. No watercourses were recorded within or adjacent to the development site.

Galway Bay Complex SAC is located approximately 5m from the western boundary of the proposed development site. The boundary between the development site and the SAC consists of a mature beech treeline and stone wall. The habitats within the SAC adjacent to the development consist of oak-ash-hazel woodland and do not conform to Annex I status.



Plate 5.1 The majority of the site is comprised of semi-improved Dry neutral grassland (GSI).



Plate 5.2 Wet grassland (GS4) to the north-west of the site.



Plate 5.3 Dry calcareous and neutral grassland (GS1) in the north-east corner of the site.



Plate 5.4 Scattered trees towards the south-east of the development site.



Plate 5.5 Scattered immature Treeline (WL2) towards the west of the development site.



Plate 5.6 Mature beech Tree line (WL2) delineating the western boundary of the development site.



Plate 5.7 Oak-ash-hazel woodland (WN2) within the development site close to the northern boundary.



Plate 5.8 Buildings and artificial surfaces (BL3); silage pit constructed within the site of a habitat within stone walls (BL1) remaining from a building in ruin with areas of scrub (WS1) within the development site boundary.

5.5.4 Protected Flora

The desk study identified a number of plant species of conservation concern previously recorded within hectad M32, 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 development site during the site visits undertaken in April 2019 and July 2019.

5.5.5 Invasive Species

The non-native invasive species, Spanish Bluebell (*Hyacinthoides hispanica*) was recorded growing at one location close to the southern boundary of the development site (Plate 4.9). This species is listed on the ‘Third Schedule’ of Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011).

No additional Third Schedule no-native invasive species were recorded.



Plate 5.9 The non-native invasive species Spanish Bluebell (*Hyacinthoides hispanica*) was recorded growing at one location close to the southern boundary of the development site.

5.5.6 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 species poor *Dry neutral grassland (GS1)*, *wet grassland (GS4)*, *Buildings and artificial surfaces (BL3)* and vegetated *Stonewalls and other stonework (BL1)* habitats within the proposed project site were assigned *Local Importance (Lower Value)* as they are of low ecological significance and abundant in the wider area.

The area of *Dry calcareous and neutral grassland (GS1)* in the disturbed, north-eastern corner of the site was assigned *Local importance (lower value)*. The area has been disturbed in the recent past and consists of imported rubble and rocks. The recolonising grassland area is small (0.5) and the grassland was not found to correspond to the Annex I habitat *Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco – Brometalia)* (refer to Relevé data in Appendix 5.2).

The woodland *Scrub (WS1)*, *Hedgerow (WL1)* 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. The area of *Oak-ash-hazel woodland (WN2)* was also assigned *Local Importance (Higher Value)*. Although small in area it helps maintain links to nearby larger areas of woodland. The woodland consisted of a mix of ash, sycamore, beech and hazel and was not found to correspond to any Annex I woodland habitat (refer to relevé data Appendix 5.2).

Galway Bay Complex SAC, which is located adjacent to the proposed development, was assigned International Importance due to its designation as a Special Area of Conservation.

Habitat mapping undertaken for the N6 Galway City Transport Project (GCTP) was reviewed. The habitats within the development site were not assessed as part of the project (GCTP, 2015).

5.5.7 Fauna in the Existing Environment

5.5.7.1 Mammals

5.5.7.1.1 Non-volant mammals

A thorough survey of the development site was undertaken for mammals. The site is located 5.0m 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. There are no watercourses within or directly adjacent to the proposed development and the shoreline of Galway Bay is buffered from the proposed development by woodland, treelines, residential dwellings and agricultural grassland.

Signs of rabbit (*Oryctolagus cuniculus*) activity, including numerous rabbit burrows and rabbit droppings, were identified within the woodland close to the northern boundary of the site as well as along the site and field boundaries.

A young pine-marten (*Martes martes*) was observed within the development site within a small patch of scrub.

No signs of badger including badger setts, latrines or tracks were identified during the site visit.

5.5.7.1.2 Bats

Habitat Appraisal

Landscape features 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*.

Mature trees within the development boundary were inspected during daylight hours to determine whether they contained cavities and crevices suitable for roosting bats. No signs of bats were observed, however, a number of trees within and delineating the development site boundary contained ivy cover and/or small cavities and crevices and were considered to be of 'Moderate' to High suitability for bats given their roosting potential. These groups of trees are shown in Figures 5.4 and 5.5.

A detailed inspection of the remains of the old building was undertaken during daylight hours. No signs of bats, e.g. live and dead specimens, droppings, feeding remains, urine splashes and fur oil staining, etc. were observed during the inspection survey. The building is open with no roof and only partial remains of the old outer walls still standing. Given the exposed nature of the building it was thus considered to be of "Low Suitability" for roosting bats (Collins, 2016).

Habitats within the proposed site were also assessed for foraging and commuting potential. Treelines and woodland within and forming the development boundary were assessed as *Moderate to High Suitability* for foraging and commuting bats. These habitats provide connectivity to the wider landscape including woodland to the west of the site.

Dusk Activity Surveys

Dedicated dusk bat surveys were undertaken at the site on the 16th April 2019 and 17th September 2019. In summary, no evidence of roosting bats was recorded within the development site and no bats were observed exiting or entering the remains of the building, however a number of mature trees within the site provide potential roosting habitat.

Low numbers of bats were recorded during the dusk activity surveys. Soprano pipistrelle, common pipistrelle and Leisler's bat were recorded foraging and commuting in the area during both bat activity surveys. Activity was focused along treelines and the edge of woodland within the development site.

Figures 5.4 and 5.5 show the route of the transect walked as well as locations where bat activity was detected. The figures also show trees/groups of trees identified as having bat roost potential given their age, ivy cover and presence of small cavities.

Static Detector Survey Results

Seven nights of bat monitoring was achieved between the 18th and 25th of September 2019 using static bat detectors situated at 2 no. locations within the site. In total, 338 bat passes were recorded. Bat activity was dominated by soprano pipistrelle (67%), followed by Myotis sp. (11%), Leisler's bat (9%) and common pipistrelle (7%). Nathusius' pipistrelle accounted for 4% of recorded bat activity and brown long-eared bat accounted for 2% of recorded bat activity. (Figure 5.6).

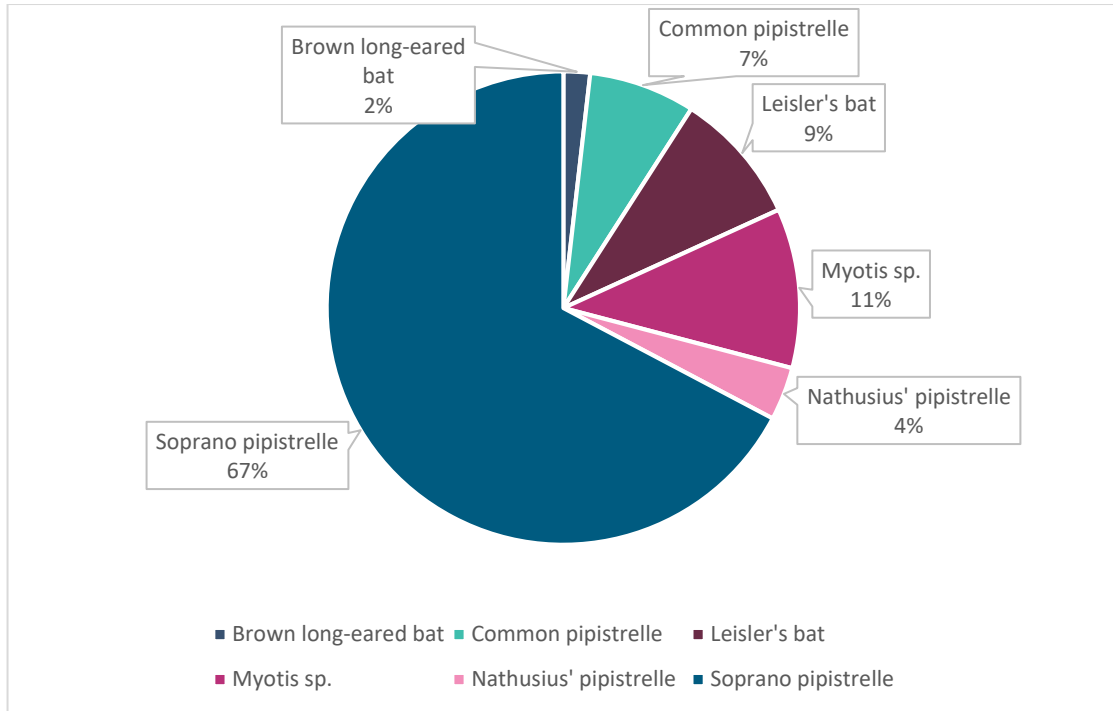


Figure 5.6: Bat species composition (total bat passes)

Bat activity was also calculated as total bat passes per hour (bpph) to account for any bias in survey effort, resulting from varying conditions throughout the survey period. Species composition per night measured in bpph is shown in Figure 5.7. The graph demonstrates that soprano pipistrelle was the most commonly recorded species during the survey periods and represented the greatest number of passes per hour on all survey nights.

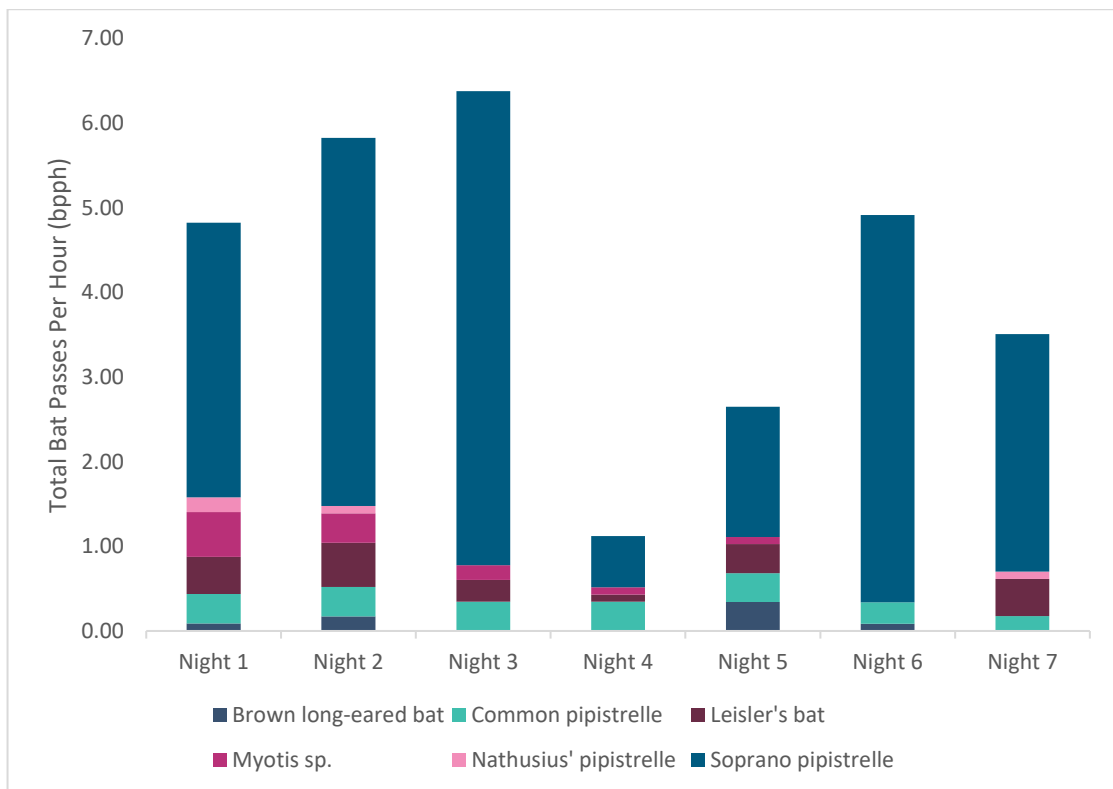


Figure 5.7: Static detector survey results. Species composition per night (bpph)

Bat activity was analysed using Ecobat, an online tool which offers a standardised method of interpreting bat activity data. Ecobat compares data entered by the user with bat survey information collected from similar areas and provides a numerical way of interpreting the levels of bat activity recorded at a site. It generates a percentile rank for each night of activity which is then categorised as a level of bat activity (Table 5.11). Following Ecobat analysis, activity ratings for each species was based on the median percentile value. Soprano pipistrelle activity at the site was high and common pipistrelle activity was moderate to high. Daubenton’s bat activity at the site was low to moderate, whiskered bat activity was low to moderate, Natterer’s bat activity was low to moderate, Lesler’s bat activity was moderate to high, Nathusius’s pipistrelle activity was low to moderate and brown long-eared bat activity was moderate.

Table 5.11 Results of Ecobat analysis of bat activity data for Rosshill.

Species/ Species Group	Median Percentile	Median Bat Activity (Low, Moderate, High)	Max Percentile	Max Bat Activity (Low, Moderate, High)	Nights Recorded	Reference Range
<i>Myotis sp.</i>	22	Low to Moderate	63	Moderate to High	6	213
<i>Nyctalus leisleri</i>	63	Moderate to High	80	Moderate to High	6	135
<i>Pipistrellus nathusii</i>	24	Low to Moderate	55	Moderate	3	34
<i>Pipistrellus pipistrellus</i>	67	Moderate to High	76	Moderate to High	7	188
<i>Pipistrellus pygmaeus</i>	89	High	93	High	10	139
<i>Plecotus auritus</i>	55	Moderate	63	Moderate to High	4	107

5.5.7.2 Birds

Bird species recorded within the proposed development site included common species such as blackbird (*Turdus merula*), robin (*Erithacus rubecula*), magpie (*Pica pica*) and bullfinch (*Pyrrhula pyrrhula*), chaffinch (*Fringilla coelebs*), wood pigeon (*Columba palumbus*), great tit (*Parus major*), jackdaw (*Corvus monedula*), hooded crow (*Corvus cornix*), wren (*Troglodytes troglodytes*), blue tit (*Parus caeruleus*), pied wagtail (*Motacilla alba yarrellii*) and meadow pipit (*Anthus pratensis*).

Inner Galway Bay is located approximately 95m from the proposed development and is designated for a number of wintering and reproducing wetland bird species. The potential for the site to support such species was considered during the site visits. The site consists predominantly of rank semi-improved grassland. The site does not contain any supporting wetland habitat and it does not support suitable breeding or roosting habitat for any of the SCI species for which the SPA is designated. Furthermore, the SPA is buffered from the development site by woodland, residential dwellings and agricultural grassland.

No wetland bird species were recorded within the development site during the site visits undertaken in April and July 2019.

5.5.7.3 Terrestrial Invertebrates

The desk study identified records for the Annex II species marsh fritillary (*Euphydryas aurinia*) in the 10km hectad, M32, within which the proposed development is located. Therefore the site was assessed for suitable marsh fritillary habitat during the site visits in April and July 2019. 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.

5.5.7.4 Other Faunal Taxa

No evidence of any other protected faunal taxa was recorded on the site of the proposed development. No watercourses were present on the site and the habitats are typical of low intensity grazing and agricultural abandonment. Such conditions do provide suitable habitat for a wide range of invertebrate species that add to the biodiversity of the area.

5.5.8 Significance of the Fauna

All bat species are listed on Annex IV of the EU Habitats Directive. The linear landscape features, including treelines and hedgerows, as well as mature trees within the site, are likely to be utilized by a bat population of *Local importance (higher value)*.

Pine marten is listed on Annex V of the EU Habitats Directive and is also protected under the Irish Wildlife Act. The site is likely to be utilized by a local population of *Local importance (higher value)*.

The site and surrounding area provide habitat and structural diversity for a wide range of common bird, small mammal and invertebrate species and provide biodiversity in the local context. This assemblage of species is assigned *Local Importance (Higher Value)*.

The field visit found no evidence of the site of the proposed development providing significant habitat for any other protected faunal taxa.

5.6 Likely Significant Effects on Flora and Fauna

Ecological evaluation and assessment of effects within this chapter follows a methodology that is set out in Chapter 3 of the ‘*Guidelines for Assessment of Ecological Impacts of National Roads Schemes*’ (NRA, 2009a). These guidelines set out the context for the determination of value on a geographic basis with a hierarchy assigned in relation to the importance of any particular receptor. The assessment of effects also follows the guidance outlined in EPA (2017) and CIEEM (2018).

This assessment of effects is structured as follows:

- Assessment of ‘Do nothing’ Impact
- Assessment of impacts during construction stage
- Assessment of impacts during the operational stage
- Assessment of impacts on designated sites
- Assessment of cumulative impacts

5.6.1 Do Nothing Effect

The site of the proposed development is dominated by species poor grazed dry neutral grassland with a number of scattered trees throughout. If the proposed development were not to go ahead, it is likely that the development site would remain under its current management regime i.e. agricultural practices.

5.6.2 Impacts During Construction Phase

5.6.2.1 Loss of Habitat

5.6.2.1.1 Habitats of Local Importance Lower Value

The development footprint will result in the permanent loss of species-poor semi-improved dry neutral grassland, species poor wet grassland, a small area of dry calcareous and neutral grassland which does not conform to Annex I status, and stone walls and buildings and artificial surfaces, considered to be of *local importance (lower value)*. These habitats are common in a local, national and international context. The dry calcareous and neutral grassland is small in area and occurs where there has been recent disturbance of soil and imported rubble. The grassland recolonising this area does not correspond to the Annex I habitat Semi-natural dry grasslands (*Festuco-Brometalia*) [6210]. No mitigation is proposed for the loss of this habitat. The effect is assessed a *permanent non-significant negative impact* on a receptor of *Local Importance Lower Value*.

Significant effects are not anticipated.

5.6.2.1.2 Habitats of Local Importance Higher Value

The development has been designed to minimise the loss of treelines delineating the site boundaries. While it is proposed to maintain the majority of these treelines, including the mature beech treeline delineating the site’s western boundary, the proposed development will result in the loss of sections of treeline along the site’s southern and eastern boundaries.

The development will also result in the loss a number of treelines within the development site. The treelines within the development site at its western end are associated with the former golfcourse and are scattered and relatively immature, consisting of a mix of native and non-native species. These treelines are of low ecological value. The remaining treelines within the development site to be lost consist of a mix of mature and semi-mature ash, sycamore and beech. The development will also include the loss of a number of native and non-native scattered trees in the south-eastern corner of the site.

In addition to the above the development will also result in the permanent loss of a small area (0.09ha) of oak-ash-hazel woodland consisting of a mix of native and non-native species close to the northern boundary of the site as well as 0.08 ha of scrub (and associated treeline) to the west of the woodland.

In the absence of appropriate design and best practice the potential loss of treelines, hedgerow, scattered trees and oak-ash-hazel woodland is considered to constitute a *permanent moderate negative impact*.

Mitigation

- The development has been designed to minimise the loss of treelines and woodland. A landscaping plan has been prepared for the proposed development and provides for the retention of existing treelines and woodland within and around the site periphery, or for the recreation of similar features through tree, hedge and native woodland planting in the new development (refer to Landscape Plan, Appendix 5.3) in order to ameliorate any tree loss. Therefore connectivity with the woodland to the west of the development site and the wider landscape will be maintained.
- Access pathways through the woodland will be constructed using a minimalist intervention approach to ensure the preservation of woodland trees. The paths will be constructed using a non-dig method using a combination of timber sleepers, cellweb system and gravel to ensure increased access to the root protection areas of the trees occurs in a manner not detrimental to the trees. The pathway will be constructed in a meandering manner so as to avoid the felling of existing trees.
- The construction area within the site will be fenced off at the outset of construction. There will be no construction activities, access or storage of materials in the area outside the defined construction site.
- Trees to be retained will be protected in accordance with BS: 5837 (Trees in relation to Construction).

Residual Impact

Following the implementation of the prescribed mitigation; the impact on habitats of local importance higher value is reduced to a *permanent slight negative effect*.

Significant effects are not anticipated.

5.6.2.2 Impacts on Fauna

5.6.2.2.1 Disturbance to Fauna

The proposed works during the construction phase will result in an increase in noise and activity within the study area. The proposed development is bordered by a number of residential dwellings to the south-east, the Rosshill Road to the east and the Galway to Dublin railway line to the north. It is likely that faunal species in the area have become accustomed to some levels of disturbance and the increased construction activity will not result in a significant increase in disturbance.

Galway Bay Complex SAC is located adjacent to the western extent of the site of the proposed development. Otter (*Lutra lutra*) and harbour seal (*Phoca vitulina*) are the only two faunal species of Qualifying Interest for the SAC. Harbour Seal is a marine species and no suitable habitat for the species exists within 100m of the proposed development. Any such habitat is separated from the site of the proposed development by woodland and residential dwellings. There is no potential for disturbance effects on this species.

No suitable habitat for otter exists on the site of the proposed development and the surrounding lands, consisting predominantly of woodland and agricultural grassland, do not provide suitable habitat for this

species. No signs of the species was recorded on the site during the site visit. The site is separated from any potential otter habitat by woodland, treelines, grassland and residential dwellings. There is no potential for significant disturbance to this species.

Inner Galway Bay SPA lies approximately 95m to the west of the development. None of the listed SCI species of Inner Galway Bay SPA were recorded utilising habitats within the development site during the site visit in April 2019 or July 2019. No populations of national or international significance were recorded on site and the site does not provide supporting wetland habitat for the wetland water birds for which the nearby SPA is designated. The development site is extensively buffered from wetland habitat in the SPA by woodland, treelines, agricultural grassland and residential dwellings. No significant disturbance of SCI bird species associated with Inner Galway Bay SPA is anticipated.

In the absence of appropriate design and best practice the potential for disturbance of fauna is considered to constitute a *short term slight negative impact*.

Best Practice

- All works will be completed during daylight hours and there will be no requirement for artificial lighting at any stage of the proposed construction works. This will avoid any potential impacts on crepuscular or nocturnal species including bat species.

Residual Impact

Significant effects are not anticipated.

5.6.2.2.2 Loss of Faunal Habitat

The site of the proposed development does not provide significant habitat for any rare or protected faunal species. The majority of the site consists of semi-improved grassland. This habitat is common in the wider landscape and of low value to faunal species.

The habitats on site do not provide suitable roosting or foraging habitat for bird species listed as SCIs for Inner Galway Bay SPA. Scrub and woodland within the site does provide suitable habitat for a range of common bird species and is likely to provide habitat for a range of small mammal species, including rabbits and pine marten which were observed during the site visit. The loss of these habitats within the site will be small-scale and similar habitats are available and common in the wider area.

The linear landscape features present along and within the site boundaries provide suitable commuting/foraging areas for bat species. The development has been designed to ensure that ecological connectivity and cover is maintained around the perimeter of the site through retention of treelines and woodland or replanting where small areas of these habitats are to be lost.

No evidence of roosting bats was identified during the field visit, however, a number of mature trees/groups of trees on the site have the potential to support roosting bats as shown on Figure 5.4. While it is proposed to retain the majority of these trees, there will be small-scale loss of woodland and treelines within the site.

In the absence of best practice and design, the loss of linear landscape features and woodland, and the loss of mature trees, has the potential to result in the fragmentation of commuting and foraging corridors for species including bats, birds, small mammals and a variety of invertebrates and the loss of potential roosting habitat for bat species. In the absence of appropriate design and best practice the potential loss of linear landscape features (i.e. hedgerow/treeline), woodland and mature trees is considered to constitute a *permanent moderate negative impact*.

Best Practice

- A landscape plan has been prepared for the development site. The landscaping plan provides for the planting of trees and woodland which will ameliorate the loss of small areas of these habitats and maintain bat commuting and foraging habitat and connectivity with the wider landscape, including woodland to the west of the site.
- Vegetation clearance will be conducted in accordance with the provisions of the Wildlife Act 1976-2017.
- Habitat loss will be minimised by temporarily fencing off the construction site during the construction phase of the development and not permitting any construction activity outside this fence.
- A pre-construction survey for bats¹, will be conducted by a fully qualified ecologist. The survey will focus on mature trees to be felled and the remains of the old building to be demolished and will be undertaken immediately prior to felling and/or demolition. This measure is in line with NRA pre construction guidance.
- If any trees to be felled are found to contain bat roosts, the felling works will be conducted under licence from the NPWS.

Residual Impact

Following the implementation of the prescribed mitigation; the impact on loss of faunal habitat is reduced to a *permanent imperceptible negative effect*.

Significant effects are not anticipated.

5.6.2.3 Impacts on Water Quality

No watercourses were identified within the proposed development site. Galway Bay Complex SAC is located adjacent to the proposed development. Galway Bay is buffered from the proposed development by woodland, treelines, grassland and residential dwellings, however, in the absence of mitigation there is potential for pollution of surface and ground waters in Galway Bay as a result of pollutants including silt-laden surface water run-off from construction activities, hydrocarbons and cement based compounds. In the absence of best practice design and mitigation the potential impact on water quality is considered to be a *temporary moderate negative impact*.

The potential for impacts on water quality is detailed in full in Chapter 7 of this EIAR. The chapter concluded that:

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

There will be no net impact on the local hydrological regime, groundwater levels, or groundwater flowpaths during the construction and operational phase of the proposed development. There will be no direct or indirect hydrological impacts on the Galway Bay SAC.

No significant cumulative impacts on groundwater or designated sites are anticipated”.

The following best practice measures to prevent pollution of surface and ground waters are also included in Chapter 7.

¹ **Please Note:** A full and comprehensive bat survey and assessment are presented in this EIAR. The requirement for a preconstruction survey comes from NRA *Guidelines For The Treatment Of Bats during The Construction of National Road Schemes*. The function of the preconstruction survey is to assess any changes to the baseline conditions of the site that may have occurred between the planning consent and construction stage. This measure does not represent a lacuna in the assessment and is in accordance with industry best practice.

Best practice

- A CEMP has been prepared for the proposed development and is included as Appendix 3.4 of this EIAR. The CEMP incorporates the mitigating principles to ensure that the work is carried out in a manner which blocks all potential pathways for adverse water quality impacts. The CEMP will be in place prior to the start of the construction phase of the project.
- Prior to the commencement of earthworks, silt fencing will be placed down-gradient of the construction areas. Fences will be embedded into the local soils to ensure all site water (should any arise) is captured and filtered;
- As construction advances there may be a small requirement to collect and treat surface water within the site. This will be completed using perimeter swales at low points around the construction areas, and if required water will be pumped from the swales into sediment bags prior to overland discharge;
- Discharge onto ground will be via a silt bag which will filter any remaining sediment from the pumped water. The entire discharge area from silt bags will be enclosed by a perimeter of double silt fencing;
- Any proposed discharge area will avoid potential surface water ponding areas and will only be located where suitable subsoils are present.
- Daily monitoring and inspections of site drainage during construction will be completed.
- Earthworks will take place during periods of low rainfall to reduce run-off and potential siltation of watercourses.
- The storm water drainage strategy has been designed to cater for all surface water runoff from all hard surfaces in the proposed development. All stormwater generated on site from roadways and roofs will discharge via an oil/petrol interceptor to one of 12 no. proposed soakaways which are strategically situated throughout the site. The soakaways are constructed of a cellular storage unit providing 95% porosity or stone filled soakaway providing 40% void ratio. These will also attenuate storm water during and post storm events prior to infiltrating through the underlying fracture rock/boulders.
- Additional storage in the northwest corner of the site, which is prone to occasional pluvial flooding, is provided by means of an open attenuation in the form of a swale.
- All soakaways are designed to accommodate a 1 in 100 year storm event throughout the site. The networks to the west of the site are designed to accommodate the 1 in 100 year storm event with an overflow being provided which will allow any additional volume of storm water to convey to the naturally forming swale to the north of the site.
- On site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site and will be towed around the site by a 4x4 jeep to where machinery is located. The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- 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;
- The plant used should be regularly inspected for leaks and fitness for purpose; and,
- An emergency plan for the construction phase to deal with accidental spillages is contained within the Construction Environmental Management Plan (CEMP) prepared for this development and included in Appendix 3.4 of the EIAR. Spill kits will be available to deal with accidental spillages.

Residual Impact

Chapter 7 concluded that “Overall the proposal presents no significant impacts to surface water and groundwater quality provided the proposed mitigation measures are implemented. There will be no net impact on the local hydrological regime, groundwater levels, or groundwater flowpaths during the construction and operational phase of the proposed development. There will be no direct or indirect hydrological impacts on the Galway Bay SAC”.

Following the implementation of the prescribed best practice and mitigation; the impact on water quality is reduced to a *permanent imperceptible negative effect*.

Significant effects are not anticipated at any geographical scale.

5.6.2.4 Invasive Species

The non-native invasive species, Spanish Bluebell (*Hyacinthoides hispanica*) was recorded growing at one location close to the southern boundary of the development site (Plate 4.9). This species is listed on the ‘Third Schedule’ of Regulations 49 and 50 of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. 477 of 2011).

Mitigation

- All construction staff will be briefed on the identification of invasive species including Spanish bluebell and made aware of the location of Spanish bluebell.
- All machinery, materials and topsoil will be verified as being clean of invasive species in advance on entering the site.
- Where disturbance of the species is unavoidable the following measures will be taken for the removal of Spanish bluebell from the development site:
 - Plants will be dug up after they have flowered with their leaves intact;
 - Plants will be left to dry until the bulbs are completely dead;
 - Once bulbs are completely dead, the material can be composted

Residual Impact

No significant effects in relation to the introduction and spread of invasive species are anticipated.

5.6.3 Impacts During Operational Phase

5.6.3.1 Change of Habitat Use

There will be no additional habitat loss associated with the operational phase of the proposed development.

5.6.3.2 Disturbance to Fauna

The operational phase of the proposed development will be permanent. The proposed development provides 350 residential housing units in the Rosshill area. 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. This is considered to be a potential significant effect as all bat species are listed under Annex IV of the EU Habitats Directive.

No suitable habitat for QI species for the adjacent Galway Bay Complex SAC, harbor seal or otter, was identified on site during the site visits. There are no watercourses within the development site and the site is buffered from suitable marine habitat by woodland, treelines, agricultural grassland and residential

dwellings. There is no potential for disturbance effects on these species during the operational stage of the development.

No populations of national or international significance were recorded on site and the site does not provide supporting wetland habitat for the wetland water birds for which the nearby SPA is designated. The development site is extensively buffered from wetland habitat in the SPA by woodland, treelines, agricultural grassland and residential dwellings. There is no potential for disturbance effects on SCI bird species for Inner Galway Bay SPA during the operational stage of the development.

The Galway City Development Plan 2017-2023 was consulted. The site of the proposed development is located on lands that are zoned Residential, with a small strip to the west zoned as Agriculture and High Amenity. The Galway City Development Plan has been subject to Appropriate Assessment. The NIR concluded that *'having incorporated mitigation measures, it is considered that the Plan 2017-2023 will not have a significant adverse effect on the integrity of European Sites'*.

Best Practice

- A site lighting design report has been prepared for the development and is included in Appendix 5.4 of this report. The lighting design has been developed to minimise the impact of lighting on bat habitat including adjacent woodland.
- The scheme comprises pole mounted warm white light LED fittings with internal louvres. The internal louvres minimise light spill, particularly to the rear of the fitting and also eliminate any upward lighting from the fittings. The warm white LED source also has the least negative impact on insects and bat prey items.
- The lowest possible design illuminance levels will be used.

Residual Impact

- Significant effects are not anticipated.

5.6.3.3 Water Pollution

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. Irish Water have upgraded the Mutton Island Wastewater Treatment facility under the Capital Investment Plan 2014-2016 (Galway Sewerage Scheme Phase 3 – Network Upgrade Contract No.1 Volume D). The upgrade increases the capacity of the plant from 92,000 to 170,000 p.e. (Reference City Plan).

Treatment process includes the following:

- Preliminary Treatment (Screening & Grit Removal)
- Primary Treatment (Upward Flow Settlement Tanks)
- Secondary Treatment (Activated Sludge)

There is full agreement with Irish Water that there is adequate capacity and capability to fully treat all sewage generated by the proposed project in the public sewage treatment system. Correspondence with Irish Water, Reference No 3880706469 is provided in Appendix 5.5 of this EIAR. The proposed project, as assessed for the confirmation of feasibility, is a standard connection, requiring no network or treatment plant upgrades or water or wastewater by either the customer or Irish Water. Given that waste will be appropriately treated to EPA standards; no potential for significant impact on water quality exists.

The storm water drainage strategy has been designed to cater for all surface water runoff from all hard surfaces in the proposed development. All stormwater generated on site from roadways and roofs will discharge via an oil/petrol interceptor to one of 12 no. proposed soakaways which are strategically situated

throughout the site. The soakaways are constructed of a cellular storage unit providing 95% porosity or stone filled soakaway providing 40% void ratio. These will also attenuate storm water during and post storm events prior to infiltrating through the underlying fracture rock/boulders. Additional storage in the northwest corner of the site, which is prone to occasional pluvial flooding, is provided by means of an open attenuation in the form of a swale. All soakaways are designed to accommodate a 1 in 100 year storm event throughout the site. The networks to the west of the site are designed to accommodate the 1 in 100 year storm event with an overflow being provided which will allow any additional volume of storm water to convey to the naturally forming swale to the north of the site.

5.6.4 Impacts on Designated Sites

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. It also identified a potential pathway for impact of Inner Galway Bay via disturbance of SCI bird species on a precautionary basis. 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 proposed development is located 5 metres from Galway Bay Complex pNHA which overlaps with Galway Bay Complex SAC. There is no surface water connectivity between the proposed development and Galway Bay Complex pNHA. There is no potential for significant indirect effects on the pNHA based on the lack of hydraulic connectivity and mitigation measures in place to protect the SAC (and pNHA) from surface water runoff.

No potential pathways for impact on any NHA or pNHA have been identified based on distance from the proposed development site and lack of hydrological connectivity.

5.6.5 Cumulative Impacts

The proposed development was considered in-combination with other plans and projects in the area that could result in cumulative impacts on European Sites. The online planning system for Galway City Council, was consulted on the 01/12/2019 for the townland of Rosshill. Additional projects identified in the townland of Rosshill, Roscam are;

- Permission for a new residential development. The development consists of 16 no. 2-storey, five-bedroom, detached houses, together with individual garages, as applicable, new vehicular site accesses and roads with all ancillary site works, landscaping and service connections (16/228)
- Permission to construct 23 two storey Dwelling houses consisting of Detached, Semi-detached and terrace including access/egress off the old coast road to Oranmore with sewer connection to adjacent sewer pumping station adjacent the Dublin Road and all associated services (17/238).
- Permission for a change of house type to previously granted planning permission (reference 16/228). These amendments consist of a change of house type C (on site 6 only) which is a 5-bedroom two storey detached house (18/187).
- Permission for development which consists of the constructing 51 No. one, two and three bedroom apartments and two one bedroom Town Houses in 6 no. Blocks ranging in height from one storey up to four storey, with sewer connection to adjacent pumping station adjacent Dublin road, together with access/egress off the old coast road to Oranmore and all associated services at Doughiska and Merlin Park Townlands. (Previous Planning Ref No. 17/283) (19/95).

In addition to the above the following developments are also planned within the immediate and wider area:

- Proposed SHD development at Moneyduff, Oranmore, Co. Galway. The proposed development will consist of the construction of 212 no. residential houses, amenity areas, a creche and associated parking facilities.
- A proposed Greenway cycling network runs along the south of the development site. It is a policy of the Galway City Development Plan to continue to develop and improve the greenway network in the city, including to facilitate a linked greenway from the city to the country area including Oranmore. According to the Development Plan, proposed greenways will be subject to a route selection process which will take cognisance of site-specific circumstances including consideration of ecological sensitivity.
- According to the Galway City Development Plan it is planned to develop Murrough, an area to the west of the development, in accordance with a Local Area Plan which will reserve a substantial bank of land for recreational purposes, allow for public access and allow for mixed use development which will create a sustainable neighbourhood and maximise the sustainable development of appropriate recreation facilities.
- The Natura Impact Statement and habitat mapping undertaken for the proposed N6 Galway City Ring Road was also consulted. The NIS concluded that *‘following an examination, analysis and evaluation of the relevant information, including in particular the nature of the predicted impacts from the proposed road development and with the implementation of the mitigation measures proposed, that the proposed road, development does not pose a risk of adversely affecting (either directly or indirectly) the integrity of any European Site, either alone or in combination with other plans or projects, and there is no reasonable scientific doubt in relation to this conclusion’*.

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.

5.7 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.

BIBLIOGRAPHY

Birds Directive (2009/47/EC) – http://ec.europa.eu/environment/naturelegislation/birdsdirective/index_en.htm

BirdWatch Ireland website <http://www.birdwatchireland.ie/>

DEHLG (2009) Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. DEHLG, Dublin.

DoEHLG (2010). Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities. Revision, February, 2010. Department of the Environment, Heritage and Local Government.

EC (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC.

EC (2002) Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission.

EC (2007a) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. Office for Official Publications of the European Communities, Luxembourg. European Commission.

EC (2013) Interpretation Manual of European Union Habitats. Version EUR 28. European Commission, DG Environment.

EC (2018) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission.

EPA website: <http://www.epa.ie>.

EPA (2010) McGarrigle *et al.*, Water Quality in Ireland 2007-2009

European Communities (Conservation of Wild Birds) Regulations, 1985, SI 291/1985 & amendments – <http://www.irishstatutebook.ie>.

European Communities (Environmental Impact Assessment) Regulations, 1989 to 2006.

European Communities (Natural Habitats) Regulations, SI 94/1997, SI 233/1998 & SI 378/2005 – <http://www.irishstatutebook.ie>.

Fossitt, J. A. (2000). A Guide to Habitats in Ireland. Dublin: The Heritage Council.

Inland Fisheries Ireland website <http://www.fisheriesireland.ie/>

Habitats Directive (92/43/EEC).

Kelly, F. *et al.* (2010) Sampling Fish for the Water Framework Directive, Rivers 2010, Shannon International River Basin District, Inland Fisheries Ireland Annual Report

Murphy, D.F. (2004) Requirements for the Protection of Fisheries Habitat During Construction and Development Works at River Sites. Eastern Regional Fisheries Board, Dublin.

National Biodiversity Data Centre website <http://www.biodiversityireland.ie/>

O'Reilly, P. (2009) Rivers of Ireland, a Flyfisher's Guide Shropshire, UK

NPWS (2013) The Status of EU Protected Habitats and Species in Ireland. Conservation Status in Ireland of Habitats and Species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC.

NPWS of the DEHLG (2013) The Report on Status of Habitats and Species in Ireland: Technical Reports and Forms.

NPWS Protected Site Synopses available on <http://www.npws.ie/en/ProtectedSites/>.

Preston C.D. et. al. (2002). New Atlas of the British and Irish Flora. Oxford University Press.

Water status data available on <http://www.epa.ie> and <http://www.wfdireland.ie>

Wildlife Act 1976 and Wildlife (Amendment) Act 2000.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) and Directive 2009/147/EC (codified version of Directive 79/409/EEC as amended) (Birds Directive) – transposed into Irish law as European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477/2011).

Tobin, 2018, Report on Civil Works, Proposed Residential Development, At Moneyduff, Oranmore, Galway.

NPWS (2013) Conservation Objectives: Galway Bay Complex SAC 000268. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht. Online, Available at: https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000268.pdf, Accessed: 12/03/2018.

6. LAND SOILS AND GEOLOGY

6.1 Introduction

6.1.1 Background and Objectives

Hydro-Environmental Services (HES) was engaged by McCarthy Keville O’Sullivan (MKO), to carry out an assessment of the potential impacts and associated effects of a proposed housing development at Rosshill, Galway City, Co. Galway on the land, soil, and geological environment.

This report 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.

6.1.2 Statement of Authority

Hydro-Environmental Services (HES) are a specialist hydrological, hydrogeological and environmental practice which delivers a range of water and environmental management consultancy services to the private and public sectors across Ireland and Northern Ireland. HES was established in 2005, and our office is located in Dungarvan, County Waterford.

Our core areas of expertise and experience includes soils, subsoils and geology. We routinely complete impact assessments for land soils and geology, hydrology and hydrogeology for a large variety of project types.

This chapter of the EIAR was prepared by Michael Gill and Adam Keegan.

Michael Gill (BA, BAI, Dip Geol., MSc, MIEI) is an Environmental Engineer and Hydrogeologist with over 17 years’ environmental consultancy experience in Ireland. Michael has completed numerous hydrological and hydrogeological impact assessments of residential and infrastructure developments in Ireland. In addition, he has substantial experience in surface water drainage design and SUDs design, and surface water/groundwater interactions.

Adam Keegan is a hydrogeologist with two years of experience in the environmental sector in Ireland. Adam has been involved in numerous hydrological and hydrogeological impact assessments, flood risk assessments and hydrogeological monitoring as part of the team at HES.

6.1.3 Relevant Legislation

The EIAR is carried out in accordance with the follow legislation:

- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 1989 to 2019;
- Planning and Development Act, 2000 as amended; and,
- S.I. No. 4 of 1995: The Heritage Council Acts 1995, as amended.

6.1.4 Relevant Guidance

The soils and geology section of this EIAR is carried out in accordance with guidance contained in the following documents:

- Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU);
- Environmental Protection Agency (2017): Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- Environmental Protection Agency (September 2015): Draft - Advice Notes on Current Practice (in the preparation of Environmental Impact Statements);
- Environmental Protection Agency (September 2015): Draft – Revised Guidelines on the Information to be Contained in Environmental Impact Statements;
- Environmental Protection Agency (2003): Advice Notes on Current Practice (in the Preparation on Environmental Impact Statements);
- Environmental Protection Agency (2002): Guidelines on the Information to be Contained in Environmental Impact Statements;
- Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements; and,
- National Roads Authority (2008): Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes.

6.2 Schedule of Works

6.2.1 Desk Study

A desk study of the Rosshill site and the surrounding study area was largely completed in advance of undertaking a site walkover survey. 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 - Groundwater Database (www.gsi.ie);
- Bedrock Geology 1:100,000 Scale Map Series, Sheet 14 (Geology of Galway Bay). Geological Survey of Ireland (GSI, 1994);
- Geological Survey of Ireland – 1:25,000 Field Mapping Sheets; and,
- General Soil Map of Ireland 2nd edition (www.epa.ie);

6.2.2 Site Investigations

A site inspection of the proposed development site and surrounding area was undertaken by HES on 10/09/2019.

The objectives of the site inspection were to determine the topographic layout of the proposed site, to investigate the geological and hydrological regime of the site and to determine potential flood patterns and flood zones at the development location.

6.2.3 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 6-1 (NRA, 2008).

Table 6-1 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 highly 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, 2002, 2003, 2015 and 2017) 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 (2017) 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 6-2.

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 6-3.

Table 6-2: 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 6-3: Impact descriptors related to the receiving environment.

Impact Characteristics		Potential Hydrological Impacts
Quality	Significance	
Negative only	Profound	<p>Widespread permanent impact on:</p> <ul style="list-style-type: none"> ➤ The extent or morphology of a cSAC. ➤ Regionally important aquifers. ➤ Extents of floodplains. <p>Mitigation measures are unlikely to remove such impacts.</p>
Positive or Negative	Significant	<p>Local or widespread time dependent impacts on:</p> <ul style="list-style-type: none"> ➤ 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. <p>Widespread permanent impacts on the extent or morphology of an NHA/ecologically important area,</p> <p>Mitigation measures (to design) will reduce but not completely remove the impact – residual impacts will occur.</p>

Impact Characteristics		Potential Hydrological Impacts
Quality	Significance	
Positive or Negative	Moderate	<p>Local time dependent impacts on:</p> <ul style="list-style-type: none"> ➤ The extent or morphology of a cSAC / NHA / ecologically important area. ➤ A minor hydrogeological feature. ➤ Extent of floodplains. <p>Mitigation measures can mitigate the impact OR residual impacts occur, but these are consistent with existing or emerging trends</p>
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.

6.3 Existing Environment

6.3.1 Site Description and Topography

The Proposed Development site is located in the townlands of Roscam, Merlin Park and Murrough, Galway City, Co. Galway. The total study area is approximately 10.0693ha (~100,693m²) in area.

The proposed site is currently tall grassland and was likely used for rough grazing in the past, with minor areas of forestry at the north of the site.

The elevation of the site ranges between approximately 9 and 20m OD (metres above Ordnance Datum) The overall local topography generally slopes from east to west, towards the shoreline located ~ 500m southeast of the proposed site.

The topography of the site was further investigated during a site visit on 10th September/2019. Within the site itself, a topographically high area is located toward the centre of the site, the ground slopes steeply to the west of this section, before becoming relatively flat. The ground generally slopes steadily east and northeast of this section, towards a topographical low point at the northeast of the site. The dominant land use on the bordering land is agricultural, with Rosshill Farm Stud located ~ 200m south of the site.

A site location map is shown as Figure 6.1. A site photograph is included as Plate 6-1.

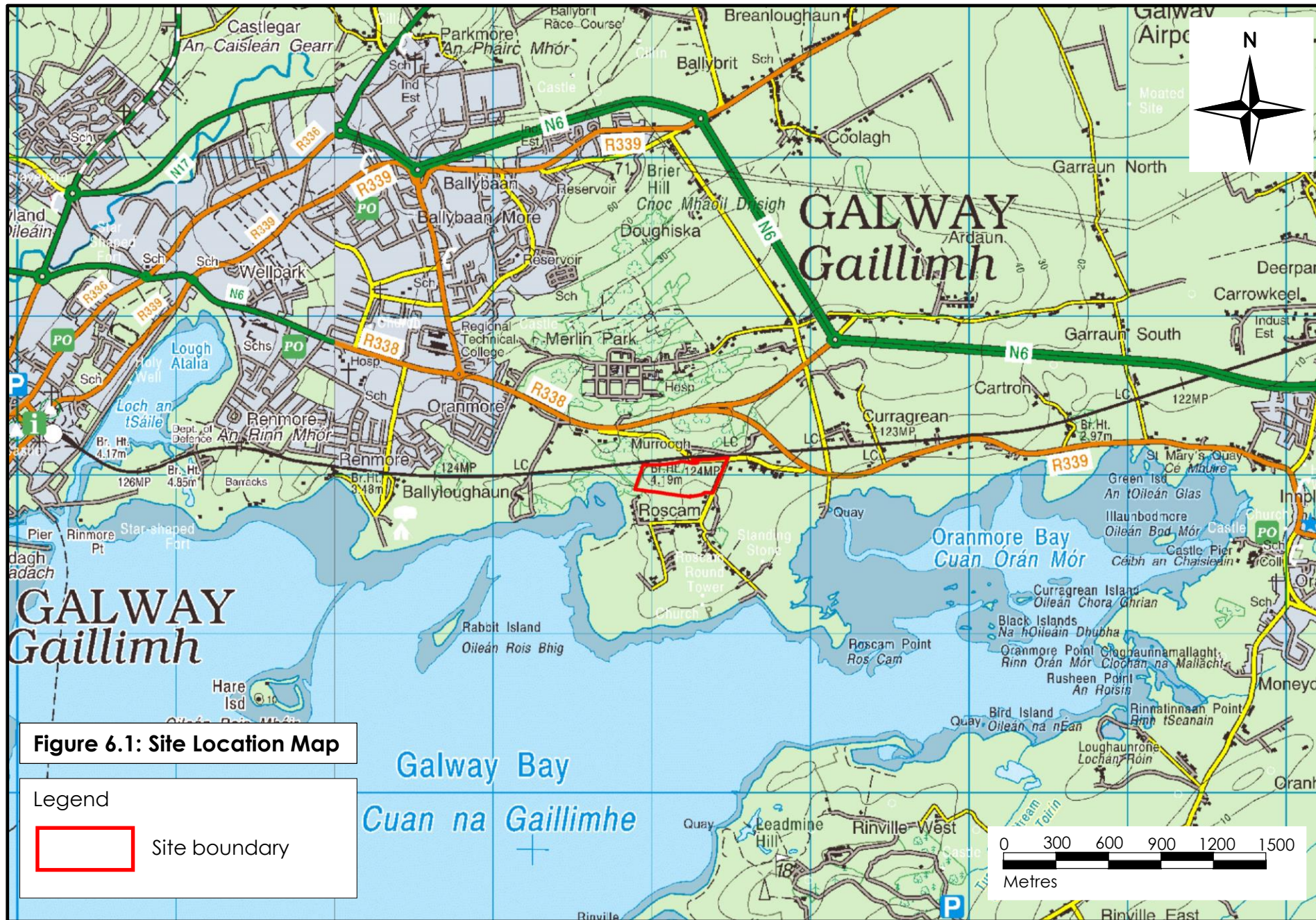




Plate 6-1: Site photograph from northeast entrance to site

6.3.2 Soils and Subsoils

According to GSI mapping (www.gsi.ie), the site is dominated by deep, well drained, mainly basic mineral soils (BminDW) with areas of shallow, well drained, mainly basic soils (BminSW) located towards the northwest of the site. The areas surrounding the site are all mapped as having similar soils, with the exception of smaller areas at the shoreline to the south and southwest, which are mapped as peaty gleys.

The mapped subsoil type (www.gsi.ie) for the proposed site indicate that the majority of the site is underlain by Tills derived from Limestone with some smaller areas of karstified bedrock outcrop/subcrop (KaRck) towards the south of the site. The local subsoils map is shown as Figure 6.2

6.3.3 Bedrock Geology

Based on the GSI bedrock map of the region, the Proposed Development site is underlain by the Burren Formation which is described as pale grey clean skeletal limestone. The limestones are classified by the GSI as a Regionally Important Aquifer – Karstified (conduit) (Rkc).

A bedrock geology map of the area is attached as Figure 6.3

6.3.4 Geological Heritage and Designated Sites

There are no recorded Geological Heritage sites within the proposed development area. The closest geological heritage site is Merlin Park Quarry (IBH 8 Lower), a disused quarry which hosts Galway Black Marble, which is located approximately 0.7km north of the site.

Immediately to the west 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 500m downstream (west) of the proposed site. The Galway Bay Complex is also listed as a proposed NHA. A designated sites map is included as Figure 6.4

6.3.5 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 subsoil/rock type material.

According to the EPA online mapping (<http://gis.epa.ie/Envision>), there are no licensed 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.

6.3.6 Economic Geology

The GSI Online Minerals Database accessed via the Public Data Viewer shows no quarries within the proposed development area. The now disused Merlin Park quarry is located ~ 0.7 km north of the site.

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).

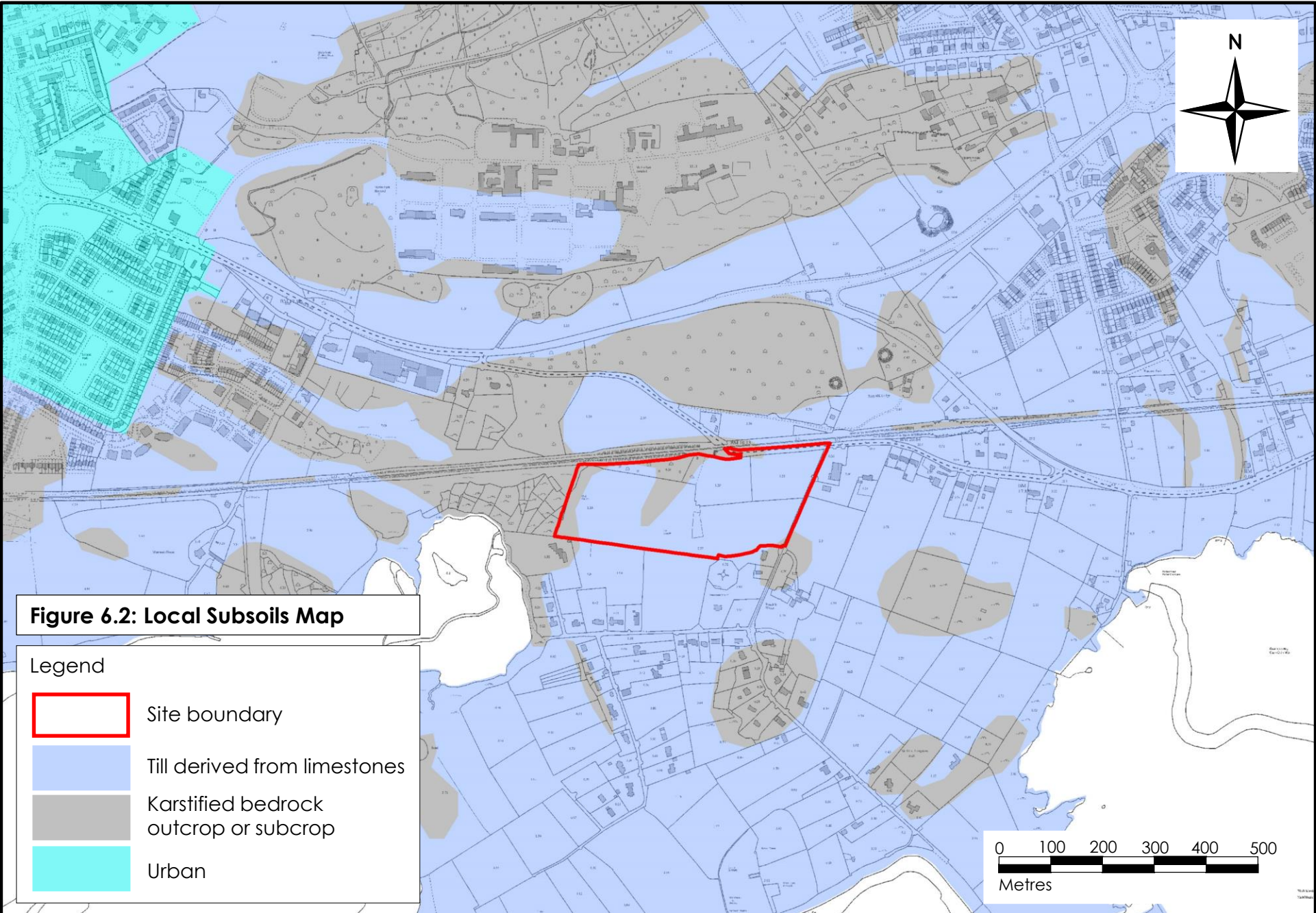



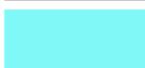
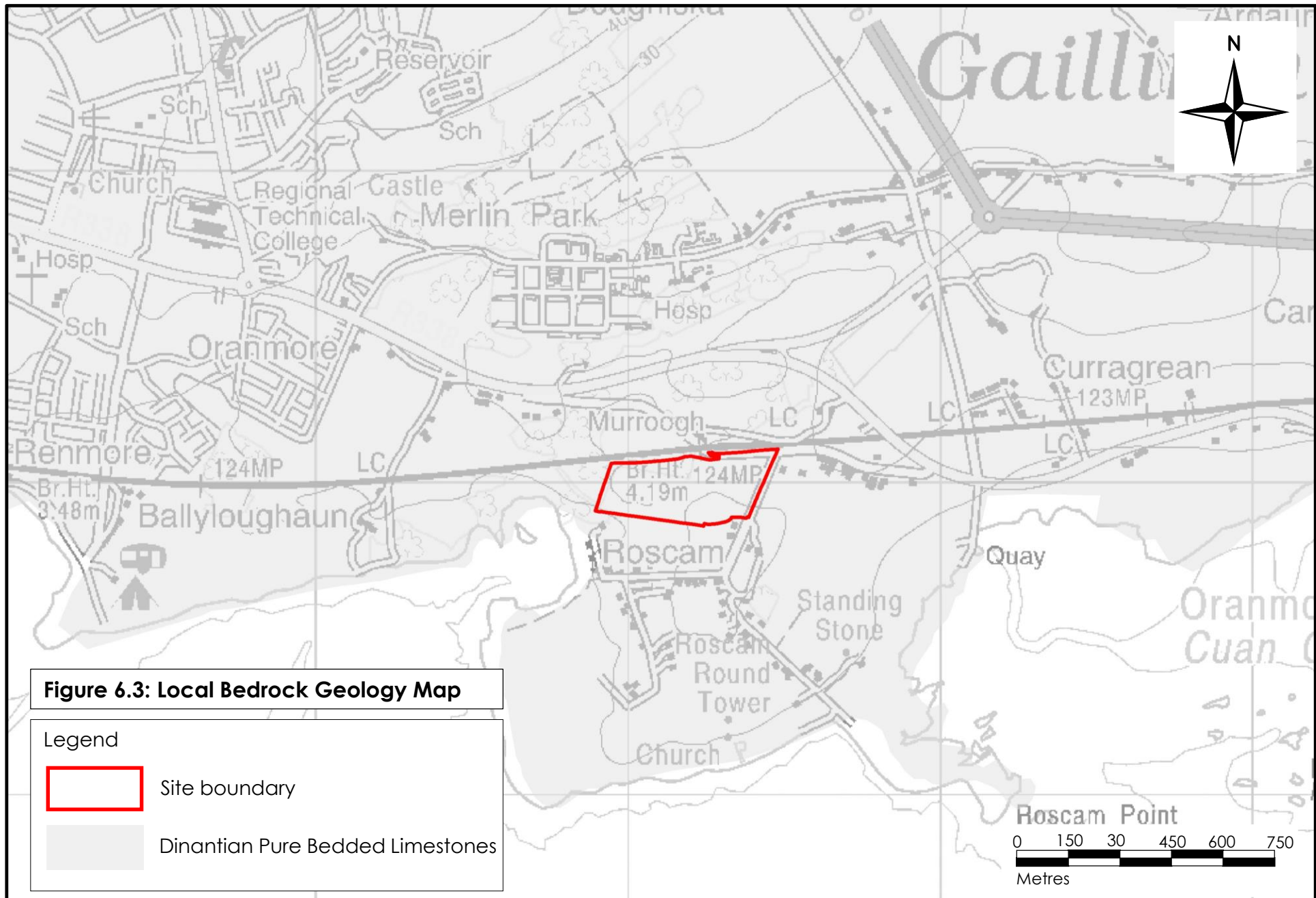


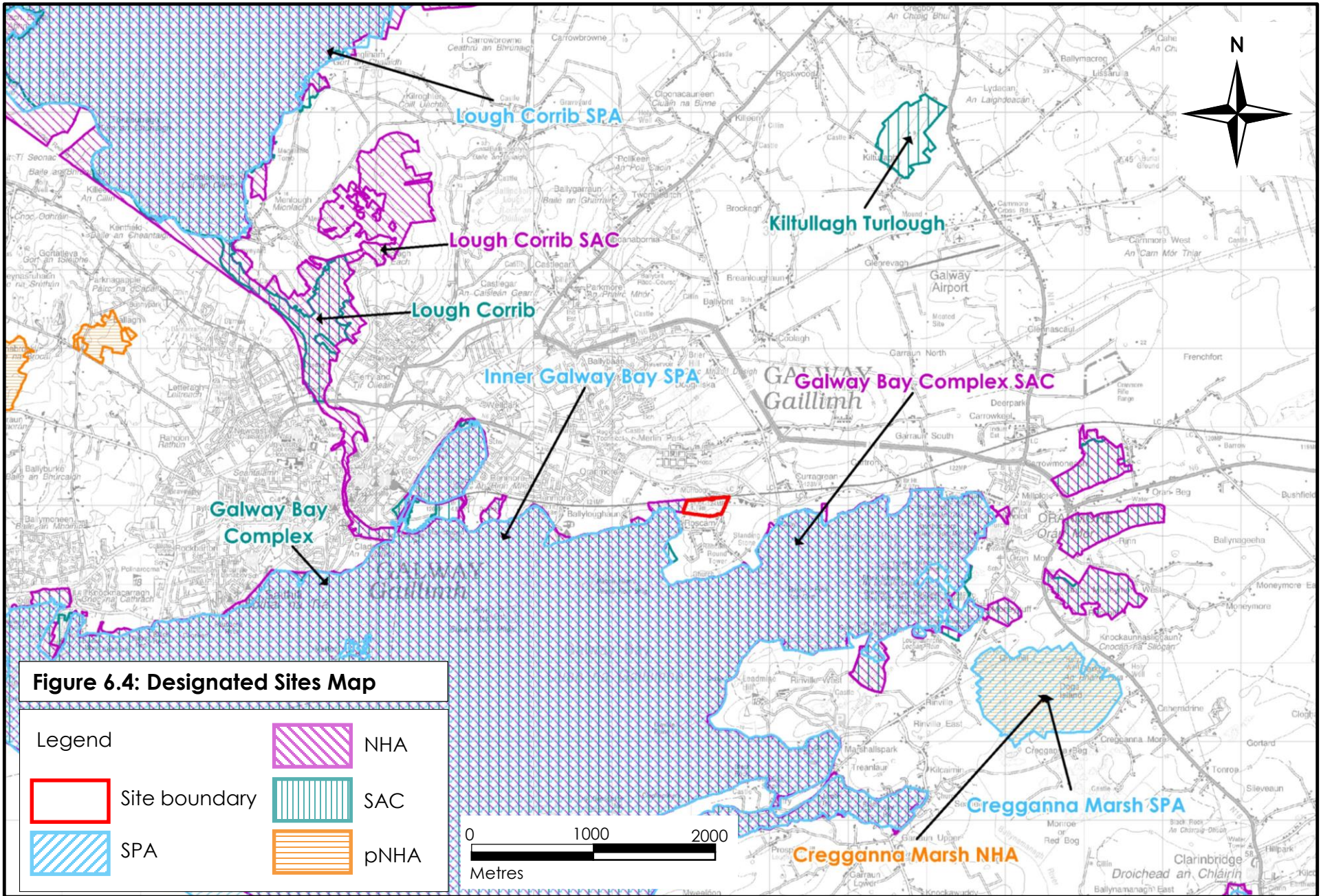
Figure 6.2: Local Subsoils Map

Legend

-  Site boundary
-  Till derived from limestones
-  Karstified bedrock outcrop or subcrop
-  Urban

0 100 200 300 400 500
Metres





6.4 Characteristics of the Proposed Development

The proposed development is described in Chapter 3 and will generally comprise the following:

- 342 no. residential units;
- Development of a crèche facility (398.8 sqm) and associated outdoor play areas and car parking;
- Provision of a new site access from the North-South oriented Rosshill Road; and,
- Provision of shared communal and private open space, site landscaping, site services and all associated site development 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, foul water drainage and to mitigate flood risk.

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.

Surface Water Drainage

It is proposed that the development will drain via gravity to 12 no. soakaways proposed on site. Water draining to soakaways will pass through silt traps and hydrocarbon interceptors prior to reaching each soakaway. No surface water from roofs or paved surfaces will be discharge from the site, other than via the soakaways to ground.

Water Supply

Water supply to the site will be via connection to the adjacent public (Irish Water) watermain.

Wastewater Infrastructure

The proposed on-site foul sewers will discharge by gravity to a pumping station to the north-west of the site, and the foul waste will discharge from this pumping station via pumped rising main to the adjacent public (Irish Water) foul sewer network.

6.5 Potential Impacts of the Proposed Development

6.5.1 Do Nothing Scenario

The use of the proposed development site for rough grazing by livestock would continue. The impact to the topsoil from compaction and poaching of soft ground from the presence of livestock would continue as a result of the Do-Nothing Scenario. The potential impacts are imperceptible.

6.5.2 Likely impacts and Mitigation Measures – Construction Stage

The likely impacts of the proposed residential 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.

6.5.2.1 Subsoil Excavation and Bedrock Excavation

Excavation of existing coarse gravel from agricultural roads, subsoil and bedrock will be required for site levelling, for the installation of foundations for the access roads, carpark and buildings, and service trenching. The cut and fill works on the site will be neutral, and there will not be a requirement for a significant import of aggregate for building works. This will result in a permanent relocation of soil and subsoil at most excavation locations. The excavated materials are expected to include quarry material, existing fill material, topsoil/subsoil, limestone bedrock.

Mechanism: Extraction/excavation.

Receptor: Land, topsoil, subsoil and bedrock.

Pre-Mitigation Potential Impact: Negative, slight/moderate, direct, likely, permanent impact on soil, subsoil and bedrock.

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; and,
- Construction of service trenching, pumping station and surface water attenuation features will generate excess material, and all excess material will be used locally within the site for landscaping.

Residual Impact: Negative, direct, slight, likely, permanent impact on topsoil, subsoils and bedrock.

Significance of Effects: No significant effects on land, topsoil, subsoils or bedrock are anticipated.

6.5.2.2 Contamination of Soil by Leakages and Spillages and Alteration of Soil Geochemistry

Pathway: Topsoil, subsoil and bedrock pore space.

Receptor: Topsoil, subsoil and bedrock.

Potential Impact: Negative, direct, slight, short term, unlikely impact on topsoil, subsoils and bedrock.

6.5.2.2.1 Proposed Mitigation Measures

- 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.

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.

Residual Impact: Negative, Imperceptible, direct, short term, unlikely impact.

Significance of Effects: No significant effects on land, soils, subsoils or bedrock are anticipated.

6.5.2.3 Soil and Subsoil Compaction

Mechanism: Excavation / handling / storage.

Receptor: Land, topsoil, subsoil.

Potential Impact: Negative, direct, slight, likely impact on topsoil and subsoils.

6.5.2.3.1 Proposed Mitigation Measures

The underlying in-situ soils and subsoils will be subject to a certain amount of compaction, but this will be unavoidable.

Any infill material/landscaping that is required will be placed and levelled in appropriate lift thicknesses to ensure the material is not over compacted thereby retaining its drainage properties.

6.5.2.3.2 Residual Impact

Negative, slight, direct, likely impact on topsoil and subsoils.

6.5.2.3.3 Significance of Effects

No significant effects on land, soils, subsoils are anticipated.

6.5.2.4 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.

6.5.2.4.1 Residual Impact

None.

6.5.2.4.2 **Significance of Effects**

None.

6.5.3 **Likely Impacts and Mitigation Measures – Operational Stage**

Due to the nature of the proposed development, no impacts on soils and geology are anticipated during the operational phase. The operational stage of the residential 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 cumulative impacts on the land, soils and geology environment are envisaged during the operational stage.

6.5.4 **Assessment of Health Effects**

Potential health effects arise mainly through the potential for soil and ground contamination. Residential developments are not a recognized source of significant potential pollution and so the potential for effects during the construction 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 negligible.

6.5.5 **Potential Cumulative Impacts**

There are 4 no. proposed housing developments with permission granted in the locality. There are no active quarries, major earthworks, or other associated activities which could impact upon the soils and geological environment near the proposed development site.

No significant cumulative impacts on land, soils and geology environment are anticipated during the construction or operation phases as long as mitigation measures outlined are put in place.

6.5.6 **Worst Case Scenario**

Permanent removal of soil/subsoil. No significant impacts on bedrock geology.

6.5.7 **Conclusion**

Excavation of existing fill, topsoil, peat, subsoil and bedrock will be required for site levelling and for the installation of drainage and services (wastewater, water supply, electricity, etc.) infrastructure. This will result in a permanent removal of peat, subsoil and bedrock at most excavation locations.

All 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 peat and 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.

No cumulative impacts on the land, soil and geology of the site will occur.

7. WATER

7.1 Introduction

7.1.1 Background and Objectives

Hydro-Environmental Services (HES) was engaged by MKO, to carry out an assessment of the potential impacts of a proposed housing development at Rosshill, Galway City on water aspects (hydrology and hydrogeology) of the receiving environment.

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, operational and decommissioning phases of the development;
- Identify mitigation measures to avoid, remediate or reduce significant negative impacts; and,
- Assess significant residual impacts and cumulative impacts of the Proposed Development along with other local residential and infrastructural developments.

7.1.2 Statement of Authority

Hydro-Environmental Services (HES) are a specialist hydrological, hydrogeological and environmental practice which delivers a range of water and environmental management consultancy services to the private and public sectors across Ireland and Northern Ireland. HES was established in 2005, and our office is located in Dungarvan, County Waterford.

Our core areas of expertise and experience include upland hydrology and windfarm drainage design. We routinely complete impact assessments for hydrology and hydrogeology for a large variety of project types.

This chapter of the EIAR was prepared by Michael Gill and Adam Keegan.

Michael Gill (BA, BAI, Dip Geol., MSc, MIEI) is an Environmental Engineer with over 17 years' environmental consultancy experience in Ireland. Michael has completed numerous hydrological and hydrogeological impact assessments of residential and infrastructure developments in Ireland. In addition, he has substantial experience in surface water drainage design and SUDs design, and surface water/groundwater interactions.

Adam Keegan is a hydrogeologist with two years of experience in the environmental sector in Ireland. Adam has been involved in numerous hydrological and hydrogeological impact assessments, flood risk assessments and hydrogeological monitoring as part of the team at HES.

7.1.3 Relevant Legislation

The EIAR is carried out in accordance with the following Irish legislation:

- S.I. No. 349 of 1989: European Communities (Environmental Impact Assessment) Regulations, and subsequent Amendments (S.I. No. 84 of 1995, S.I. No. 352 of 1998, S.I.

- No. 93 of 1999, S.I. No. 450 of 2000 and S.I. No. 538 of 2001), S.I. No. 30 of 2000, the Planning and Development Act, and S.I. 600 of 2001 Planning and Development Regulations and subsequent Amendments. These instruments implement EU Directive 85/373/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. 94 of 1997: European Communities (Natural Habitats) Regulations, resulting from EU Directives 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive) and 79/409/EEC on the conservation of wild birds (the Birds Directive);
 - S.I. No. 293 of 1988: Quality of Salmon Water 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 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). Since 2000 water management in the EU has been directed by the Water Framework Directive (WFD). The key objectives of the WFD are that all water bodies in member states achieve (or retain) at least ‘good’ status by 2015. Water bodies comprise both surface and groundwater bodies, and the achievement of ‘Good’ status for these depends also on the achievement of ‘good’ status by dependent ecosystems. Phases of characterisation, risk assessment, monitoring and the design of programmes of measures to achieve the objectives of the WFD have either been completed or are ongoing. In 2015 it will fully replace a number of existing water related directives, which are successively being repealed, while implementation of other Directives (such as the Habitats Directive 92/43/EEC) will form part of the achievement of implementation of the objectives of the WFD;
 - S.I. No. 41 of 1999: Protection of Groundwater Regulations, 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. 249 of 1989: Quality of Surface Water Intended for Abstraction (Drinking Water), resulting from EU Directive 75/440/EEC concerning the quality required of surface water intended for the abstraction of drinking water in the Member States (repealed by 2000/60/EC in 2007);
 - S.I. No. 439 of 2000: Quality of Water intended for Human Consumption Regulations and S.I. No. 278 of 2007 European Communities (Drinking Water No. 2) Regulations, arising from EU Directive 98/83/EC on the quality of water intended for human consumption (the Drinking Water Directive) and WFD 2000/60/EC (the Water Framework Directive);
 - S.I. No. 272 of 2009: European Communities Environmental Objectives (Surface Waters) Regulations 2009;
 - S.I. No. 9 of 2010: European Communities Environmental Objectives (Groundwater) Regulations 2010; and,
 - S.I. No. 296 of 2009: European Communities Environmental Objectives (Freshwater Pearl Mussel) Regulations 2009.

7.1.4 Relevant Guidance

The water section of the EIAR is carried out in accordance with guidance contained in the following:

- Guidance on the preparation of the EIA Report (Directive 2011/92/EU as amended by 2014/52/EU);
- Environmental Protection Agency (2017): Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports;
- Environmental Protection Agency (September 2015): Draft - Advice Notes on Current Practice (in the preparation on Environmental Impact Statements);
- Environmental Protection Agency (September 2015): Draft – Revised Guidelines on the Information to be Contained in Environmental Impact Statements;
- Environmental Protection Agency (2003): Advice Notes on Current Practice (in the preparation on Environmental Impact Statements);
- 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;
- 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.

7.2

Methodology

7.2.1

Desk Study & Preliminary Hydrological Assessment

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. This included consultation with the following:

- Environmental Protection Agency database (www.epa.ie);
- 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, 2004);
- 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).

7.2.2

Site Data

The following data were used in preparation of this chapter:

- A walkover survey, including detailed drainage mapping, was undertaken by HES on 10/09/2019. The walkover survey and hydrological mapping of the proposed site the surrounding area were undertaken whereby water flow directions and drainage patterns were recorded; and,

- A flood risk assessment for the proposed development footprint area completed by Tobins (June 2019).

7.2.3 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. 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 7-1 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.
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

7.3 Receiving Environment

7.3.1 General Site Description

The Proposed Development site is located in the townlands of Roscam, Merlin Park and Murrough, Galway City, Co. Galway. The total study area is approximately 10.0693ha (~100,693m²) in area.

The proposed site is currently rough grassland used for rough grazing of sheep with minor areas of forestry at the north of the site.

The elevation of the site ranges between approximately 9 and 20m OD (metres above Ordnance Datum) The overall local topography generally slopes from east to west, towards the shoreline located ~ 500m southeast of the proposed site. The dominant land use on the bordering land is agricultural, with Rosshill Farm Stud located ~ 200m south of the site.

The Proposed Development site does not contain field drains or natural watercourses and it is likely that much of the rainfall that falls on the site drains through the soils i.e. percolates to ground.

7.3.2 Water Balance

Long term rainfall and evaporation data was sourced from Met Éireann. The 30-year annual average rainfall (1981 - 2010) recorded at Athenry station, located northeast of the Proposed Development site, are presented in Table 7-2 below. This is the closest station to the proposed development site.

(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 7-2: Local Average long-term Rainfall Data (mm)

Station		X-Coord		Y-Coord		Ht (MAOD)		Opened		Closed		
Athenry		08° 47'08"W		53° 17'21" N		40		1945		N/A		
Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sept	Oct	Nov	Dec	Total
117	88	95	72	75	80	87	108	100	129	120	123	1,193

The closest synoptic station where the average potential evapotranspiration (PE) is recorded is at Claremorris station, approximately 51 kilometres north of the site. The long-term average PE for this station is 408mm/yr. This value is used as a best estimate of the site PE. Actual Evaporation (AE) at the site is estimated as 388mm/yr (which is $0.95 \times PE$).

The effective rainfall (ER) represents the water available for runoff and groundwater recharge. The ER for the site is calculated as follows:

$$\text{Effective rainfall (ER)} = \text{AAR} - \text{AE}$$

$$= 1,193\text{mm/yr} - 388\text{mm/yr}$$

$$\text{ER} = 805\text{mm/yr}$$

Based on groundwater recharge coefficient estimates at the site (which range from 60% to 85%) from the GSI (www.gsi.ie) an estimate of 563mm/year average annual recharge is given for the study area (70% recharge coefficient). This means that the hydrology of the study area is characterised by low surface water runoff rates and high groundwater recharge rates. The site is also relatively close to the coast (~500m), and all drainage from the site will ultimately end up in Galway Bay.

Therefore, annual recharge and runoff rates for the site are estimated to be 563mm/yr and 242mm/yr respectively. The large coverage of well-draining mineral soils and relatively flat ground means recharge rates are likely to be towards the higher end of the GSI range.

7.3.3 Regional Hydrology

On a regional scale, the site is located within Hydrometric Area 29. The site is located in the Galway Bay South East catchment and Carrowmoneash (Oranmore)_SC_010 sub-catchment under the Water Framework Directive (WFD). A local hydrology map is shown as Figure 7.1.

The Carrowmoneash river is situated ~ 1.5 km southeast of the proposed site, on the opposite side of Oranmore bay. Therefore, it is unlikely that any rainfall falling at the site makes it to this river, given the distance and topography. It is more likely that run-off will flow west/southwest towards the coastline.

7.3.4 Site Drainage

The site appears to be well drained from observations during the site visit. No evidence of water logging, such as the growth of reeds was observed, apart from a small area in the northeast corner of the site.

Small stream channels can be seen along the Rosshill beach which emerges ~ 100m west of the western boundary of the site. It is likely that runoff is flowing along the field boundaries and discharging to the Galway Bay at this point.

7.3.5 Flood Risk Identification

A Flood Risk Assessment was completed by Tobin Engineers in August 2019 and is include in Appendix 7-1. The results of this assessment are summarized as the following:

- The proposed development is classified as a “highly vulnerable development” in terms of its sensitivity to flooding under the PSFRM guidelines. Such developments are considered appropriate within Flood Zone C areas.
- The FRA concluded that the site is not liable to fluvial flooding during a 1000-year MRFS, as such the risk of fluvial flooding to the site is minimal.
- Based on a review of PFRA mapping and karst features, it is estimated that the risk of groundwater flooding at the site is minimal.
- Pluvial modelling, carried out as part of the PRFA mapping indicated that the site may be liable to pluvial flooding. As such, mitigation measures were included in the Flood Risk Assessment which included, but were not limited to:
 - 1) Residential units will be located above the design flood level;
 - 2) Recreational space will be located in area where pluvial flooding is indicated as more likely to occur;
 - 3) Surface water arising onsite will be managed by a dedicated storm water drainage system and;
 - 4) The landscaping and topography of the developed site shall provide safe exceedance flow paths in the event of extreme flood events or in the case of a blockage of the drainage system, to minimise risks to people and property.
- In terms of coastal flooding, the minimum existing ground levels are 1.63m above the 1000 MRFS coastal flood level of 5.07m OD. It is proposed that road levels at the proposed Rosshill site are raised to at least 7.2m OD and finished floor levels will be raised to at least 9.30mOD.

Based on the proposed levels at the site, the development is not predicted to flood during a 1 in 1000-year MRFS coastal flood event.

- It is estimated that the risk of flooding the proposed residential development will be minimal, and it is predicted that the development will not increase the risk of flooding elsewhere.

7.3.6 Surface Water Hydrochemistry

Q-rating status data is not available for the Carrowmoneash river as no EPA monitoring points exist on this watercourse. No watercourses or field drains exist within the Proposed Development site to determine surface water hydrochemistry.

7.3.7 Hydrogeology

The Burren Formation limestones, which are mapped to underlie the Proposed Development site are classified by the GSI (www.gsi.ie) as a Regionally Important Aquifer – Karstified (conduit). A bedrock aquifer map is shown as Figure 7.2.

This bedrock type has typically high transmissivity and low storativity with lower gradients closer to the coast. Groundwater flow occurs along fissures, faults, joints and bedding planes.

Groundwater flow directions are generally to the west but as flow pathways are often determined by discrete conduits, actual flow directions will not necessarily be perpendicular to the assumed water table contours (GSI, 2004). Due to the proximity to the coastline at the site, and the topography, flow directions are likely to be to the south/southwest.

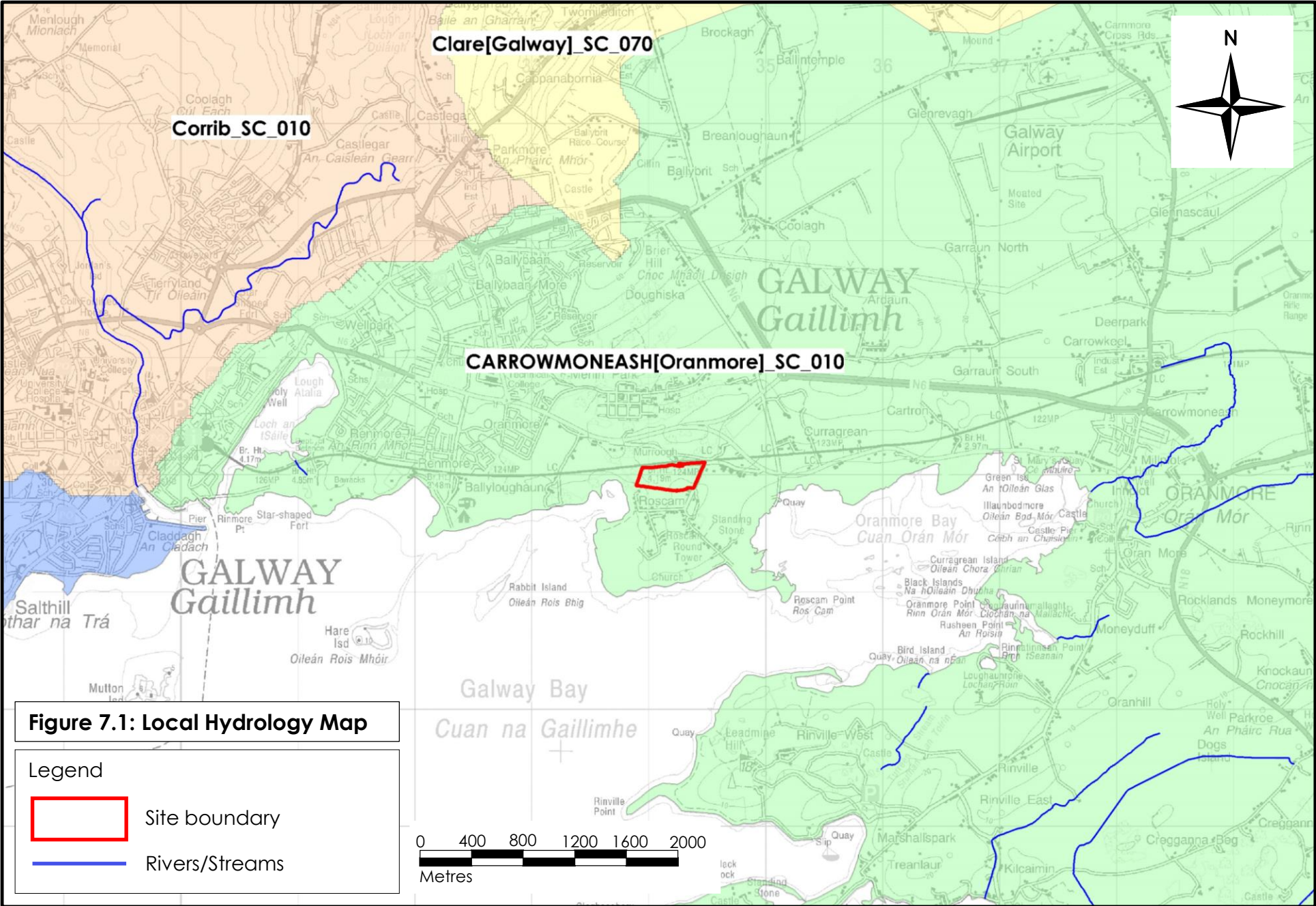
7.3.8 Groundwater Vulnerability

The vulnerability rating of the aquifer within the overall site is classified as “Extreme (X –rock at/near surface)”.

7.3.9 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 direct 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 9.6 – 990mg/L while electrical conductivity and hardness were reported to have mean values of 691 μ S/cm and 339mg/L respectively.



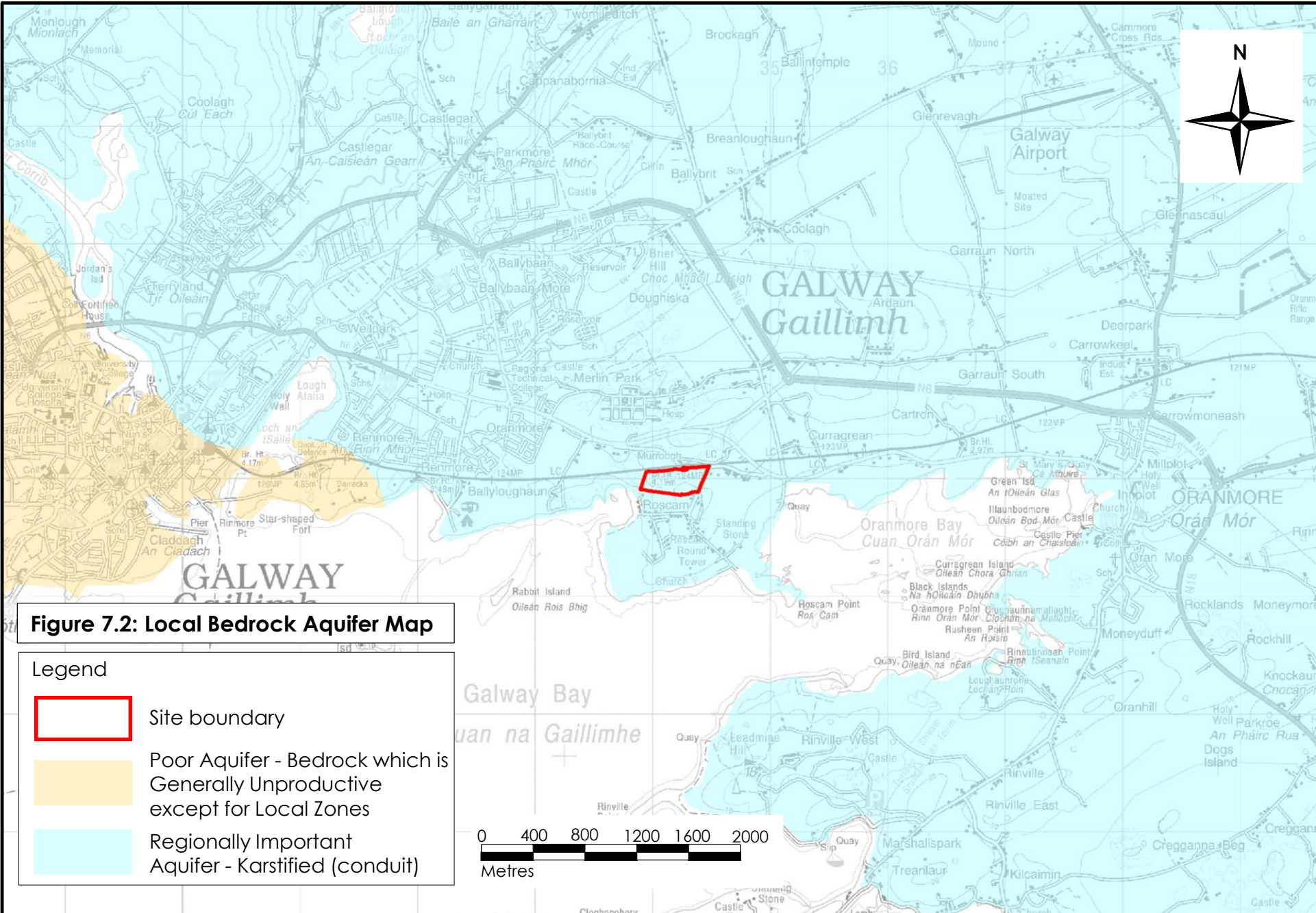


Figure 7.2: Local Bedrock Aquifer Map

Legend



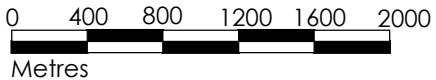
Site boundary



Poor Aquifer - Bedrock which is Generally Unproductive except for Local Zones



Regionally Important Aquifer - Karstified (conduit)



7.3.10 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 proposed development site predominately drains to the underlying subsoil and aquifer.

No River water quality data is available for watercourses near the site.

7.3.11 Groundwater Body Status

Local Groundwater Body (GWB) status information are available (www.catchments.ie). Refer to Figure 7.3 for the location and extent of local groundwater body.

The Clarinbridge GWB (IE_WE_G_0008) which underlies the Proposed Development site is assigned 'Good' status under the WFD 2010-2015.

7.3.12 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).

Immediately to the west 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 500m downstream (west) of the proposed site. The Galway Bay Complex is also listed as a proposed NHA. A designated sites map is attached as Figure 7.4.

7.3.13 Water Resources

There are no groundwater protection zones mapped within the proposed development site or study area. There is 1 no. mapped private well (GSI database to accuracy of <50m) located ~0.5km at Murrough House, which was obtained from the GSI well database (www.gsi.ie). This is a shallow dug well and likely intercepts shallow water draining from the surrounding soils, rather than the bedrock aquifer.

No groundwater wells would be expected in the area, given the proximity to the sea. Notwithstanding this, an assessment of groundwater resources relative to the proposed development is completed below.

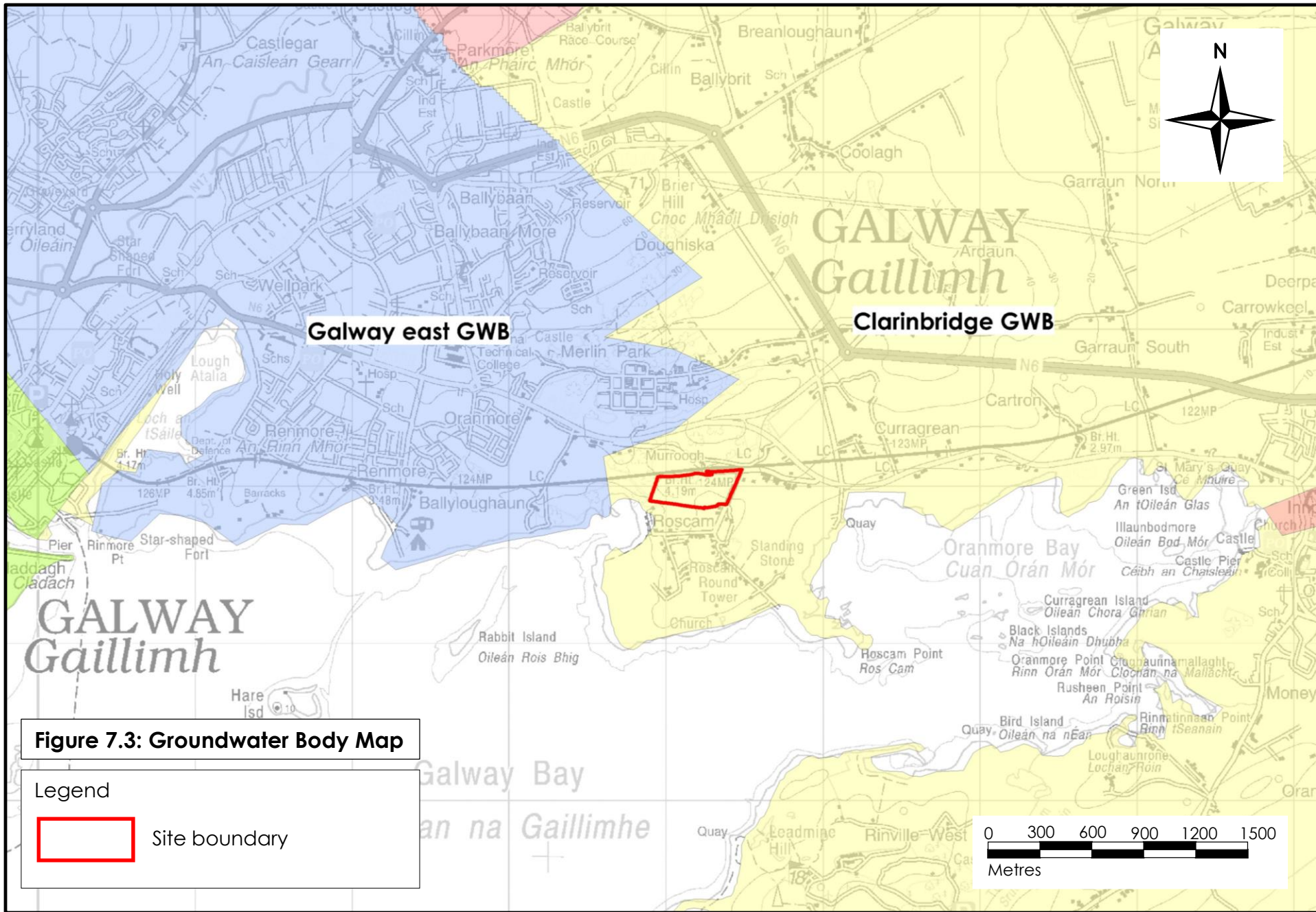
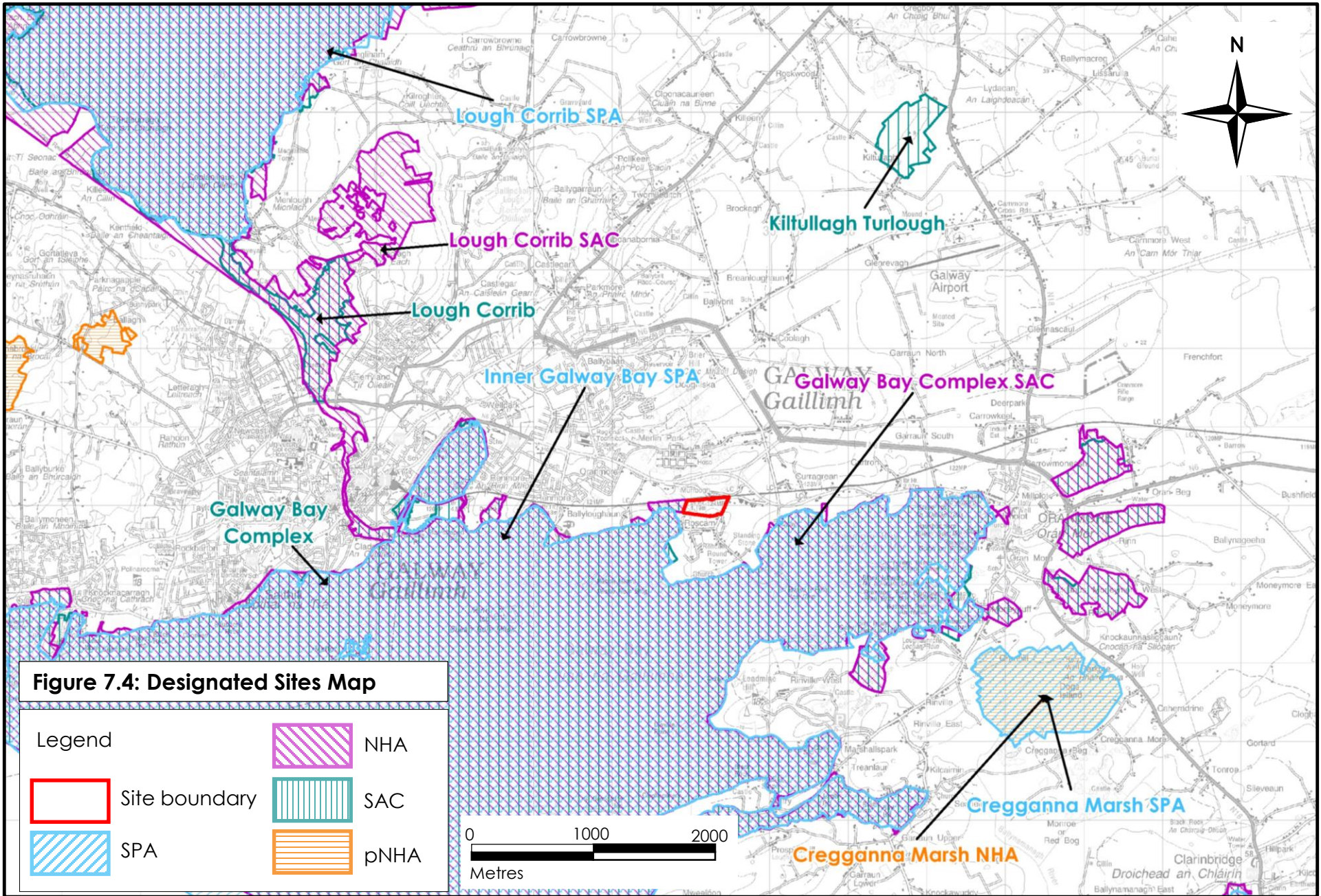


Figure 7.3: Groundwater Body Map

Legend

 Site boundary



7.3.14 Receptor Sensitivity

Due to the nature of residential developments, being near surface construction activities, impacts on groundwater are generally negligible and surface water is generally the main sensitive receptor assessed during impact assessments. 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 are anticipated 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 7.1 above, the Regionally Important Karstified Aquifer (i.e. Limestone) at the site can be classed as Sensitive to pollution. Also, any contaminants which may be accidentally released on-site may also discharge to local surface water drainage channels, and then on into Galway Bay.

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 ground via soakaways, thereby avoiding changes to surface water flow volumes leaving the site.

7.3.15 Proposed Site Infrastructure and Drainage Management

It is proposed that the development will drain via gravity to 12 no. soakaways proposed on site. Water draining to soakaways will pass through silt traps and hydrocarbon interceptors prior to reaching each soakaway. No surface water from roofs or paved surfaces will be discharge from the site, other than via the soakaways to ground.

Water supply to the site will be via connection to the adjacent public (Irish Water) watermain.

The proposed on-site foul sewers will discharge by gravity to a pumping station to the northwest of the site, and the foul waste will discharge from this pumping station via pumped rising main to the adjacent public (Irish Water) foul sewer network.

7.4 Characteristics of the Proposed Development

The proposed development is described in Chapter 3 and will generally comprise the following:

- 185 no. residential units;
- Development of a crèche facility (398.8sqm) and associated outdoor play areas and car parking;
- Provision of a new site access from the North-South oriented Rosshill Road; and,
- Provision of shared communal and private open space, site landscaping, site services and all associated site development 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, foul water drainage and to mitigate flood risk.

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.

Surface Water Drainage

It is proposed that the development will drain via gravity to 12 no. soakaways proposed on site. Water draining to soakaways will pass through silt traps and hydrocarbon interceptors prior to reaching each soakaway. No surface water from roofs or paved surfaces will be discharge from the site, other than via the soakaways to ground.

Water Supply

Water supply to the site will be via connection to the adjacent public (Irish Water) watermain.

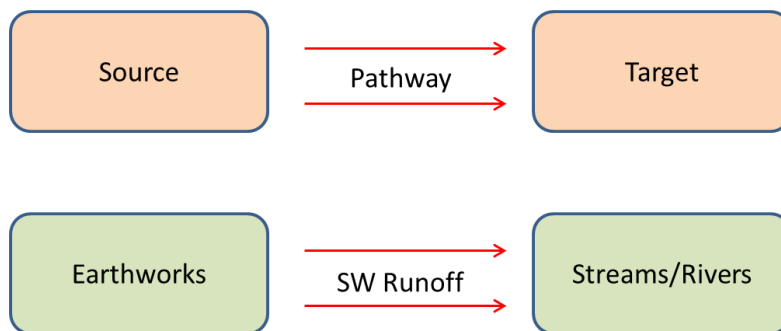
Wastewater Infrastructure

The proposed on-site foul sewers will discharge by gravity to a pumping station to the north-west of the site, and the foul waste will discharge from this pumping station via pumped rising main to the adjacent public (Irish Water) foul sewer network.

7.5 **Potential Impacts and Mitigation Measures**

7.5.1 **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):

- Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports (EPA, 2017);
- 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 (Section 9.4.2 and 9.4.3), we have firstly presented below a summary guide that defines the steps (1 to 7) taken in

each element of the impact assessment process (refer to Table 7-3). 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 7-3: Impact Assessment Methodology

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 this type of development, 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 this type of development, 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.

7.5.2 Construction Phase Potential Impacts

7.5.2.1 Earthworks (Removal of Vegetation Cover, Excavations and Stock Piling) Resulting in Suspended Solids Entrainment in Surface Waters

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. Such excavations will be relatively shallow and temporary. The main risk will be from surface water runoff from bare soil and soil storage areas during construction works.

The site is relatively unique in that there are no adjacent natural or man-made watercourses and surface water generally percolates to ground. However, construction activities can result in the release of suspended solids to local drainage features and can result in an increase in the suspended sediment load, resulting in increased turbidity which in turn could affect the water quality and fish stocks of downstream water bodies, such as Oranmore Bay/Galway Bay. However, as outlined in the Natura Impact Statement, Section 4.3.1, “there is no direct surface water connectivity between the site of the proposed project and any EU designated site”. This statement aligns with observations made by HES during the walkover survey. This potential impact cannot directly affect the Galway Bay SAC.

Surface water has the potential to carry suspended sediment via overland flow. Due to the nature of the site topography, the pathway for overland flow is limited and surface waters are expected to stay within the site boundary and percolate through the soil/subsoil. This potential impact (overland flow transporting suspended sediment) can potentially indirectly effect areas of the Galway Bay SAC.

Pathways: Drainage and surface water discharge routes. Overland drainage.

Receptors: Down-gradient transitional and water dependent ecosystems.

Pre-Mitigation Impact: Indirect, negative, slight, temporary, medium probability impact.

Proposed Mitigation Measures:

Management of surface water runoff and subsequent treatment prior to release off-site will be undertaken during construction work as follows:

- Prior to the commencement of earthwork silt fencing will be placed down-gradient of the construction areas where drains or drainage pathways are present. These will be embedded into the local soils to ensure all site water is captured and filtered;
- As construction advances there may be a small requirement to collect and treat surface water within the site. This will be completed using perimeter swales at low points around the construction areas, and if required water will be pumped from the swales into sediment bags prior to overland discharge allowing water to percolate naturally to ground;
- Discharge onto ground will be via a silt bag which will filter any remaining sediment from the pumped water. The entire discharge area from silt bags will be enclosed by a perimeter of double silt fencing;
- Any proposed discharge area will avoid potential surface water ponding areas, and will only be located where suitable subsoils are present;
- Daily monitoring and inspections of site drainage during construction will be completed;
- Earthworks will take place during periods of low rainfall to reduce run-off and potential siltation of watercourses; and,

- Good construction practices such as wheel washers and dust suppression on site roads, and regular plant maintenance will ensure minimal risk. 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), which provides information on these issues. This will ensure that surface water arising during the course of construction activities will contain minimum sediment.

Residual Impact: No impacts on water quality or downstream designated sites are anticipated.

Significance of Effects: 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.

7.5.2.2 Potential Surface Water Quality Impacts from Shallow Excavation Dewatering

Some groundwater seepages will likely occur in foundation excavations and especially where more permeable weathered bedrock is encountered. Dewatering, if undertaken, 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. Such works will be temporary.

Pathway: Overland flow and site drainage network.

Receptor: Down-gradient surface water bodies.

Pre-Mitigation Impact: Indirect, negative, moderate, temporary, medium probability impact to surface water quality.

Impact Assessment

Management of excavation seepages and subsequent treatment prior to discharge into the site drainage network will be undertaken as follows:

- Appropriate temporary interceptor drainage, to prevent upslope surface runoff from entering excavations will be put in place if required;
- If required, pumping of excavation inflows will prevent build-up of water in the excavation;
- The pumped water volumes will be discharged onto ground for infiltration or into temporary sediment attenuation ponds adjacent to excavation areas, or via silt bags; and,
- There will be no direct discharge to any water body, and therefore no risk of hydraulic loading or contamination will occur.

The temporary nature of such works (if they are required), and also the limited shallow depth of any such requirement will not affect the local hydrological regime, the level of the water table, nor the throughflow of shallow or deeper groundwater flow below the development site.

Residual Impact: Indirect, negative, slight, temporary, low probability impact on downstream surface waters.

No impact on groundwater levels or groundwater quality.

Significance of Effects: No significant impacts on surface water quality, groundwater levels or groundwater quality are expected due to excavation dewatering.

7.5.2.3 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, significant, short term, unlikely impact to surface water quality.

Proposed Mitigation Measures - Mitigation by Design:

- On site re-fuelling of machinery will be carried out using a mobile double skinned fuel bowser. The fuel bowser, a double-axel custom-built refuelling trailer will be re-filled off site and will be towed around the site by a 4x4 jeep to where machinery is located. The 4x4 jeep will also carry fuel absorbent material and pads in the event of any accidental spillages. The fuel bowser will be parked on a level area in the construction compound when not in use and only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations;
- 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;
- The plant used should be regularly inspected for leaks and fitness for purpose; and,
- An emergency plan for the construction phase to deal with accidental spillages will be contained within Environmental Management Plan. Spill kits will be available to deal with accidental spillages.

Residual Impact: Indirect, negative, imperceptible, temporary, unlikely impact on groundwater and surface water.

Significance of Effects: No significant effects on surface water or groundwater quality are anticipated.

7.5.2.4 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.

Pathway: Groundwater flowpaths and site drainage network.

Receptor: Down-gradient well supplies, groundwater quality and surface water quality.

Pre-mitigation Impact: Indirect, negative, significant, temporary, unlikely impact to surface water quality.

Indirect, negative, slight, temporary, 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.

7.5.2.5 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 $\geq 6 \leq 9$ 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:

- No batching of wet-cement products will occur on site. Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place;
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;
- Where concrete is delivered on site, only the chute need be cleaned, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed. Chute cleaning water is to be tanked and removed from the site to a suitable, non-polluting, discharge location;
- Use weather forecasting to plan dry days for pouring concrete; and,
- Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event.

Residual Impact: Negative, Indirect, imperceptible, short term, unlikely impact.

Significance of Effects: No significant effects on surface water quality are anticipated.

7.5.2.6 Potential Impacts on Hydrologically Connected Designated Sites

The lands to the east, west and south of the proposed site are located within the Galway Bay Complex SAC (Code: 000268). A review of available hydrogeological information has been used to assess impacts on the SAC east and west of the site.

Possible effects during the construction phase include surface and ground water quality impacts which could be significant if mitigation is not put in place.

There will be no impacts on the local hydrological regime or water quality during the construction phase for the following reasons:

- There will be no net change in recharge at Development Site. Soakaways will be used for roof water to recharge into ground.
- There is no direct hydrological connection to any other watercourse from the site, which limits the pathway for surface water to overland flow only.
- No significant dewatering is proposed during construction. Any pumping required will be temporary and at a very shallow depth.
- No new open drainage channels are proposed.
- All building works are proposed at or very near existing ground levels with minimal ground disturbance proposed.
- No deep foundations are required or are proposed. As such there will be no interruption or blocking of shallow or deep groundwater pathways below the site.
- Measures to prevent impacts from earthworks are set out in Section 7.5.2.1.
- Measures will be in place to protect against potential impacts on groundwater as set out in Sections 7.5.2.3 – 7.5.2.5

Groundwater flowpaths will be maintained as any excavation proposed will be shallow, and any required dewatering during construction will also be shallow and temporary in nature. Groundwater flowpaths from east to west below the site will be unaltered by the proposed development.

Pathway: Surface water and groundwater flowpaths.

Receptor: Down-gradient water quality and hydrological regime of designated sites.

Pre-Mitigation Impact: Indirect, negative, moderate - significant, long term, likely impact to surface water and groundwater quality.

No impacts on groundwater levels or existing hydrological regime or flowpaths.

Proposed Mitigation Measures

The proposed mitigation measures for protection of surface water quality which will include on site drainage control measures (i.e. silt fences, silt bags etc) will ensure that the quality of runoff from proposed development areas will be good. 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 and this will provide protection to groundwater.

All surface water arising on site will drain via soakaways to ground, with no proposed outfall. Groundwater quality risks are reduced during the operational phase by use of hydrocarbon interceptors and silt traps prior to discharge to the soakaways.

Residual Impact: No impacts on water quality or downstream designated sites will occur. No impacts on groundwater levels or existing hydrological regime or groundwater flowpaths relating to the Galway Bay SAC.

Significance of Effects: 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 the Galway Bay SAC.

7.5.3 Operational Phase Impacts

7.5.3.1 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.

All surface water arising on site will drain via soakaways to ground, with no proposed outfall. Towards the northwest of the site, where there is a risk of pluvial flooding, a retention swale for storm overflow is proposed.

Pathway: Site surface water drainage network.

Receptor: Site, adjacent lands and nearby infrastructure

Pre-Mitigation Impact: Direct, negative, slight, long term, low probability impact.

Proposed Mitigation Measures

The risk of pluvial flooding is minimised by using soakaways for drainage management. A retention swale for storm overflow with a capacity of ~3480 m³ is also proposed.

Residual Impact: Direct, negative, imperceptible, long term, low probability impact in relation to flood risk.

Significance of Effects: No significant effects in terms of flooding are expected due to the proposed development.

7.5.3.2 Potential Impacts on Hydrologically Connected Designated Sites

The lands to the east and west of the proposed site are located within the Galway Bay Complex SAC (Code: 000268).

Possible effects during the operational phase continue to include water quality impacts which could be significant if ongoing mitigation is not put in place.

There will be no impacts on the local hydrological regime during the operational phase of the development for the following reasons:

- There will be no net change in recharge at the Development Site. Soakaways will be used for roof water to recharge into ground.
- Petrol/Oil Interceptors will be installed at the 12 no. soakaways.
- No dewatering will occur during the operational phase of the development.
- No new drainage channels are proposed.
- All building works will be complete and will have been installed at or very near existing ground levels with minimal ground disturbance having occurred.
- No deep foundations will have been installed. As such there will be no interruption or blocking of shallow or deep groundwater pathways below the site during the operational phase.

Groundwater flowpaths will be maintained during the operational phase as any excavation proposed will be shallow. Groundwater flowpaths during the operational phase from east to west below the site will be unaltered by the proposed development.

Pathway: Surface water and groundwater flowpaths.

Receptor: Down-gradient water quality and hydrological regime of designated sites.

Pre-Mitigation Impact: Indirect, negative, moderate, long term, likely impact to surface water and groundwater quality.

No impacts on groundwater levels or existing hydrological regime or flowpaths.

Proposed Mitigation Measures

During the operational phase all surface water arising on site will drain via soakaways to ground, with no proposed outfall. Groundwater quality risks are reduced during the operational phase by use of hydrocarbon interceptors and silt traps prior to discharge to the soakaways.

Residual Impact: No impacts on water quality or downstream designated sites are anticipated.

No impacts on groundwater levels or existing hydrological regime or groundwater flowpaths relating to the Galway Bay SAC.

Significance of Effects: No significant impacts on groundwater or surface water quality and downstream designated sites will occur.

No significant impacts on groundwater levels, existing hydrological regime, or groundwater flowpaths relating to the Galway Bay SAC.

7.5.4 **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 housing site.

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

The flood risk assessment for the development has also shown that the risk of the proposed housing development contributing to downstream flooding is also very low, and also that the risk of inundation of the houses within the site post construction is very low due to the proposed design floor levels and site layout.

7.5.5 **Do Nothing Scenario**

Current land use (grassing/agriculture/scrub) will continue. Surface water drainage and infiltration to ground will continue as is occurring currently with no impact on either surface or groundwater.

7.5.6 **Worst Case Scenario**

Contamination of surface water streams (although a direct hydraulic connection to any stream/river was not identified during the site visit) during the construction and operational phases, which in turn could affect the ecology and quality of the downstream water bodies such as the Galway Bay. Also, potentially

localised groundwater contamination may occur. However, measures will be put in place to prevent this from happening.

7.5.7 Cumulative Impacts

There are 4 no. proposed housing developments with permission granted in the locality. A description of the development types are included below within

Table 7-4.

Table 7-4: Local/Nearby Developments

	Description	Decision
16/228	Permission for a new residential development. The development consists of 16 no. 2-storey, five-bedroom, detached houses, together with individual garages, as applicable, new vehicular site accesses and roads with all ancillary site works, landscaping and service connections	Grant
17/283	Permission to construct 23 two storey Dwelling houses consisting of Detached, Semi-detached and terrace including access/egress off the old coast road to Oranmore with sewer connection to adjacent sewer pumping station adjacent the Dublin Road and all associated services.	Grant
18/187	Permission for a change of house type to previously granted planning permission (reference 16/228). These amendments consist of a change of house type C (on site 6 only) which is a 5-bedroom two storey detached house	Grant
19/95	Permission for development which consists of the constructing 51 No. one, two and three bedroom apartments and two one bedroom Town Houses in 6 no. Blocks ranging in height from one storey up to four storey, with sewer connection to adjacent pumping station adjacent Dublin road, together with access/egress off the old coast road to Oranmore and all associated services at Doughiska and Merlin Park Townlands. (Previous Planning Ref No. 17/283)	Grant

No significant cumulative impacts on the water environment are anticipated during the construction or operational phases as long as mitigation measures outlined are put in place. The 4 no. developments are topographically upgradient of the proposed development with appropriate water and wastewater services.

7.5.8 Conclusion

The site is naturally separated from any local watercourses, and this setback distance means that there is limited potential for impact on water quality or the downstream designated sites.

Notwithstanding this, during each phase of the proposed housing development at Rosshill (construction and operation) a number of activities will take place on the proposed development site, some of 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 using silt fences, and silt bags, and to control runoff rates. The key surface water control measure is that there will be no direct discharge of development runoff into local watercourses. This will be achieved by avoidance methods and design methods (i.e. surface water drainage to soakaways).

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.

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

There will be no net impact on the local hydrological regime, groundwater levels, or groundwater flowpaths during the construction and operational phase of the proposed development. There will be no direct or indirect hydrological impacts on the Galway Bay SAC.

No significant cumulative impacts on groundwater or designated sites are anticipated.

8. AIR & CLIMATE

8.1 Introduction

MKO prepared the Air & Climate section of this Environmental Impact Assessment Report (EIAR) for the proposed housing development at Rosshill, Co. Galway.

This Chapter examines the effect of the proposed development on air and climate. Where required, appropriate mitigation measures to limit any identified significant impacts to air and climate are recommended.

8.1.1 Statement of Authority

This section of the EIAR has been prepared by Eoin Gilson and reviewed by Michael Watson, both of MKO. Eoin is an Environmental scientist with over a years' experience in Environmental Consultancy. Eoin holds an MSc in Applied Environmental Science. Michael has over seventeen 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).

8.2 Air

8.2.1 Background

The Proposed Rosshill residential Development site, which is approximately 10 hectares, is located between Galway city centre and Oranmore town (approximately 4km from each). It is anticipated that the development will be completed over 4 separate phases (See ONOM phasing plan ref 3025) and is expected to last approximately 7 years in total.

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 this Environmental Impact Assessment Report (EIAR).

8.2.2 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 8-1 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 ($\mu\text{g}/\text{m}^3$) and parts per billion (ppb). The notation PM₁₀ 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 8-1 European sites within likely zone of impact of the Proposed Development

Pollutant	Limit Value Objective	Averaging Period	Limit Value ($\mu\text{g}/\text{m}^3$)	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	1st Jan 2005

Pollutant	Limit Value Objective	Averaging Period	Limit Value ($\mu\text{g}/\text{m}^3$)	Limit Value (ppb)	Basis of Application of Limit Value	Attainment Date
					a calendar year	
Particulate matter 2.5 ($\text{PM}_{2.5}$)	Protection of human health	Calendar year	40	-	Annual mean	1st Jan 2005
Particulate matter 2.5 ($\text{PM}_{2.5}$) Stage 1	Protection of human health	Calendar year	25	-	Annual mean	1st Jan 2015
Particulate matter 2.5 ($\text{PM}_{2.5}$) 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 8-2 presents the limit and target values for ozone.

Table 8-2 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 $\text{mg}/\text{m}^3\cdot\text{h}$ averaged over 5 years	6,000 $\text{mg}/\text{m}^3\cdot\text{h}$
Information Threshold	1 hour average	180 mg/m^3	-
Alert Threshold	1 hour average	240 mg/m^3	-

AOT₄₀ is a measure of the overall exposure of plants to ozone. It is the sum of the excess hourly concentrations greater than 80 g/m³ and is expressed as g/m³ hours.

8.2.2.1 Air Quality and Health

The World Health Organisation (WHO) estimates show that more than 400,000 premature deaths are attributable to poor air quality in Europe annually. In Ireland, the number of premature deaths attributable to air pollution is estimated at 1,510 people, with fine particulate matter (PM_{2.5}) being predominantly responsible for the majority of the estimated premature deaths (1,480 Irish deaths). These emissions, along with others including nitrogen oxides (NO_x) and sulphur oxides (SO_x) are produced during fossil fuel based electricity generation in various amounts, depending on the fuel and technology used. Whilst there is the potential of such emissions to be generated from the construction operations, a number of mitigation measures will be implemented at this site to reduce the impact from dust and vehicle emissions, which are discussed in Sections 8.3.2.1 below.

8.2.3 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 urban areas with a population of greater than 15,000.

8.2.4 Existing Air Quality

The EPA publishes Air Monitoring Station Reports for monitoring locations in all four Air Quality Zones. The ambient air quality monitoring carried out closest to the subject site is at Bohermore in Galway City. This monitoring location also lies within Zone C which comprises urban areas with populations greater than 15,000. The air quality in the vicinity of the proposed development site is likely to be quite similar in nature and composition.

For the purposes of this assessment, air quality monitoring data from the station at Bohermore in Galway City is used. Data for Bohermore in Galway City is available in the EPA report ‘Ambient Air Monitoring in Galway City; March 13th 2001 – 23rd October 2001’. Similar measurement values for all air quality parameters would be expected for the proposed development site.

8.2.4.1 Sulphur Dioxide (SO₂)

Data for sulphur dioxide (SO₂) monitoring carried out in Galway City for 2001 is shown in Table 8.3.

Table 8-3 Sulphur Dioxide Data for Galway City in 2001

Parameter	Measurement
No. of measured values	3,672
Percentage Coverage	68.6%
Maximum hourly value	87.8 µg/m ³

Parameter	Measurement
98 percentile for hourly values	42.3 $\mu\text{g}/\text{m}^3$
Mean hourly value	10.0 $\mu\text{g}/\text{m}^3$

The hourly limit value was not exceeded during the measurement period. The lower assessment threshold was not exceeded during the measurement period. The mean hourly value of 10 $\mu\text{g}/\text{m}^3$ exceeds the lower assessment threshold for the protection of ecosystems but not the upper assessment threshold. However, this threshold may not be relevant to monitoring in an urban environment. Air quality of the proposed development site would be expected to be similar.

8.2.4.2 Particulate Matter (PM₁₀)

Sources of particulate matter include vehicle exhaust emissions, soil and road surfaces, construction works and industrial emissions. No limit values were exceeded during this measurement period in Galway City. PM₁₀ monitoring results from 2001 are presented in Table 8.4 below.

Table 8-4 Particulate Matter (PM₁₀) Data for Galway City in 2001

Parameter	Measurement
No. of measured values	187
Percentage Coverage	83.8%
Maximum daily value	49.9 $\mu\text{g}/\text{m}^3$
98 percentile for daily values	45.8 $\mu\text{g}/\text{m}^3$
Mean daily value	22.1 $\mu\text{g}/\text{m}^3$

The twenty four hour limit value for the protection of human health (50 $\mu\text{g}/\text{m}^3$) was not exceeded during the measurement period. The upper assessment threshold was exceeded on 32 days (17.1% of measured values), the lower assessment threshold was exceeded on 96 days (51.3% of measured values). The directive stipulates that each of the assessment thresholds should not be exceeded more than 7 times in a calendar year. The mean of the daily values during the measurement period (22.2 $\mu\text{g}/\text{m}^3$) is below the annual limit value for the protection of human health (40 $\mu\text{g}/\text{m}^3$). Air quality of the proposed development site would be expected to be similar in terms of PM₁₀ levels.

8.2.4.3 Nitrogen Dioxide (NO₂)

The values for the concentrations of nitrogen dioxide recorded in Galway City from 2001 are displayed in Table 8.5 below. Daily and annual limit values for the protection of human health were not exceeded during the assessment.

Table 8.5 Nitrogen Dioxide and Oxides of Nitrogen Data Galway City 2001

Parameter	Measurement
No. of measured values	4,531
Percentage Coverage	84.6%
Maximum hourly value (NO ₂)	120.7 µg/m ³
98 percentile for hourly values (NO ₂)	50.5 µg/m ³
Mean hourly value (NO ₂)	19.9 µg/m ³
Mean hourly value (NO _x)	34.8 µg/m ³

The hourly limit value was not exceeded during the measurement period. One hourly mean NO₂ value was above the lower assessment threshold, the directive stipulates that the lower assessment threshold should not be exceeded more than 18 times in a calendar year. With the exception of this value, all other hourly mean NO₂ values were below the lower assessment threshold. The mean hourly NO₂ value (19.9µg.m⁻³) during the measurement period was below the annual lower assessment threshold for the protection of human health (26 µg.m⁻³). The mean hourly value of NO_x (34.8 µg.m⁻³ NO₂) during the measurement period exceeded the annual limit value for the protection of vegetation (30 µg.m⁻³ NO₂). However, the applicability of this limit to urban air pollution monitoring is questionable.

8.2.4.4 Carbon Monoxide (CO)

Carbon monoxide data has been sourced from air quality monitoring carried out in Galway City (March to October 2001) and is presented in Table 8.6. The mean hourly concentration of carbon monoxide recorded was 0.5 mg/m³. The carbon monoxide limit value for the protection of human health is 10 mg/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 recorded.

Table 8.6 Carbon Monoxide Data for Galway City 2001

Parameter	Measurement
No. of hours	5,356
No. of measured values	4,533
Percentage Coverage	84.6%
Maximum hourly value	2.8 mg/m ³
98 percentile for hourly values	1.3 mg/m ³
Mean hourly value	0.5 mg/m ³
Maximum 8-hour mean	1.6 mg/m ³
98 percentile for 8-hour mean	1.1 mg/m ³

8.2.4.5 Ozone (O₃)

Ozone data for the Mace Head Atmospheric Research Station for 2008 is presented in Table 8.7. The maximum daily eight-hour mean limit of 120 µg/m³ was exceeded on three days. The legislation stipulates that this limit should not be exceeded on more than 25 days.

Table 8-7 Summary statistics for rolling 8-hr O₃ concentrations in 2008: Mace Head

Parameter	Measurement
Annual Mean	77 µg/m ³
Median	77 µg/m ³
% Data Capture	100%
No. of days > 120	3 days
Maximum 8-hour value	132 µg/m ³

8.3 Air Quality

8.3.1 Potential Air Quality Impacts and Associated Mitigation Measures

8.3.2 “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.

8.3.2.1 Construction Phase

8.3.2.1.1 Dust

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 Airport 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.

Mitigation

- Dampening down the dust at the source
- By the use of barriers such as debris netting on scaffolding around the building to block dust escaping where the building is within 10m of the site boundary where residential properties exist.
- If required, site road ways will be maintained in a stoned hardcore condition not allowing soil to accumulate which when dry can create dust.
- Wheel wash equipment will 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.
- Plant and equipment that have the potential to create volumes of dust will have appropriate attachments to allow water source to dampen dust to not allow it to get airborne.
- Deploy Road Sweeper as required on External Roads.

Residual Effect

Short-term Imperceptible Negative Impact

Significance of Effects

Based on the assessment above there will be no significant effects.

8.3.2.2 Air Quality

The construction of the proposed development will require the use of machinery and plant, thereby giving risk to exhaust emissions. This is likely to have a short to medium-term slight negative effect, which will be reduced through the use of the best practices mitigation measures as presented below.

Mitigation

All construction vehicles and plant will be maintained in good operational order while onsite, thereby minimising any emissions that arise.

Residual Effect

Short term Imperceptible Negative Impact

Significance of Effects

Based on the assessment above there will be no significant effects.

8.3.3 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.

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 slight temporary dust emissions, and is unlikely to have any negative significant impact on human health. In the case of such occasional maintenance works, Section 8.3.2.1 above can be referred to for air quality and dust related impacts.

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 Negative Impact

Significance of Effects

Based on the assessment above there will be no significant effects.

8.3.4 Health Effects

Whilst the construction phase of the proposed development is likely to lead to imperceptible increases in dust and vehicle emissions, the implementation of the mitigation measures discussed above and good management practices can prevent or minimise potential effects off-site. Good management practice consists of 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 are

considered imperceptible as the potential for both exhaust and dust emissions will be limited and controlled through site layout design and mitigation measures.

8.3.5 Cumulative Effect

Potential cumulative effects on air quality between the proposed development and other developments in the vicinity, including all those listed in Section 2.9.2 of this EIAR, were also considered as part of this assessment. It is noted that the other land use activities in the area are mostly residential or commercial land uses. Any cumulative impacts between the proposed development and all others listed in Section 2.9.2 of this EIAR would likely be not significant, given the small-scale operations and proposed mitigation measures for the proposed development.

8.3.5.1 General Air Quality

Farming, light commercial activity, 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, given the small-scale machinery use for pasture land in the area and with the implementation of the mitigation measures discussed above, there is unlikely to be cumulative impacts arising from the construction phase of the proposed development and other local existing developments, projects and plans.

8.3.5.2 Dust Emissions

Dust emissions from the other land use activities in the area are likely to be imperceptible. 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 8.3.2.1 above.

8.4 Climate

8.4.1 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. Moving away from our reliance on coal, oil and other fossil fuel-driven power plants is essential to reduce emissions of greenhouse gases and combat climate change.

8.4.1.1 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.

8.4.1.1.1 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, 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).

8.4.1.1.2 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.

8.4.1.1.3 Emissions Projections

In 2016, the EPA published an update on Ireland’s Greenhouse Gas Emission Projections to 2020. Ireland’s target is to achieve a 20% reduction of non-Emissions Trading Scheme (non-ETS) sector emissions, i.e. agriculture, transport, residential, commercial, non-energy intensive industry and waste, on 2005 levels, with annual binding limits set for each year over the period 2013 – 2020.

Greenhouse gas emissions are projected to 2020 using two scenarios; ‘With Measures’ and ‘With Additional Measures’. The ‘With Measures’ scenario assumes that no additional policies and measures, beyond those already in place by the end of 2014 are implemented. The ‘With Additional Measures’ scenario assumes implementation of the ‘With Measures’ scenario in addition to full achievement of Government renewable and energy efficiency targets for 2020, as set out in the National Renewable Energy Action Plan and the National Energy Efficiency Action Plan.

The EPA Emission Projections Update notes the following key trends:

- Ireland’s non-Emissions Trading Scheme (ETS) emissions are projected to be 6% and 11% below 2005 levels in 2020 under the ‘With Measures’ and ‘With Additional Measures’ scenarios, respectively. The target for Ireland is a 20% reduction.
- Ireland is projected to exceed its annual binding limits in 2016 and 2017 under both scenarios, ‘With Measures’ and ‘With Additional Measures’.
- Over the period 2013 – 2020, Ireland is projected to cumulatively exceed its compliance obligations by 12 Mt CO₂ (metric tonnes of Carbon Dioxide) equivalent under the ‘With Measures’ scenario and 3 Mt CO₂ equivalent under the ‘With Additional Measures’ scenario.

The EPA report states that “Failure to meet 2020 renewable and energy efficiency targets will result in Ireland’s emission levels moving even further from its emission reduction targets”. The report also concludes:

- The latest projections estimate that by 2020 non-ETS emissions will be at best 11% below 2005 levels compared to the 20% reduction target. Emission trends from agriculture and transport are key determinants in meeting targets, however emissions from both sectors are projected to increase in the period to 2020.
- It is clear that Ireland faces significant challenges in meeting emission reduction targets for 2020 and beyond. (‘Greenhouse Gas Emission Projections to 2020 – An Update’, EPA, 2016).

8.4.1.1.4 Progress to Date

The ‘Europe 2020 Strategy’ is the EU’s agenda for growth and jobs for the current decade. The Europe 2020 Strategy targets on climate change and energy include:

- Reducing greenhouse gas (GHG) emissions by at least 20% compared with 1990 levels;

- Increasing the share of renewable energy in final energy consumption to 20%; and
- Moving towards a 20% increase in energy efficiency.

Regarding progress on targets, the ‘Europe 2020 indicators – climate change and energy’ report provides a summary of recent statistics on climate change and energy in the EU.

In 2014, EU greenhouse gas emissions, including emissions from international aviation and indirect carbon dioxide (CO₂) emissions, were down by 23% when compared with 1990 levels. However, regarding the progress of individual Member States, and Ireland in particular, the Europe 2020 indicators include the following statements:

- 24 countries are on track to meet their GHG targets, except Austria, Belgium, **Ireland** and Luxembourg.
- Luxembourg emitted the most GHG per capita in the EU in 2014 ... followed by Estonia, **Ireland**, the Czech Republic and the Netherlands.
- In 2014, France, the Netherlands, the United Kingdom and **Ireland** were farthest from reaching their national targets.

While the EU as a whole is projected to exceed its 2020 target of reducing GHG emissions by 20%, Ireland is currently one of the countries project to miss its national targets.

8.4.2 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. According to Met Éireann, the average number of wet days per year in the west of Ireland is 225. The wettest months are December and January and April is usually the driest. July is the warmest month with an average temperature of 15.7° Celsius. The Met Éireann weather station at Shannon, County Clare is the nearest weather and climate monitoring station with 30-year averages, to the subject site, located approximately 65km south of the site. Meteorological data recorded at Shannon over the 30-year period from 1981-2010 is shown in Table 8.8 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.

8.4.2.1 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.

8.4.2.2 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. This will be due to Galway’s oceanic position on the Atlantic seaboard.

Table 8-8 Data from Met Éireann Weather Station, Shannon, 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
Absolute min.	-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
Mean num. of days with air frost	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
Mean num. of days with ground frost	-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
RELATIVE HUMIDITY (%)													
Mean at 0900UTC	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
Mean at 1500UTC													
SUNSHINE (Hours)													
Mean daily duration	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
Greatest daily duration													
Mean no. of days with no sun	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
RAINFALL (mm)													



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
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 $\geq 0.2\text{mm}$	20	16	19	16	16	15	16	18	16	20	20	19	211
Mean num. of days with $\geq 1.0\text{mm}$	16	12	14	11	12	11	12	13	12	16	15	15	159
Mean num. of days with $\geq 5.0\text{mm}$	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
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

8.4.3 Potential Climate Impacts and Associated Mitigation Measures

8.4.3.1 'Do-Nothing' Effect

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.

8.4.3.2 Construction Phase Impacts

The use of machinery during the construction of the proposed development may result in the emission of greenhouse gases. Operations such as the transport of equipment and materials as well as earth moving are typical examples of machinery use. This impact is considered to be imperceptible given the insignificant quantity of greenhouse gases that are emitted.

8.4.3.3 Operational Phase Impacts

The proposed development will be landscaped with green areas and trees. The proposed scheme is designed to comply with Building Regulations Part L 2017 nZEB (near zero energy building). Therefore, the climate impacts from the proposed development are expected to be imperceptible. Full details of the thermal performance and energy saving measures proposed for the development are given in the Mechanical and Electrical Services Basis of Design Report, which forms Appendix 8-1 of this EIAR.

8.4.3.4 Cumulative Impacts

The construction of the proposed development, in conjunction with other developments in the area (listed in Section 2.6.2 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 are likely to be imperceptible.

8.4.3.5 Human Health Effects

Whilst the construction phase of the proposed development is likely to lead to imperceptible increases in greenhouse gas emissions, the implementation of the mitigation measures discussed above, alongside good management practices can prevent or minimise potential effects of this. Good management practice consists of 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

8.4.3.5.1 Mitigation Measures

As the proposed development will have no significant negative effects on climate, mitigation measures are not proposed other than all machinery and plant will be maintained in good operational order while on-site, minimising any emissions that are likely to arise. These measures will minimise any effect that the development might have on climate in the long-term.



8.4.3.6 **Residual Effect**

There will be a Long-term Imperceptible neutral Effect on climate associated with the proposed project.

8.4.3.7 **Significance of Effects**

Based on the assessment above there will be no significant effects

9. NOISE & VIBRATION

9.1 Introduction

9.1.1 Overview

Potential noise and vibration impacts may be divided into the following categories:

- Construction phase noise impacts on surrounding receptors.
- Construction phase vibration impacts on surrounding receptors.
- Post-completion noise impacts on surrounding receptors.
- Post-completion vibration impacts on surrounding receptors.
- Noise impacts within the completed development from external sources ('inward impacts').

Following a preliminary scoping exercise, it was concluded that the proposed development will not give rise to any vibration impacts following commissioning, and this category has therefore been scoped out. The remaining four categories are assessed in this chapter.

9.1.2 Methodology

Typical ambient noise levels across the local area were measured, and these used to identify appropriate construction phase noise criteria. Likely construction plant were identified, and their noise emissions data used to predict likely noise levels at surrounding receptors. Predicted levels were assessed in the context of identified criteria, and mitigation measures identified where required. Potential sources of vibration during the construction phase were identified, and impacts assessed by reference to commonly applied criteria.

Noise sources associated with the commissioned development were reviewed, and potential impacts assessed. Such impacts relate chiefly to traffic, and a proposed commercial block at the northeast corner of the site. In line with emerging best practice, an assessment of inward noise impacts was undertaken, and the requirement for enhanced façade treatments was assessed.

9.1.3 Documents consulted

The following documents were consulted during the preparation of this chapter:

- Report RI 8507: Structural response and damage produced by ground vibration from surface mines blasting (US Bureau Of Mines, 1980).
- British Standard BS 7385-2:1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from groundborne vibration (1993).
- Guidelines on community noise (World Health Organisation, 1999).
- Directive 2002/49/EC of the European Parliament and of the Council relating to the assessment and management of environmental noise (2002), transposed into Irish law by the European Communities (Environmental Noise) Regulations 2018 (SI No. 549/2018).
- Night noise guidelines for Europe (World Health Organisation, 2009)
- Design manual for roads and bridges (UK Highways Agency, 2011).
- British Standard BS 4142:2014 Methods for rating and assessing industrial and commercial sound (2014).
- Galway County Council – Preliminary appraisal report – N6 Galway City outer bypass (ARUP, 2014).

- British Standard BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (2014).
- British Standard BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration (2014).
- British Standard BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (2014).
- Good practice guidance for the treatment of noise during the planning of national road schemes (National Roads Authority (now Transport Infrastructure Ireland), 2014).
- Technical guidance document TGD-021-5: Acoustic performance in new primary & post primary school buildings (Department of Education & Skills, 2015).
- Galway County Council Development Plan 2015-2021 (2015).
- Draft advice notes on current practice in the preparation of environmental impact statements (Environmental Protection Agency, 2015).
- NG4 Guidance note for noise: Licence applications, surveys and assessments in relation to scheduled activities (Environmental Protection Agency, 2016).
- Draft guidelines on the information to be contained in environmental impact assessment reports (Environmental Protection Agency, 2017).
- ProPG Planning & noise: Professional practice guidance on planning & noise – New residential development (Association of Noise Consultants, Institute of Acoustics & Chartered Institute of Environmental Health, 2017).
- Galway Noise Action Plan 2019-2023 (2019).

A baseline noise survey was undertaken in accordance with International Standard ISO 1996-2:2017 Acoustics – Description, measurement and assessment of environmental noise, Part 2: Determination of environmental noise levels (2017). Predictive modelling was carried out using International Standard ISO 9613-2:1996 Acoustics: Attenuation of sound during propagation outdoors – Part 2 General method of calculation (1996).

9.1.4 Statement of Authority

The noise and vibration assessment was undertaken by Damian Brosnan of Damian Brosnan Acoustics who has over 20 years' experience in scoping and carrying out such impact assessments. His qualifications are as follows:

- BSc (Honours) 1993 (University College Cork).
- Diploma in Acoustics & Noise Control 2009 (Institute of Acoustics).
- MSc (Distinction) in Applied Acoustics 2015 (University of Derby).
- Member of Institute of Acoustics (MIOA) & secretary of Irish branch.
- Founder member of Association of Acoustic Consultants of Ireland (AACI).
- Member of Engineers Ireland (MIEI).
- 1996-2001: Noise Officer with Cork County Council.
- 2001-2014: Partner with DixonBrosnan Environmental Consultants, specialising in EIA.
- 2015–: Principal at Damian Brosnan Acoustics.

9.2 Guidance & criteria

9.2.1 Construction phase noise

There are no national mandatory noise limits relating to the construction phases of projects. In granting planning permission, a local authority may stipulate construction phase noise limits applicable to daytime, evening, night-time and weekend hours as appropriate. There are no national guidelines available regarding the selection of such limits. Many local authorities chose to apply a 65 dB $L_{Aeq,T}$ limit.

The chief noise guidance document applied in Ireland and the UK in construction phase noise assessments is British Standard BS 5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites Part 1: Noise (2014). Annex E of the document sets out several methods to draw up suitable noise criteria applicable to the construction phase of a project. The most appropriate method here is considered to be the ‘ABC method’, which provides for the selection of criteria based on existing ambient noise data. On the basis of noise data recorded in the vicinity of the study site, as discussed below, a daytime $L_{Aeq,1h}$ criterion of 65 dB is identified. This criterion is identical to that typically applied by local authorities, and is thus applied in this assessment. The $L_{Aeq,1h}$ parameter describes the total noise emissions from all construction sources occurring during any 1 h period, averaged over that hour.

BS 5228:2009+A1:2014 states that the 65 dB criterion is applicable to the periods Monday-Friday 0700-1900 h and Saturday 0700-1300 h. Construction operations are unlikely to be undertaken during evening or night-time hours, or on Sundays. This assessment therefore applies the 65 dB criterion in respect of all construction works.

The 65 dB criterion is considered relevant to most of the construction phase. However, this criterion is considered overly onerous with respect to landscaping works proposed around the margins of the site, in proximity to offsite receptors, particularly as (a) such works will be short term, lasting no more than several hours or several days at any position, and (b) landscaping works will benefit nearby offsite receptors in the long term. For such works, an $L_{Aeq,1h}$ limit of 70 dB is considered suitable, derived from the National Roads Authority (now Transport Infrastructure Ireland) document Good practice guidance for the treatment of noise during the planning of national road schemes (2014). The daytime 70 dB criterion recommended in the NRA document is commonly applied to non-road projects in the absence of any other Irish guidance.

The 65 dB main works criterion, and the 70 dB landscaping criterion, are considered applicable to surrounding receptors, in their immediate curtilage. In this regard, the Environmental Protection Agency document NG4 Guidance note for noise: Licence applications, surveys and assessments in relation to scheduled activities (2016) defines a noise sensitive locations as:

Any dwelling house, hotel or hostel, health building, educational establishment, place of worship or entertainment, or any other facility or area of high amenity which for its proper enjoyment requires absence of noise at nuisance levels.

As construction projects tend to be relatively short, and as construction works areas are usually localised and mobile, the 65 and 70 dB limits are usually not subject to any additional criteria such as tone and impulse restrictions.

9.2.2 Construction phase vibration

As with noise, there are no national limits relating to groundborne vibration, and reference is usually made to guidance set out in British Standard BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration (2014). Table 9-1 presents guidance included in the document with respect to human perception of peak particle velocity (PPV), the most commonly applied descriptor of groundborne vibration.

Table 9-1 Human perception of vibration, from BS 5228-2:2009+A1:2014

PPV	Effect
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm/s	Vibration might be just perceptible in residential environments.
1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
10.0 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

During construction and demolition projects, reference is usually made to criteria relevant to buildings, in order to avoid potential cosmetic or structural damage. Guidance presented in the NRA's 2014 document with respect to construction vibration has seen increasing application to non-road projects due to the absence of any other Irish guidance. NRA criteria, listed in Table 9-2, are informed by documents such as British Standard BS 7385-2:1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from groundborne vibration (1993). The criteria apply to the closest part of any relevant building or structure.

Table 9-2 Building vibration criteria, from NRA (2014)

Frequency	<10 Hz	10-50 Hz	>50 Hz
PPV (mm/s)	8	12.5	20

NRA limits set out above are considerably lower than criteria recommended by two respected international authorities, as presented in Table 9-3. The criteria presented are those below which cosmetic damage (hairline cracking, etc.) to buildings is unlikely to occur. Limits relating to structural damage are significantly higher.

Table 9-3 Recommended vibration limits

Structure	Lower frequencies	Higher frequencies	Source
Modern dwellings	<40 Hz: 19 mm/s	>40 Hz: 51 mm/s	1
Older dwellings	<40 Hz: 12.7 mm/s	>40 Hz: 51 mm/s	1
Industrial & heavy commercial	4-15 Hz: 50 mm/s	>15 Hz: 50 mm/s	2&3
Residential & light commercial	4-15 Hz: 15-20 mm/s	>15 Hz: 20-50 mm/s	2&3

Sources:

1 US Bureau Of Mines report RI 8507: Structural response and damage produced by ground vibration from surface mines blasting (1980).

2 BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Vibration (2014).

3 BS 7385-02: 1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from ground borne vibration (1993).

9.2.3 Post-completion noise

There are no national mandatory noise limits applicable to commissioned developments. While a number of guidance documents have been issued with respect to certain sectors, none relate to residential developments such as those assessed in this report. Two elements of the commissioned development may give rise to noise emissions (outside of those associated with external residential activities such as children playing and grass cutting): a proposed commercial building, and traffic. These are typically assessed differently.

9.2.3.1 Commercial Emissions

Most environmental noise guidance documents issued across Europe ultimately derive limits from guidance issued by the World Health Organisation (WHO). The WHO document Guidelines on community noise (1999) sets out guideline values considered necessary to protect communities from environmental noise. With respect to residential settings, the document notes that an outdoor $L_{Aeq, 16h}$ level of 55 dB is an indicator of serious annoyance during daytime and evening hours, with 50 dB being an indicator of moderate annoyance. The 55 dB criterion was first suggested by the WHO in their 1980 document Environmental Health Criteria 12.

Since 1980, the 55 dB criterion has become the de facto daytime limit applied by most Irish regulatory authorities to commercial and industrial operators. Although the WHO criterion applies to daytime periods of 16 hours, authorities typically specify shorter periods, and thus limits as $L_{Aeq, 15min}$, $L_{Aeq, 30min}$ and $L_{Aeq, 1h}$ are variously applied. In issuing licences to industrial facilities, the EPA typically specifies a daytime $L_{Aeq, T}$ limit of 55 dB at receptors. The EPA currently considers daytime to refer to 0700-1900 h. A similar daytime limit is usually included in noise conditions attached to planning permission issued by local authorities.

The WHO's 1999 guidance document recommends an external night-time criterion of 45 dB to prevent sleep disturbance. Although the WHO document Night noise guidelines for Europe (2009) makes reference to a 40 dB night-time criterion, this relates to the $L_{night, outside}$ parameter, which is the long term average measured throughout a whole year. The 45 dB criterion is considered more appropriate to short term measurement intervals. As before, $L_{Aeq, 15min}$, $L_{Aeq, 30min}$ and $L_{Aeq, 1h}$ intervals are variously

applied by regulatory authorities, rather than the 8 hour period to which the WHO’s 45 dB criterion applies. The EPA considers that night-time refers to 2300-0700 h.

Neither of the WHO documents identified above makes reference to evening periods, and indeed their 1999 document assumes that daytime extends to 2300 h. However, a trend towards the separate assessment of evening impacts is currently evident, partly driven by EPA document *NG4 Guidance note for noise: Licence applications, surveys and assessments in relation to scheduled activities* (2016). The original 2012 version of the document introduced the evening period 1900-2300 h. The NG4 document recommends an evening criterion of 50 dB, applicable externally at receptors.

Many authorities require that a penalty be added to measured noise levels where emissions are tonal and/or impulsive. NG4 specifies the addition of a 5 dB penalty to site specific $L_{Aeq T}$ levels measured during daytime or evening hours. During night-time hours, the EPA prohibits tones and impulses entirely, stating that such characteristics should not be ‘clearly audible or measurable’. With respect to short term impulsive sources, the WHO recommends a night-time L_{Amax} limit of 60 dB outside bedroom windows during night-time hours. No L_{Amax} limit is recommended for daytime periods.

The above criteria, summarised in Table 9-4, are considered relevant to commercial sources at the proposed development. A measurement interval of 15 minutes is considered appropriate. Rather than allowing daytime and evening levels to be rated for tonal or impulsive features, the table assumes that such features are avoided at all times. Criteria apply externally at receptors.

Table 9-4 Noise criteria appropriate to commercial emissions

Period	Parameter	Limit
0700-1900 h	$L_{Aeq 15 min}$	55 dB
1900-2300 h	$L_{Aeq 15 min}$	50 dB
2300-0700 h	$L_{Aeq 15 min}$	45 dB
2300-0700	L_{AFmax}	60 dB

In addition to the absolute criteria above, the impact of noise emissions from commercial sources may be assessed by reference to relative criteria. The most commonly applied standard here is British Standard BS 4142:2014 Methods for rating and assessing industrial and commercial sound (2014) which provides for the comparison of specific $L_{Aeq T}$ levels (i.e. noise levels attributable to the source(s) in question) with background levels, and provides an indication of impact depending on the difference. Specific levels may be rated to take tonal, impulsive and other characteristics into account. The standard notes that the background noise environment may include existing industrial emissions unrelated to the specific source.

BS 4142:2014 states that a difference between specific and background levels of 10 dB or more is indicative of a significant adverse impact. A difference of 5 dB suggests an adverse impact, with lower differences suggesting reduced impacts. The standard adds that the perception of impact will be increased or reduced depending on local context.

9.2.3.2 Traffic Emissions

Local offsite receptors are currently subject to existing traffic noise levels on the surrounding road network. The proposed development is likely to increase traffic volumes locally, with a consequent increase in traffic noise levels. The Design manual for roads and bridges (UK Highway Agency, 2011)

notes that the resulting noise impact is linked to the magnitude of the noise increase. Table 9-5 sets out the DMRB guidance. Included in the table are impact categories listed by the EPA in their 2017 document Draft guidelines on the information to be contained in environmental impact assessment reports (Environmental Protection Agency, 2017).

Table 9-5 Noise criteria appropriate to commercial emissions

Noise level increase	Subjective reaction	DMRB impact	EPA impact
0 dB	None	No change	Neutral
0-3 dB	Imperceptible	Negligible	Imperceptible to not significant
3-5 dB	Perceptible	Minor	Not significant to slight
5-10 dB	Up to a doubling of loudness	Moderate	Slight to moderate
>10 dB	Doubling of loudness or greater	Major	Significant to profound

9.2.4 Inward noise

The assessment of inward noise impacts on proposed residential developments is a relatively new feature in the Irish planning system, and no national guidance has been issued to date. In the absence of Irish guidance, assessments are typically undertaken in accordance with UK guidance. Most UK assessments are now carried out using ProPG Planning & noise: Professional practice guidance on planning & noise – New residential development (2017), jointly issued by the Association of Noise Consultants, the Institute of Acoustics and the Chartered Institute of Environmental Health. ProPG provides for good acoustic design through a five step process:

- Stage 1: Initial noise risk assessment of the proposed development site.
- Stage 2 element 1: Demonstrating a good acoustic design process.
- Stage 2 element 2: Observing internal noise level guidelines.
- Stage 2 element 3: Undertaking an external amenity area noise assessment.
- Stage 2 element 4: Consideration of other relevant issues.

Internal noise guidelines recommended by ProPG, drawn from British Standard BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (2014), are presented in Table 9-6.

Table 9-6 Recommended internal criteria from BS 8233:2014 and ProPG

Activity	Location	0700-2300 h	2300-0700 h
Resting	Living room	$L_{Aeq\ 16\ h}$ 35 dB	-
Dining	Dining area	$L_{Aeq\ 16\ h}$ 40 dB	-
Sleeping or daytime resting	Bedroom	$L_{Aeq\ 16\ h}$ 35 dB	$L_{Aeq\ 8\ h}$ 30 dB

BS 8233:2014 adds that:

Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values.

ProPG adds further advice here:

In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used to that individual noise events to not normally exceed 45 dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events.

With respect to external amenity areas such as gardens in the curtilage of dwellings, BS 8233:2014 states:

For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq\ T}$, with an upper guideline value of 55 dB $L_{Aeq\ T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces, but should not be prohibited.

With respect to the proposed creche, there are no specific creche criteria in force. Reference may be made to Technical guidance document TGD-021-5: Acoustic performance in new primary & post primary school buildings (Department of Education & Skills, 2015). The document recommends an indoor ambient $L_{Aeq\ 30\ min}$ level of 35 dB. This criterion is applied in this assessment. The document adds that an external $L_{Aeq\ 30\ min}$ criterion of 51-55 dB (range dependent on ventilation type) at the façade, opening windows and vents may be suitable.

9.2.5 Development plan

The Galway County Council Development Plan 2015-2021 (2015) includes two objectives in relation to noise as follows:

Objective TI 12 – Noise

Require all new proposed development, which is considered to be noise sensitive within 300 m of existing, new or planned national roads, or roadways with traffic volumes greater than 8,200 AADT, to include a noise assessment and mitigation measures if necessary with their planning application documentation. The cost of mitigation measures shall be borne by the developer. Mitigation measures in order to protect the noise environment of existing residential development will be facilitated or enforced as necessary.

DM standard 24 of the development plan includes a similar requirement:

Require all new proposed development, within 300 m of roadways with traffic volumes greater than 8,220 AADT, to include a noise assessment and mitigation measures if necessary with their planning application documentation.

The proposed development site lies within 250 m of regional route R338 which is nearest road of significance. Traffic count information presented in Galway County Council – Preliminary appraisal report – N6 Galway City outer bypass (ARUP, 2014) indicates that the R338 AADT in 2012 was 24,349, thus exceeding the 8,200 threshold. More recent data included in the Galway Noise Action Plan 2019-2023 (2019) indicates that the AADT is 23,913 in the vicinity of the site. This chapter therefore includes an assessment of mitigation requirements as required by the development plan.

9.2.6 Noise action plan

The Galway Noise Action Plan 2019-2023 (2019) produced by Galway County Council describes a strategic plan based on noise mapping undertaken in 2017 ('round 3' mapping). Preparation of the plan is a requirement of Directive 2002/49/EC of the European Parliament and of the Council relating to the assessment and management of environmental noise (2002), transposed into Irish law by the European Communities (Environmental Noise) Regulations 2018 (SI No. 549/2018). The Directive requires preparation of noise plans for all roads with annual traffic volumes over 3 million vehicles. This includes regional route R338 near the proposed development site.

The noise action plan proposes that mitigation will be applied where L_{den} levels exceed 70 dB, and L_{night} levels exceed 57 dB. The plan includes several stipulations with respect to noise sensitive land uses (libraries, hospitals, nursing homes, schools, etc.) in areas subject to high noise levels, and with respect to development facing major roads. None of these is considered relevant to the proposed development, as baseline noise data indicate that the site is not subject to high noise levels.

9.3 Baseline

9.3.1 Location & land use

The proposed development site consists of an approximately rectangular 9.9 ha plot on the southeast fringes of Galway City (Figure 9-1). The northern boundary adjoins the railway line into the city, although at the northeast corner of the site, the railway line is separated from the site by Rosshill Road. The road veers north underneath the railway line 200 m from the northeast corner, and the railway directly adjoins the boundary over a distance of 300 m to the northwest corner. The eastern boundary of the site is formed by Rosshill Stud Farm Road which meets Rosshill Road at the northeast corner. The western boundary adjoins a wooded scrubland area. The southern boundary, 470 m in length, adjoins pasture.



Figure 9-1 Site location N

The existing ground elevation varies widely across the site. At its northeast corner, adjacent to Rosshill Road and Rosshill Stud Farm Road, the elevation lies at approximately 16 m aOD, and is relatively level with both roads and the railway line. The elevation initially rises westwards over a distance of 250 m, reaching a maximum of 21 m aOD at the southern boundary. Outside the northern boundary, the elevation of Rosshill Road decreases to 9 m aOD as it passes underneath the railway line. At this location, the northern boundary of the site lies at approximately 18 m aOD, and thus lies significantly above the road. The elevation of the railway line also falls gradually westwards, and in the vicinity of the road underpass lies at 15 m aOD. Thus the site lies 3 m above the railway line at this point.

The western third of the site lies at a considerably lower elevation than the eastern side. The transition between the two is relatively sudden, particularly in the northern region. Here the elevation drops by approximately 9 m within 100 m, falling to a floor of 6 m aOD near the northwest corner. The transition is less pronounced along the southern boundary, and the southwest corner lies at approximately 11 m aOD. The railway line's fall westwards begins to level out, and outside the northwest corner the railway runs at an elevation of approximately 14 m aOD. In this area, the railway runs on a substantial embankment which extends to a height of 5-6 m above surrounding ground level, and up to 7 m over the lowest point of the site.

The site is currently under a mixture of pasture, hedgerows and scattered trees. The surrounding area is also under pasture, with extensive proliferation of one-off dwellings along the local road network. Being within 1 km of the shore, Rosshill Stud Farm Road and its tributaries are cul de sacs, and there is no through-traffic. Rosshill Road is, however, a through-road, and sees heavy traffic at commuting times between Oranmore and the city.

9.3.2 Receptors

There are no noise receptors on the proposed development site itself. The nearest receptors are as follows:

- To the north, a dwelling lies close to the railway underpass, 70 m from the site boundary.

- Also to the north, on the far side of the railway embankment, 16 new dwellings at Merlin Park are currently coming on the market. The nearest of these lies 70 m from the site boundary.
- A dwelling lies close to the northeast corner of the site, 25 m from the boundary. A second dwelling lies further north, 60 m from the corner. These dwellings mark the western end of ribbon development.
- A dwelling immediately outside the southeast corner of the site represents one of the closest houses. Several other dwellings lie further south and southeast, forming an extensive cluster.
- Similarly, a dwelling 30 m from the southwest corner marks the northern tip of a dwelling cluster.
- The dwelling clusters near the southeast and southwest corners meet to the south of the site. Several dwellings here lie 150-200 m from the boundary.

Receptors within 500 m of the site boundary are shown in Figure 9-2. There are 83 detached dwellings within 500 m, with an additional 50-60 dwellings located at the southwest end of a residential estate to the northeast.



Figure 9-2 Receptors within 500 m. Rosshill Stud Farm stables circled green. N

All identified receptors within 500 m consist of dwellings. No other receptors such as creches, schools, care centres or nursing homes have been identified. Commercial and industrial premises in the distance to the north and northwest are not considered to be noise sensitive receptors. The only other receptor of note is Rosshill Stud Farm located outside the southern boundary, and which includes stables

(circled green in Figure 9-2). A commercial facility opposite the northeast corner of the site is not considered noise sensitive.

9.3.3 Noise mapping

The Galway Noise Action Plan 2019-2023 (2019) includes maps relating to road noise around the city, as required by Directive 2002/49/EC relating to the assessment and management of environmental noise. Due to its traffic volume, the R338 is included in the maps. The R338 runs in an east-west direction to the north of the proposed development site. From the R338, Coast Road runs southeast, to the east of the site.

Relevant traffic mapping is shown in Figures 9-3 and 9-4. The maps indicate that modelled contours do not extend as far as the proposed development site, reflecting the minimal intrusion of R338 traffic noise at the site.

Mapping has also been undertaken by Iarnrod Eireann with respect to the national rail network where the number of train passages per annum exceeds 30,000. As the railway line adjacent to the proposed development site sees significantly less traffic than this threshold, the railway line has not been mapped. The railway line, and associated noise emissions, are discussed further in Section 9.3.5 below.



Figure 9-3 R338 Lden contours N



Figure 9-4 R338 Lnight contours N

9.3.4 Noise survey

A baseline noise survey was carried out at the proposed development site over the period 15.09.19–17.09.19. The purpose of the survey was to provide up to date ambient noise data, and to allow subsequent calibration of the noise model. Monitoring was carried out at four onsite locations shown in Figure 9-5 and Plates 9-1-9-4, and described in Table 9-7. The survey consisted of a mixture of unattended and attended monitoring. Survey methodology, equipment specifications and weather conditions are listed in Appendix 9-1. Recorded time history profiles are shown in Figures 9-6 to 9-9. Noise data are presented in Appendix 9-2, and summarised in Table 9-8.



Figure 9-5 Baseline noise stations N



Plate 9-1 N1, looking NW.



Plate 9-2 N2, looking N to railway



Plate 9-3 N3 looking NW to railway embankment.



Plate 9-4 N4 looking SW towards dwelling outside boundary.

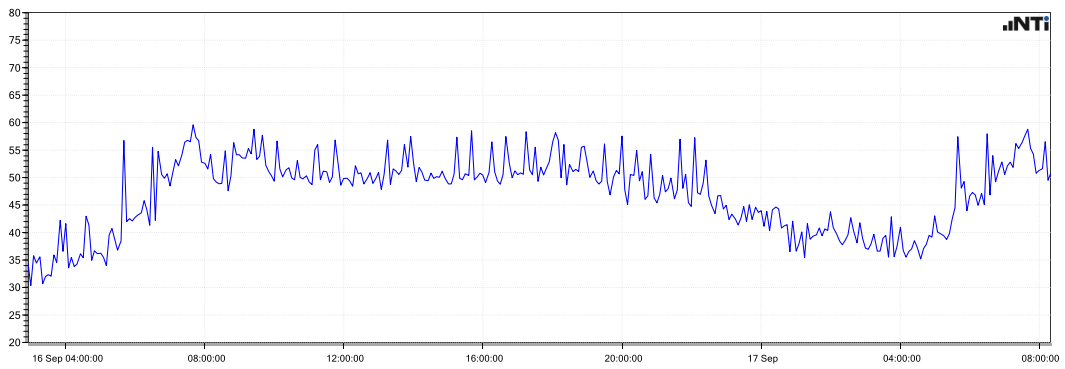


Figure 9-6 LAeq 1 s profile at N1

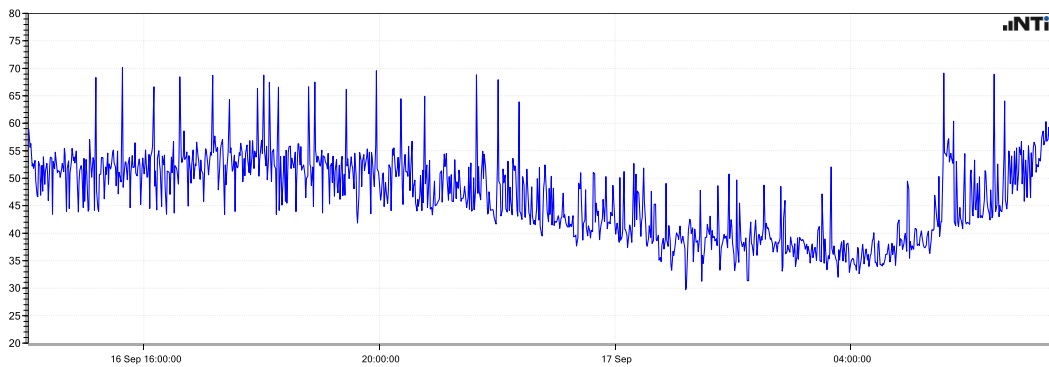


Figure 9-7 LAeq 1 s profile at N2

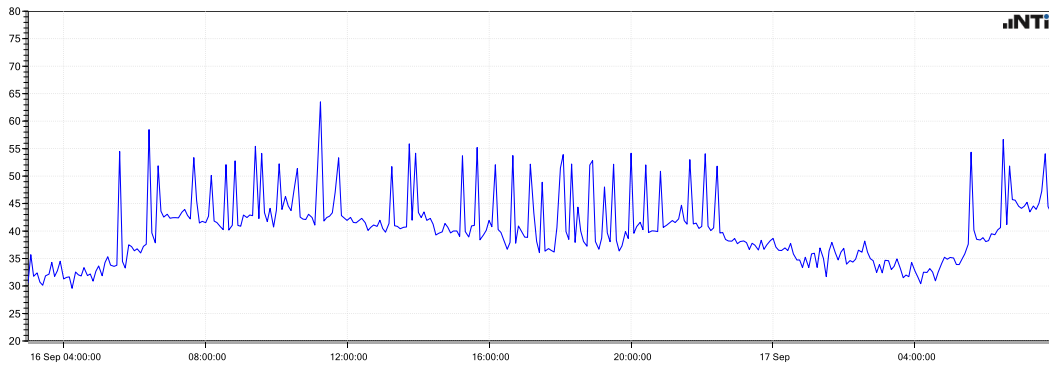


Figure 9-8 LAeq 1 s profile at N3

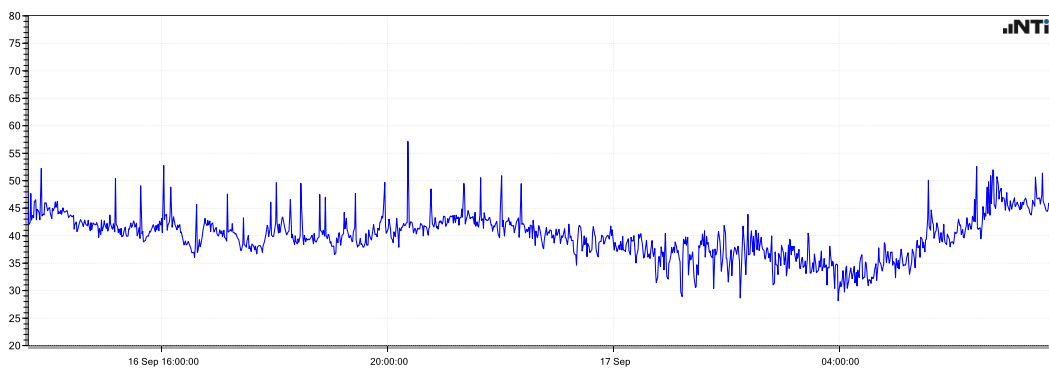


Figure 9-9 LAeq 1 s profile at N4

Table 9-7 Noise stations

Station	NGR	Reason for selection
N1	534363 725095	To provide indication of baseline soundscape in vicinity of NE corner, and assess impact due to local road and rail activity
N2	534212 725100	To assess impact of rail noise at positions overlooking rail line
N3	533981 725057	To assess impact of rail noise near NW corner, below embankment
N4	533880 724966	To provide indication of baseline soundscape at local dwellings, away from roads

Table 9-8 Noise data summary

Period	Parameter	N1	N2	N3	N4
0700-1900 h	L _{Aeq} 15 min range	49-58	52-60	37-61	38-47
	L _{Aeq} 15 min average	53	56	46	43
	L _{AF90} 15 min range	41-50	42-51	35-50	36-44
	L _{AF90} 15 min average	45	44	39	40
1900-2300 h	L _{Aeq} 15 min range	45-54	46-59	38-50	40-47
	L _{Aeq} 15 min average	50	52	44	42
	L _{AF90} 15 min range	40-45	40-45	35-41	37-42
	L _{AF90} 15 min average	43	43	38	39
2300-0700 h	L _{Aeq} 15 min range	32-54	36-59	31-54	38-43
	L _{Aeq} 15 min average	42	43	37	38
	L _{AF90} 15 min range	28-46	31-45	27-42	28-44
	L _{AF90} 15 min average	35	36	32	34
24 h	L _{den}	55	58	51	47
0700-2300	L _{Aeq} 16 h	53	56	49	43
2300-0700 h	L _{night}	46	49	43	40

The main noise source audible at all four stations was distant road traffic, which was continuously audible at all times in the background throughout daytime, evening and night-time periods. Stations N1 and N2 were additionally affected by intermittent traffic on Rosshill Road and Rosshill Stud Farm Road, particularly during the morning peak when traffic was observed queuing on the former, with the

queue stretching from the R338 back as far as the Rosshill Stud Farm Road. At all four stations, measured $L_{AF90\ 15\ min}$ levels reflect the intrusion of distant traffic noise.

All four stations were additionally affected by passing rail traffic, although the frequency of movements was observed to be low (typically 1-2 passes per hour, increasing to 4 passes per hour during commuting peaks). Other noise sources included bird song/calls, aircraft, dog barking, and sporadic emissions (chiefly truck movements) from the commercial premises opposite the northeast corner of the site.

L_{den} and L_{night} levels are considerably lower than the respective 70 and 57 dB thresholds set out in the Galway Noise Action Plan 2019-2023 (2019) with respect to traffic noise mitigation.

ProPG includes criteria by which the noise risk of a site may be assessed. Data presented in Table 9-8 suggest that the site is 'low risk'. In this regard, ProPG states that:

...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 acoustic design statement which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.

ProPG notes that the risk category of a particular site will be influenced by the number of L_{AFmax} events which exceed 60 dB externally during night-time hours. Where the number of such events exceeds 10, mitigation may be required even where L_{night} levels are below relevant criteria. Night-time L_{AFmax} levels attributable to traffic were as follows:

- At N1, L_{AFmax} levels due to Rosshill Road traffic movements typically reached 62 dB at their highest, with rail movements reaching 76 dB at their highest.
- These levels typically reached 66 and 80 dB at their highest at N2.
- N3, affected only by rail traffic, typically saw L_{AFmax} levels reach 75 dB.
- N4, also affected only by rail, saw L_{AFmax} levels reach 62 dB.

A review of recorded data indicate that the number of night-time L_{AFmax} events over 60 dB was less than 10 at N1, N3 and N4. At N2, night-time traffic movements on Rosshill Road generated several L_{AFmax} events which exceeded 60 dB. In addition, resumption of rail traffic at 0535 h resulted in three L_{AFmax} events over 60 dB prior to 0700 h. Combined road and rail traffic generated approximately 20 night-time events over 60 dB at N2. These events were mirrored at N1, although the number which exceeded 60 dB was less due to the increased set back distance of N1 from the northern boundary. The data indicate that the northern margins of the site, from the northeast corner to approximately 50 m west of the road underpass, receives more than 10 L_{AFmax} events >60 dB during night-time hours, and that this zone extends approximately 50 m into the site.

9.3.5 Railway line

The northern boundary of the proposed development adjoins the Galway-Athenry railway line, which forms part of the Galway-Dublin railway line, and also connects Galway to the unfinished Western Rail Corridor which passes through Athenry. The line, consisting of a single track, runs on a low embankment several meters above the western end of the site. A hedgerow along the northern boundary of the site extends to the base of the embankment. This area includes Treelines comprised predominantly of mature and immature ash (*Fraxinus excelsior*), sycamore (*Acer pseudoplatanus*) and beech (*Fagus sylvatica*). The railway directly adjoins the site over a distance of 300 m. At the northeast corner, an additional 200 m is separated from the site by Rosshill Road.

At the time of writing, there were 18 eastbound and 17 westbound scheduled services each weekday between Galway and Athenry, decreasing to 21 trains on Sunday. Movements commence shortly after 0530 h, and continue to approximately 2220 h. Three movements occur prior to 0700 h. During the

baseline noise survey, the number of passages was typically 1-2 per hour, increasing to 4 per hour during commuting peaks. The first movement each day was recorded at 0535 h, and the last at 2221 h.

The sound exposure level (L_{AE}) attributable to each train pass was determined using data recorded during the survey described above. L_{AE} levels were 80-83 dB at N1, 87-88 dB at N2, and 77-78 dB at N3. On some occasions, blowing of the train horn as the road underpass was approached resulted in a significant increase in L_{AE} levels, on one occasion reaching 88 dB at N3.

9.3.6 Future trends

EPA EIAR guidance recommends that a noise impact assessment should include a description of the likely evolution of the future receiving acoustic environment in the absence of the proposed development. The local noise environment is semi-urban in character, with the chief background noise sources being local and distant traffic. In the medium term, traffic noise levels are likely to increase across the study area, due to continuing development in the city and its ongoing expansion. The development of a city bypass, currently at planning stage, is expected to reduce R338 traffic slightly. While engine noise emissions will also reduce, due to increasing take-up of electric vehicles, it is noted that traffic noise above 40-50 km/h arises chiefly from tyre noise, and such tyre noise is unlikely to be less in electric vehicles.

Outside of traffic, the most prominent noise source is railway noise. Although occurring infrequently, railway emissions dominate the soundscape during each train pass. As Galway City expands, it is likely that in future years the frequency of train passes will increase, due to increasing reliance on public transport and due to the possible long term development of a suburban rail network in Galway, as set out in policy objective TI 2b of the Galway County Council Development Plan 2015-2021 which aims to 'Continue the provision of a range of transport options...including...a range of bus and rail services...'. In this regard, it is noted that the study site lies between Galway City and the expanding Oranmore area. Table 5.1 of the County Development Plan, which lists priority transport infrastructure projects, includes the installation of a second track along the line, which will allow increased capacity.

With respect to the development site itself, it is expected that, should the proposed development not proceed (the 'do nothing' scenario), no noise emissions are expected to arise other than those from land management practices, depending on how the site is used into the future. Given the site's strategic location close to the city, it is likely that the site will be earmarked for development at a later date should the current proposal not proceed.

Future increases in road and rail traffic noise are unlikely to increase L_{den} , $L_{Aeq\ 16\ h}$ or L_{night} levels above criteria discussed in Section 9.2.6. The chief impact of any increases in such traffic is a possible rise in the number of L_{AFmax} events greater than 60 dB during night-time hours along the northern margins of the site.

9.4 Noise emissions

9.4.1 Proposal summary

It is proposed to construct 185 dwellings and five apartment blocks across the site. A commercial block with overhead apartments will also be constructed at the northeast corner, in addition to a separate creche building. Possible uses of the commercial units include a shop, office and café. This building and the apartment blocks will extend to four floors, with top floor windows positioned 10-11 m above local ground level. Apartments will be provided with balconies.

The site will be served by a network of onsite roads. Open spaces will be landscaped. Access to the finished estate will be provided by an entrance on the eastern boundary, from Rosshill Stud Farm Road. At the northeast corner of the site, this road will be realigned, to improve visibility at its junction with Rosshill Road. The proposed layout is shown in Figure 9-10.

Construction will be undertaken on a phased basis, beginning within six months of grant of planning permission, and will be managed from a temporary onsite compound. The overall construction project is expected to last five years. Construction hours will be 0800-1800 h Monday-Saturday.



Figure 9-10 Proposed layout

9.4.2 Construction noise sources

Construction works will include the following activities, undertaken variously throughout the construction phase and in different areas of the site:

- Soil stripping & temporary stockpiling.
- Installation of temporary site compound.
- Provision of hardcore stone on onsite roadways.
- Excavation of dwelling foundations.
- Excavation of ground services trenches.
- Installation of services including sewerage network.
- Pouring & floating of concrete floor slabs.
- Block work and roof work.
- Building finishing (windows, doors, etc.).

- Laying of asphalt.
- Site landscaping.

During the construction phase, the chief source of noise emissions will be plant used onsite. Construction plant required onsite at various stages of the project are listed in Table 9-9. The table includes details of typical sound pressure levels, taken from BS 5228-1:2009+A1:2014. Rock breaking is unlikely to be required.

Table 9-9 Expected construction plant. Levels at 10 m.

Plant	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz	8000 Hz	Total L _{Aeq}
Asphalt paving machine with tipper truck	78	77	72	72	71	69	62	56	75
Discharging concrete mixer truck	80	69	66	70	71	69	64	58	75
Tracked excavator (16 t)	78	70	72	68	67	66	73	65	76
Wheeled backhoe loader (9 t)	68	67	63	62	62	61	54	47	67
Consaw	73	67	70	68	73	78	78	77	84
Mobile generator	78	71	66	62	59	55	56	49	65
Dumper	84	81	74	73	72	68	61	53	76
Vibro-roller	88	83	69	68	67	65	62	59	74
Telescopic handler	85	79	69	67	64	62	56	47	71
Truck (driving)	73	78	78	78	74	73	68	66	80

Noise emissions arising during the construction phase of the proposed development will vary considerably due to several reasons:

- The site is relatively large. Emissions will arise from plant operating across the site, and thus the site will not constitute a single point source.
- The large construction area will result in differing propagation conditions with respect to receptors at different locations.
- The construction phase will last several years. During this time, plant associated with different activities will relocate around the site as required.
- Different plant will be required at different times, and construction operations will vary on a daily basis. There may be extended periods during the construction phase with minimal noise emissions.
- Each machine item may operate under different loading conditions or be in varying states of repair.
- Construction works may be concentrated for certain periods, followed by periods of seeming inactivity. Localised works may require several hours of intense activity.
- During later stages of the construction phase, emissions from some operations will be screened by previously completed buildings.

- As buildings near completion, activity will gradually relocate indoors.
- With respect to particular plant, the models selected will change depending on requirements. The method of construction may be modified shortly before commencement, resulting in the need to import different equipment. Construction projects tend to be fluid in nature, with plant requirements changing as the site is progressed and circumstances change on the ground. The need for specific plant may often be established only following the start of a project.

From the foregoing, it is clear that construction phase noise emissions will vary, and it is not possible or practical to calculate a single sound power output figure for the entire site. With respect to surrounding noise sensitive receptors, worst case scenario emissions will arise when localised works are undertaken close to their respective boundaries.

9.4.3 Construction vibration sources

Potential sources of groundborne vibration during the construction phase are as follows:

- Delivery truck movements: Trucks may give rise to vibration at positions adjacent to the road. However, such emissions are typically imperceptible beyond 10 m, and are highly unlikely to be perceptible at dwellings alongside the road. Emissions will not be higher than those attributable to existing truck traffic.
- Plant movements: The movement of plant onsite is not considered to constitute a source of groundborne vibration, and is not listed in typical vibration documents such as BS 5228-2:2009. In addition, plant machinery used onsite is likely to be small to mid-sized, and similar to those used on other urban construction projects.
- Ground works: Excavation of trenches and pits for foundation and services will be required. These activities are not typically associated with offsite ground-borne vibration impacts. It is noted that piling is not proposed.
- Rock breaking: Unlike the activities listed above, breaking of rock involves a direct and repetitive impact to the rock stratum, which may generate relatively high levels of ground borne vibration locally. Although not envisaged at this time it is possible that breaking may be required locally onsite. This activity is discussed below.

Rock breaking may give rise to vibration close to the breaking zone. The vibration tends to contain relatively little energy in the lower frequencies at which buildings and occupants are most vulnerable. In addition, higher frequencies attenuate more rapidly than low frequencies, thus minimising the impact zone. For this reason, most vibration guidance documents such as BS 5228-2:2009 ignore rock breaking vibration. Table 9-10 lists various PPV levels reported in literature at sites where hydraulic rock breaking has been undertaken. The range in levels noted reflects variations in equipment power and rock type.

Table 9-10 Reported rock breaking PPV levels (various sources)

At 5 m	At 10 m	At 20 m	At 50 m
0.2-4.5 mm/s	0.06-3.0 mm/s	0.02-1.5 mm/s	0.1-0.3 mm/s

Rock breaking vibration levels are significantly lower than criteria listed in Tables 9-1, 9-2 and 9-3. Thus rock breaking, if required, is unlikely to give rise perceptible groundborne vibration at offsite receptors.

It follows that construction operations are unlikely to be perceptible offsite, or to cause cosmetic or structural damage to buildings.

9.4.4 Post-completion noise sources

Apart from several commercial units near the northeast corner, the entire development will consist of houses and apartments accessed by a network of roadways. Noise emissions from these will arise from typical residential estate sources such as playing children, lawnmowers and car movements. Emissions will also arise from vans associated with deliveries, and waste collection trucks. All such emissions are highly unlikely to be significant onsite or offsite. Onsite traffic speeds will be low, thus minimising tyre noise.

At the proposed commercial units, noise emissions may arise from air handling units (AHUs) such as fans, vents and air conditioning cassettes installed on external walls. Any such AHUs will be relatively small, and it will not be necessary to install industrial grade units. Emissions from these are highly unlikely to be audible beyond the site boundary.

Deliveries are likely to occur at the commercial units on a daily basis. Delivery vehicles are likely to consist of small trucks and vans during daytime hours. Evening or night-time deliveries are unlikely. Noise emissions from delivery vehicles will not be significant in the context of the local urban traffic environment. Little or no noise emissions are expected from the delivery operations themselves, as these will be small in scale.

The proposed site layout will incorporate open spaces which will be grassed and planted with trees. It is likely that a maintenance contract will be awarded to a local landscaping company. Maintenance activities undertaken at the proposed site will chiefly include regular mowing of open green areas. While mower emissions are likely to be audible at the nearest receptors, such emissions will blend into the urban soundscape, particularly during the summer when the daytime/evening noise environment in any urban area tends to include at least one mower audible in the distance at any time.

The proposed development will give rise to increased traffic on the local road network. A review of the traffic impact assessment document indicates that a significant increase in traffic volumes will arise on Rosshill Road, and at its junction with Rosshill Stud Farm Road.

9.5 Potential impacts

9.5.1 Overview

As identified above, several sources are highly unlikely to give rise to offsite impacts. These are as follows:

- Construction phase activities are not expected to give rise to perceptible groundborne vibration at offsite receptors.
- Similarly, the completed project will not give rise to groundborne vibration.
- Following completion, noise emissions arising within the site will be urban-residential in character, and will not give rise to offsite impacts.
- Noise emissions associated with several proposed commercial units near the northeast corner, including air handling units and deliveries, are highly unlikely to give rise to adverse impacts offsite.
- Completed dwellings and apartments at the proposed site are highly unlikely to received perceptible levels of groundborne vibration from railway activity. In the author's

experience, vibration PPV due to passing trains typically dissipates to less than 0.1 mm/s beyond 10 m from the rail line

In contrast, potential impacts may arise with respect to three sources, and these are discussed below:

- > Construction phase noise emissions may affect offsite receptors.
- > Following completion, traffic noise levels on surrounding roads will increase, resulting in noise impacts.
- > Residents at the proposed development may suffer inward impacts, due to road and/or rail noise.

9.5.2 Construction noise

Construction noise emissions will vary in time and location, and it is not possible to determine a single overall noise output figure for the construction phase. The most appropriate approach here is to assess worst case scenario emissions. A potential worst case scenario is shown in Figure 9-11.



Figure 9-11 Potential worst case noise scenario during construction phase

Key:

- > 1 Tracked excavator.
- > 2 Discharging mixer truck.
- > 3 Wheeled backhoe.
- > 4 Consaw.
- > 5 Dumper.
- > 6 Vibro-roller.
- > 7 Telescopic handler.
- > 8 Truck.

Noise emissions from the above were modelled using DGMR iNoise v2019.1 software. Input parameters were as follows:

- > Model algorithm: *International Standard ISO 9613-2:1996 Acoustics: Attenuation of sound during propagation outdoors – Part 2 General method of calculation* (1996).

- > Soft ground assumed throughout.
- > No screening.
- > Receiver height: 4 m.
- > Levels not rated for character.
- > Plant output data taken from Table 9-9.
- > 31.5 Hz levels (not provided in BS 5228) assumed to be same as 63 Hz levels.
- > Plant on-times per hour: excavator (80 %), mixer truck (50 %), backhoe (50 %), consaw (10 %), roller (90 %), handler (20 %).
- > Dumpers following 50 m haul route in proximity to SW, SE and NE corners.
- > Trucks following 100 m haul route near entrance.

The model output is shown in Figure 9-12. $L_{Aeq\ 1\ h}$ levels predicted at the three nearest receptors (close to their respective facades), located outside the three corners of the site, are listed in Table 9-11. Levels are also predicted with respect to Rosshill Stud Farm.

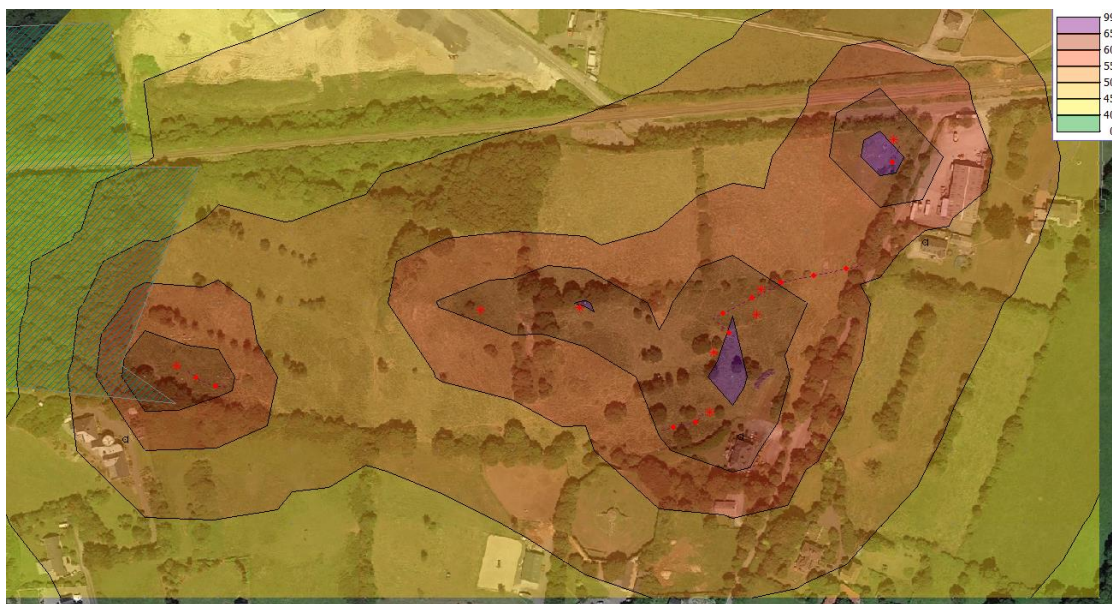


Figure 9-12 Construction phase $L_{Aeq\ 1\ h}$ levels – potential worst case scenario

Table 9-11 Construction phase $L_{Aeq\ 1\ h}$ levels at nearest receptors

Receptor	$L_{Aeq\ 1\ h}$ (dB)
Dwelling opposite NE corner	55
Dwelling outside SE corner	63
Dwelling outside SW corner	55
Rosshill Stud Farm stables	50

The highest $L_{Aeq\ 1\ h}$ level predicted is 63 dB, calculated with respect to a dwelling outside the southeast corner. Levels at all other dwellings will be considerably lower. Levels at all receptors will be lower than the 65 dB criterion recommended by BS 5228-1:2009+A1:2014 with respect to construction phase

works. Levels will also be lower than the 70 dB criterion recommended by the National Roads Authority (now Transport Infrastructure Ireland).

BS 5228:2009+A1:2014 data suggest that construction phase emissions will not be tonal. Apart from hammering, emissions are also unlikely to be impulsive. Hammering will be sporadic, typically occurring during roofing, and scaffolding erection and dismantling. Associated noise emissions will be brief and localized. Rock breaking, although unlikely to be required, will be impulsive.

It is reiterated here that the above predictions are based on a likely worst case scenario, arising when a number of different machines operate simultaneously. In reality, this is unlikely to occur regularly. Experience indicates that, at most residential building sites, construction managers direct machines to different areas in order to minimise the possibility of one activity intruding on another. Thus machines rarely operate at the same location at the same time. Typically, most operations at a particular location onsite require just 1-2 machines. Thus, throughout most, if not all, of the construction phase, received $L_{Aeq\ 1\ h}$ levels are likely to be less than presented in Table 9-11. On this basis, construction phase noise levels are likely to be short-term and slightly adverse at worst.

Throughout the construction phase, vehicles will arrive at, and depart from, the site during the working day. Vehicle movements will be associated with workers' arrival and departure, and delivery of materials. The approximate numbers of workers employed onsite over the entire construction period will fluctuate depending on schedules. Numbers are unlikely to exceed 40 at any time, due to project phasing.

All personnel and deliveries will access the proposed development site from Rosshill Stud Farm Road, via a proposed entrance on the eastern boundary of the site. Construction traffic volumes are expected to be inconsequential in the context of existing traffic volumes. Thus construction phase traffic noise impacts are not expected to be significant.

Although construction phase noise emissions will be considerably less than the 65 dB criterion at the stud farm, it will be advisable to liaise with the stud farm operator prior to the commencement of construction in order to establish noise management requirements.

9.5.3 Post-completion road traffic noise

Noise impacts at offsite receptors attributable to car movements on roadways within the completed site are expected to be negligible due to a combination of low traffic speeds, low numbers of movements, screening by buildings and separation distance. However, impacts may arise at offsite dwellings due to increased traffic on public roads in the vicinity. Dwellings most vulnerable here are as follows:

- A single dwelling on Rosshill Stud Farm Road, opposite the proposed site entrance.
- A dwelling adjacent to Rosshill Road, north of the railway underpass.
- Ribbon development along Rosshill Road to the east of the site.
- Merlin Park dwellings, northwest of the underpass.

A review of the traffic impact assessment report indicates that the number of vehicle movements generated by the proposed development will be approximately 240 during the morning peak, and 190 during the evening peak. Table 9-12 shows the increase in Rosshill Road traffic determined by the project traffic consultants. Included in the table is the resulting increase in $L_{Aeq\ T}$ levels. It is important to note that the increase indicated relates solely to Rosshill Road traffic – locations which are influenced by additional sources outside Rosshill Road traffic will see smaller increases.

Table 9-12 Traffic increases post-completion

Location	Period	Direction	2024 without dev	2024 with dev	dB increase
Rosshill Road west (via underpass)	AM	W-bound	472	555	-
		E-bound	22	43	-
		Total	494	598	0.2 dB
	PM	W-bound	39	51	-
		E-bound	139	197	-
		Total	178	248	1.4 dB
Rosshill Road east towards Coast Road	AM	W-bound	471	503	-
		E-bound	30	133	-
		Total	501	636	1.0 dB
	PM	W-bound	57	139	-
		E-bound	145	185	-
		Total	202	324	2.1 dB

The change in traffic volume required to increase the $L_{Aeq,T}$ level by 3 dB, which is the smallest change perceptible by the human ear, is 100 % i.e. traffic needs to double before the listener concludes that noise levels have increased. In all cases, increases in traffic noise levels will be lower than 3 dB. From Table 9-5 above, such increases will be imperceptible, and resulting impacts will be imperceptible to not significant.

Traffic volumes on Rosshill Stud Farm Road, between the proposed site entrance and the Rosshill Road T junction, will increase significantly as a result of the development. Information provided by the traffic team indicates that the morning peak volume will increase from 57 to 292 movements (2024 figures). The evening peak increase will be from 76 to 268. The resulting increase in $L_{Aeq,T}$ level will be 7 dB during the morning peak, and 5 dB during the evening peak. The resulting noise impact will be slight to moderate. It is noted that the project proposals include a proposal to realign Rosshill Stud Farm Road at the junction. During these works, it is recommended that the occupants of the dwelling be offered the opportunity to have an acoustic barrier installed on the western boundary of the property in order to reduce traffic noise arising on the road between the site entrance and the junction. This is discussed below under Mitigation.

9.5.4 Inward impacts

9.5.4.1 Inward sources

Inward impacts relate to noise immissions received at a receptor due to emissions emitted by one or more sources. Emerging best practice provides for the design of new developments such that occupants are not subject to high immissions from existing (and potential future) offsite noise sources. Such sources usually consist of transport (road, rail and aircraft), and industry. Internal and external criteria considered appropriate to new residential developments are identified in Section 9.2.4.

At the proposed development site, inward immissions arise from the following sources:

- R338 traffic to the north.
- Coast Road traffic to the east.
- Rosshill Road traffic outside the northeast corner.
- Rosshill Stud Farm Road traffic outside the east boundary.
- Rail traffic outside the north boundary.
- Activity at the commercial premises opposite the northeast corner.

Noise levels measured at the site indicate the following:

- Minimal noise emissions of significance arise from the commercial premises in question.
- R338 and Coast Road traffic emissions are continuously present, and determine the background soundscape at the site. Measured $L_{AF90\ 15\ min}$ levels are representative of these emissions. $L_{AF90\ 15\ min}$ levels averaged 39-45 dB across the site during daytime hours, falling to 32-36 dB during the evening. The data indicate that these emissions are not a major contributor to L_{den} , $L_{Aeq\ 16\ h}$ and L_{night} levels across the site, particularly across its northern half.
- The Galway Noise Action Plan 2019-2023 proposes that mitigation will be applied when L_{den} levels exceed 70 dB and L_{night} levels exceed 57 dB. L_{den} levels at the site are currently 47-58 dB, and L_{night} levels are 40-49 dB. These levels are significantly below the threshold values. Future growth in road and rail traffic is unlikely to alter this conclusion.
- The highest noise levels at the site are seen close to the northern boundary, particularly close to the road underpass where Rosshill Road and rail traffic combine to generate L_{den} , $L_{Aeq\ 16\ h}$ and L_{night} levels of 58, 56 and 49 dB respectively. These levels marginally decrease to the east and west. It follows that Rosshill Road and the rail line are the noise sources of greatest significance at the site.
- During night-time hours, individual road and rail movements result in occasional L_{AFmax} exceedences of 60 dB.
- Traffic on Rosshill Stud Farm Road is not of major acoustic consequence at the study site. However, completion of the proposed development will see a marked increase in traffic volumes near the junction with Rosshill Road, and night-time L_{AFmax} activity may also be an issue near the junction.

9.5.4.2 Modelled baseline

In order to quantify noise levels across the site, predictive modelling was undertaken using DGMR iNoise v2019.1 software. The following input parameters were applied:

- Model algorithm: *International Standard ISO 9613-2:1996 Acoustics: Attenuation of sound during propagation outdoors – Part 2 General method of calculation* (1996).
- Contours taken from mapping.
- Modelled heights: 2 and 4 m, to allow comparison with measured values.
- Rosshill Road and Rosshill Stud Farm Road traffic volumes taken from the traffic impact report.
- R338 and Coast Road traffic volumes taken from the Galway Noise Action Plan 2019-2023 which indicates an AADT of 23,913 and 8227 respectively. An equal east-west split is assumed, with a 3 % HGV content.
- Rail movements taken from the Iarnrod Eireann timetable, adjusted to align with field observations.

The model output is shown in Figures 9-13 and 9-14. Table 9-13 presents a comparison between modelled and measured L_{den} and L_{night} levels. Modelled levels at the four measurement positions are within 2 dB of measured levels. The model is therefore considered reasonably valid for the purposes of this assessment.

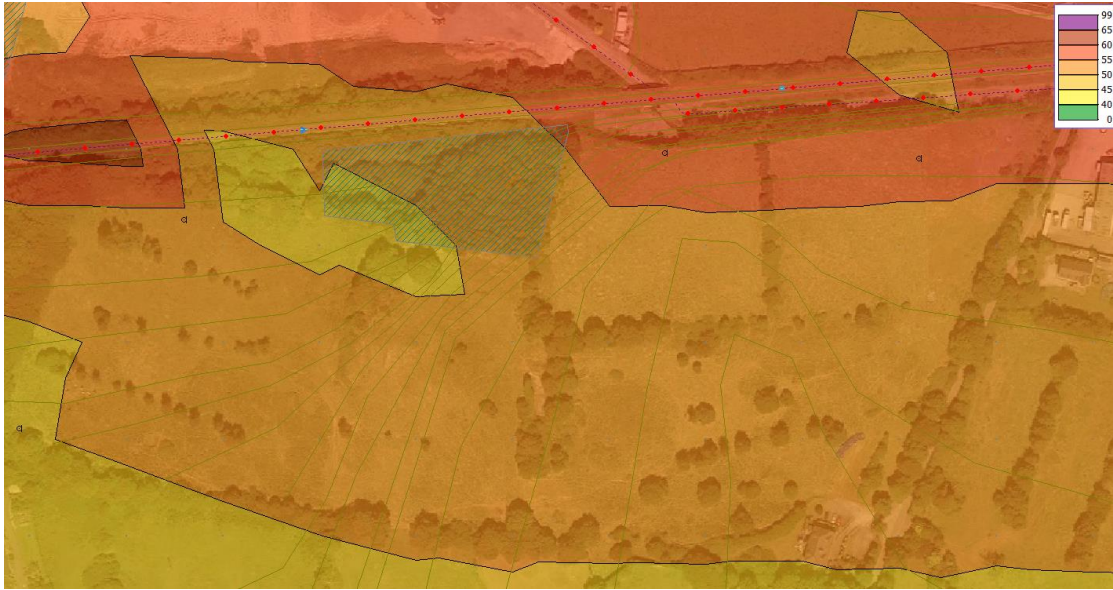


Figure 9-13 Existing Lden levels at 4 m

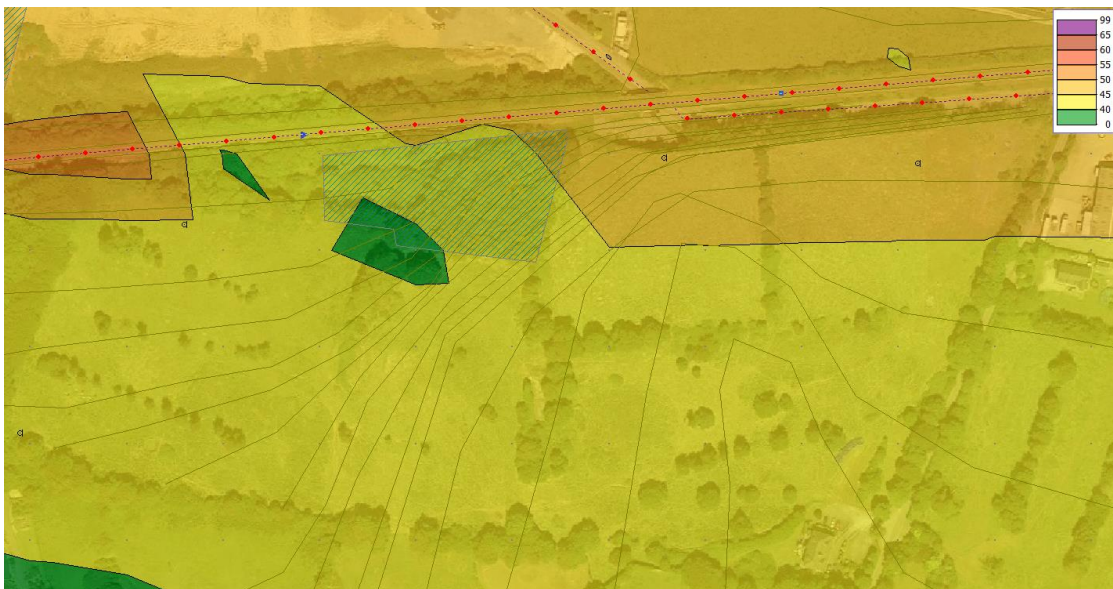


Figure 9-14 Existing Ln(1) levels at 4 m

Table 9-13 Modelled and measured Lden and Lnight levels.

Parameter		N1	N2	N3	N4
L _{den}	Measured	55	58	51	47
	Modelled	55	57	50	49
L _{night}	Measured	46	49	43	40
	Modelled	46	48	41	40

9.5.4.3 Modelled future scenario

In order to provide for future increases in noise levels, the model was modified to reflect the following:

- A 10 % increase in traffic volumes on the R338 and Coast Road.
- A 35 % increase in Rosshill Road traffic following completion.
- The introduction of approximately 1000 traffic movements per day on the Rosshill Stud Farm Road, north of the proposed site entrance.
- The proposed realignment of this road.
- A 20 % increase in passing rail traffic.

The model was also updated to include the built development, and rerun at the additional height of 11 m to reflect the top floors of the proposed apartment buildings. The model output is shown in Figures 9-15 to 9-18. L_{Aeq 16 h} and L_{night} levels are shown, as these are most relevant to the assessment. Predicted levels at the most vulnerable facades are listed in Table 9-14. Levels at other facades will be lower.

Table 9-14 Future L_{Aeq 1 h} and L_{night} levels

Location	2 nd floor		4 th floor	
	L _{Aeq 16 h}	L _{night}	L _{Aeq 16 h}	L _{night}
Block at NE corner – N façade	56-60	49-50	57	49
Block at NE corner – E façade	60	50-51	57-60	50-51
Block at NE corner – W façade	55-56	47	55-56	47-48
Block at NE corner – S façade	56-60	48-49	56-59	48-49
Dwellings along N boundary, by Rosshill Road – N facade	55-56	48	-	-
Dwellings NW corner – N facade	52	45	-	-
Apartment block 1 – N facade	50	43	47	43
Apartment block 1 – E facade	49-50	42	45-47	42
Apartment block 3 – N facade	52	44	53	44

Apartment block 3 – E facade	53	43	53	43
Apartment block 3 – W facade	51	43	51	43
Apartment block 4 – N facade	48-49	43	49-51	43
Apartment block 4 – E facade	49	42	49-51	42
Apartment block 4 – W facade	48	41	48	41
Apartment block 5 – N facade	54-55	47	55	47
Apartment block 5 – E facade	54	46	55	46
Apartment block 5 – W facade	53	45	54	45

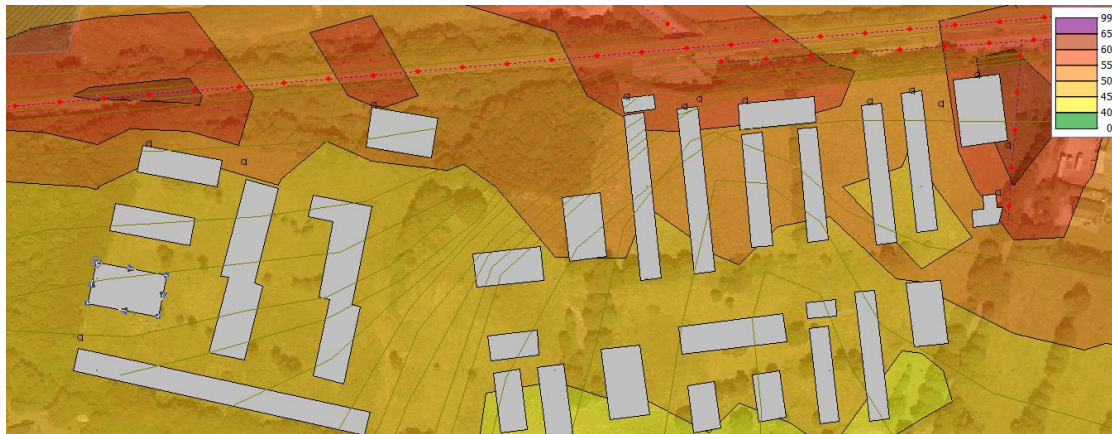


Figure 9-15 Future LAeq 16 h levels at 4 m

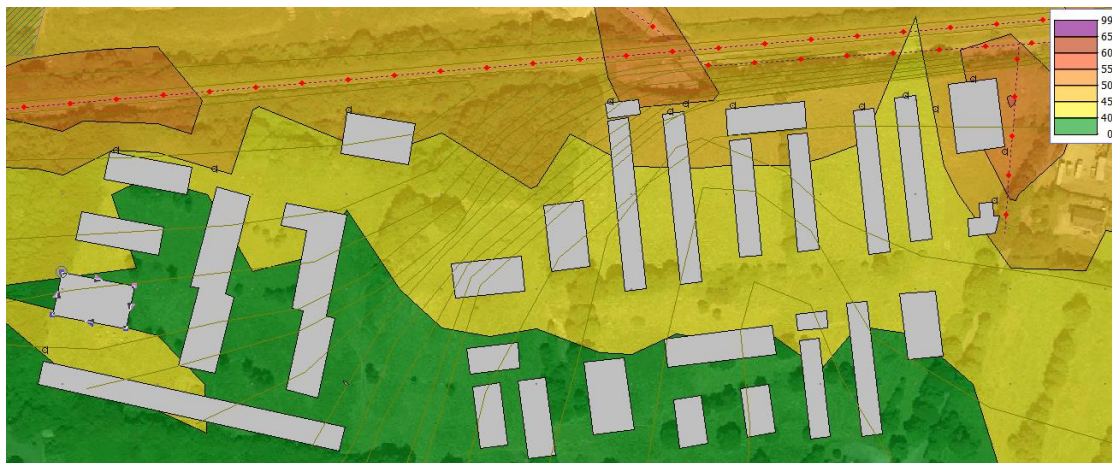


Figure 9-16 Future Lnight levels at 4 m

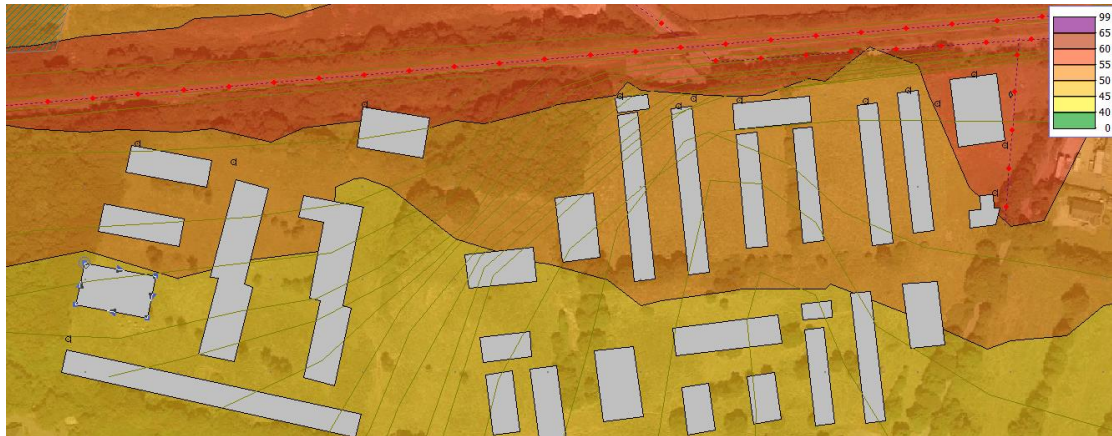


Figure 9-17 Future LAeq 16 h levels at 11 m

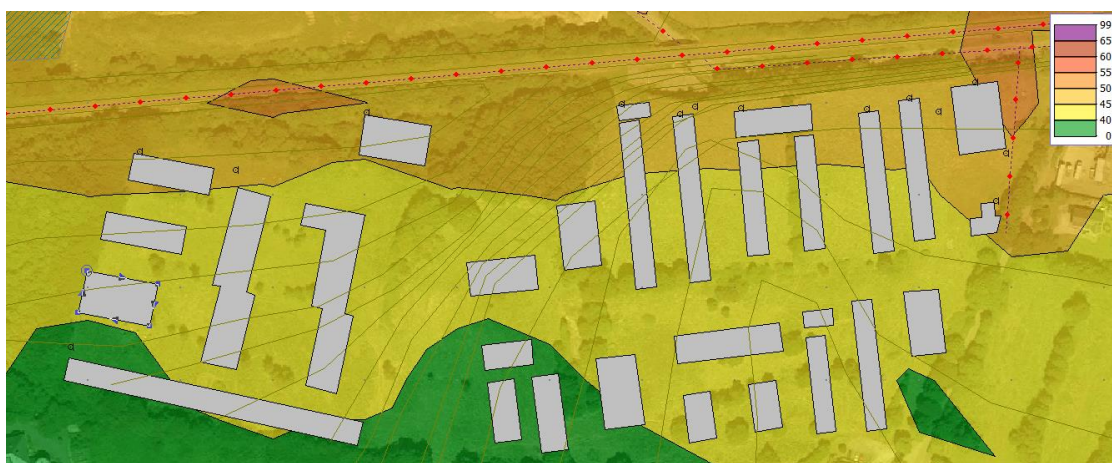


Figure 9-18 Future Lnight levels at 11 m

9.5.4.4 LAFmax levels

As noted previously, the number of night-time L_{AFmax} events above 60 dB is likely to exceed 10 along the northern margin of the site. At the western end of the site, exceedances over 60 dB arise solely from rail movements. The number of night-time rail movements is currently three. A future doubling of night-time rail activity will thus result in less than 10 L_{AFmax} events which exceed 60 dB.

In contrast, the eastern end of the site is affected by L_{AFmax} events due to Rosshill Road and rail traffic. Noise levels across the eastern end of the site were established by modifying the predictive model to reflect L_{AF} levels from a line source, and validated using the following data:

- > At N1, typical L_{AFmax} level of 62 dB due to Rosshill Road traffic, and 76 dB due to rail.
- > At N2, respective levels of 66 and 80 dB.

Figures 9-19 and 9-20 show the L_{AFmax} corridor width. The figures indicate that L_{AFmax} levels across the entire eastern end of the site exceed 60 dB due to rail movements.

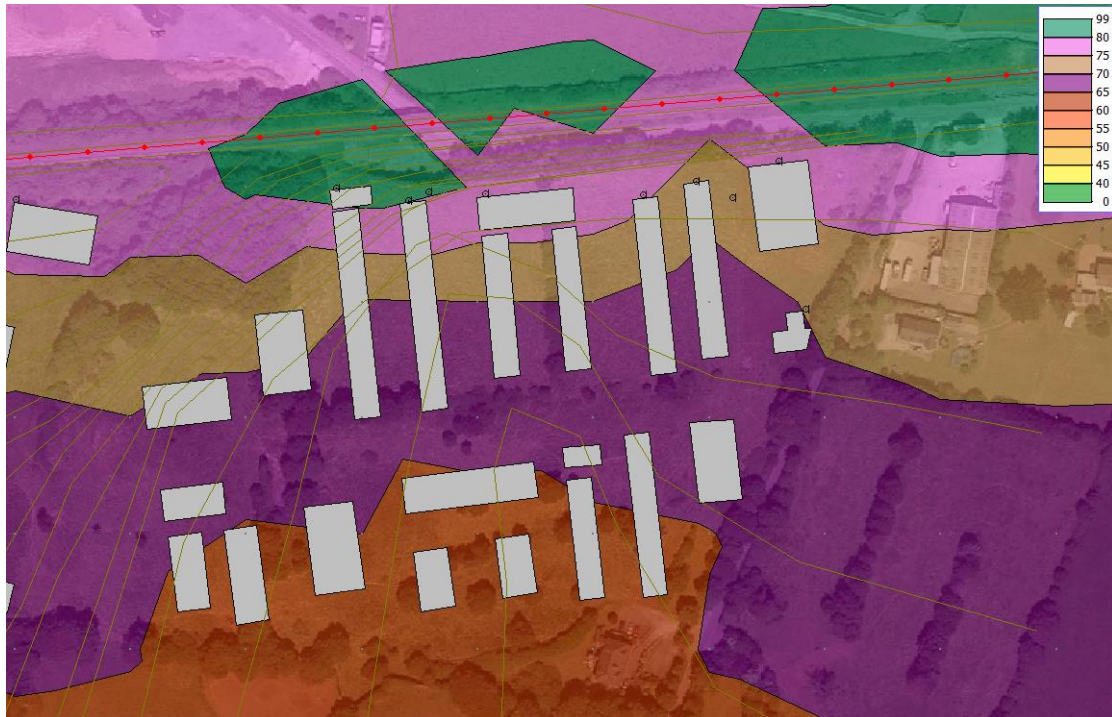


Figure 9-19 LAFmax levels at east end of site due solely to rail movements (4 m)

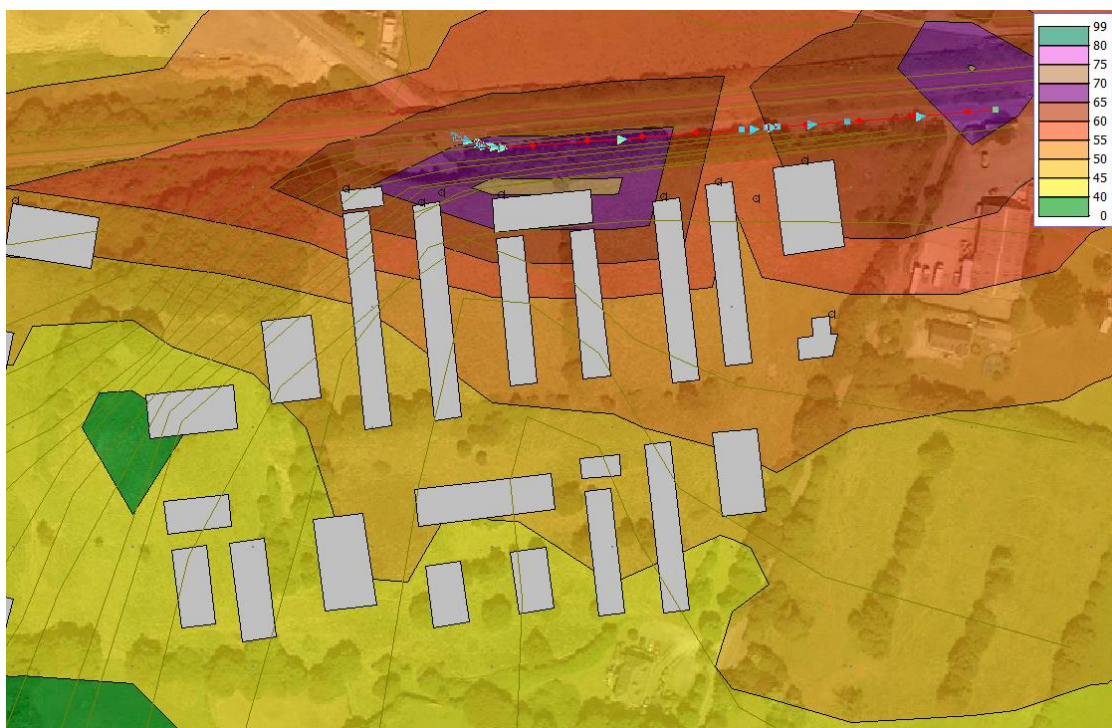


Figure 9-20 LAFmax levels at east end of site due solely to Rosshill Road traffic (4 m)

Even where the number of rail movements doubles, the number of night-time events >60 dB will not exceed 10. Rosshill Road traffic, in contrast, gives rise to more than 10 events >60 dB during night-time hours, but the zone of influence is much less, extending to approximately 50 m into the site.

Figure 9-20 was modified to include Rosshill Stud Farm Road, realigned as proposed. Figure 9-21 shows the modified model. The figure shows that LAFmax levels at onsite receptors near the site entrance will

receive L_{AFmax} levels over 60 dB. The number of such events is likely to exceed 10 per night, most of which will be attributable to traffic related to the development itself.

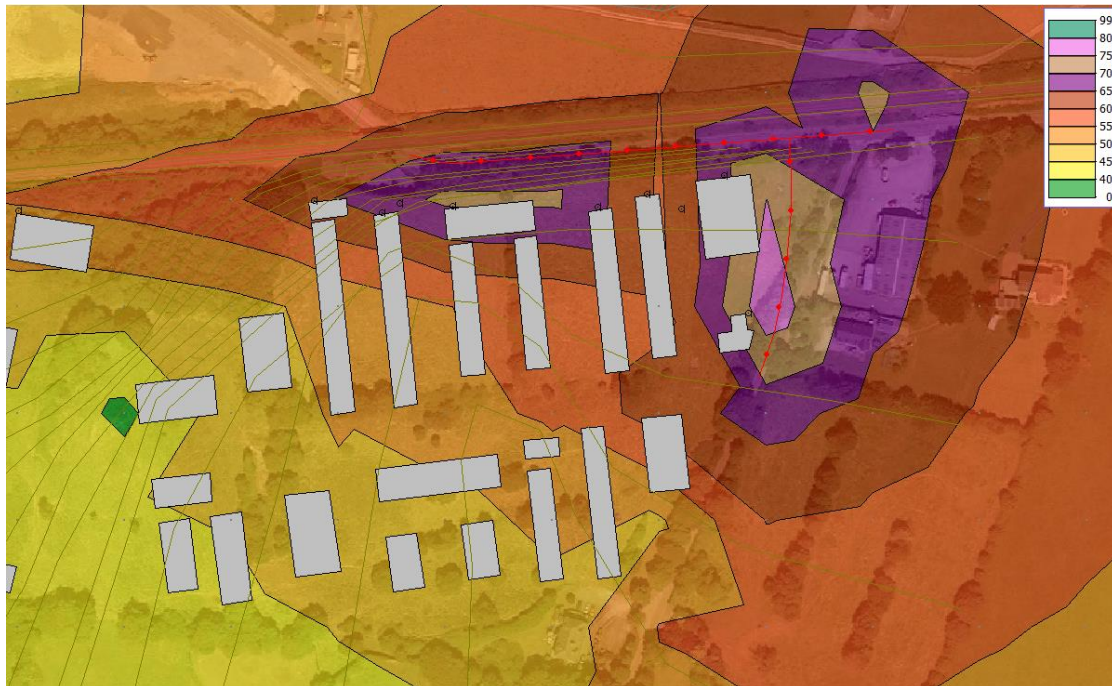


Figure 9-21 L_{AFmax} levels at east end of site due solely to Rosshill Road traffic & realigned Rosshill Stud Farm Road (4 m)

9.5.4.5 ProPG assessment

9.5.4.5.1 Stage 1: Risk assessment

The model indicates that future noise levels, based on increased traffic and rail volumes, will result in incident $L_{Aeq\ 16\ h}$ levels which reach 60 dB at facades along the northern margin of the site, highest towards the northeast corner. L_{night} levels will be 51 dB at their highest. Levels within the site will be lower. The levels indicate that the site will continue to be 'low risk' into the future.

Properties in the eastern half of the site, and located within 50 m of Rosshill Road, in addition to the closest onsite receptors to the site entrance, will receive more than 10 events >60 dB L_{AFmax} during night-time hours.

9.5.4.5.2 Stage 2: Element 1 – Good acoustic design process

In designing the overall site layout, the following principles of good acoustic design have been applied:

- Dwellings are set back from the northern boundary as much as possible.
- Similarly, dwellings are set back from the eastern boundary.
- Some of the northern boundary is given to green space, enhanced with a specific planting programme including trees, hedgerows and meadows, thus providing an attractive space for residents.
- Apart from apartments over the commercial units at the northeast corner and block 5, apartment blocks are generally positioned so as to avoid directly overlooking the railway line and Rosshill Road.

- Dwellings are generally orientated east-west, so that gables face north towards Rosshill Road, thus reducing the number of bedroom windows exposed to road traffic and rail noise. This is particularly the case in the eastern half of the site, where Rosshill Road traffic noise is greatest.

9.5.4.5.3 Stage 2: Element 2 – Internal noise level guidelines

Internal noise criteria are discussed in Section 9.2.4 above. Assuming a 15 dB reduction through an open window (the conventionally accepted value, identified in DEFRA report NANR116), and by reference to Table 9-14 above, the following conclusions are drawn:

- Recommended internal daytime $L_{Aeq\ 16\ h}$ criteria are 35-40 dB. These criteria will be met with open windows where incident levels do not exceed 50-55 dB. The criteria will be met across most of the site with windows open. At dwellings and apartments close to the northern boundary, the criteria will be met with windows closed, assuming standard thermal glazing. No residential unit will require acoustic grade windows to meet the criteria.
- The recommended L_{night} criterion in bedroom is 30 dB. As before, this criterion will be met across much of the site with windows open. At facades close to the northern boundary, it will be necessary to close windows to meet this criterion. Again, standard thermal glazing will provide the required attenuation.
- Facades near the northeast corner will be exposed to more than 10 L_{AFmax} events at night which exceed 60 dB. The World Health Organisation (1999) recommends that L_{AFmax} levels in bedrooms should not exceed 45 dB to prevent sleep disturbance. Where the number of events exceeds 10 per night, the objective is thus to ensure that internal L_{AFmax} levels with windows closed remain below 45 dB. L_{AFmax} levels will reach 75 dB at the most exposed facades (north facing bedrooms in unit type E and F in cell number 2, and east and north facing bedrooms at apartments in the commercial block). Enhanced glazing will therefore be required here. Standard thermal glazing will be sufficient at other facades.

9.5.4.5.4 Stage 2: Element 3 – External amenity area noise assessment

BS 8233:2014 recommends that $L_{Aeq\ 1\ h}$ levels should ideally not exceed 50-55 dB in external amenity areas. This criterion will be met in rear gardens across most of the site. The following exceedances are noted:

- North, east and west facing balconies on apartment block 5 will receive $L_{Aeq\ 16\ h}$ levels which rise towards 55 dB. However, as recommended by ProPG, residents here will benefit from onsite park areas where $L_{Aeq\ 1\ h}$ levels are less than 50 dB.
- Certain facades of apartment block 3 will receive $L_{Aeq\ 16\ h}$ levels which rise to 53 dB. Again, occupants will benefit from onsite park areas.
- Rear gardens at dwellings in cells 1-3, including dwellings at the northern end of these cells, will receive $L_{Aeq\ 16\ h}$ levels of 50-55 dB. These levels are considered satisfactory, given the proximity of onsite green areas where $L_{Aeq\ 16\ h}$ levels will be lower than 50 dB. The sole exception here is dwelling type C4 at the northeast corner of cell 03, where the received $L_{Aeq\ 16\ h}$ level will be approximately 56 dB. The rear garden will therefore benefit from a solid wall along its northern side, to a height of 2.4 m. Such a wall will reduce the $L_{Aeq\ 16\ h}$ level here to less than 50 dB.

- North, east and west facing balconies at apartments in the commercial block will receive $L_{Aeq\ 16\ h}$ levels which exceed 55 dB, and in some cases may reach 60 dB. As before, residents here will benefit from onsite green areas where $L_{Aeq\ 16\ h}$ levels are below 55 dB, as recommended by ProPG.

On the basis of the foregoing, noise levels in amenity areas will be satisfactory.

9.5.4.5.5 Stage 2: Element 4 – Assessment of other relevant issues

Other issues assessed, as recommended by ProPG, include the following:

- Compliance with relevant national and local policy: The most relevant policies are those set out in the Galway Noise Action Plan 2019-2023. The plan proposes that mitigation will be applied where L_{den} levels exceed 70 dB, and L_{night} levels exceed 57 dB. Onsite noise levels do not exceed these criteria, and are not expected to exceed them in the future.
- Magnitude and extend of compliance with ProPG: $L_{Aeq\ 16\ h}$ and L_{night} levels in almost all proposed units will meet identified criteria without specific acoustic mitigation measures. Several mitigation measures which are required are discussed below.
- Likely occupants of the development: The proposed development is expected to be occupied by a typical sample of the population, and is unlikely to see a predominance of one particularly sensitive group.
- Acoustic design versus unintended adverse consequences: No adverse consequences have been identified.
- Acoustic design versus wider planning objectives: No issues have been identified.

One additional item requires consideration here. At the proposed creche, incident $L_{Aeq\ 16\ h}$ levels at the northern and eastern facades will reach 61 dB, due to proximity to Rosshill Stud Farm Road traffic. $L_{Aeq\ 30\ min}$ levels are likely to reach 61 dB during the daytime. This level exceeds the 51-55 dB range suggested by Technical guidance document TGD-021-5, and thus appropriate mitigation measures will be required here as discussed below.

9.5.5 Population & human health

The assessment of impacts on human health is typically undertaken by reference to WHO guidance, which has been revised over the last four decades according as noise and health studies have been published. The WHO currently recommends the following:

- In residential settings, a daytime/evening $L_{Aeq\ 16\ h}$ level of 50 dB is an indicator of moderate annoyance.
- A night-time $L_{Aeq\ 8\ h}$ level of 45 dB is recommended to prevent sleep disturbance.
- With respect to short term impulsive sources, the WHO recommends a night-time L_{Amax} limit of 60 dB outside bedroom windows during night-time hours.

Impacts assessed above may be reviewed in light of the WHO recommendations. The review indicates the following:

- The WHO daytime 55 dB criterion is based on an interval of 16 h. It is highly unlikely that construction activities will result in $L_{Aeq\ 16\ h}$ levels above 55 dB, given that worst case scenario $L_{Aeq\ 1\ h}$ levels at most receptors will be 55 dB or less.

- The only receptor where construction phase $L_{Aeq\ 1\ h}$ levels will exceed 55 dB is at the dwelling outside the southeast corner. Although unlikely, it is possible that $L_{Aeq\ 16\ h}$ levels at this dwelling could exceed 55 dB on days when construction activities at the southeast corner are undertaken continuously over the full working day. If periods of intense activity are anticipated near the southeast corner, mitigation will be required with respect to this dwelling.
- The night-time WHO $L_{Aeq\ 8\ h}$ and L_{Amax} criteria are unlikely to be exceeded at any receptor during the construction phase, as night-time construction works are not envisaged.
- Following completion and occupation of the completed development, daytime and night-time WHO criteria are not expected to be exceeded at any offsite receptor as a result of onsite emissions.
- Traffic noise arising from public roads in the vicinity will increase slightly as a result of the proposed development. The increase will be slight, being 2.1 dB at its highest.
- With respect to inward impacts, external noise levels will be generally satisfactory in the context of WHO. However, properties along the northern margins of the site, particularly those close to Rosshill Road, will be exposed to $L_{Aeq\ 16\ h}$ and $L_{Aeq\ 8\ h}$ levels which exceed WHO criteria. The exceedances will reach 1-2 dB during the daytime, and 2-3 dB during the night-time. Exceedances will reach 5 dB at apartments over the commercial units. Internal noise levels, however, will be satisfactory. It is additionally noted that the most exposed facades, including those at the apartments, will benefit from enhanced glazing required to attenuate L_{Amax} events.

On this basis, it is considered that there will be no adverse noise impact on the local population or on human health, subject to the mitigation measures discussed below.

9.5.6 Mitigation

9.5.6.1 Construction

Construction phase $L_{Aeq\ 1\ h}$ levels will be lower than the 65 dB criterion recommended by BS 5228-1:2009+A1:2014, and the 70 dB criterion recommended by the National Roads Authority (now Transport Infrastructure Ireland). At most offsite receptors, $L_{Aeq\ 1\ h}$ levels will be lower than 55 dB. The highest level will be received at the dwelling outside the southeast corner, where the received $L_{Aeq\ 1\ h}$ level during worst case scenario operations will reach 63 dB. Here, it is proposed that acoustic panels will be erected at the south east corner of the site, as shown in Figure 9-21. The panels will consist of timber hoarding or alternatively quilt fencing, extending to a height of 2.4 m. The panel will reduce external $L_{Aeq\ 1\ h}$ levels in garden areas of the dwelling by approximately 5 dB.

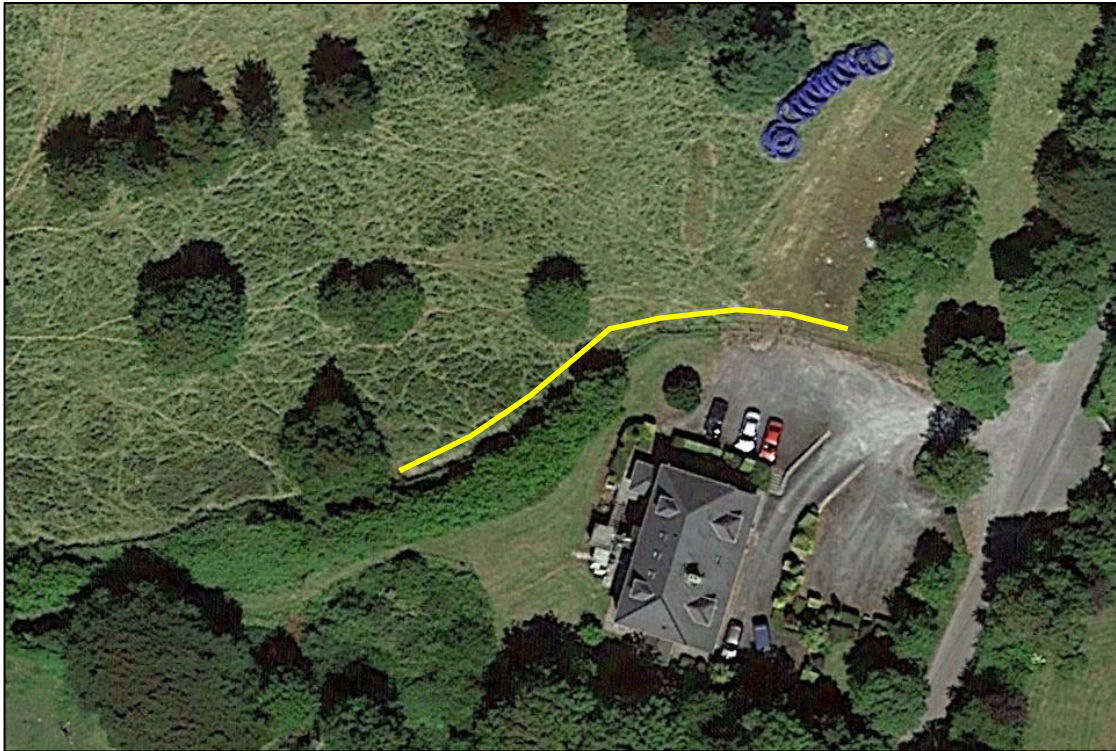


Figure 9-22 Proposed construction phase hoarding at southeast corner

The following general mitigation measures are proposed during the construction phase:

- Construction operations will in general be confined to the period Monday-Friday 0800-1900 h, and Saturday 0800-1600 h.
- Where it is proposed to operate plant during the period 0700-0800 h, standard ‘beeper’ reversing alarms will be replaced with flat spectrum alarms.
- Hooting will be prohibited onsite. Drivers of plant and vehicles will be instructed to avoiding hooting at all times.
- Plant used onsite during the construction phase will be maintained in a satisfactory condition and in accordance with manufacturer recommendations. In particular, exhaust silencers will be fitted and operating correctly at all times. Defective silencers will be immediately replaced.
- Queuing of trucks outside the site entrance will be prohibited.
- A site representative will be appointed as a liaison officer with the local community. Prior to commencement of construction, contact details for the officer will be circulated to all local residents. The officer will notify local residents of upcoming works phases and likely noise sources.
- Where evening or night-time operations are required, local residents will be notified through the liaison officer.
- All complaints of noise received during the construction phase will be logged in a register, and investigated immediately. Details of follow-up action will be included in the register.
- Where it is proposed to import potentially noisy plant to the site, the potential impact of noise emissions will be assessed in advance.
- Where generators or compressors are required within 100 m of the southeast corner, it is recommended that these are fitted with manufacturers’ acoustic enclosures. Alternatively,

a local acoustic screen or subsoil stockpile should be erected around the source. The surface density of any such screen should be 8 kg/m^2 as a minimum.

- Guidance set out in British Standard BS 5228-1:2009+A1:2014 with respect to noise control will be applied throughout the construction phase.

Prior to the commencement of construction, it is proposed to liaise with the operators of Rosshill Stud Farm to identify noise control measures specifically required by the stud farm. Identified measures will be included in a construction phase noise management plan.

9.5.6.2 Commercial units

At the proposed commercial units, noise emissions may arise from dispersed sources such as extraction fans, vents and air conditioning cassettes. Noise emissions from these sources are unlikely to be audible beyond 10 m, and are thus highly unlikely to affect offsite receptors outside the northeast corner of the site.

Plant details are not available at this stage. Once details are finalised, it is proposed to assess the impact of such emissions on residential units in the same building (floors 2-4) and nearby. Any mitigation measures identified as necessary will be installed prior to occupation of these units.

Noise emissions associated with deliveries and visitors to the commercial units are not expected to negatively impact surrounding receptors, whether onsite or offsite. It is proposed to apply a prohibition on night-time deliveries at the units.

9.5.6.3 Traffic

Increases in $L_{Aeq,T}$ levels at properties near the proposed development site will be minor, being less than the 3 dB detection threshold of the human ear. However, the increase at a dwelling opposite the proposed site entrance will be 5-7 dB at peak times. It is recommended that, during the proposed road alignment works, the occupants of the dwelling be offered the opportunity to have an acoustic barrier installed on the western boundary of the property in order to attenuate traffic noise arising between the site entrance and the T junction. Such a barrier may consist of a blockwork wall or timber acoustic panelling. Any such structure will be required to extend to a minimum height of 2 m, and should run the length of the western boundary of the garden.

9.5.6.4 Inward

An assessment in accordance with ProPG indicates that the site is low risk with respect to current road and rail traffic volumes, and will continue to be low risk in the future. Internal $L_{Aeq,T}$ criteria will be met at all residential units using standard thermal glazing. However, facades near the northeast corner will be exposed to more than 10 L_{AFmax} events at night which exceed 60 dB. The World Health Organisation recommends that L_{AFmax} levels in bedrooms should not exceed 45 dB to prevent sleep disturbance. Where the number of events exceeds 10 per night, the objective is thus to ensure that internal L_{AFmax} levels with windows closed remain below 45 dB. The affected facades are north facing bedrooms in unit type E and F in cell number 2, and east and north facing bedrooms at apartments in the commercial block. At these façades, it is proposed to install glazing with a minimum R_w value of 35 dB. Table 9-15 shows octave band spectra, measured at N1 during traffic and train pass-bys, which will be used to inform glazing selection.

Table 9-15 Typical pass-by spectra measured at N1 (levels as dBZ).

Source	63 Hz	125 Hz	250 Hz	500 Hz	1000 Hz	2000 Hz	4000 Hz
Rosshill Road pass-by	58	55	51	53	56	50	37
Train pass-by	69	71	72	70	71	68	57

External amenity areas will be satisfactory in the context of WHO and ProPG criteria. It will be necessary to install a wall on the northern side of the rear garden at dwelling type C4 at the northeast corner of cell 03. The wall height will be 2.4 m.

At the proposed creche, $L_{Aeq\ 16\ h}$ levels received at the northern and eastern facades will reach 61 dB, thus exceeding the 51-55 dB range suggested by Technical guidance document TGD-021-5, and appropriate mitigation measures will be required here. It will be necessary to install glazing so as to ensure that internal ambient $L_{Aeq\ 30\ min}$ levels do not exceed 35 dB. A minimum R_W value of 37 dB is recommended, optimised with respect to the vehicle spectrum shown in Table 9-15 above.

9.5.7 Summary of effects

The construction phase is expected to last five years. Construction will be undertaken in stages, and is unlikely to extend beyond 18 months in any particular zone. Several mitigation measures are proposed. Noise impacts will be short term and slight adverse at worst. No vibration impacts are expected.

Noise impacts associated with onsite sources at the proposed commercial units will be neutral. With respect to traffic, the proposed development will result in a slight increase in local noise levels. Impacts will be permanent and slight adverse at the nearest receptors close to the Rosshill Road – Rosshill Stud Farm Road junction.

Inward noise levels will be satisfactory in the context of WHO and ProPG criteria, subject to certain mitigation measures.

No indirect impacts or interactive effects have been identified.

There are no large scale developments previously permitted or proposed in the local area. Thus potential cumulative impacts are unlikely to arise.

Noise emissions from train movements on the adjacent railway line have been assessed, and have been used to inform the site design process. Train noise emissions are not significant when assessed using PropPG. Cumulative noise impacts with the railway line will not be significant.

10. LANDSCAPE AND VISUAL

10.1 Introduction

This chapter of the EIAR addresses the potential landscape and visual impacts of a proposed Strategic Housing Development in Rosshill, Galway City. The emphasis in this chapter is on the likely significant effects of the proposal. It covers the assessment methodology, a description of the proposed development and the existing landscape as well as landscape policy and relevant guidance. It includes a description of Galway City Council's landscape policy and the area in which the proposed development site is located.

The landscape of the area is described in terms of its existing character, which includes a description of the landscape value and the landscape's sensitivity to change. The landscape and visual impact assessment of the proposed residential development includes the use of representative viewpoints as well as an assessment of landscape value and landscape sensitivity. The potential impacts in both landscape and visual terms are then assessed, including potential cumulative impact.

10.1.1 Statement of Authority

This section of the EIAR has been prepared by Megan Geaney and Joanna Mole both of MKO. Megan is a graduate Landscape Visual Impact Professional and has a Master's in Planning and Sustainable Development and BA in Geography and English. Joanna is a Chartered Landscape Architect with over 15 years' experience, predominately in private practice, in the UK, Germany, Ireland and most recently in Israel. Joanna holds a BSc (Hons) in Landscape Design & Plant Science from Sheffield University, a Postgraduate Diploma in Landscape Architecture from Leeds Metropolitan University and a MSc in Renewable Energy Systems Technology from Loughborough University. Joanna has been a Chartered Member of the British Landscape Institute since 1998 after successfully passing her Professional Practice Examination.

10.1.2 'Do-Nothing' Scenario

In the 'Do Nothing' scenario, the proposed development would not take place. The site would continue to exist as an unkept green field site.

10.1.3 Proposed Development Description

The application is for a residential development consisting of 342no. units comprising 185no. houses and 157no. apartments, including a ground-floor community space, office, cafe and retail unit. A two-storey childcare facility. The provision of public realm landscaping including shared public open space and play areas, public art, public lighting, resident and visitor parking including car rental bays, electric vehicle charging points and bike rental spaces. Pedestrian, cyclist and vehicular links throughout the development. Access road and junction improvements at Rosshill Road/Old Dublin Road. Provision of all associated surface water and foul drainage services and connections including pumping station. All associated site works and ancillary services.

A dedicated Landscape Design has been completed by CSR and is included in Appendix 3-4. An overriding principle of the proposed landscape design philosophy is to retain the best of the existing trees present on the site to help create a high-quality' external setting, an environment for the proposed development. As such a BS5837:2012 tree survey was undertaken at the project outset and used to inform the project design team during the layout development process. The tree survey identified the exceptionally high value of the beech trees along the site's western boundary and made their retention

and protection a project priority. Other areas prioritised for retention include native boundary trees and areas of contiguous woodland scrub with ecological value.

The landscape design works with the existing topography and tree cover on the site, to create a variety of connected public open spaces suitable for both passive and active recreation needs of future residents. An area of relatively steep level change across the middle of the site with existing scrub woodland cover presents an opportunity to develop a multi-level outdoor natural playground.

The design and implementation of the landscape plan has a material effect on the potential landscape and visual effects of the project.

10.1.4 Scoping Replies/Pre-Planning Meetings

A scoping and consultation exercise has been carried out by MKO., as detailed in Chapter 3 of this EIAR.

10.2 Methodology and Assessment Criteria

This section broadly outlines the methodology used to undertake the landscape and visual assessment of the proposed development, and the guidance used in the preparation of each section. There are four main sections to the assessment:

- Outline of guidance followed
- Baseline landscape and visual assessment
- Nature and visibility of the proposed development
- Assessment of potential impacts

10.2.1 Guidance/Reference Documents

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 for Landscape and Visual Impact Assessment (GLVIA) (The Landscape Institute/Institute of Environmental Management and Assessment, UK, 2013)
- ‘Photography and Photomontage in Landscape and Visual Assessment’; Landscape Institute Advice Note 01/2011 (2011);
- Galway City Development Plan 2017-2023 Study (Galway City Council, 2016)
- Galway City Recreation and Amenity Needs Study (Galway City Council, 2008)

Consideration is also given to the Draft EPA guidance documents.

10.2.2 Baseline Landscape Assessment

As part of this assessment, an initial desk study was undertaken which identified relevant policies and guidelines, both at national and local level. This includes policies on landscape and landscape character, designated landscapes, and protected views. The site and study area are described in terms of landscape character types as identified in ‘Landscape and Landscape Assessment: Consultation Draft of Guidelines for Planning Authorities’ (DoELHG, 2000), while the surrounding landscape within 2km kilometres of the site is described with reference to landscape character as well as other landscape designations contained in the Galway City Council Development Plan 2017 – 2023 and as identified in the DoEHLG 2000 guidelines. In addition, field visits were undertaken to assess the landscape character and elements both on the site itself, and in the wider landscape.

10.2.3 Scope and Definition of Landscape and Visual Impact (LVIA) Study Area

For the purposes of this EIAR, where the ‘proposed development site’ or ‘the site’ is referred to in the LVIA, this relates to the primary study area for the proposed development, as delineated in red on the EIAR figures (maps). This total area measures approximately circa 10 hectares. The proposed housing development site is discussed in some detail in terms of its landscape character.

However, the landscape and visual baseline mapping and viewpoint selection are based on a wider study area, consisting of all the area within 2 km from the development site boundary as due to the nature of the proposed development impacts beyond this will be imperceptible. This area for which the baseline maps and viewpoint locations are produced and is referred to as the Landscape and Visual Impacts (LVIA) Study Area or ‘study area’.

10.2.4 Assessing Landscape Effects

The methodology uses qualitative methods in order to arrive at an assessment, which is based on the Landscape and Landscape Assessment (2000) Guidelines as well as the GLVIA (2013), and the DoEHLG (2006) Guidelines were also taken into account.

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 GLVIA (2013), 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.

10.2.4.1 Assessing Landscape Sensitivity

Landscape Sensitivity, which 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

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 a combination of values which are assessed in the landscape baseline, combining any formal landscape designations.

For the purposes of this LVIA and the assessment of landscape sensitivity, the following landscape sensitivity ratings assigned to the landscape character areas were identified based on the *Galway City Development Plan 2017-2023* and findings of the proposed development site and study area during the site visit:

- > Very High
- > High
- > Moderate
- > Low

10.2.4.2 Assessing Magnitude of Change in the Landscape

The magnitude of change in each landscape character area 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 each landscape character area was assessed using the definitions outlined in Table 10-1 below.

Table 10-1 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.

10.2.4.3 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 10-2 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 10-2 Landscape effects significance assessment matrix

	Substantial	Moderate	Slight	Negligible
Very High	Major	Major/Moderate	Moderate	Moderate/Minor

	Substantial	Moderate	Slight	Negligible
High	Major/Moderate	Moderate	Moderate/Minor	Minor
Moderate	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 10-6 below in Section 10.2.5.4.

10.2.5 Assessing Visual Effects

Visual effects relate to changes in views and visual amenity of the surroundings of individuals or groups of people. 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 photomontages 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.

Visual effects relate to changes in views and visual amenity of the surroundings of individuals or groups of people. These may result from changes in content and character of views because of changes to the landscape. The significance of the effect on visual receptors is a combination of the sensitivity of the receptor as well as the magnitude of the change.

10.2.5.1 Viewpoint Selection

A step by step process was followed in selecting appropriate photomontage locations. The first step was to select a number of representative locations following a detailed desk top study of mapping. These locations were based on the following criteria:

- Potential visibility of the development site
- Critical landscape designations e.g. views and prospects, scenic routes, areas classed as sensitive
- Close to settlements or groups of residential dwellings
- Within public 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 site.

Finally, following a site visit, to assess visibility on the ground, a total of 3 no. photomontage locations were agreed upon. The locations provide a representative range of local views.

10.2.5.2 Visual Receptor Sensitivity

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 High, Medium or Low, based on the definition of descriptions and examples set out in Table 10-3 below.

Table 10-3 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 or residents in close proximity or medium proximity whose primary views will be in the direction of the development.
High	Includes viewers at designated views or landscapes. Viewers such as residents in medium proximity to the viewpoint; 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, such as 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.

10.2.5.3 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 photomontage and wireframe images for each viewpoint. The magnitude of change is determined in accordance with the definitions and descriptions included in Table 10-4 below.

Table 10-4 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 through 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

Magnitude of Change	Description
	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.

10.2.5.4 Visual Effects Assessment Matrix

Table 10-5 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.

Table 10-5 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 10-6 below.

Table 10-6 EPA Impact Assessment Significance Classification for Landscape and Visual Effects

Matrix Classification Significance	EPA Significance Classification	EPA (2017) 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

Matrix Classification Significance	EPA Significance Classification	EPA (2017) Definition of Significance
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

10.2.5.5 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.

10.2.5.6 Photomontage Production

These images are not verified or located to GPS. The images are taken at 1.7m height with prime lens. Correct lighting for the time of day and year as well as location. The Model is accurate to the plans provided in AutoCAD format with the correct photo realistic materials.

10.3 Landscape Baseline: Policy Context

10.3.1 Galway City Council Development Plan 2017-2023

The Galway City Development Plan 2017-2023 (CDP) sets out policies and objectives for the city. Chapter 4 contains specific landscape related zoning, policies and objectives. These include recreation and amenity land use zoning and associated objectives as well as proposed greenways in the city and protected views.

The Galway City Development Plan 2017-2023 (CDP) sets out an overall strategy for the proper planning and sustainable development of the administrative area of Galway City Council.

***Policy 2.6** Ensure a balance between the reasonable protection of the residential amenities and the character of the established suburbs and the need to provide for sustainable residential development.*

10.3.1.1 Landscape Zoning and Designations

There are currently no landscape designations within the proposed site

Chapter 11 of the County Development Plan discusses the land use zoning objectives and development standards and guidelines. The site is located in the ‘Low Density Residential’ zone.

There are some nearby areas within the study area which are classed as ‘Recreational and Amenity’ and ‘Agriculture and High Amenity’.

The following policy item (Policy 2.9 of the CDP) applies to ‘Low Density Residential Areas’:

Protect the character of these areas by ensuring new development has regard to the prevailing pattern, form and density of these areas.

Protect the characteristics of these areas through development standards and guidelines.

The preservation of the character in terms of landscape and housing is imperative to this proposed development.

10.3.1.2 Protected Views

Section 4.5.3 of the CDP 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 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 are no protected views within the site boundary of the proposed development. However, there are protected

views within the study area, located within 5 km from the proposed development. These are described below:

- **V8** Seascape views of Galway Bay from the old Dublin Road to the city boundary.
- **V9** Views towards the sea at Roscam.
- **V13** Seascape views of Galway Bay at Ballyloughane from south of the railway bridge.

V8 and V9 are protected panoramic views within the study area. The focus of the view protected along V9 is not in the direction of the site. V13 is a linear protected view and its focus is also directed away from the proposed development site. There is no expected visibility of the proposed development from any of these protected views.

10.3.1.3 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

- 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

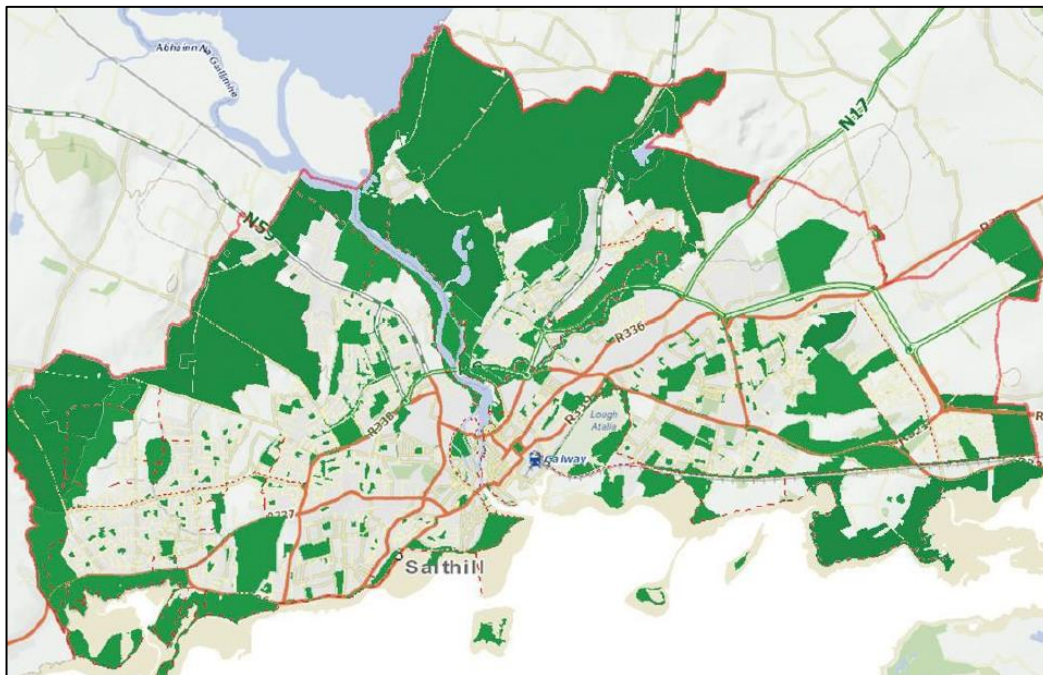


Figure 10-1 Galway City Green Network (Source: Galway City Development Plan)

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 in the city. The nearest of the Citywide Parks is Merlin Park Woods approx. 1km north of the proposed development site boundary.

Greenways are also mentioned as established or potential amenity corridors for non-motorised travel (pedestrian and cyclists). The nearest of these is just outside the south-western site boundary.

There will be no landscape or visual impacts on the woodlands or any greenways arising due to the proposed housing development

10.4 Landscape Baseline: Landscape Character

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.

10.4.1 Site of the Proposed Development

The site area comprises approximately 10ha of land located within the townlands of Roscam, Merlin Park and Murrough to the south east of Galway City. It is located on the Rosshill Road, which connects to the Old Dublin in the west and the Coast Road in the east. The general area is rural in character and is surrounded by a number of small residential developments and individual houses. A number of individual houses and the Rosshill Stud Farm lie to the south, with agricultural lands to the east. The Merlin Park Hospital lies to the north to the south, Galway Bay and agricultural lands to the west. The Galway to Dublin trainline runs along the northern border of the site.

The proposed development site is greenfield in nature, however, was previously in use as a par 3 golf course, which ceased operation in the early 2000's. There are a number of tree lines and hedgerows present within the site. A mixture of hedgerows and stone walls enclose the site. There are no watercourses on site. No landscape or environmental designations apply to the site.

10.4.2 Walking Routes and Cycleways

Galway City Development Plan outlines the importance of walkways and cycleways within the city environs. The walking routes and cycle routes listed below all fall within a 5km radius of the proposed site. It is a policy of the council to (Policy 3.6):

Support the Galway Transport Strategy proposals for a primary cycle network to facilitate safe and convenient medium distance journeys.

Support the proposed Greenways as part of the primary cycle network and as part of a link to Bearna, Oranmore, Maigh Cuilinn and Oughterard

Promote the implementation of a Wayfinding Scheme with provision of directional information and signage at appropriate locations across the city as part of a greater public realm strategy.

Objective RA6 in the Development Plan notes the following:

Prohibit the intrusion of development along public walking routes and public rights of way, particularly those in scenic areas, the sea-coast and along inland waterways.

The following trails and cycleways are the closest to the site.

The Wild Atlantic Way is a tourism trail on the west coast, and on parts of the north and south coasts, of Ireland. The 2,500 km driving route passes through nine counties and three provinces, stretching from County Donegal's Inishowen Peninsula in Ulster to Kinsale, County Cork, in Munster, on the Celtic Sea coast. One section of this trail is approximately 621 metres east from the proposed site development on the Coast Road. There is no expected visibility from this route

The **Mervue Slí** walking route is approximately 2.88 kilometres away from the proposed development site. The Mervue Slí is 2.6 kilometres and is often used as a location for a healthy lunchtime walk by those employed in the area. Routes can be walked in either direction. There is no expected visibility from this walkway.

The **Oranmore Slí** is approximately 3 kilometres away from the proposed site development. This Slí na Sláinte walking trail is approximately 4.5 kilometres in length and avails of Oranmore and its environs. There is no expected visibility from this walkway.

10.4.3 Physical Landscape

The topography, vegetation and anthropological features on the land surface in an area combine to set limits on the amount of the landscape that can be seen at any one time. These physical restrictions form individual areas or units, known as physical units, whose character can be defined by aspect, slope, scale and size. A physical unit is generally delineated by topographical boundaries and is defined by landform and landcover.

10.4.3.1 Landform

Present-day landscapes owe their form to the geological materials from which they were carved. Landform is the term used to describe the spatial and formal arrangement of landscape components as a natural product of geological and geomorphologic processes in the past and refers primarily to topography and drainage.



Plate 10-1 View eastwards onto the proposed development site from the local road passing the site.

10.4.3.1.1 Topography



Plate 10-2 Image indicating the topography of the proposed site

Although the area surrounding the proposed development site can be described as generally flat or gently undulating there is significant height variation from south-east to north-west of the site. The lowest point can be found in the north-western site area at approx. 6.70 metres O.D. (Ordnance Datum) and the highest point is along the south-eastern boundary at approx. 22.40 O.D. While gradients generally are quite steady on site there is a steep slope running approx. north to south just west of the centre of site with a gradient of up to 31.25% or 1 in 3.2.

10.4.3.1.2 **Drainage**

The site appears to be well drained from observations during the site visit. No evidence of water-logging apart from a small area in the northeast corner of the site.

Small stream channels can be seen along the Rosshill beach which emerges ~ 100m west of the western boundary of the site. It is likely that runoff is flowing along the field boundaries and discharging to the Galway Bay at this point.

Further Information relating to drainage can be found in Chapter 7 of this EIAR.

10.4.3.1.3 **Landcover**

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.



Plate 10-3 View down the Rosshill Road into a residential and agricultural area.



Plate 10-4 View facing onto the site looking to the north of the site boundary.

The proposed development site is a former golf course. The majority of the site is taken up by semi-improved, species poor dry neutral grassland and there is also a small area of poorly-drained grassland at the north-west of the site.

The north-eastern corner of the site consists of a relatively disturbed area with imported rock and rubble.

Scattered native and non-native trees are present throughout the site. A number of relatively immature trees are located to the southeast of the site and there are three scattered tree lines in the western part of the proposed site.

Treelines comprised predominantly of mature and immature ash, sycamore and beech demarcate the southern, eastern and part of the northern boundaries of the development site, whereas mature beech is found on the western boundary. Field boundaries within the site are delineated by stone walls, treelines and hedgerows

An area of mixed deciduous woodland is present along the north-western boundary of the development site.

Landcover in the surrounding landscape is predominantly residential and agricultural. This pattern is replicated throughout the outskirts of the city environs. To the north, the site is bound by the Old Dublin Road and the railway line. There is a stud farm in operation to the south. Also, to the south of the site there are low density residential developments. These are in the pattern of ribbon development. A stone walled folly can also be found to the south of the proposed development.

10.4.3.1.4 **Land Use**

This site does not appear to be actively used at present and represents a green field site which was previously used for recreational purposes as a pitch and putt course.



Plate 10-5 View looking directly eastwards onto the site off the site entrance.



Plate 10-6 View looking towards the southern part of the proposed site development.

Land use in the wider area is a combination of residential, agricultural and industrial. Residential developments are scattered throughout the area to the south and east of the development site, particularly down Rosshill Road and the Old Dublin Road. To the north, the site is bound by the Old Dublin Road and the railway line. Areas of historical significance lie directly south by the bay, as a Round Tower and the ruins of the Roscam Abbey Church reside there. The Rosshill Stud Farm is operational to the south of the proposed site

10.5 Indications of Landscape Value

10.5.1 Landscape Value

In order to determine the landscape sensitivity, and ultimately the likely significance of the effects, assessments of landscape value for the proposed development site and wider (LVIA) study area were assessed. Landscape value includes designations such as scenic views and sensitivity designations found in Development Plans, as well as values which are attached to undesignated landscapes. A number of criteria were developed in order to assess the landscape values of the study area. These then contribute to the assessment of landscape sensitivity.

Table 10-7 European sites within likely zone of impact of the Proposed Development

Feature	Description
Landscape Designations	The proposed development site is zoned as 'Low Residential' with a variety of zonings in the study areas. There are no protected views within the proposed site. However, there are three protected views within the study area as set out in Galway City Development Plan 2017-2023 (V8, V9 and V13). Merlin Park Woods, situated approximately 1 km north of the proposed site, is one of three parks described in the CDP as Citywide Parks. There is a greenway, shown the 'Land Use Zoning and Specific Objectives' Map, adjacent to the south-western corner of the proposed

	development site. The proposed development will not be visible from any of the views, the adjacent greenway or the Citywide Park.
Landscape Elements Quality/Condition	This refers to the physical state of the landscape and the condition of individual elements. The site in its current state is in good condition acting as a green field site with plentiful vegetation. There are limited attractive landscape elements other than a number of mature trees. Site vegetation mainly consists of rough grassland with area of semi-mature trees and shrubs and in itself is not of high landscape value.
Aesthetic Qualities	Views from the site are relatively screened due to vegetation and housing in the area. There are some short-distance views of some aesthetic quality of the bay to the south of the proposed development site. Views within the site have limited aesthetic quality
Wildness/naturalness	There is some sense of naturalness on the site due to the vegetation on the site and its proximity to woodland, however with the number of developments surrounding the site the sense of wildness and naturalness has been diluted.
Rarity/Conservation Interests	There are no rarity/conservation interests on the development site. See Chapter 5 of the EIAR for further information.
Cultural Meaning/Associations	There are no cultural associations on the development site. There is a round tower and the ruins of Roscam Abbey Church approximately 667 metres away from the proposed site boundary, which holds cultural and historical meaning and associations. See Chapter 11 of the EIAR for further information on Cultural Heritage.
Recreation Value	The site itself is privately owned and not currently used for recreation. The closest amenity facility would be the Merlin Park Woods directly north of the proposed site.

On the grounds of the points made above and taking the landscape policies from the Galway City Development Plan into account the landscape value is considered **Moderate**.

10.6 Visual Baseline

10.6.1 Views towards the site

The visibility from the viewpoints is discussed in Section 10.6.2 below in more detail. During the site visit in late August 2019, beyond viewpoint selection, visibility from the local area was also appraised. All the main roads in the local area were accessed including the Old Dublin Road, Coast Road (both different segments of the R338 road), and the Rosshill Road.

In the immediate vicinity of the site, many sections of dense road-side and intervening vegetation preclude visibility of the housing development from the majority of the roads surrounding the proposed development. There are limited areas where visibility is expected. Below are images and descriptions of views towards the site from various locations around the proposed development. The proposed development is not visible from these locations however block images of the heights of the buildings are shown to the foreground of the screening. This is for illustrative purposes only as the development is actually located to the rear of the vegetative screening in the photo.



Plate 10-7 View facing in the direction of the proposed development looking across residential and agricultural land off the R338 road.

Plate 10.7 shows a view from the Coast Road, in the townland of Roscam approximately 326 metres to the east of the proposed development site. The blocks evident within this image are indications of where the highest buildings within the housing development would be seen if they were not screened by landform and vegetation. As can be seen from this location and on this road the development is adequately screened. The Coastal Road is a part of the Wild Atlantic Way, and this section is also designated as a protected view (*Viewpoint 8 Seascape views of Galway Bay from the old Dublin Road to the city boundary*) by the Galway City Council.



Plate 10-8 View taken from the Coast Road (R388 road) looking past residential developments in the direction of the proposed site.

Plate 10-8 shows an image taken off the Coast Road, part of the route of the Wild Atlantic Way, in the townland of Roscam, approximately 500 metres east of the proposed development site. This image indicates the residential use of the surrounding area. The blocks in the view give an indication where the tallest buildings of the buildings would be visible if there was no screening by buildings or vegetation. It is evident that there is no expected visibility from this location

10.6.2 Viewpoint Locations and Descriptions

The viewpoints can be seen in more detail in an A3 photomontage booklet accompanying this report. Smaller images of existing and proposed viewpoints are shown and described in this section. A total of 3 no. photomontage locations were selected and are described below. An index map showing the locations of the photomontages can be seen in Figure 10-2.

Table 10-8 Viewpoints

Viewpoint	Description	Grid Ref.
1	View taken from Rosshill Road in the townland of Roscam, Galway City, approximately 185m north of the proposed site boundary	E133,928 N225,249
2	View taken from the junction of Rosshill Road and Old Dublin Road, in the townland of Roscam, Galway City, approximately 15m north-east of the proposed site boundary	E134,480 N225,082
3	View taken from an unnamed local road off the Rosshill Road, in the townland of Roscam, Galway City, approximately 150m south of the proposed site boundary	E133,900 N224,778



Map Legend

- ▲ Viewpoint
- LVIA Study Area
- Site Boundary

	MAP TITLE: Viewpoint Locations		MAP NO.: Figure 10.2	SCALE: 1:25,000
	PROJECT TITLE: 181058-a Duffy Roshill Res EIAR			
	DRAWING BY: JM/MG		CHECKED BY: EG	
	DATE: 19-12-2019			
ISSUE NO.: 181058-a-2019.12.19-D1				

10.6.2.1 Viewpoint 1



Plate 10-9 Viewpoint 1 Existing View

10.6.2.1.1 Existing View

The existing view shows an image of a residential estate in the construction phase off the Rosshill Road. The housing estate under construction is to the front of the proposed development site from this viewpoint. Behind is the railway embankment, covered in a mixture of semi-mature and mature trees and shrubs, separating the housing estate in the foreground from the proposed development. An adjacent tree can be seen to the right of the image. The railway embankment precludes anything but short-distance views from this viewpoint.

Visual Receptors are people travelling on Rosshill Road and the residents within the area. Therefore, visual receptor sensitivity is considered **Medium**.



Plate 10-10 Viewpoint 1 Proposed View

10.6.2.1.2 **Proposed View**

The rooves of a proportion of the houses within the proposed development can be seen over the trees on the railway embankment. The proposed development is screened by the building to the left in the foreground and to the right by a mature tree line screens along the railway line.

As only the rooves of a fraction of the proposed development is visible in the background from this viewpoint, the magnitude of change is considered **Slight**. **The residual visual effect is therefore considered a long term slight effect given the medium receptors sensitivity and the slight magnitude of change.**

10.6.2.2 Viewpoint 2



Plate 10-11 Viewpoint 2 Existing View

10.6.2.2.1 Existing View

The existing view shows an image taken on the Old Dublin Road, at the junction of the Rosshill Road and the Old Dublin Road just north-east of the most north-eastern part of the proposed development site. Pavements, road markings and signage as well as electricity infrastructure accompany the road networks around the site. Trees and shrubs mark the site boundary, but block views into the proposed development site, as can be seen in Plate 10.13 above. There are short to Medium distance views along the two road corridors.

The visual receptors will be motorists travelling on these roadways and nearby residents living further. Therefore, the visual receptor sensitivity is considered as **Medium**.



Plate 10-12 Viewpoint 2 Proposed View

10.6.2.2.2 **Proposed View**

The proposed view shows apartment block one behind the existing boundary vegetation. The lower parts of the building are screened alongside approximately half of the upper parts of the building. The new road section and junction can be seen just in front of the proposed building, the existing road will be closed to traffic as part of the proposed development. While this visible part of the proposed development raises the height of the skyline, at this location no other parts of the proposed development will be seen. Considering the close proximity of the viewpoint to the proposed development the spatial extent of the proposed development is moderate within the view.

Therefore, the magnitude of change is considered as **Moderate** from this viewpoint.

The residual visual effect is therefore considered a long term Moderate (*an effect that alters the character of the environment in a manner consistent with existing and emerging trends*) given the receptors Medium sensitivity and the Moderate magnitude of change.

10.6.2.3 Viewpoint 3



Plate 10-13 Viewpoint 3 Existing View

10.6.2.3.1 Existing View

The existing views looks along the residential road with the overgrown vegetation of a vacant plot to the right and beyond this ornamental conifer and broadleaf trees within the adjacent residential property boundary. Electricity posts and wires line the roadway.

The visual receptors will be residents living on this roadway off the Rosshill Road, therefore the visual receptors sensitivity would be considered as **Medium**.



Plate 10-14 Viewpoint 3 Proposed View

10.6.2.3.2 **Proposed View**

The photomontage shows that there will be no visibility of the proposed development from this location as a result, primarily, of the dense vegetation. The red line indicates the approximate ridge lines of the proposed Rosshill development. This location, to the west of the proposed site, has a number of residential developments, which are not expected have visibility of the proposed development.

The magnitude of change is considered **Negligible** as there is no visibility of the proposed development or change in the character of the landscape as a result of the proposed development.

The proposed development will have No residual effect from this location.

10.7 **Likely Significant Impacts and Associated Mitigation Measures**

10.7.1 **‘Do-Nothing’ Scenario**

If the project does not proceed on these lands, the site would remain a green field site zoned for Light Residential Purposes.

10.7.2 **Potential Impacts of the Proposed Development**

The potential effects of the proposed development relate to the potential effects without the consideration of mitigation or proposed landscape works. This enables recognition of potential, rather than actual, effects which facilitates the identification of suitable landscape mitigation measures.

At the construction phase, potential landscape and visual effects will result as the site changes from an area of open agricultural fields with some woodland, on the eastern edge of Galway City, to a construction site of considerable size. This is expected to be carried out in four main phases and will last approximately 7 years. 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, 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 machinery. These visual effects will be most pronounced in the immediate vicinity of the site, where there are several residential areas. The effects will be short term in duration.

Potential landscape effects during the operational phase are a result of the change in character of the areas from open agricultural fields and woodland on the edge of the urban area, to a built-up residential area with areas of open space. This will cause relatively localised negative effects on the character of the landscape.

10.7.3 **Avoidance, Remedial & Mitigation Measures**

Mitigation, remedial and avoidance measures have been integral in the design and which reduce the potential landscape and visual effects of the proposed development and therefore are not assessed separately to the development.

A dedicated landscape design has been completed by CSR and is included in Appendix 3-4. An overriding principle of the proposed scheme’s landscape design philosophy is to retain the best of the existing trees present on the site to help create a high-quality external setting an environment for the proposed development. As such a BS5837:2012 tree survey was undertaken at the project outset and used to inform the project design during the layout development process. The tree survey identified the

exceptionally high value of the beech trees along the site's western boundary and made their retention and protection a project priority. Other areas prioritised for retention include native boundary trees and areas of contiguous woodland scrub with ecological value.

10.7.4 Construction Phase

10.7.4.1 Predicted Impacts on Landscape

The predicted impacts arising from the proposed residential development will include noise and dust from construction operations as well as increased site traffic. The development site is located in an area of existing sub-urban development. There are three designated views within the study area. The development site is not visible from these designated views nor are the views directed towards the site.

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, car parking, etc. Visual impact during the construction phase will be mitigated somewhat through appropriate site management measures and work practices to ensure the site is kept tidy, dust is kept to a minimum and that public areas are kept free from building material and site rubbish.

Site hoarding will be appropriately scaled, finished and maintained for the period of construction of each section of the works as appropriate. To reduce the potential negative impacts during the construction phase, good site management and housekeeping practices will be adhered to. The visual impact of the site compound, and scaffolding visible during the construction phase are of a temporary to short term nature only and therefore it is expected that this will require no remedial action other than as stated above.

Although, the scrub that covers the site will be removed during the construction phase, the sub-urban nature of the surrounding area ensures this will not significantly change the character of the local landscape.

10.7.4.1.1 Significance of Effect

The construction phase is expected to last 7 years. Overall, the proposed development, during the construction phase, will have a localised Moderate, but Short Term negative effect on the landscape. The effect on the landscape is localised and will not affect the wider landscape character area. The effects of the operational phase are outlined below.

10.7.4.2 Predicted Visual Impacts

In general, the visibility of the proposed development site is restricted and can only be seen from a very limited area outside the site as illustrated in the photomontages for Viewpoints 1 to 3 and the general baseline descriptions and photos included in Sections 10.6. The limited visibility of the site is due to the presence of semi-mature to mature trees both immediately adjacent to roads and in the intervening landscape, but also due to local changes in topography which obscure views.

10.7.4.2.1 Significance of Effect

There are likely to be Slight negative visual impacts associated with the construction works over a phased basis for this development. This will be due to the process of substantial site clearance, earthworks and building processes required to construct the proposed development. Effects on visual receptors are limited in that there are few sensitive receptors with views into the site, however, any impacts by their nature are predominantly negative in nature, varying from Imperceptible to Slight. These effects will be short term in duration.

10.7.5 Operational Phase Impacts

10.7.5.1 Predicted Effects - Landscape

10.7.5.1.1 Magnitude of Change & Landscape Sensitivity

During the operational phase, the construction of the development including 342no. units comprising 185no. houses and 157no. apartments, including a ground-floor community space, office, cafe and retail unit and a two-storey childcare facility, will result in large scale changes to the local area. The Landscape Plan, which forms part of the site design is included in Appendix 3-4.

The character of the immediate vicinity will undergo change, and although the development type is consistent with the residential land uses in the surrounds, the scale of the change will be significant, and the rural qualities or parts of the site will change. The magnitude of the change is considered **Moderate**.

During the desktop study landscape designations set out in the Galway City Development Plan 2017-2023 in terms of ratings for landscape value and sensitivity and designated focal points and views, were identified for the proposed development site. The landscape value and sensitivity of the proposed development site is **Medium**. No landscape designations applied to the development site nor will the landscape designations in the surrounding landscape be affected by the proposed development. Furthermore, there were no rare landscape features identified on site. The changes to the landscape are localised yet do alter the character of the site.

Although the landscape within will undergo a considerable change, due to the site being visually segregated by vegetative screening visual effects on the landscape will be predominantly confined to the proposed site and visual effects on the wider landscape will be slight.

10.7.5.1.2 Significance of Effect

The landscape sensitivity is considered Medium and the magnitude of the change is considered Moderate.

There are some permanent changes in the character of the site and immediate vicinity, with the removal of the undulating open fields and change in topography of the site. In turning what was a rural area on the edge of the city into suburban area will have an effect on the character and fabric of the site and immediate vicinity. However, the effect will be relatively localised and is not likely to have significant effects on the landscape character of the wider area.

The construction of a large-scale development of residential units on a site on the edge of the town, which is residentially zoned, in conjunction with a considerable area of open space, is consistent with zoning objectives for the area. The provision of a large open space is also provided as set out in the LAP zoning.

Some trees and hedgerows will be retained and integrated into the development and in other areas new planting and features are proposed (see landscape plan), which are of environmental as well as aesthetic benefit.

Overall, the predicted landscape impact is considered to be Long Term, **Slight**, as a result of the level of screening provided, however the overall character of the area will be slightly affected.

10.7.5.1.3 Proposed Mitigation

Mitigation and avoidance measures have been integral in the design of the proposed development, and these will assist in reducing the potential landscape and visual effects of the proposed development,

and therefore are not assessed separately to the development. A landscape plan has been prepared and illustrates a variety of design proposals, which will introduce a positive aesthetic quality to the area.

10.7.5.1.4 **Residual Effects**

As stated above, it is expected that immediately post-construction, the landscape effects in the site and immediate vicinity are likely to be Slight, negative effects. However once mitigation measures, particularly the additional planting, have become established in the medium to long-term landscape effects are expected to be ameliorated. While some of the landscape effects will remain negative, the proposed landscape and offsetting measures will have a neutral to positive effect as the development will be better assimilated into the landscape once the vegetation establishes.

The residual effects on the wider landscape character are considered Slight and neutral. Therefore, based on the assessment above there are no significant effects at the level of the wider landscape character area.

10.7.5.2 **Predicted Visual Effects**

The desktop study, site visit, photomontages and proposed development layout all inform the assessment of visual effects. During the site visit views towards the site from the surrounding road network as well as from other areas were assessed. Visibility of the proposed development site could be excluded from the vast majority of the study area as a direct result of the screening provided by existing vegetation and landform that is set to be retained as part of the proposed development. Visibility of the proposed development could not be established other than on the Rosshill and Old Dublin Road, as seen in Viewpoint 1 and 2. Visual receptor sensitivity was considered Medium at all three viewpoints as visual receptors will be a mixture of local residents and local traffic in all cases. All viewpoints were in close proximity (less than 200 metres), despite this the development will not be visible from Viewpoint 3 and from Viewpoint 1 the magnitude of change is Slight. For Viewpoint 2, less than 20 metres from the site boundary the magnitude of change was Moderate as only one building will be visible and part of this will be screened.

10.7.5.2.1 **Residual Effects**

Once mitigation measures have established in the medium to long-term, and the landscape measures become established, visual effects are expected to improve in quality.

Due to the screening by local topography and vegetation the proposed developments will not have significant visibility within the study area. overall the visual effects will be **Long-Term, Imperceptible to Slight visual effect.**

10.7.6 **Cumulative Effects**

There are no known planned land-use changes or other developments proposed for the area. Adverse cumulative effects arising from existing land uses and activities such as agriculture, forestry, residential and roads are not anticipated.

10.8 **Conclusions**

To conclude there is a **Low** landscape visual impact anticipated from the proposed development of the Strategic Housing Development at Rosshill due to very effective screening of the proposed development by landform and existing vegetation resulting in minimal significant visual changes in the landscape from the development. Much of the visual change is not deemed negative.

11. CULTURAL HERITAGE

11.1 Introduction

This chapter assesses what, if any, impact a proposed Strategic Housing Development in the townlands of Roscam, Merlin Park and Murrough in Co. Galway will have on the archaeological and cultural heritage of the area. The assessment was compiled by Anne Carey, Archaeological and Built Heritage Consultant, M.A., M.U.B.C., M.I.A.I. and consisted of a field and desk study, comprising research of written and cartographic sources, and a walkover survey of the site on 23/02/2019, with further site visits in July, 2019. The proposed development site broadly comprises four fields, covering an area of just under 25 acres and it previously formed part of Rosshill Golf Course (Par 3), which ceased to operate in the early-2000s. The southern limit of the site is partly within the *Zone of Notification* for a Recorded Monument, being located immediately to the north of a folly/landscape feature RMP No. GA094-070, which is also a protected structure, RPS 8803. Rosshill House, set within a small irregular-shaped demesne, was owned by the Comyns-Davenport family and outbuildings associated with the estate are located within the proposed development site. The site is also located to the south of a protected structure, Rosshill Railway Bridge (RPS 8806, NIAH 30409423). There were two previous planning applications on the site; 05/352 and 06/816, and permission for a housing development was granted for the latter application.

11.2 Statement of Authority

Anne Carey is an archaeologist specialising in field work; excavation, pre-development testing, monitoring, field and desk studies, EIS and Archaeological Impact Assessment.

She is a Historic Buildings Consultant, with particular interest in architecture of towns and the historic re-use/remodelling of buildings in urban settings from the medieval period to the twentieth century. Anne has over ten years' experience in Architectural Impact Assessments on historic buildings and historic urban settings. She routinely works with clients from the earliest stages in design and planning through to completion of building conservation projects, working to preserve and maintain the historic character of buildings and their setting. She is experienced in independent Visual Impact Assessments on proposed developments on ACAs, Protected Structures and Recorded Monuments.

Anne has a Bachelor of Arts (B.A) in Archaeology and History from NUI Galway, a Master of Arts (M.A) in Archaeology from NUI Galway, a Masters in Urban Building and Conservation from UCD and a Certificate in World Heritage from UCS.

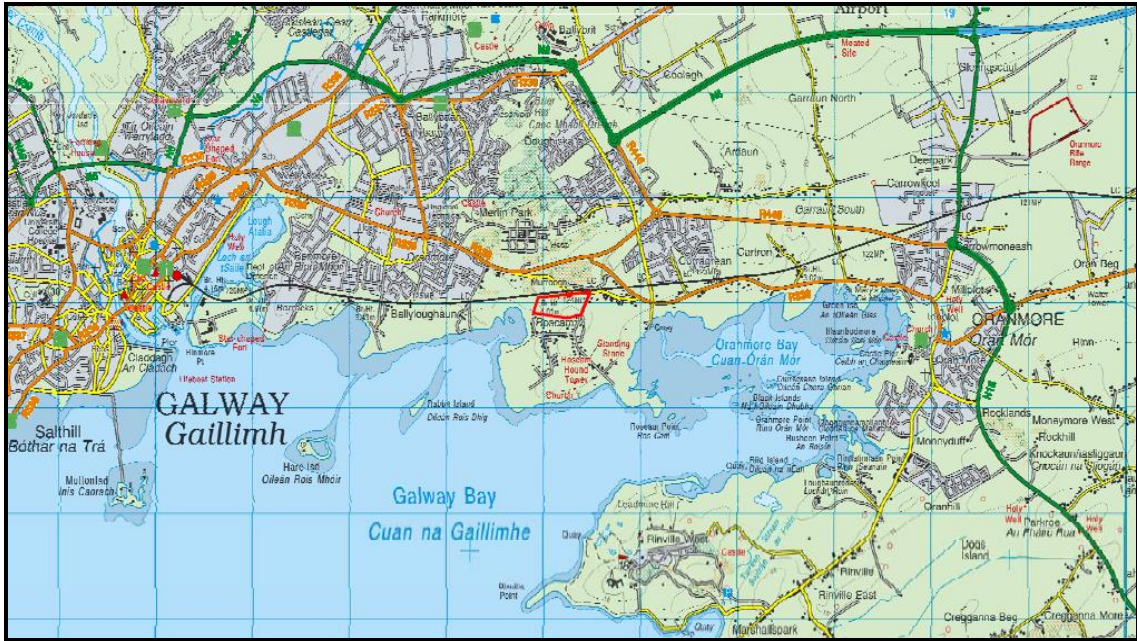


Figure 11-1 Site Location Map



Figure 11-2 Site Aerial



Figure 11-3 Site of Proposed Development

11.3 The Proposed Development

The proposed development is described in detail in Section 3 and will generally consist of the following:

The residentially-led development will consist of 342 units comprising a mixture of houses and apartments; a two storey childcare facility, community space and an office, cafe and retail unit.

The development includes the provision of public realm landscaping including shared public open space, public lighting, resident and visitor parking including provision for Car Rental bays and Bike Rental station. Provision of all associated surface water and foul drainage services and connections including pumping station. Pedestrian and vehicular access (including a stepped access) from the Rosshill/Old Dublin Road including the formation of a new junction to the Rosshill Road and the Dublin Road.

11.4 Legislation and Policy Context

Cultural Heritage in Ireland and specifically within County Galway is protected under the National Monuments Acts 1930-2014, the Local Government Planning and Development Act, 2000 and the Galway County Development Plan 2015-2021.

The National Monuments (Amendment) Act 1994 gave legal protection to recorded monuments through the establishment of the Record of Monuments and Places (RMP), which incorporated the Sites and Monuments Record (SMR) for each county into law.

The Planning and Development Act 2000 incorporated the Record of Protected Structures (RPS) for each county, giving legal protection to all buildings and structures listed.

Under section 9.5 Architectural Heritage Policies and Objectives of the Galway County Development Plan 2015-2021:

- Policy AH1-Architectural Heritage. Protect the architectural heritage of County Galway which is a unique and special resource.
- Objective AH1-Legislative Context. Ensure the protection of the architectural heritage of County Galway which is a unique and special resource, in particular by implementing the legislative provisions of the Planning and Development Act 2000 (as amended) in relation to architectural heritage and policy guidance contained in the Architectural Heritage Protection Guidelines 2011 (and any updated/superseding document).
- Objective AH2-Protected Structures. Ensure the protection and sympathetic enhancement of structures included and proposed for inclusion in the Record of Protected Structures (RPS) that are of special architectural, historical, archaeological, artistic, cultural, scientific, social or technical interest, together with the integrity of their character and setting.

Under section 9.7 Archaeological Heritage Policies and Objectives of the Galway County Development Plan 2015-2021:

- Policy ARC1- Legislative Context. It is the policy of Galway County Council to support and promote the conservation and appropriate management and enhancement of the County's archaeological heritage within the plan area. Galway County Council will ensure the implementation of the legislative, statutory and policy provisions relevant to the conservation of the archaeological heritage.
- Objective ARC1-Protection of Archaeological Sites. Protect archaeological sites and monuments their settings and visual amenity and underwater archaeological sites that are listed in the Record of Monuments and Places, in the ownership /guardianship of the State, or that area subject of Preservation Orders or have been registered in the Register of Historic Monuments and seek to protect important archaeological landscapes.
- Objective ARC2-Development Management. All planning applications for new development, redevelopment, any ground works, refurbishment, and restoration, etc. Within areas of archaeological potential or within close proximity to Recorded Monuments or within the historic towns of County Galway (Ardrahan, Athenry, Dunmore, Eyrecourt, Loughrea and Tuam) will take account of the archaeological heritage of the area and the need for archaeological mitigation.
- Objective ARC7-Recorded Monuments. Ensure that any development in the immediate vicinity of a Recorded Monument is sensitively designed and sited and does not detract from the monument or its visual amenity.

11.5

Methodology

The following resources have been consulted in the compilation of this Cultural Heritage Section of the EIAR:

- Available aerial photographs.
- Draft Guidelines on the Information to be contained in Environmental Impact Assessment Reports. Environmental Protection Agency 2017.
- Galway County Development Plan 2015-2021.
- National Monuments Acts 1930 to 2014.
- O'Flanagan, M. (1927) Letters containing information relative to the antiquities of the County of Galway collected during the progress of the Ordnance Survey in 1839. 1. 311-12. Bray.
- Ordnance Survey 1:10560 (6-inch) map of County Galway, Sheet No. 95, 1st Edition of 1840.
- Ordnance Survey 1:10560 (6-inch) map of County Galway, Sheet No. 95, Edition of 1920.

- Ordnance Survey 1:2500 (25-inch) map of County Galway, 1890-98 edition.
- Planning and Development Act 2000.
- Record of Monuments and Places, County Galway, Dúchas, The Heritage Service, Dublin 1997.
- Record of Protected Structures for County Galway (Galway County Development Plan 2015-2021).
- Topographical Files of the National Museum of Ireland.
- Unpublished files of the National Monuments Archive, Department of Culture, Heritage and the Gaeltacht.
- www.archaeology.ie
- www.excavations.ie
- www.heritage-maps.ie
- www.logainm.ie

11.6 Existing Environment

11.6.1 Record of Monuments and Places

Having consulted the Record of Monuments and Places for County Galway (1997) and www.archaeology.ie (Figure 11.6) the following eighteen (18) monuments are located within 1km of the development site (Table 11.1).

Table 11-1 List of Recorded Monuments and Sites and Monuments Record sites within 1km of the subject development

RMP No.	Description	Townland	ITM Co-ordinate	Distance
GA094-070	Folly	Roscam	534216/724854	c. 10m
GA094-071	Standing Stone	Roscam	534655/724499	608m
GA094-071001	Cist	Roscam	534655/724499	608m
GA094-072001	Church	Roscam	534288/724213	c. 640m
GA094-072002	Ecclesiastical Enclosure	Roscam	534327/724219	c. 640m
GA094-072003	Graveyard	Roscam	534325/724183	c. 640m
GA094-072004	Round Tower	Roscam	534287/728263	c. 640m
GA094-072005	Grave slab	Roscam	534296/724211	c. 640m
GA094-072006	Grave slab	Roscam	534325/724183	c. 640m
GA094-072007	Holed stone	Roscam	534325/724183	c. 640m

GA094-072008	Bullaun stone	Roscam	534323/724148	c. 640m
GA094-072009	Bullaun stone	Roscam	534325/724156	c. 640m
GA094-0720011	Graves lab	Roscam	534325/724183	c. 640m
GA094-0720012	Cross slab	Roscam	534325/724183	c. 640m
GA094-0720013	Leacht	Roscam	534329/724194	c. 640m
GA094-0720014	Architectural Fragment	Roscam	534325/724183	c. 640m
GA094-075	Castle	Roscam	535104/724807	c. 788m
GA094-122 (SMR)	Enclosure	Roscam	534274/725182	100m



Figure 11-4 Extract from Historic Environment Viewer, Sheet No. GA 094, showing recorded monuments and sites and monuments sites in blue and RPS sites in orange.

11.6.2 Record of Protected Structures

Having consulted the Record of Protected Structures (RPS) for County Galway (CGDP 2015-2021, Appendix V), there are six protected structures in Roscam townland, one of which, Roscam Folly, is located immediately to the south of the proposed development site. Rosshill Railway Bridge is located to the north c. 32m to the north. The remaining four protected structures are not within or in the immediate vicinity of the proposed development site. (Figure 11.6, Table 11.2).

Table 11-2 List of Protected Structures within 1km of development

RMP No.	Description	NIAH No.	Townland	Distance
8801	Standing Stone		Roscam	c. 608m
8802	Monastic Site with Round Tower		Roscam	c. 640m
8803	Roscam Folly		Roscam	12m
8804	Thatched House-Doughiska Road		Roscam	c. 643m
8805	Gatekeeper's Lodge		Roscam	c. 643m
8806	Rosshill Railway Bridge	30409423	Roscam	c. 32m

11.6.3 Topographical Files of the National Museum of Ireland

There are no entries in the Museum section of Heritage Maps for Roscam townland, County Galway.

11.6.4 Previous Archaeological Excavations in the Vicinity

There is one entry for Roscam townland on www.excavations.ie, (which records summaries of all excavations undertaken on the island of Ireland between 1969 and 2019).

- Excavation Licence No. 10E0172 held by Thaddeus Breen, archaeologist. Pre-development testing in advance of the construction of a proposed slatted house close to the Early Christian Ecclesiastical site of Roscam (RMP No. GA094-072002) resulted in the discovery of an undated burnt pit and the remains of a vernacular house.

11.6.5 Archaeological Excavations on the site of the proposed development

There is no record of previous archaeological pre-development testing on the subject development site.

11.6.6 Historical Information

The townland of Roscam is located in the parish of Oranmore and the barony of Dunkellin in County Galway. The townland name Roscam is derived from the Irish, ‘*Ros Cam*’ meaning ‘crooked point or wood’¹.

There are eighteen Recorded Monuments in Roscam townland, thirteen of which are associated with the ecclesiastical site associated with St. Odran, brother of St. Ciarán of Clonmacnoise, near the shoreline to the south of the townland (Figure 1.2-3). The ecclesiastical site comprises an ecclesiastical enclosure (RMP No. GA094-072002), a multi-period medieval church (RMP No. GA094-072001), a round tower (RMP No. GA094-072004), and a graveyard (RMP No. GA094-072003), as well as bullaun stones, and graveslabs, located c. 640m to the south of the subject site². The other recorded monuments in the townland comprise a standing stone and cist (RMP No. GA094-071 and -071001, located over 600m to the south-east of the subject site), and a castle (RMP No. GA094-75, located over 780m to south-east) as well as an enclosure (Sites and Monuments Record No. GA094-122, located c. 100m to the north-east).

O’Donovan recorded the proprietor of Roscam townland as Patrick Commons, Esq, of ‘Roscam House’, which he noted was built in 1835³. The First Edition Ordnance Survey map, 1838 shows the only estate in the townland named as ‘Rosshill House’ (Figure 11.7) and it may be assumed that O’Donovan was referring to this building in his description. Slater’s Dictionary of 1846 listed ‘Patrick Commons, Ross hill’, as one of the landed families in Galway. Extensive land holdings are recorded for Thomas Comyns in Griffith’s Valuation of 1855, with Comyns both owning and renting land in Roscam from the Governors of the Erasmus Smith School. An article collected by Samuel J. Maguire gives an account of the profit in rents to tenants made by Mr Cummin in Roscam on the land he had himself rented from the Erasmus Smith charity⁴. In the mid-to-late nineteenth century the estate was in the ownership of George Comyns Davenport, who was a Borough Magistrate. His grave is located in Roscam graveyard⁵. A Catholic family, the Comyns Davenports presented the altar rails to the Augustinian Church in Galway City in the early-twentieth century. The 1901 Census shows the house at Rosshill inhabited by the Davenport sisters, Georgina, Jane, Genevieve and Fanny and two servants. In 1911 another sister, Whilmina, is named.

11.6.7 Cartographic Sources

The historic mapping (Figures 11.7-9) shows the site of the proposed development in the nineteenth and early-twentieth centuries. The site is located to the north-west of Rosshill House, the irregular-shaped demesne of which extends to the edge of the larger demesne of Merlin Park to the north-west. The north-western corner of the proposed development site is in the townland of Merlin Park, with the majority of the site in the townland of Roscam (Figure 11.7). The First Edition OS 6” Map of 1838, shows a series of outbuildings occupying the centre of the site to the north-west of Rosshill House (Figure 11.7). A landscaped area is shown on this map in the area of the folly, (RMP No. GA094-070/RPS 8803), with the enclosing walls appearing to be of square plan. The Second Edition OS 25” Map names the folly as ‘Ornamental Mound’ and depicts it as being enclosed by the distinctive octagonal walls (Figure 11.8). The Record of Protected Structures describes the feature as a ‘multi-step pyramid folly’, within a walled garden. The site features are described as ‘beebowls, kerbing, cart house and dovecote’ and its special interest relates to its archaeological and historic importance. The locations of the site features are not marked on the Galway City Council Record of Protected Structures

¹ *O’Donovan, J., 1838, Ordnance Survey Name Books.*

² *Files of the Archaeological Survey of Ireland. www.archaeology.ie*

³ *O’Donovan, J., 1838, Ordnance Survey Name Books.*

⁴ *Maguire, S.J. ‘Education’. places.galwaylibrary.ie/history/*

⁵ *www.historicalgraves.com Roscam. Leaflet issued by Galway City Council.*

information sheet and the folly was not accessed during the site visit, as it was not within the redline boundary of the proposed development site.

The historic maps clearly show the impact of the railway on the landscape in the mid-nineteenth century (Figure 11.8). Immediately to the north of the subject site, the Midland Great Western line cuts east-west through townland of Roscam. The railway bridge, RPS 8806, was constructed in 1851 and it comprises rock-faced abutments with a cast iron and steel panelled superstructure, having wrought iron railings to the east parapet. Its special interest relates to its architectural, technical and historic importance.

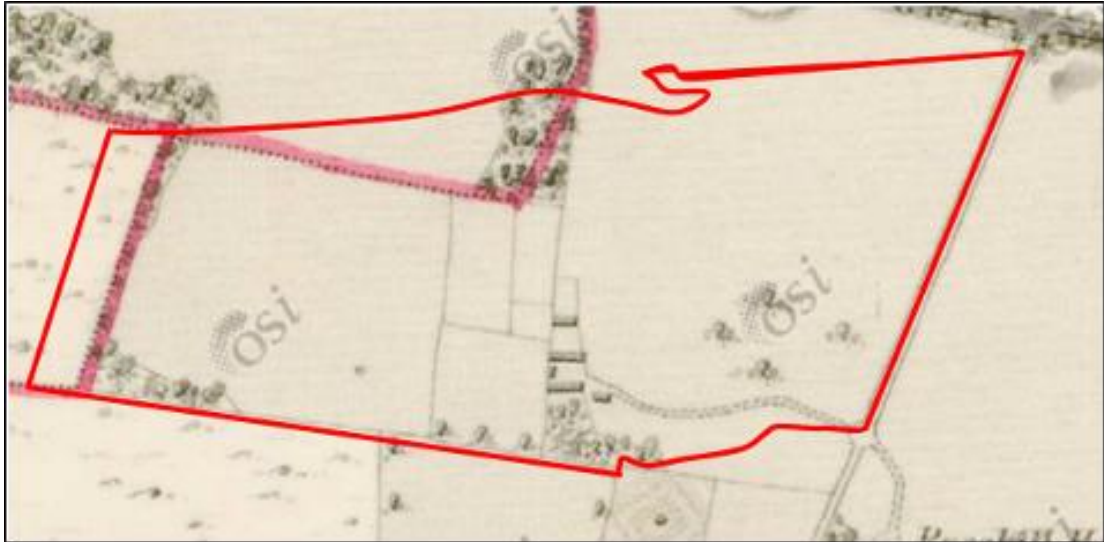


Figure 11-5 Historic Mapping. Extract from First Edition OS 6" Sheet, GA094, 1838.



Figure 11-6 Historic Mapping. Extract from Second Edition OS 25" Sheet, GA094, 1890-98.

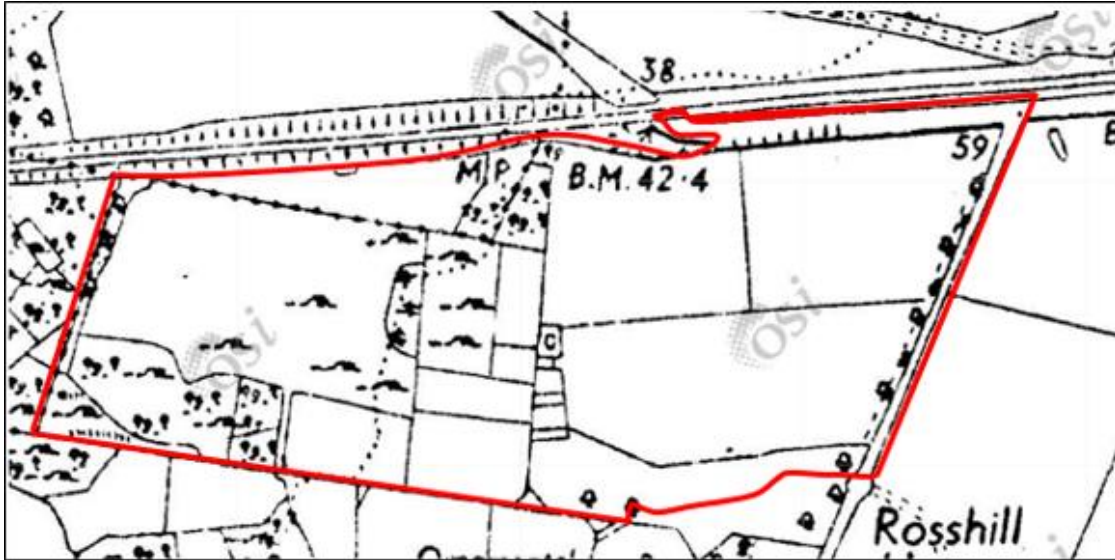


Figure 11-7 Historic Map Cassini Edition OS 6" Sheet, GA094, 1940s.



Figure 11-8 Aerial photograph, 1995, showing subject site within Rosshill Golf Course.

11.6.8 Aerial Photographs

Having consulted available aerial photographs including Google and Bing satellite images, no heretofore unrecorded archaeological features were visible within or in the immediate vicinity of the subject site area. The extent of the golf course is recorded in an aerial photograph from 1995 (Figure 11.10), comprising five fields, three of which are within the site of the proposed development.

11.6.9 Field Survey

The site of the proposed development comprises just under 25 acres, currently under pasture. The site is accessed via a third-class road off the old Dublin Road, to the east of the railway bridge, RPS 8806. The lands within the site are undulating. There is a gentle northward fall in the north-eastern two-thirds of the site but the ground falls away significantly to the western third of the site, with sweeping views to the wooded area along the western boundary.

There are two featureless fields to the north-east (Plate 11.1), enclosed by drystone walls which are lined with trees and shrubs, with modern ground disturbance noted close to the entrance gate along the eastern boundary (Plate 11.2). There is a large field to the south-east of the site with a centrally-placed scatter of trees. The folly, RMP No. GA094-070/RPS 8803, forms the boundary to the south-east of the site. It comprises a high ivy-covered stone wall (Plate 11.3), having an octagonal plan, and measuring c. 60m in diameter. There is a circular structure with cruciform extensions in the centre of the folly. The folly and any associated features were not accessed during the site walkover.



Plate 11-1 Fields at north-east of proposed development site



Plate 11-2 Ground disturbance at north-eastern boundary, near the entrance to the site.



Plate 11-3 Folly, RMP No. GA094-070/RPS 8803, from north



Plate 11-4 Largest of the three ruined outbuildings in the centre of the site, from south.



Plate 11-5 East gable with elliptical arch and overgrown dovecote openings above.

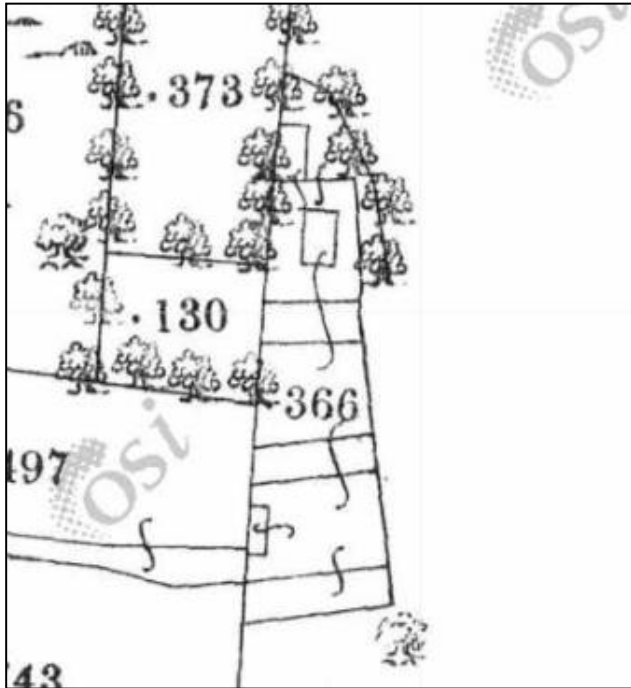


Figure 11-9 Extract from Second Edition OS 25" Map, GA094, showing outbuildings.

Centrally located within the site is a heavily-overgrown range of ruined masonry outbuildings (Figure 11.11, Plates 11.4-7). Based on the historic mapping, it appears the range comprises the remains of three outbuildings, orientated east-west, with the buildings opening to the east. It appears from the Second Edition 25" Map (Figure 11.11), 1890-98, that the buildings were not roofed from the late-nineteenth century onwards. The buildings are located within a roughly trapezoidal-shaped walled area, orientated north-south, and the longest building is located to the south (Plate 1-4). The gables to the longest building survive (Plates 11-4, 11-5 and 11-7) but the side walls are denuded. The presence of a dovecote or pigeon house in the eastern gable of this building was published by Sean Spellissy in 1999 (*The History of Galway*; Plate 11-8) but it is currently overgrown and the dovecote is not visible (Plate 11-5). According to the photographic evidence the dovecote comprises over a dozen squared boles in the upper section of the east gable. While medieval dovecotes can be elaborate round structures, simpler examples, such as the Rosshill example, are also known to have been incorporated into the gables of farm sheds in Ireland. The elliptical arch to the ground floor opening in the gable, typical of a more formal farmyard, gave access to vehicular storage (Plate 11-5). The middle of the three outbuildings is in an advanced state of decay and the interior is filled with rubble stone. A modern silage pit (Plate 11-6), orientated north-south, was constructed through the outbuilding to the north, with the western gable of that building surviving but overgrown with ivy (Plate 11-6).

There is a further ruined masonry outbuilding located to the north of the main range, incorporated into the field boundary of the north-eastern field of pasture.



Plate 11-6 View of the ruined outbuildings and modern silage pit, from north.



Plate 11-7 View of outbuildings from south-east, with dovecote in foreground.



Plate 11-8 Photograph of the ruined outbuilding, showing evidence of a dovecote. After Spellissy.

There is an area of rock outcrop c. 90m to the west of the range of outbuildings, from where the ground falls significantly to the west (Plate 11.9). The ground falls towards the western boundary, through a large field of pastureland planted with three linear settings of trees, orientated north-west/south east. This long field still contains visible reminders of the former golf club, with a scattering of small excavated areas representing bunkers (Plate 11.10). The ground rises again to the south-west and west, along the site boundary.



Plate 11-9 Fall in ground from east to west.



Plate 11-10 Small bunker, located to the south-west of the site.

The field boundary to the south-west comprises a long linear moss-covered mound of stone. There is a tree-lined avenue, possibly associated with the Merlin Park estate, running along the western boundary. This area of woodland is marked on the historic maps but the avenue, which measures c. 10m in width, is not clear on the mapping. The avenue is flanked by a low much-denuded drystone wall to the east and by a higher more substantial drystone wall to the west (Plate 11.11).



Plate 11-11 Walls flanking 10m wide avenue along the western boundary of the site.

11.7 Likely and Significant Effects and Associated Mitigation Measures

11.7.1 ‘Do Nothing’ Scenario’

Should the proposed development not proceed, there would be no impact on any potential features/deposits and/or artefacts of archaeological significance which may be located on the site.

11.7.2 Physical (Direct) Impacts

Table 11-3 Assessment of Physical Impacts

Potential Impact	Assessment
Physical impact on known archaeological sites:	There are no Recorded Monuments within the proposed development site and therefore no known archaeological remains will be impacted by the development. The site is partly located within the <i>Zone of Notification</i> for a folly, Recorded Monument GA094-070, which is located along the southern boundary.
Physical impact on destroyed archaeological sites:	The historic mapping does not record the presence of known but destroyed archaeological sites within the site boundary.
Physical impact on undiscovered archaeological features or finds:	The archaeological profile of the surrounding area suggests that the site has low to moderate archaeological potential. It is not known if any heretofore unrecorded archaeological finds or features were disturbed during the groundworks at the site to facilitate the development of the golf course.

11.7.3 Visual (Indirect) Impacts

There are no protected structures within the site to be impacted visually by the proposed development but a folly, protected structure RPS 8803, forms part of the south-eastern boundary of the site. There is also a railway bridge, RPS 8806, to the north of the site (Plate 11-12).



Plate 11-12 View towards the railway bridge, RPS 8806, beyond northern boundary of the proposed development site.

Table 11-4 Assessment of Visual Impacts

Potential Impact	Assessment
Visual Impact on the Folly, Recorded Monument RMP No. GA094-070/RPS 8803.	The design of the proposed development preserves the setting of the folly, protected structure, located along the southern boundary of the site. The plans for the development show housing units occurring outside the <i>Zone of Notification</i> for the folly, which allows a generous buffer zone of undeveloped, albeit landscaped, ground adjacent to the folly. This will retain its setting and preserve the visual amenity of the folly.
Visual Impact on the railway bridge, RPS 8806.	The proposed development site is located at a sufficient remove from the railway bridge and will not constitute a visual impact on the protected structure.

Table 11-5 Assessment of Physical Impact on outbuildings associated with Rosshill House

Potential Impact	Assessment
<p>Physical Impact on outbuildings associated with Rosshill House.</p>	<p>The proposed development will see the removal of three nineteenth century outbuildings associated with Rosshill House. The outbuildings are not located within the curtilage of the folly, being physically removed from that feature, and they are not within the <i>Zone of Notification</i> for a Recorded Monument. They contain evidence of a dovecote in one of the gables but this feature could not be recorded during the survey due to dense ivy growth.</p> <p>The outbuildings are of interest due to their connection with the small nineteenth century estate associated with Rosshill House. The presence of a dovecote in the east gable of the southern building as well as the elliptical arch below the dovecote is consistent with the design of farm buildings within a planned estate. The question of the conservation of the farm building within the proposed development has been considered but the poor preservation of the range of buildings indicates that the conservation of the masonry structures would involve a reconstruction of the buildings rather than the conservation of the historic outbuildings themselves. As the overall original form of the buildings are not recorded, this would involve conjecture and the rebuilding would not be an authentic representation of the original form.</p>

11.7.4 Mitigation Measure

The most sensitive heritage asset in the vicinity of the proposed development site is Roscam Folly, RMP GA094-070/RPS 8803. The plan of the proposed development has sought to ensure the character and setting of the folly is preserved and the design has ensured that no development occurs within the *Zone of Notification* for the feature. The *Zone of Notification* constitutes an adequate buffer zone and it preserves the setting and the character of the folly, Recorded Monument/protected structure.

The development will see the removal of the ruined outbuildings within the site. It is recommended that these are fully recorded, particularly the remains of the dovecote, which is now overgrown with ivy.

Due to the scale of the site, monitoring of topsoil stripping will be completed by a qualified archaeologist during this phase of the development. A report on the results of the monitoring shall be compiled and submitted to the relevant authorities on completion of the project.

11.7.5 Residual Impacts

The monitoring of any of the topsoil stripping within the proposed development site may uncover features of archaeological significance, which in turn may be the subject of preservation by record (excavation).

The nineteenth century farm buildings, including the dovecote, will be removed from the site following the recording of features of note in the outbuildings.

11.7.6 Significance of Effects

Based on the assessment above there will be no significant effects.

11.8 Conclusion

A planning application is being prepared for submission to An Bórd Pleanála for a Strategic Housing Development at Roscam townland. An archaeological assessment at the site was requested by the client.

The results of the archaeological field and desk study have shown that there are no Recorded Monuments or protected structures within the site of the proposed development. The nearest Recorded Monument/protected structure, a nineteenth century folly, RMP No. GA094-070/RPS 8803, borders the site to the south-east. Ruined farm building associated with Rosshill House are located centrally in the development site, where a dovecote/pigeon house is known to exist in one gable.

The proposed development will not have a direct physical impact on any Recorded Monuments or protected structures. It will see the removal of the ruined farm buildings within the site.

In terms of visual impact, the nineteenth century folly, RPS 8803, is located along the southern boundary of the site. The proximity of the folly to the proposed development site has resulted in the low-level development proposals within a buffer zone, mainly comprising a play area and landscaped green space. The buffer zone extends beyond the *Zone of Notification* from the Record of Monuments and Places (RMP) and it will preserve the character and setting of the protected structure.

It is recommended the dovecote in the north gable of the ruined farm building within the proposed development site is recorded prior to any works being carried out. Due to the scale of the site, monitoring of topsoil stripping will also be completed by a qualified archaeologist.

All recommendations are subject to the approval of the Department of the Culture, Heritage and the Gaeltacht and the Heritage Officer, Galway City Council.

12. MATERIAL ASSETS

12.1 Traffic and Transport

12.1.1 Introduction

12.1.1.1 Purpose of Section

The purpose of this Traffic and Transport EIAR Section is to assess the potential impact of the proposed Housing Development at Rosshill Co. Galway on the existing local transport network and to ensure that the proposed site access and the existing junctions which fall within the scope of the study will have adequate capacity to carry the development traffic and the future growth in existing road traffic to the design year and beyond. An assessment of the accessibility of the site for cyclists, pedestrians and public transport users has also been made.

This section is written as a concise summary of the Traffic and Transport Assessment, included as Appendix 12-1 of this EIAR. 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.

12.1.2 Statement of Authority

This EIAR Section was written by Darragh Burke of Tobin Consulting Engineers. Tobin Consulting Engineers have appointed CST Group Chartered Consulting Engineers to prepare the Traffic and Transport Assessment for the project. TOBIN Consulting Engineers are in operation for over 60 years and has carried out numerous Traffic and Transportation Assessments (TTA's) for various residential, commercial, business, retail and leisure developments. TOBIN has also drafted various Traffic Chapters for EIAR's. The drafting of TTAs and Traffic Chapters involve the followings tasks:

- Liaising with local authorities, TII, clients and other key stakeholders,
- Analysis of the suitability of haul routes,
- Design and analysis of access points to all types of developments,
- Access and site layout arrangements using AutoTRACK, swept path analysis software,
- Junction analysis on uncontrolled, signalised and roundabout junctions

12.1.3 Receiving Environment

12.1.3.1 Location and network summary

The proposed development site is an existing greenfield site located immediately to the south of the Galway-Dublin Rail Line at Rosshill, Co. Galway. The site is situated approximately 4km from Galway City Centre as shown in Figure 2.1 of this EIAR. The land surrounding the immediate site is mixed low-density residential, consisting primarily of one-off housing. Rosshill Farm Stud is located to the south of the proposed development site, with the Galway-Dublin Rail line bounding the north of the site.

The layout of the local road network is presented in Figure 12.1. The proposed development is bounded to the north by the Rosshill Road and the Galway Dublin Rail Line, and to the East by the Rosshill Farm Stud Road. A brief description of the local road network and associated junctions is provided below:

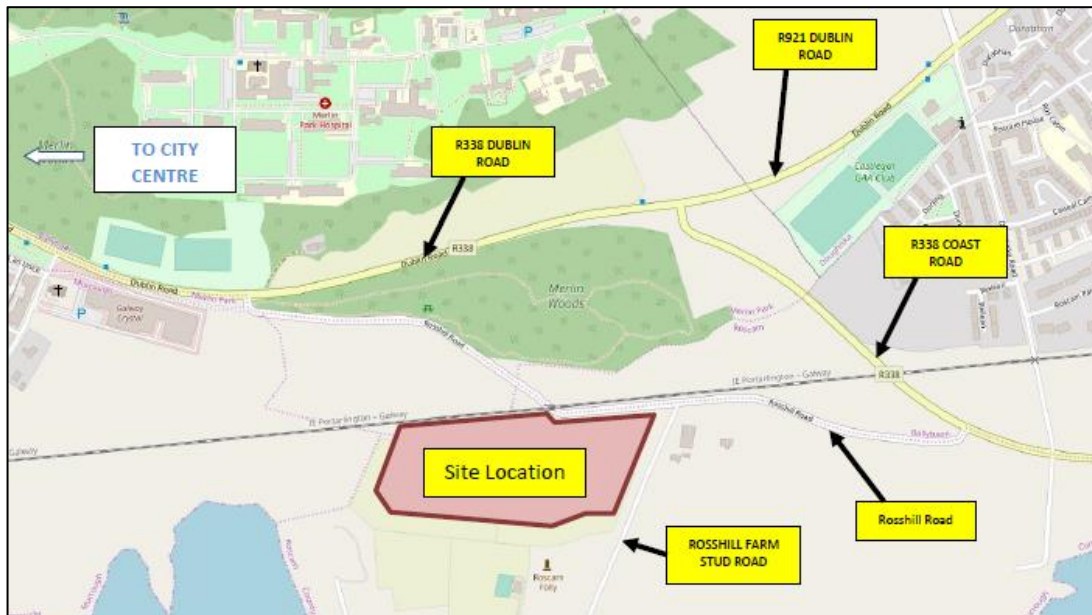


Figure 12.1 Site location and surrounding road network

The Rosshill Road is a single carriageway road with one lane in each direction. The Rosshill Road connects to the R338 Coast Road at its eastern end and the R338 Dublin Road at its western ends. Both junctions are priority-controlled T-junctions that include right turning lanes on the regional road. There is a footway along the majority of the Northern Side of the Rosshill Road. It is constructed from an unbound material and is in a state of disrepair.

The R338 Coast Road is a single carriageway road with one lane in each direction. The R338 links to the R338 Dublin Road via a signalised T-junction at its western end and to the Oranmore region to the East. There are no footways provided on the Coast Road. There is a hard shoulder along both sides of the R338 Coast Road.

The R338 Dublin Road is a single carriageway road with one lane in each direction and a segregated bus lane on the westbound (citybound) direction. The R338 Dublin Road links to the City Centre to the west and to the R338 Coast Road and R921 Old Dublin Road to the east (via a signalised T-junction). There is a footway provided along the southern side of this road which connects to pedestrian infrastructure to the west (city centre) and to the east (Roscam and Doughiska residential areas).

The Rosshill Farm Stud Road is a single carriageway county lane that runs southerly from the Rosshill Road via a Priority-Controlled T-junction. There are no pedestrian or cyclist facilities provided on this road. The existing road meets Rosshill Road at an angle more than 70 degrees and is not ideal for the increased usage as motorists are required to undertake a sharp turn at this junction. Also, elderly users can experience difficulty when attempting to look over their shoulder to observe oncoming traffic when exiting at such a sharp junction. As a result of this, the existing Rosshill Farm Stud/Rosshill Road Junction is to be realigned as part of the proposed development. This will involve construction of new carriageway from the proposed entrance to the development to the intersection with the Rosshill Road. A footway and cycleway will be provided along this new section of roadway as shown on Figure 12.2

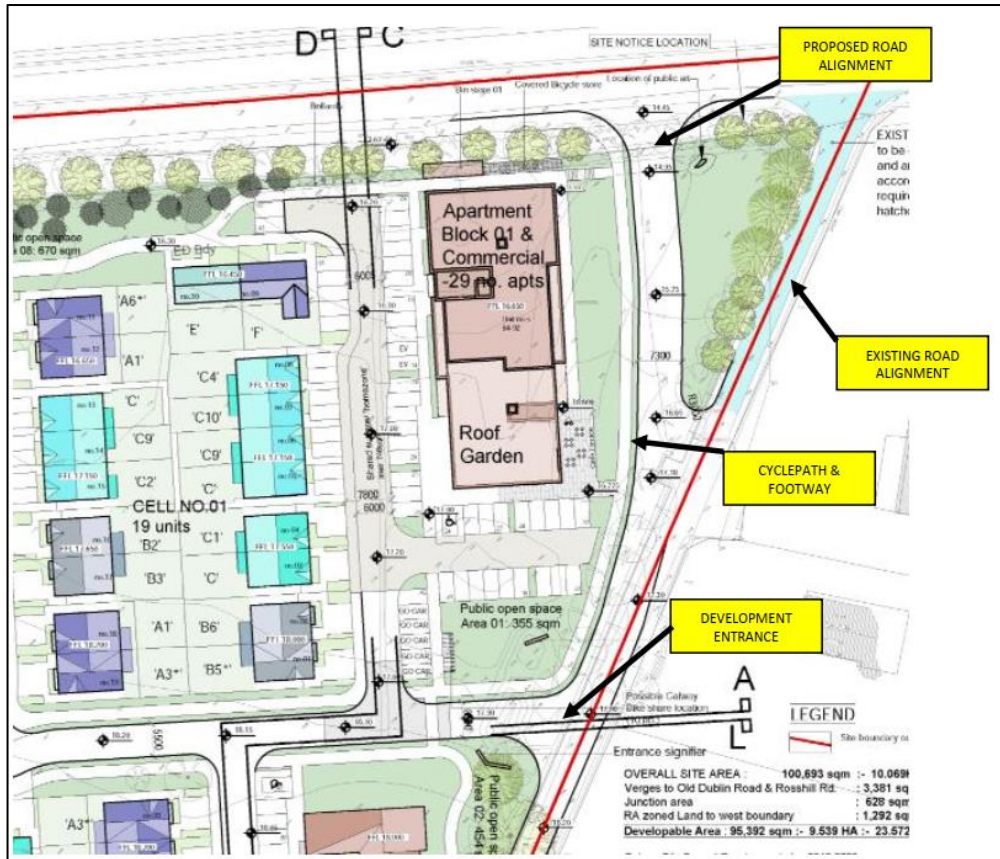


Figure 12.2 realignment of Rosshill farm Stud Road

12.1.4 Scoping

Tobin Consulting Engineers initially carried out a Traffic Scoping exercise with Galway City Council's Roads Department in relation to the proposed development in May 2019. Galway City Council requested that analysis be carried out at the following junctions:

- Junction 1: R338 Dublin Rd.- Rosshill Rd. Junction
- Junction 2: R338 Dublin Road - R338 Coast Road Junction
- Junction 3: R921 Old Dublin Road - Doughiska Road
- Junction 4: R338 Coast Road - Rosshill Road Junction
- Junction 5: Rosshill Road - Rosshill Farm Stud Junction

The outcomes of this exercise were incorporated into the draft Traffic and Transport Assessment and draft design drawings. The design and access options were further reviewed and discussed at the Stage 1 meeting held between the Client / Design Team and Galway City Council in May 2019. Again, the resulting comments were taken on board and amendments to the design were incorporated where possible.

Galway City Council's Roads Department had further comments on the final draft design submitted prior to the Pre-Application Consultation Meeting. These were discussed at the Pre-Application Consultation Meeting held on the 27th of September 2019. Following on from this, a second meeting was held between Galway City Council's Roads Department and Tobin Consulting Engineers to further discuss the items raised and to allow Tobin Consulting Engineers to pose solutions and provide mitigation measures to the items raised by the Roads Department. The main items raised by the Roads Department (and Design Team responses as discussed) are outlined as follows:

- A lack of pedestrian, cycling and public transport in the area resulting in high levels of commuting by car causing further traffic congestion in the area.
 - Tobin Consulting Engineers identified the pedestrian, cycling and public transport linkages to the site on drawings 10690-2013 and 2014. This information was tabled at the second meeting with Galway City Council's Roads Department. The information is also included in this final revision of the Traffic and Transport Assessment (refer to Section 14 of this Report). This shows that currently, there are public transport links within 1.1 km (a 12-minute walking time from the proposed development) with plans for future upgrading of the Dublin Road to incorporate bus lanes on both sides as part of the strategy to provide a better bus service in Galway City. Cycle lanes will also be provided on both sides of the road which will further enhance the linkages of the site to the City centre.
 - To further enhance the linkage to the site, the Developer has proposed to carry out maintenance works on the existing footpath network linking the site with the Dublin Road and the existing Bus Stops.
 - Consultation has also commenced between the Developer and the City Direct Bus Company in relation to the provision of a new bus service in the vicinity of the proposed development to serve the proposed development and surrounding residential developments in the area. A letter stating same is provided from City Direct and is appended to this Report.
- Clarification required regarding the proposed realignment of the Rosshill Stud Farm Road and its relationship with the existing road alignment.
 - The realignment of the access road has been clarified and is now clearly shown on drawing number 10690-2006 and the Architect's layout drawings. These identify the section of existing road which is to be decommissioned and closed off. The proposed realigned section of road is also identified on this drawing. The procedure to close this section of road will be undertaken and carried out in accordance with Galway City Council's requirements.
- That the proposed cycle parking facilities have not been given due consideration during the design process.
 - The rationale behind the bicycle parking was to provide ample parking for the apartment blocks to facilitate cyclists living in and people visiting these apartments. The cycle parking to be provided will be of a high standard and in accordance with the City Council's guidelines. It is envisaged that those living in houses can utilise their back gardens to store their bicycles.
- There is concern that the traffic analysis, particularly in relation to the Doughiska Rd / Dublin Road junction, is inadequate and doesn't reflect the current or expected situation in the area.
 - The analysis which was carried out for the draft revision of the Traffic and Transport Assessment reflected the queue lengths averaged out over the peak hour, not the peak 15 min period. This resulted in the outputs which were obtained from the LinSig analysis and the discrepancy with the expected outcomes. The analysis has been updated to reflect the current situation more accurately and the timeframes have also changed to reflect 15 min periods.
 - Also, the analysis has assumed the trip distribution will match current patterns and has not yet incorporated an allowance for traffic which will travel East to utilise the Oranmore Train Station to commute into the City.

12.1.5 Road Safety Audit

A road safety audit has been carried out by CST Group Chartered Consulting Engineers independently from the design team on the proposed development. The Audit identified a number of items which

were reviewed by the Design Team and the design amended where necessary. The recommended measures and proposals were agreed and signed off by the Designers, Client and Auditors. The final site layout provides a roads network throughout the development which incorporates measures (such as curved alignments, surface materials to differentiate pedestrian and vehicle routes etc.) that ultimately provide a high level of safety for both the pedestrian and the driver without comprising the overall quality of the development.

Please refer to the CST Road Safety Audit included as part of this submission for further details.

12.1.6 Proposed Development

12.1.6.1 Trip generation of Proposed Development

CST Group Chartered Consulting Engineers have procured Trip Rate Information Computer System (TRICS) data for similar sized residential developments in order to inform the trip rate associated with such a development. However, Galway City Council indicated that trip rates recommended by TRICS (Trip Rate Computer Information System) were not acceptable for the proposed development. Therefore, a traffic count was undertaken at a similar development (An Réileán Development) to calculate the turn-in rates at the proposed development. The similar development consists of 82 housing units and 2 apartment blocks (24 apartments). These figures were applied pro-rata to the relevant number of housing and apartment units within the proposed development. The estimated total number of vehicular trips generated by the proposed development is shown in Table 12-1 which **Error! Reference source not found.** details the applicable Trip Rate, and the associated generated traffic for the AM and PM peak hours.

Table 12.1 Traffic Generation

	Residential Units	AM Arrivals	AM Departures	PM Arrivals	PM Departures
Proposed Mixed Residential (Apartments & Houses) Ph 1	51	8	27	20	8
Proposed Mixed Residential (Apartments & Houses) Ph 2	53	8	28	21	8
Proposed Mixed Residential (Apartments & Houses) Ph 3	143	22	76	57	22
Proposed Mixed Residential (Apartments & Houses) Ph 4	95	14	50	38	14
Total	342	52	181	136	52

The above table demonstrates that a total of 233 trip movements in the AM peak and a total of 188 trip movements in the PM peak are expected to result from the proposed development.

12.1.7 Existing Traffic Flows and Traffic Impact of Proposed Development

12.1.7.1 Existing traffic flows on the local network and the traffic impact of the proposed Development

In the absence of any specific local traffic growth information it was assumed that baseline traffic will continue to grow at the levels recommended by TII in the Project Appraisal Guidelines (PAG) – Unit 5.3 ‘Travel Demand Projections’ publication (PE-PAG-02017). The Project Appraisal Guidelines describe three levels of transport model functionality. The simple model, which reflects traffic volumes on the basis of link flows, is best suited to the proposed development. Such models do not attempt any route assignment, and hence are applicable for networks where no change in traffic flows will result from a proposed scheme. Growth rates recommended in PAG – Unit 5.3 have been used to determine future traffic flows on the road network within the vicinity of the development. We have used figures from it for the Mid-West area which includes Galway City.

The year of opening of the scheme was assumed to be 2024. The central growth factors from the Project Appraisal Guidelines – Unit 5.3 publication were used and are detailed below: -

- TII Link Based Growth Rates: Annual Growth Factor for 2013-2030 = 1.0099 (LVs) and 1.0237 (HVs);
- TII Link Based Growth Rates: Annual Growth Factor for 2030-2050 = 1.0000 (LVs) and 1.0176 (HVs).

The annual growth factors for Light Vehicles (LVs) and Heavy Vehicles (HV) were applied to surveyed values of vehicles counted.

With regards to the volume of traffic using the road, the passenger car is adopted as the standard unit and other vehicles are assessed in terms of PCU’s. Cars and Light Goods Vehicles are grouped together as Light Vehicles (LV). All other Goods Vehicles, Buses and Coaches are defined as Heavy Vehicles (HV).

The classification of vehicles in PCU’s is shown below:

Table 12.2 Classification of Passenger car Units

Vehicle	PCU
Car	1
Light Goods Vehicle	1
Other Goods Vehicle (2 -3 axle)	1.5
Other Goods Vehicle (4 -5 axle)	2.3
Bus	2
Cycle	0.4

12.1.8 Likely and Significant Effects and Associated Mitigation Measures

12.1.8.1 Construction Phase

Construction traffic travelling to the proposed development site in Rosshill, Co. Galway will use the Rosshill Road. A Traffic Management Plan (which will be completed by the Contractor) for the construction stage will identify haulage routes and restrictions as appropriate in discussion with the Local Authority. There is a height restriction where the railway line goes over Rosshill Road.

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 phase of the development which will be developed in phases.

Due to the designated access point off the Rosshill road, allowing delivery vehicles to pull off the road into the site, there will be no significant disruption on the traffic flows on the Rosshill Road as a result of the construction of the development. It is recommended that all deliveries are provided with instructions / directions on accessing the site from the Rosshill Road and surrounding local road network. Overall there will be a short-term imperceptible negative impact to local traffic during the construction phase.

12.1.8.2 Operational Phase

Access to the proposed development is to be facilitated via the existing road infrastructure. As previously noted, traffic counts were undertaken at a similar type of mixed residential development and the figures applied pro-rata to the relevant number of housing and apartment units within the proposed development. It is anticipated that 233 trip movements are expected during the AM peak period and 188 movements during the PM peak period. Details of the data utilised are included in the Traffic and Transport Assessment, which is itself included as Appendix 12-1 of this EIAR.

12.1.8.3 Cumulative Assessment

The cumulative assessment considered all committed developments within the vicinity of the site. This includes sites which have previously been granted planning permission, but which are yet to become operational. Based on these projects, some potential cumulative impacts are discussed below.

There is only one major housing development adjacent to the proposed site. This consists of:

- 16 No. 2-storey, 5-bedroom, detached houses, together with individual garages. This development was granted planning permission in 2017. The development will be accessed via a new priority junction along the Rosshill Road to the northwest of the site. Work has already commenced on this development. A new footway is also being constructed along the road frontage of the site

An allowance was made in the Traffic and Transport Assessment for the trip generation from the above committed development site based on best predictions using all available information and in keeping with recognised standards. The analysis found that the housing units will result in a minor increase in the traffic on the Rosshill Road with 13 trips predicted in the AM peak hour and 13 trips in the PM peak hour. The analysis indicated that traffic generated from the proposed development will have a minimal effect on the traffic volumes

This will result in a long term imperceptible negative cumulative impact on local traffic.

12.1.8.4 Mitigation Measures

12.1.8.4.1 Mitigation measures during the construction phase

The mitigation measures proposed during the construction phase are as follows;

- A detailed haulage plan will be put in place to ensure minimal impact on the surrounding road network.
- All deliveries and removals will be subject to stringent site rules governing the loading / off-loading times, location of loading / off loading, covering of loads and cleaning of vehicles exiting the site, etc.
- No vehicle will be allowed to stop or park on the access road to the proposed development site.
- Ample parking will be provided within the site to cater for the staff and visitors during the construction phases of the proposed development.
- Construction traffic will be managed and scheduled to ensure no queueing occurs on either the internal road system or the main approach roads. The provision of an on-site vehicle staging area will facilitate waiting vehicles.
- Routine sweeping/cleaning of the road and footpaths in front of the site; and
- No uncontrolled runoff to the public road from dewatering/pumping carried out during construction activity.

12.1.8.4.2 Mitigation measures during the operational phase

Mitigation measures proposed during the operational stage are as follows;

- Provision of “STOP” road markings at the access junctions in accordance with Figure 7.35 of the Traffic Signs Manual (TII, 2019).
- Suitable Lighting of all junctions with lighting columns being positioned at the back of the footways.
- It is proposed to provide advanced warning signs on the Rosshill road as it approaches the site entrance. The signage will be in accordance with Chapter 6 of the Traffic Signs Manual (TSM) for road users travelling in the eastern and western direction towards the entrance to the development.
- The extension of the existing footpath on the Rosshill Road will allow connectivity to the existing Bus Stops on the Dublin Road.
- The provision of bicycle stands to encourage cycling. The proposed extension of the cycle lanes on the Dublin Road will also encourage residents to cycle.
- The existing Oranmore train station on the Galway-Dublin line is 2.8km away and will provide a sustainable alternative to travel by car into the city.
- The development management company will include a GoCar scheme for the apartment blocks.
- Charging points for electric vehicles are being provided for the apartments.

12.1.8.5 Residual Impact

As population grows throughout Ireland and in particular, in popular commuting hub areas like Rosshill, a continued increase in traffic volumes is not sustainable. As a result, an ever-increasing approach by designers and planners to providing sustainable commuting alternatives is required. The use of public transport and promotion of walking and cycling will ultimately increase the overall quality of life for the people living in these fast paced, busy towns and villages located within commuter belts.

The proposed development has integrated a number of measures in line with the relevant standards and guidelines, such as DMURS 2019 and the National cycle Manual, which promotes the use of

sustainable travel to and from the site. The Road Safety Audit carried out for the site allowed the design team to address any concerns initially flagged in the Road Safety Audit. A continued and collaborative approach with the road safety auditors meant that a desirable and safe site layout could be achieved without negatively impacting the overall quality of the development.

The use of the private car will still be maintained as a primary mode of transport for a number of the residents in the development. Trip generations to and from the proposed development are 232 in the morning peak and 188 in the evening peak as noted above. The internal roads on the development to be constructed have been suitably designed in accordance with the DMURS manual.

Progressive and regular liaising with Galway City Council Roads Department in relation to the internal roads and the permitted link roads layouts contributed to the final road design for the development.

As noted previously, mitigation measures are to be implemented to promote and encourage more sustainable transport modes. The maintenance of the footpaths on the Rosshill Road will encourage pedestrians to walk to the Dublin Road Bus Stops which are 1.2km away from the site. The proximity of the Bus Stops, along with Galway City Council's improved Bus Service proposals, will encourage pedestrians to utilise the higher frequency Public Transport options. Preliminary discussions have been held by the applicant with local Bus Operators to ascertain the feasibility of the commencement of an active route servicing the development via the existing bus stop on the Dublin Road.

The proposed development is located close to a number of amenities such as local shops to the east and north of the proposed development, some 12 minutes walking (approx. 1km). A café/restaurant/homewares area is located a 10-minute walk away (800m). Roscam residential estate is 1km to the east and Murrough residential estate 1.2km west. Merlin Park University Hospital is just over 2km from the site.

12.1.8.6 **Significance of Effects**

Based on the assessment above, a number of the junctions assessed will be above capacity before the design year. These junctions are predicted to be above capacity in any case without the development, but one will occur earlier with the inclusion of the Development traffic. Whilst the Dublin Road / Doughiska Road traffic signal junction is over capacity in the AM peak period, only 7 trips are added to it from the development and those are all travelling away from the City. As they are going against the traffic entering the City they do not decrease the capacity. The Dublin Road/Rosshill Road priority junction will be above capacity earlier due to the development.

12.2 **Summary & Conclusions**

12.2.1 **Summary**

An assessment of the traffic impact of the proposed development in Rosshill was undertaken. The site is forecast to generate 232 vehicle movements during the AM peak and 188 movements during the PM peak times.

The Road Safety Audit carried out for the proposed development during the planning stage considered various aspects such as, junction design, provision for pedestrians, provisions for cyclists and road signage, marking and lighting. Recommendations noted from the independent company undertaking the road safety audit, CST Group Chartered Consulting Engineers, have been taken into account and the concerns raised have either been designed out or will be considered and suitable measures put in place during the detailed design stage.

The proposed development has integrated a number of measures in line with the relevant standards and guidelines, such as DMURS 2019 and the National cycle Manual, which promotes the use of sustainable travel to and from the site.

12.2.2 Conclusion

Based on this assessment it is considered that in general, the traffic generated by the proposed development in Rosshill, Co. Galway will be adequately accommodated on the local highway network in the vicinity. The Dublin Road junctions are predicted to be above capacity without the development traffic in the future design years. The analysis shows that the inclusion of the development traffic will result in a slight increase in the degree of saturation for the junctions.

The proposed Galway Bypass will ultimately reduce traffic flow at these junctions. The development is being phased and this will allow some additional time towards implementation of the bypass. Also, with the implementation of the Operational Phase mitigation measures, such as the pedestrian, public transport and cycling measures, a shift in the modal split can be accomplished resulting in a reduction in the impact on the junction capacities.

12.3 Telecoms and Other Services

12.3.1 Consultation

The relevant national and regional authorities and bodies listed in Section 2.8 were consulted to identify any potential impact on material assets. Acknowledgements were received from ESB Networks and the National Transport Authority, but no comments were made on the development. Transport Infrastructure Ireland (TII) make a number of recommendations which can be viewed in Appendix 2-2 of this EIAR. The scoping responses are discussed in further detail in Section 2.8.2 of this EIAR.

12.3.2 Construction Methodology

The construction methodology detailed in Chapter 3 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 3 of this EIAR.

12.3.3 Receiving Environment

The existing site is almost entirely a greenfield site, and so 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)
- Water Supply Networks

› Land Use

12.3.3.1 Electricity

There are some overhead electricity cables on the site of the proposed development. While it is unlikely that there will be any underground electrical services encountered during the construction works (as the site is greenfield agricultural land), there is still a possibility that an issue may occur while carrying out works, particularly at the site boundaries. The striking of an underground electricity cable during construction operations could potentially result in serious injury or death of site staff. Details on the existing electrical cables at the development site are provided in the Mechanical and Electrical Services Report (Appendix 8-1 of this EIAR). All proposed works for the project have been designed to avoid these services as much as possible, but where any moving of electricity lines is required, this will be carried out in consultation with ESNB.

12.3.3.2 Telecommunications

There are no known telecommunication cables within the site of the proposed development. However, there is existing EIR infrastructure that currently runs both along the north and east boundaries via underground ducts and overhead cables. While it is unlikely that there will be any underground telecommunications services encountered during the construction works (as the site is greenfield agricultural land), there is still a possibility that an issue may occur while carrying out works, particularly 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. Details on the existing electrical cables at the development site are provided in the Mechanical and Electrical Services Report (Appendix 8-1 of this EIAR). All proposed works for the project have been designed to avoid these services as much as possible.

12.3.3.3 Water Supply

While it is unlikely that there will be any water mains encountered during the construction works (as the site is greenfield agricultural land), there is still a possibility that an issue may occur while carrying out works, particularly near the site boundaries. Rupturing a water main during construction operations could potentially result in disruption to local supply. All proposed works for the project have been designed to avoid this network as much as possible and is provided in the Engineers Services Report (Appendix 3-3 of this EIAR). The project has received a confirmation of feasibility for connection to Irish Water assets outside the proposed development.

12.3.3.4 Land Use

The subject site is currently in use for extensive pastoral livestock grazing. The current statutory planning policy document for the subject lands is the Galway City Development Plan 2017-2023 (GCDP). The plan is generally supportive of high quality residential development provided they adhere to the sustainable development and proper planning of the area and several objectives and policies support this. The subject lands are zoned as a matrix of open space and low to medium density residential.

The proposed development will assist Galway City Council in meeting its commitment to provide for residential development and for associated support development, which will ensure the protection of existing residential amenity and will contribute to sustainable residential neighbourhoods.

The proposed scheme includes a series of measures to encourage/increase the use of public transport, walking and cycling for residents, staff and visitors and for work-related travel and to facilitate travel by bicycle, bus and train.

In summary, it is submitted that the proposed development results in a development which accords fully with the proper planning and development of the area while providing an attractive, high quality, contemporary development which enhances the development of the area.

12.3.3.5 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 Waste Management Plan (WMP) will be adhered to by all Subcontractors / Specialists and all other site personnel involved in the project. The WMP 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 during both the construction and operational phases are provided in Sections 3.6.1 and in Appendix 3-2, EIAR.

12.3.4 Likely and Significant Impacts and Associated Mitigation Measures

12.3.4.1 Construction Phase

The construction of the proposed development will have no impact on above ground or underground telecommunications networks.

There is the potential for short-term nuisance to users of local networks and services that may be accommodated underground within the works footprint. The overall proposed development will have a short-term negative impact.

Mitigation

Specific measures are incorporated into the Construction and Environmental Management Plan, included as Appendix 3-2 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.
- 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 insignificant impact on telecoms and other services.

Significance of Effects

Based on the assessment above there will be no significant effects.

12.3.4.2 Operational Phase

There will be no operational phase impacts or associated effects on telecoms or other services associated with the proposed development.

12.3.4.3 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. There is therefore considered to be no potential for impacts on telecoms and other services.

12.3.4.4 Cumulative Effects

The potential cumulative impacts and associated effects between the proposed development and the projects described in Section 2.9.2 of this EIAR, hereafter referred to as the other projects, have been considered in terms of telecoms and other services.

The measures outlined above and in the Construction and Environmental Management Plan (CEMP), included as Appendix 3-2 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.

13. INTERACTION OF THE FOREGOING

13.1 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 13-1 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 13-1 Interaction Matrix

	Population, Human Health	Flora & Fauna	Soils & Geology	Hydrology & Hydrogeology	Air & Climate	Noise & Vibration	Landscape	Cultural Heritage	Material Assets
Population, Human Health	Black	Grey	Grey	Pink	Pink	Pink	Yellow	Grey	Grey
Biodiversity, Flora & Fauna	Grey	Black	Pink	Pink	Grey	Pink	Grey	Grey	Grey
Land, Soils & Geology	Grey	Pink	Black	Pink	Grey	Grey	Grey	Grey	Grey
Hydrology & Hydrogeology	Pink	Pink	Pink	Black	Grey	Grey	Grey	Grey	Grey
Air & Climate	Pink	Grey	Grey	Grey	Black	Grey	Grey	Grey	Pink
Noise & Vibration	Pink	Pink	Grey	Grey	Grey	Black	Grey	Grey	Grey
Landscape & Visual	Yellow	Grey	Grey	Grey	Grey	Grey	Black	Grey	Grey
Cultural Heritage	Grey	Grey	Grey	Grey	Grey	Grey	Grey	Black	Grey
Material Assets	Grey	Grey	Grey	Grey	Pink	Grey	Grey	Grey	Black
Legend:	Potential Positive Effect:				Green				
	Potential Neutral Effect:				Yellow				
	Potential Negative Effect:				Pink				
	No Interacting Effect:				Grey				

The potential for interaction of effects 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.

13.2 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.

13.2.1 Human Beings

Human Beings and Noise & Vibration

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 9 to minimise the risk of any such issues.

Human Beings 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 8 to minimise the risk of any such issues.

Human Beings 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 lack of hydrological features on or immediately adjacent the site. Also, there are no water abstraction points in the vicinity of the site. Mitigation measures are presented in Chapter 7 to minimise the risk of any such issues.

Population & Human health and Landscape

Although the scrub and grassland that covers the site will be removed during the construction phase of the proposed development, the restricted visibility of the site ensures that the development will not significantly change the character of the local landscape. The planned landscaping, surrounding residential land use, retention of certain elements of the site and the planting of trees means that the change in landscape character will not be particularly apparent from the outside. The strategic phasing of the construction of the proposed development will also mitigate against potential visual impacts.

13.2.2 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.

Biodiversity, Flora & Fauna 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 and the site is located within an urban area so potential effects are limited.

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

13.2.3 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 6.

13.2.4 Air and Climate

Air & Climate and Material Assets

The movement of vehicles both within and to and from the site has the potential to give rise to noise and dust nuisance effects during the construction phase. This is assessed further in Chapter 8 of this EIAR, and mitigation measures are presented to minimise any potential effects.

13.3 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 4-12) 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.

BIBLIOGRAPHY

Introduction

Department of the Environment, Community and Local Government (2013). Guidelines for Planning Authorities and An Bord Pleanála on carrying out Environmental Impact Assessment. DoEHLG, Dublin.

Environmental Protection Agency (August 2017): Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. EPA, Wexford.

Environmental Protection Agency (September 2015): Draft - Advice Notes on Current Practice (in the preparation on Environmental Impact Statements). EPA, Wexford.

Environmental Protection Agency (2003). Advice Notes on Current Practice in the Preparation of Environmental Impact Statements. EPA, Wexford.

Environmental Protection Agency (2002). Guidelines on Information to be Contained in Environmental Impact Statements. EPA, Wexford.

European Union (2014). Directive 2014/52/EU. European Parliament and European Council.

European Union (2011). Directive 2011/92/EU. European Parliament and European Council.

Irish Statute Book (2018). European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2018 (S.I. No. 296 of 2018).

Irish Statute Book (2001). Planning and Development Regulations S.I. No. 600 of 2001. Stationery Office, Dublin.

Background to the Proposed Development

Galway City Council (2017). Galway City Development Plan 2017 – 2023. Galway City Council, Galway.

West Regional Authority (2010). Regional Planning Guidelines for the West 2010 – 2022. WRA, County Galway.

Description of the Proposed Development

Guidelines on the Information to be Contained in Environmental Impact Assessment Reports, Draft August 2017. (EPA, August 2017).

Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002).

Population and Human Health

EPA (2017), Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports’

Census of Ireland - www.cso.ie

Galway County Development Plan 2015-2021

Fáilte Ireland - <http://www.failteireland.ie/>

Fáilte Ireland (July 2018), Tourism Facts 2017, accessed at:
http://www.failteireland.ie/FailteIreland/media/WebsiteStructure/Documents/3_Research_Insights/5_International_Tourism_Trends/Tourism-Facts-2017_1.pdf?ext=.pdf

Discover Ireland - <https://www.discoverireland.ie/>

Irish Tourist - http://www.irishtourist.com/directory/places_to_visit/west/galway/

Cushman & Wakefield (Quarter 2, 2018) ‘Galway Office Market’ Available on:
<http://www.cushmanwakefield.com/en/research-and-insight/2018/galway-office-market-q2-2018>

WDC Insights (2017) ‘Galway City’s Labour Market – Census 2016’. Available on:
<http://www.wdc.ie/publications/reports-and-papers/>

Biodiversity, Flora and Fauna

Aquafact, (2010a) Reef Investigations in Galway Bay cSAC. Subtidal Benthic Investigations in Galway Bay Complex cSAC (0268) and Inner Galway Bay SPA (4031).

Bailey, M. and Rochford J. (2006) Otter Survey of Ireland 2004/2005. Irish Wildlife Manuals, No. 23. National Parks and Wildlife Service, Department of Environment, Heritage and Local Government, Dublin, Ireland.

Balmer, D.E., Gillings, S., Caffrey, B.J., Swann, R.L., Downie, I.S. and Fuller, R.J. (2013). Bird Atlas 2007-11: the breeding and wintering birds of Britain and Ireland. BTO Books, Thetford, UK.

Birds Directive (2009/47/EC) – http://ec.europa.eu/environment/nature/legislation/birdsdirective/index_en.htm

Blumstein DT, Anthony LL, Harcourt R, Ross G. 2003. Testing a key assumption of wildlife buffer zones: is flight initiation distance a species-specific trait? *Biological Conservation* 110:97–100.

Bowers Marriott, B. (1997) Practical Guide to Environmental Impact Assessment: A Practical Guide. Published by McGraw-Hill Professional, 1997, 320 pp.

Chandler, J.R. (1970) A Biological Approach to water Quality Management. *Water Poll. Cont.* 69:415-421.

Chanin P (2003). Ecology of the European Otter. *Conserving Natura 2000 Rivers Ecology Series No. 10.* English Nature, Peterborough.

Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (Habitats Directive) and Directive 2009/147/EC (codified version of Directive 79/409/EEC as amended) (Birds Directive) – transposed into Irish law as European Communities (Birds and Natural Habitats) Regulations 2011 (SI 477/2011).

CIEEM (2016) Institute of Ecology and Environmental Management Draft Guidelines for Ecological Impact Assessment.

Crowe, O., Wilson, J., Aznar, I. and More, S.J. (2009). A review of Ireland's waterbirds, with emphasis on wintering migrants and reference to H5N1 avian influenza. *Irish Veterinary Journal* 62, 800–811.

Crowe, O. (2005) Ireland's Wetlands and their Waterbirds: Status and Distribution. BirdWatch Ireland, Rockingham, Co. Wicklow.

Del Hoyo, J., Elliott, A., and Sargatal, J. 1996. Handbook of the Birds of the World, vol. 3: Hoatzin to Auks. Lynx Edicions, Barcelona, Spain

DEHLG (2009) Appropriate Assessment of Plans and Projects in Ireland: Guidance for Planning Authorities. DEHLG, Dublin.

DoEHLG (2010). Appropriate Assessment of Plans and Projects in Ireland. Guidance for Planning Authorities. Revision, February, 2010. Department of the Environment, Heritage and Local Government.

EC (2000) Managing Natura 2000 Sites: the provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission.

EC (2001) Assessment of plans and projects significantly affecting Natura 2000 sites: Methodological guidance on the provisions of Articles 6(3) and (4) of the Habitats Directive 92/43/EEC.

EC (2002) Assessment of Plans and Projects Significantly Affecting Natura 2000 Sites: Methodological guidance on the provisions of Article 6(3) and (4) of the Habitats Directive 92/43/EEC, Office for Official Publications of the European Communities, Luxembourg. European Commission.

EC (2006) Nature and biodiversity cases: Ruling of the European Court of Justice. Office for Official Publications of the European Communities, Luxembourg.

EC (2007a) Guidance document on Article 6(4) of the 'Habitats Directive' 92/43/EEC – Clarification of the concepts of: alternative solutions, imperative reasons of overriding public interest, compensatory measures, overall coherence, opinion of the commission. Office for Official Publications of the European Communities, Luxembourg. European Commission.

EC (2007b) Interpretation Manual of European Union Habitats. Version EUR 27. European Commission, DG Environment.

EPA (2002) Guidelines on the information to be contained in Environmental Impact Statements. Environmental Protection Agency.

EPA (2003) Advice Notes on current practice in the preparation of Environmental Impact Statements. Environmental Protection Agency.

EPA website: <http://www.epa.ie>.

European Communities (Conservation of Wild Birds) Regulations, 1985, SI 291/1985 & amendments – <http://www.irishstatutebook.ie>.

European Communities (Environmental Impact Assessment) Regulations, 1989 to 2001.

European Communities (Natural Habitats) Regulations, SI 94/1997, SI 233/1998 & SI 378/2005 – <http://www.irishstatutebook.ie>.

Fossitt, J. A. (2000). A Guide to Habitats in Ireland. Dublin: The Heritage Council.

Habitats Directive (92/43/EEC).

Livezey, K.B., Fernández-Juricic, E. and Blumstein, D.T., 2016. Database and metadata of bird flight initiation distances worldwide to assist in estimating human disturbance effects and delineating buffer areas. *Journal of Fish and Wildlife Management* 7, pp.1-11

McCorry, M. (2007) The Saltmarsh Monitoring Project 2006. Unpublished Report to NPWS.

McCorry, M. and Ryle, T. (2009). Coastal Monitoring Project 2004 – 2006. Unpublished Report to NPWS.

Murphy, D.F. (2004) Requirements for the Protection of Fisheries Habitat During Construction and Development Works at River Sites. Eastern Regional Fisheries Board, Dublin.

NPWS (2008) The Status of EU Protected Habitats and Species in Ireland. Conservation Status in Ireland of Habitats and Species listed in the European Council Directive on the Conservation of Habitats, Flora and Fauna 92/43/EEC.

NPWS of the DEHLG (2008) The Report on Status of Habitats and Species in Ireland: Technical Reports and Forms.

NPWS (2009) Threat Response Plan: Otter (2009-2011). National Parks & Wildlife Service, Department of the Environment, Heritage & Local Government, Dublin.

NPWS (2010) Harbour Seal Population Monitoring 2009-2012: Report No. 1

NPWS (2011) Harbour Seal Population Monitoring 2009-2012: Report No. 2

NPWS (2013) Conservation Objectives: Galway Bay Complex SAC 000268. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht.

NPWS Protected Areas Site Synopses and maps available on <http://www.npws.ie/en/ProtectedSites/>.

NRA (2004) Environmental Impact Assessment of National Road Schemes – A Practical Guide, National Roads Authority, Dublin.

NRA (2004) Guidelines for the Treatment of Noise and Vibration in National Road Schemes (1 ed.). Dublin: National Roads Authority.

NRA (2006) A Guide to Landscape Treatments for National Road Schemes in Ireland. Dublin: National Roads Authority.

NRA (2009). Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes. Dublin: National Roads Authority.

- Oliver, G. (2007). Inventory of Irish coastal lagoons (version 2). Unpublished Report to NPWS.
- RPS, 2012. Benthic Survey Services Framework. Galway Bay Intertidal Surveys 2009 & 2010. Unpublished report to NPWS & Marine Institute.
- Scottish Natural Heritage (SNH) (July 2013) Assessing Connectivity with Special Protection Areas (SPA)
- Therivel R. (2009) Workshop Material on the Habitats Directive Assessment of Plans Levett-Therivel Sustainability Consultants on behalf of the Heritage Council, Kilkenny.
- Water status data available on <http://www.epa.ie> and <http://www.wfdireland.ie>
- Wildlife Act 1976 and Wildlife (Amendment) Act 2000.

Land, Soils and Geology

- Bedrock Geology 1:100,000 Scale Map Series, Sheet 14 (Geology of Galway Bay). Geological Survey of Ireland (GSI, 1994);
- Residential Development, Rosshill, Galway – Report on Civil Works, Planning Stage (Tobin Consulting Engineers, 2019)

Hydrology and Hydrogeology

- CIRIA, 2006: Control of Water Pollution from Construction Sites - Guidance for Consultants and Contractors. CIRIA C532. London, 2006.
- EPA (2017) Guidelines on the Information to be Contained in Environmental Impact Assessment Reports – Draft.
- EPA (September 2015): Draft - Advice Notes on Current Practice (in the preparation on Environmental Impact Statements) where relevant.
- EPA (September 2015): Draft – Revised Guidelines on the Information to be Contained in Environmental Impact Statements where relevant.
- EPA, 2003: Advice Notes on Current Practice (in the preparation on Environmental Impact Statements) where relevant.
- GSI, 2004: Bedrock Geology 1:100,000 Scale Map Series, Sheet 14 (Geology of Galway Bay). Geological Survey of Ireland.
- IGI, 2013: Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements, (Institute of Geologists Ireland, 2013).
- NRA, 2005: Guidelines on Procedures for Assessment and Treatment of Geology, Hydrology and Hydrogeology for National Road Schemes, (National Roads Authority, NRA, 2005).
- PPG1 - General Guide to Prevention of Pollution (UK Guidance Note).
- PPG5 – Works or Maintenance in or Near Watercourses (UK Guidance Note).

Residential Development, Rosshill, Galway - Report on Civil Works, Planning Stage (Tobin Consulting Engineers, 2019)

Residential Development, Rosshill, Galway – Flood Risk Assessment (Tobin Consulting Engineers, 2019)

Air and Climate

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).

Council of the European Union (2008). Council Directive 2008/50/EC on ambient air quality and cleaner air for Europe. Official Journal of the European Union No. L152.

Council of the European Union (2007). Council Directive 2005/107/EC relating to arsenic, cadmium, mercury, nickel and polycyclic aromatic hydrocarbons in ambient air.

Environmental Protection Agency (2002). Ambient Air Monitoring in Galway City; March 13th 2001 – 23rd October 2001'. EPA, Wexford.

Europe 2020 indicators – climate change and energy report (http://ec.europa.eu/eurostat/statistics-explained/index.php/Europe_2020_indicators_-_climate_change_and_energy).

Greenhouse Gas Emission Projections to 2020 – An Update. (Environmental Protection Agency 2016).

Ireland's Environment – An Assessment 2016. (Environmental Protection Agency, 2016).

Met Éireann (2018). Full Data Series for Athenry, Co. Galway 2011 – 2017. www.met.ie

Met Éireann (2011). Summary of Weather Station Data at Shannon, Co. Clare 1981 – 2010. www.met.ie

Noise and Vibration

US Bureau Of Mines, 1980. Report RI 8507: Structural response and damage produced by ground vibration from surface mines blasting.

British Standards Institution, 1993. BS 7385-2:1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from groundborne vibration.

World Health Organisation, 1999. Guidelines on community noise.

Directive 2002/49/EC of the European Parliament and of the Council relating to the assessment and management of environmental noise (2002), transposed into Irish law by the European Communities (Environmental Noise) Regulations 2018 (SI No. 549/2018).

World Health Organisation, 2009. Night noise guidelines for Europe.

UK Highways Agency, 2011. Design manual for roads and bridges.

- British Standards Institution, 2014. BS 4142:2014 Methods for rating and assessing industrial and commercial sound.
- ARUP, 2014. Galway County Council – Preliminary appraisal report – N6 Galway City outer bypass.
- British Standards Institution, 2014. BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise.
- British Standards Institution, 2014. BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration.
- British Standards Institution, 2014. BS 8233:2014 Guidance on sound insulation and noise reduction for buildings.
- National Roads Authority, 2014. Good practice guidance for the treatment of noise during the planning of national road schemes.
- Department of Education & Skills, 2015. Technical guidance document TGD-021-5: Acoustic performance in new primary & post primary school buildings.
- Galway County Council, 2015. Galway County Council Development Plan 2015-2021.
- Environmental Protection Agency, 2015. Draft advice notes on current practice in the preparation of environmental impact statements.
- Environmental Protection Agency, 2016. NG4 Guidance note for noise: Licence applications, surveys and assessments in relation to scheduled activities.
- Environmental Protection Agency, 2017. Draft guidelines on the information to be contained in environmental impact assessment reports.
- Association of Noise Consultants, Institute of Acoustics & Chartered Institute of Environmental Health, 2017. ProPG Planning & noise: Professional practice guidance on planning & noise – New residential development.
- Galway County Council, 2019. Galway Noise Action Plan 2019-2023.

Landscape and Visual

- Galway City Development Plan 2017 – 2023.
- Galway County Council (2002). Landscape and Landscape Character Assessment for County Galway. Galway County Council, Galway.
- Guidelines for Landscape and Visual Impact Assessment, Third Edition. The Landscape Institute, Institute of Environmental Management & Assessment (2013).
- Landscape and Landscape Assessment - Consultation Draft of Guidelines for Planning Authorities. Dublin. Department of the Environment and Local Government. (2000).
- National Landscape Strategy for Ireland 2015 – 2025. Department of Arts, Heritage and the Gaeltacht (2015).

Photography and photomontage in landscape and visual impact assessment Landscape Institute Advice Note 01/11, 2011).

EPA Guidelines on the information to be contained on Environmental Impact Statements (EPA 2002)

EPA Advice Notes on Current Practice in the preparation of Environmental Impact Statements (EPA, 2003).

Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, August 2017),

Scottish National Heritage <https://www.nature.scot/>

Cultural Heritage

Architectural Heritage Guidelines for Planning Authorities (Department of the Environment, Heritage and Local Government) 2004.

Aalen, F.H.A. et al., (1997), Atlas of the Irish Rural Landscape. Cork University Press, Cork.

Department of Arts, Heritage, Gaeltacht and the Islands, (1999), Framework and Principles for the Protection of the Archaeological Heritage, 1999.

Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports' (EPA, August 2017).

EPA (2015). Draft guidelines on the information to be contained in Environmental Impact Statements.

Galway City Development Plan 2017 – 2023.

National Monuments Acts, 1930-2014.

The Planning and Development Acts, 2000-2015.

1st Edition 6 inch OS maps (1837-8).

2nd Edition 25 inch OS maps (1911)

www.webgis.archaeology.ie/historicenvironment

www.excavations.ie

www.logainm.ie

Material Assets

Environmental Protection Agency (August 2017): Draft Guidelines on the Information to be Contained in Environmental Impact Assessment Reports. EPA, Wexford.

Environmental Protection Agency (2003). Advice Notes on Current Practice in the Preparation of Environmental Impact Statements. EPA, Wexford.

Galway County Council (2015). Galway County Development Plan 2015 – 2021. Galway County Council, Galway.

National Roads Authority (2011). Project Appraisal Guidelines, Unit 5.5 Link Based Traffic Growth Forecasting. NRA, Dublin.

National Roads Authority (2011). NRA TD 41-42/11 Geometric Design of Major/Minor Priority Junctions and Vehicular Access to National Roads. NRA, Dublin.

National Roads Authority (2007). Traffic and Transport Assessment Guidelines. NRA, Dublin.

National Roads Authority (2003). Future Traffic Forecasts, 2002 to 2040. NRA, Dublin.

Transport Infrastructure Ireland, (2014) Traffic and Transport Assessment Guidelines