Natura Impact Statement

Proposed Mixed-Use Development (Phase 2) Crown Square Mervue, Galway City

McCarthy Keville O'Sullivan

Planning & Environmental Consultants

DOCUMENT DETAILS

Client:	Crown Square Developments Ltd.
Project title:	Mixed-Use Development (Phase 2), Mervue, Galway City.

Project Number:	180745-b
Document Title:	Natura Impact Statement
Doc. File Name:	NIS F – 180745c – 2019.07.11
Prepared By:	McCarthy Keville O'Sullivan Ltd. Planning & Environmental Consultants Block 1, G.F.S.C. Moneenageisha Road, Galway

Document Issue:

Rev	Status	Issue Date	Document File Name	Author(s)	Approved By:
01	Draft	21.01.2019	NIS D- 180745-b – 2019.01.21	IS	PR
02	Final	15.03.2019	NIS F – 180745c – 2019.07.11	JH	PR

Table of Contents

1 INTRODUCTION

1.1 Background

McCarthy Keville O'Sullivan Ltd. (MKO) has been appointed to provide the information necessary to allow the competent authority to conduct an Article 6(3) Appropriate Assessment for the second phase of a proposed mixed-use development at Crown Square, Mervue, Galway City. This is submitted as a voluntary Natura Impact Statement (NIS). The NIS is provided following a very precautionary principle on the basis that pathways for effects on ground and surface waters exist and could potentially result in significant effects on European Sites that are located outside the development site.

The current project is not directly connected with, or necessary for, the management of any European Site, consequently the project is subject to the Appropriate Assessment Screening process and in this case, on a precautionary basis, a voluntary NIS has been provided.

The assessment in this report is based on a desk study and field surveys undertaken in August 2018, October 2018, March 2019 and June 2019. It specifically assesses the potential for the proposed development to impact upon European Sites.

This report has been prepared in accordance with the European Commission guidance document *Assessment of Plans and Projects Significantly affecting Natura 2000 Sites: Methodological Guidance on the provisions of Article 6(3) and 6(4) of the Habitats Directive 92/43/EEC* (EC, 2001), European Communities (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 and the Department of the Environment's Guidance on the Appropriate Assessment of Plans and Projects in Ireland (December 2009, amended February 2010).

In addition to the guidelines referenced above, the following relevant guidance was considered in preparation of this report:

1. European Communities (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,
2. *Directive 92/43/EEC*, Office for Official Publications of the European Communities, Luxembourg. European Commission,
3. *EC (2007) 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. European Commission.*

1.2 Appropriate Assessment

1.2.1 Screening for Appropriate Assessment

Screening is the process of determining whether an Appropriate Assessment is required for a plan or project. Under Part XAB of the Planning and Development Act, 2000, as amended, screening must be carried out by the Competent Authority to assess, in view of best scientific knowledge, if a land-use plan or proposed

development, individually or in combination with another plan or project, is likely to have a significant effect on a European site. The Competent Authority's determination as to whether an Appropriate Assessment is required must be made on the basis of objective information and should be recorded. The competent authority may request information to be supplied to enable it to carry out screening.

Consultants or project proponents may undertake a form of screening to establish if an Appropriate Assessment is required and provide advice or may submit the information necessary to allow the Competent Authority to conduct a screening with an application for consent. Where it cannot be excluded beyond reasonable scientific doubt, that a proposed plan or project, individually or in combination with other plans and projects, would have a significant effect on the conservation objectives of a European site, an Appropriate Assessment (Natura Impact Statement (NIS)) of the plan or project is required.

1.2.2 Appropriate Assessment (Natura Impact Statement)

The term Natura Impact Statement (NIS) is defined in legislation[1]. An NIS, where required, should present the data, information and analysis necessary to reach a definitive determination as to 1) the implications of the plan or project, alone or in combination with other plans and projects, for a European site in view of its conservation objectives, and 2) whether there will be adverse effects on the integrity of a European site. The NIS should be underpinned by best scientific knowledge, objective information and by the precautionary principle.

1.2.3 Statement of Authority

The survey work was carried out by Pat Roberts (B.Sc. MCIEEM), John Hynes (B.Sc M.Sc MCIEEM) John Staunton (BSc., PhD., Irene Sullivan (BSc.) and Luke Dodebier (Ecologist with MKO).

This NIS has been prepared by a competent expert, John Hynes and reviewed by Pat Roberts (B.Sc. Environmental Science) who has over 13 years' experience in management and ecological assessment.

[1] As defined in Section 177T of the Planning and Development Act, 2000 as amended, an NIS means a statement, for the purposes of Article 6 of the Habitats Directive, of the implications of a proposed development, on its own and in combination with other plans and projects, for a European site in view of its conservation objectives. It is required to include a report of a scientific examination of evidence and data, carried out by competent persons to identify and classify any implications for the European site in view of its conservation objectives

2 DESCRIPTION OF THE PROPOSED DEVELOPMENT AND BASELINE ENVIRONMENT

2.1 Site Location

The subject site extends to 5.12 ha and is located in the north-east of Galway City in Mervue, at the junction of the Monivea Road and Joyce's Road (Grid reference: M 31967 26885). The IDA Business Park and Mervue Industrial Estate are located to the west/south-west of the site and the Eircom Telecommunications site immediately borders the subject site to the north-east. Medium density residential development is located to the east of the site along the Monivea Road. The proposed development layout is shown on Figures 2.1-2.3 below. The full description of the proposed development is provided in Appendix 1 to this NIS and has informed this assessment. Any references to Appendices in Appendix 1 refer to Appendices of the EIAR and can be cross referenced.

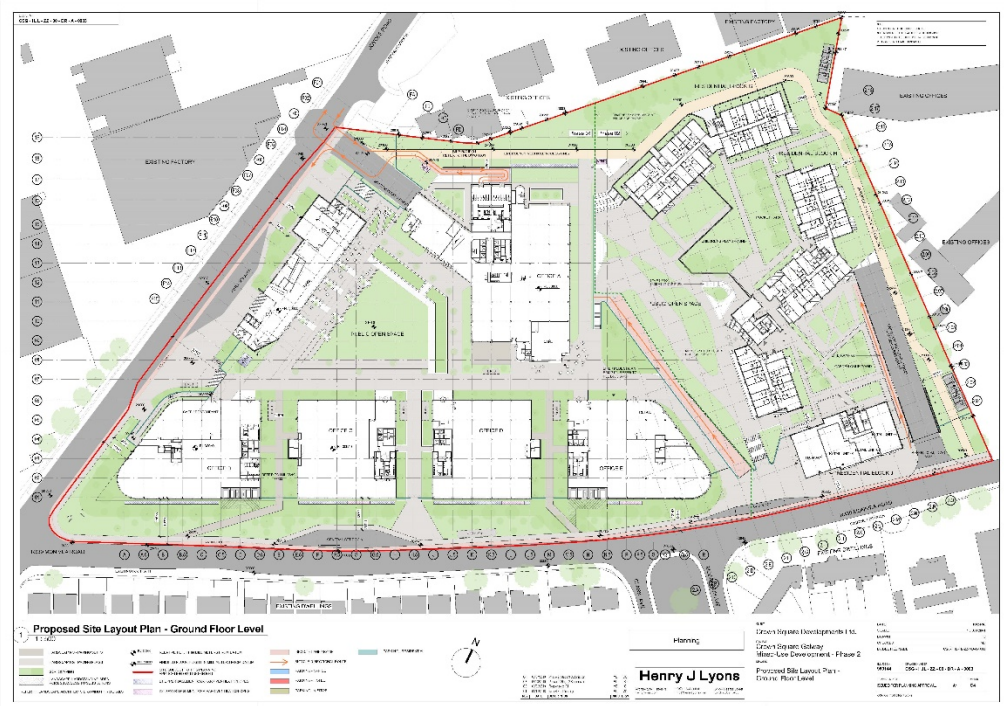


Figure 2.1: Ground Level Layout. Image extracted from Henry J Lyons Design Statement

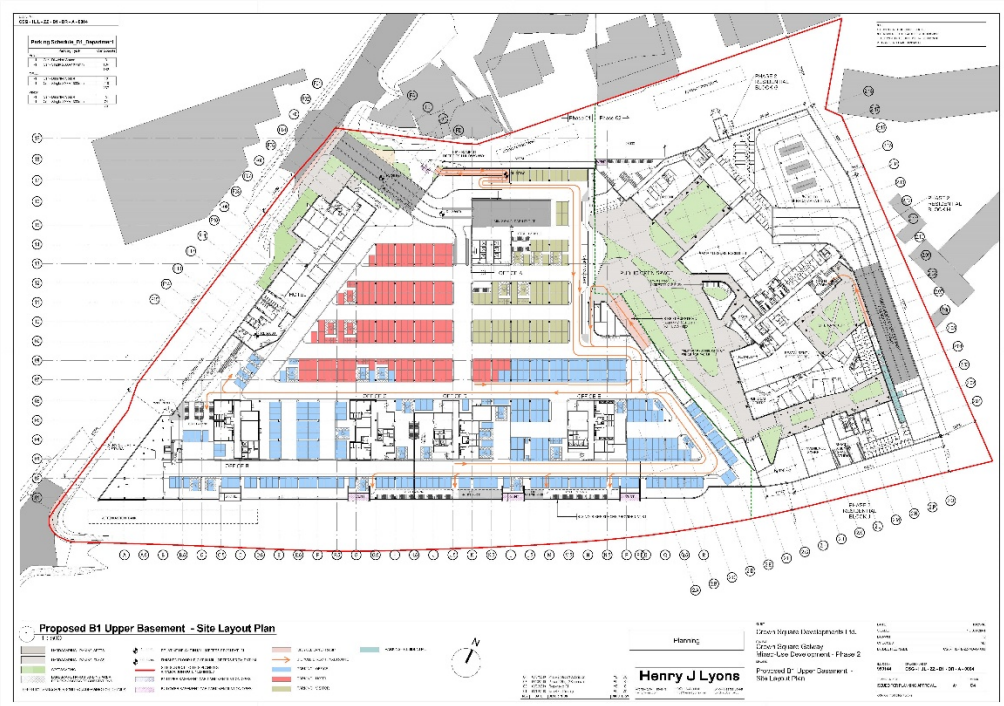


Figure 2.2: Upper Basement Layout. Extracted from Henry J Lyons Planning Drawings

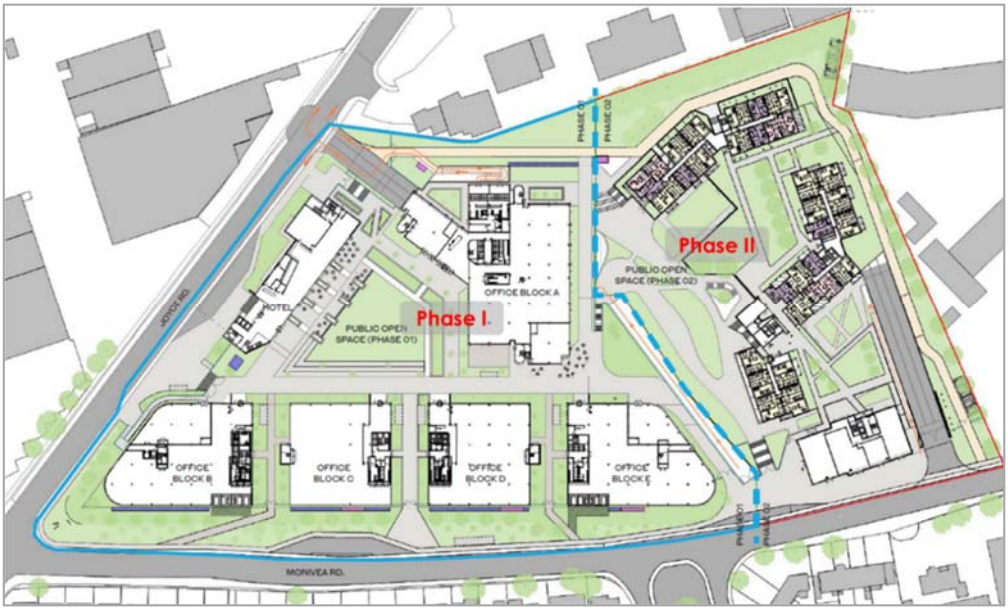


Figure 2.3: Proposed above ground Site Layout, showing the phased development for phase 1 and phase 2.

2.2 Characteristics of the Proposed Development

A comprehensive masterplan for the entire site has been developed, setting out proposals for buildings, spaces and a movement and land use strategy. The proposed development strategy envisages that the subject lands will be developed in two distinct stages, with two separate planning applications:

- Phase 1: Commercial and basement/ infrastructural works
- Phase 2: Strategic Housing Development - Residential, leisure and local service elements

Phase 1 of the scheme has been previously permitted under Galway City Council Pl Ref 18/363 .The proposed development comprises Phase 2 of the mixed-use scheme.

The Phase II development will consist of:

1. A residential scheme comprising 288 no. apartments and amenity accommodation with a gross floor area of 32,379 sqm, which will include:
    - Block G (104 no. units); Block H (136 no. units) and Block J (48 no. units).
    - 75 no. one-beds (26%); 185 no. two-beds (64.2%); and 28 no. three-bed units (9.7%)
    - Ancillary residential amenity areas (1,275 sqm).
    - Block G extends to eight-storeys, Block H extends to seven-storeys and Block J extends to five-storeys.
    - External balconies are provided on all elevations.
2. A commercial scheme with a cumulative gross floor area of 4,096 sqm, which will include:
    - A neighbourhood facility comprising a restaurant (500 sqm), café (50 sqm), local convenience store (225 sqm), a pharmacy (200 sqm), 5 no. retail/commercial units (797 sqm in total), a crèche (310 sqm)
    - A fitness/leisure facility (1,140 sqm); and
    - A medical centre (655 sqm).
3. Public realm and landscaping works, including pedestrian and cyclist linkages.
4. Vehicular access to the double basement permitted under Pl Ref 18/363 and the allocation of 288 no. car parking spaces located on the lower basement level to service the residential units. Visitor car parking will be provided on the upper basement level and will be managed in accordance with an Operational Management Plan and a Mobility Management Plan.
5. The provision of a dedicated cyclist ramp and 733 no. secure bicycle parking spaces located in the upper basement permitted under Pl Ref 18/36 (comprising 529 no. residential; 144 visitor parking and 60 no. bicycle parking spaces to service the neighbourhood facility).
6. All other associated site development, plant and servicing works.
7. The application will be supported by an Environmental Impact Assessment Report and a Natura Impact Statement.

The proposed development builds upon the previous planning permissions and construction works carried out at the site in c.2008. Almost the entire site has already been excavated to structural formation level and there are extensive foundations and partially complete building structures in-situ which will be used and adapted where possible. No further significant excavation is required.

Following consultation with Irish Water, it has been confirmed that the proposed connection to the Irish Water network(s) required by this project can be facilitated (see Technical Appendix 3-3 of the EIAR). All infrastructure will be designed and installed in accordance with the Irish Water Codes of Practice and Standard Details.

The proposed development will require periodic maintenance throughout the operational phase. The operation of a mixed-use development such as this is not a recognised source of environmental emissions or nuisance and so there will be no adverse effects associated with its operation.

It is proposed that any surface water that enters the basement levels of the proposed development will drain via gravity to a silt trap and then an attenuation tank acting as a basement sump, with a hydrocarbon interceptor which is already existing on site. From here, water will be pumped to the Monivea foul sewer which runs along the public road on the Monivea Road.

Surface water from the site will pass through a silt trap before entering attenuation tanks prior to discharging to outfalls on either Connolly Avenue or the Monivea Road. It is proposed that approximately 70% of this surface water discharge will be to Connolly Avenue, while the remaining 30% will be to the Monivea Road.

As described in the Engineering Report (Section 2.2.2) a below ground drainage system will be provided for the site. This will deal with foul water from both the residential/commercial developments and the suspended drainage system in the basement. It is proposed to connect this drainage system to the 675mm diameter public foul water sewer located in the Monivea Road. The limited volume of foul water associated with the -1 & -2 basement is proposed to be collected via an on-site network of pipes in the lower basement and discharged to the Monivea public (Irish Water) foul sewer via two pumping stations. One at the southwestern corner of the site would deal with the foul water from the commercial development, including the hotel, while the residential development on the eastern side of the site would discharge via a pumping station on the southeastern corner. The pumping stations would have expected storage for 24 hours.

Further information on Waste Water Management is referenced in Appendix 3-2 and 3-3 of the EIAR.

Water supply to the site will be via an existing onsite 125mm connection to the adjacent public (Irish Water) watermain.

An Operational Phase Waste Management Plan is provided in Appendix 3-9 of the EIAR.

The development will provide approximately 1,104 bike parking spaces. Consideration will be given to the provision of a cycle for rent scheme such as the existing 'Coke Zero' Galway Bike scheme. Car parking spaces (1,377 no.) will be provided in the basement levels of the proposed development. In accordance with the extant Galway City Development Plan requirements provision will be made for disabled parking an area within the car-park visitor spaces may be reserved for 'GoCar' type (rental) facilities and Electrical Vehicle (EV) charging Points will be provided in accordance with the EU Directive - Energy Performance in Building Directive 2018 and the GCDP.

Further information on site operation is provided in the Operational Management Plan (Appendix 3-10 of the EIAR).

The *Galway City Development Plan 2017-2023* (Development Plan) came into effect on Saturday 7th January 2017. The subject lands are designated 'Commercial/Industrial' (CI with a stated objective '*to provide for enterprise, light industry and commercial uses other than those reserved to the City Centre zone*'. The site is also identified as a 'Neighbourhood Centre' in the retail hierarchy of the City. The extant Development Plan includes a specific development objective pertinent to the proposed site, as set out below:

> '*Former Crown Equipment Site zoned CI. The majority of retail floor space to be dedicated for bulky goods retailing and the balance for local retailing needs.*

Parking shall be kept back from Monivea Road and separated from the Monivea Road by buildings. The design of frontage facing Monivea Road shall be of a high architectural standard'.

2.3 Characteristics of the Existing Environment

2.3.1 Habitats & Flora

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

Multidisciplinary walkover surveys have been conducted for the site. These surveys were undertaken on the 29th of August 2018, 9th of October 2018, 14th of March 2019 and 11th of June 2019. Surveys were undertaken by John Hynes, Pat Roberts, Irene Sullivan, John Staunton and Luke Dodebier. Surveys were undertaken in line with NRA (2009) guidelines (*Ecological Surveying Techniques for Protected Flora and Fauna during the Planning of National Road Schemes*). The ecological survey was undertaken within the optimal time of year to undertake a habitat and flora survey (Smith *et. al* 2011) and all habitats within and adjacent to the proposed development site were readily identifiable during the site visits.

The site is currently a brown-field building-site. The majority of the site is graveled and is classified as ***Spoil and bare ground (ED2)***. ***Buildings and artificial surfaces (BL3)*** in the form of construction foundations and existing buildings are also present within the wider site (Plates 2.1-2.3). The proposed development builds upon the previous planning permissions and construction works carried out at the site in c2008. Almost the entire site has already been excavated to structural formation level and exposed limestone rockface is present surrounding the site (Plate 2.4).

Most of the site is devoid of any vegetation. Some grassy areas which were classified as ***Dry Meadows and Grassy verges (GS2)*** occur in isolated locations surrounding the site (Plate 2.3). Species recorded in these areas included red clover (*Trifolium pretense*), bramble (*Rubus fruticosus*), plantain (*Plantago* sp.), white clover (*Trifolium repens*), butterfly bush (*Buddleja davidii*) and cock's-foot (*Dactylis glomerata*).

There are no treelines within the Phase 2 development area and there will be no loss of linear landscape features associated with the development.

A cypress (*Cupressus leylandii*) ***Treeline (WL2)*** grows along the southern boundary of the Phase 1 development area. The loss of the treeline has been fully assessed and mitigated for as part of the permitted Phase 1 development (Pl Ref 18/363).

There are no natural ponds, springs, streams, drains or other waterbodies present within the development site boundary. No stonewort communities were recoded from areas of standing water and no Annex I tufa forming spring heads were identified.

No third schedule invasive species were recorded on site.

Plate 2.1 Spoil and bare ground (ED2) (June 2019)

Plate 2.2 Spoil and bare ground (ED2) & existing buildings (BL3) (June 2019)

Plate 2.3 Spoil and bare ground (ED2), Buildings and artificial surfaces (BL3) & Dry meadows and grassy verges (GS2) in left background (June 2019)

Plate 2.4 Spoil and bare ground (ED2) and exposed limestone rock face. (June 2019)

2.3.1.1 Significance of Habitats

Ecological evaluation within this section follows a methodology that is set out in Chapter three of the *'Guidelines for Assessment of Ecological Impacts of National Roads Schemes'* (NRA, 2009).

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). The evaluation methodology also took cognisance of the geological context evaluation criteria outlined in Chapter 4 of CIEEM 2016.

None of the habitats within the development site boundary correspond to habitats listed on Annex I of the EU Habitats Directive. Grassy verges, spoil and bare ground, and buildings and artificial surfaces within the development site were assigned *Local Importance (Lower Value)* status.

The treeline along the southern site boundary is composed of a line of non-native conifer trees (*Cupressus leylandii*). The treeline grows uniformly and does not support a biodiverse understory. For these reasons, the treeline is unlikely to be of significant use to fauna. It has therefore also been determined to be of *Local Importance (Lower Value)*.

Whilst there is no watercourse on the site, there may be the requirement to pump excess waters arising on the site to the public storm sewer. This provides a potential link to Lough Atalia, which is designated for conservation as part of the Galway Bay Complex SAC and Inner Galway Bay SPA. These designated sites are assigned *International* importance.

2.3.2 Fauna

The walkover survey was designed to detect the presence, or likely presence, of a range of protected species associated with protected sites in the zone of likely impact. The proposed development site is dominated by 'spoil and bare ground,' and therefore the development site provides very little faunal habitat.

No evidence of Annex protected species was discovered during the site visit.

2.3.2.1 Significance of Fauna

The development site is not of significance to QI/SCI species populations associated with any EU site. Overall, it is considered that the site of the development is of relatively low value to faunal species due to the nature of the habitats identified on site and the small area that they cover.

3 IDENTIFICATION OF RELEVANT EUROPEAN SITES

3.1 Background to European Sites

The Habitats Directive (92/43/EEC) (together with the Birds Directive (2009/147/EC)) 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 and Birds Directive 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'.

Habitats Directive/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. 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**.

Birds Directive/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**).

3.2 Identification of the Designated Sites within the Zone of Likely Impact

The most up to date GIS spatial datasets for European designated sites were downloaded from the NPWS website (www.npws.ie) on the 05/07/2018. Using the GIS software, MapInfo (Version 10.0), European sites within the likely zone of impact of the project were identified. The following rationale was used to identify the likely zone of impact. Initially, sites within a 15km radius of the proposed development were identified (as per the DoEHLG Guidance (2010)). In addition, using the precautionary principle, European Sites located outside the 15km buffer zone were also taken into account but no pathway for impact on such sites was identified.

Table 3.1 below, lists all European Sites that are within 15km the proposed development and considers which (if any) are within the Likely Zone of Impact. Figure 3.1 shows the location of the proposed development in relation to all European sites within 15km as identified according to the criteria described above.

The site synopses and conservation objectives of these sites, as per the NPWS website (www.npws.ie), were considered at the time of preparing this report (05/07/2018). Details of these sites, including their distance from the proposed development, are provided in Table 3.1.

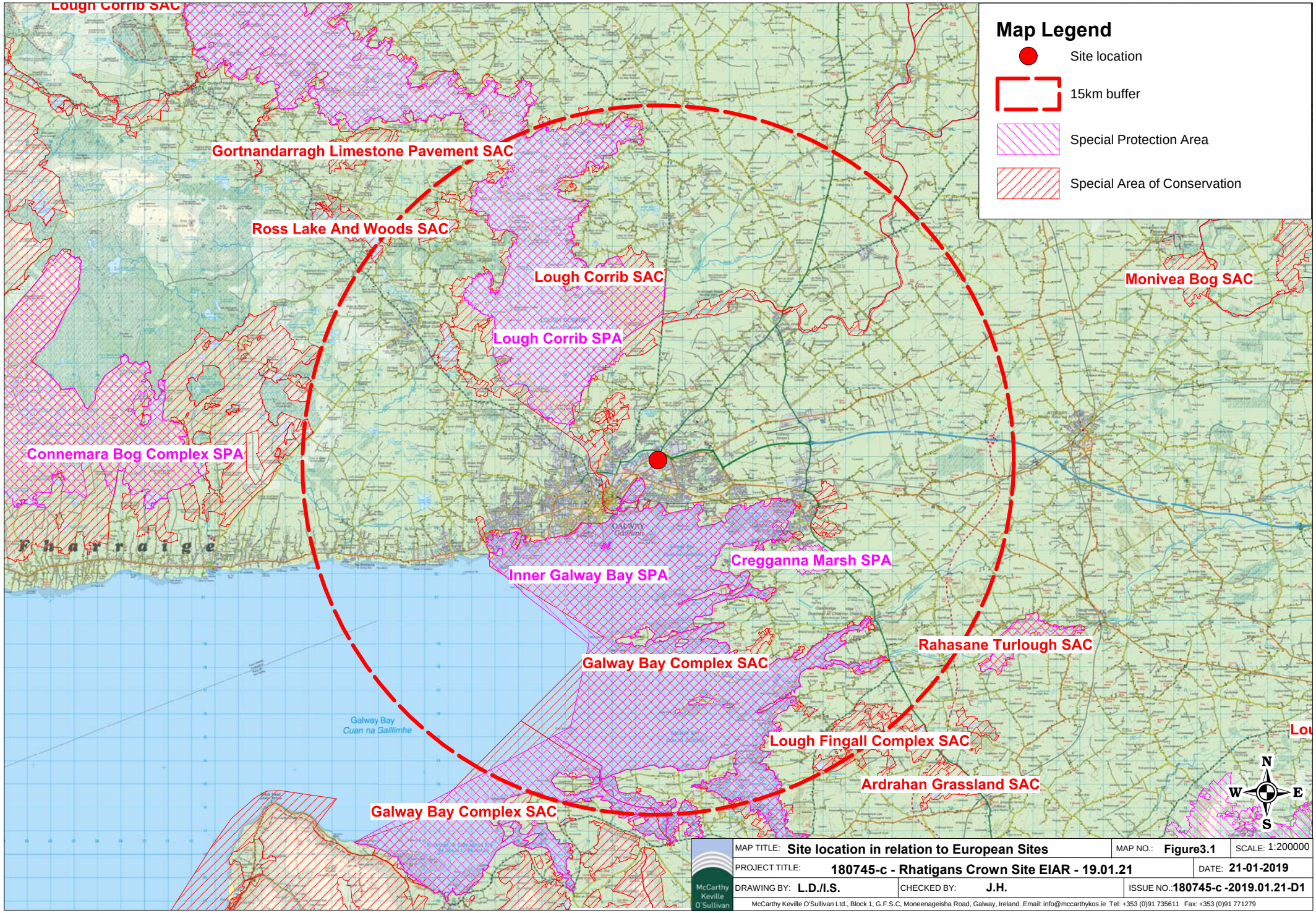
Cregganna Marsh SPA had the generic conservation objective:

> *'To maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for this SPA' (NPWS Generic version 6.0, 2018)*

Lough Corrib SPA had the generic conservation objective:

> *'To maintain or restore the favourable conservation condition of the wetland habitat at Lough Corrib SPA as a resource for the regularly-occurring migratory waterbirds that utilise it.' (NPWS Generic version 6.0, 2018)*

Galway Bay Complex SAC, Lough Corrib SAC, Ross Lake and Woods SAC and Inner Galway Bay SPA had detailed conservation objective documents that were reviewed on the 05th of July 2019 while carrying out this Article 6(3) Assessment.



MAP TITLE: Site location in relation to European Sites		MAP NO.: Figure3.1	SCALE: 1:200000
PROJECT TITLE: 180745-c - Rhatigans Crown Site EIAR - 19.01.21			DATE: 21-01-2019
DRAWING BY: L.D./I.S.	CHECKED BY: J.H.		ISSUE NO.: 180745-c -2019.01.21-D1

McCarthy Keville O'Sullivan Ltd., Block 1, G.F.S.C, Moneenageisha Road, Galway, Ireland. Email: info@mccarthykos.ie Tel: +353 (0)91 735611 Fax: +353 (0)91 771279

Table 3.1. Identification of European sites within likely zone of impact of the Proposed Development

European Sites	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 05/07/2019)	Zone of Likely impact determination
Special Areas of Conservation (SAC)		
Galway Bay Complex SAC 0.8km	▪ Mudflats and sandflats not covered by seawater at low tide [1140] ▪ Coastal lagoons [1150] ▪ Large shallow inlets and bays [1160] ▪ Reefs [1170] ▪ Perennial vegetation of stony banks [1220] ▪ *Salicornia* and other annuals colonising mud and sand [1310] ▪ Atlantic salt meadows (*Glauco-Puccinellietalia maritimae*) [1330] ▪ Mediterranean salt meadows (*Juncetalia maritimi*) [1410] ▪ Turloughs [3180] ▪ *Juniperus communis* formations on heaths or calcareous grasslands [5130] ▪ Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] ▪ Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] ▪ Alkaline fens [7230] ▪ Limestone pavements ▪ *Lutra lutra* (Otter) [1355] ▪ *Phoca vitulina* (Harbour Seal) [1365]	Given the distance between the site of proposed development and this SAC, direct effects upon the SAC can be excluded. However, indirect effects of the development are also considered within the NIS. No potential pathway for effect on any of the terrestrial habitats for which the SAC is designated was identified. Though no watercourses were identified on-site, the construction phase of the proposed development may result in pollution to groundwaters via the percolation of polluting materials through the limestone bedrock underlying the site. Groundwater flows are generally to the west and southwest towards potentially toward this SAC (see Ch. 7 of the EIAR which accompanies this application). Surface waters may require pumping out of the site to the local public storm sewer (which ultimately discharges to the SAC) during construction works, thus creating potential for impact upon this receptor via siltation and pollution.

European Sites	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 05/07/2019)	Zone of Likely impact determination
		The proposed development will also lead to the production of foul sewage and surface water. If discharged untreated, this has the potential to result in adverse effects on this SAC during the operation of the proposed development. As there is a surface and ground water connection to this SAC, it is therefore **within the likely zone of impact**, due to the potential for pollutants to be transmitted to it indirectly via ground and surface water during construction and operation.
Lough Corrib SAC 2.1km	▪ Oligotrophic waters containing very few minerals of sandy plains (Littorelletalia uniflorae) [3110] ▪ Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea [3130] ▪ Hard oligo-mesotrophic waters with benthic vegetation of Chara spp. [3140] ▪ Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation [3260] ▪ Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco-Brometalia) (* important orchid sites) [6210] ▪ Molinia meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae) [6410] ▪ Active raised bogs [7110] ▪ Degraded raised bogs still capable of natural regeneration [7120] ▪ Depressions on peat substrates of the Rhynchosporion [7150] ▪ Calcareous fens with Cladium mariscus and species of the Caricion davallianae [7210] ▪ Petrifying springs with tufa formation (Cratoneurion) [7220] ▪ Alkaline fens [7230]	The proposed development site does not contain or support connections to foraging and commuting habitat for Lesser Horseshoe bats or otter. There will therefore be no potential for effects on these qualifying interests. No pathway for effect exists between the site of proposed development and the terrestrial habitats within this SAC (as identified), therefore the potential for effects upon those QI's can be excluded. No hydrological connection between the site of the proposed development and this SAC was identified and therefore no potential pathway for effects on any aquatic receptor was identified.

European Sites	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 05/07/2019)	Zone of Likely impact determination
	▪ Limestone pavements [8240] ▪ Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] ▪ Bog woodland [91D0] ▪ Margaritifera margaritifera (Freshwater Pearl Mussel) [1029] ▪ Austropotamobius pallipes (White-clawed Crayfish) [1092] ▪ Petromyzon marinus (Sea Lamprey) [1095] ▪ Lampetra planeri (Brook Lamprey) [1096] ▪ Salmo salar (Salmon) [1106] ▪ Rhinolophus hipposideros (Lesser Horseshoe Bat) [1303] ▪ Lutra lutra (Otter) [1355] ▪ Drepanocladus vernicosus (Slender Green Feather-moss) [1393] ▪ Najas flexilis (Slender Naiad) [1833]	No complete impact source-pathway-receptor chain for impact was identified. Potential for direct and indirect impact on the European Site can be excluded. **The site is therefore not located within the Zone of Likely Impact and no further assessment is required.**
Lough Fingall Complex SAC 13.3km	▪ Turloughs ▪ Alpine and Boreal heaths [4060] ▪ *Juniperus communis* formations on heaths or calcareous grasslands [5130] ▪ Semi-natural dry grasslands and scrubland facies on calcareous substrates (*Festuco-Brometalia*) (* important orchid sites) [6210] ▪ Calcareous fens with *Cladium mariscus* and species of the *Caricion davallianae* [7210] ▪ Limestone pavements [8240] ▪ *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303]	This SAC is located over 13km away from the site of proposed development and is separated by a landscape of varied land-use, topography, hydrology, and the expanse of Galway Bay. No complete impact source-pathway-receptor chain between this SAC and the site of proposed development was identified. **This site is not in the zone of likely impact, therefore no further assessment is required.**
Ross Lake and Woods SAC 14.6km	▪ *Rhinolophus hipposideros* (Lesser Horseshoe Bat) [1303] ▪ Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp. [3140]	This SAC is located over 14km away from the site of proposed development and is separated by a landscape of varied land-use and topography. It is in an entirely separate hydrological catchment.

European Sites	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 05/07/2019)	Zone of Likely impact determination
		No complete impact source-pathway-receptor chain between this SAC and the site of proposed development was identified. **This site is not in the zone of likely impact, therefore no further assessment is required.**
Connemara Bog Complex SAC (002034) 14.6km	▪ Coastal lagoons [1150] ▪ Reefs [1170] ▪ Oligotrophic waters containing very few minerals of sandy plains (*Littorelletalia uniflorae*) [3110] ▪ Oligotrophic to mesotrophic standing waters with vegetation of the *Littorelletea uniflorae* and/or *Isoeto-Nanojuncetea* [3130] ▪ Natural dystrophic lakes and ponds [3160] ▪ Water courses of plain to montane levels with the *Ranunculion fluitantis* and *Callitricho-Batrachion* vegetation [3260] ▪ Northern Atlantic wet heaths with *Erica tetralix* [4010] ▪ European dry heaths [4030] ▪ *Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (*Molinion caeruleae*) [6410] ▪ Blanket bogs (* if active bog) [7130] ▪ Transition mires and quaking bogs [7140] ▪ Depressions on peat substrates of the *Rhynchosporion* [7150] ▪ Alkaline fens [7230] ▪ Old sessile oak woods with Ilex and Blechnum in the British Isles [91A0] ▪ *Euphydryas aurinia* (Marsh Fritillary) [1065] ▪ *Salmo salar* (Salmon) [1106] ▪ *Lutra lutra* (Otter) [1355] ▪ *Najas flexilis* (Slender Naiad) [1833]	This SAC is located over 14km away from the site of proposed development and is separated by a landscape of varied land-use and topography. It is in an entirely separate hydrological catchment No complete impact source-pathway-receptor chain between this SAC and the site of proposed development was identified. **This site is not in the zone of likely impact, therefore no further assessment is required.**
Special Protected Areas (SPA)		
Inner Galway Bay SPA 0.8km	▪ Great Northern Diver (*Gavia immer*) [A003] ▪ Cormorant (*Phalacrocorax carbo*) [A017]	Given the distance between the site of proposed development and this SPA,

European Sites	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 05/07/2019)	Zone of Likely impact determination
	▪ Grey Heron (*Ardea cinerea*) [A028] ▪ Light-bellied Brent Goose (*Branta bernicla hrota*) [A046] ▪ Wigeon (*Anas penelope*) [A050] ▪ Teal (*Anas crecca*) [A052] ▪ Shoveler (*Anas clypeata*) [A056] ▪ Red-breasted Merganser (*Mergus serrator*) [A069] ▪ Ringed Plover (*Charadrius hiaticula*) [A137] ▪ Golden Plover (*Pluvialis apricaria*) [A140] ▪ Lapwing (*Vanellus vanellus*) [A142] ▪ Dunlin (*Calidris alpina*) [A149] ▪ Bar-tailed Godwit (*Limosa lapponica*) [A157] ▪ Curlew (*Numenius arquata*) [A160] ▪ Redshank (*Tringa totanus*) [A162] ▪ Turnstone (*Arenaria interpres*) [A169] ▪ Black-headed Gull (*Chroicocephalus ridibundus*) [A179] ▪ Common Gull (*Larus canus*) [A182] ▪ Sandwich Tern (*Sterna sandvicensis*) [A191] ▪ Common Tern (*Sterna hirundo*) [A193] ▪ Wetlands [A999]	direct impacts upon the SPA can be excluded. However, indirect impacts of the development are also considered within the NIS. There is no potential for the proposed development to result in any disturbance related effects on the SCI species of the SPA. The site is located approximately 800metres from the SPA and is buffered from it by high density urban and industrial infrastructure within Galway City. The site of proposed development does not provide any habitat suitable for foraging/commuting birds that are SCI species of the SPA. Though no watercourses were identified on-site, the construction and operational phases of the proposed development may result in pollution to groundwaters and surface waters, as described in the "zone of likely impact," determination for Galway Bay SAC. Galway Bay Complex SPA lies to the south-west of the proposed development site. This SPA is **within the likely zone of impact**, due to the potential for pollutants to be transmitted to it indirectly via ground and surface water.

European Sites	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 05/07/2019)	Zone of Likely impact determination
Lough Corrib SPA 3.9km	▪ Gadwall (*Anas strepera*) [A051] ▪ Shoveler (*Anas clypeata*) [A056] ▪ Pochard (*Aythya ferina*) [A059] ▪ Tufted Duck (*Aythya fuligula*) [A061] ▪ Common Scoter (*Melanitta nigra*) [A065] ▪ Hen Harrier (*Circus cyaneus*) [A082] ▪ Coot (*Fulica atra*) [A125] ▪ Golden Plover (*Pluvialis apricaria*) [A140] ▪ Black-headed Gull (*Chroicocephalus ridibundus*) [A179] ▪ Common Gull (*Larus canus*) [A182] ▪ Common Tern (*Sterna hirundo*) [A193] ▪ Arctic Tern (*Sterna paradisaea*) [A194] ▪ Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395] ▪ Wetland and Waterbirds [A999]	This SPA is located more than 3km from the site of the proposed development and is separated from it by various urban land uses and supports no suitable habitat for SCI species. There is no hydrological connection to the site of the proposed development and the SPA. No complete impact source-pathway-receptor chain for impact between this SPA and the site of proposed development was identified. Based on the nature and scale of works and the distance from this SPA, potential for direct or indirect impact on the European Site can be excluded. **This site is not in the zone of likely impact, therefore no further assessment is required.**
Cregganna Marsh SPA 6.6km	▪ Greenland White-fronted Goose (*Anser albifrons flavirostris*) [A395]	This SPA is over 6.6 km away from the site of proposed development, separated by a landscape of varied land-use, topography and hydrology. The site is urban in nature and supports no suitable habitat for the SCI species (Greenland White-fronted geese) and effects thereon can be excluded. No complete impact source-pathway-receptor chain between this SPA and the site of proposed development was identified. **This site is not in the zone of**

European Sites	Qualify Interests/Special Conservation Interests for which the European site has been designated (Sourced from NPWS online Conservation Objectives, www.npws.ie on the 05/07/2019)	Zone of Likely impact determination
		likely impact, therefore no further assessment is required.

The following European Sites were identified as being within the Zone of Likely Impact and taking a precautionary approach, pathways for adverse effects were identified with regard to the following QI/SCI habitats and species:

- Aquatic Habitats and Species within Galway Bay Complex SAC
  - Mudflats and sandflats not covered by seawater at low tide [1140]
  - Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]
  - Mediterranean salt meadows (*Juncetalia maritimae*) [1410]
  - Perennial Vegetation of Stony Banks [1220]
  - Coastal lagoons [1150]
  - Large shallow inlets and bays [1160]
  - Reefs [1170]
  - Salicornia and other annuals colonising mud and sand [1310]
  - *Lutra lutra* (Otter) [1355]
  - *Phoca vitulina* (Harbour Seal) [1365]

- Inner Galway Bay SPA
  - Great Northern Diver (*Gavia immer*) [A003]
  - Cormorant (*Phalacrocorax carbo*) [A017]
  - Grey Heron (*Ardea cinerea*) [A028]
  - Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]
  - Wigeon (*Anas penelope*) [A050]
  - Teal (*Anas crecca*) [A052]
  - Shoveler (*Anas clypeata*) [A056]
  - Red-breasted Merganser (*Mergus serrator*) [A069]
  - Ringed Plover (*Charadrius hiaticula*) [A137]
  - Golden Plover (*Pluvialis apricaria*) [A140]
  - Lapwing (*Vanellus vanellus*) [A142]
  - Dunlin (*Calidris alpina*) [A149]
  - Bar-tailed Godwit (*Limosa lapponica*) [A157]
  - Curlew (*Numenius arquata*) [A160]
  - Redshank (*Tringa totanus*) [A162]
  - Turnstone (*Arenaria interpres*) [A169]
  - Black-headed Gull (*Chroicocephalus ridibundus*) [A179]
  - Common Gull (*Larus canus*) [A182]
  - Sandwich Tern (*Sterna sandvicensis*) [A191]
  - Common Tern (*Sterna hirundo*) [A193]
  - Wetlands [A999]

Two potential pathways for effect were identified:

1. Pollution of Groundwaters during the construction phase through construction activity on a karst limestone site with the overburden removed and small scale excavations undertaken. This has the potential to result in effects on water quality in the identified SAC and SPA that are likely to be hydrologically connected to the site.
2. Pollution of surface waters within the public storm water sewer during construction and operation following pumping of waters arising on the site to the sewer if necessary to facilitate construction and during operation.

3.3 Review of Conservation Objectives for Galway Bay Complex SAC

The relevant QIs and the associated conservation objectives of the site are presented in Table 3.2. The Target and Attributes for the habitats, as described in the Galway Bay

Complex SAC Conservation Objectives supporting documents, were reviewed and considered in this assessment.

Table 3.2. Qualifying Interest and Conservation Objectives (Version 01, 2013)

Special Conservation Interest	Conservation Objective (Version 1, May 2013)
Mudflats and sandflats not covered by seawater at low tide [1140]	*To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide in Galway Bay Complex SAC*
Coastal lagoons [1150]	*To restore the favourable conservation condition of Coastal lagoons in Galway Bay Complex SAC*
Large shallow inlets and bays [1160]	*To maintain the favourable conservation condition of Large shallow inlets and bays in Galway Bay Complex SAC*
Reefs [1170]	*To maintain the favourable conservation condition of Reefs in Galway Bay Complex SAC*
Salicornia and other annuals colonising mud and sand [1310]	*To maintain the favourable conservation condition of Salicornia and other annuals colonizing mud and sand in Galway Bay Complex SAC*
Lutra lutra (Otter) [1355]	*To restore the favourable conservation condition of Otter in Galway Bay Complex SAC*
Phoca vitulina (Harbour Seal) [1365]	*To maintain the favourable conservation condition of Harbour Seal in Galway Bay Complex SAC*

3.3.1 Review of site-specific pressures and threats for Galway Bay Complex SAC

As per the Natura 2000 Data Form (NPWS, 2015), the site-specific threats, pressures and activities with potential to impact on the SAC are as follows:

- H01.08 diffuse pollution to surface waters due to household sewage and waste waters (High)
- I01 invasive non-native species (Medium)
- A04.02.02 non- intensive sheep grazing (Medium)
- J02.01.02 reclamation of land from sea, estuary or marsh (Medium)
- D03.01.01 slipways (Low)
- D01.01 paths, tracks, cycling tracks (Low)
- J02.05.01 'modification of water flow (tidal & marine currents) (Low)
- J02.01.02 'reclamation of land from sea, estuary or marsh (Medium)
- G02.01 golf course (Low)
- C01.01 Sand and gravel extraction (Medium)
- H01.05 diffuse pollution to surface waters due to agricultural and forestry activities (High)
- J02.12.01 sea defense or coast protection works, tidal barrages (High)
- A04.02.01 non- intensive cattle grazing (Medium)
- D03 shipping lanes, ports, marine constructions (High)
- F02.03.01 'bait digging / collection (Low)

The proposed development has identified the potential to result in: *H01.08 diffuse pollution to surface waters due to household sewage and waste waters (High).* The development has the potential, in the absence of best practice and mitigation, to result in *pollution to surface waters.*

No pathways for impact with regard to any additional site-specific threats, pressures and activities were identified.

3.4 Review of Conservation Objectives for Inner Galway Bay SPA

The relevant QI and the associated conservation objective of the site are presented in Table 3.3. The Target and Attributes for the species, as described in the Inner Galway Bay SPA Conservation Objectives supporting documents, were reviewed and considered in this assessment (NPWS, 2013[2]).

Table 3.3. Qualifying Interest and Conservation Objectives (Version 01, 2013)

Special Conservation Interest	Conservation Objective (Version 01, May 2013)
Great Northern Diver (Gavia immer) [A003]	*To maintain the favourable conservation condition of the bird species as Special Conservation Interests for this SPA.*
Cormorant (*Phalacrocorax carbo*) [A017]	
Grey Heron (*Ardea cinerea*) [A028]	
Light-bellied Brent Goose (*Branta bernicla hrota*) [A046]	
Wigeon (*Anas penelope*) [A050]	
Teal (*Anas crecca*) [A052]	
Shoveler (*Anas clypeata*) [A056]	
Red-breasted Merganser (*Mergus serrator*) [A069]	
Ringed Plover (*Charadrius hiaticula*) [A137]	
Golden Plover (*Pluvialis apricaria*) [A140]	
Lapwing (*Vanellus vanellus*) [A142]	
Dunlin (*Calidris alpina*) [A149]	
Bar-tailed Godwit (*Limosa lapponica*) [A157]	
Curlew (*Numenius arquata*) [A160]	
Redshank (*Tringa totanus*) [A162]	
Turnstone (*Arenaria interpres*) [A169]	
Black-headed Gull (*Chroicocephalus ridibundus*) [A179]	
Common Gull (*Larus canus*) [A182]	
Sandwich Tern (*Sterna sandvicensis*) [A191]	
Common Tern (*Sterna hirundo*) [A193]	
Wetland [A999]	*'To maintain the favourable conservation condition of wetland habitat in Inner Galway Bay SPA as a resource for the regularly occurring migratory waterbirds that utilise it.'*

3.4.1 Review of site-specific pressures and threats for Inner Galway Bay SPA

As per the Natura 2000 Data Form (NPWS, 2015), the site-specific threats, pressures and activities with potential to impact on the SPA are as follows:

- E02 Industrial or commercial areas (Medium)
- A04 grazing (Low)

[2] NPWS, 2013, Inner Galway Bay Special Protection Area; Conservation Objectives Supporting Document VERSION 1

- F01 Marine and Freshwater Aquaculture (Medium)
- G01.02 walking, horse-riding and non-motorised vehicles (Medium)
- J02.12 'Dykes, embankments, artificial beaches, general (Medium)
- J02.01.02 reclamation of land from sea, estuary or marsh (High)
- A08 Fertilisation (Medium)
- E01 Urbanised areas, human habitation (High)
- F02.03 Leisure fishing (Medium)
- E03 Discharges (High)
- F03.01 Hunting (Low)
- G01.01 nautical sports (Medium)
- D01.02 roads, motorways (Medium)

The impact assessment of the proposed development identified potential for water pollution associated with the construction phase and operational phases of the development. No pathways for impact via the site-specific threats, pressures and activities were identified in relation to the Special Conservation Interests for this site.

4 DISCUSSION OF POTENTIAL FOR EFFECTS TAKING INTO ACCOUNT BEST PRACTICE, MITIGATION AND DESIGN FEATURES

4.1 Measures included to prevent pollution of groundwaters during Construction

The measures that are in place to fully block this pathway for potential effect on any European Site are fully described in the project description in Section 3 of the EIAR as provided in Appendix 1, In Section 7 of the EIAR (Hydrology & Hydrogeology) that is provided as Appendix 2 and in the Construction Environmental Management Plan (CEMP) that accompanies the application and is provided as Appendix 3. Where appendices are referenced in Appendix 1, 2 or 3, they refer to the Appendices to the EIAR, for this project, which can be cross referenced if necessary. The measures that are in place to prevent any discharge of potentially polluting materials to groundwater are summarised below:

Measures to prevent pollution from hydrocarbons

- On-site refuelling will be carried out at designated refuelling stations on site.
- Drip trays will be used when refuelling all plant. Absorbent material and pads will be available in the event of any accidental spillages. Alternatively, mobile double skinned fuel bowsers may be used. Fuel bowsers will be parked on a level area in the site when not in use.
- Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays, spill kits and fuel absorbent mats will be used during all refuelling operations.
- Minimal maintenance of construction vehicles or plant will take place on site.
- Drip trays will be used to control on-site refuelling at controlled fuelling stations.
- On-site diesel tanks will be double skinned to 110% of their capacity.
- Containment stores will be used for refuelling of small plant such as consaws etc.
- Any fuel bowsers used on site will be custom-built / bunded to 100% of capacity. Fuel bowsers will be parked on a level area in the construction compound when not in use.
- 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 volumes stored on site will be minimised. Any fuel storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction.
- Plant used will be regularly inspected for leaks and fitness for purpose.
- Any Hazardous Materials will be stored in drip trays in secure containment stores.
- Refuelling/containment store signage will be erected at predetermined locations around the site.

- 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 any accidental spillage in and outside the refuelling area

Measures to avoid effects associated with the disposal of wastewater

- 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;
- No wastewater will be discharged on-site during either the construction or operational phase.

Measures to avoid the release of cement-based material during construction

- 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.

4.2 Measures to avoid pollution of surface waters during construction

Measures to avoid effects on surface waters (public storm sewer) associated with run-off of silt laden water

- A Trade Effluent Discharge License which will regulate flow volumes and quality will be applied for to Galway City Council prior to construction commencing
- As construction advances there may be a small requirement to collect and treat surface water within the site. This will be completed using the existing sump at the western boundary which will be used to pump water to an above ground water holding tank (c20m^3) prior to discharge to the storm sewer
- No pumped construction water will be discharged directly into any local watercourse;
- Daily monitoring and inspections of site drainage during construction will be completed;
- Good construction practices such 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', CIRlA, 2001), which provides information on these issues. This will ensure that surface water arising during the course of construction activities will contain minimum sediment.

Surface water controls that can be employed during the earthworks and construction phase are as follows:

Source controls:
- Small working areas, covering stockpiles, weathering off stockpiles, cessation of works in certain areas or other similar/equivalent or appropriate measures.

In-Line controls:
- Silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriates systems.

Treatment systems:
- Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems.

Silt Fences:
Silt fences will be placed up-gradient of the site sump. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to the sump of sand and gravel sized sediment, released from excavation of mineral sub-soils of glacial and glacio-fluvial origin, and entrained in surface water runoff. Inspection and maintenance of these structures during construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase.

Silt Bags:
Silt bags will be used where small to medium volumes of water need to be pumped from excavations. As water is pumped through the bag, most of the sediment is retained by the geotextile fabric allowing filtered water to pass through. Silt bags will be used with to the east of the site and the discharge allowed percolate to ground.

Monitoring:
An inspection and maintenance plan for the on-site drainage system will be prepared in advance of commencement of any construction works. Regular inspections of the sump and holding tank will be undertaken, especially after heavy rainfall, to check for visual evidence of sediment in the water body.

During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken for the holding tank, and specifically following heavy rainfall events (*i.e.* weekly, monthly, and event-based monitoring is proposed).

4.3 Design features to avoid pollution of surface and ground waters during operation

Foul water drainage has been designed in compliance with Irish Water standards (see Technical Appendix 3-3 of this EIAR). It is proposed to collect all foul water from ground level upwards and discharge to the public foul water sewer network by gravity via an external below ground drainage system. Further information on foul water reduction measures, the proposed external foul water drainage system, and proposed foul water drainage system are available in the engineering planning report relevant

to the proposed development. Surface waters from un-trafficked areas will be connected directly into the public storm sewer. Surface water from the trafficked basement areas will be attenuated and will pass through a hydrocarbon interceptor before being ultimately pumped to the public storm water system.

4.3.1 Conclusion of potential for effects following implementation of preventive measures

Post implementation of avoidance and preventive measures, the identified pathways by which effects on European Sites could potentially occur are robustly blocked. Based on the above, it can be concluded in view of best scientific knowledge, on the basis of objective information that the proposed development will not adversely affect the integrity of any European Site. A detailed assessment of the potential for effects on each of the Targets and Attributes of the relevant QI and SCI species and habitats of the Galway Bay Complex SAC and Inner Galway Bay SPA is provided in Appendix 4.

4.4 Projects Considered in Cumulative Assessment

The potential for the proposed development to contribute to a cumulative impact on European Sites was considered. The Environmental Impact Assessment Report (EIAR) which accompanies this NIS includes a description of likely significant impacts of the project and includes an assessment of cumulative impacts that may arise.

Assessment material for this cumulative impact assessment was compiled on the relevant developments within the vicinity of the proposed development. The material was gathered through a search of the Galway City Council online Planning Register, reviews of relevant Environmental 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 listed below:

- Permitted Phase I Development Crown Square (18/363)
- N6 Galway City Ring Road
- Office Development Ballybrit Business Park – PL Ref 18/338
- Mixed Use Development Bonham Quay – Pl Ref 17/83 / ABP Ref PL 61 .300275 - Granted
- Mixed-Use Development Monivea Road – Pl Ref 16/332 / ABP Ref PL 61 .248815 - Granted

Also considered as part of the cumulative impact assessment are local small-scale developments such as alterations to single dwellings houses and commercial and industrial premises.

4.4.1 Review of Development and Biodiversity Plans

The Policies and Objectives of the Galway City Development Plan, the Regional Planning Guidelines for the West and the National Biodiversity Action Plan were reviewed as part of the assessment of cumulative impacts (See Table 4.1 below).

Table 4.1: Review of plans

Plans	Key Policies/Issues/Objectives Directly Related To European Sites, Biodiversity and Sustainable Development In The Zone of Influence	Assessment of development compliance with policy
Galway City Council Development Plan 2017-2023	**Policy 4.2 Protected Spaces: Sites of European, National and Local Ecological Importance** Protect European sites that form part of the Natura 2000 network (including Special Protection Areas and Special Areas of Conservation) in accordance with the requirements in the EU Habitats Directive (92/43/EEC), EU Birds Directive (2009/147/EC) and associated national legislation.	The surveys undertaken in the preparation of this application and the assessment provided in the preceding sections have demonstrated that the proposed project will not adversely affect the Qualifying Interests/Special Conservation Interests associated with the Galway Bay Complex SAC or Inner Galway Bay SPA.
The Regional Planning Guidelines for the West 2010-2022	**EAP13:** To support the protection of Natural Heritage Areas, Special Protection Areas, Special Areas of Conservation, Nature Reserves, Ramsar Sites (Wetlands), Wildfowl Sanctuaries, National Parks, Nature Reserves and the biodiversity designated under the Habitats Directive, Birds Directive, Wildlife Act, Flora Protection Order and other designated or future designated sites.	
	EAO18: Support the achievement of favourable conservation status of Annex I habitats, Annex II species, Annex I bird species and other regularly occurring migratory bird species and their habitats in the region.	
National Biodiversity Action Plan 2017-2021	**Target 6.2 -** Sufficiency, coherence, connectivity, and resilience of the protected areas network substantially enhanced by 2020.	

4.4.2 Conclusion of in-combination/cumulative assessment

The potential for in-combination impacts to result in cumulative effects when considered in-combination with other plans and projects was assessed. The proposed development has been strategically designed to minimise, and avoid where possible, additional pressures on existing services and infrastructure, including amenity, recreational and otherwise. Future developments have also been considered in this cumulative assessment.

The proposed development will not result in any residual effects on any EU Designated Sites. Therefore, there is no potential for the proposed development to contribute to any cumulative impacts in this regard when considered in-combination with other plans and projects.

5 CONCLUDING STATEMENT

This NIS has provided an assessment of all potential direct or indirect adverse effects on European Sites

Where the potential for any adverse effect on any European Site has been identified, the pathway by which any such effect may occur has been robustly blocked through the use of avoidance, appropriate design and mitigation measures as set out within this report and its appendices. The measures ensure that the construction and operation of the proposed development does not adversely affect the integrity of European sites

Therefore, it can be objectively concluded that the Proposed Development, individually or in combination with other plans or projects, will not adversely affect the integrity of any European Site.

BIBLIOGRAPHY

Birds Directive (2009/47/EC) – http://ec.europa.eu/environment/nature /legislation/birdsdirective /index _en.htm

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).

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 (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.

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.

Ecofact (2017). Screening for Appropriate Assessment on the Demolition of industrial building and construction of private dwelling house and-garage, entrance from the road, connection to the public services and ancillary site development works at Marine Village, Cullenagh, Ballina.

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

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

Habitats Directive (92/43/EEC).

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 Protected Site Synopses and maps available on http://www.npws.ie/en/ProtectedSites/.

Scottish Natural Heritage (SNH) (July 2013) Assessing Connectivity with Special Protection Areas (SPA)

Appendix 1

EIAR Chapter 3 – Description of Proposed Development

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. 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 project strategy envisages that the subject lands will be developed in two distinct stages, with two separate planning applications:

- Phase 1: Commercial Offices (Blocks A-E), Hotel and Site Infrastructure, including all basement structures for the entire site
- Phase 2: Strategic Housing Development - Residential, Leisure and Ancillary Uses

The proposed masterplan includes 85,554sq m of gross floor area (above ground) on a stated site area of 5.1 ha ,(51,148 sqm), which equates to a plot ratio of 1.67:1. It is considered that the proposed development will provide for a development of suitable mass and scale which makes a considerable contribution to the civic amenity of this rejuvenating area.

Figures 3.1-3.3 provide an overview of the proposed development both above and below ground level. Figure 3.4 shows in outline of the Phase 1 stage at the site, which has been granted by Galway City Council under Pl Ref 18/363.

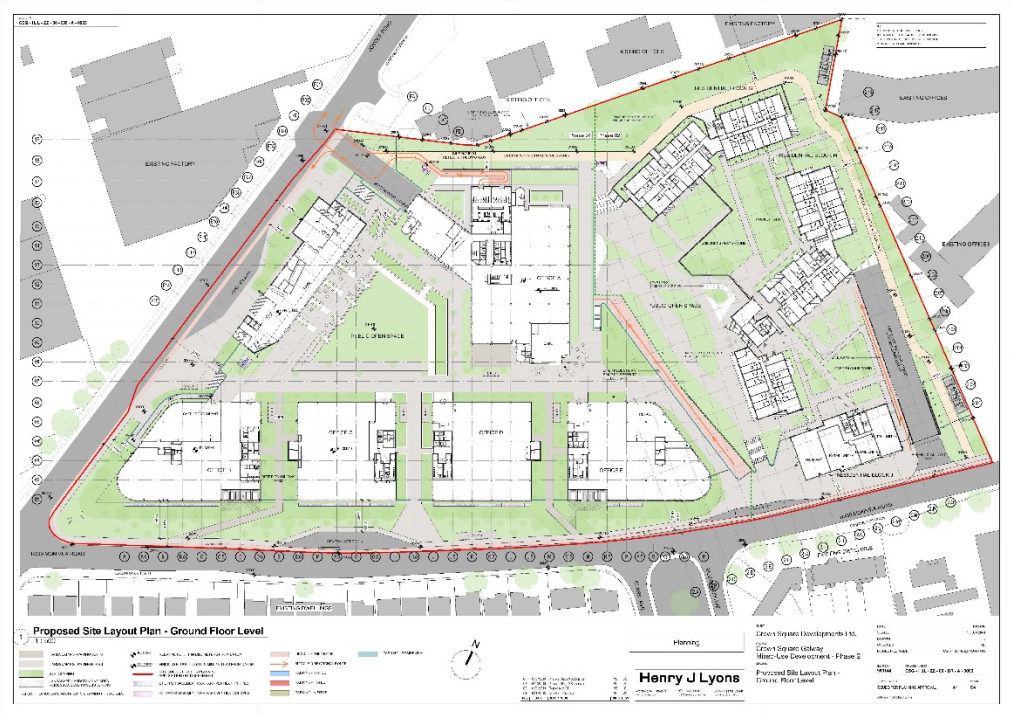


Figure 3.1: Ground Level Layout. Image extracted from Henry J Lyons Design Statement

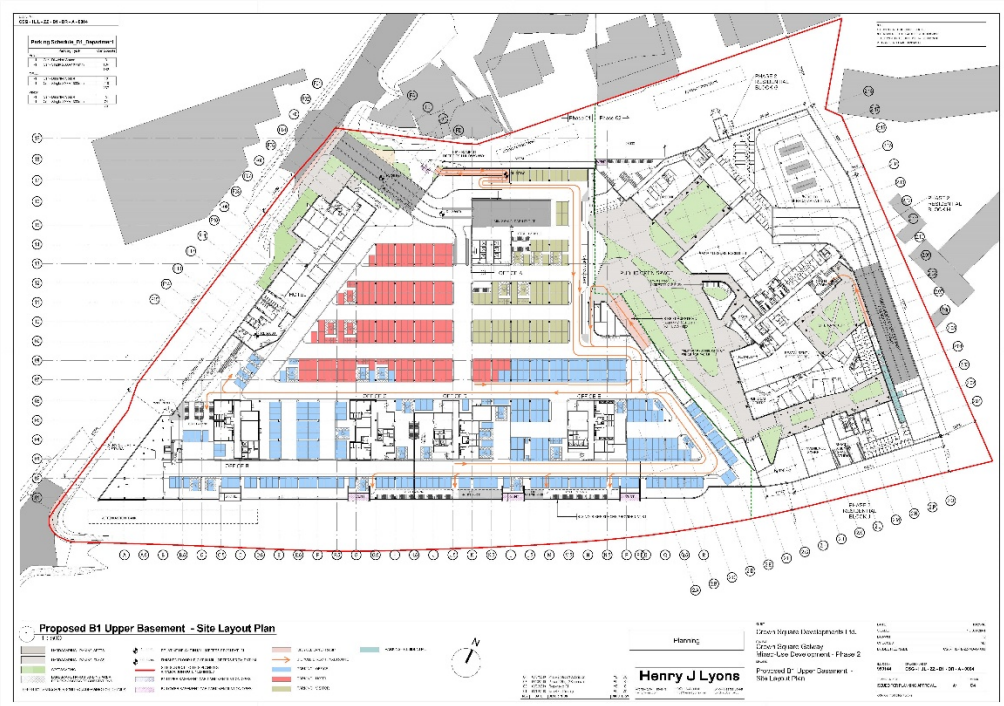


Figure 3.2: Upper Basement Layout. Extracted from Henry J Lyons Planning Drawings

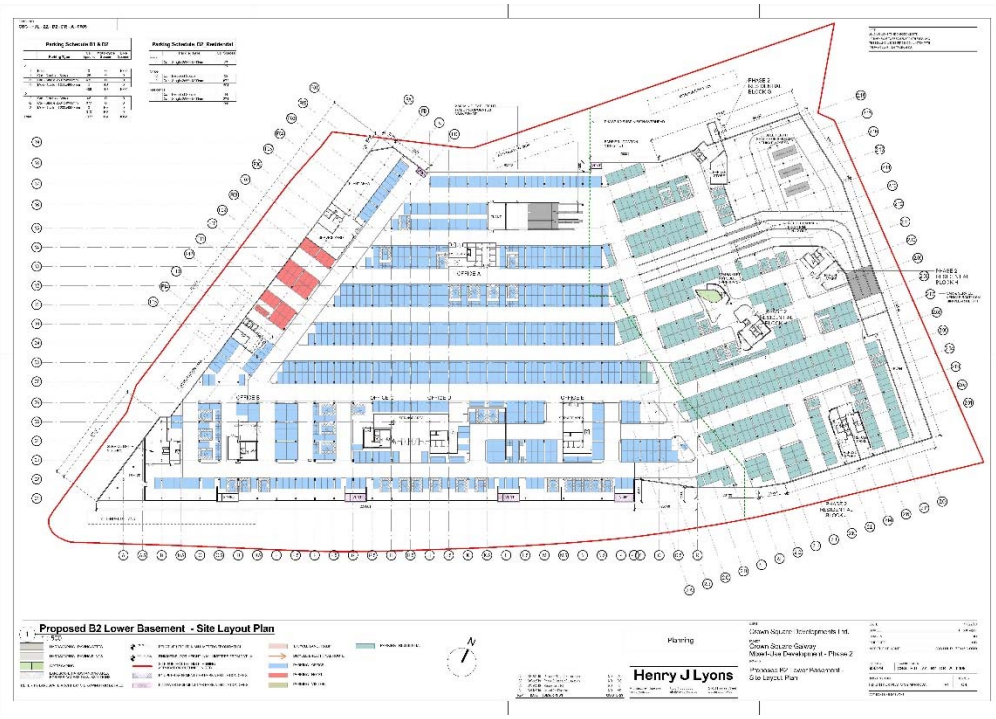


Figure 3.3: Lower Basement Layout. Extracted from Henry J Lyons Planning Drawings

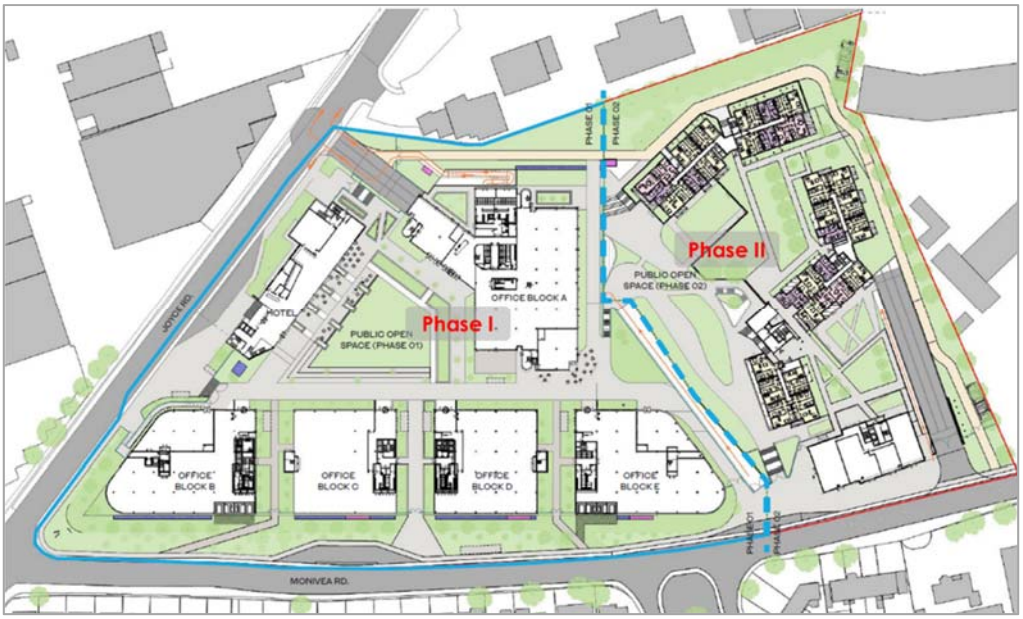


Figure 3.4: Proposed above ground Site Layout, showing the phased development for phase 1 and phase 2.

The first phase of development for which permission has already been obtained from Galway City Council provides for:

- 5 no. blocks of commercial offices which range in height from 3-6 stories over ground floor level (40,405 sqm).
- A hotel development with 5 floors over ground floor level, comprising 175 no. bedrooms, conferencing facilities and restaurant/bar areas (8,675 sqm).
- A double basement which includes a 'high bay' area for service, delivery and waste management vehicles; in addition to the provision of plant, car and bicycle parking, changing/shower areas and locker/amenity facilities (62,175 sqm), incorporating alterations to the existing structures on site permitted under Pl Ref. 06/223/ ABP Ref. PL 61.220893.
- Public realm and landscaping works, including pedestrian and cyclist linkages.
- The provision of vehicular access/egress via Monivea Road and Joyces Road, public transport set-down areas and cycle lanes.
- The provision of substations and associated ancillary works.
- All other associated site development and servicing works.

The second phase of development (to which this EIAR applies) comprises a residential scheme with associated commercial, leisure and ancillary uses. The Phase II development (Figure 3.1) will consist of:

1. A residential scheme comprising 288 no. apartments and amenity accommodation with a gross floor area of 32,379 sqm, which will include:
    - Block G (104 no. units); Block H (136 no. units) and Block J (48 no. units).
    - 75 no. one-beds (26%); 185 no. two-beds (64.2%); and 28 no. three-bed units (9.7%)
    - Ancillary residential amenity areas (1,275 sqm).
    - Block G extends to eight-storeys, Block H extends to seven-storeys and Block J extends to five-storeys.

- External balconies are provided on all elevations.

2. A commercial scheme with a cumulative gross floor area of 4,096 sqm, which will include:
    - A neighbourhood facility comprising a restaurant (500 sqm), café (50 sqm), local convenience store (225 sqm), a pharmacy (200 sqm), 5 no. retail/commercial units (797 sqm in total), a crèche (310 sqm)
    - A fitness/leisure facility (1,140 sqm); and
    - A medical centre (655 sqm).
3. Public realm and landscaping works, including pedestrian and cyclist linkages.
4. Vehicular access to the double basement permitted under Pl Ref 18/363 and the allocation of 288 no. car parking spaces located on the lower basement level to service the residential units. Visitor car parking will be provided on the upper basement level and will be managed in accordance with an Operational Management Plan and a Mobility Management Plan.
5. The provision of a dedicated cyclist ramp and 733 no. secure bicycle parking spaces located in the upper basement permitted under Pl Ref 18/36 (comprising 529 no. residential; 144 visitor parking and 60 no. bicycle parking spaces to service the neighbourhood facility).
6. All other associated site development, plant and servicing works.
7. The application will be supported by an Environmental Impact Assessment Report and a Natura Impact Statement.

While this EIAR relates only to the second phase of the proposed project strategy, the first phase has been included in the cumulative assessments for each chapter. The groundworks and basement structures are included in both phases, but will only be constructed once. The application will be supported by an Environmental Impact Assessment Report and a Natura Impact Statement.

3.2 Existing Site Description

3.2.1 Site Layout

The subject site extends to 5.12 ha and is located in the north-east of Galway City in Mervue, at the junction of the Monivea Road and Joyce's Road. The IDA Business Park and Mervue Industrial Estate are located to the west/south-west of the site and the Eircom Telecommunications site immediately borders the subject site to the north-east. Medium density residential development is located to the east of the site along the Monivea Road. The proposed development layout is shown on Figures 3.1-3.3.

Development permitted under Pl Ref. 06/223/ ABP Ref. PL 61.220893 has previously commenced and substantial works have been completed. Following the onset of the economic recession, development was put on hold and the site was hoarded up. An Extension of Duration was granted until 12/09/2017 which has since expired. Phase 1 of the current site masterplan was given permission by Galway City Council under Pl Ref 18/363, and the site has recently become active. A summary of the site's planning history is provided in Section 2.2 of this EIAR.

There are no Protected Structures or Recorded Monuments on the proposed site. The nearest Recorded Monument to the subject lands comprises a 18th/19th Century House (Recorded Number GA082-088), located circa 200 metres south of the site. The building is also designated as a Protected Structure under the extant Development Plan (RPS no. 6002).

The Galway Bay Complex Special Area of Conservation (Site Code 000268) and Inner Bay Special Protection Area (Site Code 004031) is located circa 1km south west of the proposed site.

3.2.2 Site Access

Existing vehicular access to the development is available via Joyce's Road (note: Connolly Avenue, as shown on the OSI mapping, is generally locally called Joyce's Road). 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.

Access for vehicles to the proposed development after the construction phase will be via a new site entrances from the R339 Regional Road, known as the Monivea Road, and a second entrance from Joyces Avenue local road as shown below in Figure 3.4. Both of these entrances will descend into the underground basement levels. Surface roads will therefore be limited to immediately inside the site entrances only.

Various access points will also be required along the Monivea Road and Joyces Avenue to be engineered with ease and safety of access for pedestrians and cycle transport. The proximity to Galway City centre and other suburbs such as Wellpark will mean that sustainable forms of transport to and from the site will be designed into the project.

Car parking, bicycle parking and service delivery temporary parking will be located in the basement levels. A network of footpaths throughout the proposed development will provide a high rate of accessibility to the local facilities in Galway. 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, as well as encouraging those living in the surrounding area to walk to the proposed development, rather than taking their car.

3.2.2.1 Access arrangements for pedestrians

During the construction phase of the proposed development, pedestrian access will not be permitted for the public to the site. In the final stages of works completion, barriers and/or signage will be used to prevent the public from accessing any areas where works are ongoing if necessary.

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) has been produced and is included as Appendix 3-2. The CEMP provides the Construction and Environmental management framework to be adhered to during the pre-commencement and construction phases of the proposed development and it incorporates the mitigating principles to ensure that the work is carried out in a way that minimises the potential for any environmental impacts to occur.

3.3.1 Hoarding

The site areas will be enclosed with a hoarding, details of which are to be agreed with Galway City Co. Hoarding panels will be maintained and kept clean for the duration of the project. 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 staff at all times,
- Install access security in the form of turn-styles and gates for staff,
- Separate 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 (i.e. the proposed development) is complete, the site will not be open to members of the public. However, the general public will have right of way along the roads surrounding the site. When vehicles are entering the site, or leaving the site, these movements will 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 will be put in place to warn and safely direct cyclists around obstructions.

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 7.00am to 7.00pm in the evening from Monday to Friday, and 7:00am to 2:00pm on Saturday. The construction phase of the proposed development is expected to last approximately two-three 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.

It is assumed that most construction traffic approaching the site will travel via the Tuam Road and Monivea Road. The Traffic and Transport Assessment (located in Appendix 12-1) for the construction stage will identify haulage routes and restrictions as appropriate in discussion with the Local Authority.

3.3.5 Size of Vehicles

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

- Skip lorries. These will include roll on/roll off skips for major demolition works and standard yard skips for waste.
- Spoil/rock excavation. – Some limited and localised excavations will be required to construct foundations, etc. The site has
- Ready mix concrete lorries.
- Flatbed delivery vehicles for the delivery of various material.

3.3.6 Parking and Loading Arrangements

Material deliveries comprise largely of steel and concrete for the substructure, and concrete/precast concrete units/steel, timber, glazing and cladding for the superstructure. The main activity is likely to occur during the construction of the remaining substructure, where large concrete pours may be required.

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.

Parking for site operatives will be a requirement throughout the contract. It would be expected that a site of this size would generate a requirement for in the region of 300 site operatives during the peak period of construction, and which would lead to a parking requirement for about 100 vehicles.

During the early stages parking will be available on the areas of site where construction of blocks has yet to begin. Given the close proximity of the bus routes and bus stops to the development site it is considered reasonable that this could be a mode of transport during the construction stage. It is anticipated that due to the large area of the site the parking demand will be accommodated within the site.

During the main period of construction, space for parking will become available for site operatives in the basement car park, and the reliance on alternative facilities will be reduced. Parking demand will be accommodated in the basement car park which is proposed to contain 1,425 car parking spaces. A Traffic Management Plan for the construction stage would include parking arrangements and be agreed with Galway City Council prior to commencement of the works on site.

3.3.7 Temporary Site Accommodation and Facilities

Temporary 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 security fencing.

3.3.8 Phasing

The proposed development is the second of two distinct phases for the site. This EIAR deals directly with this second phase, as well as cumulatively assessing the first phase of the site works. Layout details of the development are shown in Figures 3.1-3.3, and in Appendix 3-3 of this EIAR.

The Phase 1 development will be to the west of the site along the Monivea and Joyce's Roads. Phase 1 will comprise of the construction of 5 office blocks, 4 of which are located on the footprint of the previously constructed basement carparks, and a standalone hotel building. The hotel fronts and has vehicular set-down on the Joyce's Road. It is also accessed as are all of the offices from the new central public space at ground level.

Phase 2 will front the eastern end of the Monivea Road frontage and extend to the northern site boundary over the following basement level completion. This basement structure is included in both the Phase 1 and Phase 2 applications, as it is intrinsically

linked to both. Phase 2 is mainly residential apartments. Other complementary and neighbourhood facilities are proposed including a Restaurant, Cafe/Coffee Shop, Convenience Store, Medical Centre, Pharmacy, Other Small Retail/Service. These are proposed at ground/lower ground and first floor levels fronting both Monivea Road and the new Phase 2 public open space.

The site as proposed would be expected to require approximately 3 years to complete from occupation of the site (Appendix 3-4 Outline Construction Programme). Activities would include:

- Site Clearance;
- Excavation and Spoil Removal;
- Construction of Substructure;
- Construction of Superstructure; and
- Fitting and finishing.

The site will exhibit distinct characteristics during each stage of the construction programme, with varying demands for site deliveries, spoil removal, and car parking by site operatives.

Further information on phasing activities, including construction of the lower and upper basement, as the proposed order of construction for each element of the Phase 2 works included in Section 3.5.5 below.

3.3.9 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.

An Estate Director will be responsible for the overall management of the development. The property management company will have the following responsibilities for the apartments within the development once constructed:

- Team management;
- Health and safety;
- Risk management;
- Implementation of estate policies and procedures;
- Tenant management;
- Security and,
- Cleaning and maintenance

Further details of the operational phase property management are provided in Appendices 3-9 and 3-10.

3.3.10 Energy Use

As part of the proposed development the following strategies and technologies will be incorporated where practical to provide a new high efficiency installation;

- Where possible equipment will be listed on the SEAI Triple E register
- An intelligent, computer-based BMS - building management system - ensuring control systems are set correctly for different weather conditions and occupancy levels. Operational costs can be reduced by maintaining appropriate temperatures and ensuring that heating equipment and controls are operated and managed correctly.

- Set appropriate hot water temperatures - Excessive heating of hot water is wasteful and could scald staff or guests. The optimum temperature for stored hot water is 60ºC which is adequate to kill Legionella bacteria and is sufficiently warm for staff and guests to use.
- Match ventilation to demand - Ventilation requirements may vary at different times and in different parts of a building throughout the day. Check that operating times for ventilation and cooling systems are consistent with the occupancy patterns of the building, unless ventilation is being used to provide cooling overnight.
- Low energy fans for ventilation systems
- Installing variable-speed drives to ensure pumps and fans only operate at the speeds necessary to meet demand. This reduction in speed saves energy and there are corresponding heating and cooling cost savings too.
- High efficiency motors – low loss and variable speed types with good controls
- LED lighting for both general and emergency lighting
- Automatic lighting controls to minimise electricity consumption where applicable
- Heat metering – every circuit will be provided with its own heat meter to allow quantification across the different areas.
- Water Saving Measures -wasting water is literally throwing money down the drain. All premises could benefit from the installation of water conserving devices such as:
    - Tap controls – these switch taps off after a certain time and are useful in communal areas such as toilets and leisure facilities.
    - Spray taps and water efficient showerheads – these reduce the volume of water coming out of a tap or shower and can reduce consumption without diminishing the service to the customer, provided the water pressure is adequate.
    - Urinal flush controls – these help to reduce unnecessary flushing in toilets.
- Rainwater harvesting - this is the process of collecting and the storing rainwater that falls on your property. Rainwater shall be collected at carpark level then in turn be distributed to each building. Each building shall be provided with a break tank and distribution system for rainwater and the water shall be used for flushing toilets. Rainwater harvesting is a simple way to reduce your environmental impact and reduce your water usage.
- Heat recovery - It costs money to heat the air inside a building and it may be possible to reclaim some of that energy.
- There is increasing recognition of the benefits of future proofing against increasing fuel costs through energy efficiency and using sustainable technologies. The final design solution will incorporate where possible the most energy efficient systems to provide a complete new operational and sustainable system.

Further details of the project energy saving features can be found in Appendix 3-5.

3.3.11 Site Activities

3.3.11.1 Environmental Management

All proposed site activities will be provided for in an environmental management plan. A Construction and Environmental Management Plan (CEMP) has been prepared for the proposed development and is included in Appendix 3-2 of this EIAR. The CEMP includes details of drainage, waste and water management. It is intended that the CEMP would be updated prior to the commencement of the development, to include all

mitigation measures, conditions and or alterations to the EIAR and application documents that may emerge during the course of the planning process, and will be submitted to Galway City Council for written approval.

3.3.11.2 Refueling

On-site refuelling will be carried out at designated refuelling stations on site. Drip trays will be used when refuelling all plant. Absorbent material and pads will be available in the event of any accidental spillages. Alternatively, mobile double skinned fuel bowsers may be used. Fuel bowsers will be parked on a level area in the compound when not in use.

Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays, spill kits and fuel absorbent mats will be used during all refuelling operations.

The following mitigation measures are proposed to avoid release of hydrocarbons at the site:

- Minimal maintenance of construction vehicles or plant will take place on site.
- Drip trays will be used to control on-site refuelling at controlled fuelling stations.
- On-site diesel tanks will be double skinned to 110% of their capacity.
- Containment stores will be used for refuelling of small plant such as consaws etc.
- Any fuel bowsers used on site will be custom-built / bunded to 100% of capacity. Fuel bowsers will be parked on a level area in the construction compound when not in use.
- 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 volumes stored on site will be minimised. Any fuel storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction.
- Plant used will be regularly inspected for leaks and fitness for purpose.
- Any Hazardous Materials will be stored in drip trays in secure containment stores.
- Refuelling/containment store signage will be erected at predetermined locations around the site.
- 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 any accidental spillage in and outside the refuelling area.

Further spill control measures are noted in Section 5.1.3 of Appendix 3-2 Construction Environment Management Plan.

3.4 Site Landscaping

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 in Appendix 3-6 of 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 Management

3.5.1 Construction Timing

It is expected that building works for the entire of Phase 1 will take in the region of 42 months to complete. Development of Phase 2 is expected to commence 11 months after Phase 1 commencement and will take circa 31 months to complete. These estimations are based on a high-level analysis of the site and proposed scheme. The total timeframe based on above is circa 42 months (3 ½ yrs.).

3.5.2 Construction Sequencing

The development, as described in Section 3.3 above, will be completed in key phases as set out below;

- Temporary site accommodation & welfare facilities
- Final breaking/trimming of rock to formation
- Pads/foundations
- Lower basement drainage
- Lower basement slab
- Rising elements lower basement / upper basement
- Upper basement slab
- Rising elements upper basement / podium
- Podium / Ground floor slab
- Residential and commercial superstructure
- Residential and commercial façade / roof
- Boundary treatments
- Completion of vehicular access, car and cycle parking
- Residential fitout
- Commercial/leisure premises fitout
- Podium slab/courtyard hard/soft landscaping

Construction methodologies for all individual Phase 2 works, including construction of the basement (previously permitted under Phase 1), residential units, commercial premises and site access is contained within Appendix 3-2 Section 2.4.

3.5.3 Construction Phase Monitoring and Oversight

As detailed in Section 7 of Appendix 3-2-Construction and Environmental Management Plan (CEMP), monitoring measures are listed which relate to the construction phase of the proposed development.

It is intended that the CEMP will be updated prior to the commencement of the development, to include all monitoring measures, conditions and or alterations that may emerge during the course of the planning process and will be submitted to the Planning Authority for written approval.

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. Environmental inspections will ensure that the works are undertaken in compliance with this CEMP and all other planning application documents. Only suitably trained staff will undertake environmental site inspections.

Further information regarding site inspections, site environmental audits and environmental compliance are detailed in Appendix 3-2, Section 9.

3.6 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.

3.6.1 General Construction Measures

Prior to any works commencing, surveys will be conducted of the adjoining roads, footpaths and adjoining buildings, photographing and noting any existing damage or defects to structure or road surfaces. A copy of this survey will be retained on site and issued to Galway City Council if required.

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.

3.6.2 Soil Stripping & Temporary Stockpiling

A very limited amount of soil stripping and temporary stockpiling of soils and subsoils may be required around the site as the proposed development progresses. The requirement for this will be very limited due to the existing excavated nature of the site. 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.
- A silt filtration system will be used as appropriate to prevent contamination of any watercourse.

3.6.3 Temporary Site Compound

One temporary construction compound is proposed for the construction phase of the proposed development, located on the northern edge of the development, near the location for the second phase of works. 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 toilets will be provided for the workers on the construction site. An application will be made to connect temporarily to the local sewage network for these site toilets. Wastewater arising on-site from these toilets will be then discharged to the foul sewer network for treatment. Power will be supplied to the compound area by an existing site power connection. The construction compound will be used for temporary storage of some construction materials, prior to their delivery to the required area of the site.

3.6.4 Site Roads

It is currently not envisaged that any constructed site roads will be required. The site has been almost entirely excavated already, and the existing rock formation and temporary access ramp will be used for on-site transport. Another temporary access ramp may also be required on the Monivea and/or Joyces road. The concrete basement floors and access ramps will also be used for construction traffic. Where any areas of temporary roads might be required, a suitable aggregate will be lain on the ground. Before the completion of works on the site, this would be either removed or just covered before the finishing surface is applied.

3.6.5 Excavation and Services Installation

Services will be required to all buildings 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.

3.6.5.1 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.

3.6.6 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.

3.6.6.1 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', CIRlA, 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. The Terryland/Sandy River is located approximately 750m to the west of the proposed site.

The following measures will be put in place to prevent the transportation of silt laden water or pollutants from entering the wider environments including any 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 instream works will 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.
- All discharge, whether foul or surface water discharge will enter the public sewer network via an external below ground drainage system as detailed below.

As noted in Appendix 3-3 - Engineering Planning Report; both foul and surface water drainage systems have been designed in accordance with *"Irish Water Code of Practice for Wastewater Infrastructure"* design guide.

Foul Water Drainage

The general approach taken for the design of the proposed foul water drainage system is to collect all foul water from ground level upwards and discharge to the public foul water sewer network by gravity via an external below ground drainage system. This will minimise the volume of foul water which will need to be pumped from the development and, furthermore, reduce the volume of emergency storage required in the pumping station.

It is noted that the development will incorporate water conservation measures in the sanitary facilities. These will include low flow dual flush toilets, and monobloc low volume push taps. These will reduce the foul discharge from the development.

Further information relating to foul water drainage is noted in Section 2 of Appendix 3-3.

Surface Water Drainage

The drainage system has been designed with the aim of providing a sustainable drainage solution ensuring, in so far as feasible, that the development has a minimal impact on the existing public surface water sewer system. This is achieved with the incorporation of Sustainable urban Drainage Systems (SuDS).

Similar to the design of foul water drainage, the general approach taken for the design of the proposed surface water drainage system is to collect all surface water from ground level upwards and discharge to the public surface water sewer network by gravity via an external below ground drainage system. This will minimise the volume of surface water which will need to be pumped from the development, hence reducing the whole life cost and impact for the development

Further information relating to surface water drainage and SuDS implementation is noted in Section 3 of Appendix 3-3.

Construction Phase Water Management

As the basement is already excavated only minimal water / rainwater will need to be removed from site. It is planned to let rainwater soak naturally back into the ground in areas not being worked on. In zones under construction it is proposed to run any excess water through an environmental structure such as a settlement tank / silt trap and

pump clean water into the combined sewer at an agreed discharge rate during the construction phase (subject to Galway City Council agreement).

A discharge monitoring inspection programme will be put in place and agreed with the Galway City Council Drainage Engineer. This methodology safeguards water quality and provides a solution for catching suspended solids and sediment prior to discharge into the combined sewer.

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.

- Minimal maintenance of construction vehicles or plant will take place on site.
- Drip trays will be used to control on-site refuelling at controlled fuelling stations.
- On-site diesel tanks will be double skinned to 110% of their capacity.
- Containment stores will be used for refuelling of small plant such as consaws etc.
- Any fuel bowsers used on site will be custom-built / bunded to 100% of capacity. Fuel bowsers will be parked on a level area in the construction compound when not in use.
- 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 volumes stored on site will be minimised. Any fuel storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction.
- Plant used will be regularly inspected for leaks and fitness for purpose.
- Any Hazardous Materials will be stored in drip trays in secure containment stores.
- Refuelling / containment store signage will be erected at predetermined locations around the site.
- 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 any accidental spillage in and outside the refuelling area.

3.6.7 Landscaping works

Prior to completion of works on the development site, the landscaping works will be carried out. The proposed landscaping plan is shown in Appendix 3-6 of this EIAR. The finishes include areas of amenity grassland, footpaths and tree planting. This work will be carried out before the completion of the proposed development in order to ensure that the development will be aesthetically pleasing place for people to work and stay. 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. Solid barriers will be erected around the site boundary for the duration of the construction works.

3.6.8 Invasive Species

No invasive species were recorded on the site; therefore no effects from invasive species are anticipated. 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.

3.6.8.1 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:

- All earthworks machinery will be thoroughly pressure-washed prior to arrival on site and prior to their further use elsewhere.
- 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 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).

3.7 Other Site Details

Further site details, including management and mitigation during construction and operation of the proposed development are detailed below and further referenced in Appendix 3-2, CEMP.

3.7.1 Waste Management

A project specific Waste Management Plan (WMP) has been prepared for the site (Appendix 3-7) which outlines the best practice procedures during the construction phases of the project. This WMP should be used alongside the CEMP (Appendix 3-2). 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.

The primary aim of the WMP will be to prevent and thereby reduce the amount of waste generated at each stage of the project. Reusing as much of the waste generated on site as possible will reduce the quantities of waste that will have to be transported off site to recovery facilities or landfill. Where waste cannot be reused, a target of 92% of waste generated is to be recycled as noted in Appendix 3-2. There are a number of established markets available for the beneficial use of Construction and Demolition waste such as using waste concrete as fill for new roads. At all times during the implementation of the WMP, disposal of waste to landfill will be considered only as a last resort.

Prior to the commencement of the proposed development a member of the on-site construction management staff will be assigned the role of Waste Management Coordinator. The Waste Management Coordinator will be in charge of the implementation of the objectives of the WMP, ensuring that all hired waste contractors have the necessary authorisations and that the waste management hierarchy is adhered to. The person nominated will have sufficient authority so that they can ensure everyone working on the proposed development adheres to the WMP.

The WMP will be adhered to by all Subcontractors / Specialists and all other site personnel involved in the project. The WMP which will be explained during the induction process for all site personnel. The waste hierarchy will always be employed to ensure that the least possible amount of waste is produced during the construction phase. Reuse of certain types of construction wastes such as broken rock will cut down

on the cost and requirement of raw materials therefore further minimising waste levels.

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.

3.7.2 Dust

Construction dust can be generated from many on-site activities such as excavation and backfilling. The extent of dust generation will depend on the type of activity undertaken, the location, the nature of the dust and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather. Construction traffic movements also have the potential to generate dust as they travel along haul routes.

Proposed measures to control dust include:

- Any site haul roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions.
- The designated public roads outside the site and along the main transport routes to the site will be regularly inspected by the foremen for cleanliness and cleaned as necessary.
- Material handling systems and material storage areas will be designed and laid out to minimise exposure to wind.
- Water misting or sprays will be used if required particularly if dusty activities are necessary during dry or windy periods.
- All construction related traffic will have speed restrictions on un-surfaced roads to 15 kph.
- Daily inspection of the construction site to examine dust measures and their effectiveness.
- When necessary, sections of the haul route will be swept using a truck mounted vacuum sweeper; and
- All vehicles leaving the construction areas of the site will pass through a wheel cleansing area prior to entering the local road network.

3.7.3 Noise

Noise emissions arising from construction phase operations at the proposed development site will be at a level which is considered normal for such a building site, and will comply with legal requirements.

If it is necessary to undertake rock breaking along the northern or eastern boundaries, noise levels received at the Eir building, and at the office building outside the northwest corner of the site, may increase temporarily, and the following mitigation measures are proposed here:

- It is proposed that management at these buildings be given adequate advance notice.
- As the duration of breaking may be shortened to several hours by using two or more breakers simultaneously, it may be possible to agree suitable breaking periods which allows shorter intense breaking, thus completing the operation more quickly.

- Alternatively, it may be practical to carry out breaking near these buildings on a Saturday, when the buildings are less occupied.
- The use of quiet breakers is recommended. Such breakers typically produce sound pressure levels which are 2-5 dB lower than conventional units.
- Depending on the location of breaking, it may be feasible to insert a temporary barrier between the breaker and the office buildings. The requirement for a barrier, and the specific dimensions and type, may be determined following identification of locations to be broken out.

No other specific construction mitigation measures are warranted. General measures are proposed as follows:

- 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.
- During the construction phase, an increased number of trucks may arrive at the site during certain activities eg. during concrete pours. It is recommended that a management plan be drawn up to prevent unnecessary congregation of trucks around the site entrance, and that queuing is prohibited on Monivea Road.
- Ensure that operations are designed to be undertaken with any directional noise emissions pointing away from noise-sensitive receptors;
- Local hoarding, screens or barriers will be erected as required to shield particularly noisy activities.
- Drop heights will be minimised when loading vehicles with rubble.
- Vehicles will be prohibited from waiting within the site with their engines running or alternatively, located in waiting areas away from sensitive receptors.
- The use of particularly noise plant will be limited, i.e. avoiding use of particularly noisy plant early in the morning.
- All pneumatic tools will be fitted with silencers/mufflers.
- Diesel generators will be sound proofed to minimise the potential for noise impacts.
- Plant and machinery with low inherent potential for generation of noise and/or vibration will be selected. All construction plant and equipment to be used onsite will be modern equipment and will comply with the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations.
- Regular maintenance of plant will be carried out in order to minimise noise emissions. Particular attention will be paid to the lubrication of bearings and the integrity of silencers.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the works.
- Compressors will be of the "sound reduced" models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.
- Machines, which are used intermittently, will be shut down during those periods when they are not in use.
- Tool Box Talks will be provided to drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation; and,
- Access routes will be condition monitored and maintained in a clean condition.

Certain construction operations, chiefly rock breaking (if required), may give rise to ground borne vibration. If undertaken in proximity to the Eir building, or the office building outside the northwest corner, vibration may be perceptible to building occupants. PPV levels are not expected to approach typically applied criteria with respect to building damage. Nonetheless, it is recommended that real time monitoring of PPV levels be undertaken at both buildings if rock breaking is undertaken within 50 m.

Prior to rock breaking (if required), it is also recommended that the management at the office building outside the northwest corner, and at a laboratory at the northeastern end of the same commercial park, be contacted to determine if inhouse medical or analytical equipment requires real time monitoring of PPV levels while breaking is undertaken.

No specific mitigation measures have been identified with respect to the commissioned development, apart from the following which have been agreed with the applicant:

- Traffic speeds on external site areas will be restricted through layout design and signage. Speed bumps will not be used, due to their tendency to increase noise emissions.
- Clear signage will be posted in carpark areas advising users to refrain from hooting.

3.7.4 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 as required. 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 Sent off site for recovery. All road sweeping vehicles will be emptied off site at a suitably licensed facility as per our construction stage environmental waste management document.

3.7.5 Water Supply

As noted in Appendix 3-3, the following existing public watermain infrastructure exists adjacent to the development:

- 9-inch nominal diameter asbestos watermain located on Joyce's Road with a 150mm diameter Cast Iron connection to the proposed development;
- 300mm nominal diameter asbestos watermain located on Monivea Road and
- 300mm nominal diameter asbestos watermain located on the Tuam Road.

The existing water supply connection is to be retained on site. The extent of the existing connection within the site is not known. This is intended to be confirmed through a utility survey currently being undertaken.

The design loading for foul drainage is used to evaluate an approximation of the water demand on the site, without additional flow to allow for surface water infiltration.

To further reduce the water demand on Irish Water, water supplies and to reduce the foul discharge from the development, water conservation measures will be incorporated in the sanitary facilities throughout the development, e.g. dual flush toilets, Monobloc low volume push taps and waterless urinals.

3.7.6 Water Management

As the basement is already excavated only minimal water / rainwater will need to be removed from site. It is planned to let rainwater soak naturally back into the ground in areas not being worked on. In zones under construction it is proposed to run any excess water through an environmental structure such as a settlement tank / silt trap and pump clean water into the combined sewer at an agreed discharge rate during the construction phase (subject to Galway City Council agreement).

A discharge monitoring inspection programme will be put in place and agreed with the Galway City Council Drainage Engineer. This methodology safeguards water quality and provides a solution for catching suspended solids and sediment prior to discharge into the combined sewer.

Temporary toilets will be provided for the workers on the construction site. An application will be made to connect temporarily to the local sewage network for these site toilets. Wastewater arising on-site from these toilets will be then discharged to the foul sewer network for treatment.

A project specific Waste Management Plan (WMP) has been prepared to accompany the CEMP which outlines the best practice procedures during the construction phases of the project. 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 information on Waste Water Management is referenced in Appendix 3-2 and 3-3.

3.7.7 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.

3.7.8 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
- No site runoff of water or mud.
- 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

Further information can be found in Appendix 3-8, the Construction Traffic Management Plan.

3.8 Operational Phase

The proposed development will require periodic maintenance throughout the operational phase. The operation of a mixed-use development such as this is not a recognised source of environmental emissions or nuisance and so there will be no adverse effects associated with its operation.

It is proposed that any surface water that enters the basement levels of the proposed development will drain via gravity to a silt trap and then an attenuation tank acting as a basement sump, with a hydrocarbon interceptor which is already existing on site. From here, water will be pumped to the Monivea foul sewer which runs along the public road on the Monivea Road.

Surface water from the site will pass through a silt trap before entering attenuation tanks prior to discharging to outfalls on either Connolly Avenue or the Monivea Road. It is proposed that approximately 70% of this surface water discharge will be to Connolly Avenue, while the remaining 30% will be to the Monivea Road.

As described in the Engineering Report (Section 2.2.2) a below ground drainage system will be provided for the site. This will deal with foul water from both the residential/commercial developments and the suspended drainage system in the basement. It is proposed to connect this drainage system to the 675mm diameter public foul water sewer located in the Monivea Road. The limited volume of foul water associated with the -1 & -2 basement is proposed to be collected via an on-site network of pipes in the lower basement and discharged to the Monivea public (Irish Water) foul sewer via two pumping stations. One at the southwestern corner of the site would deal with the foul water from the commercial development, including the hotel, while the residential development on the eastern side of the site would discharge via a pumping station on the southeastern corner. The pumping stations would have expected storage for 24 hours.

Further information on Waste Water Management is referenced in Appendix 3-2 and 3-3.

Water supply to the site will be via an existing onsite 125mm connection to the adjacent public (Irish Water) watermain.

An Operational Phase Waste Management Plan is provided in Appendix 3-9 of this EIAR.

The development will provide approximately 1,104 bike parking spaces. Consideration will be given to the provision of a cycle for rent scheme such as the existing 'Coke Zero' Galway Bike scheme. Car parking spaces (1,377 no.) will be provided in the basement levels of the proposed development. In accordance with the extant Galway City Development Plan requirements provision will be made for disabled parking an area within the car-park visitor spaces may be reserved for 'GoCar' type (rental) facilities and Electrical Vehicle (EV) charging Points will be provided in accordance with the EU Directive - Energy Performance in Building Directive 2018 and the GCDP.

Further information on site operation is provided in the Operational Management Plan (Appendix 3-10).

3.9 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 commercial, recreational and tourism needs. Therefore, it is intended that the proposed development will be retained as permanent, with no intention or requirement for decommissioning.

Appendix 2

EIAR Chapter 7 – Hydrology

7 HYDROLOGY AND HYDROGEOLOGY

7.1 Introduction

7.1.1 Background & Objectives

McCarthy Keville O'Sullivan (MKO), on behalf of Crown Square Ltd, has carried out an assessment of the likely significant effects of a proposed mixed use development at the Crown Square site in Mervue, Galway City on water aspects (hydrology and hydrogeology) of the receiving environment.

This chapter provides a baseline assessment of the environmental setting of the proposed development in terms of hydrology and hydrogeology and discusses the potential impacts that the construction and operation of the proposed development will have. Where required, appropriate mitigation measures to limit any identified significant impacts to water are recommended and an assessment of residual impacts and significance of effects provided.

The objectives of the assessment are:

- Produce a baseline study of the existing water environment (surface water and groundwater including connectivity with local designated sites) in the area of the proposed development site;
- Identify likely negative impacts of the proposed development on surface water and groundwater during construction and operational phases of the development;
- Identify mitigation measures to avoid, remediate or reduce significant negative effects; and,
- Assess significant residual effects and cumulative impacts of the proposed development along with other local commercial and infrastructural developments.

7.1.2 Statement of Authority

McCarthy Keville O'Sullivan Ltd. (MKO) is a specialist planning and environmental consultancy. Based in Galway but working nationwide, we deliver challenging and complex projects on behalf of our clients. MKO employs 50 people across the company's four planning, ecology, environmental and ornithology teams. Our multi-disciplinary service offering and broad range of nationwide experience add real value to our client's projects.

MKO company experience spans the full range of industry sectors, including renewable energy, commercial development, roads and transport infrastructure, ports and marinas, tourism, energy infrastructure, retail, sport and leisure, quarrying and aggregates, manufacturing, education, housing, waste management, water, telecoms and other utilities.

Our areas of expertise and experience include a wide variety of environmental topics, including hydrology and hydrogeology. We routinely are involved with carrying out impact assessments for hydrology and hydrogeology for a large variety of project types.

This chapter of the EIAR was prepared by Michael Watson and John Staunton.

Michael Watson completed an MA in Environmental Management at NUI, Maynooth in 1999. He is a professional geologist (PGeo) and full member of IEMA (MIEMA) as well as a Chartered Environmentalist (CEnv). Michael joined McCarthy Keville O'Sullivan Ltd. in 2014 having gained over 15 years' experience in a Cork-based environmental & hydrogeological consultancy firm. John Staunton holds both a BSc (1st class Hons) and a PhD in Environmental Science. Prior to taking up his position with McCarthy Keville O'Sullivan in October 2014, John worked as a research assistant for several soil and hydrogeological contamination research projects being undertaken by the Earth and Ocean Sciences department in NUI Galway.

7.1.3 Relevant Legislation

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

- European Union (Planning and Development) (Environmental Impact Assessment) Regulations 2001 - 2018
- Planning and Development Act, 2000, as amended;
- 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);
- 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:

- 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;
- European Commission (2017), Environmental Impact Assessment of Projects Guidance on the preparation of the Environmental Impact Assessment Report.
- Institute of Geologists Ireland (2013): Guidelines for Preparation of Soils, Geology & Hydrogeology Chapters in Environmental Impact Statements;
- National Roads Authority (2008): 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

A desk study of the proposed development study area was largely completed prior to the undertaking of field mapping and walkover assessments. The desk study involved collecting all relevant geological, hydrological, hydrogeological and meteorological data for the area. The desk study also included a review of the Engineering Report and Site-Specific Flood Risk Assessment compiled by Punch Consulting Engineers which sets out the proposed surface water drainage, foul water drainage, watermain design and flood protection measures for the proposed development. The following data sources were reviewed:

- Environmental Protection Agency database (www.epa.ie);
- Environmental Protection Agency River Catchment Mapper (www.catchments.ie);
- Geological Survey of Ireland - National Draft Bedrock Aquifer map;
- Geological Survey of Ireland - Groundwater Database (www.gsi.ie);
- Met Eireann Meteorological Databases (www.met.ie);
- National Parks & Wildlife Services Public Map Viewer (www.npws.ie);
- Water Framework Directive Map Viewer (www.catchments.ie);
- Bedrock Geology 1:100,000 Scale Map Series, Sheet 14 (Geology of Galway Bay). Geological Survey of Ireland (GSI, 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).
- Hydrological survey data associated with historical projects on the site
- Site Specific Flood Risk Assessment Report (Punchs 2018)
- Engineering Report (Punch 2018)

7.2.2 Site Investigations

A walkover survey, including drainage mapping and water sampling, was undertaken by MKO staff on 28th September 2018, 9th October 2018 and the 23rd October 2018. PUNCH Consulting Engineers visited the site on the 22nd of June 2018 to establish any potential sources of flooding, likely routes of floodwaters and key features of the site to inform their Site Specific Flood Risk Assessment completed for the development.

The hydrological walkover survey involved:

- Walkover survey and hydrological mapping of the proposed site the surrounding area were undertaken whereby water flow directions and drainage patterns were recorded (where present); and,
- Collection of a surface water sample for chemical analysis`

In 2007, immediately prior to construction works commencing, Irish Drilling Ltd carried out a detailed intrusive site investigation which was described in Chapter 6 comprising the following,

- 16 no. Shell & Auger boreholes and associated sampling

- 7 no. Rotory Core Boreholes to a depth of between 5-14m below ground levels.
- 11 no. Trial Pits

The Irish Drilling Report is included in Appendix 6-1 of this EIAR.

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 9.1 are then used to assess the potential effect that the Proposed Development may have on them.

Table 9.1 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 Site Description & Topography

The proposed development site is located in Mervue, in Galway City. The total above ground site area for the current planning application (Phase 2) measures approximately 2.0 ha while the ground and basement works area extends to approximately 5.1 ha in total.

Development permitted under a previous planning permission was previously commenced and substantial works were completed in 2008. Soils and subsoils were stripped and bedrock excavated with between approximately 6-7m of excavations across the site footprint. The excavation was partially infilled with a two-story concrete frame adjacent Monivea Road as well as some sections of basement slabs and foundations. Following the onset of the economic recession, development was put on hold and the site is currently hoarded up.

The general topography of the site excluding the excavation is largely flat. Levels vary on Joyce's Rd from 28-29m AOD (above ordnance datum) and rise to approximately 30.5m AOD on Monivea Road at the eastern extremity of the site. The excavated site area has been reduced to formation level for the original basement which was at an FFL of 23.3m AOD.

The proposed development site does not contain field drains or natural watercourses and rainfall that falls on the site percolates through the soils and exposed bedrock to ground. After periods of heavy rainfall, surface water drains towards the lowest point of the site at the eastern boundary and is directed to a concrete 'sump' which was installed during the 2008 construction phase. The sump is relatively small, approximately 2m wide x 2m long x 2m deep and during periods of heavy rainfall, water is periodically pumped off-site to the municipal storm sewer.

The Terryland/Sandy River is located approximately 750m North West of the Site and flows in from the River Corrib and discharges to ground. There are no direct discharges to the Terryland/Sandy River from the proposed project.

7.3.2 Water Balance

Greenfield runoff rates for the site have been calculated from the HR Wallingford calculation tool and are included in Appendix 7-1. The Standard Average Annual Rainfall has been calculated at 1,281mm and the Qbar (mean annual flow from the site catchment) 1 in 1 year is 1.56 l/s.

7.3.3 Regional & Local Hydrology

On a regional scale, the site is located within Hydrometric Area 29 on the boarder between the Galway Bay South East catchment and the Corrib catchment, in both the Carrowmoneash (Oranmore)_SC_010 sub-catchment and the Corrib_SC_010 sub-catchment respectively under the Water Framework Directive (WFD). A regional hydrology map is shown as Figure 7.1.

The proposed development site does not contain any mapped watercourses and none were shown to exist during site walkovers. The Terryland/Sandy River is located approximately 750m North West of the Site and flows in from the River Corrib and discharges to ground.

A local hydrology map is shown as Figure 7.2.

Figure 7.1 Regional Hydrology

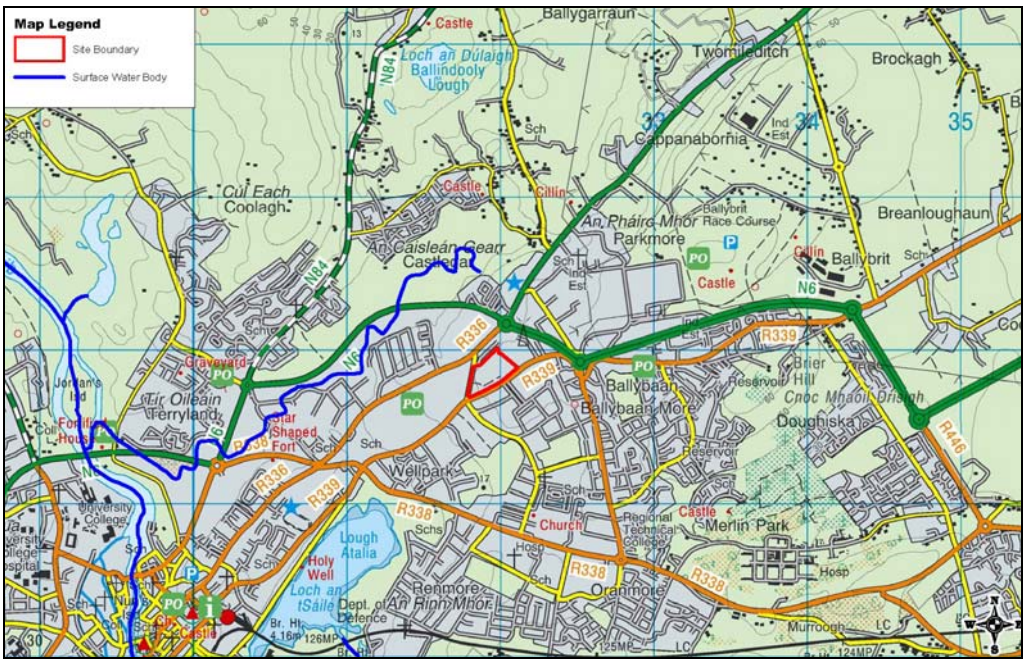


Figure 7.2 Local Hydrology

7.3.4 Site Drainage

The site of the proposed development does not currently have any surface watercourses. As the basement is already excavated only minimal water / rainwater will need to be removed from site. It is planned to let rainwater soak naturally back into the ground in areas not being worked on. In zones under construction it is proposed to run any excess water through an environmental structure such as a settlement tank / silt trap and pump clean water into the combined sewer at an agreed discharge rate during the construction phase (subject to Galway City Council agreement).

A discharge monitoring inspection programme will be put in place and agreed with the

Galway City Council Drainage Engineer. This methodology safeguards water quality and provides a solution for catching suspended solids and sediment prior to discharge into the combined sewer.

In the areas surrounding the proposed development site, the ground has been mainly built upon/made. This hard surfacing combined with extensive storm water sewer systems means that the drainage of the area has been heavily modified and generally directed to the municipal sewer or likely discharges via soakways. Where soil is at the surface, it was relatively dry, firm, and mineral based. Local watercourses, such as the Terryland/Sandy River have minimal influence, if any, on the local hydrological conditions around the site due to the distances.

Some localised and small scale temporary surface water ponding does occur within the site of the proposed development as is to be expected for any large excavation. Staining in the bedrock along the sites boundary indicates that shallow subsurface flows from areas adjacent the site drain into the excavation but the lack of water generally present in the excavated area indicates that this is relatively minor.

There is no evidence of groundwater levels at or above the existing base of the excavations.

7.3.5 Flood Risk Identification

PUNCH Consulting Engineers have completed Site Specific Flood Risk Assessment which is included as Appendix 7-2.

To identify those areas as being at risk of flooding OPW's indicative river and coastal flood map (www.floodmaps.ie), CFRAM Preliminary Flood Risk Assessment (PFRA) maps (www.cfram.ie), Department of Environment, Community and Local Government on-line planning mapping (www.myplan.ie) and historical mapping (*i.e.* 6" and 25" base maps) were consulted.

There is no identifiable map text on local available historical 6" or 25" mapping for the study area that identify lands that are "prone to flooding".

There are no recurring flood incidents within the study area boundary according to the OPW's flood mapping. There are no areas within the study area mapped as "Benefiting Lands". Benefiting lands are defined as a dataset prepared by the Office of Public Works identifying land that might benefit from the implementation of Arterial (Major) Drainage Schemes (under the Arterial Drainage Act 1945) and indicating areas of land subject to flooding or poor drainage.

The OPW PFRA map for the area, Map no. 210 (www.cfram.ie/pfra/interactive-mapping/), indicates that there are no areas of the proposed site within any of the indicative coastal, fluvial, or groundwater flood zones for 100-year, 200-year or 1000-year events (Flood Zones A and B). The PFRA flood extents indicate that the site of the proposed development is not located within a flood zone. There is an area to the north of the proposed site noted as being at risk of pluvial flooding.

Where complete the Catchment Flood Risk Assessment and Management (CFRAM) OPW Flood Risk Assessment Maps are now the primary reference for flood risk planning in Ireland and supersede the PFRA maps. CFRAM mapping has been completed for the area of the proposed site.

The CFRAM mapping shows that the proposed development site is outside the 10-year, 100-year and 1000-year Fluvial Flood Extent areas. An area of the land alongside the Terryland River over 750m to the west of the proposed development site is located within these Flood Extents but owing to higher land within the development site, the flood extent does not encompass the land where the proposed development is located.

Although the site is shown to not be at risk of flooding there is still potential for pluvial flooding on the site. The proposed design includes a reduced podium area with a pumped surface water drainage system. In the event of a pump failure the surface water system in the podium will fill and flooding could occur in the podium depending on the level of rainfall at the time. Details of the measures introduced to the design are outlined in detail in the Site Specific Flood Risk Assessment in Appendix 7-2

7.3.6 Surface Water Hydrochemistry

Q-rating status data is available from 1971 – 2016 for the Terryland River at an EPA monitoring point approximately 720m west of the proposed development site. No watercourses or field drains exist within the Proposed Development site, but a sample was obtained from the standing water at the lowest point in the site to determine surface water hydrochemistry. The Terryland/Sandy River has a poor status under the Water Framework Directive 2010-2015 programme and is 'at risk' of not achieving good status by 2021.

The surface water quality results (Table 9.2) at the site indicates that the water quality is good. The water was shown to have a chemical signature consistent with surface water and showed no evidence of any form of contamination. No hydrocarbons were detected in the sample. The sample results are included in Appendix 7-3.

Table 9.2 Surface water chemistry results (23/10/2018)

Test/ Parameter	Units	Sample result	EQS	AA-EQS	SW Regs A1	SW Regs A2	SW Regs A3
BOD	mg/l	<1				5	5
Suspended Solids	mg/l	<2				50	
COD	mg/l	<10	-	-	-	-	-
pH	pH Units	8.5		4.5<pH< 9.0	4.5<p H<9.0		
Nitrate as N	mg/l	<0.1	-	-	-	50	50
Nitrate as NO3	mg/l	<0.44	-	-	-	50	50
Copper, dissolved	ug/l	1	-	-	-	50	100
Lead, dissolved	ug/l	<0.5	10	-	-	50	50
Chromium, dissolved	ug/l	0.9	30	0.6	32	50	50
Nickel, dissolved	ug/l	1	50	20	-	-	-
Cadmium, dissolved	ug/l	<0.5	5	-	-	5	5
Arsenic, dissolved	ug/l	0.8	25	20		50	50

Test/ Parameter	Units	Sample result	EQS	AA-EQS	SW Regs A1	SW Regs A2	SW Regs A3
Selenium, dissolved	ug/l	1	-	-	-	10	10
Zinc, dissolved	ug/l	<5	-	-	-	3000	5000
Boron, dissolved	ug/l	15	2000	-	-	2000	2000
Petrol Range Organics Water (C5-C12) by GC-FID	ug/l	<10	10*	-	-	-	-
BTEX (Benzene, Toluene, Ethylbenzene, m,p- & o-Xylene)	ug/l	<10	-	-	-	-	-
Beryllium, dissolved	ug/l	<0.5	-	-	-	-	-
Vanadium, dissolved	ug/l	6	-	-	-	-	-
TPH CWG (Aliphatic, Aromatic Fragmentation & Carbon Banding)							
Total Aliphatics and Aromatics C8-C44	ug/l	<133 (Not Detected)	-	-	-	-	-
*Total Hydrocarbons							

7.3.7 Hydrogeology

Visean Limestones (undifferentiated), 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 7.3.

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. Rapid groundwater flow velocities indicate a large proportion of groundwater flow occurs in enlarged conduit systems (GSI, 2004).

Groundwater flow directions are generally to the west and southwest 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).

There is a low degree of interaction between surface water and groundwater in the wider area around the site of the proposed development, due to the coverage of built land, and the presence of an extensive drainage system and the lack of water courses.

Some localised and small scale temporary surface water ponding does occur within the site of the proposed development as is to be expected for any large excavation and in the main this ultimately percolates to ground. This occurs mainly along the eastern boundary. Staining in the bedrock along the sites eastern boundary indicates that shallow subsurface flows from areas adjacent the site drain into the excavation but the lack of water generally present in the excavated area indicates that this is relatively minor.

There is no evidence of groundwater levels at or above the existing base of the excavations. The site is located at a slightly higher level to the lands that surround it with ground water flows likely to the west (towards Terryland/Sandy River) and southwest (towards Lough Atalia). The existing excavation base level of approximately 23 mOD is significantly higher than Lough Atalia located 1km to the south west which is tidal and so at sea level. Therefore, the lack of evidence for groundwater being present continually onsite is not considered unusual. The Site Investigation report completed in 2007 included the installation of rotary core boreholes and groundwater levels recorded were on average approximately 7m below ground level across the site.

The location of the existing sump at the eastern site boundary indicates that water naturally accumulates at this location. On a precautionary basis, it is understood that protective measures have been incorporated into the engineering design of the basement at this location to ensure its integrity and allow subsurface water to flow around the basement if required.

Figure 7.3 Bedrock Aquifer Map

7.3.8 Groundwater Vulnerability

The vulnerability rating of the aquifer within the overall site is classified as "Extreme". The site has been excavated and therefore there is no protection afforded to it by soils and subsoils.

Due to the relatively high transmissivity nature of the limestone bedrock aquifer underlying the site and the highly karstified nature of the bedrock, there is a higher

potential for groundwater dispersion and movement within the aquifer and aquifer vulnerability has been considered in the mitigation measures for the site.

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 there are no proposed discharges to ground. The WFD status for the local groundwater body in terms of water quality is Good and therefore this is considered 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 691µS/cm and 339mg/L respectively.

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. The Terryland/Sandy River drains the land to the west of the site.

The River Water Quality Status (2010 – 2015) for the Terryland River is rated as "Poor" and has a risk result of "At Risk".

7.3.11 Groundwater Body Status

Local Groundwater Body (GWB) status information are available (www.catchments.ie). Refer to Figure 7.4 for the location and extent of local groundwater body.

The Clarinbridge GWB (IE_WE_G_0008) and Clare-Corrib GWB (IE_WE_G_0020) which underlie the proposed development site is assigned an 'At Risk' status based on the quantitative status and chemical status of the GWB.

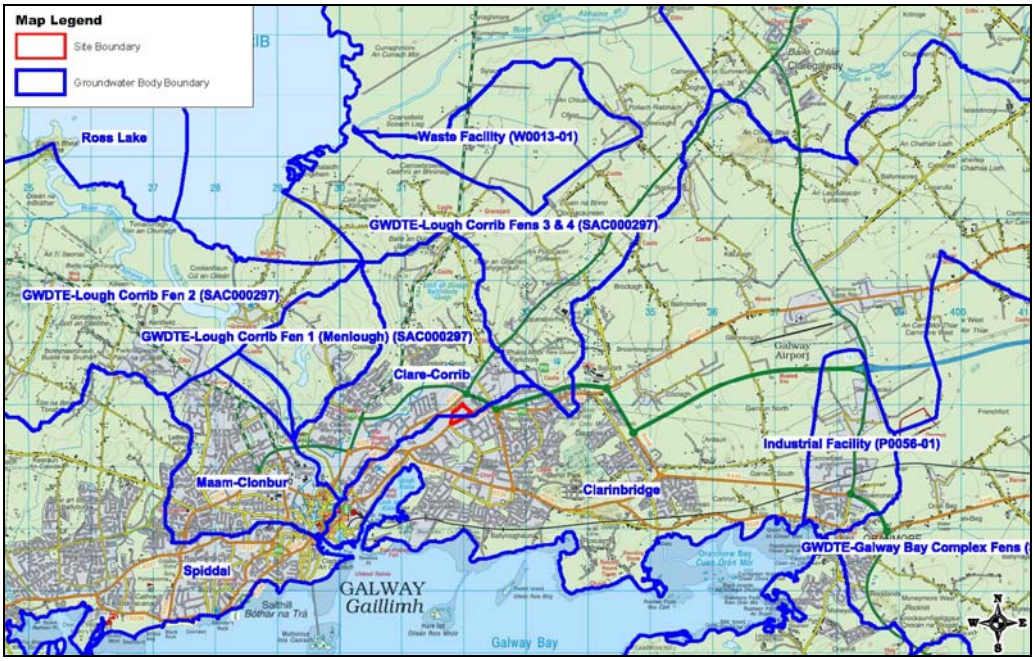


Figure 7.4 Local Groundwater Bodies

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).

Approximately 1 km to the southwest of the proposed site is the Galway Bay Complex SAC (Code: 000268), and the Terryland River, which is hydraulically downgradient of the site connects the Inner Galway Bay SPA (Code: 004031) approximately 1km downstream of the proposed site.

7.3.13 Water Resources

There are no groundwater protection zones mapped within the proposed development site or study area. A borehole well (GSI database to accuracy of 2km) for the Ballinfoyle Group Scheme water supply is located to the northwest of the site. There are two other mapped private well locations (GSI database to accuracy of 100m) within 1km, which were obtained from the GSI well database (www.gsi.ie).

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

7.3.14 Receptor Sensitivity

Due to the nature of the proposed development and the current site topography, construction activities will be near the surface. It is not proposed to carry out extensive excavations at the site and so the potential to affect the local hydrological regime is limited. There are no surface water courses onsite or adjacent the site and there are no proposed discharges direct or indirect to surface water courses. During the operational phase all surface water will directed to the municipal storm sewer and all foul water will be direct to the municipal foul sewer.

Impacts on surface water for this development will generally be negligible and groundwater is generally the main sensitive receptor during the construction phase. Although there will be up to two basement levels below the proposed finished ground level, the excavation work for this development has been almost entirely completed, with only minor excavation required for creating pad foundations and laying pipes. The primary risk to groundwater at the site would be from cementitious materials, hydrocarbon spillage and leakages. These are common potential impacts on all construction sites (such as road works and industrial sites). All potential contamination sources are to be carefully managed at the site during the construction and operational phases of the development and mitigation measures are proposed below to deal with these potential minor impacts.

Based on criteria set out in Table 9.1 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 accidently released on-site may also discharge to via groundwater flow paths to the local surface water drainage and either into the storm water sewer or into the Terryland/Sandy River and potentially into the River Corrib.

The Galway Bay Complex SAC (Code: 000268) is located 1km to the southwest of the site which is considered sensitive.

Comprehensive surface water mitigation and controls are outlined 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 groundwater or downstream surface water bodies or the municipal storm sewer.

Any introduced drainage works at the development site will mostly discharge to storm water sewers via attenuation tanks, with a small amount of basement runoff discharging to the foul sewer network via a hydrocarbon interceptor and pumping station. A very small amount of surface water from the soft-surfaced (i.e. grass and landscaped) areas will percolate to the surrounding soils.

7.3.15 Proposed Site infrastructure and Drainage Management

The proposed development has been designed using MicroDrainage software as described fully in the Section 3.3.1 of the Engineering Report which forms Appendix 3-3 of this EIAR. It is proposed that any surface water that enters the basement levels of the proposed development will drain via gravity to an attenuation tank acting as a basement sump, with a hydrocarbon interceptor. From here, water will be pumped to the Monivea foul sewer which runs along the public road on the Monivea Road.

Surface water from the site directed to the sewers will pass firstly through silt traps (sump manholes) and then through attenuation tanks prior to discharging to outfalls on either Connolly Avenue or the Monivea Road. It is proposed that approximately 70% of this surface water discharge will be to Connolly Avenue, while the remaining 30% will be to the Monivea Road. The forward flow from the site will be limited to 2l/ha/ sec in accordance with the Greater Dublin Strategic Drainage Strategy.

As described in the Engineering Report (Section 2.2.2 of Appendix 3-3) a below ground drainage system will be provided for the site. This will deal with foul water from both the residential/commercial developments and the suspended drainage system in the basement. It is proposed to connect this drainage system to the 675mm diameter public foul water sewer located in the Monivea Road. The limited volume of foul water

associated with the -1 & -2 basement is proposed to be collected via an on-site network of pipes in the lower basement and discharged to the Monivea public (Irish Water) foul sewer via two pumping stations. One at the southwestern corner of the site will deal with the foul water from the commercial development, including the hotel, while the residential development on the eastern side of the site will discharge via a pumping station on the southeastern corner. The pumping stations would have expected storage for 24 hours.

Water supply to the site will be via an existing onsite 125mm connection to the adjacent public (Irish Water) watermain.

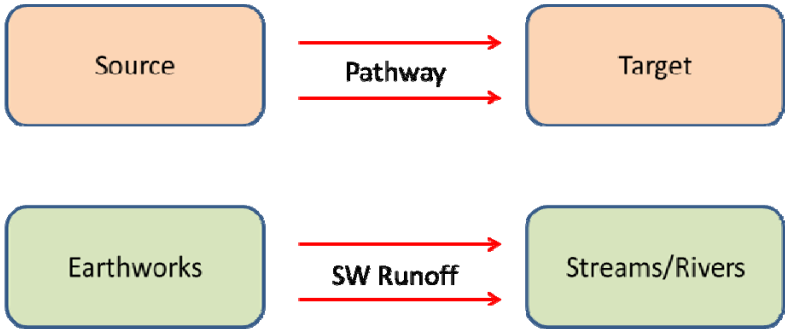
As the basement is already excavated only minimal water / rainwater will need to be removed from site. It is planned to let rainwater soak naturally back into the ground in areas not being worked on. In zones under construction it is proposed to run any excess water through an environmental structure such as a settlement tank / silt trap and pump clean water into the combined sewer at an agreed discharge rate during the construction phase (subject to Galway City Council agreement).

A discharge monitoring inspection programme will be put in place and agreed with the Galway City Council Drainage Engineer. This methodology safeguards water quality and provides a solution for catching suspended solids and sediment prior to discharge into the combined sewer.

7.4 Potential Impacts and Mitigation Measures

7.4.1 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);
- Guidelines on the Information to be contained in Environmental Impact Statements (EPA, 2002).

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 7.4.2 and 7.4.3), we have firstly presented below a summary guide that defines the steps (1 to 7) taken in each element of the impact assessment process. 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.

Step 1	Identification and Description of Potential Impact Source This section presents and describes the activity that brings about the potential impact or the potential source of pollution. The significance of effects is briefly described.	
Step 2	**Pathway / Mechanism:**	The route by which a potential source of impact can transfer or migrate to an identified receptor. In terms of housing developments, surface water and groundwater flows are the primary pathways, or for example, excavation or soil erosion are physical mechanisms by which a potential impact is generated.
Step 3	**Receptor:**	A receptor is a part of the natural environment which could potentially be impacted upon, *e.g.* human health, plant / animal species, aquatic habitats, soils/geology, water resources, water sources. The potential impact can only arise as a result of a source and pathway being present.
Step 4	**Pre-mitigation Impact:**	Impact descriptors which describe the magnitude, likelihood, duration and direct or indirect nature of the potential impact before mitigation is put in place.
Step 5	**Proposed Mitigation Measures:**	Control measures that will be put in place to prevent or reduce all identified significant adverse impacts. In relation to housing developments, these measures are generally provided in two types: (1) mitigation by avoidance, and (2) mitigation by engineering design.
Step 6	**Post Mitigation Residual Impact:**	Impact descriptors which describe the magnitude, likelihood, duration and direct or indirect nature of the potential impacts after mitigation is put in place.
Step 7	**Significance of Effects:**	Describes the likely significant post mitigation effects of the identified potential impact source on the receiving environment.

7.4.2 Construction Phase Potential Impacts

7.4.2.1 Earthworks (Excavations and Stock Piling) Resulting in Suspended Solids Entrainment in Surface Waters – Discharge to Storm Sewer

Construction phase activities including site preparations, service trench construction, levelling/construction, tree removal and pad foundation excavation will require some level of earthworks resulting in removal of vegetation cover and excavation of any minor local pockets of organic soil/subsoils, and bedrock. The main risk will be from surface water runoff from bare soil and soil storage areas during construction works.

The site is relatively unique in that there are no adjacent natural or man-made watercourses and surface water generally percolates to ground. Also, the nature of the mineral soils (gravelly clay) at the site and the bedrock (limestone) means that sediments are not easily entrained in surface waters. The water currently present on site is clear however, the construction activities can result in the release of suspended solids. It is planned to let rainwater soak naturally back into the ground in areas not being worked on. In zones under construction it is proposed to run any excess water through an environmental structure such as a settlement tank / silt trap and pump clean water into the combined sewer at an agreed discharge rate during the construction phase (subject to Galway City Council agreement). This could result in an increase in the suspended sediment load, resulting in increased turbidity to the storm sewer. This process will only be required prior to the sub-basement and retaining walls being constructed and at that point the drainage system will be as described for the Operational Stage of the project. There are no open water courses at or adjacent the site which could be affected by sediment release.

Pathways: Intermittent pumping.
Receptors: Down-gradient municipal storm sewer.

Pre-Mitigation Impact
Indirect, negative, moderate, short-term, likely 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:

- A Trade Effluent Discharge License which will regulate flow volumes and quality will be applied for to Galway City Council prior to construction commencing
- Prior to the commencement of earthwork silt fencing will be placed down-gradient of the construction areas where drains or drainage pathways are present.
- As construction advances there may be a small requirement to collect surface water within the site. As the basement is already excavated only minimal water / rainwater will need to be removed. It is planned to let rainwater soak naturally back into the ground in areas not being worked on. In zones under construction it is proposed to run any excess water through an environmental structure such as a settlement tank / silt trap and pump clean water into the combined sewer at an agreed discharge rate during the construction phase (subject to Galway City Council agreement).
- A discharge monitoring inspection programme will be put in place and agreed with the Galway City Council Drainage Engineer. This methodology safeguards water quality and provides a solution for

catching suspended solids and sediment prior to discharge into the combined sewer.

- No pumped construction water will be discharged directly into any local watercourse;
- Daily monitoring and inspections of site drainage during construction will be completed;
- Good construction practices such 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', CIRlA, 2001), which provides information on these issues. This will ensure that surface water arising during the course of construction activities will contain minimum sediment.

Mitigation by Design:
A summary of surface water controls that can be employed during the earthworks and construction phase are as follows:

- Source controls:
  - Small working areas, covering stockpiles, weathering off stockpiles, cessation of works in certain areas or other similar/equivalent or appropriate measures.
- In-Line controls:
  - Silt bags, silt fences, sedimats, filter fabrics, and collection sumps, temporary sumps/attenuation lagoons, sediment traps, pumping systems, settlement ponds, temporary pumping chambers, or other similar/equivalent or appropriates systems.
- Treatment systems:
  - Temporary sumps and attenuation ponds, temporary storage lagoons, sediment traps, and settlement ponds, and proprietary settlement systems such as Siltbuster, and/or other similar/equivalent or appropriate systems.

Silt Fences:
Silt fences will be placed up-gradient of the site sump. Silt fences are effective at removing heavy settleable solids. This will act to prevent entry to the sump of sand and gravel sized sediment, released from excavation of mineral sub-soils of glacial and glacio-fluvial origin, and entrained in surface water runoff. Inspection and maintenance of these structures during construction phase is critical to their functioning to stated purpose. They will remain in place throughout the entire construction phase.

Silt Bags:
Silt bags will be used where small to medium volumes of water need to be pumped from excavations. As water is pumped through the bag, most of the sediment is retained by the geotextile fabric allowing filtered water to pass through. Silt bags will be used with to the east of the site and the discharge allowed percolate to ground.

Monitoring:
An inspection and maintenance plan for the on-site drainage system will be prepared in advance of commencement of any construction works. Regular inspections of the

sump and holding tank will be undertaken, especially after heavy rainfall, to check for visual evidence of sediment in the water body.

During the construction phase field testing and laboratory analysis of a range of parameters with relevant regulatory limits and EQSs will be undertaken for the holding/settlement tank, and specifically following heavy rainfall events (*i.e.* weekly, monthly, and event-based monitoring is proposed).

Residual Impact

Indirect, negative, slight, short-term, medium probability impact on the municipal sewer.

Significance of Effects

No significant effects on surface water quality are expected due to site excavation work. There is no hydraulic connectivity between the site and open watercourses. Mitigation measures will be employed on a precautionary basis to protect the storm sewer. The potential effects on the storm sewer will be slight as the flow and quality will be controlled for the short-term use of the discharge.

7.4.2.2 Potential Release of Hydrocarbons during Construction Stage

Accidental spillage during refueling of construction plant with petroleum hydrocarbons is a significant pollution risk to groundwater, surface water (via subsurface flows) and associated ecosystems, and to terrestrial ecology. In this case, the most sensitive receptor is groundwater. 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 discharge to the municipal sewer.
Receptor: Groundwater, surface water (via subsurface flows) and surface water sewer.

Pre-Mitigation Impact
Indirect, negative, significant, short term, likely impact to local groundwater quality.
Indirect, negative, moderate, short term, unlikely impact to surface water quality.

Proposed Mitigation Measures:

Mitigation by Design:

On-site refuelling will be carried out at designated refuelling stations on site. Drip trays will be used when refuelling all plant. Absorbent material and pads will be available in the event of any accidental spillages. Alternatively, mobile double skinned fuel bowsers may be used. Fuel bowsers will be parked on a level area in the site when not in use.

Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays, spill kits and fuel absorbent mats will be used during all refuelling operations.

The following mitigation measures are proposed to avoid release of hydrocarbons at the site:

- Minimal maintenance of construction vehicles or plant will take place on site.
- Drip trays will be used to control on-site refuelling at controlled fuelling stations.
- On-site diesel tanks will be double skinned to 110% of their capacity.
- Containment stores will be used for refuelling of small plant such as consaws etc.
- Any fuel bowsers used on site will be custom-built / bunded to 100% of capacity. Fuel bowsers will be parked on a level area in the construction compound when not in use.
- 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 volumes stored on site will be minimised. Any fuel storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction.
- Plant used will be regularly inspected for leaks and fitness for purpose.
- Any Hazardous Materials will be stored in drip trays in secure containment stores.
- Refuelling/containment store signage will be erected at predetermined locations around the site.

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 any accidental spillage in and outside the refuelling area

Residual Impact
Indirect, negative, imperceptible, short-term, unlikely impact on groundwater and surface water.

Significance of Effects
No significant effects on surface water or groundwater quality are anticipated.

7.4.2.3 Groundwater and Surface Water Contamination from Wastewater Disposal (Construction Phase)

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, short-term, unlikely impact to surface water quality.
Indirect, negative, slight, short-term, unlikely impact to local groundwater.

Proposed Mitigation Measures

Mitigation by Avoidance:

- A self-contained port-a-loo with an integrated waste holding tank will be used at the site compounds, maintained by the providing contractor, and removed from site on completion of the construction works;

- 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.

7.4.2.4 Release of Cement-Based Products

Concrete and other cement-based products are highly alkaline and corrosive and can have significant negative impacts on water quality. They generate very fine, highly alkaline silt (pH 11.5) that can physically damage fish by burning their skin and blocking their gills. A pH range of ⩾ 6 ⩽ 9 is set in S.I. No. 293 of 1988 Quality of Salmonid Water Regulations, with artificial variations not in excess of ± 0.5 of a pH unit. Entry of cement based products into the site drainage system, into surface water runoff, and hence to surface sewer or into watercourses represents a risk to the aquatic environment.

There is no direct hydraulic connection between the site and open water courses.

Pathway: Site drainage network.
Receptor: Surface water sewer system and ground water

Pre-Mitigation Impact
Indirect, negative, moderate, short term, likely impact to surface water and/or sewer.

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, likely impact.

Significance of Effects

No significant effects on water quality are anticipated.

7.4.2.5 Potential Impacts on Hydrologically Connected Designated Sites

The Galway Bay Complex SAC (Code: 000268) is located 1m to the southwest of the site.

Possible effects include water quality impacts most likely via groundwater flow paths which could be significant if mitigation is not put in place.

Pathway: Groundwater flowpaths.
Receptor: Down-gradient water quality and designated sites.

Pre-Mitigation Impact
Indirect, negative, moderate, long term, likely impact to surface water and groundwater quality.

Proposed Mitigation Measures
The proposed mitigation measures for protection of groundwater quality and surface water quality which will include on site drainage control measures (i.e. sump and settlement/holding tank) will ensure that the quality of runoff from proposed development areas will be very high. 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.

The majority surface water arising on site will drain to ground, with no proposed outfall other than intermittent and temporary pumping of surface water to the municipal foul sewer. Groundwater quality risks are reduced during the construction phase by use of the control measures described above.

Residual Impact

No impacts on water quality or downstream designated sites are anticipated.

Significance of Effects

No significant impacts on groundwater or surface water quality and downstream designated sites are anticipated.

7.4.3 Operational Phase Impacts

7.4.3.1 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.

The surface water runoff from the proposed development is to be entirely separate from the development's foul sewerage network development drainage as described in the PUNCH Engineering Report.

All surface water run-off from roof areas and hardstanding areas shall be collected in the gravity pipe network. The surface water from any open deck parking areas or pavements shall be collected via a series of gullies and channels.

Any surface water that is generated within the -1 & -2 basement will run through a bypass interceptor prior to being pumped to the foul water system, this figure is estimated at 0.04l/s based upon approximately 1600 parking bays at 2l/ bay/ day.

New surface water connections will be designed to connect by gravity to the existing public drainage network, with 70% of limited forward flow discharging to the Tuam Road located north of the site and the remainder discharging to the Monivea Road

located south of the development. On-site attenuation is to be provided to restrict flows from the development to greenfield runoff rates of 2 litres per second per hectare across the site in accordance with the Galway City Development Plan.

On the eastern half of the site, a portion of the external podium level drops down to Basement -1 level. Therefore, it will not be possible to discharge surface water from this area by gravity to the public sewer. Surface water from the proposed reduced podium area on site will be collected by gravity and then pumped via rising main to the North of the site where it will connect into the main line of the proposed surface water drainage network. In the event of a pump failure the surface water system in the podium will fill and flooding could occur in the podium depending on the level of rainfall at the time. Details of the measures introduced to the design to protect property are outlined in detail Section 5.2 of the Site Specific Flood Risk Assessment in Appendix 7-2.

Pathway: Site surface water drainage network.
Receptor: Groundwater aquifer and surface water.

Pre-Mitigation Impact
Direct, negative, slight, long term, low probability impact.

Proposed Mitigation Measures
The risk of flooding is minimized by the collection, treatment and discharge of water to the municipal sewers. While there is a risk of flooding to the reduced height podium should the proposed pump system fail however the risk associated with this is mainly to property and people. The mitigation measures described in Section 5.2 of the Site Specific Flood Risk Assessment reduces this risk.

Water quality risks are reduced by use of hydrocarbon interceptors and silt traps.

Residual Impact

Direct, negative, imperceptible, long term, low probability impact in relation to flood risk.
Direct, negative, imperceptible, long term, low probability impact in relation to groundwater quality.

Significance of Effects

No significant impacts in terms of flooding or water quality are expected due to the proposed development.

7.4.3.2 Potential Emissions to Groundwater and/or Surface water

There are no proposed emissions to ground or surface water courses from the site during the operational phase.

All surface water run-off from roof areas and hardstanding areas shall be collected in the gravity pipe network. The surface water from any open deck parking areas or pavements shall be collected via a series of gullies and channels.

Any surface water that is generated within the -1 & -2 basement will run through a bypass interceptor prior to being pumped to the foul water system.

New surface water connections will be designed to connect by gravity to the existing public drainage network as described above in Section 7.4.3.1.

Pathway: Site surface water drainage network.
Receptor: Groundwater aquifer and surface water.

Pre-Mitigation Impact
Direct, negative, slight, long term, low probability impact.

Proposed Mitigation Measures
The risk of emissions is minimized by the collection, treatment and discharge of water to the municipal sewers.
Water quality risks are reduced by use of hydrocarbon interceptors and silt traps.

Residual Impact

Direct, negative, imperceptible, long term, low probability impact in relation to groundwater quality.

Significance of Effects
No significant impacts in terms of water quality are expected due to the proposed development.

7.4.4 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 development.

The proposed site design and mitigation measures outlined in the previous subsections ensures that the potential for impacts on the water environment are not significant.

The flood risk assessment for the development has also shown that the risk of the proposed development contributing to downstream flooding is also very low, and also that the risk of inundation of the buildings within the site post construction is very low due to the proposed design floor levels and site layout and measures described in the Site Specific Flood Risk Assessment.

7.4.5 Do Nothing Scenario

The site currently comprises an excavated partially constructed commercial development which is hoarded up. Phase 1 of the development (which includes Commercial Offices (Blocks A-E), Hotel and Site Infrastructure, including all basement structures for the entire site) has received permission, and will be constructed regardless of whether this currently proposed phase 2 is permitted or not. The potential impacts are considered to be permanent direct slight negative on Hydrology.

7.4.6 Cumulative Impacts

Due to the localised and shallow nature of the proposed construction works which will be kept within the proposed project site boundary, there is no potential for significant cumulative effects on the water environment in-combination with other local developments. The construction of the proposed development and all associated site infrastructure will only require relatively localised excavation works the output of

which will be retained onsite and therefore will not contribute to any significant cumulative effects on water.

Water management during the operational phase (including the Phase 1 element of this development) will be highly controlled and so there is no potential for significant cumulative effects.

No significant cumulative impacts on the water environment are anticipated during the construction or operation phases as long as mitigation measures outlined are put in place.

7.4.7 Conclusion

The site is naturally separated from any local watercourses, and this setback distance means that there is limited potential for impact on surface water quality or the downstream designated sites.

Notwithstanding this, during each phase of the proposed development (construction and operation) a number of activities will take place on the proposed development site, 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.

During the construction phase, the surface water drainage plan will focus on silt management to control runoff rates to the municipal sewer. 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 sump and holding tank).

Preventative measures during construction include fuel and concrete management and a waste management plan which will all be incorporated into the Construction and Environmental Management Plan (Refer to Appendix 3-2).

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

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

Appendix 3

Construction & Environmental Management Plan

Construction and Environmental Management Plan (CEMP)

JJ Rhatigan
Building Contractors

The Crown Square
Development,
Mervue Industrial Estate,
Tuam Road,
Mervue,
Co. Galway.

Revision No.	Date	Revision Details
Rev 01	7/06/2019	Original – "For Construction Issue"

Table of Contents

1. Introduction

This Construction and Environmental Management Plan (CEMP) has been developed by JJ Rhatigan & Company on behalf of our Client Crown Square Developments Limited. Planning permission has been granted for Phase 1 Works (Planning Ref 18/363, 14th March, 2019) to construct a double basement, 5nr Commercial office Blocks and Hotel on an integrated campus.

The CEMP has been updated in line with the conditions and obligations contained in the grant of permission (Planning Ref 18/363, 14th March, 2019). The CEMP due to its structure and nature will also require updating and revision throughout the construction period as set out below. Therefore, this is a working document and will be developed further during construction period of the project.

Triggers for amendments to the CEMP will include:

- When there is a perceived need to improve performance in an area of environmental impact;
- As a result of changes in environmental legislation applicable and relevant to the project;
- Where the outcomes from auditing establish a need for change;
- Where Work Method Statements identify changes to a construction methodology to address high environmental risk; and
- As a result of an incident or complaint occurring that necessitates an amendment.
- Any updates to the Construction Traffic Management Plan for the project.

This report provides the Construction and Environmental management framework to be adhered to during the pre-commencement and construction phases of the proposed development and it incorporates the mitigating principles to ensure that the work is carried out in a way that minimises the potential for any environmental impacts to occur.

1.1 Scope of the Construction and Environmental Management Plan

This report is presented as a guidance document for the construction of the proposed Crown Square project at Mervue Galway. The CEMP outlines clearly the mitigation measures and monitoring proposals that are required to be adhered to in order to complete the works in an appropriate manner.

The report is divided into nine sections, as outlined below.

- **Section 1** provides a brief Introduction as to the scope of the report
- **Section 2** outlines the Site and Project Details, detailing the targets and objectives of this plan along with providing an overview of construction methodologies that will be adopted throughout the project.
- **Section 3** sets out details of the environmental controls on site including noise, dust and vibration controls.
- **Section 4** sets out a fully detailed implementation plan for the environmental management of the project outlining the roles and responsibilities of the project team.
- **Section 5** outlines the Emergency Response Procedure to be adopted in the event of an emergency in terms of site Health & Safety and Environmental protection.
- **Section 6** consists of a summary table of all mitigation proposals to be adhered to during the project.
- **Section 7** consists of a summary table of all monitoring requirements and proposals to be adhered to during the project.
- **Section 8** sets out a programme for the timing of the works.

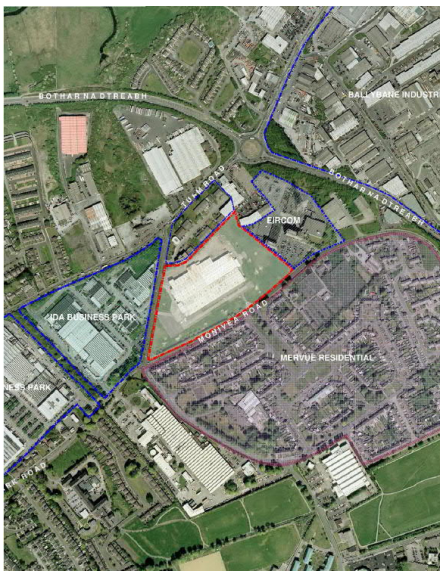
- **Section 9** outlines the proposals for reviewing compliance with the provisions of this report.
- **Section 10** – Appendix 1.0 - JJ Rhatigan Construction Stage Traffic Management Plan, Rev 01

2. Project Details

2.1 Site Location and Description

The site of the Proposed Development is located at the former Crown Equipment site at Mervue with road frontage to the Monivea and Joyce Roads. The Crown factory has been demolished.

The Mervue and IDA Business Parks as well as the Eircom telecommunications centre are immediately adjacent.



Crown Square, Galway

2.2 Description of the Development

The development comprises commercial office, technology and hotel uses on an integrated campus with residential, leisure, local service and ancillary accommodation. Phase 1 will be to the west of the site along the Monivea and Joyce Roads and includes Basement, Commercial and infrastructure works. Phase 2 will front the eastern end of the Monivea Road frontage and extend to the northern site boundary over the Phase 1 Basement level completion. Phase 2 works encompasses Residential, Leisure and local service elements.

Phasing Diagram

2.3 Targets and Objectives

In so far as they have been completed to date, or are to be further completed in future, the construction phase works are designed to approved standards, which include specified materials, standards, specifications and codes of

practice. The design of the project has considered environmental issues and this is enhanced by the works proposals.

The key site targets / objectives are as follows:

1. Ensure construction works and activities are completed in accordance with any planning conditions for the development.
2. Ensure construction works and activities have minimal impact/disturbance to the local community and businesses.
3. Adopt a sustainable approach to construction and, ensure sustainable sources for materials supply where possible.
4. Correct fuel storage and refuelling procedures to be followed.
5. Air and noise pollution prevention to be implemented.
6. Good waste management and house-keeping to be implemented;
7. Provide adequate environmental training and awareness for all project personnel.

2.4 Construction Methodologies Overview

2.4.1 Introduction

The appointed Subcontractors, Specialists and site personnel will be required to comply with this CEMP and any revisions made to this document for the construction phase of the proposed development. An overview of the proposed Construction Methodologies is provided below.

2.4.2 Overview of Proposed Construction Methodology

The proposed anticipated construction methodology is set out below under Phase 1 and Phase 2 works.

Phase 1

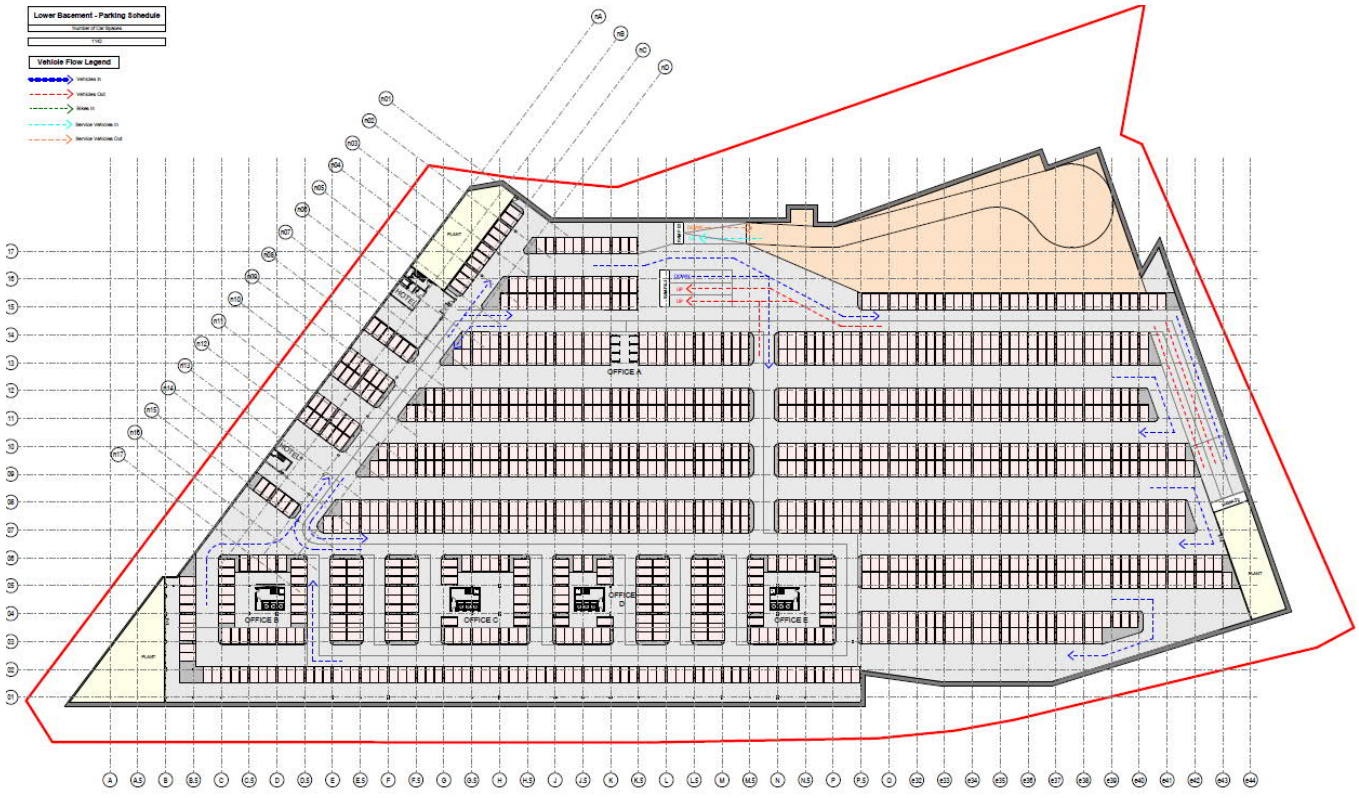
Phase 1 works includes basement level completion, office, hotel and local service elements. Key phases of construction are set out below.

- Temporary site accommodation & welfare facilities
- Final breaking/trimming of rock to formation
- Pads/foundations
- Lower basement drainage
- Lower basement slab – B2 Level
- Rising elements lower basement / upper basement
- Upper basement slab – B1 Level
- Rising elements upper basement / podium
- Podium / Ground floor slab
- Office A, B, C, D, E and hotel superstructure
- Office A, B, C, D, E and hotel façade / roof
- Boundary treatments
- Completion of vehicular access, car and cycle parking
- Office A, B, C, D, E fitout
- Hotel fitout
- Podium slab / courtyard hard/soft landscaping

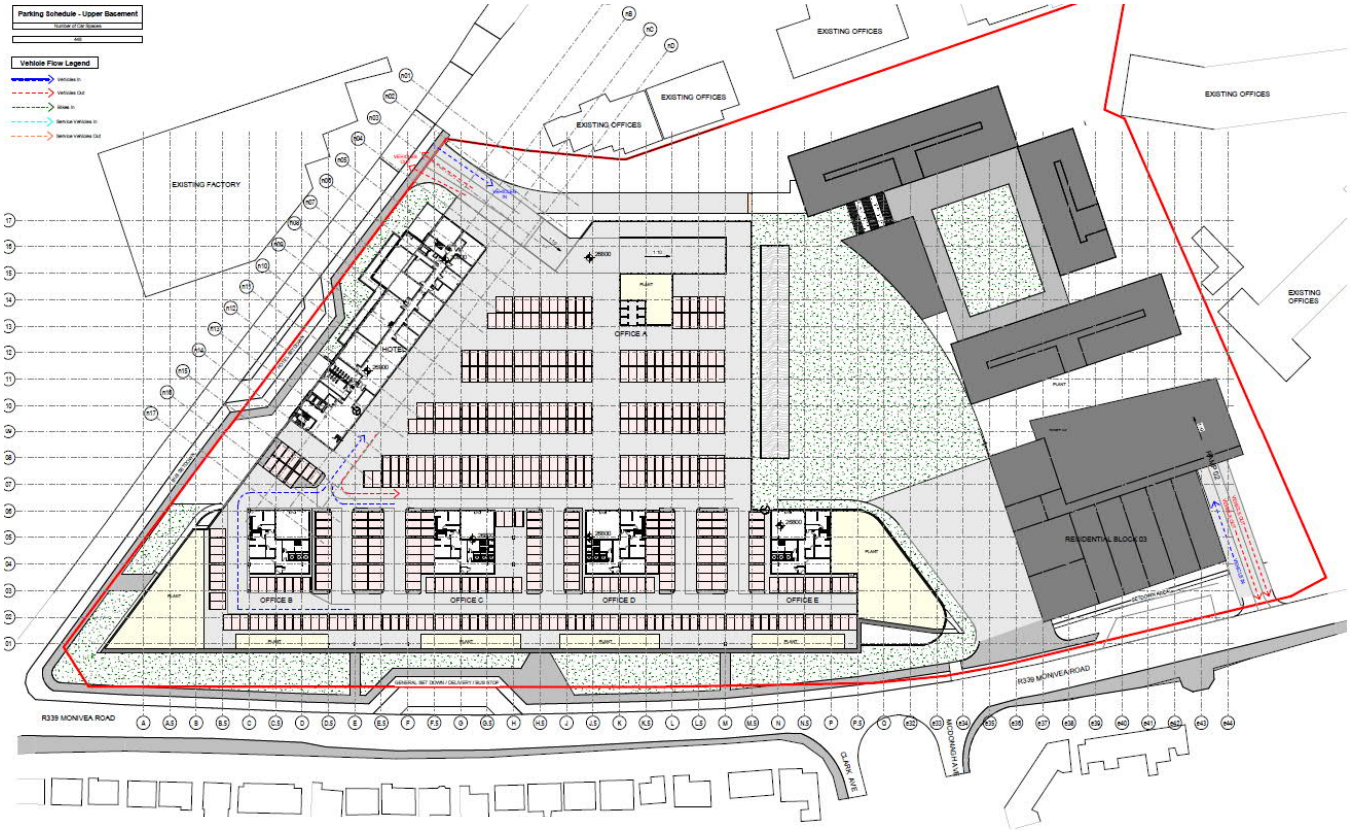
Phase 2

Phase 2 works includes B2 & B1 basement level completions, Residential Block J (South), Residential Block H (Middle) and Residential Block G (North) construction together with retail & commercial units at ground level and local service elements. Key phases of construction are set out below.

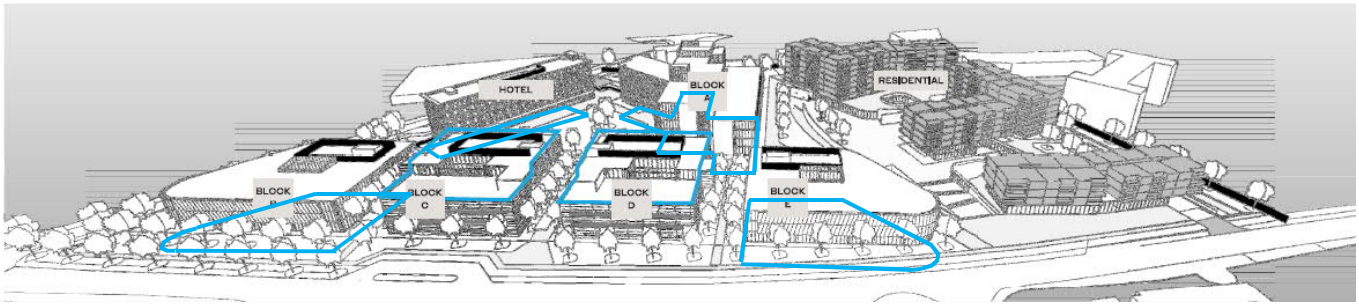
- Final breaking/trimming of rock to formation
- Pads/foundations
- Lower basement drainage
- Lower basement slab – B2 Level
- Rising elements lower basement / upper basement
- Upper basement slab B1 Level
- Rising elements upper basement / podium
- Podium / Ground floor slab
- Retail & Commercial Units at ground floor level
- Residential Blocks J, H & G superstructure
- Residential Blocks J, H & G façade / roof
- Boundary treatments
- Completion of vehicular access, car and cycle parking
- Retail & Commercial Units fitout
- Residential Blocks J, H & G fitout
- Podium slab / courtyard hard/soft landscaping



Lower Basement- Parking Layout - Car / Bikes.



Upper Basement- Parking Layout - Car / Bikes.

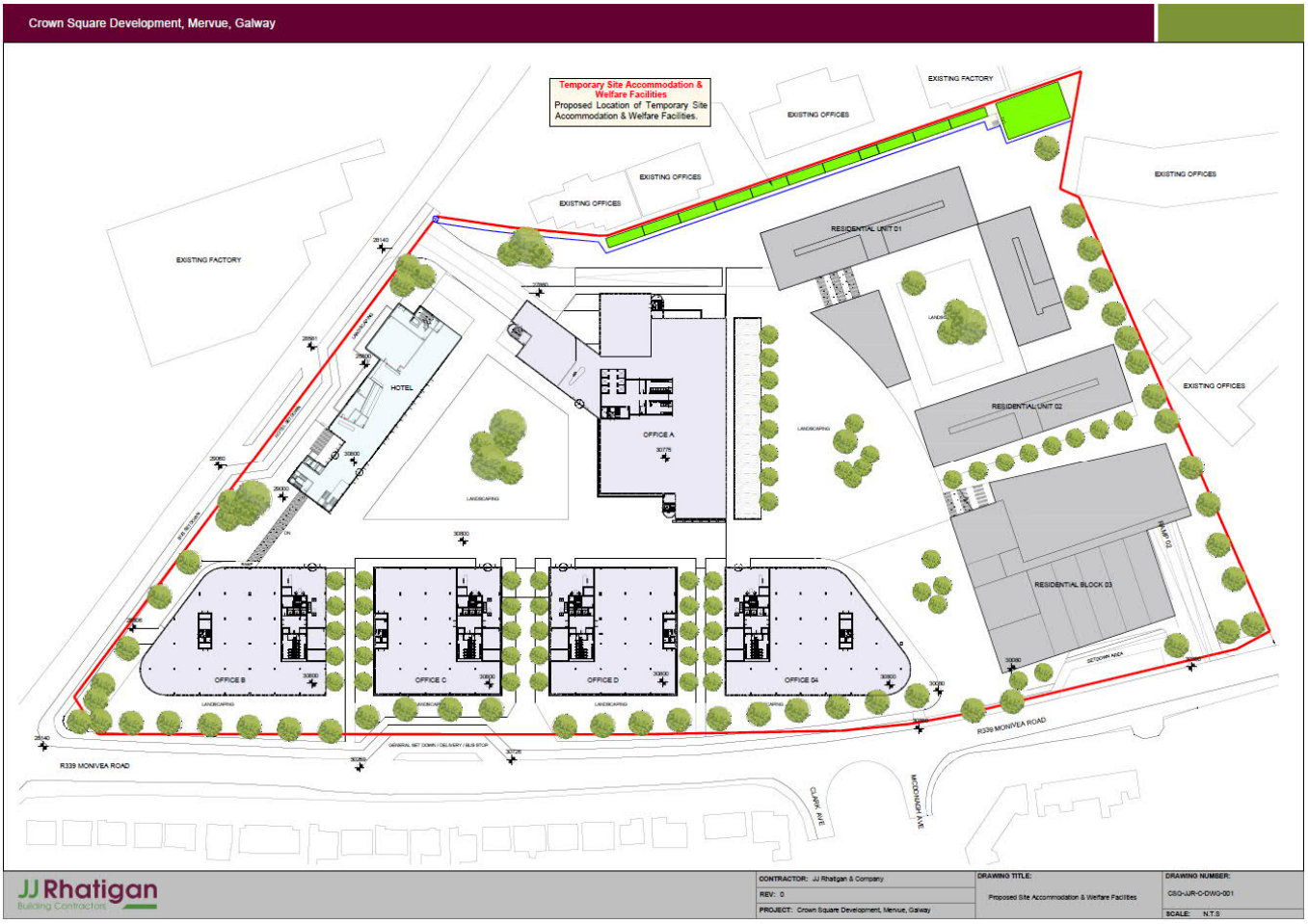


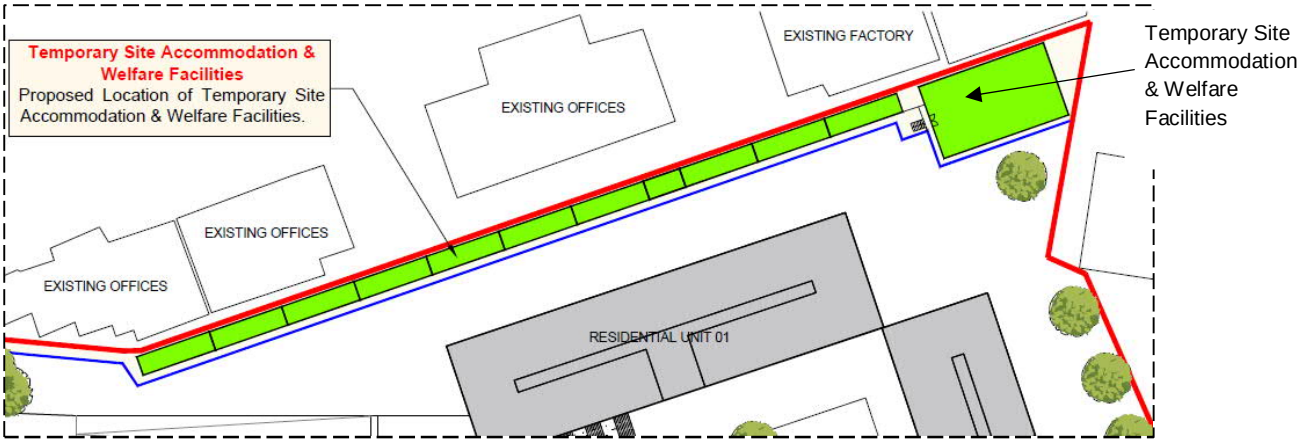
Phase 1 - **Basement, Office Blocks A, B, C, D & E, Hotel**

Phase 2 - **B1 & B2 Basement, Residential Block J (South), Residential Block H (Middle) and Residential Block G (North) construction together with retail & commercial units at ground level**

2.4.2.1 Temporary Site Accommodation & Welfare Facilities

It is proposed to locate the temporary site accommodation and welfare facilities in the north east of the site as shown on the Site Layout Drawing CSQ-JJR-C-DWG-001 below.





2.4.2.2 Final breaking/trimming of rock to formation

The basement excavation including rock breaking has already been completed. Any remaining rock breaking to formation including pad / strip foundations will be carried out with modern equipment and will comply with the European Communities (Construction Plant and Equipment Permissible Noise Levels) Regulations.

Method of Monitoring Noise & Vibration

The Svantek 977 and Svantek 958 or similar equipment will be used to monitor noise and vibration. The following information will be recorded:

LA eq	The average noise in decibels, over a given period of time
LA max	The maximum noise created within the LA eq time period
LA min	The minimum noise created within the LA eq time period
PPVmm/sec	Peak Vector Sum of vibration created during the period of monitoring

The units will be set up in in accordance with BS 5228 and will record noise over 15-minute intervals 24 hrs a day. Vibration levels will be monitored in accordance with British Standard 7385 part 1 and part 2.

2.4.2.3 Pads/foundations

Reinforcement and column starter bars for pad foundations to Structural Engineers design (c.1500mm x 1500mm x 800mm) will be placed prior to casting of insitu concrete C 30/37 to EN 206:2013. Pre-pour Quality Check sheet *EQS-15 (07) Rev 3-Concrete Pour Inspection* will be used for sign-off.

2.4.2.4 Lower Basement Drainage

The balance of the lower basement drainage will be installed and tested prior to casting of the insitu lower basement slab. Quality Check sheet *EQS-15 (13) Rev 2-Drain Test Certificate* will be used to record results of the inspections, testing and sign-off for each section of pipework / underground services prior to backfilling. A traceability drawing and date stamped photographs will accompany each Check sheet as proof of compliance.

2.4.2.5 Lower Basement Slab – B2 Level

The remainder of the lower basement slab will be cast in sections. Suitable spacers will be used as necessary to support the bottom mat reinforcement in position. Steel chairs will be used in the spacing of top reinforcement and will be of suitable strength and number to hold the reinforcement in its correct position. Following pre-pour inspection and sign-off using Quality Check sheet *EQS-15 (07) Rev 3-Concrete Pour Inspection* the lower basement slab will be cast in segments using a mobile concrete pump. Manual compaction will only be carried out with approved compaction equipment. Column and wall starters bars will be protected with rebar protection caps.

2.4.2.6 Rising elements lower basement / upper basement

Rising elements from lower basement to upper basement will consist of precast concrete columns, beams, twinwall and hollowcore to precast manufactures design and Structural Engineer sign-off. Erection will be by mobile crane and specialist crews. Tanking to wall face will be to approved Architects details. Precast Check sheets *EQS-11, 19, 20, 21* will be used for inspection and sign-off.

2.4.2.7 Upper Basement Slab – B1 Level

Following fixing of reinforcement, insitu concrete and structural screeds to Engineers design over hollowcore/plate flooring will be placed by mobile concrete pump.

2.4.2.8 Rising elements upper basement / podium

Rising elements from upper basement to podium will consist of precast concrete columns, beams, twinwall and hollowcore to precast manufactures design and Structural Engineer sign-off. Erection will be by mobile crane.

2.4.2.9 Podium / Ground floor slab

The podium slab will consist of insitu concrete, structural screeds over hollowcore/plate flooring all to Engineers design. Placing of concrete will be by mobile concrete pump.

2.4.2.10 Office A, B, C, D, E and Hotel Superstructure

The Office and Hotel superstructure will be formed in precast concrete (columns, beams, walls, stairs, hollowcore/plate flooring) all to precast manufactured design and Structural Engineers sign-off. Erection will by mobile crane and specialist precast erection crews as per approved RAMS. Structural screeds will follow in tandem, poured using mobile concrete pumps.

Typical Office floor plates are 16m wide, arranged around a central core and atrium. The typical office floor plate is subdivided in 2no. / 5no. parts, providing for whole building, whole floor or partial floor occupancies. Structural columns are arranged to maximise open space and provide flexible and substantial floor plates. Fire safety design (Fire Safety Certification) is planned on this basis.

The hotel is a freestanding block fronting both the Joyce Road and the Phase 1 public space. The main public entrance is on the Joyce Road where there is a vehicular set-down area. Guest and service vehicular access is also via basement levels.

2.4.2.11 Office A, B, C, D, E and Hotel Façade / Roof

Following façade Technical & Sample Submittal approval process installation of facades will follow superstructure erection sequence. Regular inspections and use of our suite of Façade Quality Check sheets will safeguard stringent compliance. The external experience of the overall development will respect the scale of its surroundings.

The office facades will be substantially enclosed by proprietary curtain wall glazing with external privacy screening and solar shading where required. The glazing will be a thermally broken structural glazing curtain wall system. Stone faced cladding to solid walls, stair cores and similar will be to Architects design.

Roof finishes will progress in tandem and will consist of modified bitumen sheet ‘warm roof’ incorporating insulation achieving the required u-value in accordance with the requirements of TGD L of the Building Regulations.

2.4.2.12 Boundary treatments

Boundary walls, railings etc will progress concurrently as per Engineers and Architects design/details. Works will include Hotel set down, bus stop and cycle lane along the Joyce Road interface and general set down, delivery, bus etc.

2.4.2.13 Completion of vehicular access, car and cycle parking

Completion of vehicular access, car and cycle linemarking, racks, signage will provide vehicular access to basement levels with emergency vehicle access only interfacing with pedestrian and cycle access at ground level. Vehicular set-down access will be provided on both the Monivea and Joyce Roads.

Visitor, delivery service and additional commercial and residential access will be provided in a centrally managed and secure basement car-park facility. Cycle access and parking will be separated from vehicular access, located is secure locked areas.

2.4.2.14 Office A, B, C, D, E fitout

The office buildings will provide multi-tenant occupancy shell & core. Fit-out will be bespoke to suit tenants needs and will be progressed to completion once tenants have signed lease agreements.

2.4.2.15 Hotel fitout

The hotel is arranged as a 175 bed 3-4-star hotel with bar, restaurant/ cafe and meeting/conference facilities. The hotel entrance is at ground level opening on Joyce Road and opening with bar and restaurant also to the principal

site public open space. The Hotel fit-out will be progressed on a top down basis as the building becomes weathered. In order to streamline the construction process, it is proposed to install Bathroom Pods resulting in many efficiencies including high quality and less waste. All works will be inspected and signed off prior to closing up utilising our suite of Quality Check sheets.

2.4.2.16 Podium slab / courtyard hard/soft landscaping

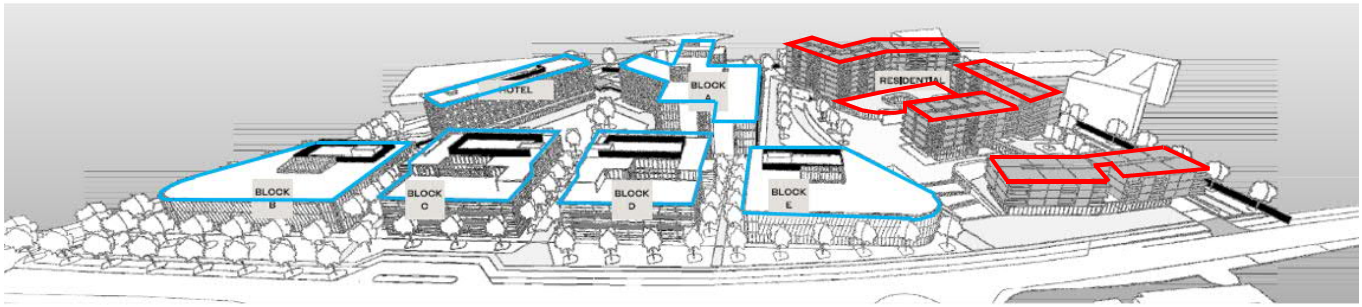
Hard and soft landscaping will be to Landscape Architects Design & Specification. Planting of bareroot and rootballed stock will take place in the planting season from completion of topsoil works; namely November / March. Container grown stock and grass seeding will be carried out in the appropriate weather conditions following completion of topsoil works. All trees will be full and well-shaped, bark unmarked and have healthy root systems. All planting operations will be carried out in accordance with BS 4428 and good horticultural practice. All shrubs will be pit planted in locations as shown in the plans. The construction of hardworks will be carried out in tandem with the main construction programme whereby care is taken to avoid any unnecessary machinery traffic on completed areas.

Phase 2

Phase 2 works comprise residential, leisure / fitness facility, cafe, restaurant and local service elements. Key phases of construction are set out below.

- Residential superstructure
- Residential façade / roof
- Boundary treatments
- Residential fitout
- Other Facilities fitout incl: leisure / fitness facility, cafe, restaurant, convenience store, pharmacy
- Hard / soft landscaping

Other facilities itemised above are proposed at lower ground / ground and first floor levels fronting both Monivea road and the new Phase 2 public open space.



Phase 2 - **Residential, Leisure / Fitness Facility, Cafe, Restaurant, Local Service Elements**

2.4.2.17 Residential Superstructure

Residential blocks superstructure will be formed in precast concrete (columns, beams, walls, stairs, hollowcore/plate flooring) all to precast manufactured design and Structural Engineers sign-off. Erection will by mobile crane and specialist precast erection crews as per approved RAMS. Structural screeds will follow in tandem, poured using mobile concrete pumps.

2.4.2.18 Residential Façade / Roof

Following façade Technical & Sample Submittal approval process installation of facades to Architects details and specification will follow superstructure erection sequence. Regular inspections and use of our suite of Façade Quality Check sheets will safeguard stringent compliance.

2.4.2.19 Boundary treatments

Boundary walls, railings etc will progress concurrently as per Engineers and Architects design/details including completion of boundary works along the R339 Monivea Road.

2.4.2.20 Residential fitout

Residential fit-out will be progressed on a top down basis as the buildings becomes weathered in stages. Bathroom Pods will be fitted throughout. All works will be inspected and signed off prior to closing up utilising our suite of Quality Check sheets.

2.4.2.21 Other Facilities fitout incl: leisure / fitness facility, cafe, restaurant, convenience store, pharmacy

Fit-out works to other facilities will be bespoke to their needs and will be progressed to completion once tenants have signed lease agreements.

2.4.2.22 Hard / soft landscaping

Hard and soft landscaping will be to Landscape Architects Design & Specification. Planting will take place in the planting season from completion of topsoil works i.e. November / March. All planting operations will be carried out in accordance with BS 4428 and good horticultural practice. The construction of hardworks will be carried out in tandem with the main construction programme whereby care is taken to avoid any unnecessary machinery traffic on completed areas.

2.4.3 General Construction Measures

Prior to any works commencing a dilapidation / condition survey will be conducted of the adjoining roads, footpaths and adjoining buildings, photographing and noting any existing damage or defects to structure or road surfaces. A copy of this survey will be retained on site and issued to Galway City Council if required.

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 – see section 10 – Appendix 1.0. 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. Environmental Management

3.1 Introduction

This CEMP has been prepared and presented as a standalone document and includes all noise, dust and vibration control measures refuelling, hazardous material storage and a Waste Management Plan for the site.

3.2 Noise & Vibration Control Measures

The operation of plant and machinery, including construction vehicles, is a source of potential impact that will require mitigation at all locations within the site. Proposed measures to control noise include:

- Ensure that operations are designed to be undertaken with any directional noise emissions pointing away from noise-sensitive receptors.
- Local hoarding, screens or barriers will be erected as required to shield particularly noisy activities.
- Drop heights will be minimised when loading vehicles with rubble.
- Vehicles will be prohibited from waiting within the site with their engines running or alternatively, located in waiting areas away from sensitive receptors.
- The use of particularly noise plant will be limited, i.e. avoiding use of particularly noisy plant early in the morning.
- All pneumatic tools will be fitted with silencers/mufflers.
- Diesel generators will be sound proofed to minimise the potential for noise impacts.
- Plant and machinery with low inherent potential for generation of noise and/or vibration will be selected. All construction plant and equipment to be used onsite will be modern equipment and will comply with the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations.
- Regular maintenance of plant will be carried out in order to minimise noise emissions. Particular attention will be paid to the lubrication of bearings and the integrity of silencers.
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the works.
- Compressors will be of the “sound reduced” models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers.
- Machines, which are used intermittently, will be shut down during those periods when they are not in use.
- Tool Box Talks will be provided to drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation; and,
- Access routes will be condition monitored and maintained in a clean condition.

Specific mitigation measures will be implemented during those construction activities identified as having the highest potential to cause disturbance from either noise and or vibration. For example, final trimming / breaking of Basement rock (Basement excavation / rockbreaking already completed) will be carried out by excavators fitted with shrouded breakers to minimise noise/vibration transfer.

Breakers with top and side buffers to absorb vibration and noise will be the preferred option.

A regular programme of noise and vibration monitoring will be implemented. Noise baseline levels will be agreed prior to commencement of construction.

3.3 Dust Control Measures

Construction dust can be generated from many on-site activities such as excavation and backfilling. The extent of dust generation will depend on the type of activity undertaken, the location, the nature of the dust and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather. Construction traffic movements also have the potential to generate dust as they travel along haul routes.

Proposed measures to control dust include:

- Any site haul roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions.
- The designated public roads outside the site and along the main transport routes to the site will be regularly inspected by the foremen for cleanliness, and cleaned as necessary.
- Material handling systems and material storage areas will be designed and laid out to minimise exposure to wind.
- Water misting or sprays will be used if required particularly if dusty activities are necessary during dry or windy periods.
- All construction related traffic will have speed restrictions on un-surfaced roads to 15 kph.
- Daily inspection of the construction site to examine dust measures and their effectiveness.
- When necessary, sections of the haul route will be swept using a truck mounted vacuum sweeper; and
- All vehicles leaving the construction areas of the site will pass through a wheel cleansing area prior to entering the local road network.

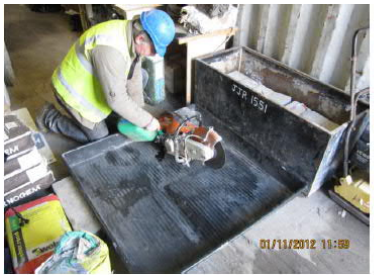
3.4 Refuelling, Fuel and Hazardous Material Storage

The following mitigation measures are proposed to avoid release of hydrocarbons at the site:

- Minimal maintenance of construction vehicles or plant will take place on site.
- Drip trays will be used to control on-site refuelling at controlled fuelling stations.
- On-site diesel tanks will be double skinned to 110% of their capacity.
- Containment stores will be used for refuelling of small plant such as consaws etc.
- Any fuel bowsers used on site will be custom-built / bunded to 100% of capacity. Fuel bowsers will be parked on a level area in the construction compound when not in use.
- 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 volumes stored on site will be minimised. Any fuel storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction.
- Plant used will be regularly inspected for leaks and fitness for purpose.
- Any Hazardous Materials will be stored in drip trays in secure containment stores.
- Refuelling / containment store signage will be erected at predetermined locations around the site.
- 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 any accidental spillage in and outside the refuelling area.

CONTAINMENT STORE

Example of JJ Rhatigan & Company refuelling of small plant carried out in Containment Store with drip tray protection / refuelling signage.



3.5 Water Management / Water Quality

As the basement is already excavated only minimal water / rainwater will need to be removed from site. It is planned to let rainwater soak naturally back into the ground in areas not being worked on. In zones under construction it is proposed to run any excess water through an environmental structure such as a settlement tank / silt trap and pump clean water into the combined sewer at an agreed discharge rate during the construction phase (subject to Galway City Council agreement). A discharge monitoring inspection programme will be put in place and agreed with the Galway City Council Drainage Engineer. This methodology safeguards water quality and provides a solution for catching suspended solids and sediment prior to discharge into the combined sewer.

3.6 Waste Management Plan

A project specific Waste Management Plan (WMP) has been prepared to accompany the CEMP which outlines the best practice procedures during the construction phases of the project. 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.

3.6.1 Waste Management Hierarchy

The waste management hierarchy sets out the most efficient way of managing waste in the following order:

Prevention and Minimisation:
The primary aim of the WMP will be to prevent and thereby reduce the amount of waste generated at each stage of the project.

Reuse of Waste:
Reusing as much of the waste generated on site as possible will reduce the quantities of waste that will have to be transported off site to recovery facilities or landfill.

Recycling of Waste:
There are a number of established markets available for the beneficial use of Construction and Demolition waste such as using waste concrete as fill for new roads. At all times during the implementation of the WMP, disposal of waste to landfill will be considered only as a last resort.

3.6.2 Roles and Responsibilities for Waste Management

Prior to the commencement of the proposed development a member of the on-site construction management staff will be assigned the role of Waste Management Coordinator. The Waste Management Coordinator will be in charge of the implementation of the objectives of the WMP, ensuring that all hired waste contractors have the necessary authorisations and that the waste management hierarchy is adhered to. The person nominated will have sufficient authority so that they can ensure everyone working on the proposed development adheres to the WMP.

3.6.3 Waste Management Plan Conclusion

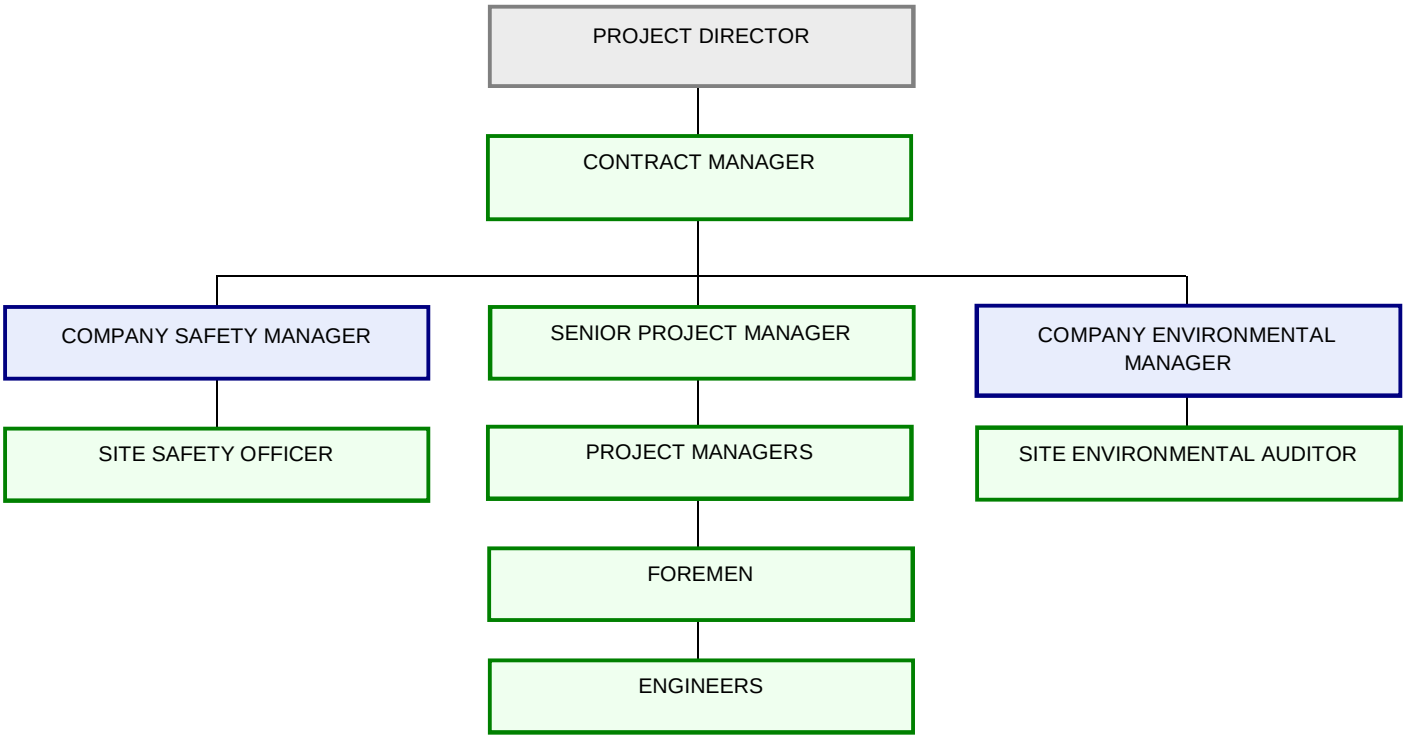
The WMP will be adhered to by all Subcontractors / Specialists and all other site personnel involved in the project. The WMP which will be explained during the induction process for all site personnel. The waste hierarchy will always be employed to ensure that the least possible amount of waste is produced during the construction phase. Reuse of certain types of construction wastes such as broken rock will cut down on the cost and requirement of raw materials therefore further minimising waste levels.

4. Environmental Management Implementation

4.1 Roles and Responsibilities

The Site Contracts Manager / Senior Project Manager / Foremen / Engineers are the project focal point relating to construction related environmental issues. In general, the Senior Project Manager will maintain responsibility for monitoring the works and Subcontractors / Specialists / Site Personnel from an environmental perspective. The Senior Project Manager will act as the regulatory interface on any environmental matters by reporting to and liaising with Galway City Council and other statutory bodies as required.

The Senior Project Manager will report directly to the Site Contracts Manager, Company Environmental Manager and Company Safety Manager. The Contracts Manager will report directly to the Project Director. This structure provides a “triple lock” review / interaction process. An organogram structure for the construction stage is as follows:



4.2 Environmental Awareness and Training

4.2.1 Environmental Induction

The Environmental Induction will be integrated into the general site induction on a case by case basis for each member of staff / personnel employed on-site depending on their assigned roles and responsibilities on site. Where necessary, the Environmental Induction will as a minimum include:

- A copy of the Environmental Management Site Plan and discussion of the key environmental risks and constraints.
- An outline of the CEMP structure.
- A discussion of the applicable Works Method Statement.
- The roles and responsibilities of staff, including contractors, in relation to environmental management; and,
- An outline of the Environmental Incident Management Procedure.

4.2.2 Toolbox Talks

Tool box talks will be held by a nominated person at the commencement of each day, or at the commencement of new activities. The aims of the tool box talks are to identify the specific work activities that are scheduled for that week or phase of work. In addition, the necessary work method statements and sub plans will be identified and discussed prior to the commencement of the week's activities.

Site meetings will be held on a regular basis involving appropriate site personnel. The objectives of site meetings are to discuss the coming weeks activities and identify the relevant work method statements and sub plans that will be relevant to that week's activities. Additionally, any non-compliance identified during the previous week will also be discussed with the aim to reduce the potential of the same non-compliance reoccurring.

5. Emergency Response Plan

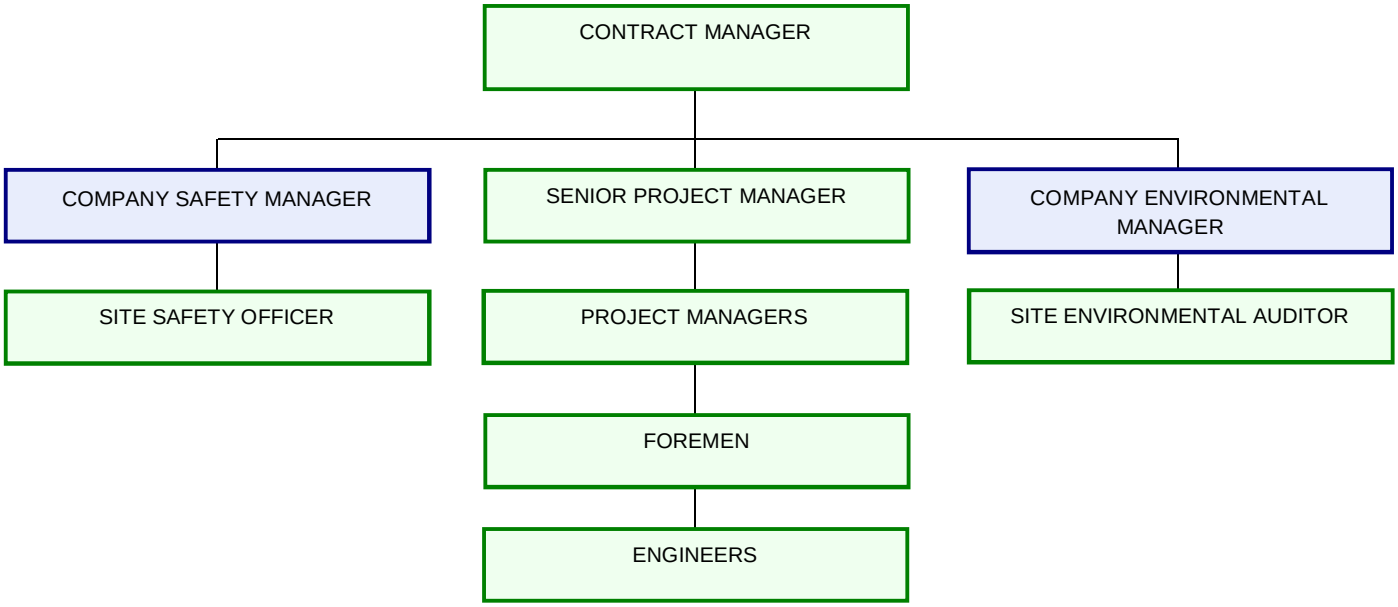
An Emergency Response Plan (ERP) is presented in this section of the CEMP. It provides details of procedures to be adopted in the event of an emergency in terms of site health and safety and environmental protection.

5.1 Emergency Response Procedures

The ERP provides details of procedures to be adopted in the event of an emergency and includes details on the response required and the responsibilities of all personnel in the event of an emergency. The ERP will require updating and submissions from the contractor/PSCS and suppliers as the project progresses. Where subcontractors that are contracted on site are governed by their own emergency response procedure a bridging arrangement will be adopted to allow for inclusion of the subcontractor's ERP within this document. This is a working document that requires updating throughout the various stages of the project.

5.1.1 Roles and Responsibilities

The chain of command during an emergency response sets out who is responsible for coordinating the response. The Senior Project Manager, will lead the emergency response which makes him responsible for activating and coordinating the emergency response procedure. The other site personnel who can be identified at this time who will be delegated responsibilities during the emergency response are presented in Figure 5.1 below. In a situation where the Senior Project Manager is unavailable or incapable of coordinating the emergency response, the responsibility will be transferred to the next person in the chain of command outlined in Figure 5.1. This will be updated throughout the various stages of the project.



5.1.2 Site Evacuation/Fire Drill

A site evacuation/fire drill procedure will provide the basis for carrying out the immediate evacuation of all site personnel in the event of an emergency. The following steps will be taken:

- Notification of the emergency situation. Provision of a siren or fog horn to notify all personnel of an emergency situation.
- An assembly point will be designated in the construction compound area and will be marked with a sign. All site personnel will assemble at this point.
- A roll call will be carried out by the Site Safety Officer to account for all personnel on site.
- The Site Safety Officer will inform the Senior Project Manager when all personnel have been accounted for. At this time, the Senior Project Manager will decide the next course of action which be determined by the situation that exists at that time. The Senior Project Manager will advise all personnel accordingly.

All personnel will be made aware of the evacuation procedure during site induction. The Fire Services Acts of 1981 and 2003 require the holding of fire safety evacuation drills at specified intervals and record keeping of such drills.

5.1.3 Spill Control Measures

Every effort will be made to prevent an environmental incident during the construction and operational phase of the proposed project. Oil/Fuel spillages are one of the main environmental risks that will require an emergency response procedure. The importance of a swift and effective response in the event of such an incident occurring is key. The following steps provide the procedure to be followed in the event of such an incident.

- Stop the source of the spill and raise the alarm to alert people working in the vicinity of any potential dangers.
- If applicable, eliminate any sources of ignition in the immediate vicinity of the incident.
- Contain the spill using the spill control materials, track mats or other material as required. Do not spread or flush away the spill.
- If possible, cover or bund off any vulnerable areas where appropriate such as drains or sensitive habitats.
- If possible, clean up as much as possible using the spill control materials.
- Contain any used spill control material and dispose of used materials appropriately using a fully licensed waste contractor with the appropriate permits so that further contamination is limited.
- Notify the Environmental Manager immediately giving information on the location, type and extent of the spill so that they he can take appropriate action.
- The Environmental Manager will inspect the site and ensure the necessary measures are in place to contain and clean up the spill and prevent further spillage from occurring.
- The Environmental Manager will notify the appropriate regulatory body such as Galway City Council, Department of Communications, Energy and Natural Resources (DCENR) and Department of Environment, Community and Local Government (DOECLG), if deemed necessary.

Environmental incidents are not limited to just fuel spillages. Therefore, any environmental incident must be investigated in accordance with the following steps.

- The Environmental Manager must be immediately notified.
- If necessary, the Environmental Manager will inform the appropriate regulatory authority. The appropriate regulatory authority will depend on the nature of the incident.
- The details of the incident will be recorded on an Environmental Incident Form which will provide information such as the cause, extent, actions and remedial measures used following the incident. The form will also include any recommendations made to avoid reoccurrence of the incident

- A record of all Environmental Incidents will be kept on file by the Senior Project Manager and the Environmental Manager. These records will be made available to the relevant authorities if required.
- The Environmental Manager / Senior Project Manager will be responsible for any corrective actions required as a result of an incident e.g. an investigative report and formulation of alternative construction methods.

5.2 Contacting the Emergency Services

5.2.1 Emergency Communications Procedure

In the event of requiring the assistance of the emergency services the following steps should be taken:

Stay Calm
It's important to stay calm. Any situation that requires 999/112 is, by definition an emergency. The dispatcher or call-taker knows that and will try to move things along quickly, but under control.

Know the location of the emergency and the number you are calling from.
Confirmation of location and number you are calling from may be asked and answered a number of times. Even though many emergency call centres have enhanced capabilities meaning they are able to see your location on the computer screen they are still required to confirm the information. If for any reason you are disconnected, at least emergency crews will know where to go and how to call you back.

Wait for the call-taker to ask questions, then answer clearly and calmly.

If you reach a recording, listen to what it says.
If the recording says your call cannot be completed, hang up and try again. If the recording says all call takers are busy, WAIT. When the next call-taker or dispatcher is available to take the call, it will transfer you.

Let the call-taker guide the conversation.
He or she is typing the information into a computer. There's a good chance, however, that emergency services are already being sent while you are still on the line.

Follow all directions.
In some cases, the call-taker will give you directions. Listen carefully, follow each step exactly, and ask for clarification if you don't understand.

Keep your eyes open.
You may be asked to describe the scene, vehicles / plant involved or other adjacent parts to the scene.

Do not hang up the call until directed to do so by the call taker.

5.2.2 Contact Details

A list of emergency contacts is presented in Table 5.2. A copy of these contacts will be included in the Site Safety Statement and in the site offices and the various site welfare facilities.

Table 5.2 Emergency Contacts

Contact	Telephone No.
Emergency Services - Ambulance, Fire, Gardaí	999/112
Doctor - Medical Centre, Mervue	091 773 000
Hospital - University Hospital Galway	091 524222
ESB Emergency Services	1850 372 999
Gardaí - Mill Street Garda Station	091 538000
Health & Safety Officer	Barry Brennan
Health & Safety Authority	1890 289 389
Project Supervisor Construction Stage (PSCS) - Emmet Hynes	086 8103574
Project Supervisor Design Stage (PSDS)	Henry J Lyons Architects

6. Mitigation Measures

This section of the CEMP groups together the mitigation measures. It is intended that the CEMP will be updated prior to and during the course of the development to include all mitigations measures necessary. The CEMP will be submitted to the Planning Authorities for written approval.

For the purposes of demonstration, a table of selected mitigation measures providing the structure of how the measures are presented is outlined in Table 6.1. The selected mitigation measures have been grouped together according to environmental field/topic, as follows:

- Noise & Vibration Control
- Dust Control
- Fuel and Oil Control
- Run-off, Sediment and Erosion Control

By presenting the mitigation proposals in the below format, it is intended to provide an easy to audit list that can be reviewed and reported on during the future phases of the project. The tabular format in which the below information is presented, can be further expanded upon during the course of the project phases to provide a reporting template for site compliance audits.

Table 6.1 Site preparation and Mitigation Measures (Example Format)

Mitigation Measures	Reference	Mitigation Measure	Audit Result	Action Required
1	Noise & Vibration Control CEMP Section 3	Noise & Vibration Monitoring control stations will be set up at pre-determined locations adjacent sensitive receptors. We will continue to ensure the monitoring stations are supported and the development team have access to the live data 24/7.		
2	Dust Control CEMP Section 3	If necessary water will be pumped into a bowser or water spreader to dampen down haul roads and site compounds to prevent the generation of dust. Silty or oily water will not be used for dust suppression.		
3	Fuel and Oil Control CEMP Section 3	On-site refuelling will be carried out at designated refuelling stations on site. Drip trays will be used when refuelling all plant. Absorbent material and pads will be available in the event of any accidental spillages. Alternatively, mobile double skinned fuel bowsers may be used. Fuel bowsers will be parked on a level area in the compound when not in use.		
4	Run-off, Sediment and Erosion Controls	Erosion and Sedimentation control measures such as sandbags around storm water gullies will be employed as required to prevent any silty runoff to the storm network.		

7 Monitoring Proposals

This section of the CEMP groups together the monitoring measures relating to the construction phases of the proposed development. It is intended that the CEMP will be updated prior to the commencement of the development, to include all monitoring measures, conditions and or alterations that may emerge during the course of the planning process, and will be submitted to the Planning Authority for written approval.

For the purposes of demonstration, a preliminary table of selected monitoring measures providing the structure of how the measures are presented can be found in Table 7.1. The monitoring proposals are presented in terms of frequency of monitoring, reporting measures and monitoring responsibility.

Table 7.1 Schedule of Monitoring Measures (Example Format)

Mitigation Measures	Reference	Survey/Monitoring	Frequency	Reporting Measures	Responsibility
1	Noise & Vibration Control CEMP Section 3	Noise & Vibration monitoring will be carried out during the construction phases.	Daily	Weekly Noise & Vibration Monitoring reports	Senior Project Manager
2	Dust Control CEMP Section 3	Dust monitoring will be carried out during the construction phases.	Daily	Bi-weekly reports	Senior Project Manager
3	Fuel and Oil Control CEMP Section 3	On-site refuelling inspections.	Daily	Bi-weekly reports	Senior Engineer / Foremen
4	Run-off, Sediment and Erosion Controls	Erosion and Sedimentation Plan (ESCP) will be issued at pre-commencement. Monitored on a daily basis or after a storm event.	Daily	Bi-weekly reports or after a storm event	Senior Engineer

8. Programme of Works

It is expected that building works for the entire of Phase 1 will take in the region of 30 months to complete. Development of Phase 2 is expected to commence 18 months after Phase 1 commencement and will take circa 24 months to complete. These estimations are based on a high-level analysis of the site and proposed scheme. The total timeframe based on above is circa 42 months (3 ½ yrs.)

9. Compliance and Review

9.1 Site Inspections and Environmental Audits

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. Environmental inspections will ensure that the works are undertaken in compliance with this CEMP and all other planning application documents. Only suitably trained staff will undertake environmental site inspections.

9.2 Site Environmental Audit

Environmental audits will be carried out during the construction phase of the project. In contrast to monitoring and inspection activities, audits are designed to shed light on any underlying causes of non-compliance, and not merely detect the non-compliance itself. In addition, audits are the main means by which system and performance improvement opportunities may be identified. Environmental audits will be carried out by contractor staff. It is

important that an impartial and objective approach is adopted. Environmental audits will be conducted at planned intervals to determine whether the CEMP is being properly implemented and maintained. The results of environmental audits will be provided to project management personnel.

9.3 Environmental Compliance

The following definitions will apply in relation to the classification of Environmental Occurrences during construction of the proposed development:

Environmental Near Miss: An occurrence which if not controlled or due to its nature could lead to an Environmental Incident.

Environmental Incident: Any occurrence which has potential, due to its scale and nature, to migrate from source and have an environmental impact beyond the site boundary.

Environmental Exceedance Event: An environmental exceedance event occurs when monitoring results indicate that limits for a particular environmental parameter (as indicated in the Environmental Monitoring Programme) has been exceeded.

An exceedance will immediately trigger an investigation into the reason for the exceedance occurring and the application of suitable mitigation where necessary. Exceedance events can be closed out on achieving a monitoring result below the assigned limit for a particular environmental parameter.

Environmental Non-Compliance: Non-fulfilment of a requirement and includes any deviations from established procedures, programs and other arrangements related to the EMP.

9.4 Corrective Action Procedure

A corrective action is implemented to rectify an environmental problem on-site. Corrective actions will be implemented by the Senior Project Manager, as advised by the Environmental Manager. Corrective actions may be required as a result of the following;

- Environmental Audits;
- Environmental Inspections and Reviews;
- Environmental Monitoring;
- Environmental Incidents; and,
- Environmental Complaints.

A Corrective Action Notice will be used to communicate the details of the action required to site management. A Corrective Action Notice is a form that describes the cause and effect of an environmental problem on site and the recommended corrective action that is required. The Corrective Action Notice, when completed, will include details of close out and follow up actions.

If an environmental problem occurs on site that requires immediate attention direct communications between the Senior Project Manager and the Environmental Manager will be conducted. This in turn will be passed down to the site staff involved. A Corrective Action Notice will be completed at a later date.

9.5 Construction Phase Plan Review

This CEMP will be updated and reviewed prior to commencement of construction, and as required thereafter during the construction phases of the project.

10. Appendix 1.0

Crown Square – Construction Stage Traffic Management Plan Rev 01

TRAFFIC MANAGEMENT PLAN

JJ Rhatigan
Building Contractors

The Crown Square Development,
Mervue Industrial Estate,
Tuam Road,
Mervue,
Co. Galway.

Revision No.	Date	Revision Details
Rev 01	28/05/2019	Original

Traffic Management Plan – Crown Square Development

Scope:

This traffic management plan applies to construction related traffic entering, using, and leaving the Crown Development, for the duration of the construction stage. This traffic management plan will be reviewed and updated on an ongoing basis throughout all phases of the project.
This plan outlines the proposed access routes to and from site taking account of local traffic, local businesses, residential areas, and public footpaths, and shall outline the acceptable site construction traffic routes to and from the project.

Objectives:

This traffic management plan is designed to control the movement of traffic, both public & site related, and also to safely co-ordinate the delivery and loading / off-loading of materials and products. In particular the objectives of this traffic management plan include:

- To facilitate the construction of the Crown Development for the duration of the project and in minimising the impacts on the general public of construction related traffic, throughout all phases of the development.
- To ensure all modes of traffic along the route and adjoining junctions are catered for and considered, including public transport flows, disabled persons, pedestrians in general and cyclists and to warn all public/ site personnel of any hazards that may exist.
- Cater for all events in the surrounding areas.
- To have minimal impact on the businesses and local residents in the area in terms of noise, parking, and traffic flow.
- Include safety measures to provide for safe traffic flows for users and the general workforce including the measures to control all site vehicles during movement, reversing and turning so that no injury or damage may occur.
- Facilitate the needs of stakeholders including local authorities, Gardaí with responsibilities for roads and traffic in the area.
- Ensure safe access and egress for all construction personnel and visitors to the Crown Square project, and ensure safe passage for pedestrians at all site gateways
- To protect all site workers, members of the general public & drivers alike, from any injury involving site vehicles.
- This traffic management plan aims to minimise as much as possible the journey time delays to motorists and other road users and provide a safe traffic route for all construction and non-construction related traffic.

- During the construction stage, the traffic management plan will be managed by JJ Rhatigan & Co., who will ensure continuous distribution of information to all those affected by the plan.
- During construction works the JJ Rhatigan & Co. shall ensure that appropriate resources are in place for the implementation of this traffic management plan, and to plan works so as to reduce the need for vehicles to reverse wherever possible, and provide traffic control measures where necessary.

This Traffic Management Plan will cover 7 areas:

1. Delivery & Site Construction Vehicles
    I. Designated Traffic Access Routes
    II. Site Access – Vehicular & Pedestrian
    III. Site Access & Egress Routes
    IV. Internal Traffic Management Crown Square Development
    V. Exiting Site Lines of Sight
2. Personal Transport to Site
3. Footpaths & Road ways
4. Offloading
5. Emergency Services Access

1. Delivery & Site Construction Vehicles

The construction entrance gates will be adequately sign posted and will be accessible at agreed times between 08.00am to 18:00pm Monday to Friday, & 9.00am to 13.00pm on Saturday. The gate will be locked and controlled by designated key holders at all times. The key holder's numbers will be displayed prominently on the gates, and will be stated on all Purchase Orders issued by JJ Rhatigan & Co.

The Gate will only be opened when deliveries arrive to site/ leave site, and when construction vehicles need to enter/exit the site. The vehicular gates to the site will remain closed at all other times. The gate will be set back a sufficient distance from the road to facilitate deliveries on arrival, and keep the road clear.

JJ Rhatigan & Co. will endeavour to plan, as far as reasonably practicable, that deliveries will coincide with off peak traffic times, along with site requirements, in order to reduce or eliminate disruption to day-to-day traffic, and also to reduce the need for double handling materials once delivered. Planned deliveries will make the delivery process more efficient in terms of time, and reduced disruption. The benefits of this approach to deliveries include, a reduction in the volume of space required for material storage on site, reduction of waste through damage or materials being stolen, and site safety and site logistics benefit from a tidy and less cluttered site which leads to better productivity and improved safety standards.

Deliveries to site will be planned, coordinated and communicated between JJ Rhatigan & Co., subcontractors, and suppliers. Clear direction will be given to all subcontractors, suppliers, and visitors regarding the traffic management procedures before commencement on site. Representatives from appointed subcontractors, design teams, client etc. will be encouraged to visit the site before there

commencement on site to see the traffic management arrangements in person, which can then be communicated back to their workforces who will be involved in the project.

On PO's that are issued for deliveries, information will be detailed regarding the site directions, site restrictions, and numbers of the gatemen at the Crown Square Development. This information will be updated as required so that deliveries arriving to site can arrive knowing the procedure for access/egress and loading/unloading.

Delivery drivers will be under strict instruction as to the site rules. No parking or 'pulling up' will be permitted in any of the surrounding areas which may adversely affect the traffic flow, block footpath or driveways, or case obstruction to view for road users or pedestrians. In the event the delivery cannot be accepted to site immediately, the vehicles keep moving and return to site a time later as agreed with the gatemen.

- Site deliveries will only be allowed on site with the coordination of the JJ Rhatigan site management. This will be inclusive of the designated site access times and potential clashes with peak local traffic.
- Site deliveries must follow the designated access routes.
- Sub-Contractors are advised to source and utilise holding areas elsewhere on approach to the site, so as to ensure that the site deliveries are not causing disruptions to the normal flow of traffic.
- Site delivery vehicles delivering to the JJ Rhatigan & Co. Crown Square Project must adhere to the rules of the Road, in particular the designated speed limits.
- The onsite speed limit is 10km/h which will be posted on site in visible areas, while the approach road speed limit is 50km/h.
- Delivery vehicles must give way to pedestrians and take note of local traffic
- Site plant and delivery vehicles must only be operated by trained and competent people who hold all relevant certification and licenses.
- Flashing beacons and reversing sirens and all appropriate auxiliary devices as outlined by the H.S.A. must be fitted on all site vehicles.
- All delivery drivers must comply with the site safety rules at all times. Full PPE must be worn at all times while on site and out of the vehicle.
- All deliveries whereby working at height may be present must only be carried out with approved safe systems of works, as discussed and approved with site management.
- Any unusual loads or out of hour deliveries must be approved and coordinated with JJ Rhatigan & Co. and Galway City Council.
- Delivery vehicles must not be detrimental to the environmental rules of the site. This is inclusive of oil/fluid leaks.

- The ultimate and final responsibility for the manoeuvring of plant and delivery vehicles will rest with the driver of the vehicle / plant. All instruction issue by the JJ Rhatigan & Co. must be adhered to at all times.

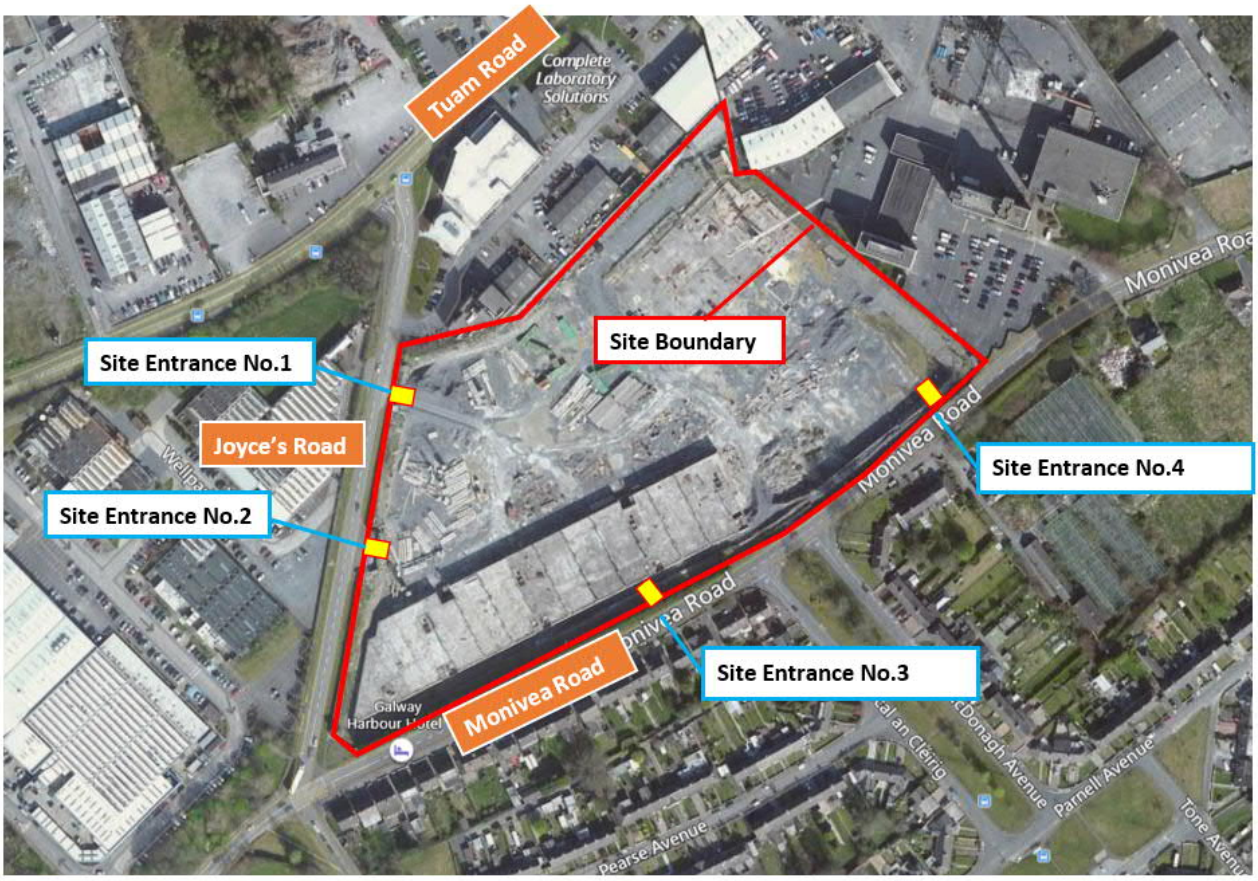


Figure 1: Site Location & Entrances (Entrances 1 -4 will be utilised at different phases of the development)

I. Designated Traffic Access Routes:

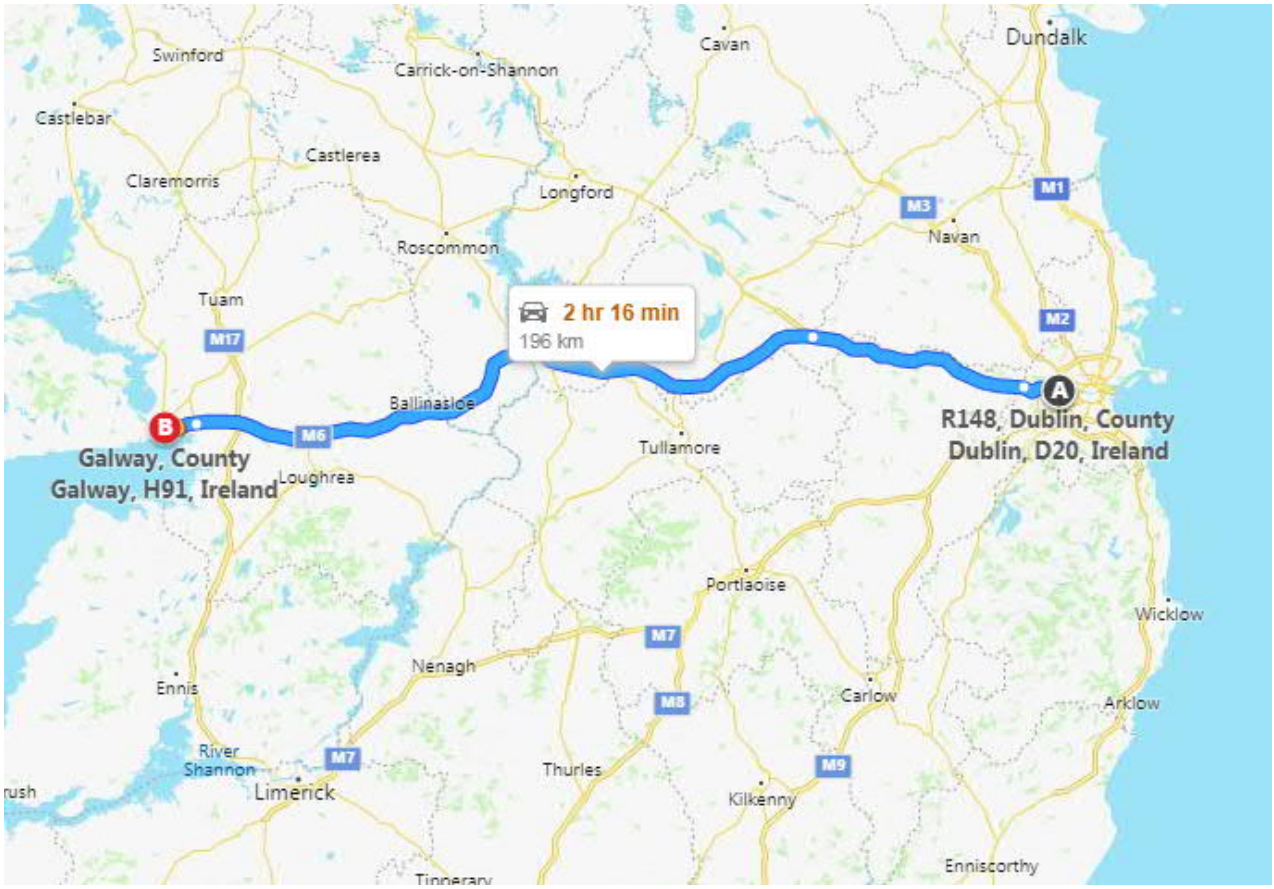
The agreed routes to site and away from site shall include the following direction:

Dublin → Crown Square Development Galway

A R148, Dublin, County Dublin, D20, Ireland

↑	1.	Depart **R148** toward Kennelsfort Road Upper	1.0 km
	2.	Road name changes to **N4**	6.4 km
	3.	Keep **straight** onto **M4** • *Entering County Kildare* • *Toll road* • *Entering County Meath*	45.0 km, 27 min
	4.	At exit **11**, take ramp **left** for **M6** toward **Athlone / B. Átha Luain / Gaillimh / Galway** • *Entering County Westmeath* • *Entering County Roscommon*	57.9 km, 36 min
	5.	Road name changes to **N6**	7.1 km
	6.	Keep **straight** onto **M6** • *Entering County Galway* • *Toll road*	71.5 km, 48 min
	7.	Road name changes to **N6**	3.7 km
↻	8.	At roundabout, take **2nd** exit	3.2 km
↖	9.	Bear **left** onto **R336 / Tuam Road**	0.4 km
↰	10.	Turn **left** onto **road**	0.2 km
	11.	Arrive The last intersection is Tuam Road If you reach R339 / Monivea Road, you've gone too far	

B Galway, County Galway, H91, Ireland

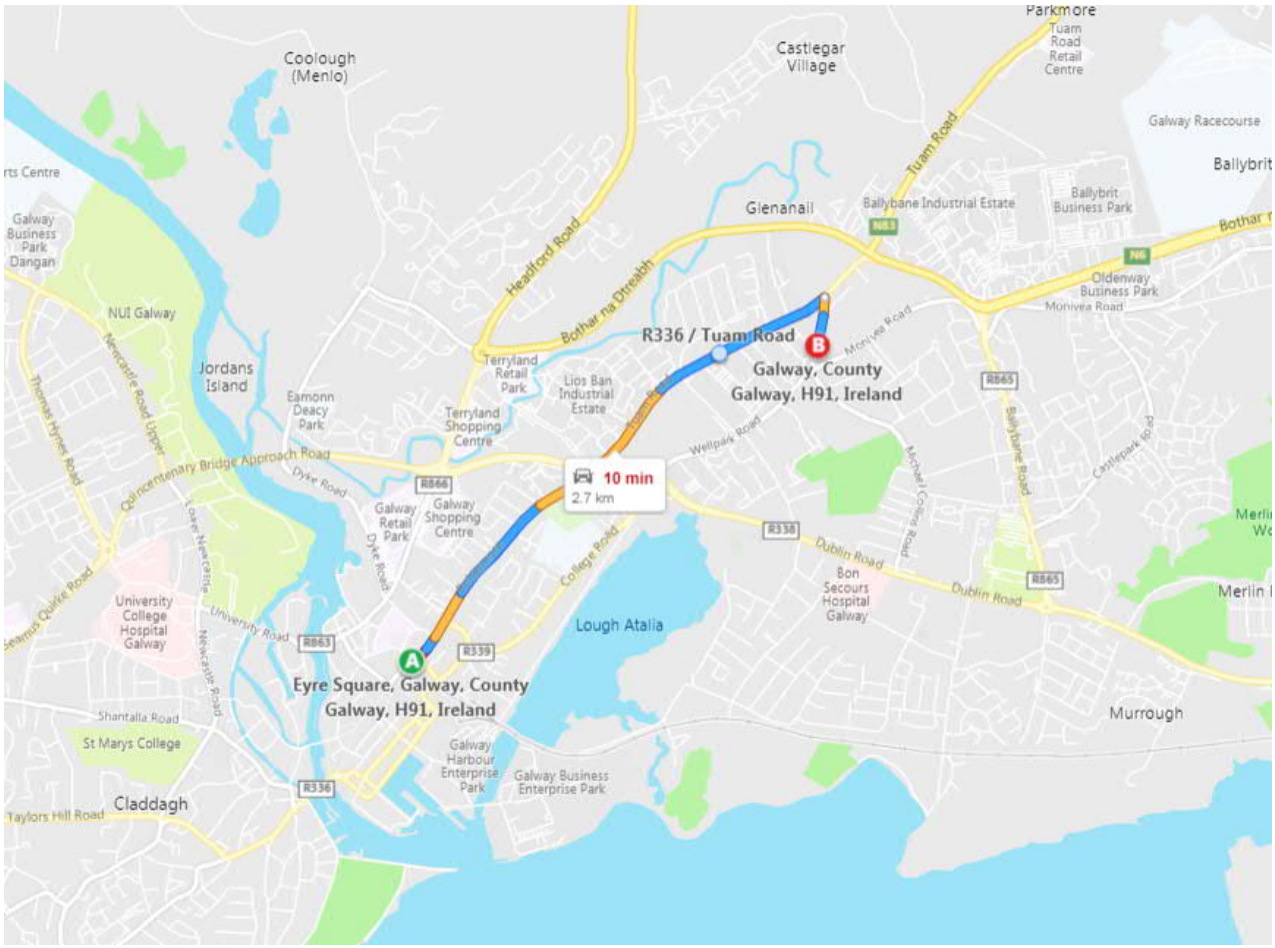

Swinford
Carrick-on-Shannon
Cavan
Dundalk
Castlebar
Castlerea
Claremorris
Longford
M1
M3
Navan
Roscommon
Tuam
M17
2 hr 16 min
196 km
M2
Ballinasloe
B
M6
Galway, County
Galway, H91, Ireland
Loughrea
Tullamore
A
R148, Dublin, County
Dublin, D20, Ireland
Portlaoise
Wicklow
M7
Nenagh
Ennis
M8
Carlow
Arklow
River
Shannon
M7
Thurles
M9
Limerick
Kilkenny
Enniscorthy

Galway City → Crown Square Development Galway

A Eyre Square, Galway, County Galway, H91, Ireland

↑	1.	Depart **R336 / Williamsgate Street / Eyre Square** toward R336 / Prospect Hill	1.1 km
↻	2.	At roundabout, take **3rd** exit	1.3 km
↱	3.	Turn **right** onto **road**	0.2 km
	4.	Arrive The last intersection is Tuam Road If you reach R339 / Monivea Road, you've gone too far	

B Galway, County Galway, H91, Ireland

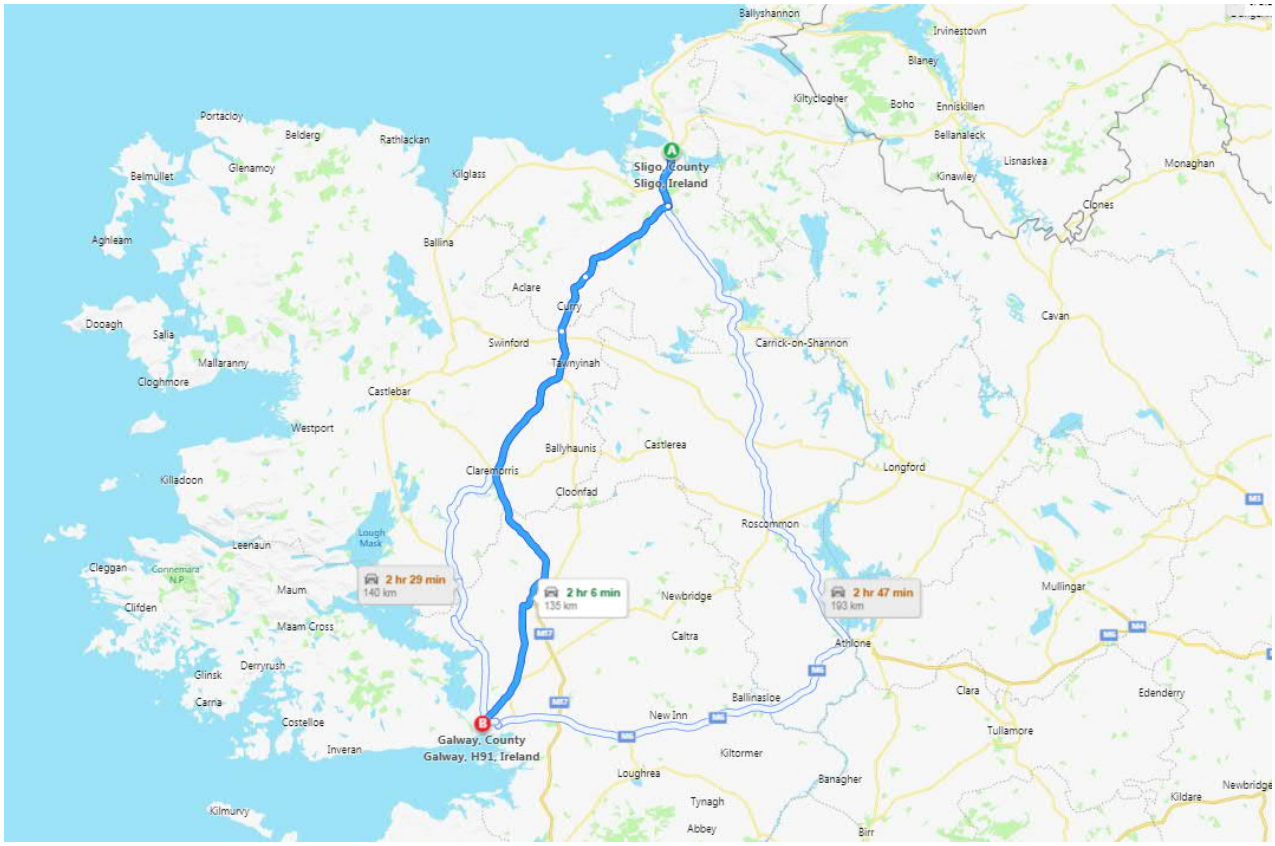


Sligo → Crown Square Development Galway

A Sligo, County Sligo, Ireland

↑	1.	Depart **Lower Knox Street** toward Wine Street	17 m
↑	2.	Road name changes to **Wine Street**	0.2 km
	3.	Road name changes to **R292 / Lord Edward Street**	74 m
↰	4.	Turn **left** onto **N4 / Joe Banks Road**	0.6 km
↻	5.	Pass through 2 roundabouts, remaining on **N4**	10.6 km, 9 min
↻	6.	At roundabout, take **3rd** exit onto **N17**	22.3 km, 21 min
↰	7.	Turn **left** onto **Humbert Street**	0.2 km
↑	8.	Road name changes to **Wolfe Tone Square**	64 m
↑	9.	Keep **straight** onto **R294 / Teeling Street**	0.5 km
↑	10.	Keep **straight** onto **N17 / Charlestown Road** • *Entering County Mayo*	11.2 km, 11 min
↖	11.	Bear **left** onto **N71 / Chapel Street**	44 m
↱	12.	Turn **right** onto **N17 / Ballyhaunis Road**	0.9 km
↻	13.	Pass through 3 roundabouts, remaining on **N17**	59.7 km, 50 min
↻	14.	At roundabout, take **3rd** exit onto **N83 / Galway Road**	28.0 km, 28 min
↑	15.	Keep **straight** onto **R336 / Tuam Road**	0.3 km
↰	16.	Turn **left** onto **road**	0.2 km
	17.	Arrive The last intersection is Tuam Road If you reach R339 / Monivea Road, you've gone too far	

B Galway, County Galway, H91, Ireland



Note: All delivery trucks entering and leaving the project shall follow the instructions issued in this Traffic Management Plan. Unless otherwise advised by JJR Project Management Team it is understood that vehicles will follow the designated routes on all journeys to and from site. This Traffic Management Plan will be issued to all subcontractors, suppliers, and visitors to the site to make it clear about the site working hours, parking arrangements, and restrictions around the local area.

II. Site Access – Vehicular & Pedestrian:

The access into the site is divided into the following:

i. 4no. controlled entrance gateways which will be used for site vehicles and deliveries entering/exiting the site. The main gate will allow access within the site compound to the lay-down area and turning circle where there is very limited space. Subcontractors are encouraged to utilise holding areas elsewhere off site on approach to the area where necessary, so as to ensure that the site works are not causing disruptions to the normal flow of traffic along the approach and access roads.

ii. A number of controlled pedestrian bi-metric turnstile access units will be situated at the site perimeter. The site can only be accessed by authorised site personnel through the site turnstile units. The turnstile units are a security measure to ensure no unauthorised persons can gain access to the site at any time.

These gateways will be adequately sign posted with the below signage at a minimum, to illustrate the above procedures. Public & Site awareness signs will be located at each access point to the Crown Square development.

III. Site Access & Egress Routes:

The management of Crown Square Development construction traffic on the public road network around the local area is an important part of the overall project, and will be actively managed by JJ Rhatigan & Co.

To combat any negative impact on local traffic and traffic in the surrounding areas of the city, JJ Rhatigan & Co. will instruct and direct all construction related traffic to use one route in and out of the city. The below route, which utilises the main transport infrastructure in Galway and the surrounding counties, aims to keep disruption to day to day traffic in the city to a minimum.

The M6 motorway shall be used as the main access route to the site from outside of the city. The M6 merges construction related traffic that may be coming from M17 and M18 and will filter this traffic through to the N6 until the Tuam Road is met. From here, the construction related traffic which needs to access the site (mainly deliveries) will turn left and head towards the city and take another immediate left onto Joyce's Road where the site entrances are located and will be signposted.

The construction related traffic that will be leaving site will be directed to leave via the same route onto the Tuam Road, N6, and then M6. From the Joyce's Road entrances and also the Monivea Road entrances, construction traffic must turn RIGHT when leaving site. The Monivea Road can be very congested at certain times and due to this, JJ Rhatigan & Co. shall instruct all construction traffic to avoid this route upon arrival, and exiting the city.

The site access and egress routes are located within an 50Km/h Zone. Traffic Management Signage shall be made from reflective orange metal with bold black writing will be erected on both approaches to the site access points at intervals of 100m, & 50m. These signs will highlight to all road users that "CAUTION CONSTRUCTION SITE ENTRANCE AHEAD 100M, & WK052 SITE ACCESS ON LEFT WK053 SITE ACCESS ON RIGHT.

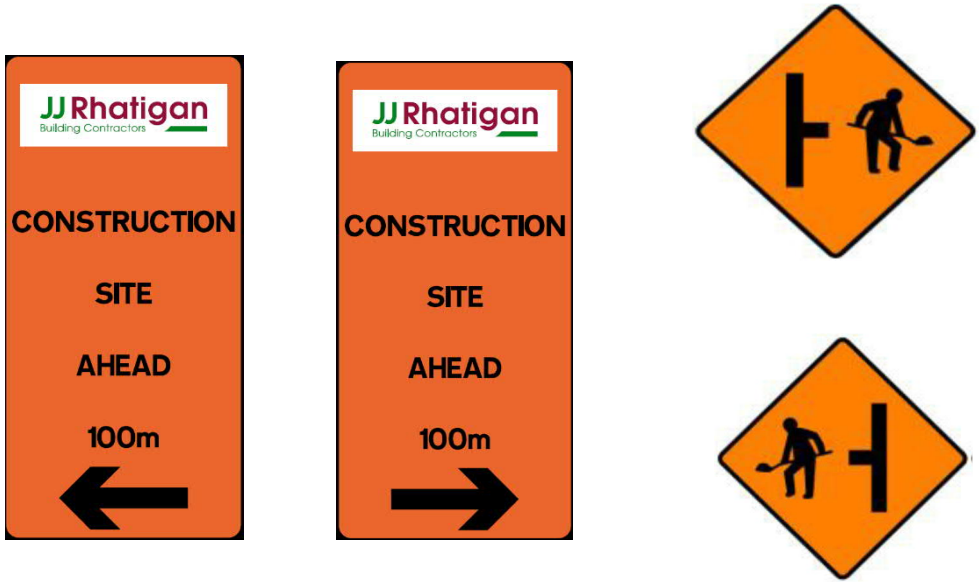


Figure 2 Traffic Management Signage that will be displayed upon approach to site

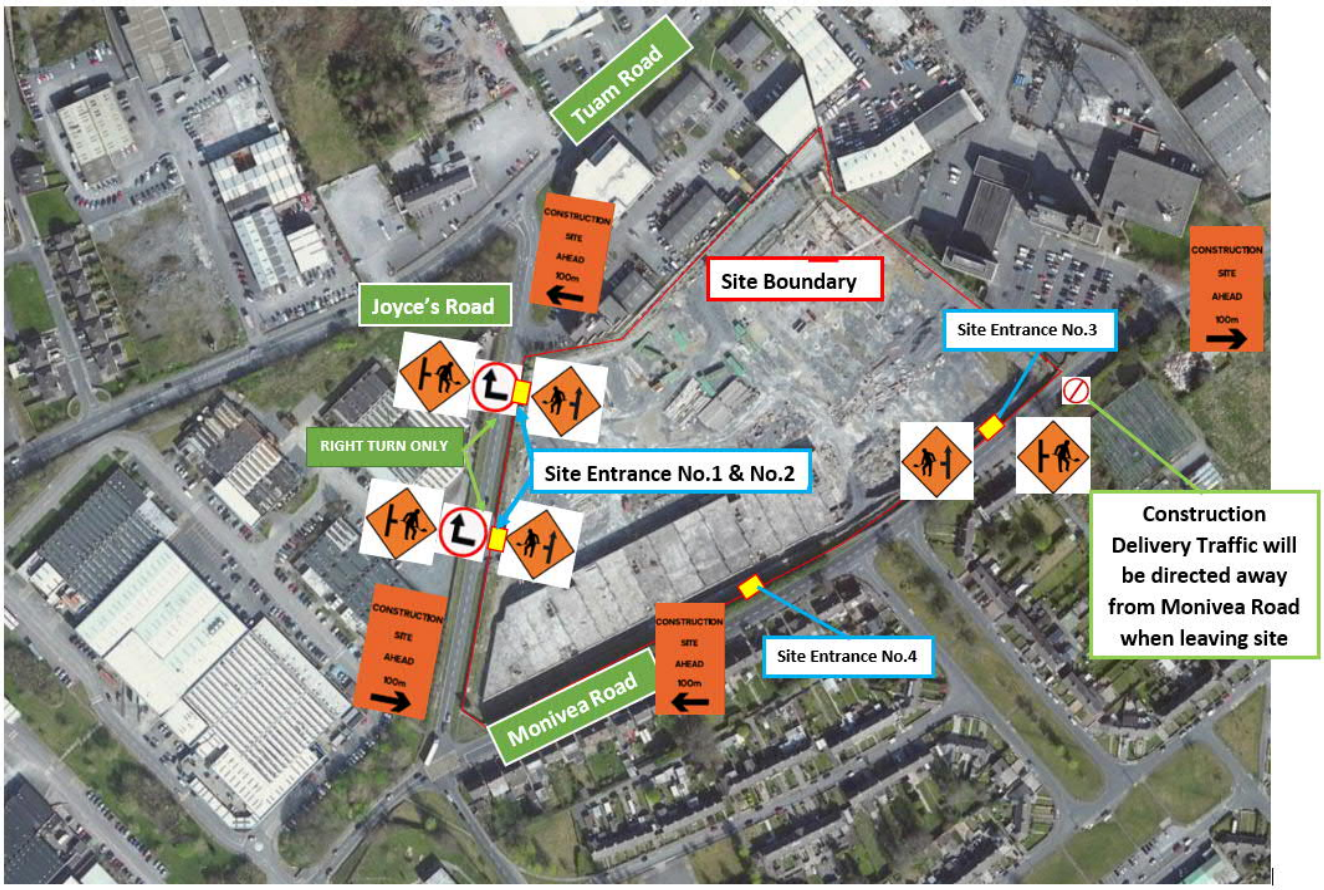


Figure 3 Traffic Management Layout

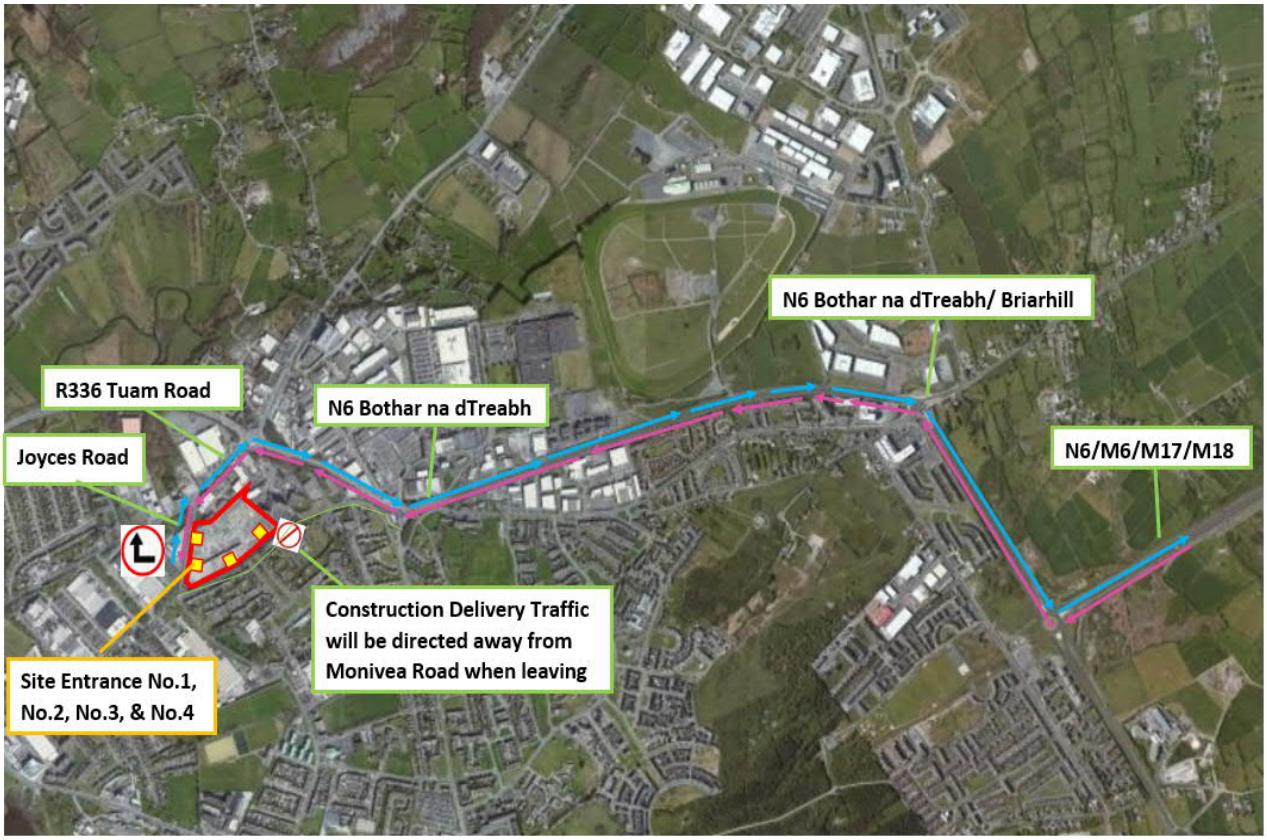


Figure 4 Site Access & Egress Route

The entrance vehicle and pedestrian gateways are the only locations where construction vehicles will interact with the public pedestrians and vehicles, therefore with the controls outlined above will minimise the risk of incident to members of the public, or other road users. The following signage shall be erected at the site exit points at the 4no. locations to warn drivers of the potential hazards:

1. STOP
2. ADVANCED WARNING – CAUTION PEDESTRIANS & OTHER ROAD USERS HAVE RIGHT OF WAY

IV. Internal Traffic Management Crown Square Development:

The traffic route within the site boundary will be set up by provision of haul roads and will be maintained in a clean environment.

The haul roads will be set up from the 4no. access gates to the Material Unloading and Laydown Areas which will be located around the site at various areas. The designated Material Unloading and Laydown Areas will be shown on a Site Logistics Plan. The Site Logistics Plan will be kept up to date with the phases of the development and changed/reviewed as necessary.

The haul roads will be used for deliveries to site and construction site vehicles. The gatemen situated at the site access gates will ensure site deliveries are banked to the laydown areas for unloading and loading.

Pedestrian crossings & walkways will be marked out using pedestrian & red 'loopover' barriers throughout the site. The pedestrian crossings will be marked and the below signage will be in place on both approaches. The red 'loopovers' act as a visual aid for operatives on site to enable them to clearly see the designated crossing points. The pedestrian routes on site will change regularly due to various activities on site and progress of the project.

Construction personnel will enter the site through the biometric turnstile units at the pedestrian entrances, and make their way to the site compound. From there they will be directed around the site via pedestrian direction signs and walkways, with the crossing points on internal roads indicated with the red 'loopovers'.

On occasions where large numbers of delivery vehicles are expected to be on site at one time such as during concrete pours JJ Rhatigan & Co. site management will ensure there is adequate capacity by enforcing the following:

i. JJ Rhatigan & Co. will control and co-ordinate all site movements and delivers to and from the site and be aware of the maximum vehicle capacity on site
ii. Ensure non-critical deliveries are not delivered during these periods.

The speed limit is 10Km/h within the confines of the site boundary and will be signposted accordingly.

V. Exiting Site Lines of Sight:

The pictures below are the sight lines either side of the site road entrance along the Monivea Road, and Joyce's Road. There are no obstacles and a clear view of road ahead on both sides of the site entrance.

R339 view to the left

R339 view to the right

Joyce's Road view to the left

Joyce's Road view to the Right

2.Personnel Transport to Site

There will be very limited onsite parking available for the project. JJ Rhatigan & Co. will monitor the construction personnel car parking to ensure the amenity, livelihood and trade of local residents and business people are not affected. Our site induction for all workers will be very clear on parking arrangements, as well as the issue of this traffic management plan to all appointed subcontractors and suppliers. Means of transportation to the site can be utilised by operatives by then following methods:

- Personal transport vehicle – Operatives can arrange for the legal parking of their own vehicle off site in nearby public car parks. We encourage operatives to car pool if taking this option to reduce the number of public parking used up in the City.
- Cycle – Operatives my choose to cycle to the construction site. In this instance, JJ Rhatigan & Co. will have bicycle stands provided for the securing of bicycles for those who choose to cycle to work.
- Public transport – There are a number of forms of public transport that operatives can avail of in order to get the construction site:
    - Bus services from local towns & villages in Mayo and Galway. Details http://burkesbus.com/
    - Bus services around Galway City. Details https://www.buseireann.ie/inner.php?id=459
    - Rail services into Galway City from a number of locations. Details http://www.irishrail.ie/travel-information/galway-ceannt
    - Public Bike Sharing – A number of options for this are available through the city. Details https://www.bikeshare.ie/galway.html

3. Footpaths & Road ways

All footpaths and roads surrounding the site will be kept clear of construction material and debris. Controls as discussed in the Exiting section of Site Construction Vehicles will be employed to ensure the roads are maintained clean. Construction vehicles will constantly travel on high quality stoned haul roadways within the site boundary which should ensure minimum or eliminate debris gathering to vehicle wheels and undercarriage.

Water hoses will be used inside site perimeter to minimize dust levels during dry weather. Temporary signage will be erected on approach to the main gate highlighting the fact that a construction entrance is ahead. The gatemen situated at the access point shall ensure that footpaths remain clear of debris, materials, and illegal construction vehicle parking. Under no circumstance will illegal parking be tolerated outside the side boundary.

4. Offloading

Offloading of deliveries will, were possible, occur from within the confines of the site footprint. Planned set down areas and unloading areas will be established inside the site, and these areas will be maintained for the duration of the project. Gatemen will aid in the safe access and egress of delivery vehicles to the site.

For deliveries vehicles which must be unloaded from outside the site, a task specific traffic management will be in place, as well as a detailed method statement outlining exclusion zones, safe access for public, and movement of vehicles. A fully segregated set down area will be established. Loads which must be unloaded from the road will be done in a planned manner with the main means of unloading being tower crane and telehandler. Banksmen will be on hand to assist in the unloading procedure which again will be planned and agreed with in advance.

5. Emergency Services Access

At all times throughout the duration of the project all roads will be maintained in a clear and safe fashion to not only provide access for construction vehicles but all emergency services vehicles. This plan will be continuously monitored and updated as necessary. As necessary JJ Rhatigan & Co. will make the site available to the emergency service so as to undertake drills or training or just to inspect the site to ensure that emergency vehicles can gain access to the necessary areas.

Communication:

Communication of this plan to subcontractors, suppliers, delivery companies will be by fax, post or e-mail when appointed. The plan will be communicated to site workers during site induction. Signage will be erected to communicate to the general public, as per the attached drawings.

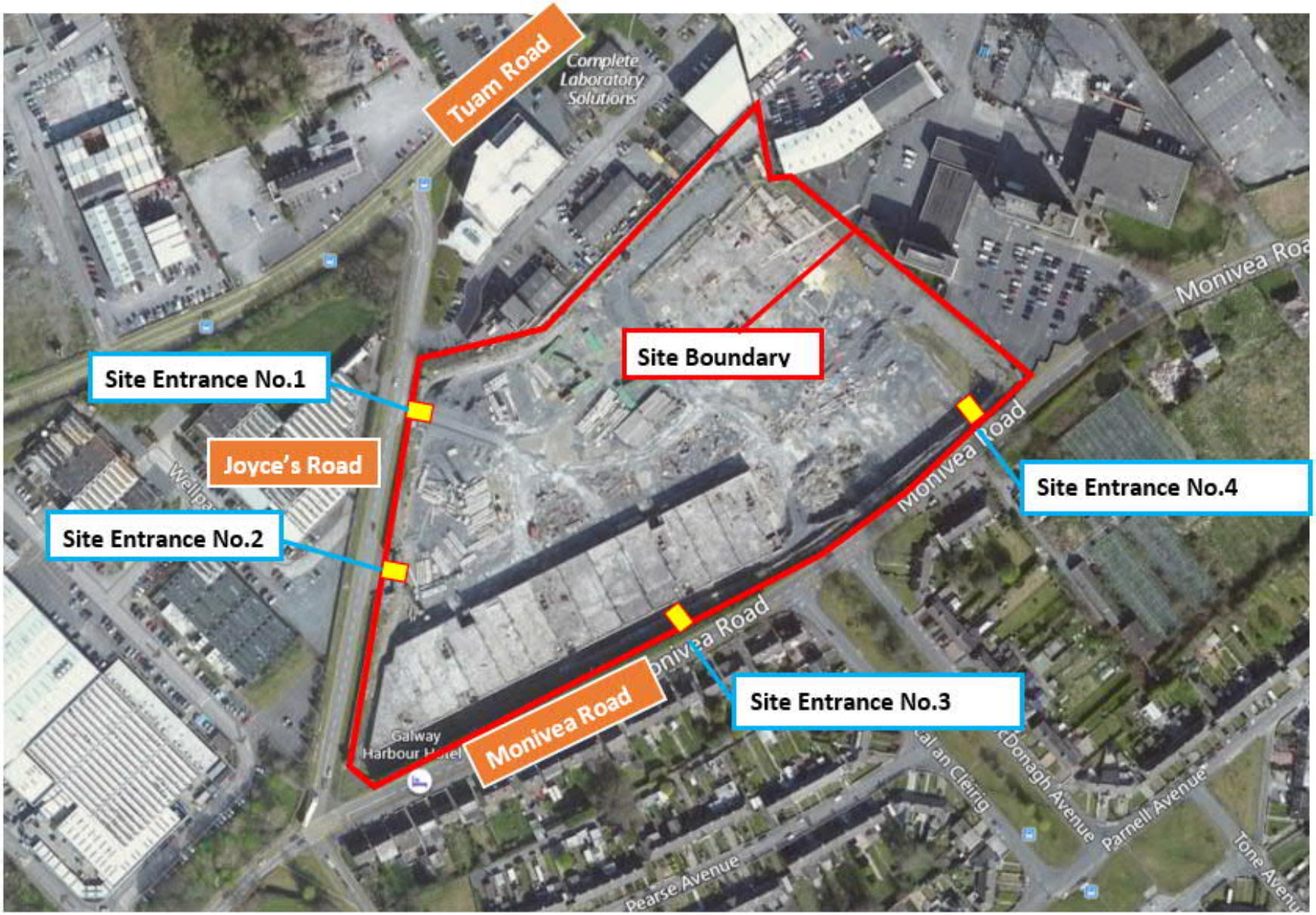
Monitoring & Corrective Actions:

The site management will monitor the compliance of delivery drivers with the requirements of this plan. Any non-conformances will be reported to the Site Management and will be dealt with immediately by notifying the individual driver and his employer, stating that the driver is no longer permitted to return to the site.

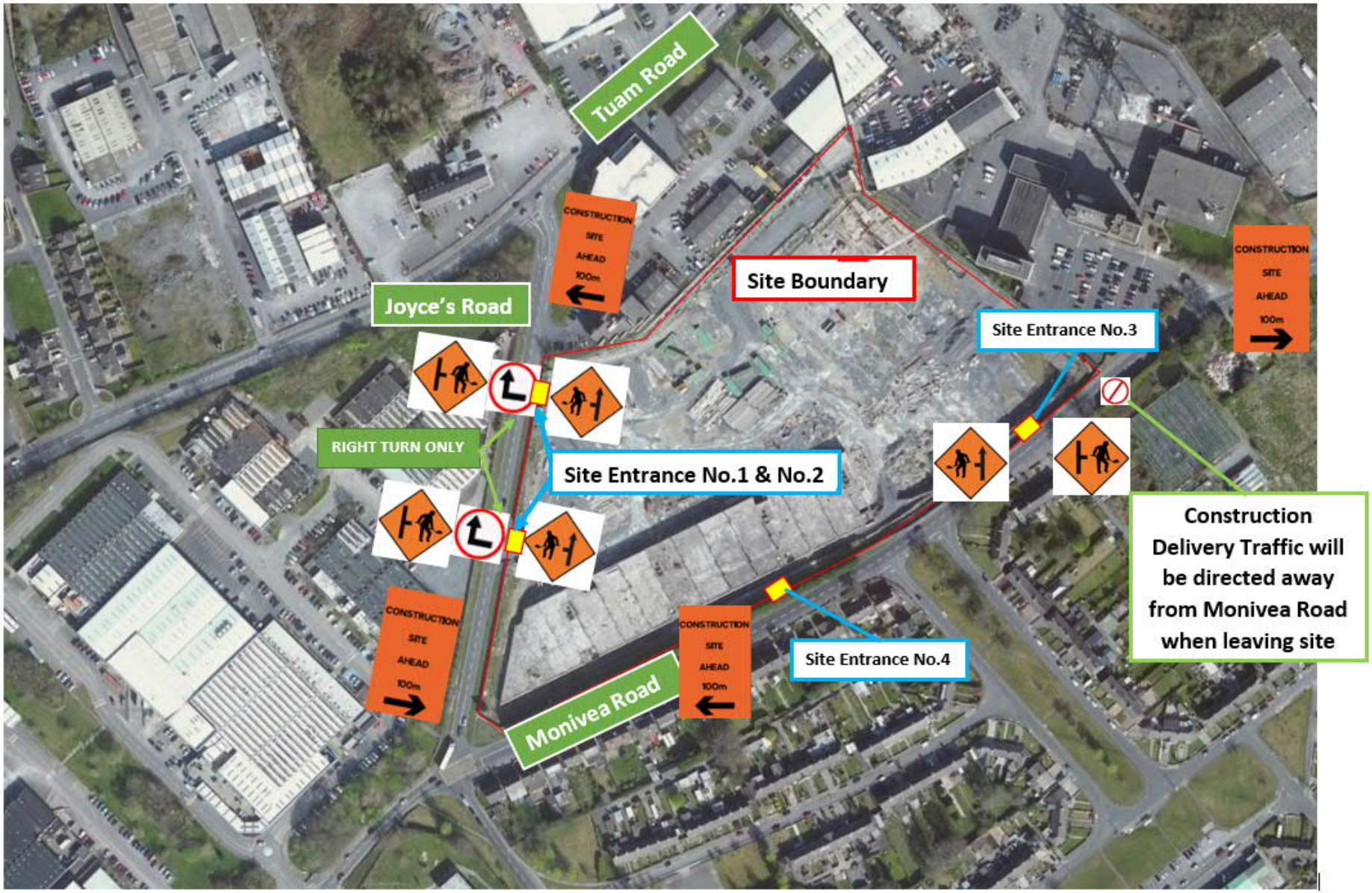
Signage:

JJ Rhatigan & Co. confirm they will use a competent sign provider and all signage used will meet the requirements of the Safety, Health & Welfare at Work (General Applications) Regulations 2007 and Chapter 8 of the Traffic Signs Manual.

Crown Square Site Entrances

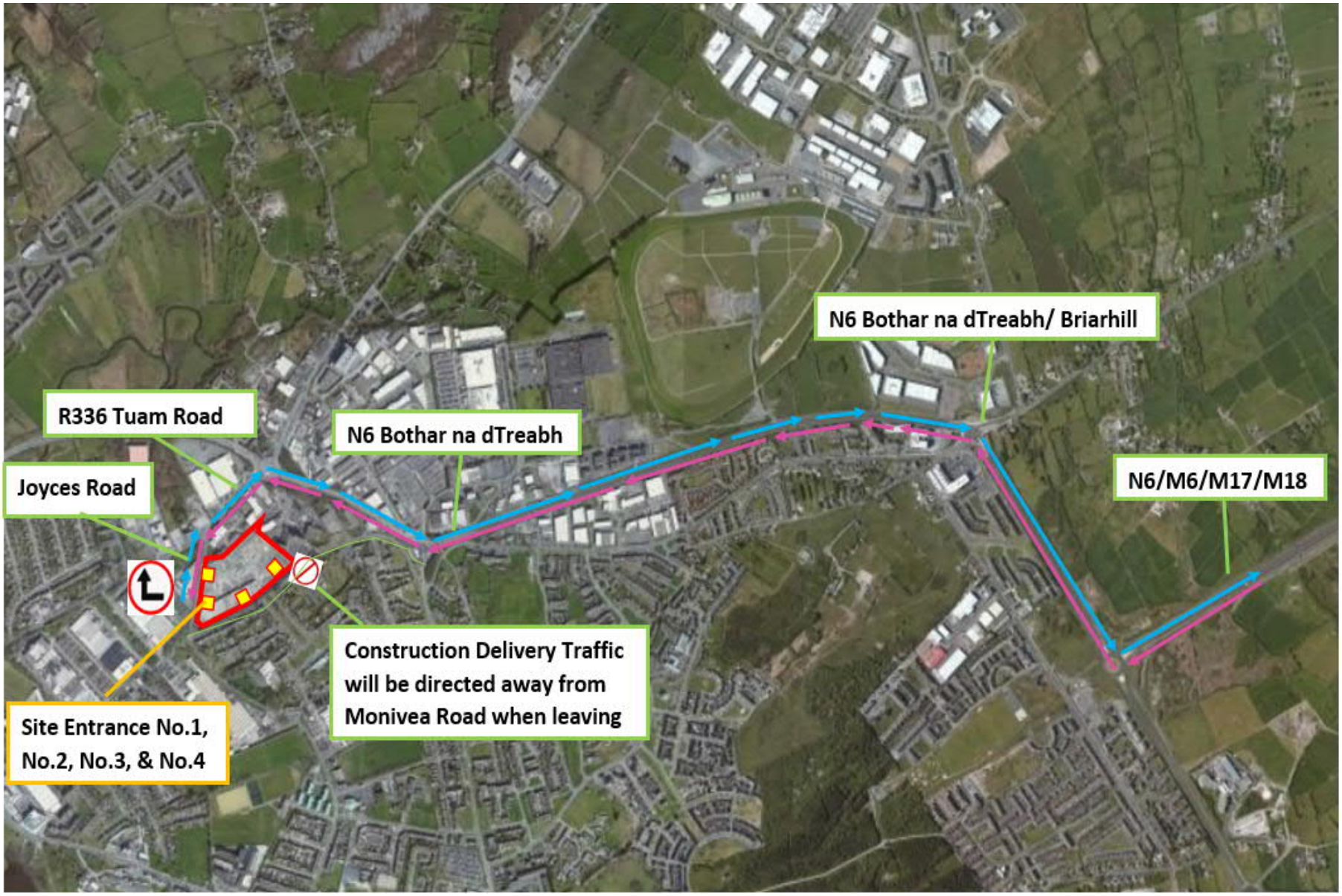


Traffic Management Plan Layout



Traffic Management Plan

Site Access & Egress Route



Appendix 4

Assessment of post mitigation impacts on individual conservation objectives of Inner Galway Bay SPA and Galway Bay Complex SAC

1.1 Assessment of the potential for the proposed development to impact on the conservation objectives of reproducing SCIs of Inner Galway Bay SPA (Post Mitigation).

Table 1.1: Impact of the proposed development on the conservation objectives of reproducing SCIs of Inner Galway Bay SPA.

To maintain the favourable conservation condition of sandwich tern in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	Typical sandwich tern breeding sites are located on low-lying offshore islands or islets in bays or brackish lagoons on spits or remote mainland dunes (Cramp, 1985). There is no suitable breeding habitat for this species within 800m of the development site. There will be no impact on the population abundance, productivity rate or distribution of breeding colonies as a result of the proposal. The proposed development is set back from Inner Galway Bay SPA by 800m. The minimum approach distance to pedestrian disturbance by Charadriformes is 42.2m and 22.3m whilst nesting (Livezey et al., 2016). There will be no impact on the population abundance or distribution of breeding colonies as a result of the proposal.
Productivity rate: fledged young per breeding pair	Mean Number	No significant decline	
Distribution: breeding colonies	Number; location; area (hectares)	No significant decline	
Disturbance at breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding sandwich tern population	
Prey biomass available	Kilogrammes	No significant decline	Key prey items of this species include fish, crustaceans, insects and rag worms. There will be no deterioration in water quality of Inner Galway Bay and thus no impact on prey biomass availability. Mitigation measures outlined in the NIS and its Appendices, ensure that any potential pathways for surface or groundwater pollution to this SCI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described the NIS and its appendices

To maintain the favourable conservation condition of sandwich tern in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
			Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution
Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase	There will be no barriers to connectivity as a result of the proposed development.

Table 1.2: Impact of the proposed development on the conservation objectives of Common Tern

To maintain the favourable conservation condition of common tern in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	Common tern breeding colonies can be sited in both coastal and inland areas using a wide variety of habitats including sandy, rocky or well-vegetated islands in estuaries, lakes and rivers. This species can also use man-made subtrates (Del Hoyo et al., 1996). There is no suitable breeding habitat for this species within 800m of the development site. According to the site synopsis for Inner Galway Bay the tern colonies are located in Green Island and Mutton Island with "98 pairs in 1995 on Green Island and 46 pairs in 2001 on Mutton Island". There will be no disturbance to the breeding site as a result of the proposal. The proposed development is set back from Inner Galway Bay SPA by 800m. The mean flight initiation distance of this species is 20.5m in response to pedestrian disturbance (Weston et al., 2012). The minimum approach distance to pedestrian disturbance by Charadriiformes is 42.2m and 22.3m whilst nesting (Livezey et al., 2016). There will be no impact on the population abundance or distribution of breeding colonies as a result of the proposal. There will be no disturbance as a result of the proposal.
Productivity rate: fledged young per breeding pair	Mean Number	No significant decline	
Distribution: breeding colonies	Number; location; area (hectares)	No significant decline	
Disturbance at breeding site	Level of impact	Human activities should occur at levels that do not adversely affect the breeding tern population	
Prey biomass available	Kilogrammes	No significant decline	Key prey items of this species include fish, crustaceans, insects and rag worms. There will be no deterioration in water quality of Inner Galway Bay and thus no impact on prey biomass availability. Mitigation measures outlined in the NIS and its Appendices, ensure that any potential pathways for surface or groundwater pollution to this SCI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described the NIS and its appendices Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution

To maintain the favourable conservation condition of common tern in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Barriers to connectivity	Number; location; shape; area (hectares)	No significant increase	There will be no barriers to connectivity as a result of the proposed development.

Table 1.3: Impact of the proposed development on the conservation objectives of cormorant

To maintain the favourable conservation condition of Cormorant in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Breeding population abundance: apparently occupied nests (AONs)	Number	No significant decline	According to the site-specific conservation objectives (NPWS, 2013), a recent survey of Deer Island (conducted in 2010) estimated 128 AONs at this colony, which represents an approximate decline of 38% since 1985. Deer Island is not in close proximity to the site. There will be no impact on the breeding population of Cormorant due to the proposal. The mean flight initiation distance of this species is 23.5m, in response to motorized vehicles, and 74m, in response to pedestrian disturbance in non-nesting birds (Guay et al., 2014).
Productivity rate	Mean Number	No significant decline	
Distribution: breeding colonies	Number; location; area (hectares)	No significant decline	
Prey biomass available	Kilogrammes	No significant decline	Key prey items of this species include fish, crustaceans, insects and rag worms. There will be no deterioration in water quality of Inner Galway Bay and thus no impact on prey biomass availability. Mitigation measures outlined in the NIS and its Appendices, ensure that any potential pathways for surface or groundwater pollution to this SCI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described the NIS and its appendices Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution
Barriers to connectivity	Number; location; shape; area (hectares	No significant increase	There will be no barriers to connectivity as a result of the proposed development.
Disturbance at breeding site	Level of impact	Human activities should occur at	

To maintain the favourable conservation condition of Cormorant in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
		levels that do not adversely affect the breeding cormorant population	There will be no effects on the population in terms of disturbance. According to the site synopsis the cormorant colony is located on Deer Island "A large Cormorant colony occurs on Deer Island - this had 200 pairs in 1985 and 300 pairs in 198." The proposed development is set back from Galway Bay SPA by 800m. Mean flight initiation distance of 23.5m, in response to motorized vehicle, and 74m, in response to pedestrian disturbance in non-nesting birds (Guay et al., 2014). The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no impact on the population or distribution of the population as a result of the proposal.
Population trend	Percentage change	Long term population trend stable or increasing	
Distribution	Number and range of areas used by waterbirds	No significant decrease in the numbers or range of areas used by cormorant, other than that occurring from natural patterns of variation	

1.2 Assessment of the potential Impacts of the proposed development on the conservation objectives of wintering SCIs of Inner Galway Bay SPA (Post Mitigation).

Table 1.4: Impact of the proposed development on the conservation objectives of Great Northern Diver

To maintain the favourable conservation condition of Great Northern Diver in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of great northern diver within Inner Galway Bay SPA as a result of the proposed development. The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. Mean flight initiation distance of 76.8m in response to human recreational activity (Jiang and Møller, 2017). A study of the disturbance response of great northern diver to boat traffic in Inner Galway Bay, found that Great Northern Divers in the area around Galway harbour do not show any significant response to normal ship and boat traffic with no Great Northern Divers flushed by the survey boat, even though the boat passed within 10 to 20 m of some birds (Gittings et al. 2015).
Distribution	Range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by great northern diver, other than that occurring from natural patterns of variation.	

Table 1.5: Impact of the proposed development on the conservation objectives of Grey Heron.

To maintain the favourable conservation condition of Grey Heron in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of Grey Heron within Inner Galway Bay SPA as a result of the proposed development.

To maintain the favourable conservation condition of Grey Heron in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Distribution	Number and range of areas used by waterbirds	No significant decrease in the range, timing or intensity of use of areas by grey heron, other than that occurring from natural patterns of variation.	The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. Mean flight initiation distance of this species is 47.36m in response to pedestrian disturbance (Møller & Erritzøe, 2010).

Table 1.6: Impact of the proposed development on the conservation objectives of Light-bellied Brent Goose.

To maintain the favourable conservation condition of Light-bellied Brent Goose in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of light-bellied Brent geese within Inner Galway Bay SPA as a result of the proposed development. The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. Mean flight initiation distance of 105m in response to pedestrian disturbance (Smit & Visser, 1993); other studies have found a minimum flight distance of 23.5m in response to pedestrian disturbance (Møller & Erritzøe, 2010).
Distribution	Number and range of areas used by waterbirds	No significant decrease in the range, timing and intensity of use of areas by light-bellied brent goose, other than that occurring from natural patterns of variation.	

Table 1.7: Impact of the proposed development on the conservation objectives of Wigeon.

To maintain the favourable conservation condition of Wigeon in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of wigeon within Inner Galway Bay SPA as a result of the proposed development. The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. A review of the available literature found disturbance distances of 91m in response to human activity (Holloway, 1997).
Distribution	Number, range, timing and intensity of areas used by waterbirds	No significant decrease in the range, timing or intensity of use of areas by wigeon, other than that occurring from natural patterns of variation	

Table 1.8: Impact of the proposed development on the conservation objectives of Teal.

To maintain the favourable conservation condition of Teal in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of teal within Inner Galway Bay SPA as a result of the proposed development. The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. A review of the available literature found disturbances distances of 58m in response to pedestrian disturbance (Møller, 2008b) and 39.23m in response to pedestrian disturbance (Møller & Erritzøe, 2010).
Distribution	Number and range of areas used by waterbirds	No significant decrease in the range, timing or intensity of use of areas by teal, other than that occurring from natural patterns of variation.	

Table 1.9: Impact of the proposed development on the conservation objectives of Shoveler.

To maintain the favourable conservation condition of Shoveler in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of shoveler within Inner Galway Bay SPA as a result of the proposed development. The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. A review of the available literature found a flush distance of 100m in response to vehicles and walking (Pease, 2005).
Distribution	Number and range of areas used by waterbirds	No significant decrease in the range, timing or intensity of use of areas by Shoveler, other than that occurring from natural patterns of variation.	

Table 1.10: Impact of the proposed development on the conservation objectives of Red-breasted Merganser.

To maintain the favourable conservation condition of Red-breasted Merganser in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of red-breasted merganser within Inner Galway Bay SPA as a result of the proposed development. The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. A review of the available literature found a flush distance of 28m in response to human recreational activity (Knapton, 2000).
Distribution	Number and range of areas used by waterbirds	No significant decrease in the range, timing or intensity of use of areas by red-breasted merganser, other than that occurring from natural patterns of variation.	

Table 1.11: Impact of the proposed development on the conservation objectives of Ringed Plover.

To maintain the favourable conservation condition of Ringed Plover in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of ringed plover within Inner Galway Bay SPA as a result of the proposed development. The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. A review of the available literature found that the mean flight initiation distance is 22.5m in response to pedestrian disturbance (Møller, 2008b); other studies have found a distance of 121m in response to pedestrian disturbance (Smit & Visser, 1993).
Distribution	Number and range of areas used by waterbirds	No significant decrease in the range, timing or intensity of use of areas by ringed plover, other than that occurring from natural patterns of variation.	

Table 1.12: Impact of the proposed development on the conservation objectives of Golden Plover.

To maintain the favourable conservation condition of Golden Plover in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of golden plover within Inner Galway Bay SPA as a result of the proposed development. The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. A review of the available literature found that the minimum approach distance to pedestrian disturbance is 42.2m (Livezey et al., 2016).
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by golden plover, other than that occurring from natural patterns of variation.	

To maintain the favourable conservation condition of Golden Plover in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**

Table 1.13: Impact of the proposed development on the conservation objectives of Lapwing.

To maintain the favourable conservation condition of Lapwing in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of Lapwing within Inner Galway Bay SPA as a result of the proposed development. The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. A review of the available literature found that the mean flight initiation distance of Lapwing is 41.32m (Møller, 2008b) in response to pedestrian disturbance.
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by Lapwing, other than that occurring from natural patterns of variation.	

Table 1.14: Impact of the proposed development on the conservation objectives of Dunlin.

To maintain the favourable conservation condition of Dunlin in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of Dunlin within Inner Galway Bay SPA as a result of the proposed development.
Distribution	Number, range, timing	No significant decrease in the range, timing or intensity of use of areas	

To maintain the favourable conservation condition of Dunlin in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
	and intensity of use of areas	by dunlin, other than that occurring from natural patterns of variation	The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. A review of the available literature found that the mean flight initiation distance of Dunlin is 163m in response to pedestrian disturbance (Smit & Visser, 1993).

Table 1.15: Impact of the proposed development on the conservation objectives of Bar-tailed Godwit.

To maintain the favourable conservation condition of Bar-tailed Godwit in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of bar-tailed godwit within Inner Galway Bay SPA as a result of the proposed development. The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. A review of the available literature found that the mean flight initiation distance of Bar-tailed godwit is 219m in response to pedestrian disturbance (Smit & Visser, 1993). Other studies have found a mean flight initiation distance of 22.1m in response to pedestrian disturbance (Blumstein et al., 2003).
Distribution	Number, range, timing and intensity of use of areas	No significant decrease in the range, timing or intensity of use of areas by bar-tailed godwit, other than that occurring from natural patterns of variation	

Table 1.16: Impact of the proposed development on the conservation objectives of Curlew.

To maintain the favourable conservation condition of Curlew in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of Curlew within Inner Galway Bay SPA as a result of the proposed development. The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. A review of the available literature found that the mean flight initiation distance of Curlew is 90m in response to dog disturbance, 188m in response to car disturbance and 213m in response to pedestrian disturbance (Smit & Visser, 1993).
Distribution	Number, range, timing and intensity of use of areas	There should be no significant decrease in the range, timing or intensity of use of areas by curlew, other than that occurring from natural patterns of variation.	

Table 1.17: Impact of the proposed development on the conservation objectives of Redshank.

To maintain the favourable conservation condition of Redshank in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of Turnstone within Inner Galway Bay SPA as a result of the proposed development. The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. A review of the available literature found that the mean flight initiation distance of Redshank in response to pedestrian disturbance as 29.71m (Møller, 2008b) (Møller & Erritzøe, 2010).
Distribution	Number, range, timing and intensity of use of area	There should be no significant decrease in the range, timing or intensity of use of areas by redshank, other than that occurring from natural patterns of variation.	

Table 1.18: Impact of the proposed development on the conservation objectives of Turnstone.

To maintain the favourable conservation condition of Turnstone in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of Turnstone within Inner Galway Bay SPA as a result of the proposed development. The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. A review of the available literature found that the mean flight initiation distance of turnstone in response to pedestrian disturbance is 13.8m at the closest (Blumstein et al., 2005). Other studies found disturbance distances of 29.66m (Glover et al., 2011) and 47m (Smit and Visser, 1993).
Distribution	Number and range of areas used by waterbirds	There should be no significant decrease in the range, timing or intensity of use of areas by turnstone, other than that occurring from natural patterns of variation.	

Table 1.19: Impact of the proposed development on the conservation objectives of Black-headed Gull.

To maintain the favourable conservation condition of Black-headed Gull in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of black-headed gull within Inner Galway Bay SPA as a result of the proposed development. The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. The mean flight initiation distance of Black-headed Gull in response to pedestrian disturbance is 41.20m (Møller & Erritzøe, 2010).
Distribution	Number and range of areas used by waterbirds.	There should be no significant decrease in the range, timing and intensity of use of areas used by black-headed gull other than that occurring from natural patterns of variation.	

Table1.20: Impact of the proposed development on the conservation objectives of Common Gull.

To maintain the favourable conservation condition of Common Gull in Inner Galway Bay SPA, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Population Trend	Percentage Change	Long term population trend stable or increasing	There will be no impact on the population or distribution of common gull within Inner Galway Bay SPA as a result of the proposed development. The development is entirely outside the boundary of the SPA and there will be no reduction in the area used by this species as a result of the proposed development. The habitats within the proposed development site are not of significance to this species. There will be no effects on the population in terms of disturbance. The proposed development is set back from Galway Bay SPA by 800m. The mean flight initiation distance of Common Gull in response to pedestrian disturbance is 59.8m (Møller & Erritzøe, 2010).
Distribution	Number and range of areas used by waterbirds	No significant decrease in the range, timing or intensity of use of areas by the common gull, other than that occurring from natural patterns of variation	

Table 1.21: Impact of the proposed development on the conservation objectives of Wetlands [A999].

To maintain the favourable conservation condition of wetland habitat in Inner Galway Bay SPA as a resource for the regularly occurring migratory waterbirds that utilise it. This is defined by the following attribute and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Habitat Area	Hectares	The permanent area occupied by the wetland habitat should be stable and not significantly less than the area of 13,267ha, other than that occurring from natural patterns of variation.	According to the site-specific conservation objective documents (NPWS, 2013), the wetland habitat area was estimated as 13,267ha. The footprint of the proposed development is outside the boundary of Inner Galway Bay SPA and therefore there will be no direct loss of wetland habitat as a result of the proposal. Indirect habitat loss as a result of deterioration in water quality was considered. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution There will be no direct or indirect loss of *'Wetland'* habitat due to the proposal, and therefore no decline in distribution.

1.2. Assessment of the potential for the proposed development to impact on the conservation objectives of the QI Habitats and species of Galway Bay Complex SAC (Post Mitigation).

Salicornia Mud [1310]

Information on this habitat was gained from the NPWS (2013) *The Status of EU Protected Habitats and Species in Ireland* Habitat Assessments Volume 2. Version 1.1. Unpublished Report, National Parks & Wildlife Services. Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland; hereafter referred to as the NPWS Article 17 report.

> *'Salicornia and other annuals colonising mud and sand (1310)' is a pioneer saltmarsh community that may occur on muddy sediment seaward of established saltmarsh, or form patches within other saltmarsh communities where the elevation is suitable and there is regular tidal inundation.*
>
> *The Interpretation Manual of EU Habitats (Commission of the European Communities 2003) defines Salicornia and other annuals colonising mud and sand (1310) as annuals belonging mainly to the genus Salicornia that colonise periodically inundated muds and sands of marine or interior salt marshes and belong to the phytosociological classes: Thero-Salicornietea, Frankenietea pulverulentae and Saginetea maritimae. Only vegetation from the first and third class is known in the Republic of Ireland. There are several sub-types listed and four British National Vegetation Classification plant communities (Rodwell 2000) are listed: "SM7 Arthrocnemum perenne stands", "SM8 Annual Salicornia saltmarsh", "SM9 Suaeda maritima saltmarsh" and "SM27 Ephemeral saltmarsh vegetation with Sagina maritima". In Ireland, three sub-types are recognised: (1) Salicornia type (2) Suaeda type and (3) the much rarer Sagina type. Mono-specific swards of Salicornia spp. growing on muddy sediments are the most common plant community belonging to this Annex I habitat type found in Ireland*
>
> *The plant community "SM7 Arthrocnemum perenne stands" is characteristic of a different Annex I saltmarsh community; Mediterranean and thermo-Atlantic Halophilous scrubs (1420). This habitat has a very restricted distribution and area, and is not considered part of the 1310 Salicornia flats habitat.*
>
> *As this habitat is dominated by annuals it can be ephemeral or transient in nature and is highly susceptible to erosion. Its distribution can vary considerably from year to year and it can move in response to changing conditions, e.g. in estuaries with shifting river channels.*

The range and area of this habitat in Ireland has been assessed as **favourable** in the NPWS Article 17 Report.

The specific structures and functions (including species) and the future prospects for the habitat have both been assessed as **inadequate (declining)**. On the basis of the above, the overall assessment of conservation status is **inadequate (declining)**.

Pressures:

- Invasive non-native species **(high importance)**
- Erosion **(medium importance)**

- Silting up **(medium importance)**
- Intensive cattle grazing **(high importance)**
- Diffuse pollution to surface waters due to household sewage and waste waters **(high importance)**
- Reclamation of land from sea, estuary or marsh **(medium importance)**
- Dykes, embankments, artificial beaches, general **(medium importance)**
- Walking, horseriding and non-motorised vehicles **(medium importance)**
- Intensive sheep grazing **(low importance)**
- Species composition change (succession) **(medium importance)**

Threats:

- Invasive non-native species **(high importance)**
- Erosion **(medium importance)**
- Silting up **(medium importance)**
- Intensive cattle grazing **(high importance)**
- Diffuse pollution to surface waters due to household sewage and waste waters **(medium importance)**
- Reclamation of land from sea, estuary or marsh **(medium importance)**
- Dykes, embankments, artificial beaches, general **(medium importance)**
- Walking, horseriding and non-motorised vehicles **(medium importance)**
- Intensive sheep grazing **(low importance)**
- Changes in abiotic conditions **(high importance)**
- Species composition change (succession) **(medium importance)**

Targets and attributes for the conservation of this habitat are available in the detailed Conservation Objectives for Galway Bay Complex SAC. These have been reviewed and considered in relation to the current development in Table 1.22.

Table 1.22: Impact of the proposed development on *Salicornia* and other annuals colonising mud and sand [1310] conservation objectives.

To maintain the favourable conservation condition of *Salicornia* and other annuals colonising mud and sand [1310] in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Habitat Area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession.	According to the site-specific conservation objectives (NPWS, 2013) the full extent this habitat within Galway Bay Complex SAC is unknown and further unsurveyed areas may be present within the SAC. '*Salicornia* and other annuals colonising mud and sand (1310)' is a pioneer saltmarsh community that may occur on muddy sediment seaward of established saltmarsh, or form patches within other saltmarsh communities where the elevation is suitable and there is regular tidal inundation. This habitat does not occur within, or immediately adjacent to the site. The proposed development site is in excess of 800m from of any mudflat habitat, that could have the potential to support *Salicornia* habitat within Galway Bay Complex SAC. There will be no direct loss of *Salicornia* habitat due to the proposal, and therefore no decline in distribution. Indirect habitat loss as a result of deterioration in water quality was considered. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution
Habitat distribution	Occurrence	No decline, or change in distribution, subject to natural processes	
Physical structure: sediment supply.	Presence/absence of physical barriers.	Maintain/restore the natural circulation of sediment and organic matter, without any physical obstructions.	This habitat is generally found in the lower zone of the saltmarsh. The proposed development site is in excess of 800m from of any mudflat habitat, that could have the potential to support *Salicornia [1310]* habitat within Galway Bay Complex SAC.

To maintain the favourable conservation condition of *Salicornia* and other annuals colonising mud and sand [1310] in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Physical structure: creeks and pans	Occurrence	Maintain, or where necessary restore, creek and pan structure, subject to natural processes, including erosion and succession.	The natural processes that maintain the physical structures of this habitat including regular tidal inundation, flooding, sediment circulation and accretion will not be affected by the proposed development, as there will be no alteration of the flood regime or physical barriers affecting flooding.
Physical structure: Flooding Regime	Hectares flooded; frequency	Maintain natural tidal regime.	
Vegetation composition: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.	There will be no impact on the vegetation composition or structure of this habitat. According to the saltmarsh monitoring project (McCorry and Ryle, 2006) anthropogenic factors which may influence vegetation structure and composition include reclamation, drainage, pollution, vehicle tracks, peat-cutting, turf cutting, poaching and overuse, none of which will occur as a result of the proposed development. The proposed development site is in excess of 800m from any mudflat habitat and there will be no direct access to this habitat.
Vegetation structure: Height	Centimetres	Maintain structural variation within the sward.	
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	
Vegetation composition: typical species and sub-communities	Percentage cover	Maintain the range of species-poor communities with typical species listed in SMP (McCorry and Ryle, 2009)	
Vegetation structure: negative indicator species – *Spartina anglica*	Hectares	There is currently no common cordgrass (*Spartina anglica*) in this SAC. Prevent establishment of cordgrass.	According to the site-specific conservation objectives (NPWS, 2013) there is currently no common cordgrass in this SAC. There will be no introduction of cordgrass to the SAC, as a result of the proposed development.

Atlantic salt meadows (Glauco-Puccinellietalia maritimae) [1330]

Information on this habitat was gained from the NPWS Article 17 report (NPWS, 2013). The habitat account in that document reads as follows:

> *Atlantic salt meadows generally occupy the widest part of the saltmarsh gradient. They also contain a distinctive topography with an intricate network of creeks and salt pans occurring on the medium to large sized saltmarshes. Atlantic salt meadows contain several distinctive zones that are related to elevation and submergence frequency. The lowest part along the tidal zone is generally dominated by common saltmarsh-grass (Puccinellia maritima) with species like glasswort (Salicornia spp.), annual sea-blite (Suaeda maritima) and lax-flowered sea-lavender (Limonium humile) also important. The invasive common cordgrass (Spartina anglica) can be locally abundant in this habitat. The mid marsh zones are generally characterised by thrift (Armeria maritima) and or sea plantain (Plantago maritima). This zone is generally transitional to an upper marsh herbaceous community with red fescue (Festuca rubra), saltmarsh rush (Juncus gerardii) and creeping bent (Agrostis stolonifera). This habitat is also important for other wildlife including wintering waders and wildfow. Atlantic salt meadows are distributed around most of the coastline of Ireland. The intricate topography of the Irish coastline with many inlets has created an abundance of sites that are sheltered and allow muddy sediments to accumulate, leading to the development of saltmarsh.*

Both the range and area of this habitat in Ireland has been assessed as **favourable** in the NPWS Article 17 Report.

The specific structures and functions (including species) and future prospects for the habitat have both been assessed as **inadequate (stable)** On the basis of the above, the overall assessment of conservation status is **inadequate** with the overall trend assessed as **stable.**

The main pressures and threats identified in the Article 17 report are listed below:

Pressures:

- Intensive cattle grazing **(high importance)**
- Intensive sheep grazing **(medium importance)**
- Paths, tracks, cycling tracks **(high importance)**
- Disposal of household/recreational facility waste **(low importance)**
- Other industrial/commercial area **(low importance)**
- Reclamation of land from sea, estuary or marsh **(low importance)**
- Polderisation **(low importance)**
- Modification of hydrographic functioning, general **(low importance)**
- Erosion **(medium importance)**
- Invasive non-native species **(medium importance)**

Threats:

- Intensive cattle grazing **(high importance)**
- Intensive sheep grazing **(medium importance)**
- Paths, tracks, cycling tracks **(high importance)**
- Disposal of household/recreational facility waste **(low importance)**

- Disposal of industrial waste **(low importance)**
- Reclamation of land from sea, estuary or marsh **(low importance)**
- Polderisation **(low importance)**
- Modification of hydrographic functioning, general **(low importance)**
- Erosion **(medium importance)**
- Invasive non-native species **(medium importance)**

Targets and attributes for the conservation of this habitat are available in the detailed Conservation Objectives for Galway Bay Complex SAC. These have been reviewed and considered in relation to the current development in Table 1.23.

Table 1.23: Impact of the proposed development on *Atlantic salt meadows (Glauco-Puccinellietalia maritimae)* conservation objectives.

To restore the favourable conservation condition of Atlantic Salt Meadows (*Glauco-Puccinellietalia maritimae*) [1330] in Galway Bay Complex SAC, which is defined by the following list of attributes and targets			
Attributes	**Measure**	**Target**	**Assessment**
Habitat Area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession.	According to the site-specific conservation objectives (NPWS, 2013) the full extent this habitat within Galway Bay Complex SAC is unknown and further unsurveyed areas may be present within the SAC. Atlantic salt meadows generally occupy the widest part of the saltmarsh gradient. They also contain a distinctive topography with an intricate network of creeks and salt pans occurring on the medium to large sized saltmarshes. Atlantic salt meadows contain several distinctive zones that are related to elevation and submergence frequency. This habitat does not occur within 800b metres of the site. The saltmarsh Monitoring Project mapped 12.36ha of potential Atlantic saltmarsh/Mediterranean Salt Meadow habitat in 2009 within the SAC. There will be no direct loss of *Atlantic Salt Meadow* habitat due to the proposal, and therefore no decline in distribution. Indirect habitat loss as a result of deterioration in water quality was considered. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution
Habitat distribution	Occurrence	No decline, or change in distribution, subject to natural processes	
Physical structure: sediment supply.	Presence/absence of physical barriers.	Maintain/restore the natural circulation of sediment and	The processes that maintain the physical structures of this habitat including regular tidal inundation, flooding, sediment circulation and accretion will not be affected by the

To restore the favourable conservation condition of Atlantic Salt Meadows (*Glauco-Puccinellietalia maritimae*) [1330] in Galway Bay Complex SAC, which is defined by the following list of attributes and targets			
Attributes	**Measure**	**Target**	**Assessment**
		organic matter, without any physical obstructions.	proposed development, as there will be no alteration of the flood regime or physical barrier affecting flooding.
Physical structure: creeks and pans	Occurrence	Maintain, or where necessary restore, creek and pan structure, subject to natural processes, including erosion and succession.	
Physical structure: Flooding Regime	Hectares flooded; frequency	Maintain natural tidal regime.	
Vegetation composition: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.	There will be no impact on the vegetation composition or structure of this habitat. According to the saltmarsh monitoring project (McCorry and Ryle, 2006) anthropogenic factors which may influence vegetation structure and composition include reclamation, drainage, pollution, vehicle tracks, peat-cutting, turf cutting, poaching and overuse, none of which will occur as a result of the proposed development. The proposed development site is in excess of 800m from this habitat and there will be no direct access to this habitat.
Vegetation structure: Height	Centimetres	Maintain structural variation within the sward.	
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	
Vegetation composition: typical species and sub-communities	Percentage cover	Maintain the range of species-poor communities with typical species listed in SMP (McCorry and Ryle, 2009)	
Vegetation structure: negative indicator species – *Spartina anglica*	Hectares	There is currently no common cordgrass (*Spartina anglica*) in this SAC. Prevent establishment of cordgrass.	According to the site-specific conservation objectives (NPWS, 2013) there is currently no common cordgrass in this SAC. There will be no introduction of cordgrass to the SAC, as a result of the proposed development.

Mediterranean salt meadows (*Juncetalia maritimae*) [1410]

Information on this habitat was gained from the NPWS Article 17 report (NPWS, 2013). The habitat account in that document reads as follows:

> *Mediterranean salt meadows occupy the upper zone of saltmarshes and usually occur adjacent to the boundary with terrestrial habitats. They are widespread on the Irish coastline, however they are not as extensive as Atlantic salt meadows. The habitat is distinguished from Atlantic salt meadows by the presence of rushes such as sea rush (Juncus maritimus) and/or sharp rush (J. acutus), along with a range of species typically found in Atlantic salt meadows; including sea aster (Aster tripolium), sea purslane (Atriplex portulacoides), sea-milkwort (Glaux maritima), saltmarsh rush (J. gerardii), parsley water-dropwort (Oenanthe lachenalii), sea plantain (Plantago maritima) and common saltmarsh grass (Puccinellia maritima).*

The range and area of this habitat in Ireland has been assessed as **favourable** in the NPWS Article 17 Report.

The specific structures and functions (including species) and future prospects for the habitat have both been assessed as **inadequate (stable).** On the basis of the above, the overall assessment of conservation status is **inadequate** with the overall trend assessed as **stable.**

The main pressures and threats identified in the Article 17 report are listed below:

Pressures:

- Intensive cattle grazing **(high importance)**
- Paths, tracks, cycling tracks **(medium importance)**
- Erosion **(low importance)**
- Modification of hydrographic functioning, general **(low importance)**

Threats:

- Intensive cattle grazing **(high importance)**
- Paths, tracks, cycling tracks **(medium importance)**
- Erosion **(low importance)**
- Modification of hydrographic functioning, general **(low importance)**
- Infilling of ditches, dykes, ponds, pools, marshes or pits **(low importance)**

Targets and attributes for the conservation of this habitat are available in the detailed Conservation Objectives for Galway Bay Complex SAC. These have been reviewed and considered in relation to the current development in Table 1.24.

Table 1.24: Impact of the proposed development on Mediterranean salt meadows *(Juncetalia maritimi)* conservation objectives.

To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
Habitat Area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession.	According to the site-specific conservation objectives (NPWS, 2013) the total estimated area of this habitat within Galway Bay Complex SAC is 19.887ha and further unsurveyed areas may be present within the SAC. Mediterranean salt meadows occupy the upper zone of saltmarshes and usually occur adjacent to the boundary with terrestrial habitats. This habitat does not occur within, or immediately adjacent to the site. The saltmarsh Monitoring Project mapped 12.36ha of potential Atlantic saltmarsh/Mediterranean salt meadow mosaic habitat in 2009. There will be no direct loss of *Mediterranean Salt Meadow* habitat due to the proposal, and therefore no decline in distribution. Indirect habitat loss as a result of deterioration in water quality was considered. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution
Habitat distribution	Occurrence	No decline, or change in distribution, subject to natural processes	
Physical structure: sediment supply.	Presence/absence of physical barriers.	Maintain/restore the natural circulation of sediment and organic matter, without any physical obstructions.	The processes that maintain the physical structures of this habitat including regular tidal inundation, flooding, sediment circulation and accretion will not be affected by the proposed development, as there will be no alteration of the flood regime or physical barriers affecting flooding.
Physical structure: creeks and pans	Occurrence	Maintain, or where necessary restore, creek and pan structure, subject to natural processes,	

To restore the favourable conservation condition of Mediterranean salt meadows (*Juncetalia maritimi*) in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:			
Attributes	**Measure**	**Target**	**Assessment**
		including erosion and succession.	
Physical structure: Flooding Regime	Hectares flooded; frequency	Maintain natural tidal regime.	
Vegetation composition: zonation	Occurrence	Maintain the range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.	There will be no impact on the vegetation composition or structure of this habitat. According to the saltmarsh monitoring project (McCorry and Ryle, 2006) anthropogenic factors which may influence vegetation structure and composition include reclamation, drainage, pollution, vehicle tracks, peat-cutting, turf cutting, poaching and overuse, none of which will occur as a result of the proposed development. The proposed development site is in excess of 800m from this habitat and there will be no direct access to this habitat.
Vegetation structure: Height	Centimetres	Maintain structural variation within the sward.	
Vegetation structure: vegetation cover	Percentage cover at a representative sample of monitoring stops	Maintain more than 90% of area outside creeks vegetated	
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops	Maintain the range of species-poor communities with typical species listed in SMP (McCorry and Ryle, 2009)	
Vegetation structure: negative indicator species – *Spartina anglica*	Hectares	There is currently no common cordgrass (*Spartina anglica*) in this SAC. Prevent establishment of cordgrass.	According to the site-specific conservation objectives (NPWS, 2013) there is currently no common cordgrass in this SAC. There will be no introduction of cordgrass to the SAC, as a result of the proposed development.

Reefs [1170]

Information on this habitat was gained from the NPWS Article 17 report (NPWS, 2013). The habitat account in that document reads as follows:

> *Reef habitats are widespread marine features with immobile hard substrate available for colonisation by epifauna. Reef habitat in Irish waters ranges from the intertidal to 4500m below the sea surface and more than 400km from the coast.*
>
> *Intertidal Reefs are familiar and widespread habitats characterised by hard rock washed by the tide. There are a number of factors that influence this habitat type including tidal immersion, influence of freshwater (riverine and rainwater), variation in temperature, desiccation, exposure to waves, stability of substrate, and weathering of substrate. With distance from the intertidal these parameters become less active in influencing the habitat.*
>
> *Subtidal Reef is most often found in exposed areas with little influence of freshwater. In depths down to 30m along the Atlantic margin there is still a significant penetration of light and swell waves reach the reef. In depths below 30m (or shallower in some coastal areas) insufficient light penetrates to hard rock structures to allow photosynthesis of algae and the habitat usually becomes dominated by fauna.*
>
> *In the offshore, hard rock structures occur intermittently between soft sediment, mostly along the shelf margin. In depths of several hundred meters no light reaches the bottom and temperatures are usually cool and fairly constant. A significant type of the Reef habitat is that generated by the habitat forming accretions of animals. These Biogenic Reefs increase the structural complexity beyond the surrounding areas and usually result in greater biodiversity. In the inshore these may be formed by the protective structures of worms or in the offshore by stony deep-water coral species.*
>
> *Intertidal and subtidal Reefs are frequently dominated by algal species including: Ulva spp., Chaetomorpha spp., Fucus spp., Laminaria spp., Dictyota dichotoma, Corallina officinalis, Porphyra spp. Chondrus crispus, Mastocarpus stellatus, Delesseria sanguinea, Cryptopleura ramosa, Lomentaria articulata, Polysiphonia spp., Ceramium spp.). Near shore Reef species commonly include the invertebrate species of poriferans (Scypha ciliata, Grantia compressa, Halichondria panicea, Hymeniacidon perleve, Cliona stellata, Pachymatisma johnstonia, Dysidea fragilis), cnidarians (Nemertesia antennina, Halecium halecium, Anemonia viridis, Actinia equina, Sagartia elegans, Actinothoe sphyrodeta, Corynactis viridis, Alcyonium digitatum, Caryophyllia smithii, Metridium spp.), polychaetes (Sabellaria alveolata, Spirorbis spp. Pomatoceros triqueter), crustaceans (Balanus spp., Semibalanus balanoides, Carcinus maenas, Cancer pagurus, Necora puber, Pagurus bernhardus, Galathea spp.), molluscans (Gibbula spp, Littorina spp., Nucella lapillus, Patella spp., Calliostoma zizyphinum, Aplysia punctata, Mytilus edulis), bryozoans (Alcyonidium diaphanum), echinoderms (Antedon bifida, Echinus esculentus, Marthasterias glacialis, Holothuria forskali, Aslia lefevrei, Pawsonia saxicola), and tunicates (Botryllus schlosseri, Ascidia mentula, Dendrodoa grossularia). A range of fish species are also associated*

with this habitat including Pholis gunnellus, Lotidae spp., Nerophis lumbriciformis, Pollachius spp., Conger conger, Labridae spp.). Deepwater Reefs exhibit a range of species including scleractinian corals (Lophelia pertusa, Madrepora oculata, Solenosmilia variabilis, Flabellum spp. Desmophyllum dianthus), antipatharian black corals (Cirrhipathes sp., Leiopathes sp., Parantipathes sp., Stichopathes gravieri), soft corals (Anthomastus grandiflorus, Paragorgia arborea, Paramuricea spp., Anthothela spp. and isididaen bamboo corals), sea pens (Pennatula phosphorea, Kophobelemnon spp.), anemones (Bolocera spp), sponges (Aphrocallistes spp., Hexactinellid spp., Pheronema spp.), echinoderms (Brisingella coronata, Pseudarchaster spp., Psolus squamatus, Cidaris cidaris, Koehlermetra porrecta), crustaceans (Bathynectes spp., Chirostylus spp., Chaecon spp., Neolithoides spp.) and fish (Chimaera monstrosa, Lepidion eques, Synaphobranchus spp., Neocyttus helgae, Coryphaenoides rupestris).

Recent work on Annex I habitats in the inshore has highlighted atypical presentation of species or communities. Mulroy Bay reported a few notable species including the sponges Dercitus bucklandi, Stelletta grubii and an un-described species of Polymastia and the anthozoan Parerythropodium coralloides. Reef habitat in Kilkieran showed some unusual presentations of the sponge and ascidian community, particularly the Gurraig Sound, typified by the presence of the sponges Esperiopsis fucorum, Haliclona simulans, Myxilla incrustans, Polymastia mamillaris, Raspailia sp. and Suberites sp., Plakortis simplex and Tricheurypon viride and ascidians Ascidiella aspersa, Ascidia mentula, Ciona
intestinalis, Corella parallelogramma and Dendrodoa grossularia. The occurrence of Phakellia vermiculata and Axinella damicornis is also notable. Similarly in Kenmare River rare species included the brachiopod Neocrania anomala and at Slyne Head the nudibranch Aldisa zetlandica. The urchin, Paracentrotus lividus, a once typical intertidal Reef species, shows a restricted distribution with few records nationally.

The range and area of this habitat in Ireland has been assessed as **favourable** in the NPWS Article 17 Report.

Both the specific structures and functions (including species) and the future prospects have been assessed as **bad (declining)**. On the basis of the above, the overall assessment of conservation status is **bad** with the overall trend assessed as **declining.**

Pressures:

- Fishing and harvesting aquatic resources **(high importance)**
- Bottom culture **(medium importance)**
- Suspension culture **(medium importance)**
- Pollution to waters (limnic & terrestrial, marine & brackish) **(medium importance)**
- Industrial ports **(low importance)**
- Intensive fish farming, intensification **(low importance)**
- Piers/tourist harbours or recreational piers **(low importance)**
- Fishing harbours **(low importance)**
- Slipways **(low importance)**
- Exploration and extraction of oil or gas **(low importance)**
- Estuarine and coastal dredging **(low importance)**

- Geotechnical survey **(low importance)**
- Nautical sports **(low importance)**
- Hand collection **(low importance)**

Threats:

- Fishing and harvesting aquatic resources **(high importance)**
- Pollution to waters (limnic & terrestrial, marine & brackish) **(medium importance)**
- Bottom culture **(low importance)**
- Suspension culture **(low importance)**
- Industrial ports **(low importance)**
- Intensive fish farming, intensification **(low importance)**
- Piers/tourist harbours or recreational piers **(low importance)**
- Fishing harbours **(low importance)**
- Slipways **(low importance)**
- Exploration and extraction of oil or gas **(low importance)**
- Estuarine and coastal dredging **(low importance)**
- Geotechnical survey **(low importance)**

Targets and attributes for the conservation of this habitat are available in the detailed Conservation Objectives for Galway Bay Complex SAC. These have been reviewed and considered in relation to the current development in Table 1.25.

Table 1.25: Impact of the proposed development on Reefs [1770] conservation objectives.

To maintain the favourable conservation condition of Reefs in Galway Bay Complex SAC			
Attributes	**Measure**	**Target**	**Assessment**
Distribution	Occurrence	The distribution of reefs is stable or increasing, subject to natural processes.	According to the site-specific conservation objectives (NPWS, 2013) the total estimated area of this habitat within Galway Bay Complex SAC is 2,773ha. This habitat does not occur within, or immediately adjacent to the site. The closest mapped occurrence of this habitat is in Galway Bay to the south of Lough Atalia. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution There will be no direct or indirect loss of *Reef* habitat due to the proposal, and therefore no decline in distribution. Indirect habitat loss as a result of deterioration in water quality was considered. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices.
Habitat Area	Hectares	Area stable or increasing, subject to natural processes.	
Community Extent	Hectares	Maintain the extent of the *Mytilus*-dominated reef community, subject to natural processes.	According to the Galway Bay Complex SAC Marine supporting document (NPWS, 2013) this intertidal *mytilus*-dominated reef community occurs on the northern shore of the bay at Roscam. This is a well defined bed as distinct from the accumulations of mussel spatfall commonly seen on hard substrate along the north shore between Salthill and Galway. This habitat does not occur within 800m of the site.
Community structure: *Mytilus* density	Individuals per m^2	Conserve the high quality of the Mytilus-dominated reef community, subject to natural processes.	
Community structure:	Biological composition	Conserve the following community types in a natural condition: Fucoid-dominated	Laminaria-dominated community complex occur subtidally throughout the site. This habitat does not occur within 800m of the site.

To maintain the favourable conservation condition of Reefs in Galway Bay Complex SAC			
Attributes	**Measure**	**Target**	**Assessment**
		community complex; Laminaria-dominated community complex; and Shallow sponge-dominated community complex.	

Tidal Mudflats [1140]

Information on this habitat was gained from the NPWS Article 17 report (NPWS, 2013). The habitat account in that document reads as follows:

> *This habitat is found exclusively between the low water and mean high water marks. It is often a subset of the Annex I habitats Large shallow and bay and Estuaries but is not dependent on those habitats for occurrence. The fundamental building block of this habitat is sediment ranging from around 1 micron to 2 millimeters. The finer silt and clay sediments are dominant in mud flats and the larger sand fractions are associated with areas exposed to significant wave energy. The fine sediment of intertidal mudflats is most often associated with rivers. The limit of tidal ingress often coincides with the beginning of flanking mudflat habitats. The competing forces of seaward-flowing freshwater meeting the flooding tide reduces net flow velocity and consequently the carrying capacity for sediment leading to deposition. A range of physical pressures operate in these habitats including dynamic fluctuations in salinity, temperature, and immersion. Small sediment grains can be very closely packed and the consequent minimal exchange of water may lead to oxygen deprivation of underlying sediments. Sandflats associated with larger estuaries are frequently shaped by locally generated or coastal wind-waves. The force required to dislodge sediment is dependent on the mass and cohesion of the material. Smaller lighter fractions are easily removed and become less dominant in areas exposed to wind waves. However, the packing arrangement of larger grained material allows space between grains for accumulations of finer material. This can produce cohesive and extensive flats not susceptible to eroding forces. Due to the relatively low gradient of the sandflat, wave energy is dissipated over a greater surface area. The combination of grain sizes also leads to a high retention of water within the flats producing a fairly stable physical environment with good biological productivity. In areas exposed to large waves with little or no source of riverine material the habitat is often characterized by large grains resulting from erosion or long-shore drift. Without a source of binding fine sediments these coarse sands are susceptible to frequent mobilization. The packing arrangements also allows for a free draining habitat. These coarse beaches are consequently susceptible to not only marine forces but can be mobilized by wind to form coastal habitats. The degree of mobility and harsh physiological conditions poses a significant challenge to marine flora and fauna.*
>
> *The type of biological communities found at Mudflats and Sandflats is quite variable across Ireland. Currently, approximately 50% of the national resource of this habitat has been analysed as part of baseline mapping to set Conservation Objectives. The most prevalent community identified through this process was the Mud to Fine Sand community which was often characterised by the presence of the following species Angulus tenuis, Corophium volutator, Crangon crangon, Eteone longa, Hediste diversicolor, Peringia ulvae, Pygospio elegans, Scoloplos armiger, Spio martinensis, Tharyx sp., and Tubificoides benedii where 44% of the national resource was within Lower River Shannon SAC. The next most prevalent broad community type recognised at around 40% of the habitat resource was Fine Sand to Sand community and again the largest proportion of the national resource was within Lower River Shannon SAC with typifying species including Angulus tenuis, Bathyporeia pilosa, Nephtys cirrosa, Pontocrates spp., Scolelepis mesnili, Scolelepis squamata, and Spio martinensis. The largest contribution of the remaining habitat was identified*

as being Muddy sands/Sandy Muds Community and the most prevalent species included Arenicola marina, Chaetozone gibber, Fabulina fabula, Nephtys hombergii, Nucula nucleus, Owenia fusiformis, and Thyasira flexuosa and the greatest proportion of this community was within Lough Swilly SAC. Occasional intertidal Zostera spp., mixed sediments and coarse sediment characterised by Pisione remota are reported. The bivalve Barnea candida, also known as white piddock, is rarely recorded in Ireland and is found in the intertidal at Bannow Bay SAC.

Mudflats and Sandflats also form a significant resource for various bird and mammal
species for feeding, breeding and resting.

The range and area of this habitat in Ireland has been assessed as **favourable** in the NPWS Article 17 Report.

The specific structures and functions (including species) have been assessed as **inadequate** but **improving** and the future prospects for the habitat have been assessed as **favourable**. On the basis of the above, the overall assessment of conservation status is **inadequate** with the overall trend assessed as **improving.**

Pressures:

- Pollution to surface waters (limnic & terrestrial, marine & brackish) **(high importance)**
- Fishing and harvesting aquatic resources **(high importance)**
- Bottom culture **(high importance)**
- Suspension culture **(medium importance)**
- Hand collection **(low importance)**
- Other outdoor sports and leisure activities **(low importance)**
- Nautical sports **(low importance)**

Threats:

- Pollution to surface waters (limnic & terrestrial, marine & brackish) **(high importance)**
- Fishing and harvesting aquatic resources **(low importance)**
- Bottom culture **(low importance)**
- Suspension culture **(low importance)**
- Hand collection **(low importance)**
- Other outdoor sports and leisure activities **(low importance)**
- Nautical sports **(low importance)**

Targets and attributes for the conservation of this habitat are available in the detailed Conservation Objectives for Galway Bay Complex SAC. These have been reviewed and considered in relation to the current development in Table 1.26.

To maintain the favourable conservation condition of Mudflats and sandflats not covered by seawater at low tide [1140] in Galway Bay Complex SAC			
Attributes	**Measure**	**Target**	**Assessment**
Habitat Area	Hectares	The permanent habitat area is stable or increasing subject to natural processes.	According to the Conservation objectives supporting document the habitat area was estimated using OSi data as 744ha. The nearest mapped extent of this habitat to the proposed development is in Galway Bay to the South of Lough Ataliaof the site. There will be no direct loss of habitat due to the proposal. Indirect habitat loss as a result of deterioration in water quality was considered. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal sandy mud community complex; and Intertidal sand community complex.	Intertidal sand community complex occurs on the southern shores of Galway Bay at Ballyvaghan Bay, on its eastern shores around Glasheen, Eddy and Mweenish Islands and in the Dunkellin Estuary and on the northern shore at Silverstrand, Rusheen Bay and Blake's Hill. sandy mud to mixed sediment community complex is recorded extensively in the northern part of Galway Bay from western boundary of the site to Ardfry Point, between Tawin Island and Lackanaloy Creek and Loughnahulla Bay. In the southern part of the bay it occurs from the western boundary eastward into the Dunkellin Estuary and the Doorus Strait. The Galway Bay Complex SAC marine supporting documents highlights that significant anthropogenic disturbance may occur with such intensity and/or frequency as to effectively represent a continuous or ongoing source of disturbance over time and space (e.g. effluent discharge within a given area). There will be no deterioration in water quality as a result of the proposed development. Indirect habitat loss as a result of deterioration in water quality was considered. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface

			water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution

Table 1.26: Impact of the proposed development on Mudflats and Sandflats not covered by water at low tide [1140] conservation objectives.

Perennial Vegetation of Stony Banks [1220]

Information on this habitat was gained from the NPWS Article 17 report (NPWS, 2013). The habitat account in that document reads as follows:

> *This habitat occurs along the coast where shingle (cobbles and pebbles) and gravel have accumulated to form elevated ridges or banks above the high tide mark. Most of the rocky material should be less than 250mm in diameter to be considered in this category. The vegetation tends to be dominated by perennial species, typically including Honckenya peploides, Rumex crispus, Beta vulgaris ssp. maritima, Crithmum maritimum and Tripleurospermum maritimum. The rare plants Crambe maritima and Mertensia maritima are also associated with this community (Fossitt, 2000). Species diversity is determined by the degree of exposure and by substrate stability, coarseness and size. The presence of lichens indicates long term stability.*

The range for this habitat has been assessed as **favourable** and the area **inadequate (stable)** in the NPWS Article 17 Report.

The specific structures and functions (including species) and future prospects have been assessed as **inadequate** but **stable.** On the basis of the above, the overall assessment of conservation status is **inadequate** with the overall trend assessed as **stable.**

The main pressures and threats identified in the Article 17 report are listed below:

Pressures:

- Sand and gravel extraction **(medium importance)**
- Removal of beach materials **(high importance)**
- Pipe lines **(low importance)**
- Disposal of inert materials **(low importance)**
- Walking, horseriding and non-motorized vehicles **(medium importance)**
- Trampling, overuse **(medium importance)**
- Garbage and solid waste **(medium importance)**
- Other forms of pollution **(low importance)**
- Landfill, land reclamation and drying out, general **(low importance)**
- Sea defence or coast protection works, tidal barrages **(high importance)**

Threats:

- Sand and gravel extraction **(medium importance)**
- Removal of beach materials **(medium importance)**
- Pipe lines **(low importance)**
- Disposal of inert materials **(low importance)**
- Walking, horseriding and non-motorized vehicles **(medium importance)**
- Trampling, overuse **(medium importance)**
- Garbage and solid waste **(medium importance)**
- Other forms of pollution **(low importance)**
- Landfill, land reclamation and drying out, general **(low importance)**
- Sea defence or coast protection works, tidal barrages **(high importance)**
- Changes in abiotic conditions **(low importance)**

Targets and attributes for the conservation of this habitat are available in the detailed Conservation Objectives for Galway Bay Complex SAC. These have been reviewed and considered in relation to the current development in Table 1.27.

Table 1.27: Impact of the proposed development on Perennial vegetation of stony banks [1220] conservation objectives.

To maintain the favourable conservation condition of Perennial vegetation of stony banks [1220] in Galway Bay Complex SAC			
Attributes	**Measure**	**Target**	**Assessment**
Habitat Area	Hectares	Area stable or increasing, subject to natural processes, including erosion and succession.	Current area unknown within the SAC. This habitat does not occur within, or immediately adjacent to the site. This habitat was not recorded in the most proximal part of the SAC to the proposed development site. There will be no direct loss of *Perennial vegetation of stony banks* habitat due to the proposal, and therefore no decline in distribution.
Habitat distribution	Occurrence	No decline, or change in habitat distribution, subject to natural processes.	
Physical structure: functionality and sediment supply	Presence/ absence of physical barriers	Maintain the natural circulation of sediment and organic matter, without any physical obstructions.	This habitat relies on a continuing supply of shingle sediment which may occur sporadically as a response to storm events rather than continuously. Interference with the natural coastal processes, through offshore extraction or coastal defence structures in particular, can interrupt the supply of sediment and lead to beach starvation. There will be no alteration to the physical processes that govern the functionality and sediment supply of this habitat. There will be no physical barriers impeding flow as a result of the proposal.
Vegetation structure: zonation	Occurrence	Maintain range of coastal habitats including transitional zones, subject to natural processes including erosion and succession.	Ecological variation in the vegetation structure of this habitat type depends on stability; the amount of fine material accumulating between the pebbles; climatic conditions; width of the foreshore and past management of the site. The degree of exposure, as well as the coarseness and stability of the substrate determines species diversity. Negative indicators include non-native species indicative of changes in nutrient status and species not considered characteristic of the habitat. There will be no alternation in the natural processes that determine the vegetation composition as a result of the proposed development. Indirect habitat loss as a result of deterioration in water quality was considered. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution
Vegetation composition: typical species and sub-communities	Percentage cover at a representative sample of monitoring stops.	Maintain the typical vegetated shingle flora including the range of sub-communities within the different zones. Typical species include sea sandwort (*Honckenya peploides*), sea beet (*Beta vulgaris* ssp. *maritima*), rock samphire (*Crithmum maritimum*), sea mayweed (*Tripleurospermum maritimum*), yellow-horned poppy (*Glaucium flavum*) and sea campion (*Silene uniflora*).	

To maintain the favourable conservation condition of Perennial vegetation of stony banks [1220] in Galway Bay Complex SAC			
Attributes	**Measure**	**Target**	**Assessment**
Vegetation composition: negative indicator species	Percentage cover	Negative indicator species (including non-natives) to represent less than 5% cover	

Coastal Lagoons* [1150]

Information on this habitat was gained from the NPWS Article 17 report (NPWS, 2013). The habitat account in that document reads as follows:

> *Irish lagoons are defined on biological communities present rather than morphology. Any permanent water body, natural or artificial with salinity > 1 psu and a very restricted tidal prism is considered a lagoon. The great majority have Ruppia sp. present. Water bodies separated from the sea by barrier islands are classified as lagoons in some European countries but are not accepted as such in Ireland due to large tidal range and marine biota. Five main morphological types of lagoon are recognised in Ireland: 1. Classic "sedimentary" lagoons found on all parts of the coastline (21 lagoons, 41.4% of habitat area. 2. Artificial lagoons found on all parts of the coastline (30 lagoons, 35.2% of habitat area). 3. "Rock/peat" lagoons on the west coast, similar to lagoons in Scotland, but otherwise rare in Europe (18 lagoons, 20% of habitat area). 4. "Karst" lagoons found in parts of Counties Clare and Galway, and within Europe, possibly unique to Ireland (11 lagoons, 4.5% of habitat area). 5. "Saltmarsh" lagoons (6 lagoons, 1.5% of habitat area).*

The range and area of this habitat in Ireland has been assessed as **favourable** in the NPWS Article 17 Report.

The specific structures and functions (including species) and future prospects for the habitat have both been assessed as **unfavourable (bad)**. On the basis of the above, the overall assessment of conservation status is **bad** with the overall trend assessed as **stable.**

Pressures:

- Pollution to surface waters (limnic & terrestrial, marine & brackish) **(high importance)**
- Erosion **(high importance)**
- Silting up **(medium importance)**
- Fertilisation **(high importance)**
- Reclamation of land from sea, estuary or marsh **(high importance)**
- Accumulation of organic material **(medium importance)**
- Marine and freshwater aquaculture **(low importance)**
- Removal of beach materials **(low importance)**
- Urbanised areas, human habitation **(low importance)**
- Golf course **(low importance)**
- Circuit, track **(low importance)**
- Camping and caravans **(low importance)**
- Invasive non-native species **(low importance)**
- Disposal of household/recreational facility waste **(high importance)**

Threats:

- Pollution to surface waters (limnic & terrestrial, marine & brackish) **(high importance)**
- Modification of hydrographic functioning, general **(high importance)**
- Erosion **(high importance)**
- Silting up **(medium importance)**
- Fertilisation **(high importance)**
- Reclamation of land from sea, estuary or marsh **(high importance)**
- Accumulation of organic material **(medium importance)**

- Marine and freshwater aquaculture **(low importance)**
- Removal of beach materials **(low importance)**
- Urbanised areas, human habitation **(low importance)**
- Golf course **(low importance)**
- Circuit, track **(low importance)**
- Camping and caravans **(low importance)**
- Invasive non-native species **(low importance)**
- Disposal of household/recreational facility waste **(high importance)**

Targets and attributes for the conservation of this habitat are available in the detailed Conservation Objectives for Galway Bay Complex SAC. These have been reviewed and considered in relation to the current development in Table 1.28.

Table 1.28: Impact of the proposed development on Coastal lagoons [1150] conservation objectives.

To restore the favourable conservation condition of Coastal lagoons [1150] in Galway Bay Complex SAC			
Attributes	**Measure**	**Target**	**Assessment**
Habitat Area	Hectares	Area stable, subject to slight natural variation. The favourable reference area is 76.7ha.	The closest mapped lagoon to the proposed development is Lough Atalia, which is located approximately 800metres from the site of the proposed development Favourable reference area for mapped lagoon habitat within the SAC is 76.7ha and according to the conservation objectives supporting documents for lagoons there may be more, as yet unmapped, lagoons within this site (NPWS, 2013). The proposed development will not result in any direct loss of habitat. Indirect habitat loss as a result of deterioration in water quality was considered. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution
Habitat distribution	Occurrence	No decline, subject to natural processes.	
Salinity regime	Practical salinity units (psu)	Median annual salinity and temporal variation within natural ranges.	The salinity regime of lagoons depends on the volume and timing of inflowing and outflowing fresh and seawater. There will be no alteration in flow regime as a result of the proposed development. The discharge of storm water from the development to the public sewer will not result in any significant change to the salinity regime in Lough Atalia.
Hydrological regime	Metres	Annual water level fluctuations and minima within natural ranges.	Fluctuations in water depth are a natural feature of lagoon hydrology. However, if water levels fluctuate beyond their natural values due to issues such as drainage, the condition of the habitat can deteriorate. The proposed development will not alter the fluctuation of water levels in Lough Atalia and no resultant effects are anticipated
Barrier: connectivity between lagoon and sea	Permeability	Appropriate hydrological connections between lagoons and sea, including where	The morphology of the barrier between a lagoon and sea determines how it functions ecologically. Changes to the barrier can be due to natural processes such as storms, but they can also be modified through human intervention.

To restore the favourable conservation condition of Coastal lagoons [1150] in Galway Bay Complex SAC			
Attributes	**Measure**	**Target**	**Assessment**
		necessary, appropriate management	The proposed development will not result in a loss of connectivity between lagoons and sea and no barriers to connectivity will occur as a result of the proposal.
Water quality: Chlorophyll a	µg/L	Annual median chlorophyll a within natural ranges and less than µg/L	This attribute indicates the level of phytoplankton in the water column. Phytoplankton tends to increase in density in response to increasing nutrient levels. Excessive shading from phytoplankton can reduce submergent macrophyte colonisation of the littoral zone of lagoons. There will be no deterioration in water quality due to an increase in nutrient levels as a result of the proposed development. Indirect habitat loss as a result of deterioration in water quality was considered. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution
Water quality: Molybdate Reactive Phosphorus (MRP)	mg/L	The target for the attribute water quality- Molybdate Reactive Phosphorus (MRP) is: annual median MRP within natural ranges and less than 0.1mg/L.	This limit is required to ensure that excessive shading from phytoplankton does not reduce submergent colonisation of the littoral zone. The proposed development will not effect the phosphorous concentrations within the water and measures are in place to avoid all water pollution. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution

To restore the favourable conservation condition of Coastal lagoons [1150] in Galway Bay Complex SAC			
Attributes	**Measure**	**Target**	**Assessment**
Water quality: Dissolved Inorganic Nitrogen (DIN)	mg/L	Annual median DIN within natural ranges and less than 0.15mg/L	Indirect habitat loss as a result of deterioration in water quality was considered. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution
Depth of macrophyte colonisation	Metres	Macrophyte colonisation to at least 2m depth	There will be no effects on plant and animal species associated with lagoons, as a result of the proposal, due to the lack of potential for water pollution. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution
Typical plant species	Number and m^2	Maintain number and extent of listed lagoonal specialists, subject to natural variation	
Typical animal species	Number	Maintain listed lagoon specialists, subject to natural variation	
Negative indicator species	Number and % cover	Negative indicator species absent or under control	Low salinity, shallow water and elevated nutrient levels increase the threat of accelerated encroachment by reedbeds. There will be no alteration to salinity levels, nutrient levels or the hydrological regime of the lagoon as a result of the proposed development. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution

To restore the favourable conservation condition of Coastal lagoons [1150] in Galway Bay Complex SAC			
Attributes	**Measure**	**Target**	**Assessment**
			Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will enter appropriately designed petrol interceptors prior to discharge to specified percolation areas.

Large Shallow Inlets and Bays [1160]

Information on this habitat was gained from the NPWS Article 17 report (NPWS, 2013). The habitat account in that document reads as follows:

> *The EU interpretation manual describes Large Shallow Inlets and Bays as indentations of the coast where, in contrast to estuaries, the influence of freshwater is generally limited or reduced. These habitats are typically shallower and more sheltered than open coasts and can report a variety of different habitat forms. They are variously composed of fine sediments to bedrock, intertidally and subtidally, and in Ireland are typified to a large extent by their constituent sub-habitats. They are frequently the vestiges of glacial erosion (Lough Swilly) or deposition (Clew Bay) and occasionally occur at the mouth of rivers where the lower density of freshwater flows over the fully marine benthos and vertical wind-driven mixing of layers is absent or significantly reduced. The shallow and sheltered nature of these habitats results in highly productive and frequently diverse areas in terms of both species and communities.*
>
> *Large Shallow Inlets and Bays habitats frequently incorporate a number of constituent Annex I habitats including Sandbank at the mouth of the Lower River Shannon where Nephtys cirrosa and Bathyporeia elegans characterised the habitat. Sediment and Reef communities constitute the majority of the remaining habitats (including the intertidal Annex I habitat). The three most prevalent sediment communities which account for 70% of the examined habitats of Large Shallow Inlets and Bays include: Fine Sand to Sand community shown usually to express dominance in the following species: Angulus tenuis, Arenicola marina, Chaetezone christei, Fabulina fabula, Iphinoe trispinosa, Nephtys cirrosa, Pontocrates arenarius, Pygospio elegans, Scolelepis mesnili, Scolelepis squamata, Scoloplos armiger, Spio martinensis, and Spiophanes bombyx; Muds to Fine Sand Community commonly reporting Crangon crangon and Pygospio elegans; and Muddy Sands/Sandy Muds Community typified by Abra alba, Chaetozone gibber, Donax vittatus, Euclymene oerstedii, Kurtiella bidentata, Lumbrineris gracilis, Melinna palmata, Nephtys hombergii, Nucula nucleus, Thyasira flexuosa and Owenia fusiformis.*
>
> *Habitats associated with hard substrates constitute around 20% of the intertidal and subtidal habitat. The typical species for inshore reef habitats is dependent on a number of factors including depth and exposure (described under 1170). Intertidal and subtidal hard ground in Bays and Inlets are frequently dominated by fucoid and Laminaria algal species. In deeper water the reef habitats tend to be predominantly sponges an anemones with associated polychaetes, molluscs, bryozoans, tunicates, crustaceans and fish species.*
>
> *A very significant proportion of some less frequently encountered species in Ireland have been found within the boundaries of Large Shallow Inlets and Bays including 85% of mapped maërl (Lithothamnion corallioides and Phymatolithon calcareum) and 70% of mapped eel grass beds (Zostera marina and Z. noltii), all records of the endemic species Edwardsia delapiae in Valentia Harbour, all mapped areas of the reef building polychaete Sabellaria alveolata, and the majority of such species as Neopentadactyla mixta, Pachycerianthus multiplicatus, Sabella pavonia, and Virgularia mirabilis. Limaria hians, commonly known as the gaping file shell forms a "nest" of byssus threads. Where these are sufficiently dense, they form reefs on the sediment; Mulroy Bay is the only known area in Ireland where these bivalves occur.*
>
> *This Annex I habitat also forms an important resource for various bird and mammal species (notably Annex II marine mammals) for feeding, breeding and resting.*

The range and area of this habitat in Ireland has been assessed as **favourable** in the NPWS Article 17 Report.

The specific structures and functions (including species) have been assessed as **inadequate** but **improving** and the future prospects for the habitat have been assessed as **favourable**. On the basis of the above, the overall assessment of conservation status is **inadequate** with the overall trend assessed as **improving.**

Pressures:

- Fishing and harvesting aquatic resources **(high importance)**
- Bottom culture **(medium importance)**
- Suspension culture **(medium importance)**
- Other outdoor sports and leisure activities **(medium importance)**
- Pollution to waters (limnic & terrestrial, marine & brackish) **(low importance)**
- Nautical sports **(low importance)**
- Hand collection **(low importance)**
- Intensive fish farming, intensification **(low importance)**

Threats:

- Fishing and harvesting aquatic resources **(high importance)**
- Other outdoor sports and leisure activities **(medium importance)**
- Pollution to waters (limnic & terrestrial, marine & brackish) **(low importance)**
- Bottom culture **(low importance)**
- Suspension culture **(low importance)**
- Nautical sports **(low importance)**
- Hand collection **(low importance)**

Targets and attributes for the conservation of this habitat are available in the detailed Conservation Objectives for Galway Bay Complex SAC. These have been reviewed and considered in relation to the current development in Table 1.29.

Table 1.29: Impact of the proposed development on Large shallow inlets and bays [1160] conservation objectives.

To maintain the favourable conservation condition of Large shallow inlets and bays [1160] in Galway Bay Complex SAC			
Attributes	**Measure**	**Target**	**Assessment**
Habitat Area	Hectares	Area stable or increasing, subject to natural processes.	According to the conservation objectives supporting document the habitat area was estimated as 10,825ha using OSI data and the Transitional Water Body area as defined under the Water Framework Directive (NPWS, 2013). There will be no direct loss of habitat as the proposed development is located approximately 800m from the SAC, with the closest mapped examples of the habitat being located approximately 3km away in Galway Bay Indirect habitat loss as a result of deterioration in water quality was considered. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution
Community Extent	Hectares	Maintain the extent of the *Zostera*-dominated community complex and the maërl-dominated community, subject to natural processes.	The main causes of decline in *Zostera*-dominated communities in recent decades are anthropogenic and include land reclamation, coastal development, boating and fishing activity, sewage discharge and agricultural run-off often result in physical disturbance and siltation as well as increased water turbidity and nutrient loading (Spalding et al. 2003). Maerl communities are very sensitive to substratum loss, smothering, increase in suspended sediment, abrasion and physical disturbance which can prevent light reaching the living maerl and therefore halt photosynthesis (Jones et al., 2000). As outlined above there will be no deterioration in water quality as a result of the proposed development.
Community structure: *Zostera* density	Shoots per m^2	Conserve the high quality of *Zostera*-dominated communities, subject to natural processes	
Community structure:	Biological composition	Conserve the high quality of the maërl-dominated community, subject to natural processes	
Community distribution	Hectares	Conserve the following community types in a natural condition: Intertidal sandy mud community complex; Intertidal sand community complex; Fine to	Typical species will vary depending on the depth, substrate and degree of exposure to wave action. There will be no alteration to the physical processes that form these communities. As outlined above there will be no deterioration in water quality as a result of the proposed development.

To maintain the favourable conservation condition of Large shallow inlets and bays [1160] in Galway Bay Complex SAC			
Attributes	**Measure**	**Target**	**Assessment**
		medium sand with bivalves community complex; Sandy mud to mixed sediment community complex; Mixed sediment dominated by Mytilidae community complex; Shingle; Fucoid-dominated community complex; *Laminaria*-dominated community complex; and Shallow sponge-dominated community complex.	

Otter (1355)

The range for this species in Ireland has been assessed as **favourable** in the NPWS Article 17 Report. The population is also assessed as **favourable**.

The habitat and future prospects for the species have both been assessed as **favourable.** On the basis of the above, the overall assessment of conservation status is **favourable**.

The pressures and threats (National level) relating to this species, as identified in the 2013 Article 17 Report, are listed below:

Pressures:

- Roads, motorways **(medium importance)**
- Professional passive fishing **(low importance)**
- Pollution to surface waters (limnic & terrestrial, marine & brackish) **(low importance)**

Threats:

- Roads, motorways **(medium importance)**
- Professional passive fishing **(low importance)**
- Pollution to surface waters (limnic & terrestrial, marine & brackish) **(low importance)**

The assessment of the proposed development has identified potential pathways for impacts on this species in relation to the *low importance* Pressure and *Threat Pollution to surface waters (limnic & terrestrial, marine & brackish)*.

The targets and attributes for this habitat as per the specific conservation objectives for Galway Bay Complex SAC have been reviewed and considered in relation to the current development and are described in Table 1.30 below.

The Site-Specific Conservation Objective for Otter is:

To restore the favourable conservation condition of Otter in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:

Table 1.30. Targets and attributes associated with site specific conservation objectives for Otter (*Lutra lutra*) [1355]

Attribute	Target	Assessment
Distribution.	No significant decline	There is no suitable habitat for this species on the site of the proposed development and there will be no direct effect on its distribution. Indirect impacts on distribution as a result of deterioration in water quality was considered. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution
Extent of terrestrial habitat	No significant decline. Area mapped and calculated as 2194.8ha	There will be no decline in the extent of terrestrial, marine of freshwater habitat associated with the proposed development Indirect habitat loss as a result of deterioration in water quality was considered. Mitigation measures outlined in the NIS and appendices, ensure that any potential pathways for surface water pollution to this QI are robustly blocked. Construction best practice measures have been implemented into the construction phase of the development, as described in the NIS and its appendices. Operational services, including all foul water will be connected to the local public sewer. All surface water runoff will be appropriately treated to avoid pollution
Extent of marine habitat	No significant decline. Area mapped and calculated as 139.0ha.	
Extent of freshwater (river) habitat	No significant decline. Length mapped and calculated as 564.0km	
Extent of freshwater (lake/lagoon) habitat	No significant decline. Area mapped and calculated as 3908.6ha	
Couching sites and holts.	No significant decline	No couches or holting site were identified during the surveys undertaken. There will be no decline in couching or holt sites associate with the proposed development.
Fish biomass available	No significant decline.	There will be no decline in availability of fish biomass associated with the proposed development. Pathways including water pollution that would allow impacts to occur were considered in the design of the proposed development and a range of measures are in place to avoid all water pollution during construction, operation and decommissioning.

Harbour Seal (1365)

Information on this habitat was gained from the NPWS Article 17 report (NPWS, 2013). The habitat account in that document reads as follows:

> *The harbour seal is the smaller of two species of true seal (Phocidae) that commonly breed around the coast of Ireland and inhabit its inshore and offshore waters. Notable by its preferential use of enclosed sheltered coastal bays and estuaries in which it occupies established intertidal/terrestrial resting sites known as haul-out sites (or haul-outs, most of which are intertidal), the species is also widely known as the common seal possibly due to its regular and historic occurrence in or near areas of human settlement. Unlike grey seals, harbour seals do not show a very pronounced sexual dimorphism when mature. Adult males of the species can measure up to 1.9m in length and weigh between 70kg and 150kg, while adult females may be up to 1.7m in length and weigh between 60kg and 110kg (Thompson & Härkönen, 2008), though typical adult weights fall into the 80-100kg range. Harbour seals are one of the most widespread species of pinniped, inhabiting the Northern Hemisphere from warm temperate and even subtropical waters to northern polar regions (Burns, 2009). Five subspecies are recognised, with the European subspecies (Phoca vitulina vitulina) distributed from Svalbard, Northern Norway and the Barents Sea to the French coast, and including the Baltic Sea (Thompson & Härkönen, 2008; Burns, 2009). Information on the genetic structure of regional harbour seal populations in Europe is limited to date but significant genetic differentiation is suggested (Goodman, 1998) with samples indicating that populations in Ireland-Scotland, eastern England and the Wadden Sea could be considered as distinct units. On a global scale, harbour seal is classified as a species of Least Concern due to its large and either stable or increasing population (Thompson & Härkönen, 2008). However substantial declines and die-offs have been recorded both historically and recently in this species, including via viral disease in Europe and elsewhere (Burns, 2009). Further significant yet unexplained decreases in harbour seal numbers have been recorded within parts of Scotland since the mid-1990s (SCOS, 2011). In Ireland the species occurs in estuarine, coastal and fully marine areas. Individual harbour seals may also travel upstream within river systems to a distance several kilometres from the coast. In addition to its aquatic ecology the species occupies regular haul-out sites about which animals breed, moult, rest and engage in social activity, for example, according to an annual cycle (Bonner, 1990). With practice most harbour seals are quite readily distinguished visually from grey seals though sub-adults/juveniles of both species can be more difficult to identify in the field. In general most harbour seal pups shed their natal coat in the uterus before birth and they subsequently bear a grey-black or brown speckled coat similar to that of adults. At all ages harbour seal fur (pelage) colouration patterns can be highly variable (Burns, 2009) ranging from yellow-brown, tan or mid-brown to grey-black and with variable spotted, dappled or speckled markings along the body length. Animals may appear quite plump or short-necked when seen on land and where a seal's comparatively small head is more visible, this species can also be identified by their characteristic short, blunt muzzle and obvious bridged, dog-like snout from forehead to nose (Duck, 2007).*

The range for this species in Ireland has been assessed as **favourable** in the NPWS Article 17 Report. The population is also assessed as **favourable**.

The habitat and future prospects for the species have both been assessed as **inadequate.** On the basis of the above, the overall assessment of conservation status is **improving**.

The pressures and threats (National level) relating to this species, as identified in the 2013 Article 17 Report, are listed below:

Pressures:

- Fishing and harvesting aquatic resources **(medium importance)**
- Suspension culture **(low importance)**
- Intensive fish farming. Intensification **(low importance)**
- Nautical Sports **(low importance)**

Threats:

- Fishing and harvesting aquatic resources **(medium importance)**
- Suspension culture **(low importance)**
- Intensive fish farming. Intensification **(low importance)**
- Nautical Sports **(low importance)**

The assessment of the proposed development has not identified potential pathways for impacts on this species in relation any of the identified pressures or threats.

The targets and attributes for this habitat as per the specific conservation objectives for Galway Bay Complex SAC have been reviewed and considered in relation to the current development and are described in Table 1.31 below.

The Site-Specific Conservation Objective for Otter is:

To maintain the favourable conservation condition of Harbour Seal in Galway Bay Complex SAC, which is defined by the following list of attributes and targets:

Table 1.31: Impact of the proposed development on Large shallow inlets and bays [1160] conservation objectives.

To maintain the favourable conservation condition of Large shallow inlets and bays [1160] in Galway Bay Complex SAC			
Attributes	**Measure**	**Target**	**Assessment**
Access to Suitable Habitat	Number of artificial barriers	Species range within the site should not be restricted by artificial barriers to site use..	The proposed development is located over 800m from the SAC and will not result in any barriers to the marine environment
Breeding behaviour	Breeding sites	Conserve breeding sites in a natural condition	The proposed development is located over 800m from the SAC and will not result in effect on any breeding, moulting or resting site for Harbour Seal
Moulting behaviour	Moult Haul-out sites	Conserve Moult haul out sites in a natural condition	
Resting Behaviour	Resting haul out sites	Conserve resting haul-out sites in a natural condition	
Disturbance	Level of impact	Human activities should occur at levels that do not adversely affect the harbour seal population at the site	The proposed development is located over 800m from the SAC and is separated from it by urban infrastructure associated with Galway City. There is no potential for any disturbance to this species.

Bibliography

Dale, A. L., McAllen, R. & Whelan, P. (2007) Management considerations for subtidal Zostera marinabeds in Ireland. Irish Wildlife Manuals, No. 28. National Parks and Wildlife Service, Department ofEnvironment, Heritage and Local Government, Dublin, Ireland

Jones, L.A., Hiscock, K., & Connor, D.W. (2000). Marine habitat reviews. A summary of ecological requirements and sensitivity characteristics for the conservation and management of marine SACs. Joint Nature Conservation Committee, Peterborough. (UK Marine SACs Project report)

Spalding, M., Taylor, M., Ravilious, C., Short, F., Green, E. (2003). The distribution and status of seagrasses, pp5-26. In: Spalding, M., Taylor, M., Ravilious, C., Short, F., Green, E. (eds.), World Atlas Of Seagrasses.University of California Press. 298pp.