Chapter 21
Summary of Mitigation & Monitoring Measures

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21 SUMMARY OF MITIGATION AND MONITORING MEASURES

21.1 Introduction

The purpose of this Chapter is to collate the mitigation and monitoring measures identified in the Environmental Impact Assessment Report (EIAR) that are considered necessary to protect the environment, prior to the commencement of, and throughout the duration of the Construction and/or Operational Phases of the BusConnects Galway: Dublin Road scheme (hereafter referred to as the Proposed Development).

The design of the Proposed Development has evolved through comprehensive design iteration, with particular emphasis on minimising the potential for environmental impacts, where practicable, whilst ensuring the objectives of the Proposed Development are attained. In addition, feedback received from the comprehensive consultation programme undertaken throughout the option selection and design development process has been incorporated, where appropriate.

As described throughout this EIAR, the design of the Proposed Development has been progressed taking account of environmental constraints and considerations that have been identified in assessments. This has enabled the avoidance of potential environmental impacts, wherever possible.

21.2 Mitigation and Monitoring Schedules

Mitigation and monitoring measures have been identified as environmental commitments and overarching requirements which shall avoid, reduce or offset potential impacts.

Mitigation and monitoring measures specified within the EIAR technical assessments are also provided in Chapter 6 to Chapter 20 of this EIAR.

The timing and implementation of the mitigation and monitoring measures are indicated within this Chapter as either during the:

- Pre-Construction Phase: Activities such as investigative surveys (e.g. bat surveys) that need to be undertaken in advance of the construction works;
- Construction Phase: The undertaking of physical works to construct elements of the Proposed Development, as outlined in Chapter 4 (Proposed Project Description); and
- Operational Phase: When the Proposed Development commences operation, (i.e., any mitigation associated with planned maintenance).

The following tables summarise the Construction and Operational Phase mitigation outlined in the relevant EIAR technical assessments but should be read in conjunction with the mitigation outlined in the specific chapter and also with the Construction Environmental Management Plan (CEMP) in Appendix A5.1 in Volume 4 of this EIAR (note that the CEMP summarises the Construction Phase mitigation only). Where appropriate, the location to which the mitigation relates to is identified and where the mitigation measure is scheme wide the location is given as ‘throughout (as required)’. Note that in certain instances, a mitigation measure may be relevant to more than one environmental aspect (e.g. Mitigation Number WT1 is also a mitigation measure used in relation to Biodiversity).

21.3 General Mitigation Requirements

Table 21-1 General Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
GM1	CEMP 5.5.1	Throughout (as required)	The mitigation measures appropriate to the construction - summarised in this Chapter have been included in the Construction Environmental Management Plan (CEMP) and its associated management plans (provided in Appendix A5.1 in Volume 4 of this EIAR).	Construction

21.4 Traffic & Transport

Table 21-2 Traffic and Transport Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
TT1	6.6.1	Throughout (as required)	A Construction Environmental Management Plan (CEMP) has been prepared (included as Appendix A5.1 in Volume 4 of this EIAR) and will be implemented (and developed further as required) by the appointed contractor. A detailed Construction Traffic Management Plan has been prepared (and included in Appendix A5.1 CEMP in Volume 4 of this EIAR) and will be implemented by the appointed contractor. The appointed contractor will also prepare (and include in the CEMP) and implement a Construction Stage Mobility Management Plan (CSMMP), to actively encourage personnel to travel to site by sustainable means.	Construction

21.5 Air Quality

Table 21-3 Air Quality Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
AQ1	7.5.1.1	Construction Compounds and Throughout (as required)	In order to ensure that no significant dust nuisance occurs, a series of mitigation measures that are applicable to the construction phase of the Proposed Development will be implemented. ▪ Fully enclose structures with screens during demolition to minimise dust dispersion; ▪ Public roads outside the Proposed Development will be regularly inspected for cleanliness and cleaned as necessary; ▪ Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays (or similar dust suppression methods) will be used as required if particularly dusty activities associated with the construction contract are necessary during dry or windy periods; ▪ During movement of dust-generating or potentially hazardous materials both on and off-site, trucks will be covered with tarpaulin and before entrance onto public roads, trucks will be checked to ensure the tarpaulins are properly in place; and ▪ The appointed contractor will provide a site hoarding of 2.4m height along boundaries where works are taking place adjacent to ecological sensitive receptors and at the main construction compound which will assist in minimising the potential for dust impacts off- site. The appointed contractor will keep the effectiveness of the mitigation measures under daily review and revise them as necessary. In the event of dust nuisance occurring outside the works boundary associated with the Proposed Development, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem.	Construction
AQ2	7.5.1.1	Construction Compounds and Throughout (as required)	A Construction Traffic Management Plan has been prepared (and included in Appendix A5.1 CEMP in Volume 4 of this EIAR) and will be implemented by the appointed contractor to deliver the mitigation measures on a location-specific basis in advance of the works commencing on-site: ▪ A designated delivery route shall be used for all materials to/from the site for all drivers, as overseen by the Project Supervisor for Construction Stage (PSCS) to be appointed by GCC; ▪ The use of low emissions vehicles within the haulage fleet will be included within the Contract Documents; and ▪ The use of private vehicles by construction staff to access the site will be minimised through the encouragement of use of public transport, encouragement of car sharing, and maximising use of local	Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			labour to reduce transport emissions. To implement this, the contractor shall prepare a Mobility Management Plan for site staff and Construction Plant. To reduce emissions from compounds and mobile plant the following mitigation is recommended: ▪ For electricity generation at the construction compounds, hydrogen generators or electrified plant shall be utilised over traditional diesel generators. This should also apply to lower powered mobile plant as appropriate; ▪ A regular maintenance schedule for all construction plant machinery shall be undertaken to maintain optimum machinery efficiency; and ▪ Engines will be turned off when machinery is not in use.	
AQ3	7.5.1.2	Construction Compounds and Throughout (as required)	The following monitoring measures, will be implemented for the construction phase of the proposed development: ▪ The contractor will undertake on-site and off-site inspections, where receptors (including roads) are nearby, to monitor dust, record inspection results, and make the log available to Galway City Council on request. The frequency of the inspections will be increased during site activities with a high potential to produce dust are being carried out; and ▪ Dust monitoring will be undertaken at the three nearest sensitive receptors (with agreement from the landowner) to the works during the construction phase. The TA Luft dust deposition limit values of 350 mg/m^2/day applied as a 30-day average.	Construction

21.6 Climate

Table 21-4 Climate Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
CL1	8.6.1	Throughout (as required)	A series of mitigation measures have been incorporated into the construction design with the goal of reducing the embodied carbon associated with the Construction Phase of the Proposed Development. These mitigation measures include: ▪ The replacement, where feasible, of concrete containing Portland cement with concrete containing ground granulated blast furnace slag (GGBS); ▪ The Proposed Development will minimise wastage of materials due to poor timing or over ordering on site thus helping to minimise the embodied carbon footprint of the Proposed Development; ▪ Where practicable, opportunities for materials reuse will be incorporated within the extent of the Proposed Development; and ▪ Where practicable, materials will be sourced locally to reduce the embodied emissions associated with transport.	Construction

21.7 Noise & Vibration

Table 21-5 Noise and Vibration Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
NV1	9.5.1.1	Throughout (as required)	The appointed contractor will be required to take specific noise abatement measures to the extent required and comply with the recommendations of BS 5228–1:2009 +A1 2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise and S.I. No. 241/2006 - European Communities (Noise Emissions by Equipment for Use Outdoors) (Amendment) Regulations 2006. The mitigation measures outlined below for the Construction Phase have also been included in the Construction and Environmental Management Plan (CEMP) in Appendix A5.1 in Volume 4 of this EIAR.	Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			These measures will ensure that: ▪ During the Construction Phase, the appointed contractor will be required to manage the works to comply with the limits detailed in Section 9.2.4.1 in Chapter 9 (Noise & Vibration) in Volume 2 of this EIAR using methods outlined in BS 5228–1 :2009 +A1 2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise; and ▪ The best means practicable, including proper maintenance of plant and equipment, will be employed to minimise the noise produced by on-site operations.	
NV2	9.5.1.1	Throughout (as required)	The appointed contractor will put in place the most appropriate noise control measures depending on the level of noise reduction required at individual working areas (i.e. based on the construction threshold values for noise and vibration set out in Table 9.6 and Table 9.9 in Chapter 9 (Noise & Vibration) in Volume 2 of the EIAR). Reference to Table 9.31 in Chapter 9 (Noise & Vibration) in Volume 2 of the EIAR indicates that intrusive works occurring within 50m of NSLs will need specific noise control measures to reduce impacts depending on the time period over which they will occur.	Construction
NV3	9.5.1.1.1	Throughout (as required)	The potential for any item of plant to result in exceedance of construction noise thresholds will be assessed prior to the item being brought onto the site. The least noisy item of plant will be selected wherever practicable (e.g. plant items with sound attenuation incorporated). Should a particular item of plant already on the site be found to exceed the construction noise thresholds, the first action will be to identify whether the item can be replaced with a quieter alternative. The appointed contractor will evaluate the choice of excavation, breaking or other working method taking into account various ground conditions and site constraints. Where alternative lower noise generating equipment are available that will provide equivalent structural / excavation / breaking results, these will be selected to control noise within the relevant thresholds, where it is practicable to do so.	Construction
NV4	9.5.1.1.2	Throughout (as required) and Construction Compound	The following measures will be implemented, if required, by the appointed contractor to control noise at source in order to remain below the threshold values for noise set out in Table 9.6 in Chapter 9 (Noise & Vibration) in Volume 2 of the EIAR, which relate to specific site considerations: ▪ For mobile plant items such as dump trucks, planers, excavators and loaders, the installation of an acoustic exhaust, utilising an acoustic canopy to replace the normal engine cover and maintaining enclosure panels closed during operation can reduce noise levels by up to 10 dB;	Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			▪ For percussive tools such as pneumatic concrete breakers and tools, a number of noise control measures include fitting a muffler or sound reducing equipment to the breaker 'tool' and ensuring any leaks in the air lines are sealed; ▪ A strict noise control policy relating to materials handling will be applied at the proposed Construction Compound. Noisy items of plant will be sited away from noise sensitive boundaries. ▪ Where compressors, generators and pumps are located in proximity to NSLs and have the potential to exceed the construction noise thresholds, these will be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation; and ▪ Resonance effects in panel work or cover plates can be reduced through stiffening or the application of damping compounds, while other noise nuisance can be controlled by fixing resilient materials in between the surfaces in contact.	
NV5	9.5.1.1.3	Throughout (as required)	Erection of localised demountable enclosures or screens will be used around breakers or drill bits, as required, when in operation in proximity to NSL boundaries with the potential to exceed the construction noise thresholds. Annex B of BS 5228–1:2009+A1:2014 (Figures B1, B2 and B3) provide typical details for temporary and mobile acoustic screens, sheds and enclosures that can be constructed on-site from standard materials. A well placed and designed mobile temporary screen around a breaker or excavation can effectively reduce noise emissions by 10 dB(A). The appointed contractor will provide a site hoarding of 2.4m height along noise sensitive boundaries, at a minimum, at the Construction Compound. The length of the screen should in practice be at least five times the height. However, if shorter sections are necessary, then the ends of the screen will be wrapped around the source. Careful planning of the Construction Compounds including the placement of site buildings and stores between the site and NSLs will be considered by the appointed contractor.	Construction
NV6	9.5.1.1.4	Throughout (as required)	It is envisaged that generally construction working hours will be between 07:00hrs and 19:00hrs on weekdays and between 08:00hrs and 14:00hrs on Saturdays. Evening or Night-time and Sunday working may be required during certain periods to facilitate street works that cannot be undertaken under daytime / evening time conditions. The planning of such works will take consideration of sensitive receptors, in particular any nearby residential areas.	
NV7	9.5.1.1.4	Throughout (as required)	Construction activities / plant items will be considered with respect to their potential to exceed construction noise thresholds at NSLs and will be scheduled according to their noise level, proximity to sensitive locations and possible options for noise control. In situations where an activity with potential for exceedance of	Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			construction noise thresholds is scheduled (e.g. road widening and utility diversions or activities with similar noise levels identified in Table 9.31 in Chapter 9 (Noise & Vibration) in Volume 2 of the EIAR)), other construction activities will be scheduled at different times to not result in significant cumulative noise levels.	
NV8	9.5.1.1.5	Throughout (as required)	Galway City Council (GCC) will establish clear forms of communication that will involve the appointed contractor and NSLs in proximity to the works, so that residents or building occupants are aware of the likely duration of activities likely and timing to generate noise or vibration that are potentially significant.	Construction
NV9	9.5.1.1.6	Throughout (as required)	During the Construction Phase the appointed contractor will carry out noise monitoring at representative NSLs to evaluate and inform the requirement and / or implementation of noise management measures. Noise monitoring will be conducted in accordance with ISO 1996–1 (ISO 2016) and ISO 1996–2 (ISO 2017). The selection of monitoring locations will be based on the nearest representative NSLs to the working area which will progress along the length of the Proposed Development.	Construction
NV10	9.5.1.2	Throughout (as required)	During the Construction Phase the appointed contractor will carry out vibration monitoring at identified sensitive buildings, in the event that proposed works have the potential to be at or exceed the vibration limit values in Table 9-9 in Chapter 9 (Noise & Vibration) in Volume 2 of the EIAR.	Construction
NV11	9.5.1.2	Throughout (as required)	In the case of vibration levels giving rise to human discomfort, in order to minimise such impacts, the following measures shall be implemented during the Construction Phase: ▪ A clear communication programme will be established by GCC to inform adjacent building occupants in advance of any potentially intrusive works which may give rise to vibration levels likely to result in significant effects**.** In so far as possible the timing of such work will be scheduled to cause minimal disruption; ▪ Activities capable of generating significant vibration effects with respect to human response (as per Table 9-10 in Chapter 9 (Noise & Vibration) in Volume 2 of the EIAR)) will be restricted to daytime hours only, as far as practicable; and ▪ Appropriate vibration isolation shall be applied to plant (such as resilient mounts to pumps and generators), where required and where feasible.	Construction

21.8 Population

Table 21-6 Population Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
P1	n/a	n/a	No additional mitigation or monitoring measures are considered necessary beyond those already identified in other environmental assessments	n/a

21.9 Human Health

Table 21-7 Human Health Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
HH1	11.5	Throughout (as required)	Access to all hospitals and schools will be maintained. Mitigation for Construction Phase access to hospitals and schools are set out in Appendix A5.1 CEMP in Volume 4 of this EIAR. Any mitigation or monitoring requirements in relation to effects on human health are properly addressed by the measures set out in the chapters which assess effects on the vectors through which the Proposed Development has potential to cause likely and significant effects on human health. No specific mitigation or monitoring measures are proposed for human health over and above those identified elsewhere in this EIAR.	Construction
HH2	CEMP Table 5-2	Throughout (as required)	Mitigation for adverse psychosocial responses to the Construction Phase will include providing the public with sufficient information to enable people to plan their days, journeys and activities around the construction works and take control of their options to some extent. The appointed contractor will put in place a Communications Plan in accordance with GCC requirements. The Plan will provide a mechanism for members of the public to communicate with the GCC and the appointed contractor, and for the GCC and appointed contractor to communicate important information on various aspects of the Proposed Development to the public. This will include timely communication to the local community on the planned work activities, timings and traffic management.	

21.10 Biodiversity

Table 21-8 Biodiversity Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
BD1	12.6.1.1	Throughout (as required)	<u>Designated Sites</u> The mitigation measures that are required to ensure that the Proposed Development will not adversely affect the integrity of the Natura 2000 sites within the ZoI are presented in the NIS and within Chapter 13 (Water) of this EIAR. The following mitigation measures were developed to address potential impacts that were identified: ▪ Measures to protect surface water quality and egress during construction; and ▪ Measures to prevent the spread of non-native invasive species. Mitigation measures include general protection measures and good working practices, following guidance set out in: ▪ IFI (2010) 'Biosecurity Protocol for Field Survey Work'; ▪ TII (2020) 'The Management of Invasive Alien Plant Species on National Roads - Technical Guidance'; ▪ CIRIA C648 (2006) 'Control of Water Pollution from Linear Construction Projects' – Guidance for consultants and contractors; ▪ CIRIA C811 (2023) 'Environmental Good Practice on Site Guide'; and ▪ CIRIA C768 (2017) 'Guidance on the construction of SuDS'. During construction, water quality protection measures will be employed, including following the Surface Water Management Plan (SWMP) in Appendix A5.1 - CEMP of volume 4 of EIAR. An Environmental Incident Response Plan has been prepared (included in Appendix A5.1 - CEMP of Volume 4 of EIAR) and will be communicated to personnel prior to commencement of work. The following mitigation measures will be implemented: ▪ Existing surface water infrastructure will be inspected and deemed to be in good working order prior to works starting; ▪ All fuels, oils and construction fluids will be stored in the designated construction compound on lands adjacent to the existing Connacht Hotel and stored in bunds of 110% capacity in a secure area away from any drains or watercourses;	Pre-Construction Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			▪ All equipment and machinery will be checked for leaks prior to usage on site and on a daily basis; ▪ Any cement mixing where required will be undertaken away from surface water drainage systems, whether temporary during construction, or permanent and any washout from vehicles, machinery or tools will be stored securely in the construction compound and appropriately removed from site; ▪ Sediment barriers such as silt fencing will be used and checked daily for effectiveness; ▪ Construction will take cognisance of weather conditions and the duration that subsoil layers are exposed will be minimised; and ▪ Waste will be managed appropriately on site. An Invasive Species Management Plan (ISMP) has been prepared and is included in Appendix A5.1 - CEMP of Volume 4 of EIAR. A pre-construction survey for invasives will be carried out to determine the status of invasives on site prior to commencement of works. High-risk species Himalayan knotweed will be removed and monitoring undertaken. All equipment will be steam cleaned prior to and after use on site.	
BD2	12.6.1.1	Throughout (as required)	<u>Designated Sites</u> For vegetation maintenance or management, any herbicide / weed killer used will be an ecologically safe product, including safe for pollinators and the aquatic environment. Waste from landscaping will also be appropriately dealt with away from any watercourse. The surface water drainage system, including petrol / oil separator will be regularly checked and maintained to ensure it is working appropriately and effectively. For invasive species, Transport Infrastructure Ireland (TII,2020) guidance for management of roads should be followed as appropriate. Checks should be made for invasive species during road maintenance, and if found, plans should be put in place for management and eradication of the invasive species recorded.	Operation
BD3	12.6.1.2.1	Throughout (as required) and Construction Compound	<u>Habitat Loss / Fragmentation</u> Vegetation clearance will be kept to a minimum as required during the construction phase and in compliance with the conditions of any Derogation Licence, felling licence, statutory limits (including temporal) and the provisions of the Development plan on removing vegetation. Vegetation will only be cleared where required, and efforts made to retain vegetation wherever possible. Tree felling will only be carried out where	Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			necessary to facilitate the development. Efforts will be made to retain trees where possible, and measures employed to limit any potential damage to retained trees, including root systems. Trees selected for planting have taken cognisance of existing species in the study area. A minimum height of 4 m will be achieved for all planted trees. Emphasis will be given to include a majority of native species, including pollinator-friendly and diverse plant species. The Landscaping Plan includes for hedge and native shrub mixes, ornamental shrub planting, groundcover planting, seasonal bulbs and grassy verges. Other landscaping elements such as earth banks will also be considered which would improve insect production, to act as prey items for fauna. Care will be taken to ensure that plants and seed mixes used are regulated and quality controlled from the supplier to ensure no inadvertent non-native invasive species are present. Plants should be sourced from organic growers who produce stock free from insecticides and invasive species. In areas where temporary works are required along the southern edge of the Meadow fields, it should be considered that reseeding be undertaken using seeds from the existing Meadows. Seeds from the Meadows could be harvested three years prior to year of opening (e.g., 2025) calendar year and stored for reseeding once temporary works areas are no longer needed. This would ensure that the species assemblage already present, including genetics, would be consistent. The design of the Proposed Development is such that buffer zones are present between the new Proposed Development layout and existing baseline habitats, by way of additional planting and retention of existing trees and vegetation. This will ensure appropriate buffer zones and will mitigate fragmentation impacts. The Landscaping General Arrangement Drawings (BCGDR-BTL-ENV_LA-XX-DR-CE-00001- 00011) also indicate Root Protection Areas (RPAs) for each tree to be retained, obtained from the Arboricultural Impact Assessment (Barton Hyett Associates, 2024). The temporary RPAs should be fenced off from the works where possible. No storage of materials, or vehicle access should be allowed within the RPAs. No storage of hazardous materials within 10m of any retained trees is permitted. Should works be required within an RPA, a qualified arborist will be consulted, and mitigation measures included in the Arboricultural Impact Assessment will be followed (Barton Hyett Associates, 2024). The tree inside the construction compound area and their root zones will to be properly protected and no entry by individuals or machinery into the root protection zone will be permitted while the site is in use. The	

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			root protection area will not be used for storage of any kind. The tree protection fencing will be in place prior to commencement.	
BD4	12.6.2.2.1	Throughout (as required)	<u>Habitat Loss / Fragmentation</u> The habitat management and maintenance regime should follow the All-Ireland Pollinator Plan 2021-2025 where relevant (National Biodiversity Data Centre, 2021) (and subsequent revisions). Vegetation clearance along the roads edge should only be undertaken where necessary for safety. The Annex I habitat at the HSE Merlin Park meadow fields currently undergoes management in the form of mowing twice a year. It should be ensured that this management is ongoing and maintained in its current frequency. Historically, lowland hay meadow habitat types were subject to low intensity grazing by livestock. In the absence of this, management of this habitat type will take cognisance of relevant sections of Natural England's (2007) 'Lowland Grassland Management Handbook (Section Edition)'. The spread of Bracken on the fringes of the meadows should be monitored to ensure its spread is controlled. This habitat is of ecological value to a variety of wildlife, including invertebrates and mammals, but should be maintained in its current abundance to ensure habitat loss of the meadow fields is managed. Due to the large rhizomes this species can spread rapidly, and it's naturally occurring toxins can prevent colonisation of other plant species (NE, 2007). Non-chemical control is recommended as in NE (2007) with cutting twice a year, which may be done at the same time as mowing of the meadow fields. Potential impacts on bird and mammal species must be considered for any vegetation management. Enhancement measures will involve consultation with existing HSE Merlin Park management of Meadow fields lands as well as with local community wildlife group Friends of Merlin Park to ensure details of historic and current management are aligned with proposed enhancements. Species such as common ragwort were noted in the middle field, which may be indicators of nutrient enrichment (NE, 2007). Ragwort is recommended to be mechanically removed (as there are no large areas this is feasible) to facilitate the increased abundance of Lowland Hay Meadow characteristic species. Yellow rattle seed could also be harvested from other fields, and reseeded here, to improve the balance of dominant grassland species such as cock's foot. This reseeding with species already present would also provide for an accelerated natural regeneration.	Operation
BD5	12.6.1.2.2	Throughout (as required)	<u>Invasive species</u>	Pre-Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			Prior to the commencement of works, a pre-construction survey for invasive species should be carried out along the length of the Proposed Development. An Invasive Species Management Plan (ISMP) has been prepared and is included in Appendix A5.1 - CEMP of Volume 4 of this EIAR). Measures outlined in the ISMP will be implemented by a suitability qualified specialist prior to the commencement of construction to ensure non-native invasive species are controlled. The high-risk invasive species Himalayan knotweed should be appropriately removed to prevent further spread. All equipment working on Site will be steam cleaned prior to and after use on Site and wastewater will be appropriately dealt with as in the Inland Fisheries Ireland (IFI,2010) 'Biosecurity Protocol for Field Survey Work' and CIRIA C811 (2023) 'Environmental Good Practice on Site Guide'. During works on Site, vehicles and machinery will be regularly inspected for plant material, such as roots or seeds, and if found, will be removed and safely disposed of in the construction compound.	Construction
BD6	12.6.2.2.2	Throughout (as required)	<u>Invasive species</u> When construction does commence, monitoring of these areas should be undertaken to ensure there is no regrowth or introduction of additional species via machinery and personnel once mobilised on Site. Post-construction monitoring should be undertaken along the length of the route, to ensure no introduction of invasive species occurred during the construction phase. Ongoing management of the Proposed Development should include regular checks for invasive species, and management employed where required. Should invasive species be found, appropriate signage should be erected, and treatment promptly undertaken. This will follow local authorities' management procedures.	Operation
BD7	12.6.1.2.3	Throughout (as required)	<u>Habitat Degradation - Surface water</u> In terms of mitigation a Surface Water Management Plan (SWMP) has been prepared and included Appendix A5.1 CEMP in Volume 4, which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Development. Mitigation measures include: ▪ The works area will be fenced off from the Meadow grassland fields during construction;	Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			▪ Silt fences and sediment filter socks will be deployed along this fence to ensure no overland flows into the grassland; ▪ Monitoring of silt fencing and sediment filter socks will take place weekly and after heavy rainfall for the course of the works to ensure effectiveness; ▪ No storage of hazardous materials, fuel or stockpiling of materials should occur along this stretch, and ideally, will be kept to the temporary construction compound; ▪ No waste will be stored along this stretch and no refuelling should take place adjacent to the Meadow fields; and ▪ Refuelling should only be undertaken in a designated area, with appropriate bunding, within the temporary construction compound.	
BD8	12.6.2.2.3	Throughout (as required)	<u>Surface water</u> Maintenance of new surface water infrastructure should be ongoing during the operational phase. Regular maintenance of petrol interceptors and oil separators, swales, tree pits, rain gardens and bioretention areas should be undertaken as standard to ensure appropriate effectiveness. Maintenance regimes will be carried out by local authorities as standard.	Operation
BD9	12.6.1.3.1	Throughout (as required)	<u>Non-volant mammals</u> While there are no guidelines for timeframes in Ireland, it is recommended in this case that surveys take place no later than 4 weeks prior to clearance works. This will be undertaken to ensure that no mammal dwellings are present immediately prior to construction, that may have been created in the time elapsed between the current surveys and the commencement of works. All vegetation clearance works should be undertaken slowly to allow mammals and other animals sufficient time to escape if needed. Any excavations will be covered when not in use and backfilled as soon as possible to reduce the potential for mammals to get trapped or potentially harmed. Excavations will also be covered at night where practicable. To reduce disturbance, vibration during the construction works will be regularly monitored and will comply with standards to ensure this is kept to a minimum.	Pre-Construction Construction
BD10	12.6.1.3.2	Throughout (as required)	<u>Bats</u> <u>Disturbance of Flight Patterns / Foraging Routes as a Result of Lighting</u> A suitably qualified bat ecologist will be present on site for any tree felling works and setting up roost protection areas for retained trees with PRFs. This ecologist should undertake a pre-construction survey of	Pre-Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			the affected trees. This pre-construction survey may determine that further PRFs have formed in the interim or give a confirmation of whether these trees are being used by bats. A derogation licence is required as there is potential for bats to be present in suitable trees at any point of time. While the Derogation Licence applied for is not a mitigation measure per se, it will have conditions attached to it which must be complied with. The Derogation licence application submitted on behalf of GCC committed to undertaking certain measures detailed in Section 12.6.1.3.2 in Chapter 12 (Biodiversity) of this EIAR. The suitably qualified bat ecologist in conjunction with the NPWS will ensure there are no bats in the trees prior to felling. National Roads Authority 'Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes' will be followed as relevant (NRA, 2006). Tree felling is best undertaken from late August to late October / early November, during which time all bats are capable of flight, but are not yet in hibernation. Trees with PRFs should be felled using a first warning, nudging the tree two or three times with a pause in between, to warn bats that may be present. Trees should be felled in sections, undertaken carefully, cutting from the canopy of the tree first and removing and checking each section for bats. As a precaution, cut tree sections should be left overnight before mulching. If any bats are found throughout this process, ccommitments provided in the application for the Derogation licence must be complied with, works must stop, NPWS will be notified. If bats are encountered in any trees or vegetation or over the course of the works, works must also stop and NPWS will be notified. Due to the required loss of some mature trees with PRFs for bats, alternative accommodations for bats should be provided. A bat box scheme will be included. The bat boxes will be erected on mature trees in the study area, a season prior to the felling of trees, ideally prior to construction. An ecologist will advise on the location and orientation of the bat boxes on site based on relevant guidelines. However, a minimum height of 4 m should be obtained and a preferred aspect of south-east or south-west and away from any light spill. A total of 3 boxes per PRF tree removed is recommended. For each PRF tree felled, Standard Schwegler 2F (1 no.), 1FF (2 no.) bat boxes should be erected. Any bat boxes installed should be labelled and information supplied to Bat Conservation Ireland and the local NPWS ranger. Artificial lighting has been designed to minimise lighting impacts on nocturnal fauna. The landscaping design also includes for additional planting along the southern boundary of the Meadow Park fields, which would act as a barrier to light spill from the road. Measures are proposed to reduce the potential for light spill impacts from temporary construction lighting, along hedgerows, treelines, scrub and grassland habitats: ▪ Motion sensors / timer triggers used where possible; ▪ Column heights kept to a minimum as practicable;	Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			▪ Lighting directed only to areas where lighting is needed (avoid unnecessary light spill); ▪ Luminaires used to prevent light spill; ▪ Warm colour temperatures used where possible (2700K or less); ▪ Cowls, louvres, hoods or baffles used to direct lighting; and ▪ No upward facing lighting.	
BD11	12.6.2.3.2	Throughout (as required)	<u>Bats</u> Measures are included to ensure light spill is kept to a minimum along the route during the operational phase, particularly in areas close to hedgerows, treelines, scrub, woodland and grassland: ▪ During sensitive times of the year for bats, April-October, lighting should be dimmed, restricted or turned off during late hours of the night; ▪ Warm colour temperatures used where possible (2700K or less); ▪ Column heights kept to a minimum as practicable; ▪ Directional lighting used, assisted by cowls, louvres, hoods or baffles; ▪ Motion sensors / timer triggers used where possible; ▪ No upward facing lighting; and ▪ No lighting near any bat or bird box locations.	Operation
BD12	12.6.1.3.3	Throughout (as required)	<u>Birds</u> Vegetation clearance works should be undertaken outside the bird nesting season, from 1st March to 31st August (as per S40(1) Wildlife Act 1976, as amended (which prohibits cutting vegetation growing on land (not cultivated between) 1st March and 31st August). In areas where this cannot be observed, should S40(2)(e) not be applied (disapplies to the clearance of vegetation in the course of road or other construction works), a pre-construction survey of vegetation to be removed will be undertaken in advance of construction by a suitably qualified ecologist. If any active nests are identified, these areas will be appropriately fenced off and no vegetation removal will be undertaken in these areas until birds have fledged and nests are no longer in use. Bird boxes will be installed within the study area prior to the clearance of vegetation. Generalist bird boxes of a durable material should be used, and an ecologist consulted prior to installation for location and orientation.	Pre-Construction Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
BD13	12.6.3.1	Throughout (as required)	An Ecological Clerk of Works (EcOW) will be employed to ensure ecological mitigation measures are adhered to. All vegetation removal will be supervised by the EcOW. An initial site environmental induction and ongoing training will be provided by the Environmental Manager to communicate the main provisions of this environmental plan to all site personnel. Two-way communication will be encouraged to promote a culture of environmental protection. Prior to any works, all personnel will receive an on-site induction relating to operations adjacent to the environmentally sensitive areas and to re-emphasise the precautions that are required as well as the construction management measures to be implemented. Galway City Council will also ensure that the engineer setting out the works is fully aware of the ecological constraints and construction management requirements.	Monitoring during Construction
BD14	12.6.3.2 12.6.3.3	Throughout (as required)	<u>Designated Sites</u> Checks should be made for invasive species during road maintenance, and if found, plans should be put in place for management and eradication of the invasive species recorded. <u>Habitat and Flora</u> Monitoring of the Annex I habitat in the HSE lands within Merlin Park will be undertaken annually, over a period of three years and will involve consultation with the HSE that undertake management of these lands. This should be undertaken by a suitably qualified ecologist / botanist. Any negative changes noted in the baseline of these fields should be recorded and mitigation amended (air quality and/ or surface water) to reduce further impacts. Monitoring will be undertaken by way of habitat surveys to record vegetation structure and changes. This should be undertaken at least once a year, at the same period each year. This is to reduce seasonal variation effects on the results. The first visit should be undertaken to form a baseline prior to enhancement measures listed in section 12.7.2.2.1 in Chapter 12 (Biodiversity). Results will be analysed after each survey to compare with baseline results and indicator species targets in BSBI (2021) and O'Neill *et al*., (2013) to establish efficacy of enhancement measures. Areas used for temporary works will be allowed to naturally regenerate, to include reseeding with seed harvested from the existing fields, the success of which should be monitored to establish efficacy of seeding measures. Any additional measures deemed required by the ecologist after the first year of monitoring will be considered.	Monitoring during Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
BD15	12.6.3.4	Throughout (as required)	<u>Fauna</u> Bat boxes installed as part of the construction phase of the Proposed Development, should be monitored according to guidelines (Bat Mitigation Guidelines for Ireland - v2, Marnell et al., 2022). The bird boxes installed as part of the construction phase of the Proposed Development will also be monitored. Monitoring should include one check annually for two years.	Monitoring during Construction

21.11 Water

Table 21-9 Water Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
WT1	13.5.1.1	Throughout (as required)	In terms of mitigation, a Surface Water Management Plan (SWMP) has been developed within the CEMP (Appendix A5.1 of Volume 4 of this EIAR), which details the measures to be put in place to avoid, prevent and reduce any significant adverse impacts on the surrounding water environment during the Construction Phase of the Proposed Development. The mitigation measures proposed for the management of surface water runoff were formulated with due regard for the following guidance documents and should be adhered to during the constriction near water bodies: ▪ CIRIA C648 (2006) Control of Water Pollution from Linear Construction Projects; ▪ CIRIA C532 (2001) Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors; and ▪ Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters (IFI 2016). At a minimum, all of the control and management measures detailed within the SWMP will be implemented, including measures related to: ▪ Control of sediment (use of silt fences and silt sacs); ▪ Use of concrete (precast concrete products to be used, where possible);	Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			▪ The incorporation of SUDS measures (i.e. petrol interceptor) before the discharge of surface water generated during construction; ▪ The establishment of an Emergency Incident Response Plan (EIRP); ▪ Environmental monitoring; ▪ Construction Compound management (including the storage of materials); and ▪ Management of refuelling and wheel wash facilities (containment) to prevent release to the surrounding surface waters.	
WT2	13.5.1.2	Throughout (as required)	In addition to mitigation measures outlined in the SWMP, Method Statements for responding to accidental spillages will be provided by the Appointed Contractor. To reduce the potential risk of spillages, all oil, fuel, solvent and paints used during the Construction Phase of the Proposed Development will be stored in temporary bunded areas. Oil and fuel storage will include bunds capable of providing 110% of the capacity of the largest tank within the bunded area, including an allowance of 30mm for rainwater ingress. Any drummed fuel is to be stored in a dedicated chemical storage cabinet that features internal bunding. All drums are to be clearly labelled to allow for prompt, appropriate remedial action in the event of a spillage. Hydraulic oil / lubricant will only be added to vehicles / plant at the designated refuelling area within the Construction Compound. Where is it not possible for refuelling to take place within the designated refuelling area, fuel will be transported in a mobile double skinned tank. A spill kit and drip tray must be present in this scenario. Spill kits shall include 10-hour terrestrial oil booms (80mm ⌀ x 1000mm) and a plastic sheet, as a minimum. In the event of a spill, any contaminated soil is to be transferred on to the plastic sheet to prevent contaminants leaching to groundwater. Concrete ready-mix will be delivered to site by truck on a 'just in time' basis to minimise the potential exposure time for leaks / spills. A concrete slump test will be completed to ensure the consistency of the concrete is not too watery / soupy in order to reduce the risk of alkaline wastewaters entering the storm water drain or contaminated storm water reaching the underlying subsoil. Concrete transporting vehicles will be directed back to their depot for washout.	Construction
WT3	13.5.1.3	Throughout (as required)	Once the new infrastructure has been constructed, a specialist saw will be used to expose the internal portion of the drainage system. A dry cutting blade must be used, in combination with a dust extractor or	Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			vacuum to remove dust. Wet cutting methods should be avoided as the water combines with the dust to create a concrete slurry.	
WT4	13.5.1.4	Construction compound	As the proposed Construction Compound currently consists of permeable surfacing (grassed playing fields), an area of hardstanding with its own drainage network will be installed to facilitate refuelling, washing and servicing of vehicles / plant. As it is proposed that this area will be drained to a soakaway, the soakaway is considered an adequate treatment for hydrocarbons as soil-borne microbes within the organic rich layers provide a degradation mechanism for hydrocarbons. As the organic rich layers are present close to the surface, the soakaway system for this area of hardstanding should consist of a broad and shallow system rather than a deep and narrow system. An example of a suitable system is an infiltration pond.	Construction
WT5	13.5.1.5	Throughout (as required)	As detailed within the SWMP, the appointed contractor shall carry out visual monitoring of surface water control measures (settlement tanks, silt fences, fuel storage areas, etc.) on a daily basis. In addition, weekly visual inspections of waterbodies in proximity to the Proposed Development will be carried out by the appointed contractor. If hydrocarbons are observed or other water quality parameters are suspected to have been exceeded, as a result of an incident but where a visual inspection may not provide sufficient information to conclude, an investigation will be carried out to determine whether any element of the construction of the Proposed Development could be causing the contamination. A record of incidents will be kept aiming to prevent reoccurrence.	Construction
WT6	13.5.2	Lough Atalia, Corrib Estuary and Oranmore Bay	The Proposed Development will maintain the existing outfalls, discharging to Lough Atalia, Corrib Estuary and Oranmore Bay. The maintenance of the SUDS assets and the emptying and maintenance of petrol interceptors will be the responsibility of GCC.	Operation

21.12 Land, Soils, Geology & Hydrogeology

Table 21-10 Land, Soils, Geology and Hydrogeology Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
LSGH1	14.5.1.1 14.5.1.2	Lough Atalia area	The following mitigation measures will be implemented to avoid the impact into the Regionally Important Aquifer: ▪ The appointed contractor will be required to ensure that the excavation footprint shall be kept to a minimum, using shoring or trench boxes where appropriate; ▪ If ground is suspected of contamination, samples will be taken and tested for contamination by the appointed contractor immediately or without delay. Ground excavated from areas found to be contaminated will be disposed of to a suitably licensed or permitted sites in accordance with the current Irish waste management legislation; ▪ Silt traps will be installed by the appointed contractor to prevent silt and other fine particles from migrating off-site; ▪ The drainage network will be sealed throughout the Proposed Development to prevent surface runoff entering the Regionally Important Karstified Aquifer; and ▪ Any dewatering shall be designed by the appointed contractor to mitigate against the mobilisation of fines/ contaminants into the surrounding environment.	Construction
LSGH2	14.5.1.3	Throughout (as required)	Measures to be implemented to minimise the risk of spills and contamination of soils and waters include: ▪ Ensure that all areas where liquids (including fuel) are stored, or cleaning is carried out, are in designated impermeable areas that are isolated from the surrounding area and within a secondary containment system, e.g., by a roll-over bund, raised kerb, ramps or stepped access; ▪ The location of any fuel storage facilities shall be considered in the design of the Construction Compound. These are to be designed in accordance with relevant guidelines and codes of best practice and will be fully bunded; ▪ Good housekeeping at the site (daily site clean-ups, use of disposal bins, etc.) during the entire Construction Phase; ▪ All concrete mixing and batching activities will be located in areas away from watercourses and drains; ▪ Potential pollutants to be adequately secured against vandalism; ▪ Provision of proper containment of potential pollutants according to codes of best practice;	Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			▪ Thorough control during the entire Construction Phase to ensure that any spillage is identified at an early stage and subsequently effectively contained and managed; and ▪ Spill kit to be provided and to be kept close to the storage area. Staff to be trained on how to use spill kits correctly.	
LSGH3	14.5.1.3	Throughout (as required)	An Environmental Incident Response Plan has been prepared (Section 5.6) detailing actions to be taken in the event of a pollution incident. In addition, the appointed contractor will develop a Sediment Control Plan (SCP) prior to construction commence.	Construction

21.13 Archaeological and Cultural Heritage

Table 21-11 Archaeological and Cultural Heritage Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
CH1	15.6.1	Throughout (as required)	An experienced and competent licence-eligible archaeologist will be employed by the appointed contractor to advise on archaeological and cultural heritage matters during construction, to communicate all findings in a timely manner to GCC and statutory authorities, to acquire any licenses / consents required to conduct the work, and to supervise and direct the archaeological measures associated with the Proposed Development. Any required statutory notifications for proposed works on or near to recorded archaeological monuments will require two months' notice to the Minister of Housing, Local Government & Heritage under Section 12 of the National Monuments (Amendment) Act 1994.	Construction
CH2	Appendix A15.5 - CHMP	Throughout (as required)	A Cultural Heritage Management Plan has been prepared (Appendix A15.5 – CHMP in Volume 4 of this EIAR) and it includes the mitigation measures to be implemented to avoid or mitigate the impacts on cultural heritage receptors.	Construction & Operation

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
CH3	15.6.1	Throughout (as required)	Archaeological monitoring under licence will take place during the initial stages of construction at all greenfield areas (including the temporary construction compound) and for all works within the Zone of Notification of the recorded milestone monument **CH002**. In the event of an archaeological feature being identified, if preservation *in situ* is not feasible, preservation by record through a programme of archaeological excavation and recording will be completed prior to construction and subject to consultation and liaison by the Project Archaeologist with the Project Manager and National Monuments Service/National Museum of Ireland (NMI).	Construction
CH4	15.6.1	Throughout (as required)	Preservation by avoidance is the principle mitigatory measure applicable to the Cultural Heritage resource. Where avoidance in whole or in part via design refinement has been exhausted, recourse to preservation in situ or preservation by record shall be the primary applicable mitigation measures, subject to statutory agreement. Where the cultural heritage receptor cannot be avoided but can be incorporated into the proposed development footprint, without additional ground reduction, drainage measures, or amenity impact such that preservation in situ can avoid or reduce the level of impact, this measure shall be adopted (subject to statutory agreement). In principle, given the continued sub-surface site preservation (although altered site context), this shall provide a lesser residual significance of effect on same. Where the cultural heritage receptor cannot be incorporated into the proposed development footprint, preservation by record shall be adopted (subject to statutory agreement). This shall involve a full and detailed licenced archaeological investigation and/or built heritage survey records (written, drawn and photographic). In principle, given the creation of a full and detailed archaeological and built heritage record, the results of which shall be publicly accessible and disseminated, this shall provide a lesser residual significance of effect on same.	Construction
CH5	15.6.1.2	Boundary wall (townland boundary)	Installation of protective barrier via Heras fencing to avoid any inadvertent damage during works (vehicular/machine movements) and careful construction of Proposed Development design that abuts the upstanding feature (no tie-in)	Construction
CH6	15.6.1.2	Milestone (RMP & RPS)	An RMP and RPS asset. Buffer/exclusion area to be installed around stone during works (heras fencing), and on-site archaeological monitoring of adjacent groundworks during construction stage (subject to NMS statutory approval). Limestone surface treatment to east ward side as a connection link to green area, together with appropriate lighting and interpretative signage	Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
CH7	15.6.2	Milestone (RMP & RPS)	Removal of vegetation and discreet adjacent design intervention will reveal this feature and present a positive opportunity to highlight it as a landmark (with non-intrusive placename signage, lighting) along the proposed BusConnects route	Operation
CH8	15.6.1.2	Rinmore estate building façade and original entrance – location only	Full built heritage record prior to removal (written, photographic, drawn) and salvage of any dressed/cut stone for re-use in rebuilding of boundary wall to sufficient height (+700mm), Retention and repair of any sections not directly affected.	Construction
CH9	15.6.1.2	Renmore House (RPS)	Works at the former entrance area to Renmore House (RPS) (CH013) and former building façade (CH003) at the Brothers of Charity complex, where feasible, should be prioritised in the overall project programme in order to reduce any potential temporary disruption.	Construction
CH10	15.6.1.2	Modern roadside memorial	Careful removal and placement in secure storage for safe keeping during works, with careful reinstatement/ re-siting as close to current location as possible	Construction
CH11	15.6.1.2	Boundary wall/townland boundary & former gated entrance	All cut and dressed stone to be recorded (written, drawn, photographic) prior to and after removal. All stone to be salvaged and re-used in re-built (as like) boundary by suitably qualified stonemasons in accordance with best conservation practice (masonry numbering, use of lime for pointing etc.).	Construction
CH12	15.6.1.2	Cast-iron vent pipe	Careful removal and placement in secure storage for safe keeping during works, with careful reinstatement/ re-siting as close to current location as possible together with cleaning and re-painting per best conservation practice.	Construction
CH13	15.6.1.2	Modern roadside memorial	Careful removal and placement in secure storage for safe keeping during works, with careful reinstatement/ re-siting as close to current location as possible	Construction
CH14	15.6.1.2	Boundary walling & vernacular gate	Wall and gate to be recorded (written, photographic) before removal and gate reinstated post-works. Wall to be rebuilt incorporating existing features (pillars, gate, width, height, coursing etc.) in the arrangement as they currently exist	Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
CH15	15.6.1.2	Dressed stone	Cut stone and wall to be recorded (written, drawn, photographic) before removal. All stone to be salvaged and re-used in re-built (as like) boundary	Construction
CH16	15.6.1.2	Former quarry (SMR)	Given the close proximity to the study area, archaeological monitoring during works (subject to statutory approval) per mitigation set out for CH014 Merlin Park will also apply (and be extended) to this area	Construction
CH17	15.6.1.2	Cast-iron vent pipe	Sited close to edge of Proposed Development and will be cleaned, and painted in accordance with best conservation practice None required	Construction
CH18	15.6.1.2	Renmore House - NIAH Garden Survey	Full written, drawn and photographic record per measures for CH003	Construction
CH19	15.6.1.2	Merlin Park - NIAH Garden Survey	Archaeological monitoring during works (subject to statutory approval)	Construction
CH20	15.6.1.2	Glenina House - NIAH Building Survey	Full written, drawn and photographic record per measures for CH006	Construction
CH21	15.6.1.2	Wellpark - NIAH Garden Survey	Installation of protective barrier via Heras fencing to avoid any inadvertent damage to boundary wall CH001 during works	Construction
CH22	15.6.1.2	Throughout (as required)	The archaeological monitoring will involve the stripping of topsoil/removal of overburden in a controlled manner down to the uppermost archaeological horizon, natural subsoil or formation level, whichever is encountered first. The topsoil/overburden will be removed using a mechanical excavator fitted with a toothless bucket under the constant supervision of a suitably qualified archaeologist. A systematic programme of manual archaeological excavation of all revealed features of archaeological potential will then be carried out in accordance with a method statement submitted to the NMS as part of the licence application process. This will include the manual excavation of all identified archaeological features, the compilation of written, drawn and photographic records, the retrieval of archaeological objects and a programme of environmental sampling, as required.	Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			The archaeological excavations where possible shall be undertaken in advance of the main construction works at the relevant areas, in order to allocate adequate time to appropriately excavate and record the archaeological deposits/features, should they be identified. Following the completion of excavations, a post-excavation phase of works, involving analysis, reporting and dissemination to the relevant authorities will be undertaken off site. The level of the post-excavation analysis and reporting will be commensurate with the level of archaeology excavated on site.	
CH23	CHMP Section 1.4.4.4	CH005 and CH008	Consultation meetings/correspondence will be required in advance of pre-works stage and at construction stage both immediately prior to and after reinstallation.	Construction

21.14 Landscape & Visual

Table 21-12 Landscape and Visual Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
LV1	16.5	Merlin Park Boundary	Mitigation and management measures are proposed to avoid, reduce or remediate, wherever practicable significant negative landscape (townscape) and visual effects of the Construction Phase of the Proposed Development. These measures include: The proposed planting has allowed for species similar to those on site and to those removed and is specified to be planted at an advanced heavy-standard size. It is recommended for the proposed trees to be planted along the Merlin Park boundary immediately after the felling of existing trees and in advance of construction works. This provides an immediate replacement between existing and proposed visual amenity and reduces the duration of impact. This should be carried out in any location along the Merlin Park boundary where changes in levels are not required.	Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
LV2	16.5	Throughout (as required)	The newly planted trees should be monitored by the appointed landscape contractor for their successful establishment. A 'no-dig' detail, as advised by the Arborist and Landscape Architect, should be implemented to all existing trees in proximity to new footpaths, to ensure the protection of the existing root system. Standard horticultural operations and other operations mentioned in the planting schedule must be adhered to.	Construction

21.15 Waste and Resources

Table 21-13 Waste and Resources Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
WR1	17.6.1	Throughout (as required)	A Construction and Demolition Resource and Waste Management Plan (CDRWMP) has been prepared and this will be implemented (and updated as necessary) by the appointed contractor in advance of construction commencing.	Construction
WR2	17.6.1	Throughout (as required)	The following measures will be implemented during construction, where practicable by the appointed contractor, to ensure the maximum quantity of material is reused on the Proposed Development and to contribute to achieving the objectives set out in the National Waste Action Plan as follows: ▪ Stockpiling of existing sub-base, capping layer and topsoil material generated on-site for direct reuse in the Proposed Development where practicable in the proposed construction compound (subject to material quality testing to ensure it is suitable for its proposed end use); and ▪ Recycled aggregates and reclaimed bituminous mixtures will be specified in the Proposed Development where practicable. For example, suitable recycled aggregates and appropriate site won material may be specified in the proposed road base / binder layers, sub-base layers under footpaths / cycle tracks, and capping layer material within the road, footpath and cycle track pavement, subject to testing to ensure material is suitable for its proposed use.	Construction
WR3	17.6.1	Throughout (as required)	The following management measures will be implemented in so far as reasonably practicable: ▪ Where waste generation cannot be avoided, waste disposal will be minimised;	Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			▪ Opportunities for reuse of materials, by-products and wastes will be sought throughout the Construction Phase of the Proposed Development; ▪ Possibilities for reuse of clean non-hazardous excavation material as fill on the site or in landscaping works will be considered following appropriate testing to ensure material is suitable for its proposed end use; ▪ Where excavated material cannot be reused within the Proposed Development works, material will be sent for recovery or recycling; ▪ Source segregation: Metal, timber, glass and other recyclable material will be segregated (and waste stream colour coding will be used) during construction works and removed off site to a permitted/licensed facility for recycling; ▪ Material management: 'Just-in-time' delivery, where practicable, will be used to minimise material wastage; General construction waste and by-products will be reused within the Proposed Development, where practicable, or appropriately reused (in accordance with Article 27 of the EC Waste Directive Regulations)2011, as amended, recovered, recycled or disposed of off-site, as arranged by the appointed contractor; and ▪ Any hazardous waste arising will be managed by the appointed contractor in accordance with the applicable legislation.	
WR4	17.6.1	Throughout (as required)	Waste auditing: The quantity and types of waste and materials leaving site during the Construction Phase will be recorded by the appointed contractor. The name, address and authorisation details of all facilities and locations to which waste and materials will be delivered will be recorded along with the quantity to each facility. Records will show which material is recovered, which is recycled, and which is disposed of. Where Article 27 of S.I. No. 126/2011 EPA notifications are required in relation to the Proposed Development, the appointed contractor will complete and submit these Article 27 notifications to the EPA for by-product reuse. Any off-site interim storage or waste management facilities for excavated material will have the appropriate EPA Licence, Waste Facility permit or Certificate of Registration, as appropriate, in place. The relevant appropriate waste authorisation will be in place for all facilities that wastes are delivered to (i.e. EPA Licence, Waste Facility Permit or Certificate of Registration).	Construction

21.16 Material Assets

Table 21-14 Material Assets Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
MA1	18.5.1	Throughout (as required)	Where there are interfaces with existing utility infrastructure, the appointed contractor will ensure that protection is in place or diversions will be carried out to prevent long-term interruption to the provision of the affected services.	Construction
MA2	18.5.1	Throughout (as required)	All possible precautions will be taken by the appointed contractor to avoid unplanned interruptions to any services during the Construction Phase of the Proposed Development. Prior to excavation works being commenced, localised confirmatory surveys will be undertaken by the appointed contractor to verify the results of the pre-construction assessments undertaken and reported in this EIAR. Where works are required in and around known utility infrastructure, precautions will be implemented by the appointed contractor to protect the infrastructure from damage, in accordance with best practice methodologies and the requirements of the utility companies, where practicable. Protection measures during construction will include warning signs and markings indicating the location of utility infrastructure, safe digging techniques in the vicinity of known utilities, and in certain circumstances where possible, isolation of the section of infrastructure during works in the immediate vicinity.	Construction
MA3	18.5.1	Throughout (as required)	All utility companies for which diversions are proposed will continue to be consulted when designing any diversions to ensure that proposed diversions conform to the utility provider's requirements, where practicable, and to ensure that service interruptions are kept to a minimum.	Construction
MA4	18.5.1	Throughout (as required)	Where diversions, or modifications, are required to utility infrastructure (as listed in Section 18.4.4), service interruptions and disturbance to the surrounding residential, commercial and / or community property may be unavoidable. Where this is the case, it will be planned in advance by the appointed contractor. Prior notification will be given to all impacted properties. Any required works will be carefully planned by the appointed contractor to ensure that the duration of interruptions is minimised in so far as is practicable.	Construction
MA5	18.5.1.1	Throughout (as required)	Consideration will be given to the sustainability of material being sourced for the construction of the Proposed Development by the appointed contractor.	Construction

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			In so far as is reasonably practicable, materials required for the construction of the Proposed Development will be sourced locally to reduce the amount of travelling required to get the material to the site. Only quarries which are included in Local Authority quarry registers will be used by the appointed contractor to source any quarried material.	
MA6	18.5.1.1	Throughout (as required)	Construction materials will be managed on site by the appointed contractor in such a way as to prevent over-ordering and waste. Materials will be stored in appropriate storage areas or receptacles to reduce the potential for damage requiring replacement. 'Just-In-Time' ordering principles will be implemented by the appointed contractor where practicable to reduce the potential for over-ordering.	Construction

21.17 Major Accidents and / or Disasters

Table 21-15 Major Accidents and/or Disasters Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
N/A	N/A	N/A	No additional mitigation or monitoring measures are considered necessary beyond those already identified in other environmental assessments and the CEMP (Appendix A5.1 in Volume 4 of this EIAR).	N/A

21.18 Cumulative Impacts and Environmental Interaction

Table 21-16 Cumulative Impacts Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
CI&E1	20.5.1	Throughout (as required)	Other major infrastructure projects could directly interface with the construction of the Proposed Development. Interface liaison will take place on a case-by-case basis through the GCC, as will be set out in the Construction Contract, to ensure that there is coordination between projects, that construction access locations remain unobstructed by the Proposed Development works and that any additional construction traffic mitigation measures required to deal with cumulative impacts are managed appropriately.	Construction and Operation

21.19 References

British Standards Institute (BSI) (2010). BS 3998:2010 Tree Work – Recommendations

British Standards Institute (BSI) (2012). BS 5837:2012 Trees in relation to design, demolition and construction. Recommendations

British Standards Institute (BSI) (2014). BS 5228-1:2009 +A1:2014 Code of Practice for noise and vibration control of construction and open sites - Part 1: Noise

Bat Mitigation Guidelines for Ireland - v2, Marnell et al., 2022

CIRIA (2006). CIRIA C648: Control of Water Pollution from Construction Sites – Guidance for consultants and contractors

CIRIA (2023), C811 Environmental Good Practice on Site Guide

CIRIA (2017), C768 Guidance on the construction of SuDs

Department of Transport, Tourism and Sport (2019). Traffic Signs Manual

European Commission (2018). The EU Construction and Demolition Waste Protocol and Guidelines

Inland Fisheries Ireland (2010), Biosecurity Protocol for Field Survey Work

ISO (2016). ISO 1996-1:2016 Acoustics - Description, measurement and assessment of environmental noise. Part 1: Basic quantities and assessment procedures

ISO (2017). ISO 1996-2:2017 - Description, measurement and assessment of environmental noise - Part 2: Determination of sound pressure levels

National Biodiversity Data Centre (2021), All-Ireland Pollinator Plan 2021-2025

National Roads Authority (2006). Guidelines for the Treatment of Badgers During the Construction of National Road Schemes

National Roads Authority (2008). Guidelines for the Treatment of Otters prior to the Construction of National Road Schemes

Natural England (2007), 'Lowland Grassland Management Handbook (Section Edition)'

Transport Infrastructure Ireland (2020). The Management of Invasive Alien Plant Species on National Roads – Technical Guidance (GE-ENV-01105) Natural England's (2007) 'Lowland Grassland Management Handbook (Section Edition)'

Transport Infrastructure Ireland (2024), CC-SPW-00600 (Sept. 2024) – Earthworks Specification for National Roads

Directives and Legislation

European Communities Noise Emission by Equipment for Use Outdoors (Amendment) Regulations 2006 (S.I. No. 241/2006)

National Monuments (Amendment) Act 2004, as amended (No. 22 of 2004)

Regulation (EC) no 1013/2006 of the European Parliament and of the Council of 14 June 2006 on shipments of waste

Waste Management Act 1996 (S.I No. 10 of 1996) as amended

Waste Management (Collection Permit) Regulations 2007, as amended (S.I. No. 820 of 2007)

Waste Management (Shipments of Waste) Regulations 2007, as amended (S.I. No. 419/2007)