Chapter 27
Summary of Mitigation and Monitoring Measures

CONTENTS

27. SUMMARY OF MITIGATION & MONITORING MEASURES

27.1 Introduction

The Transport (Railway Infrastructure) Act 2001 (as amended) provides for the making of a Railway Order application (also referred to herein as "the proposed Project") by Córas Iompair Éireann (CIÉ) to An Bord Pleanála. The European Union (Railway Orders) (Environmental Impact Assessment) (Amendment) Regulations 2021 (S.I. No. 743 of 2021) gives further effect to the transposition of the EIA Directive (EU Directive 2011/92/EU as amended by Directive 2014/52/EU) on the assessment of the effects of certain public and private projects on the environment by amending the Transport (Railway Infrastructure) Act 2001 ('the 2001 Act').

Annex IV (7) of the amended EIA Directive (2014/52/EU) requires: *A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis). That description should explain the extent, to which significant adverse effects on the environment are avoided, prevented, reduced or offset, and should cover both the Construction and Operational Phases.*

This chapter presents a summary of the mitigation and monitoring measures identified as a result of the environmental assessments carried out in the preceding chapters of this EIAR.

From the inception of the design and environmental assessment process of the proposed DART+ Coastal North project (referred to hereafter as the 'Proposed Development') the project team has strived to avoid, prevent, and reduce adverse effects which are incorporated into the design drawings and specifications of the project that have been assessed as part of this EIAR.

Avoidance of impacts is most applicable at the earliest stages of a project, whilst prevention has taken place during the design and environmental assessments process between the design team and EIA team. Mitigation is a last resort and can include a remedy or offsetting of adverse effects. For example, this can apply when projects cannot avoid significant effects due to their need to locate on a particular site, etc.

Where likely significant environmental effects have been identified during the environmental impact assessment process, measures have been proposed to mitigate these effects as much as reasonably possible, with any residual effects identified in the relevant chapters of this EIAR. The objective of this chapter is to provide a central location where all measures from the preceding chapters are presented together for both ease of reference and inclusion in the contract documents at a later stage of the project.

All the mitigation and monitoring commitments described below are incorporated into the Construction Environmental Management Plan (CEMP) submitted as part of this Railway Order application; refer to Volume 4, Appendix A5.1.

27.2 Mitigation and Monitoring Measures

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 provided in Chapter 6 to Chapter 24 of this EIAR. The following tables in section 27.2.1 to 27.2.21 summarise the Construction and Operational Phase mitigation and monitoring measures outlined in the relevant EIAR technical assessments, plus the Natura Impact Statement, and should be read in conjunction with the mitigation outlined in the specific chapter and also with the Construction Environmental Management Plan (CEMP) in Volume 4, Appendix A5.1 of this EIAR.

27.2.1 Mitigation and Monitoring Measures for Traffic and Transportation

The table below describes the mitigation and monitoring measures identified in Chapter 6 (Traffic and Transportation).

Table 27-1 Mitigation and Monitoring Measures for Traffic and Transportation

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Traffic and Transportation
Mitigation Measures	
Construction Phase Mitigation	
6.6.1.1	**Impact of Construction Trips** **Construction Traffic Management Plan (CTMP)** The design and development of a Construction Traffic Management Plan (CTMP) will be implemented to be included within the Construction & Environmental Management Plan (CEMP), as outlined in Volume 4, Appendix 5.1 of this EIAR, in order to reduce potential impacts throughout the Construction Phase. Mitigation measures include: • Routing of heavy goods vehicles (HGVs) away from sensitive areas such as schools, residential areas, and areas sensitive in terms of air quality. • Use of sufficient clear signage to ensure that construction vehicles use only designated routes, such that HGVs refrain from using New Street within Malahide. • Scheduled arrival of bulk deliveries and large loads to ensure that traffic congestion does not result from vehicles arriving simultaneously. • Provision of holding areas to reduce congestion impacts along local roads. • Scheduling deliveries before AM peak traffic times, or throughout the day between AM and PM peak traffic periods. • Encouraging construction workers to access sites via sustainable modes of transport to reduce the capacity of cars on street and surrounding the compounds, especially in rural construction areas with reduced availability of car parking. • Facilitating on-site recycling of materials to reduce vehicle movements for importing and exporting. • Keeping access routes clear of construction debris that may create trip hazards for workers and pedestrians. • Implementation of wheel washing facilities to prevent deposition of materials and construction related dirt to be deposited on the surrounding road network. • Implementation of appropriate traffic management measures to ensure that compound access does not create major disruption.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Traffic and Transportation
	• Ensure appropriate vehicles for importing and exporting goods are acquired to minimise environmental impacts and vehicular capacity on the surrounding access roads. • A reduction in speed limits in the vicinity of the site may be managed with the use of appropriate signage and will maintain a consistent flow of traffic, especially within the areas of Malahide, Donabate and Drogheda MacBride Stations. • All vehicles should be suitably serviced and maintained to avoid leaks of spillages of oil, petrol, diesel, as well as other carbon emissions and combustible materials. • Provision of safe footways and cycleways where current infrastructure has been impacted by construction works and vehicular access. Physical barriers and segregated pedestrian movements should be retained throughout the construction process. **Mobility Management Plan (MMP)** A MMP will be implemented for the duration of construction and the measures detailed below and will be further developed by the Contractor, in liaison and with the agreement of the relevant local authorities. The Construction Traffic Management Plan (CTMP) (included in the CEMP in Appendix A5.1 of Volume 4 of this EIAR) references the need for a detailed MMP. This MMP will manage trips associated with construction staff. The MMP is set out to achieve the following objectives: • To reduce and discourage the use of the private car as the primary means of travel when accessing the Construction Compounds as far as possible within daytime working hours. • Promote the use of sustainable modes of transport such as walking, cycling and public transport when travelling to and from the Construction Compounds. • To liaise with the Local Authorities, National Transport Authority and Iarnród Éireann to encourage and facilitate staff active travel take up. • To create a unified network of stakeholders to support the constraints outlined within the mitigation measures while accessing the Construction Compounds. • To Coordinate with adjacent construction projects in relation to forming a combined and supported Mobility Management Plan.
6.6.1.2	**Impact of Road Closures** A Traffic Management Plan (TMP) will be established to coordinate traffic diversions whenever road closures are necessary, such as the ones in Harbour Road, which will be closed over-night on several occasions or Dublin Road bridge, where work on abutments will require the reduction to a single lane of traffic. Traffic management will be established based on latest regulations to ensure the safety of all road users (including cyclists), pedestrians and mobility impaired people. A safe route will be established as well where footpaths or off-road cycle tracks are affected.
6.6.1.3	**Impact on Car Parking** The contractors and construction workers' vehicles will be parked within the designated areas associated with each compound. While the use of sustainable modes of transport is encouraged, the Mobility Management Plan (MMP) will establish initiatives to manage parking throughout the construction period. It must be ensured that there is no construction related parking on public roads or in areas designated for use by the public. In order for train stations to maintain parking efficiency for rail users, Iarnród Éireann will continue to monitor the amount of parking, where there will be an increased capacity for public parking at the latter stages of construction. Public car parking spaces will be lost at a number of stations, with this temporary loss of car parking primarily in the areas of the railway to be electrified between Malahide and Drogheda. The greatest loss of commuter car parking will occur at Donabate station followed by Drogheda MacBride Station as a result of the Construction Compounds in these facilities.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Traffic and Transportation
	At the Drogheda MacBride Station it is recommended that the contractor be limited to only occupy a maximum of 110 spaces at any one time during the overall period of works, these to be within one or both of the two compounds. The contractor will make every effort to reduce the footprint of the compound as the construction programme progresses in order to maximise the number of car parking spaces available to the public.
6.6.1.4	**Impact on Rail Network** Replacement bus services will be provided where rail services are impacted during construction. The functionality of the railway lines is planned to be retained during the works, limiting services to one track at a time (as opposed to full closure) where safe to do so.
6.6.1.5	**Impact on Bus Network** Bus routes impacted in Drogheda (D4, D5, 101, 101X) will be impacted as a result of the proposed bridge modification works and subsequent road closures. Where relevant, bus stops will be temporarily relocated to continue the bus service.
Operational Phase Mitigation	
6.6.2	Impacts on vehicular traffic and public transport during abnormal highly trafficked days, with potential blocking back of queues from Kilbarrack (Baldoyle Road) and Sutton Level Crossing, are proposed to be mitigated with yellow box markings, which are already provided at all major junctions along Sutton Road and Baldoyle Road. Pedestrians and cyclists may also be impacted, for example at Cosh Level Crossing near Burrow Beach. Law enforcement officials will ensure efficient operations on highly trafficked days. Commuters living in close proximity to the railway station are encouraged to travel to and from via sustainable transport modes, assisted by good quality infrastructure and an increase in cycle parking facilities and bike lockers.
Monitoring	
	No specific monitoring is required.

27.2.2 Mitigation and Monitoring Measures for Population

The table below describes the mitigation and monitoring measures identified in Chapter 7 (Population).

Table 27-2 Mitigation and Monitoring Measures for Population

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Population
Mitigation Measures	
Construction Phase Mitigation	
7.6	In addition to the design measures included in Chapter 4 (Description of the Proposed Development) and Chapter 5 (Construction Strategy), and to the mitigation proposed in the specialist chapters for Chapter 6 (Traffic and Transportation), Chapter 14 (Noise and Vibration), and Chapter 15 (Landscape and Visual), the following mitigation measures are proposed to be implemented as far as reasonably practicable during the Construction Phase: • Portmarnock Walking and Cycle Way - provide flag man at R123 Moyne Road crossing at times of most construction traffic movement;

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Population
	• Howth Junction and Donaghmede - use access points east of tracks where possible to avoid undue impacts on residential estate in Donaghmede; • Malahide Village - Adherence to the CTMP, including low limits on HGV speed. Construction traffic access will take place between 10am and 4pm and avoid nighttime; • Sea Road, Caves Strand, Yellow Walls Road. Adherence to the CTMP, including low limit on HGV speed. Construction traffic access will take place between 10am and 4pm and avoid nighttime; • Information signage should be provided for the duration of the construction works to provide appropriate information on the nature and duration of works, for cyclists and pedestrians using the Broadmeadow Greenway in the vicinity of works at Malahide; • Skerries North, Ardgillan - avoid use of local road by construction traffic during summer weekends and holiday periods where possible; • Balbriggan Viaduct - avoid simultaneous closure of both viaduct walkways; • Balbriggan - temporarily close playpark during the busier period for construction traffic. • Station works - Howth Junction and Donaghmede and Drogheda Stations - provide clear directional signage and access facilities for passengers during works internal to the station, bearing in mind the needs of more sensitive subsets and people with disabilities; and • Drogheda - St Mary's Primary School, Meadow View - during term time, provide for facilitated crossing of school children if local road is being used as a diversion for Dublin Road during UBK1 bridge works.
Operational Phase Mitigation	
7.6	Operational Phase mitigation measures include: • Provide visible security measures within Howth Junction and Donaghmede Station and on the platform extension, for example good lighting, CCTV and panic buttons.
Monitoring	
	No project specific monitoring is proposed in relation to the Population effects.

27.2.3 Mitigation and Monitoring Measures for Biodiversity

The table below describes the mitigation and monitoring measures identified in Chapter 8 (Biodiversity).

Table 27-3 Mitigation and Monitoring Measures for Biodiversity

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Biodiversity
Mitigation Measures	
Construction Phase Mitigation	
8.9.1	**Roles and Responsibilities (Framework Measures)** A suitably experienced and qualified ecologist (Ecological Clerk of Works (ECoW)) will be employed by the appointed contractor to advise on ecological matters during construction, communicate all findings in a timely manner to the IÉ and statutory authorities, acquire any licences or consents required to conduct the work, and supervise and direct the ecological measures associated with the Proposed Development.
8.9.1.1	**Designated Areas of Nature Conservation**

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Biodiversity
8.9.1.1.1	**European Sites** The mitigation measures that are required to ensure that the Proposed Development will not adversely affect the integrity of the European sites within the ZoI are presented in the NIS. The following mitigation measures were developed to address potential impacts that were identified: • Measures to protect surface water quality during construction; • Measures to prevent the spread of non-native invasive species to downstream European sites; • Measures to prevent disturbance and displacement of QI/SCI species from European sites; and • Measures to prevent habitat degradation as a result of changes to air quality.
8.9.1.1.2	**National Sites** The mitigation measures in relation to potential impacts arising from the Proposed Development on pNHAs within the ZoI are as per those for European sites as the boundaries coincide with the SACs and SPAs.
8.9.1.2	**Habitats**
8.9.1.2.1	**Habitats Degradation – Surface Water Quality** A Surface Water Management Plan (SWMP) is included as part of the Construction Environmental Management Plan (CEMP), this includes measures relating to: • A requirement for a Pollution Incident Response Plan; • Construction Compound management including the storage of any fuels and materials; • Control of Sediments; • Use of concrete; and • Management of vehicles and plant including refuelling and wheel wash facilities, etc. As well as these generic mitigation measures, other specific mitigation and/or monitoring measures may be required, which will include, but will not be limited to: • Works in Flood Zones A and B are avoided where possible. In these areas, the Contractor will be required to provide a method statement for the removal of materials and personnel to minimise sediment discharge into the river and risk to personnel during flood events; • Construction works in areas prone to flooding are to take place during dry seasons. The Contractor must follow the weather forecast prior to commencing instream works and concrete pouring. It is noted that track levels for the entirety of the development are well above flood levels. • Works areas to be kept dry at all times through the use of bunds of non-erodible material adjacent to watercourses to avoid contaminated water entering the watercourse. • Settlement tanks, silt traps/bags and bunds will be used where required to remove silt from surface water runoff. Sizing of the tanks will be based on best available guidelines, CIRIA (2006). Any construction work within a 10m buffer zone must be provided with these measures to minimise sediment discharge to a watercourse; • Refuelling of all plant, machinery, and vehicles will be undertaken only in designated areas where leaks and spills are can be contained relatively easily. Spill kits will be made available on all temporary and permanent construction sites. Refuelling areas must be kept at least 50m away from any watercourse, including, but not limited to; estuarine, transitional, and coastal waterbodies; • Construction materials to be managed in such a way as to effectively minimise the risk posed to the aquatic environment; • Construction Compounds and haul roads will avoid high flood risk zones as much as possible and maintain a minimum buffer of 50m from surface watercourses, and

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Biodiversity
	• Excavated material to be placed in such a way as to avoid any disturbance of areas near to the banks of watercourses and any spillage into the watercourses.
8.9.1.2.2	**Habitat Degradation – Groundwater** The following mitigation measures will be implemented with regard to pollution of soil and groundwater: • Good construction management practices as outlined in the CIRIA guidance Control of Water Pollution from Construction Sites – Guidance for consultants and contractors (Masters-Williams et al., 2001) will be employed by the appointed contractor to minimise the risk of transmission of hazardous materials as well as pollution of adjacent watercourses and groundwater. The construction management of the site will take account of these recommendations to minimise as far as possible the risk of soil, groundwater and surface water contamination; • Employing only competent and experienced workforce, and site-specific training of site managers, foremen and workforce, including all subcontractors, in pollution risks and preventative measures; • 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 will be considered in the design of the Construction Compounds. These are to be designed in accordance with relevant guidelines and codes of best practice at the time of construction and will be fully bunded; • Good housekeeping on site (daily site clean-ups, use of disposal bins, etc.) will be applied during the entire Construction Phase; • All concrete mixing and batching activities will be located in areas away from watercourses and drains; • Potential pollutants will be adequately secured against vandalism in containers in a dedicated secured area; • Provision of proper containment of potential pollutants according to codes of best practice; • Thorough control will be implemented during the entire Construction Phase to ensure that any spillage is identified at early stage and subsequently effectively contained and managed; and • Spill kits will be provided and will be kept close to the storage area and staff will be trained on how to use spill kits correctly.
8.9.1.2.3	**Habitat Degradation – Air Quality** Standard measures to control nuisance dust such as inspection and cleaning of public roads, measures for stockpiling of materials within the Construction Compound, water misting / spraying, vehicle coverings, and hoarding (2.4m in height) around the Construction Compounds and noise sensitive receptors.
8.9.1.2.4	**Habitat Degradation – Non-native Invasive Plant Species** A confirmatory pre-construction non-native invasive species survey will be undertaken by a suitably qualified specialist to confirm the absence and/or extent of all Third Schedule non-native invasive species within the footprint of the Proposed Development. The following mitigation measures will be implemented, as required: • Where a pre-construction non-native invasive species re-survey has confirmed the presence of previously identified Third Schedule non-native invasive species, or identified newly established non-native invasive species within the footprint of the Proposed

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Biodiversity
	Development, the ISMP produced will provide a detailed description of the infestations (e.g., approximate area of the respective colonies (m2), where feasible; approximate total number of stems, pattern of growth and information on other vegetation present), and where necessary, will include calculations of volumes of infested soils to be excavated; • The ISMP will be updated following the pre-construction survey as advised by a suitably qualified specialist, with regard to the guidance, on The Management of Invasive Alien Plant Species on National Roads (Technical Guidance) (TII 2020a; 2020b) and other species-specific guidance documents including those listed in the ISMP, as necessary; and • IÉ will ensure that all control measures specified in the ISMP will be implemented by a suitably qualified and licensed specialist prior to the construction of the Proposed Development to control the spread of non-native invasive species within the footprint of the Proposed Development. Furthermore, the appointed contractor will adhere to control measures specified within the ISMP throughout the Construction Phase of the Proposed Development.
8.9.1.3	**Mammals**
8.9.1.3.1	**Bats** **Protection of Bats during Vegetation Clearence** The following mitigation measures will be implemented by the appointed contractor: • Retained trees will be fenced off at the outset of works (i.e., at compounds and substations), and for the duration of construction to avoid structural damage to the trunk, branches, or root system of the tree which could disturb roosting bats. Temporary fencing will be erected at a sufficient distance from the tree so as to enclose the Root Protection Area (RPA) of the tree. The RPA will be defined based upon the recommendation of a qualified arborist; • Where fencing is not feasible due to insufficient space, protection for the tree will be afforded by wrapping hessian sacking (or suitable equivalent) around the trunk and strapping stout buffer timbers around it; • The area within the RPA will not be used for vehicle parking or the storage of materials (including soils, oils, and chemicals). The storage of hazardous materials (e.g., hydrocarbons) or concrete washout areas will not be undertaken within 10m of any retained trees, hedgerows, and tree lines; • A qualified arborist engaged by the appointed contractor will assess the condition of, and advise on any repair works necessary to, any trees which are to be retained or that lie outside of the Proposed Development footprint but whose RPA is impacted by the works; and • All trees and vegetation to be retained within and adjoining the works area will be protected in accordance with the British Standard Institution (BSI) British Standard (BS) 5837:2012 ‘Trees in relation to in relation to design, demolition, and construction - Recommendations’ (BSI 2012). • Works required within the root protection area (RPA) of trees to be retained will follow a project-specific arboricultural methodology for such works, which will be prepared by a professional qualified arborist. • In addition to the above the following bat specific mitigation measures (in relation to vegetation clearance) will be implemented by the appointed contractor:

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Biodiversity
	• Where the qualified arborist engaged by the appointed contractor is required to assess the condition of, and advise on any repair works necessary to, any trees which are to be retained, these will be notified to the appointed ecologist to be surveyed to confirm if these trees have potential roost features (PRFs) or have developed PRF(s) during the interim between the surveys and grant of planning. Where trees with PRF(s) require works including removal for example due to poor condition, they will be subject to mitigation as described below, under the PRF Re-Appraisal; and • There will be no additional lighting within 5m of any tree with PRFs during the Construction Phase of the Proposed Development to avoid potential disturbance to roosting bats, as far as reasonably p ractical, but will not involve direct lighting on any roost features. **Roost Loss** Where reasonably practicable the removal of trees, and modifications of bridges (i.e., parapet modifications, or any other structural works), with PRFs, will occur only between April – May, and September – October to avoid the most sensitive time periods for bats (i.e., during breeding season and hibernation). However, to ensure the protection of bats and if the project timeframe does not allow for this, the following mitigation will be undertaken. *PRF Re-Appraisal (First Step of Pre-Construction Survey)* A pre-construction survey of all trees being removed, and of all bridges with bat roosting potential, to rechecked for PRFs will be undertaken by an experienced bat specialist/ecologist engaged by the IÉ as part of the pre-construction surveys. The survey will: • Confirm trees due for removal with PRFs; • Confirm PRFs identified in bridges are still suitable for roosting bats and have not become unsuitable in the meantime (i.e., become inundated with water or filled etc.). *Pre-Construction Survey for trees* In the event that additional PRFs are detected during the pre-construction survey, it is recommended that: • In advance of any clearance, all trees deemed to contain PRFs which are subject to felling / clearance will be checked for the presence of bats by a suitably qualified / licensed bat specialist (using an endoscope); • In the event that bats are found on the Proposed Development site during construction works such as vegetation clearance, works will immediately cease in that area and the local NPWS Conservation Ranger will be contacted; • An application will then be made to the NPWS for a derogation licence seeking to permit actions affecting bats or their roosts that would normally be prohibited by law; • After licence approval from the NPWS (which may include the necessity for additional mitigation measures to those recommended here) bats may be removed by a bat specialist licensed to handle bats and released in the area in the evening following capture; and • Only then will PRF trees be felled, and this should be undertaken 'in sections' where the section can be handled to avoid sudden movements or jarring of the sections. *Pre-Construction Survey for Bridges* Bridges where proposed works are being undertaken, i.e., demolition at bridge OBB80/80A/80B, parapet modifications, and track lowering beneath bridges, and that have been deemed to have the potential for roosting bats (as described above) by virtue of having potential bat roosting features, will require a pre-construction survey. The following mitigation measures will be followed for the aforementioned bridges with bat roosting potential: • The night prior to the start of works, a bat activity survey will be undertaken to ensure no roosting bats are present. A suitably qualified and experienced ecologist must carry out

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Biodiversity
	one bat emergence and one bat re-entry survey during the active bat season (generally taken as mid-April to mid-September inclusive). • Where a bat roost is encountered, all relevant works will cease and an application for a derogation licence shall be submitted by the suitably qualified/licenced bat specialist to the NPWS to seek permission for the removal of the roost. **Habitat Loss and Fragmentation** Where practicable, habitats of importance to bats such as scattered trees and parkland, tree line and hedgerow habitat types, which lie within the footprint, or along the boundary of the Proposed Development, that are not directly impacted by the Proposed Development will be retained. These areas will be protected for the duration of construction works and fenced off at an appropriate distance. **Disturbance of Flight Patterns / Foraging Routes as a result of Lighting Impacts** The appointed contractor in liaison with the suitably qualified licensed ecologist(s) will ensure that lighting at the Construction Compounds, and active work areas in proximity to known bat activity, will be designed, and installed to minimise light spill and be cognisant of light-spill onto these areas. Mitigation measures to reduce light spill will include the following: • The use of sensor / timer triggered lighting; • LED luminaires to be used where practicable due to their sharp cut-off, lower intensity, good colour rendition and dimming capability; • Column heights to be considered to minimise light spill; and • Accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only where needed. Where night-time works are required, the appointed contractor will liaise with the engaged suitably experienced and qualified ecologist(s) and implement measures to mitigate the impact of such works.
8.9.1.3.2	**Badger** **Disturbance/Displacement** Pre-confirmatory pre-construction check will be required of all suitable badger habitat, completed within 12 months prior to any construction works commencing. **Protection of Badgers from Accidental Harm during Construction (Excavations)** To protect badgers from indirect harm during construction, where practicable, open excavations will be covered when not in use and backfilled as soon as practicable by the appointed contractor. Excavations will also be covered at night, or fenced off where practicable, and any deep excavations which must be left open will have appropriate egress ramps in place to allow badgers to safely exit should they fall in.
8.9.1.3.3	**Otter** Otters are known to occur in the vicinity of the Proposed evelopment, likely across some watercourses in the vicinity of the Proposed Development. Given the ecological sensitivity of these watercourses in particular, the appointed contractor will engage a suitably qualified and/or licensed ecologist to oversee and advise works at watercourse crossings during construction to communicate all findings in a timely manner to IÉ and statutory authorities, to acquire any licences or consents required to conduct the work, and to supervise and direct the ecological measures associated with the Proposed Development. Where a newly established otter holt is encountered, within 150 meters (up and downstream) of a watercourse crossing, the qualified ecologist(s) will consult with the NPWS in conjunction with IÉ and the appointed contractor. The qualified ecologist will review method statements; oversee works; provide instruction to the appointed contractor(s), deliver toolbox talks and temporarily halt works, if, and as, necessary, having conferred with IÉ.

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	Loss of Breeding/Resting Sites IÉ will ensure that a confirmatory pre-construction check of all suitable otter habitat will be completed by a suitably qualified ecologist within 12-month period prior to any construction works commencing. Where any new active holts/couches are recorded within 150m of the Proposed Development the appointed ecologist will ensure that adequate mitigation is provided in accordance with Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (TII, 2006), and a derogation licence is sought from the NPWS where necessary. *Precautionary Mitigation measures for new active holts/couches recorded within 150m of the Proposed Development* Until such time as otters have been successfully evacuated from active holts, the following provisions will apply to all construction works: No works will be undertaken within 150m of any holts at which breeding females or cubs are present. Until consultation with NPWS, works closer to such breeding holts may take place - provided appropriate mitigation measures detailed below are in place; No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding, otter holts. Light work, such as digging by hand or scrub clearance should also not take place within 15m of such holts, except under licence; and The prohibited working area associated with otter holts will where appropriate, be fenced with temporary fencing prior to any possibly invasive works. Fencing will be in accordance with Clause 303 of the TII's Specification for Roadworks (TII 2011). Appropriate awareness of the purpose of the enclosure will be conveyed through notification to site staff and sufficient signage should be placed on each exclusion fence. All contractors or operators on site will be made fully aware of the procedures pertaining to each affected holt. **Habitat Degradation/Reduced Prey Availability – Water Quality** A SWMP has been prepared (provided in Appendix A5.1 – CEMP in Volume 4 of this EIAR), 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. Specific mitigation measures which the appointed contractor will implement in relation to surface water quality are described in Chapter 10 (Water). **Disturbance/Displacement** Security lighting in active works areas in close proximity to watercourses with known otter activity will be designed in conjunction with a suitably qualified ecologist to minimise light spill. Similarly, where any new or amended lighting design is required at a watercourse crossing, it should be cognisant of downward light-spill onto watercourses. Measures to reduce light spill may include the following: The use of sensor/timer triggered lighting; LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability; Column heights should be considered to minimise light spill; and Accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only where needed. To prevent otter mortality/injury during operation, an otter tunnel will be constructed in Malahide Estuary, where the River Pill/Turvey flows under the railway line. During construction, there is potential for disturbance/displacement of otters from this location and in the surrounding area. To prevent disturbance and/or displacement of otters, the above mitigation (i.e., pre-construction checks along the watercourse for any active holts/resting place, and subsequent mitigation should they be identified), will apply in this case.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Biodiversity
	Direct Injury/Mortality To prevent otter mortality/injury during operation, an otter tunnel will be constructed in Malahide Estuary, where the River Pill/Turvey flows under the railway line. During construction, there is potential for disturbance/displacement of otters from this location and in the surrounding area. To prevent disturbance and/or displacement of otters, the above mitigation (i.e. pre-construction checks along the watercourse for any active holts/resting place, and subsequent mitigation should they be identified), will apply in this case. Full details of the construction of this pipe are include in Section 5.5.7 of Chapter 5 of the EIAR, Construction Strategy. The proposed otter crossing in Malahide where the River Pill/Turvey flows under the railway, will comprise a 600mm diameter pipe (as per TII guidance 2006c) which will pass beneath the railway close to Underbridge UBB31. The pipe will have a crossfall over its length and the pipe has been set at a level to avoid flooding from high tides. At either end of the pipe, an otter-proof fence will extend for at least 100m in each direction, to encourage the otters to make use of the crossing. The fence is partially buried to prevent the otters from burrowing beneath.
8.9.1.3.4	**Marine Mammals** **Habitat and Food Source Degradation – Water Quality** A SWMP has been prepared (provided in Appendix A5.1 – CEMP in Volume 4 of this EIAR), 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. Specific mitigation measures which the appointed contractor will implement in relation to surface water quality are described in Chapter 10 (Water).
8.9.1.3.5	**Other Mammals** The Construction Phase of the Proposed Development is not deemed to affect the local populations of other small, protected mammal species and will not result in a significant negative effect, at any geographic scale. No additional mitigation is proposed other than the following: • A SWMP has been prepared (provided in Appendix A5.1 – CEMP in Volume 4 of this EIAR), 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. Specific mitigation measures which the appointed contractor will implement in relation to Surface Water quality are described in Chapter 10 (Water). • Where possible, habitats of importance providing refuge / shelter to other protected mammals such as scattered trees and parkland, scrub, tree line and hedgerow habitat types, which lie within the footprint, or along the boundary of the Proposed Development, that are not directly impacted will be retained. These areas will be protected for the duration of construction works and fenced off at an appropriate distance. Similar to the mitigation for breeding birds, tree removal, particularly where understorey vegetation is abundant will be undertaken outside of the bird nesting season, but as late in the wintering season (e.g., February) so as to give small resting mammals such as hedgehog that might be hibernating a chance at moving.
8.9.1.3.6	**Birds** **Breeding Birds** *Habitat Loss and Fragmentation* Where possible, habitats of importance to breeding birds such as scattered trees and parkland, treeline and hedgerow habitat types, which lie within the footprint, or along the boundary of the Proposed Development, that are not directly impacted will be retained. These areas will be protected for the duration of construction works and fenced off at an appropriate distance. Planting of treeline, hedgerow and grassland habitats within the Proposed Development footprint will be carried out by the appointed contractor, as detailed in the landscape drawings.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Biodiversity
	Mortality Risk Where reasonably practicable, vegetation (e.g., hedgerows, trees, scrub, bankside vegetation and grassland) will not be removed, between the 01 March and the 31 August, to avoid potential direct impacts on nesting birds. Where the construction programme does not allow this seasonal restriction to be observed, then these areas will be inspected by a suitably qualified ecologist as engaged by the appointed contractor, for the presence of breeding birds prior to clearance. Areas found not to contain nests will be cleared within three days of the nest survey, otherwise repeat surveys will be required. Vegetation clearance will not commence where nests are present, works will resume when birds have fledged, and nests are no longer in use. *Disturbance/Displacement* Vegetation clearance undertaken in the appropriate time (i.e. outside of the breeding bird season) should ensure that breeding birds have adequate time in which to identify alternative vegetation in which to establish nests. To minimise disturbance and/or displacement to breeding birds from noise and vibration activities the relevant mitigation measures as described in Chapter 14 (Noise & Vibration) will be implemented by the appointed contractor. **Wintering Birds** *Measures to Prevent Disturbance and Displacement Impacts to non-SCI Birds Due to Vegetation Loss During Construction* Where practicable, the removal of screening or overhanging vegetation (e.g., hedgerows, trees, scrub, bankside vegetation and grassland) will be undertaken outside of the breeding bird season (01 March to the 31 August) and before the arrival of the wintering birds at the start of October. This is particularly relevant for areas of highly suitable habitat for wintering birds, i.e., the estuaries along the Proposed Development (Malahide Estuary, Rogerstown Estuary, Nanny Estuary). However, where the construction programme does not allow these seasonal restrictions to be observed, then these areas will be inspected by a suitably qualified ecologist as engaged by the appointed contractor, for the presence of wintering birds prior to clearance. Where wintering birds are observed the suitably qualified ecologist will, in discussion with the appointed the contractor, advise how works will be appropriately undertaken. Where a site Construction Compound is required, its location relative to the Proposed Development is likely to be adjacent to the potential foraging areas. The appointed contractor will undertake the establishment of the following Construction Compounds outside of the wintering bird season (October to March): • CC-16100 Malahide (Caves Strand) • CC-15900W Malahide (Bissets Strand) • CC-52050, CC-51800, CC-51900 Drogheda Substation/Compounds • CC-44900 Laytown Construction Compound • CC-32200 Skerries Substation/Compound • CC 40200 Gormanston Construction Compound In addition, the Construction Compound in Malahide (CC-16100 Caves Strand), and the utilities compound in Laytown (CC- 44390E) will only be in use outside of the wintering bird season (October to March, inclusive) to ensure there are no disturbance related impacts to wintering birds foraging and roosting in the surrounding habitats. As a further precautionary measures, the design of the lighting will ensure that light-spill will not occur in the direction of any adjacent fields. Mitigation measures to reduce light spill will include the following: • The use of sensor/timer triggered lighting; • LED luminaires to be used where practicable;

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Biodiversity
	• Column heights to be considered to minimise light spill; and • Accessories such as baffles, hoods or louvres to be used to reduce light spill and direct it only where needed.
8.9.1.3.7	**Reptiles** No reptile species were recorded during the multi-disciplinary surveys carried out along the Proposed Development. The Construction Phase of the Proposed Development is not deemed to affect the local reptile population and will not result in a significant negative effect, at any geographic scale. However, mitigation is provided to avoid harm/injury to reptiles that may be using the railway line and verges. **Temporary Fencing** Temporary fencing (such as bitumen felt, tin, carpet tiles, or bitumen onduline) can be used to deter reptiles from moving into areas where development could cause damage to them. The fencing should be structured to ensure that reptiles cannot pass under, over, or through the fence, by ensuring the fencing is buried deep into the ground, and is high enough so reptiles cannot jump over. Temporary fencing is only required in areas where extensive works are taking place (i.e. where OHLE supports are being installed within railway ballast). **Capture Methods** Prior to reptile mitigation methods, such as translocation, reptiles may need to be captured if they do not leave the area on their own accord. The best time to capture reptiles is between March and September and they should not be captured during autumn, in extreme weather conditions, or when they are hibernating. Capturing heavily gravid reptiles will also be avoided. Reptiles will be moved to an area of suitable reptile habitat not at risk from the works outside of the reptile fencing. Capture methods can involve the following: • Use of artificial refuges, such as roofing felt; • Reduction of the amount of suitable habitat. This will help to concentrate the reptiles into specific areas to make it easier to capture them; and • Using dismantled rubble, rock, or wood piles as refuges to capture the reptiles. **Translocation** Translocation should be undertaken as a last resort and involves moving the reptiles to an alternative location. The new receptor site should be suitable for reptiles and should be as close as possible to the original development site. The receptor site should also be at least the same size as the original habitat, and better quality, where possible. If the receptor site has an existing species of reptiles, a small number of reptiles may be introduced to the existing population as long as the habitat has been improved to be able to support the additional reptiles.
8.9.1.3.8	**Amphibians** *Habitat Degradation – Surface Water Quality* A SWMP has been prepared (provided in Appendix A5.1 – CEMP in Volume 4 of this EIAR), 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. Specific mitigation measures which the appointed contractor will implement in relation to surface water quality are described in Chapter 10 (Water).
8.9.1.3.9	**Fish** *Habitat Degradation – Surface Water Quality* A SWMP has been prepared (provided in Appendix A5.1 – CEMP in Volume 4 of this EIAR), 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

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Biodiversity
	the Proposed Development. Specific mitigation measures which the appointed contractor will implement in relation to surface water quality are described in Chapter 10 (Water).
Operational Phase Mitigation	
8.9.2.1	**Designated Areas for Nature Conservation**
8.9.2.1.1	**European Sites** • Measures to protect surface water quality during operation; • Measures to prevent the spread of non-native invasive species to downstream European sites; and • Measures to prevent direct injury/mortality.
8.9.2.1.2	**National Sites** The mitigation measures outlined in Section 8.9.1.1.1, and as detailed in the NIS (which accompanies the application for a Railway Order), will prevent the Proposed Development resulting in a significant negative effect on these pNHAs and NHAs.
8.9.2.2	**Habitats**
8.9.2.2.1	*Habitat Degradation – Surface Water Quality* Measures to control the risk of flooding and contamination to local waterbodies and the hydrological environment have been included within the design of the Proposed Development. Maintenance of the railway and substations will be on-going to ensure the risks are minimised during the Operational Phase.
8.9.2.2.2	*Habitat Degradation – Groundwater* In the Operational Phase the infrastructure will be maintained by IÉ and will be subject to their management procedures to ensure that the correct measures are taken in the event of any accidental spillages, and this will reduce the potential for any impact.
8.9.2.2.3	*Habitat Loss* Whilst the habitat loss of the Proposed Development was not deemed to be significant at any geographic scale during the Construction or Operational Phase, an area of habitat adjacent to the Proposed Development (to the east of the existing user worked level crossing (XB001) in Malahide Estuary which is being closed – i.e. no future access to third parties). This area will be left as a wildlife refuge during construction and operation and will no longer be used for agricultural use. As some management is required so the area does not become overcome with rank and fast-growing grasses, less intensive maintenance will be required on a yearly basis, such as: • Staggering cutting regime to allow small mammals to move freely through the site; • Once a year mowing of grassland to reduce the dominance of rank, perennial grass species which will encourage more plant diversity to develop, and allow flowering and seed heads to be retained for pollinators; • Some areas left in winter in order to provide cover and food sources for local birds; • No use of pesticides and herbicides. More details on the management of this area can be found in Appendix A8.9 in Volume 4 of this EIAR.
8.9.2.3	**Mammals**

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Biodiversity
8.9.2.3.3	**Otter** *Habitat Degradation – Surface Water Quality* For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on otter, refer to Section 8.9.2.1.1. *Direct Injury/Mortality* The proposed otter crossing in Malahide where the River Pill/Turvey flows under the railway, will comprise a 600mm diameter pipe which will pass beneath the railway close to Underbridge UBB31. The pipe will have a crossfall over its length and the pipe has been set at a level to avoid flooding from high tides. At either end of the pipe, an otter proof fence will extend for 100m in each direction, to encourage the otters to make use of the crossing. The fence is partially buried to prevent the otters from burrowing beneath.
8.9.2.3.4	**Marine Mammals** *Habitat Degradation – Surface Water Quality* For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on marine mammals, refer to Section 8.9.2.1.1.
8.9.2.3.6	**Birds** **Breeding Birds** *Habitat Degradation – Surface Water Quality* For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on breeding birds, please refer to Section 8.9.2.1.1. **Wintering Birds** *Habitat Degradation – Surface Water Quality* For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on wintering bird species, please refer to Section 8.9.2.1.1. *Direct Injury/Mortality* For mitigation to avoid the effects of direct injury/mortality to wintering bird species, please refer to Section 8.9.2.1.1. **Amphibians** *Habitat Degradation- Surface Water Quality* For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on amphibians, please refer to Section 8.9.2.1.1. **Fish** *Habitat Degradation – Surface Water Quality* For mitigation to avoid the effects of habitat degradation as a result of impacts on surface water quality on fish, please refer to Section 8.9.2.1.1.
Monitoring	
	Ongoing long term maintenance of and management of an area of habitat north of Malahide/ south of Donabate is required as per Appendix A8.9 in Volume 4 of this EIAR.

27.2.4 Mitigation and Monitoring Measures for Land and Soils

The table below describes the mitigation and monitoring measures identified in Chapter 9 (Land and Soils).

Table 27-4 Mitigation and Monitoring Measures for Land and Soils

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Land and Soils
Mitigation Measures	
Construction Phase Mitigation	
9.8.1	A Construction & Environmental Management Plan (CEMP) as outlined in Volume 4, Appendix A5.1 of this EIAR, will be updated by the successful Main Contractor. The CEMP will set out the Contractor's overall management and administration of the construction project. It will be prepared by the Contractor during the pre-Construction Phase to ensure commitments included in the statutory approvals are adhered to and that it integrates the requirements of the CEMP including management of Construction & Demolition Waste. The mitigation measures will be implemented by the appointed Main Contractor(s). These include the best practice measures and the site-specific mitigation measures outlined below.
9.8.1.1	**Loss or Damage of Topsoil** During the Construction Phase, mitigation measures will include: • Excavated topsoil's will be stockpiled using appropriate methods to minimise effects of weathering; • Minimization of dust generation, groundwater infiltration and generation of runoff; • Topsoil and subsoil to be assessed for re-use ensuring appropriate handling, processing, and segregation of material; and • All excavated material and imported material to be classified using the same methodology allowing opportunity for reuse of materials on site.
9.8.1.2	**Effect on the surrounding ground** All earthworks and piling works will be undertaken in accordance with project-specific engineering specifications ensuring that all works are completed to the design requirements, including: • Particular piling specification: this document will set out particulars of all piling works associated with the construction of the proposed works. In particular minimum criteria for piling, acceptable materials and testing will be specified. • Particular earthworks specification: this document will set out the requirements during the Construction Phase in relation to any excavation or filling activities for the project. In particular minimum criteria for earthwork formations, acceptable materials and material disposal will be specified. • Particular instrumentation and monitoring specification; where excavation or piling works may affect the alignment of the operational railway tracks or the condition of the surrounding structures/assets, instrumentation will be installed, and monitoring completed during the works to confirm the ground response such that appropriate actions can be carried out during the construction stage to maintain movements within the acceptable design limits.
9.8.1.3	**Excavation of Potentially Contaminated Ground** Once construction works start, excavations will be kept to a minimum, using shoring or trench boxes where appropriate. Excavation of contaminated ground will be minimised with excavation support measures in accordance with all relevant guidelines. The appointed contractor will be responsible for regular testing of excavated soils to monitor the suitability of the soil for reuse. Suspected contaminated ground will be tested for contamination during ground investigation and ground excavated in the area disposed of to a suitably licensed or permitted site in accordance with Irish Waste Management legislation.

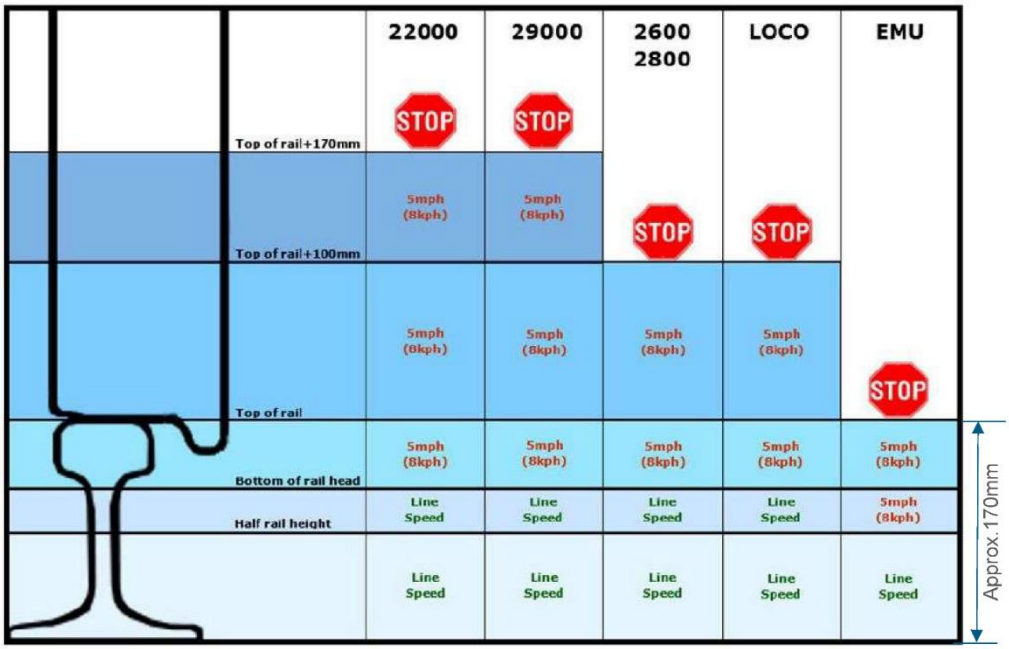
EIAR Section Reference	Description of Mitigation and Monitoring Measures for Land and Soils
	The appointed contractor shall issue copies of all waste disposal receipts/records to the Employers Representative/IÉ for the duration of works.
9.8.1.4	**Pollution of Soil** Mitigation measures will be implemented to minimise potential soil and water pollution by the implementation of good construction practises such as: • Good housekeeping (daily site clean-ups, use of disposal bins, etc.); • All activities involving the use of potential pollutants or hazardous materials such as concrete, fuels, lubricants, and hydraulic fluids will be carefully handled and stored to avoid spillages; • Adequate bunding for oil containers, wheel washers and dust suppression on site roads; and • Regular plant maintenance. An Emergency Response Plan will be drawn prior to commencement of works, identifying the actions to be taken in the event of a pollution incident. Further detail can be found in the CEMP in Appendix A5.1 in Volume 4 of this EIAR. The Emergency Response Plan will include: • Secure oil and chemical storage in over-ground bunded areas, limited to the minimum volume required to serve immediate needs with specified delivery and refuelling areas; • No refuelling or fuel storage within 50m of waterways and only on a sealed surface; • Emergency spill kits will be retained at sensitive locations, with portable kits provided to plant and equipment operators; • Cessation of work and development of measures to contain and/or remove pollutant should an incident be identified; • Silt traps will be employed and maintained in appropriate locations; • Temporary interception bunds and drainage ditches will be constructed up slope of excavations to minimise surface runoff ingress and in advance of excavation activities; and • Excavation and earthworks will be suspended during and immediately following periods of heavy rainfall to minimise sediment generation and soil damage.
Operational Phase Mitigation	
9.8.2	No additional mitigation measures for land and soils are considered necessary for the operation of the Proposed Development. In the Operational Phase the infrastructure will be maintained by Iarnród Éireann and will be subject to their management procedures to ensure that the correct measures are taken in the event of any accidental spillages. This will reduce the potential for any impact.
Decommissioning Phase Mitigation	
9.8.3	The mitigation measures outlined for the Construction Phase, will be applied as appropriate, during any future decommissioning (as appropriate).
Monitoring	
9.8.1.2	Monitoring measures include the use of a qualified person to ensure that any hotspots of possible encountered contamination, regarding excavations made in ground, are properly identified, segregated, and disposed of appropriately. Care will be taken ensuring that no cross-contamination occurs on clean soils throughout the site.

27.2.5 Mitigation and Monitoring Measures for Water (including Hydrology & Flood Risk)

The table below describes the mitigation and monitoring measures for Chapter 10 (Water (including Hydrology and Flood Risk)).

Table 27-5 Mitigation and Monitoring Measures for Water (including Hydrology and Flood Risk)

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Water (including Hydrology and Flood Risk)
Mitigation Measures	
Construction Phase Mitigation	
10.9.1.1	**Generic Mitigation Measures** A Surface Water Management Plan (SWMP) will be included as part of the Construction Environmental Management Plan (CEMP), refer to Appendix A5.1 in Volume 4 of this EIAR. Mitigation measures include: • A requirement for a Pollution Incident Response Plan; • Construction Compound management including the storage of any fuels and materials; • Control of sediments; • Use of concrete; • Management of vehicles and plant including refuelling and wheel wash facilities, etc. Other specific mitigation measures may be required, such as: • Works in Flood Zones A and B are avoided where possible. In these areas, the Contractor will be required to provide appropriate mitigation measures within a method statement for the removal of materials to minimise sediment discharge into the nearest watercourse; • Construction works in areas prone to flooding are to take place during dry seasons. The Contractor must follow the weather forecast prior to commencing instream works and concrete pouring. It is noted that track levels for the entirety of the development are well above flood levels. • Works areas will be kept dry as far as reasonably practicable; • Bunds of non-erodible material will be used adjacent to watercourses to avoid contaminated water entering the watercourse as far as reasonably practicable; • Settlement tanks, silt traps/bags and bunds will be used where required to remove silt from surface water runoff. Sizing of the tanks will be based on best available guidelines, CIRIA (2006). Any construction work within a 10m buffer zone must be provided with these measures to minimise sediment discharge to a watercourse; • Weather conditions to be checked by the Contractor and coordinated with any planning construction activities in order to minimise surface water runoff from the site. • Refuelling of all plant, machinery, and vehicles will be undertaken only in designated areas where leaks and spills are can be contained relatively easily. Spill kits will be made available on all temporary and permanent construction sites. Refuelling areas must be kept at least 50m away from any watercourse; • Construction materials to be managed in such a way as to effectively minimise the risk posed to the aquatic environment; • Construction Compounds and haul roads will avoid high flood risk zones as much as possible and maintain a minimum buffer of 50m from surface watercourses, and • Excavated material to be placed in such a way as to avoid any disturbance of areas near to the banks of watercourses and any spillage into the watercourses.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Water (including Hydrology and Flood Risk)
Operational Phase Mitigation	
10.9.2	Maintenance of the railway and substations will be on-going to ensure the risks are minimised during the Operational Phase. Maintenance activities will be in accordance with Iarnród Éireann best practice procedures to ensure that no additional risks to waterbodies are encountered. Iarnród Éireann flood risk management operational procedures will be implemented, these include: • CCE-TMS-311 - Irish Rail Weather Management Procedures (2017); • CCE-TEB-2014-05 - Guidance On Alerts And Service Restrictions During Adverse Weather Events; and • CME-TMS-001-008 - Operation Of IE RU Rolling Stock On Flooded Track (2016). These procedures specify how Iarnród Éireann: • Monitors and disseminates applicable weather warnings from Met Éireann; • Prepares and implements local weather management plans for predicted adverse weather events; • Sets out recommended flood level limits for their rolling stock passing over flooded tracks; and • Sets out actions to be undertaken by duty managers, drivers, signallers etc when high water alerts are issued. Operational limits on flooded tracks have been specified for the different rolling stock (i.e., types of trains) within their fleet, as shown in Image 27-1. The limits have been set to avoid damage to critical onboard equipment and to mitigate against the risk of a train becoming disabled in a flooded area. The limits are also subject to change depending on the track and weather conditions. It is important to note that no trains may operate over flooded track until permitted to do so by Iarnród Éireann's Infrastructure Department. The maximum limit identified within the procedure for the EMU is the top of the railway track. A typical railway track is approximately 170mm deep from ground level.
	 **Image 27-1 Iarnród Éireann RU Rolling Stock Operating Procedure on Flooded Track Condition**

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Water (including Hydrology and Flood Risk)
Monitoring	
10.9.3	Water quality monitoring should be undertaken in the surface water bodies located in the proximity of construction works and sensitive watercourses. Monthly samples have been taken as a baseline prior to commencement of the Construction Phase. Sampling should continue from the start of the Construction Phase until at least 12 months post-completion. Additional sampling points can be added if required, determined by the Site Environmental Manager. The results of the water quality monitoring programme will be reviewed by the Site Environmental Manager on an ongoing basis during the Construction Phase. In the event of any non-compliance with regulatory limits for any of the water quality parameters monitored, an investigation will be undertaken to identify the source of this non-compliance and corrective action will be taken where this is deemed to be associated with the Proposed Development. It is expected that the OPW and EPA will continue to monitor water levels in the 11no. waterbodies listed below in Table 27-6. The Marine Institute also has a tidal gauge at Dublin Port which can be monitored. Sea level rise and freeboard have been assessed and accounted for in the design, however, any unforeseen changes identified in continued monitoring can be used to inform and update the scheme design and considered on a case-by-case basis. The drainage systems including new underground attenuation tanks serving the Proposed Development must continue to function as designed. Maintenance of the new underground attenuation tanks and other drainage features will be in accordance with manufacturer recommendations.

Table 27-6 Watercourses where water quality sampling was undertaken

No.	Water Body Name	Monitoring Location
1	Balcunnin	Balcunnin Featherbed Lane, Co. Dublin
2	Betaghstown	Ardmore Ave, Betaghstown, Co. Meath
3	Betaghstown	Betaghstown, Ministown. Co. Meath
4	Boyne River	River Boyne, Drogheda
5	Matt/Bracken River	Matt/Bracken River Balbriggan Harbour, Balbriggan
6	Mayne River	Mayne River Grange, Co. Dublin
7	Nanny River	Nanny River Nanny Car Park, Corballis, Laytown
8	Palmerstown	Palmerstown House. Horsetown
9	Palmerstown	Palmerstown Effelstown Farm, Lusk, Co. Dublin
10	Pill/Turvey River	River Pill/Turvey
11	Tolka River	Tolka River, E Wall

27.2.6 Mitigation and Monitoring Measures for Hydrogeology

The table below describes the mitigation and monitoring measures for Chapter 11 (Hydrogeology).

Table 27-7 Mitigation and Monitoring Measures for Hydrogeology

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Hydrogeology
Mitigation Measures	
11.8	A Construction & Environmental Management Plan (CEMP) as outlined in Volume 4, Appendix A5.1 of this EIAR, will be updated by the successful Main Contractor. The CEMP will set out the Contractor's overall management and administration of the construction project. It will be prepared by the Contractor during the pre-Construction Phase to ensure commitments included in the statutory approvals are adhered to and that it integrates the requirements of the CEMP including management of Construction & Demolition Waste. The mitigation measures will be implemented by the appointed Main Contractor(s). These include the best practice measures and the site-specific mitigation measures as they relate to hydrogeology are outlined below.
Construction Phase Mitigation	
11.8.1	**Damage to the aquifer or sites designated for environmental protection including hydro-ecology due to accidental spills** Good construction management practices will be employed to minimise the risk of transmission of hazardous materials and subsequent pollution of adjacent watercourses or groundwater. Mitigation measures will include: • Employing only competent and experienced workforce, and site-specific training of site managers, foremen and workforce, including all subcontractors, in pollution risks and preventative measures; • 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; • The location of any fuel storage facilities shall be considered in the design of the Construction Compound; • 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; • 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. An Environmental Incident Response Plan, as outlined in Volume 4, Appendix A5.1 of this EIAR, will be implemented to help identify the actions to be taken in the event of a pollution incident. It will address such aspects as: • Containment measures; • Emergency discharge routes; • A list of appropriate equipment and clean-up materials; and • Notification procedures to inform the relevant environmental protection authority. Sediment control methods will be outlined in the Surface Water Management Plan found in Appendix A5.1: (CEMP) and implemented by appointed contractor.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Hydrogeology
Operational Phase Mitigation	
11.8.2	With the implementation of the proposed design, no additional mitigation measures for hydrogeology are considered necessary for the operation of the Proposed Development. In the Operational Phase the infrastructure will be maintained by Iarnród Éireann and will be subject to their management procedures to ensure that the correct measures are taken in the event of any accidental spillages, and this will reduce the potential for any impact.
Monitoring	
11.10	No monitoring is required for the Construction or Operational Phases.

27.2.7 Mitigation and Monitoring Measures for Air Quality

The table below describes the mitigation and monitoring measures for Chapter 12 (Air Quality).

Table 27-8 Mitigation and Monitoring Measures for Air Quality

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Air Quality
Mitigation Measures	
Construction Phase Mitigation	
12.6.1.1	**Dust** Before commencing relevant works, an air quality management plan will be prepared by the contractor and submitted for approval to the relevant planning authority. The plan must include all appropriate dust and emissions mitigation measures, applicable to the circumstances of the relevant site, based on the local authority requirements and industry best practices. Dublin City Council (DCC) guidance document titled Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition (DCC 2016) will be taken into consideration with respect to mitigation dust measures. The plan will be developed by the contractor and for each worksite shall include: • An inventory and timetable of activities which may give rise to emissions or dust; • Alert levels; • Alert system to be used (including notification process); • Details of control measures; and • Details of dust monitoring arrangements, including the location of sensitive receptors, monitoring locations, and monitoring equipment to be used.
12.6.1.2	**Air Quality reporting requirements** A pre-construction dilapidation survey of all bridge structures requiring demolition will be required prior to commencement of the Construction Phase. There are no buildings which have shown potential for asbestos containing material, however, a fully intrusive asbestos-containing materials survey, will be completed if asbestos potential is indicated in the pre-construction dilapidation survey. Prior to commencement of the demolition works, all asbestos containing materials identified by the Asbestos Survey and Refurbishment and Demolition Survey will be removed by a suitably trained and competent person. Asbestos-containing materials will only be removed from site by a suitably permitted/licensed waste contractor and will be brought to a suitably licensed facility. The Health and Safety Authority will be contacted where needed in relation to the handling of asbestos and material will be dealt with in accordance with the Safety, Health, and Welfare at Work (Exposure to Asbestos) Regulations 2006, as amended and associated approved Codes of Practice.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Air Quality
	In summary, the measures which will be implemented will include: • Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods; • Liaison with local authorities and community groups; • Hoarding will be provided around the construction compounds; and • It is anticipated that methods of collecting rainwater and recycling for general site use, will be adopted where reasonably practical. Strict dust prevention will always be in place, to minimise any potential emissions and these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations.
12.6.1.3	**Traffic** The modelling of road traffic for impacts on human and ecological receptors has found no significant impacts that require mitigation measures with respect to the modelling of emissions. However, some mitigation measures will be put in place to minimise emissions as far as reasonably practicable: • Implement a policy which prevents idling of vehicles both on and off-site including HGV holding sites; • Construction Phase traffic should be monitored to ensure construction vehicles are using the designated haul routes; • The contractor must adhere to defined traffic routes as noted in the Construction Traffic Management Plan; • Efficient scheduling of deliveries to minimise number of truck movements; and • Construction vehicles should conform to the current EU emissions standards and where reasonably practicable, their emissions should meet upcoming standards prior to the legal requirement date for the new standard. This will ensure emissions on haul routes are minimised. Mitigation measures are required for the control of dust with respect to HGV movements onsite and deliveries to/from the site: • HGV traffic leaving site will pass through a wheel wash; • Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary. If public roads are deemed to require additional cleaning where possible a suction device for road cleaning will be utilised to access spaces around cars and other street furniture more effectively; and • During movement of materials both on and off-site, trucks will be stringently covered with tarpaulin. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.
Operational Phase Mitigation	
12.6.2	As the Operational Phase of the development will result in positive impacts, no specific Operational Phase mitigation measures are required.
Monitoring Measures	
Construction Phase Monitoring	
12.7.1	Monitoring of construction dust deposition to occur at nearby sensitive receptors to ensure mitigation measures are working satisfactorily. The Bergerhoff method to be used in accordance with the requirements of the German Standard VDI 2119. The Bergerhoff Gauge consists of a collection vessel and a stand with a protecting gauge. The collection vessel is

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Air Quality
	secured to the stand with the opening of the collecting vessel located approximately 2m above ground level. The TA Luft limit value is 350mg (m^2/day) during a monitoring period between 28-32 days. Consistent implementation of good dust minimisation practices will ensure that the likely effects from construction dust is short-term, localised, reversible, and not significant when considered with respect to the EPA description of effects (EPA 2022).
Operational Phase Monitoring	
12.7.2	No monitoring is proposed for the Operational Phase.

27.2.8 Mitigation and Monitoring Measures for Climate

The table below describes the mitigation and monitoring measures for Chapter 13 (Climate).

Table 27-9 Mitigation and Monitoring Measures for Climate

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Climate
Mitigation Measures	
Construction Phase Mitigation	
13.6.1.1	**Embodied Carbon** • Ground Granulated Blast-furnace Slag (GGBS) to be used in replacement of standard concrete to reduce carbon footprint (savings of approximately 680 tonnes CO_2); • Steel to be sourced from continental Europe where a high proportion of it is made from recycled materials. Iarnród Éireann will pursue procurement of the highest recycled steel content that is available for the particular steel usage; • Minimisation of wastage of materials due to poor timing or over ordering on site with direct impact on the reduction of embodied carbon footprint of the site; • Waste management strategy according to the accepted waste hierarchy set out in the Waste Framework Directive (2008/98/EC) giving precedence to prevention, minimisation, reuse, and recycling over disposal with energy recovery and final disposal to landfill. Assumption made that all waste that is not guaranteed to reused on site will be sent to landfill.
13.6.1.2	**Road Traffic** A Construction Traffic Management Plan (CTMP) (See Appendix A5.1 – Appendix G in Volume 4 of this EIAR) and a Mobility Management Plan (MMP) will be implemented throughout the construction stage to avoid congestion and thus reduce GHG emissions. All plant and machinery will be maintained and serviced regularly. The following mitigation measures will be put in place in order to minimise possible GHG emissions due to road traffic: • Implement a policy which prevents idling of vehicles both on and off-site including HGV holding sites; • Construction Phase traffic should be monitored to ensure construction vehicles are using the designated haul routes; • All plant and machinery will be maintained and serviced regularly; • Efficient scheduling of deliveries to minimise number of road trips required; and

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Climate
	• Construction vehicles will conform to the current EU emissions standards and where reasonably practicable, their emissions should meet upcoming standards prior to the legal requirement date for the new standard. This will ensure emissions on haul routes are minimised.
Operational Phase Mitigation	
13.6.2.1	**Embodied Carbon** The Maintenance Phase GHG emissions will primarily consist of the maintenance of materials which were used in construction. No specific mitigation is set out however where possible, materials should be replaced in the most sustainable manner available. This may mean different materials used in replacement during the Operational Phase.
13.6.2.2	**Rail** • Using timetable optimisation and driver training; • Fuel consumption telematics for older rolling stock; • Auto-Shut down for a significant portion of the fleet; • Matching train sizes to customer demand; • Elimination of Temporary Speed Restrictions (TSRs) arising from infrastructure renewals; and • Use of a Corporate Power Purchase Agreement (CPPA) to ensure an energy mix of 80% renewables in the Operational Phase electricity use. In addition, a number of fuel efficiency programs are currently in progress / on-trial (Iarnród Éireann 2021). These include the trial replacement of ICR gearboxes, replacement of ICR diesel engines with hybrid drives, Envirox fuel additive to increase fuel efficiency and to keep diesel engine DP filters clean and replacement of diesel vans with electric road vehicles supported by charging points at depots and stations.
13.6.2.3	• Compliance with relevant ISO and national NSAI energy and environmental standards; • Contributing to transport sector decarbonisation including improving fleet and buildings fuel / energy performance, fleet hybridisation, phased network electrification and promoting and facilitating a shift to rail; • Recycling of 70% of all waste; • Near Zero Energy Building standard in all new buildings, and upgrades of 140 existing buildings to minimum BER B; • Reduction in overall carbon emissions by 51% between 2021 to 2030; • Improving operations, infrastructure and fleet climate change resilience including partnership approach to emergency responses and wide-ranging mitigation measures including coastal protection; • Reducing environmental impacts including LEAN management, waste and water management, green procurement in support of the circular economy and site decontamination; and • Protecting habitats and promoting biodiversity in a partnership approach. The above actions and others within the Iarnród Éireann Sustainability strategy will be implemented as part of Iarnród Éireann's future mitigation and this includes the Proposed Development mitigation.
Monitoring Measures	
13.7	No monitoring measures are proposed for the Operational Phase.

27.2.9 Mitigation and Monitoring Measures for Noise & Vibration

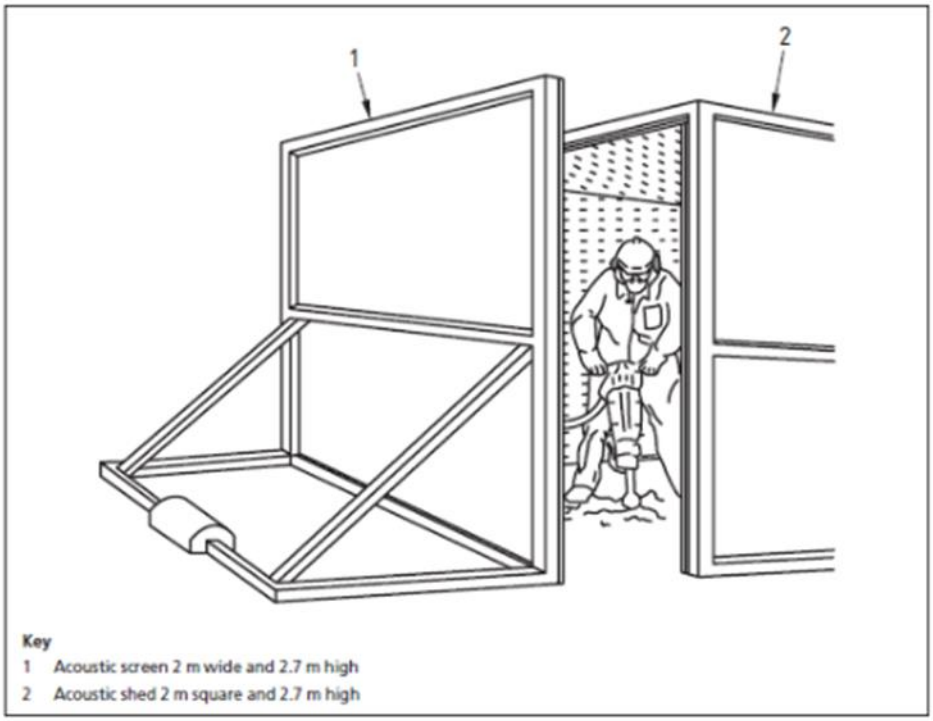
The table below describes the mitigation and monitoring measures for Chapter 14 (Noise and Vibration).

Table 27-10 Mitigation and Monitoring Measures for Noise and Vibration

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Noise and Vibration
Mitigation Measures	
Construction Phase Mitigation	
14.6.1	During the course of construction, the procedures outlined in Iarnród Éireann operation procedure CCE-QMS-008-002 Noise Management – CCE Activities as well as the DCC GPG (DCC 2016) will be implemented. The Iarnród Éireann and DCC documents include the following noise mitigation measures: • The Community Liaison Officer (or other nominated person) will notify affected residents in advance of any planned works commencing with a letter drop in the relevant area. • Where planned work occurs over a 72hr weekend shutdown there will be a noise management plan submitted to the local authority. • The following measures will be implemented where feasible during construction activities: o Carry out as much preparatory work in daylight as practicable (for example, pre-sawing or drilling rails). o Inspect the worksite in daylight if practicable and look for the best location to position generators, which maximises existing screening. o Position generators and lighting away from residential dwellings. o Take advantage of natural barriers such as vegetation, walls or embankments that can offer noise screening to adjacent neighbours. o Where necessary, use noise attenuation screens. The screens must be located as close to the receiver or source as possible. o Consider using additional supply cables and structures so that the generators can be positioned as far away from housing as practicable. o Where possible, use low-noise plant. Any unsuitable plant should be replaced by higher quality low noise plant or contained by the use of mufflers/silencers. o Do not leave equipment or vehicles running/idling unnecessarily. o Do not shout work instructions when working in residential areas at night unless absolutely necessary. o Plan effectively to ensure timely deliveries of materials.
14.6.1.1	**Communication with Neighbours** The Contractor will be proactive in engaging with the occupants of neighbouring properties in relation to individual and particular concerns that may arise and will notify them of any works forecast to generate appreciable levels of noise, explaining the nature and duration of the works. A designated noise liaison will be appointed by the contractor for the duration of the construction works. This person will log any issues and follow up in a prompt fashion. Night-works in particular have the potential to generate the most significant noise effects. All affected sensitive locations will be notified of planned works in advance of the works progressing. The notification will include a description of the works, the expected duration and details of how to contact the contractor to log complaints.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Noise and Vibration
14.6.1.2	**Noise & Vibration Monitoring** The following ongoing noise monitoring programme is proposed in relation to demolition and construction activities: Noise Monitoring Terminals (NMT), number and locations to be agreed, to be installed with the following specifications (or similar approved): • Logging of two concurrent periods, e.g. 15-minute & hourly. • Daily CIC automated calibrations. • E-mail alert on threshold exceedance. • E-mail alert on low battery and low memory. • Remote access to measured data. • Live display of noise levels. Vibration monitoring stations will continually log vibration levels using the Peak Particle Velocity parameter (PPV, mm/s) in the X, Y and Z directions, in accordance with BS ISO 4866: 2010: Mechanical vibration and shock – Vibration of fixed structures – Guidelines for the measurement of vibrations and evaluation of their effects on structures. The mounting of the transducer to the vibrating structure will need to comply with BS ISO 5348: 1998: Mechanical vibration and shock – Mechanical mounting of accelerometers. In summary, mounting conditions should have consideration to the following: • The transducer and its mountings should be as rigid as possible. • The mounting surfaces should be as clean and flat as possible. • Simple symmetric mountings are best. • The mass of the mounting should be small in comparison to that of the structure under test. • The monitoring equipment should be set to monitor vibration in 5-minute periods. • E-mail alert on threshold exceedance. • E-mail alert on low battery and low memory. • Remote access to measured data. • Live display of vibration levels. In addition, it is proposed that spot check noise & vibration measurements are conducted on a monthly basis. These spot checks can be organized to coincide with works that have potential to generate high levels of noise or vibration on site in order to confirm the potential extent of effects. A monthly noise and vibration monitoring report will be prepared by the contractor. Reports will identify any exceedances above nominal limit values and attempts to clarify the causes etc. Where remedial measures are required and identifiable, these will also be clearly stated.
14.6.1.3	**Noise Control Audits** It is proposed that noise control audits be conducted at regular intervals throughout the construction programme. Consideration will be given to issues such as the following (note that this list is not intended to be exhaustive): • Hours of operation being correctly observed. • Opportunities for noise control “at source”. • Optimum siting of plant items. • Plant items being left to run unnecessarily. • Correct use of proprietary noise control measures. • Materials handling.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Noise and Vibration
	• Poor maintenance. • Correct use of screening provided and opportunities for provision of additional screening.
14.6.1.4	**Hours of Work** In order to maintain services during the day, the majority of on track construction works along the railway line itself will take place at night. Works outside of the live railway corridor can progress during the day (i.e. the construction of depots, substations, Construction Compounds). Every effort will be made to avoid, reduce, and/or mitigate negative effects, however, there is likely to be some disturbance experienced for those in close proximity to the railway line caused by noise, lighting or fencing/hoarding erected associated with the construction activities. Consideration will be given to the scheduling of activities in a manner that reflects the location of the site and the nature of neighbouring properties. Each potentially noisy event/activity should be considered on its individual merits and scheduled according to its noise level, proximity to sensitive locations and possible options for noise control. Depending on the noise emission levels experienced and associated noise effects, the contractor will be flexible and able to conduct certain works at hours which reflect periods when the neighbouring properties have lower sensitivities to noise. Furthermore, every effort will be made to schedule the noisiest works to take place during the less sensitive daytime working hours.
14.6.1.5	**Selection of Quiet Plant** Careful consideration will be given to the noise emission levels of plant items when they are being considered for use on the site. This practice is proposed in relation to sites with static plant such as compressors and generators. It is proposed that these units be supplied with manufacturers' proprietary acoustic enclosures where possible. The potential for any item of plant to generate noise will be assessed prior to the item being brought onto the site. The least noisy item should be selected wherever possible. Should a particular item of plant already on the site be found to generate high noise levels, the first action should be to identify whether or not said item can be replaced with a quieter alternative.
14.6.1.6	**Control of Noise Sources** If the use of low noise plant or replacing a noisy item of plant are not viable or practicable options, consideration should be given to noise control "at source". This refers to the modification of an item of plant or the application of improved sound reduction methods, often in consultation with the supplier. The following outline guidance in relation to specific considerations is provided below: • For mobile plant items such as cranes, dump trucks, excavators and loaders, the installation of an acoustic exhaust and/or maintaining enclosure panels closed during operation can reduce noise levels by up to 10 dB. Mobile plant will be switched off when not in use and not left idling. • For piling plant, noise reduction can be achieved by enclosing the driving system in an acoustic shroud. For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system or utilising an acoustic canopy to replace the normal engine cover. • For percussive tools such as pneumatic concrete breakers, rock drills and tools a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensuring any leaks in the air lines are sealed. Erect localised screens around breaker or drill bit when in operation in close proximity to noise sensitive boundaries. • For all materials handling ensure that materials are not dropped from excessive heights and drop chutes/dump trucks are lined with resilient materials. • For compressors, generators and pumps, these can be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Noise and Vibration
	• Demountable enclosures can also be used to screen operatives using hand tools and may be moved around site as necessary. • All items of plant will be subject to regular maintenance. Such maintenance can prevent unnecessary increases in plant noise and can serve to prolong the effectiveness of noise control measures. • Where practicable, metal on metal or rock on metal impacts will be avoided during night works. This can be achieved through the use of rubber mallets or impact linings etc. on site. • White noise reverse alarms will be utilised on vehicles where practicable to reduce potential annoyance of tonal noise emissions from site.
14.6.1.7	**Screening** The use of screens can be effective in reducing the noise level at a receiver location and will be employed as a complementary measure to all other forms of noise control.  Key 1 Acoustic screen 2 m wide and 2.7 m high 2 Acoustic shed 2 m square and 2.7 m high Table B.4 **Measured sound reduction given by types of partial enclosure** Type of enclosure (see Figure B.3) / Reduction dB(A): Facing the opening(s) / Sideways / Facing rear of shed Open-sided shed lined with absorbent material; no screen: 1 / 9 / 14 Open-sided shed lined with absorbent material; with reflecting screen in front: 10 / 6 / 8 Open-sided shed lined with absorbent material; with absorbent screen in front: 10 / 10 / 10 **Image 27-2 Typical acoustic screen/shed detail.** It is acknowledged that for some worksites it will not be practicable to install localised screens due to the constrained nature of the work area. However, where practicable screens will be installed by the contractor.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Noise and Vibration
14.6.1.8	**Vibration** Limit values have been provided for the following building types: • Soundly constructed residential and commercial properties. • Protected structures and sensitive buildings such as those with no or minimal foundations. Consideration will be given to the following methods to further mitigate the vibration levels from bored piling: • Minimise obstructions between the vibration source and the sensitive receiver, e.g. old basement floors, old foundations etc., which exacerbate the transmission of vibration. • Reduce the resistance to bored piles by "mudding in". This technique involves lubricating the borehole with a small amount of bentonite slurry.
14.6.1.9	**Pilling** Piling programmes will be arranged so as to control the amount of disturbance in noise and vibration sensitive areas at times that are considered of greatest sensitivity. Noise reduction can be achieved by enclosing the driving system in an acoustic shroud. For steady continuous noise, such as that generated by diesel engines, it may be possible to reduce the noise emitted by fitting a more effective exhaust silencer system or utilising an acoustic canopy to replace the normal engine cover. Steel driven piles can utilise acoustic wrapping mitigation to reduce noise levels at source. Screening by barriers and hoardings is less effective than total enclosure but can be a useful adjunct to other noise control measures. For maximum benefit, screens will be close either to the source of noise (as with stationary plant) or to the listener. Removal of a direct line of sight between source and listener can be advantageous both physically and psychologically. In certain types of piling works there will be ancillary mechanical plant and equipment that may be stationary, in which case, care will be taken in location, having due regard also for access routes. When appropriate, screens or enclosures will be provided for such equipment. Contributions to the total site noise can also be anticipated from mobile ancillary equipment, such as handling cranes, dumpers, front end loaders etc. All mechanical plant will be well maintained throughout the duration of the piling works. Piling works will be managed in accordance with the project criteria where works durations will not exceed: • Ten or more days or nights in any 15 consecutive days or nights; and • A total number of days exceeding 40 in any six consecutive months.
14.6.1.10	**OHLE specific mitigation** There is the potential for significant adverse noise and vibration impacts to arise during the catenary system installation due to the piling requirement, the nighttime nature of the works and the proximity of sensitive receptors. In accordance with the project criteria, noise impacts shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding: • Ten or more days or nights in any 15 consecutive days or nights; and • A total number of days exceeding 40 in any six consecutive months. As the works are of a brief duration and will move linearly along the track, it is not expected that these durations will be exceeded, i.e. no moderate or major impacts will arise for a duration greater than the periods defined. In addition, the screening of the installation works will be implemented to minimise the noise impacts at sensitive receptors.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Noise and Vibration
14.6.1.11	**Eligibility of Temporary Accommodation** Given the proximity of construction activity to some noise sensitive locations and the occasional intensity of works, the mitigation measures proposed may not be sufficient to fully mitigate the noise impact. Temporary accommodation will be offered to eligible owners/occupiers where the construction of the proposed development causes, or is expected to cause, a measured or predicted airborne construction noise level that exceeds either of the following at property lawfully occupied as a permanent dwelling: A noise level 10 dB above any of the trigger noise levels presented in: • Table 14-4 (in Section 14.3.6.2) for the corresponding times of day; • A noise level 10 dB or more above the existing pre-construction ambient noise level for the corresponding times of day; and • Whichever level is the higher; and for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months.
Operational Phase Mitigation	
14.6.2.3	**Maintenance** During the course of ongoing maintenance, the procedures outlined in Iarnród Éireann operation procedure CCE-QMS-008-002 Noise Management – CCE Activities will be implemented. This document outlines the following noise mitigation measures: • The Community Liaison Officer (or other nominated person) will notify affected residents in advance of any planned works commencing with a letter drop in the relevant area. • Where planned work occurs over a 72hr weekend shutdown there will be a noise management plan submitted to the local authority. • All attempts to avoid, prevent or reduce the harmful effects of exposure to environmental noise. • arising from CCE work activities must be practical and appropriately risk assessed before • implementation. The following measures should be implemented where feasible during maintenance activities: • Carry out as much preparatory work in daylight as possible (sawing or drilling rails). • Inspect the worksite in daylight if possible and look for the best location to position generators. • Position generators and lighting away from residential dwellings. • Take advantage of natural barriers such as vegetation, walls or embankments that can offer noise screening to adjacent neighbours. • Where necessary, use noise attenuation screens. The screens must be located as close to the receiver or source as possible. • Consider using additional supply cables and structures so that the generators can be positioned as far away from housing as practicable. • Where possible, use low-noise plant. Any unsuitable plant should be replaced by higher quality low noise plant or contained by the use of mufflers/silencers. • Do not leave equipment or vehicles running/idling unnecessarily. • Do not shout work instructions when working in residential areas at night unless absolutely necessary. • Plan effectively to ensure timely deliveries of materials.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Noise and Vibration
Monitoring	
	See Section 4.6.1.2 for monitoring during the Construction Phase. No specific monitoring is required during the Operational Phase.

27.2.10 Mitigation and Monitoring Measures for Landscape & Visual Amenity

The table below describes the mitigation and monitoring measures for Chapter 15 (Landscape and Visual Amenity).

Table 27-11 Mitigation and Monitoring Measures for Landscape and Visual Amenity

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Landscape and Visual Amenity
Mitigation Measures	
Construction Phase Mitigation	
15.6.2	• A series of mitigation measures are proposed to avoid, reduce, and remediate, relevant significant negative landscape (townscape) and visual effects of the Construction Phase of the Proposed Development. These measures include: • An Arboricultural Survey will be produced for the area of the Proposed Development prior to commencement of works, as well as for any adjoining areas where trees are likely to be impacted by the works, in accordance with British Standard Institution (BSI) British Standard (BS) 5837:2012 'Trees in relation to in relation to design, demolition and construction - Recommendations' (BSI 2012); • All trees and vegetation to be retained within and adjoining the works area will be protected in accordance with the British Standard Institution (BSI) British Standard (BS) 5837:2012 'Trees in relation to in relation to design, demolition, and construction - Recommendations' (BSI 2012). Works required within the root protection area (RPA) of trees to be retained will follow a project-specific arboricultural methodology for such works, which will be prepared by a professional qualified arborist; • Wherever possible, trees and vegetation will be retained within the Proposed Development. Trees and vegetation identified for removal will be removed in accordance with 'BS 3998:2010 Tree Work – Recommendations' (BSI 2010) and best arboricultural practices as detailed and monitored by a professional qualified arborist. • The Arboricultural Assessment to be prepared as part of mitigation for the Proposed Development will be fully updated at the end of the Construction Phase and made available to the landowner (IÉ, planning authority, other as appropriate), with any recommendations for on-going monitoring of retained trees during the Operational Phase; • Where properties are subject to permanent and / or temporary acquisition, an inventory of existing boundary details and accesses, planting, paving, and other features that may be disturbed or removed will be prepared by the contractor prior to commencement of construction works; and • Where properties are subject to permanent and / or temporary acquisition, appropriate measures will be put in place to provide for protection of features, trees and vegetation to be retained, and for continued access during construction, for adequate security and screening of construction works. All temporary acquisition areas will be decommissioned and reinstated at the end of the Construction Phase.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Landscape and Visual Amenity
	• In addition to the above measures, construction works will be managed in accordance with the Construction Environmental Management Plan (CEMP) - refer to Appendix A5.1 in Volume 4 of this EIAR. This provides the environmental management framework to be adhered to during the Construction Phase of the Proposed Development.
Operational Phase Mitigation	
15.6.3	**General Mitigation Measures** Mitigation measures are proposed to avoid, reduce, or remediate, wherever possible significant negative landscape and visual effects of the Operational Phase of the Proposed Development. In addition to the management of all Operational Phase activities in accordance with best methodologies and practice, that following general measures are proposed for the mitigation of landscape / townscape and visual impacts: • Where existing trees, hedges, and/or plantings are removed, new planting will be provided in replacement of those removed; • The Proposed Development will provide for the planting of new trees and shrubs both for mitigation of tree removal and for screening of proposals particularly substations. Species selected shall be appropriate to the characteristics of the specific location; • Proposals for the treatment of the public realm within the streetscape effected by the Proposed Development will have regard to the existing character of the street or location, to emerging policies, objectives and proposals for the public realm and to opportunities for enhancement of the public realm and the streetscape. Proposals will have regard to historic details and features, to the quality of existing and proposed materials, to the reduction of visible elements, ease of legibility, and management and maintenance requirements; • The materials and finishes used for proposed substation buildings and associated fencing will be sympathetic to the context; • New lighting to use modern fittings with directional horizontal cut-off cowling; • Landscape proposals will have regard to the recommendations of: Chapter 8 (Biodiversity) in relation to opportunities for enhancement of biodiversity; Chapter 20 (Archaeology and Cultural Heritage) and Chapter 21 (Architectural Heritage) in relation to opportunities for enhancement of cultural and architectural heritage; and Chapter 10 (Water) in relation to opportunities for incorporation of Sustainable Urban Drainage Systems (SuDS); • Maintenance and monitoring of reinstatement works in public areas will ensure that any defective materials or workmanship will be made good within a period of 12 months from completion of all construction works in any given area. Thereafter, responsibility for maintenance and monitoring of the area will revert to the landowner (e.g. local authority); • All aspects of the Proposed Development within public areas will revert to on-going management and maintenance in accordance with normal operational practices by the landowner / tenant. This will include hard and soft landscape works and townscape measures, new and reinstated tree and other planting, new and reinstated surfacing and paving, etc.; • Unless otherwise requested by the property owner, maintenance and monitoring of reinstatement and hard and soft landscape works and reinstated and new boundaries in private areas (i.e. temporary acquisition areas) will ensure that any defective materials or workmanship will be made good within a period of 12 months following completion of the works in property. Thereafter, responsibility for maintenance and monitoring of private areas will revert to the landowner.
15.6.3	**Specific Landscape Mitigation Measures** • The design of the proposed railway bridge over the Mayne River to use materials and finishes which are appropriate to the form and setting of the existing protected structure. Potential access for a future greenway to be maintained as far as possible;

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Landscape and Visual Amenity
	• Provision of coastal wildflower mix to the side slope of Malahide Turnback with species suitable for coastal situation; • Provision of cascading plants (e.g. Hedera helix) to the top of proposed retaining wall along edge of Broadmeadow Greenway to help soften the new wall for views from the greenway and the Estuary. • At Donabate Substation, appropriate native planting will be proposed to the perimeter to screen the proposals from the surrounding High Amenity designation; • Provision of replacement planting where necessary to reinstate sections of existing perimeter hedgerows removed for substation at Rush and Lusk; • Replacement planting for hedgerow removed as part of the Rush and Lusk Station entrance road works. Native hedgerow / shrub planting to be provided to the west of the removed hedgerow location on land currently occupied by the existing entrance; • Provision of replacement planting along Golf Links Road and new native tree and shrub planting to the perimeter of Skerries South Substation, to limit effects on amenity of road, adjacent residential property and Skerries Golf Course; • Provision of perimeter planting to Skerries North Substation, to limit effects on surrounding residential receptors; • Reinstatement of planned Public Realm Redevelopment at Quay Street and Environs, Balbriggan, including reinstatement of planting and other landscape features; • Offset of access road to sub-station at Balbriggan to retain / augment field boundary hedgerow; • Provide space for new screen planting around north, west and south of sub-station at Balbriggan North including around infiltration basin; • Replacement of hedgerow / trees at Irishtown Road, Gormanston, and around perimeter of substation, to limit effects on nearby residential receptors; • Replanting of screening planting at setback alignment to residential property undergoing landtake south of Gormanston Station; • Replacement of any trees or other vegetation damaged or lost at designated open space (woodland) by works at Laytown Station compound; • Replanting of tree planting to either side of access road to Bettystown substation and provision of tree and shrub planting along boundary with residential areas, to restore screening between nearby residential areas and screen the substation from residential properties; • Replanting of screening planting at setback alignment to residential property undergoing landtake at St Mary's Villas; and • Replanting of woodland area adjacent to Dublin Road rail bridge / Railway Terrace, Drogheda, as far as reasonably practicable.
Monitoring	
	No specific monitoring is required.

27.2.11 Mitigation and Monitoring Measures for Material Assets: Agricultural Properties

The table below describes the mitigation and monitoring measures for Chapter 16 (Material Assets: Agricultural Properties).

Table 27-12 Mitigation and Monitoring Measures for Material Assets: Agricultural Properties

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Material Assets: Agricultural Properties
Mitigation Measures	
Construction Phase Mitigation	
16.6.1	**Temporary Land take** • A landowner liaison officer (LLO) will be identified by the contractor during the Construction Phase to facilitate communications between affected landowners and to facilitate the management of farm enterprises with landowners during critical times; • Prior to works commencing each affected landowner will be met by a member of the project team to inform them of the expected start date on their lands, duration of works and to agree on specific issues of access, presence of livestock, etc. pertaining to the Proposed Development; • Following completion of relevant construction work, lands temporarily acquired will be reinstated to the existing agricultural condition. All materials and waste will be removed and disposed of appropriately. • The landowner will be provided with access to all separated land parcels during the Construction Phase of the Proposed Development where reasonably practicable. Where temporary disruptions to this access occur landowners will be notified in advance, and access will be restored as soon as possible. Temporary or replacement access will be provided at a suitable location, and where possible, in agreement with the landowner; • Where existing water and electricity supplies are disrupted during the Construction Phase an alternative water source or electricity supply will be made available. If access to surface drinking water sources are permanently restricted alternative groundwater supplies will be provided (or compensation provided to enable landowner to drill his own well); • Suitable boundary fencing will be erected to delineate the line of the Proposed Development boundary and prevent straying livestock; • Landowners with lands adjoining sites where either rock breaking, piling takes place will be notified in advance of these activities. • If the Proposed Development boundary interferes with access to agricultural land the contractor will facilitate the movement of livestock and agricultural machinery to minimise disturbance; • A re-instatement programme for the construction compounds will be agreed with each land owner. This programme will apply best practice to the storage of top soil, maintenance of land drainage and re instatement of land; • The impacts on water quality will be minimised by way of a programme of mitigation measures for surface and ground water sources as described in Chapter 10 (Water); • The spread of dust onto adjoining lands would be minimised by way of mitigation measures set out in Chapter 12 (Air Quality) and Appendix A5.1 (Construction Environmental Management Plan). Typically, the effect of dust on agricultural grazing livestock is not significant; and • Where drainage outfalls are temporarily altered, or land drains blocked or damaged an adequate drainage outfall will be maintained and land drains will be repaired.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Material Assets: Agricultural Properties
Operational Phase Mitigation	
16.6.2	• The loss of agricultural land due to the construction of the Proposed Development will be a permanent loss which cannot be mitigated except through compensation; • Where existing water and electricity supplies to fields or farmyards are severed, the supply would be reinstated by provision of ducting where possible. Alternatively, where ducting is not feasible a permanent alternative water source or electricity supply would be made available. Compensation payments would enable farmers to replace power and water supplies; • The drainage design of the Proposed Development will connect with existing field drainage systems and carry the drainage water to suitable outfalls; • The loss of shelter would be addressed by the proposed landscaping plan (see Chapter 15 (Landscape and Visual Amenity). Landscaping along the Proposed Development will minimise the visual impact on farms, and • The Proposed Development boundary will prevent trespass of livestock onto the adjoining railway development.
Monitoring	
16.7	No specific monitoring is required.

27.2.12 Mitigation and Monitoring Measures for Material Assets: Non-Agricultural Properties

The table below describes the mitigation and monitoring measures for Chapter 17 (Material Assets: Non-Agricultural Properties).

Table 27-13 Mitigation and Monitoring Measures for Material Assets: Non-Agricultural Properties

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Material Assets: Non-Agricultural Properties
Construction Phase Mitigation	
17.7.1.1	**Temporary Land-take** Following the completion of relevant construction works, lands temporarily acquired will be fully reinstated and returned to the landowner.
17.7.1.2	**Access to Property** Access will be maintained to all affected property as far as reasonably practicable and if interruption is necessary, it will be pre-notified to the property owner / occupant and it will be restored without unreasonable delay. Traffic management measures will be put in place during the Construction Phase where temporary or minor diversions are required.
17.7.1.3	**Noise and vibration** Timing of works and noise and vibration limit values are amongst the main measures to mitigate noise impacts on sensitive receptors. These measures are detailed within Chapter 14 (Noise and Vibration) in Volume 2 of this EIAR.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Material Assets: Non-Agricultural Properties
17.7.1.4	**Dust** Dust suppression measures to mitigate generation and spread of dust are detailed within Chapter 12 (Air Quality) in Volume 2 of this EIAR. Mitigation measures will be implemented by the contractor during the Construction Phase to minimise the potential impacts to nearby sensitive receptors to reduce undue disturbance due to dust.
17.7.1.5	**Disturbance of Field Drainage** In cases where drainage is impeded during the Construction Phase and causes obvious difficulty to a particular property owner, temporary measures will be considered on a site-specific basis. This may include allowing waters to drain to less critical areas, so as to minimise the impact.
17.7.1.6	**Disturbance of Utility Services** Where required, an alternative source of water / electricity will be provided to ensure that disruption is minimised during the Construction Phase. Further measures relating to utilities are detailed within Chapter 18 (Material Assets: Utilities) in Volume 2 of this EIAR.
Operational Phase Mitigation	
17.7.2	The following general mitigation measures will be provided: • Access will be maintained to all affected properties as far as reasonably practicable and if interrupted will be restored without unreasonable delay. • Where part of the curtilage of a property is to be permanently acquired, the acquiring authority will hold discussions with the property owner and generally agree to replace boundaries on a like-for-like basis where possible, subject to safety considerations. Permanent boundary treatment will consist of a boundary that is comprised of one of the following: a) Replacement boundary on a like-for-like basis. b) Concrete post and wire. c) Timber post and wire. d) 2.4m Security Purpose (SP) Palisade fencing. e) 2.4m Security Purpose (SP) Paladine fencing. • Any services that are interfered with as a result of the Proposed Development will be repaired / replaced without unreasonable delay. • The new drainage system will be designed to ensure that there will be no increased risk of flooding as a consequence of the Proposed Development.
Monitoring	
Monitoring	No specific monitoring is required.

27.2.13 Mitigation and Monitoring Measures for Material Assets: Utilities

The table below describes the mitigation and monitoring measures for Chapter 18 (Material Assets: Utilities).

Table 27-14 Mitigation and Monitoring Measures for Material Assets: Utilities

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Material Assets: Utilities
Mitigation Measures	
Construction Phase Mitigation	
18.6.1	A Construction & Environmental Management Plan (CEMP) has been prepared and is included in Volume 4, Appendix A5.1 of this EIAR. The CEMP will be updated by the successful Main Contractor. The CEMP will set out the Contractor's overall management and administration of the construction project. It will be prepared by the Contractor during the pre-Construction Phase. The mitigation measures will be implemented by the appointed Main Contractor(s). These include the best practice measures as outlined below: • Agreements have been put in place with various utility providers in order to maintain connections, or at least minimise downtimes, to public and private entities during the construction of the Proposed Development. These agreements include the provision of temporary diversions which will enable providers to reroute their service during non-peak periods to maintain connections to customers; • All existing services will be located by the appointed contractor and confirmed with relevant utility providers using service records, GPR surveys and slit trenches to ensure that their position accurately identified before excavation works commence; • 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 in line with the requirements of the utility companies whose assets are present in the area, where practicable; • Where diversions, or modifications, are required to utility infrastructure, 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. Required service interruptions will generally not be continuous for full days at a time. Prior to works commencing, advance notification will be given to all impacted properties (including vulnerable customers). This notification will include information on when interruptions and works are scheduled to occur and the duration of such interruption. 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; • Safety procedures will be put in place to minimise the risk to utility provider personnel and the general public during works on services. 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; • Traffic management plans will be implemented to minimise the effect of utility diversion works for commuters; and • Collaboration with each utility provider will ensure safe practise when working on services and will minimise the time required for such works.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Material Assets: Utilities
Operational Phase Mitigation	
18.6.2	• Substations providing power to the OHLE will need to be maintained to ensure the new DART line remains operational. The substations will be required to have unimpeded vehicular access 24 hours per day from the public road network for maintenance staff from both Iarnród Éireann and ESB Networks; • The substation must be located at ground level in order to facilitate the installation or replacement of heavy electrical equipment; the immediate area around the substation should be level; • Any major utility infrastructure implemented in the reconfiguration of utilities to enable the Proposed Development will require periodical maintenance, such as foul pumping stations; and • Any overhead assets (such as electrical cables) relocated underground for the Proposed Development will require different procedures by the utility provider in order to be maintained. Collaboration with each utility provider will ensure their maintenance requirements have been considered and that the appropriate wayleaves have been put in place.
Monitoring	
	No specific monitoring is required.

27.2.14 Mitigation and Monitoring Measures for Material Assets: Resource & Waste Management

The table below describes the mitigation and monitoring measures for Chapter 19 (Material Assets: Resource and Waste Management).

Table 27-15 Mitigation and Monitoring Measures for Material Assets: Resource and Waste Management

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Material Assets: Resource and Waste Management
Mitigation Measures	
Construction Phase Mitigation	
19.6.1	**Waste Management** A Construction Demolition Waste Management Plan (CDWMP) has been prepared and is included in Appendix A5.1 (CEMP), sub-appendix E, in Volume 4 of this EIAR. This has been prepared and will be implemented by the appointed Contractor in line with the 'Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects' (EPA, 2021b). The CDWMP outlines how waste arising during the Construction Phase of the Proposed Development will be managed in a way that ensures compliance with the provisions of the Waste Management Acts, 1996, as amended. Mitigation measures are set out as follows: • Where waste generation cannot be avoided, waste disposal will be minimised; • 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 will be considered following appropriate testing to ensure material is suitable for its proposed end use; • Where non-hazardous excavation material cannot be reused within the Proposed Development works, material will be sent for recycling or recovery; • Excavations of made ground will be monitored by an appropriately qualified person to ensure that any hotspots of possible contamination are properly identified, with the contaminated material segregated and disposed of appropriately; • Any identified contaminated material will be segregated and stored in an area where there is no possibility of runoff generation or infiltration to ground or surface water drainage. Care will be taken to ensure that the hotspot does not cross contaminate clean soils elsewhere throughout the site; • If encountered, any potential asbestos during the Construction Phase will be managed using standard health and safety measures as outlined in 'Asbestos-containing Materials (ACMs) in Workplaces: Practical Guidelines on ACM Management and Abatement' (HSA, 2013); • The site will be maintained to prevent litter and regular litter picking will take place throughout the site; • 'Just-in-time' delivery will be used to minimise material wastage; • Paints, sealants and hazardous chemicals will be stored in secure, bunded locations; • All staff on-site will be trained on how to minimise waste (i.e., training, induction, inspections and meetings); • Materials on-site will be correctly and securely stored;

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Material Assets: Resource and Waste Management
	• Where possible, metal, timber, glass, and other recyclable material will be segregated and removed off site to a permitted / licensed facility for recycling. Waste stream colour coding and photographs will be used to facilitate segregation; • On-site office and food waste arising will be source separated at least into dry mixed recyclables, biodegradable and residual wastes; • Waste bins, containers, skip containers and storage areas will be clearly labelled with waste types which they should contain, including photographs as appropriate; • Segregated skips will be used within a designated waste segregation area to be located in the on-site Construction Compound (particularly for hazardous, gypsum, metal, timber, inert waste and general waste); • The appointed Contractor will record the quantity in tonnes and types of waste and materials leaving the site during the Construction Phase. The name, address and authorisation details of all facilities and locations to which waste and materials are delivered will be recorded along with the quantity of waste in tonnes delivered to each facility. Records will show material, which is recovered, which is recycled, and which is disposed of; • Waste generated on-site will be removed as soon as practicable following generation for delivery to an authorised waste facility; • The appointed Contractor will ensure that any off-site interim storage facilities for excavation material have the appropriate Certificate of Registration, Waste Facility Permit and / or EPA Waste Licence in place; • Where Regulation 27 notifications are required in relation to the Proposed Development, the appointed Contractor will complete and submit these Regulation 27 notifications to the EPA for by-product reuse; and • The relevant appropriate waste authorisation will be in place for all facilities that wastes are delivered to (i.e., Certificate of Registration, Waste Facility Permit and / or EPA Waste Licence).
Operational Phase Mitigation	
19.6.2	CIÉ will re-use and recycle materials throughout the site, to the maximum extent possible, and make use of local suppliers when importing materials to site during the Operational Phase, thereby minimising potential impacts. The sustainable resource and waste management principles detailed in Section 19.2.3 will be implemented to ensure that the waste hierarchy is adhered to. As the effect of Operational Phase waste is predicted to be not significant, no further mitigation measures are required.
Decommissioning Phase	
19.6.3	The DART+ Coastal North project is providing rail infrastructure which will enable an increase in frequency and capacity on the Northern Line and the Howth Branch in the coming years. It is not intended that this infrastructure will be decommissioned, but rather, as the infrastructure reaches the end of its design life, it will likely be refurbished or renewed to enable continued operation of the railway. Any such future renewal or refurbishment may require additional construction works, which would be similar to, but of a much lesser impact (in terms of extent and duration) than, the Construction Phase associated with the DART+ Coastal North project. The mitigation measures outlined herein for the Construction Phase, will be applied as appropriate, during any future decommissioning.
Monitoring	
	No specific monitoring is required.

27.2.15 Mitigation and Monitoring Measures for Archaeology & Cultural Heritage

The table below describes the mitigation and monitoring measures for Chapter 20 (Archaeology and Cultural Heritage).

Table 27-16 Mitigation and Monitoring Measures for Archaeology and Cultural Heritage

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Archaeology and Cultural Heritage
Mitigation Measures	
20.6.1	**Project Archaeologist** A Project Archaeologist with a detailed knowledge of the Proposed Development will be appointed to develop and manage a centralised framework for tracking and managing all archaeological considerations. The Project Archaeologist will oversee the implementation and reporting of all archaeological and cultural heritage mitigation measures. The role of the Project Archaeologist is to provide a consistent and independent approach throughout the duration of the Proposed Development. In addition to making consistent recommendations and approving mitigation strategies and ensuring open lines of communication, a Project Archaeologist will provide archaeological training to operators and contractors and provide an advisory role offering practical advice on specific archaeological issues encountered in the field while promoting awareness of archaeological assets. The effective management of the archaeological component of the project will be achieved through communication and a milestone driven contract process. The appointment of a Project Archaeologist can ensure the smooth running of a scheme while providing controls on budgets and streamlining the point of communication for all heritage matters. In addition to this, a Project Archaeologist will: • Review and agree details of the archaeological monitoring and investigation. • Review and agree the details of method statements, license applications and Ministerial Consents. • Manage the archaeological contract and specifically the work of the archaeological contractors. • Oversee the conduct of the archaeological excavations/ investigations. • Review the archaeological requirements as the works proceed. Implement any required changes to the methodology as construction work proceeds. • Certify all archaeological costs. • Oversee all post excavation works and certify all post excavation costs. • Review the content of reports prepared by the Archaeological Contractors and ensure that all the archaeological contractors provide all appropriate reports on their work in accordance with the contract conditions. • Ongoing consultation with the heritage authorities and statutory authorities. • Ensure all work is proceeding according to archaeological licensing or consent requirements. • Identify the requirement for additional investigation, including where necessary recording, survey, testing, or excavation works. • Where possible implement time and cost-effective strategies that are in line with best practice guidelines and statutory authority approvals. • Provide advice to Iarnród Éireann. • Provide advice to the design, construction team and relevant contractors.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Archaeology and Cultural Heritage
20.6.2	**Consultant Archaeologist** Experienced and competent licence-eligible archaeologist (s) will be employed by the appointed contractor to carry out the archaeological work and to advise on archaeological heritage matters during construction, to communicate all findings in a timely manner to the Project Archaeologist and Iarnród Éireann, to acquire any licenses/ consents required to conduct the work, and to supervise and direct the archaeological measures associated with the Proposed Development. Iarnród Éireann will make provision to allow for, and to fund, the necessary archaeological monitoring, inspection, test excavation and excavation works that will be needed on-site during and prior to construction, either directly or indirectly via the appointed contractor. During the Construction Phase all mitigation measures will be undertaken in compliance with national policy guidelines and statutory provisions for the protection of the archaeological heritage. All methodologies will have to be agreed in advance with the National Monuments Section of the Department of Housing, Local Government and Heritage (DHLGH). Archaeological mitigation measures can avoid, prevent, reduce or offset negative effects and these are achieved by preservation in-situ (avoidance), by design and / or by record. Mitigation measures shall be undertaken as directed by the Minister of the DHLGH in compliance with the code of practice, national policy guidelines and statutory provisions for the protection of archaeology and cultural heritage. It is proposed that the following measures will take place as a minimum.
20.6.2.1	**Archaeological Test Excavation** Archaeological testing will be guided by the results of the geophysical survey. In areas where geophysical survey could not take place due to unsuitable ground conditions and access issues, archaeological testing will take place in advance of construction, to confirm the design approach. While there are no recorded monuments within these areas, and field inspection or an analysis of historic maps and aerial photography did not reveal any newly identified sites, these areas were put forward for assessment as they were considered to be of an archaeological potential given their greenfield nature, previously undisturbed soils and/ or proximity to designated monuments. Testing will also take place to verify the results of the geophysical survey. The purpose of testing is to determine the location, date, nature and extent of any previously unknown archaeological site. As such, it is proposed to test excavate the following areas: Zone B — Maynetown, County Dublin — AAP4 Zone C — Corballis County Dublin — AAP7 Zone C — Tyrrelstown, County Dublin — AAP13 Zone C — Hacketstown, County Dublin — AAP15 Zone C — Barnageeragh, County Dublin — AAP18 Zone C — Hampton Demesne, County Dublin — AAP20 Zone C — Bremore, County Dublin — AAP22 Zone D — Gormanston 1, County Meath — AAP26 Zone D — Irishtown, County Meath — AAP27 Zone D — Colp East (S), County Meath — AAP34 Zone E — Newtown/Lagavooren, County Meath/ County Louth — AAP37 The archaeological test trenching strategy shall entail mechanical excavation of a 2m wide (or at least a 1.8m wide) trench (es) within the above specified areas. The frequency and pattern of the trenching layout is not prescribed, and the testing array may vary from one area to another, with the agreement of the Project Archaeologist and the DHLGH, to take account of local topographic factors.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Archaeology and Cultural Heritage
	It is proposed that any archaeological features revealed by the test trenching, which will be directly impacted by the proposed works, will be mitigated prior to and during the construction of the Proposed Development in agreement with the DHLGH. On the basis of the geophysical survey and test excavation results, the National Monuments Service may require preservation in the form of in situ (by avoidance or design) or resolution by archaeological excavation. All mitigation practices will be carried out in accordance with the requirements of the statutory authorities. The process of archaeological excavation, recording and publication of results ensures that all the features are recorded and excavated in advance of development. Excavation results in the removal of archaeological remains from their natural environment. Archaeological excavation ensures that this removal is systematically and accurately recorded, drawn and photographed, providing a paper and digital archive and adding to the archaeological knowledge of a specified area. The detailed technical reports arising from this will form part of the national archive of archaeological data in the Sites and Monuments record curated by the DHLGH.
20.6.2.2	**Protection of newly revealed archaeological remains** Measures will be put in place to protect all archaeological features that are revealed prior to backfilling. This generally involves placing a geotextile protective membrane over any archaeological features identified during the test excavation exercise. Other measures such as the provision of hardboard over fragile remains must be used where appropriate. This is in accordance with the Code of Practice between the IÉ and the Minister for AHG, 2012 (NMS).
20.6.2.3	**Archaeological Monitoring** Archaeological monitoring will be undertaken in order to establish the presence or absence, as well as the nature and extent, of any archaeological deposits, features or sites that may be present within the land-take of the Project. If archaeological features are identified, provision (time and funding) will be made available for the full recording and, if necessary, excavation of the archaeological material in compliance with any measures that the DHLGH and the relevant local authority deem appropriate. All construction work such as the clearance of land, new drainage track storage, the widening of culverts, the placement of maintenance tracks and topsoil stripping within the permanent and temporary land-take will be monitored. All other activities such as drainage, landscaping, access and maintenance roads and the provision of services, the diversion of utilities and placement of compounds associated with the improvement of the railway will also have to be monitored by a licensed archaeologist. Monitoring includes all groundwork associated with the development including the placement of Construction Compounds, access and maintenance roads, landscaping, drainage and topsoil stripping within the permanent and temporary land-take to ensure that no previously unknown and buried archaeological features are damaged or removed without proper recording. Archaeological monitoring will be carried out under licence to the Department of Housing, Local Government and Heritage (DHLGH) and the NMI, and will ensure the full recognition of, and the proper excavation and recording of, all archaeological soils, features, finds and deposits which may be disturbed below the ground surface. The licensed archaeologist will have provision to inspect all excavation to the formation level for the proposed works and to temporarily halt the excavation work, if and as necessary. They will be given provision to ensure the temporary protection of any features of archaeological importance identified until a decision has been made by the statutory authorities as to whether or not avoidance and preservation in situ can be achieved or if preservation by record (ie excavation) is warranted. The archaeologist will be afforded sufficient time and resources to record and remove any such features identified.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Archaeology and Cultural Heritage
	Archaeological excavation ensures that the removal of any archaeological soils, features, finds and deposits is systematically and accurately recorded, drawn and photographed, providing a paper and digital archive and adding to the archaeological knowledge of a specified area (i.e. preservation by record). As archaeological excavation involves the removal of the archaeological soils, features, finds and deposits, following this mitigation measure there is no further impact on the archaeological heritage.
Construction Phase Mitigation	
20.6.3.1	**Zone A – North of Connolly Station to Howth Junction & Donaghmede Station (including Fairview Depot)** There is only one area of archaeological potential identified within Zone A (AAP1 Fairview Park) and the proposed works are determined to be not significant and imperceptible as works are proposed in made ground within the depot and railway line.
20.6.3.2	**Zone B – South of Howth Junction & Donaghmede Station (including Howth Branch) to north of Malahide Viaduct** Five areas of archaeological potential have been identified in Zone B (AAP2-AAP6), four of which have been identified as having a general greenfield and /or brownfield archaeological potential. Full time licenced archaeological monitoring will take place during earthmoving works located in AAP2-AAP4 where there is a general below ground archaeological potential. Due to challenging ground conditions, it was not possible to carry out the geophysical survey at AAP4 in Maynetown. It is proposed to carry out test excavation in this area. If features are detected, a decision will be made as to whether or not preservation by record or insitu will be required. This assessment is to take place prior to construction within the footprint of the proposed ground breaking works. No mitigation measures are necessary at AAP6, Malahide Viaduct where there will be no impact to the estuarian soils as there are no in water works anticipated.
20.6.3.3	**Zone C – North of Malahide Viaduct to south of Gormanston Station (Fingal boundary)** No mitigation measures are required for AAP17 (Townparks) and AAP22 (Balbriggan) as no impact is anticipated. At Donabate Station in Beaverstown townland (AAP9) works are to take place to the east of the rail line and a Construction Compound is proposed in an area of hardstanding and an overgrown, previously disturbed vegetated area (a brownfield area). Full time licenced archaeological monitoring of all earthmoving works will be carried out. At AAP8 in Corballis townland, AAP10 in Rogerstown, AAP14 in Ballykea, AAP19 in Kilmainham/ Barnageeragh and AAP23 in Knocknagin townlands, utility diversions are proposed in greenfield and roadside environments. Full time licenced archaeological monitoring will take place for all earthmoving and or excavation associated with these activities to ensure the identification of discrete archaeological features (if present). Seven areas occur in greenfield environments, (AAP7, AAP11, AAP13, AAP15, AAP20, AAP18 and AAP22). Geophysical survey took place at AAP11, AAP18, AAP20. Due to challenging ground conditions and issues with access, it was not possible to carry out the survey in all the proposed areas. It is proposed to carry out test excavation at Corballis (AAP7), Tyrrelstown (AAP13), Hacketstown (AAP15), Barnageeragh (AAP18) and at Hampton Demesne (AAP20) and Bremore (AAP22). A programme of archaeological test trenching will be designed in order to establish the presence or absence, as well as the nature and extent, of any archaeological deposits that may be present within the landtake of these areas of archaeological potential (AAPs).

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Archaeology and Cultural Heritage
	Should any subsurface archaeological stratigraphy associated with this constraint be encountered, an appropriate ameliorative strategy will be implemented. This will entail avoidance by design or licensed archaeological excavation in full or part of any identified archaeological remains (preservation by record). This assessment will take place prior to construction within the footprint of the proposed ground breaking works, for example, the construction of a Construction Compound, substation and permanent access tracks etc. Utility diversions are proposed at AAP12 in proximity to an enclosure (DU008-011) and at AAP16 in Milverton townland where burials have been revealed in the same townland. Works have been minimised in both these areas. At AAP12 in Effelstown, full time licenced archaeological monitoring will take place for the installation of the single ESB pole and to ensure the identification of discrete archaeological features (if present). At Milverton, geophysical survey took place at AAP16 and no clear archaeological responses were detected. Archaeological monitoring will take place during the construction works to ensure the identification of discrete archaeological features (if present).
20.6.3.4	**Zone D – South of Gormanston Station (Fingal border) to County Meath/County Louth border** Thirteen areas of archaeological potential (AAP24, AAP36) have been identified in Zone D, as listed in Table 20-23. Nine areas (AAP24, AAP25, AAP26 - Gormanston, AAP27 - Irishtown, AAP30, AAP31 – Ninch, AAP32 – Sevitsland (area has been topsoil stripped and is disturbed) and AAP34 and AAP35 Colp East) have been identified as having a general greenfield archaeological potential. It was proposed that a non-invasive geophysical survey take place within these areas. This was carried out, apart from Irishtown, where it was determined that the area was not suitable due to magnetic disturbance. Geophysical anomalies of probable archaeological derivation were detected at Gormanston (AAP26) and this area will be subject to test excavation to verify the nature and extent of the subsurface features. It is proposed to carry out test excavation at Gormanston (AAP26), Irishtown (AAP27), Colp East (AAP34), A programme of archaeological test trenching will be designed in order to establish the presence or absence, as well as the nature and extent, of any archaeological deposits that may be present within the landtake of these areas of archaeological potential (AAPs). Should any subsurface archaeological stratigraphy associated with this constraint be encountered, an appropriate ameliorative strategy will be implemented. This will entail avoidance by design or licensed archaeological excavation in full or part of any identified archaeological remains (preservation by record). At AAP224 (Gormanston) anomalies were detected but this area of interest will not be impacted by the proposed localised works and it is proposed to condition any future works in this area) to take place under archaeological supervision. Archaeological monitoring will take place at AAP25, AAP27, AAP28, AAP29, AAP30, AAP31, AAP, 32, AAP33, AAP34, AAP35 and AAP36). For overhead diversions that will require the relocation of poles with overhead cables which will result in localised disturbance and for underground diversions involving trench excavation at AAP25, AAP30, AAP33 archaeological monitoring will take place of any earthmoving works as a result of this Proposed Development. At Colp West (AAP36), the lands to the north of the railway have largely been previously archaeologically investigated and as a result of this, it is now proposed to apply a mitigation measure of full time licenced archaeological monitoring for any earthmoving activities within these lands. The lands to the south of the railway, will require tree clearance before any archaeological investigation can take place. Tree clearance and the removal of tree roots will be carried out under archaeological supervision.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Archaeology and Cultural Heritage
	Two areas have experienced previous disturbance, AAP28 – Corballis, AAP29 River Nanny/ Ninch as such full time licenced archaeological monitoring will take place during earthmoving works associated with these areas of archaeological limited potential. At Corballis (AAP28) trenching is required on either side of the existing railway track and this will be archaeologically monitored.
20.6.3.5	**Zone E – Drogheda Station and surrounds** Large scale earthmoving activities are to take place around Drogheda Station in greenfield and brownfield environments and throughout the existing infrastructure and railway lands. Archaeological geophysical survey and test excavation has taken place throughout the agricultural fields to the north of the station where Construction Compounds are proposed. As a result of these surveys, archaeological excavation took place of a newly revealed archaeological site that included an enclosure and four graves located to the east of the proposed Construction Compound along the tree lined boundary with the wastewater treatment plant. No sites were revealed within the proposed Construction Compound areas. In greenfield and brownfield areas within and surrounding Drogheda MacBride Station that have not been previously disturbed or investigated, the appropriate level of archaeological investigation will take place in order to identify and provide certainty as to the below ground potential in advance of construction. Full time licenced archaeological monitoring will take place during earthmoving and excavation works associated with works at McBride Station. At Newtown, Co Meath and Lagavooren Co Louth (AAP37), a geophysical survey could not take place due to the overgrown nature of the site. Archaeological test excavation is proposed to assess the below ground archaeological potential of these greenfield areas. There are no recorded monuments in the immediate vicinity. AAP38 is the site of a well, annotated on the 25-inch OS map (1910) in Newtown townland, overhead wires are located adjacent to this area. Once these wires have been diverted, the area can be cleared from the existing vegetation under archaeological supervision. Archaeological monitoring prior to construction, can then take place to examine if the site of the well exists within this area. If it does exist, it will be archaeologically examined, recorded (drawn and photographed) and digitally located.
20.7	A suitably qualified archaeologist will monitor the areas outlined above during the Construction Phase to ensure that all archaeological heritage remains are identified and recorded.
Operational Phase Mitigation	
20.6.4	No operational mitigation measures are envisioned in relation to archaeology during the Operational Phase of the Proposed Development.
Monitoring	
20.7	A suitably qualified archaeologist will monitor the areas outlined above during the Construction Phase and all areas requiring excavation works to ensure that all archaeological heritage remains are identified and recorded.

27.2.16 Mitigation and Monitoring Measures for Architectural Heritage

The table below describes the mitigation and monitoring measures for Chapter 21 (Architectural Heritage).

Table 27-17 Mitigation and Monitoring Measures for Architectural Heritage

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Architectural Heritage
Mitigation Measures	
Construction Phase Mitigation	
21.7.1	Proposed mitigation measures for architectural heritage features are outlined below and detailed in Appendix A21.1 in Volume 4 of this EIAR. The methodology has been prepared in accordance with the Architectural Heritage Protection: Guidelines for Planning Authorities (DEHLG 2011).
21.7.1.1	**Direct Impacts** Five locations were identified where the Proposed Development would directly impact on sensitive architectural heritage fabric and where there will be a moderate impact in the unmitigated case. • The works associated with the Clongriffin Turnback require a new loop line to be installed to the east of the existing tracks. The East Loop over the Mayne River will require a new bridge adjacent to BH-24 (UBB19-UBB19A) to cross the river and adjacent path. The existing railway bridge (UBB19-UBB19A) at this location comprises a twin masonry arch structure with a dividing wall between the arches. The bridge is listed as a protected structure in Fingal County Council's Development Plan 2023-2029 (FCC RPS 0919). The proposed bridge will directly adjoin the existing and comprises a low profiled reinforced concrete arch structure. The direct impact is on the embankment rather than the stone bridge structure. Mitigation includes recording the existing fabric in position prior to the works. Recording is to be undertaken by an appropriate architectural heritage specialist engaged by the appointed contractor. The architectural heritage specialist will oversee works in the vicinity of the masonry bridge. Works to historic fabric will be carried out in accordance with the methodology provided in Appendix A21.1 in Volume 4 of this EIAR. • OHLE support works are to be carried out on UBB36, Rogerstown Viaduct (BH-61), a Protected Structure of medium sensitivity. The deck of the bridge has previously been replaced with a concrete structure. Direct impacts will be on the deck. The end piers, which are of heritage interest will also require alteration to facilitate the OHLE masts. Mitigation includes recording the existing fabric in position prior to the works. Recording is to be undertaken by an appropriate architectural heritage specialist engaged by the appointed contractor. The masonry is to be salvaged for repair and conservation works on the scheme. • A new substation (north Skerries) is proposed at Barnageeragh. An access gate is proposed which will result in the removal of a section of walling associated with the small early 19th century settlement at Barnageeragh (BH-88). The proposed Mitigation includes recording the existing fabric in position prior to the works. Recording is to be undertaken by an appropriate architectural heritage specialist engaged by the appointed contractor. Following the creation of the 20m gate, the wall on either side of the gate shall be repaired. The masonry from the removed section is to be salvaged for repair and conservation works to the retained portions of the wall. • OHLE support works are to be carried out on the UBB56, Balbriggan Railway Viaduct (BH-101), a Protected Structure of medium sensitivity. Mitigation includes recording the existing fabric in position prior to the works and labelling the affected masonry and fabric. Recording is to be undertaken by an appropriate architectural heritage specialist engaged by the appointed contractor. The architectural heritage specialist will oversee any labelling, taking down and reinstatement of the affected masonry.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Architectural Heritage
	• OHLE support works are to be carried out on the UBB72, Laytown Railway Viaduct (BH-129), a Protected Structure of medium sensitivity. Mitigation includes recording the existing fabric in position prior to the works and labelling the affected fabric. Recording is to be undertaken by an appropriate architectural heritage specialist engaged by the appointed contractor. The architectural heritage specialist will oversee any labelling, taking down and reinstatement of the affected fabric. • It is proposed to remove and replace OBB80/OBB80A/OBB80B (BH-141) which are of architectural heritage interest as they are noted on historic maps. Because there is limited scope for mitigation where bridges are being removed in their entirety, the magnitude of impact remains high. The canopy over the south platform Drogheda MacBride Station (BH-146) is to be altered to accommodate the proposed overhead wires. Mitigation includes recording the existing fabric in position prior to the works and labelling the affected masonry and fabric. Recording is to be undertaken by an appropriate architectural heritage specialist engaged by the appointed contractor. The architectural heritage specialist will oversee any labelling, taking down and reinstatement of the affected masonry.
21.7.1.2	**Indirect Impacts** • A Construction Compound is proposed to the North and south of the UBB19, Mayne River Cattle Pass (BH-24), a Protected Structure of medium sensitivity. A new bridge is also proposed to the east There is potential for damage to the bridge during construction. Mitigation to offset the risk of damage will include recording, protection, and monitoring of the sensitive fabric prior to, and for the duration of the Construction Phase. • OHLE support works are to be carried out on the UBB30, Malahide Viaduct (BH-45), a Protected Structure of medium sensitivity. There is potential for damage to the piers during the works the magnitude of which is medium. Mitigation to offset the risk of damage will include recording, protection, and monitoring of the sensitive fabric prior to, and for the duration of the Construction Phase. • A construction compound is proposed at UBB56, Balbriggan Railway Viaduct (BH-105), Which is of medium sensitivity. There is potential for damage to the bridge during construction. Mitigation to offset the risk of damage will include recording, protection, and monitoring of the sensitive fabric prior to, and for the duration of the Construction Phase. • It is proposed to replace the deck of the Bridge UBK1 with a wider structure on the Dublin Road Drogheda (BH-144) in order to facilitate the new platform, stabling line and turnback facility. The deck is a 20th century steel structure of low sensitivity but rests on 19th century pier abutments which are of architectural heritage interest and noted on historic maps. The pier abutments are of medium sensitivity. The pier abutments will also be modified or extended southward to allow space for the new platform as part of the works. There is potential for damage to the pier abutments during the Construction Phase. The design of the new bridge abutments will be sympathetic to the existing abutments to ensure that the bridge design has less of a visual impact on the bridge and station. Mitigation to offset the risk of damage will also include recording, protection, and monitoring of the sensitive fabric prior to, and for the duration of the Construction Phase. • Works are proposed to replace OBB81, a pedestrian footbridge (BH-146), in Drogheda MacBride Station (DB 055, 396-9). It is also proposed to alter the canopy on the south platform. The erection of OHLE infrastructure, excavation, and stabling works and Construction Compounds in the grounds of the Station all have the potential to indirectly impact the station buildings, particularly the station building and the stairs to the bridge. Mitigation to offset the risk of damage will include recording, protection, and monitoring of the sensitive fabric prior to, and for the duration of the Construction Phase.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Architectural Heritage
Operational Phase Mitigation	
21.7.2	Considering the measures that have been inherently included in the design of the Proposed Development to reduce or to avoid impacting on the settings of the identified sites, buildings and features, all pre-mitigation impacts during the Operational Phase are Slight or Not Significant and therefore no mitigation measures are required during the Operational Phase.
Monitoring	
	No specific monitoring is required.

27.2.17 Mitigation and Monitoring Measures for Electromagnetic Effects & Stray Current

The table below describes the mitigation and monitoring measures for Chapter 22 (Electromagnetic Effects and Stray Current).

Table 27-18 Mitigation and Monitoring Measures for Electromagnetic Effects and Stray Current

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Electromagnetic Effects and Stray Current
Mitigation Measures	
22.6.1	**Overline Structures** During the ongoing design of the proposed railway electrification project in the Northern Line, the assessment is done to determine the need to bond overline structures to the traction return system using a Voltage Limiting Device (VLD) and/or utilize traction bonded flashover plates. The need for these measures mainly depends on the following factors: • The material of the structure, such as stone, brick, steel, etc. • The clearance planned between the bridge soffit and the contact wire.
22.6.3	**Buried Services (Electrical Cables)** The presence of buried electrical cables that are typically insulated mitigates the risk of increased stray current flow. Insulation acts as a barrier, preventing the unwanted flow of current into the surrounding environment. As a result, the likelihood of stray current causing significant issues such as corrosion or damage to railway and third-party assets is reduced. The insulation effectively contains the electrical currents within the cables, minimizing their impact on nearby structures and underground metallic services.
22.6.4	**Buried Services (Gas/Water/Sewage Mains)** The presence of underground metallic services may increase the occurrence of stray current flow from the DC traction return system, which can potentially cause corrosion or damage to railway and third-party assets. To mitigate this issue, the following measures have been taken into consideration in the ongoing Design Phase, as well as for the specification of construction requirements: • Renewing pads between tracks and sleepers to enhance the rail-to-earth resistance, if determined by an assessment of the conditions of the existing pads. This can help limit the flow of stray current through the rail system. • Whenever deemed appropriate, implementing collection mats, which are designed to collect and redirect stray current away from sensitive areas. These mats provide an alternative path for the current, reducing the risk of corrosion or damage to assets.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Electromagnetic Effects and Stray Current
	• Whenever deemed appropriate, using sacrificial anodes, which are designed to corrode over time instead of the metallic assets they are protecting. These anodes can help divert stray current and protect vulnerable structures from corrosion. It is also worth mentioning that the Proposed Development has set a requirement for the D&B Contractor to provide rail fasteners with a high insulation level that counteract as much as possible the loss over time of the insulation level of the rail fasteners due to mechanical, thermal, and chemical aging of materials, as well as the pollution due to intensive use of tracks.
Monitoring	
22.7	A stray current monitoring system will be implemented at each traction substation in the DART+ Coastal North project. This system will enable continuous monitoring of the rail-to-earth potential along the railway line. Dedicated monitoring locations, typically located at the traction substations, will be used to measure the rail potential (electrical potential of the rails with respect to earth). The purpose of this monitoring is twofold: • To ensure that the electrification system does not generate excessive levels of stray current that could cause issues or disruptions. • To verify that the mitigation measures implemented by the design and construction teams are functioning correctly and are compliant with the EN 50122-2 standard. For the DART+ Coastal North project, a centralized data acquisition system is anticipated to be utilized for the stray current monitoring. This will facilitate the transfer of monitoring data to the IÉ SET (Signalling, Electrification and Telecommunications) Department for analysis and further evaluation.

27.2.18 Mitigation and Monitoring Measures for Human Health

The table below describes the mitigation and monitoring measures for Chapter 23 (Human Health).

Table 27-19 Mitigation and Monitoring Measures for Human Health

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Human Health
Mitigation Measures	
Construction Phase Mitigation	
26.6.1	No additional human health mitigation measures are proposed other than those outlined in other chapters of this EIAR.
Operational Phase Mitigation	
23.6.2	No additional human health mitigation measures are proposed other than those outlined in other chapters of this EIAR.
Monitoring	
Construction Phase Monitoring	
23.7.1	No additional human health monitoring measures are proposed other than those outlined in other chapters of this EIAR.
Operational Phase Monitoring	
23.7.2	No additional human health monitoring measures are proposed other than those outlined in other chapters of this EIAR.

27.2.19 Mitigation and Monitoring Measures for Major Accidents and Disasters

The table below describes the mitigation and monitoring measures for Chapter 24 (Major Accidents and Disasters).

Table 27-20 Mitigation and Monitoring Measures for Major Accidents and disasters

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Major Accidents and disasters
Mitigation Measures	
Construction Phase Mitigation	
24.5.3 (Table 24-8)	**Major Road Traffic Accidents** • A Construction Traffic Management Plan (CTMP) has been prepared and will be further developed in consultation with Iarnród Éireann and the respective local authority prior to the commencement of the Construction Phase and implemented during the Construction Phase. • A Mobility Management Plan has been included and will be further developed as part of the CTMP and will address all modes of transport and travel required to deliver the project during the Construction Phase. This will include details regarding construction workers travelling to site, car-parking, haulage routes and construction compounds to reduce potential effects (incl. traffic accidents) caused due to construction traffic and residential neighbourhoods. • All accesses to the worksite and the compounds will be signposted, and anyone outside the work will be prohibited, installing the necessary perimeter fences and the necessary warning signs. • The necessary traffic signs will be placed outside the work to warn pedestrian and vehicle traffic of the risks involved in the work. Similarly, the necessary protections and notices will be placed, in specific cases in which the circulation through the annexed streets is affected. • All HGV drivers will be provided with appropriate safety awareness training.
24.5.3 (Table 24-8)	**Collapse/Damage to Structures** • Stakeholder consultations with owners of sensitive structures / buildings. • Monitoring of existing historic / sensitive structures during construction to ensure their stability and durability. • Where appropriate, sensitive structures at risk from construction works will be protected. • A CEMP and an Incident Response Plan (IRP) have been prepared and will be further developed and implemented during construction so as to manage the risk of collapse / damage to structures. • Mitigation measures in relation to vibration identified in EIAR Chapter 14 (Noise & Vibration) will be adhered to.
24.5.3 (Table 24-8)	**Ground Collapse** • A CEMP and an Incident Response Plan (IRP) have been prepared and will be further developed and implemented during construction, so as to manage the risk of collapse/ damage to structures.
24.5.3 (Table 24-8)	**Fire/Explosion** • The risk is managed through the CEMP and IRP. • Hot Work Permit procedure will be followed. • All construction compounds and construction sites will have 24/7 security.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Major Accidents and disasters
	• Explosive materials will not be stored on construction site /compounds overnight. • Transportation of explosives will be subject to prior agreement. When transportation of these materials is required, appropriate security measures will be implemented such as escort by An Garda Síochána.
24.5.3 (Table 24-8)	**Industrial Accidents (works near Seveso site)** • The Proposed Development cannot provide offsite mitigation measures however, TII's protocols for the management of major accidents will be followed in an event there is an incident at a nearby Seveso sites.
24.5.3 (Table 24-8)	**Extreme Weather (Flooding) Events** • As is normal practice with infrastructure projects a Construction Environmental Management Plan (CEMP) has been prepared for the Proposed Development. This will be further developed prior to construction and will be fully implemented during the Construction Phase. • Monitoring of weather forecasts to ensure that necessary actions will be implemented in time at construction sites prior to prolonged / extreme weather events. • An emergency response plan may be drawn up including appropriate response measures for such Extreme Weather (Flooding) situations.
24.5.3 (Table 24-8)	**Spillage or long-term seepage of pollutants into a watercourse** • As is normal practice with infrastructure projects, a CEMP has been prepared for the Proposed Development. This will be further developed prior to construction and will be fully implemented during the Construction Phase. An Incident Response Plan is included as part of the CEMP detailing the procedures to be undertaken in the event of spillage of chemical, fuel or other hazardous wastes, non-compliance with any permit or license, or other such risks that could lead to a pollution incident, including flood risks. • The Environmental Manager will prepare Method Statements for construction works as detailed in the CEMP to be undertaken on, over or near water in consultation with Inland Fisheries Ireland (IFI) and other relevant authorities as necessary. • Mitigation measures identified in Chapter 8 (Biodiversity), Chapter 10 (Water), and Chapter 11 (Hydrogeology) in Volume 2 of this EIAR will be fully implemented. • During construction, cognisance will have to be taken of the following guidance documents for construction work on, over or near water: o Requirements for the Protection of Fisheries Habitat during Construction and Development Works at River Sites (Eastern Regional Fisheries Board). o Central Fisheries Board Channels and Challenges – The enhancement of Salmonid Rivers. o CIRIA C532 Control of Water Pollution from Construction Sites Guidance for Consultants and Contractors. o CIRIA C648 Control of Water Pollution from Constructional Sites. Guidelines for the Crossing of Watercourses during the Construction of National Road Schemes (TII, 2006).
24.5.3 (Table 24-8)	**Human Disease** • The contractor will provide site operatives with appropriate first aid material. All site operatives will be advised to wear steel toe cap boots with trousers to be tucked inside along with appropriate PPE such as gloves and headwear. All site operatives should be advised of the importance of washing hands before eating to avoid the risk of contracting Weils disease and other water borne diseases.

EIAR Section Reference	Description of Mitigation and Monitoring Measures for Major Accidents and disasters
	• Government and HSE health and safety guidelines will be adhered to in relation to Covid-19 in workplaces to reduce the spread of the virus amongst the construction workers.
Operational Phase Mitigation	
24.5.3 (Table 24-8)	**Train Derailment** • Appropriate training will be provided to all relevant staff members for operation of the electrified train fleet. • All relevant staff members shall familiarise themselves with Section Z Electrified Lines of the IÉ Rule Book prior to operating the fleet. • Operation and maintenance manuals will be made available to staff as early as possible. • A dedicated Major Incident Response Plan has been developed by Iarnród Éireann for the DART+ Coastal North project to identify the appropriate emergency response plans in event of an incident. • Appropriate back up procedures will be prepared and implemented in an event of an incident. • Periodic inspections and maintenance (as required) of the rail line in accordance with Iarnród Éireann (IÉ) Standards which include, but not limited to, the following: o IÉ CCE-TMS-363 Requirements for the Rail Testing Vehicle. o IÉ CCE-TMS-360 Track and Structures Inspection Requirements. o IÉ CCE-TMS-320 Track Quality Standard. o International Union of Railways (UIC) Code 712 R Rail Defects • Design measures for the DART+ Coastal North project have been accepted by the Commission for Railway Regulation (CRR) in order for licence to be granted.
24.5.3 (Table 24-8)	**Building/Failure Fire** • Fire Safety Strategies outlining measure to be implemented in the event of a fire will be prepared for the proposed substations and be submitted for approval to the relevant authorities.
24.5.3 (Table 24-8)	**Extreme Weather (Flooding) Events** • Ongoing consultation and cooperation with local authorities and the Office of Public Works (OPW). • Inspections and maintenance (as applicable) of the drainage system and the compensatory storage areas. • A dedicated Major Incident Response Plan has been developed by Iarnród Éireann for the DART+ Coastal North project to identify the appropriate emergency response plans in event of flooding.
24.5.3 (Table 24-8)	**Industrial Accidents – Seveso sites** • The Proposed Development cannot provide offsite mitigation measures however, TII's protocols for the management of major accidents will be followed in an event there is an incident at a nearby Seveso sites.
Monitoring	
	No specific monitoring is required.

27.2.20 Interactions

Interactions occur between many of the environmental factors. The assessments for each of the environmental factors undertaken in this EIAR have considered, and taken cognisance of these direct, indirect, cumulative, and synergistic interactions during both the Construction Phase and the Operational Phase of the Proposed Development. The individual environmental assessments have identified appropriate mitigation measures to address these interactions to avoid, reduce or mitigate likely significant environmental effects which are described, and residual effects identified in the respective specialist chapters of this EIAR. Therefore, no additional mitigation is proposed in this chapter.

27.2.21 Natura Impact Statement

In addition to the mitigation and monitoring measures included in the EIAR, specific mitigation is identified within the Natura Impact Statement (NIS) which accompanies the Railway Order application, in order to ensure that there are no significant effects on European sites[1] as a result of the Proposed Development. For completeness, mitigation and monitoring measures included in the NIS are detailed below.

Table 27-21 Mitigation and Monitoring Measures from the Natura Impact Statement

NIS Section Reference	Description of Mitigation and Monitoring Measures from the NIS
Mitigation Measures	
Construction Phase Mitigation	
7.1	**Malahide Estuary SAC [000205], Rogerstown Estuary SAC [000208], North Dublin Bay SAC [000206], South Dublin Bay SAC [000210] and Baldoyle Bay SAC [000199]**
7.1.12	**Mitigation Measures**
7.1.12.1	**Measures to Protect Surface Water Quality during Construction** Surface water protections are included within the Construction Environmental Management Plan (CEMP) which outlines appropriate mitigation measures for the Construction Phase (See Appendix 1.7). This includes measures relating to: • A requirement for a Pollution Incident Response Plan; • Construction Compound management including the storage of any fuels and materials; • Control of Sediments; • Use of concrete; and • Management of vehicles and plant including refuelling and wheel wash facilities, etc.

[1] The Natura 2000 network of sites are defined under the Habitats Directive (Article 3) as a European ecological network of special areas of conservation, composed of sites hosting the natural habitat types listed in Annex I and species listed in Annex II, and special protection areas classified pursuant to the Birds Directive (2009/147/EC). The aim of the network is to aid the long-term survival of Europe's most valuable and threatened species and habitats. In Ireland, these sites are designed as *European sites* – as defined under the Planning and Development Acts and/or Birds and Habitats Regulations as (a) a candidate site of Community importance, (b) a site of Community importance, (c) a candidate special area of conservation, (d) a special area of conservation, (e) a candidate special protection area, or (f) a special protection area. They are commonly referred to in Ireland as candidate Special Areas of Conservation (cSACs) and Special Protection Areas (SPAs).

NIS Section Reference	Description of Mitigation and Monitoring Measures from the NIS
	As well as these generic mitigation measures, other specific mitigation and/or monitoring measures may be required, which will include, but will not be limited to: • Works in Flood Zones A and B are avoided where possible. In these areas, the Contractor will be required to provide a method statement for the removal of materials and personnel to minimise sediment discharge into the river and risk to personnel during flood events; • Construction works in areas prone to flooding are to take place during dry seasons. The Contractor must follow the weather forecast prior to commencing instream works and concrete pouring. It is noted that track levels for the entirety of the development are well above flood levels. • Works areas to be kept dry at all times through the use of bunds of non-erodible material adjacent to watercourses to avoid contaminated water entering the watercourse. • Settlement tanks, silt traps/bags and bunds will be used where required to remove silt from surface water runoff. Sizing of the tanks will be based on best available guidelines, CIRIA (2006). Any construction work within a 10m buffer zone must be provided with these measures to minimise sediment discharge to a watercourse; • Refuelling of all plant, machinery, and vehicles will be undertaken only in designated areas where leaks and spills are can be contained relatively easily. Spill kits will be made available on all temporary and permanent construction sites. Refuelling areas must be kept at least 50m away from any watercourse; • Construction materials to be managed in such a way as to effectively minimise the risk posed to the aquatic environment; • Construction Compounds and haul roads will avoid high flood risk zones as much as possible and maintain a minimum buffer of 50m from surface watercourses, and • Excavated material to be placed in such a way as to avoid any disturbance of areas near to the banks of watercourses and any spillage into the watercourses. All of the above measures implemented on site will be monitored throughout the duration of construction/ to ensure that they are working effectively, to implement maintenance measures if required/applicable and to address any potential issues that may arise.
7.1.12.3	**Measures to Prevent introduction /spreading of non-native Invasive species during Construction** The appointed contractor will ensure that a confirmatory pre-construction invasive species survey will be undertaken by a suitably qualified specialist to confirm the absence and/or extent of all Third Schedule invasive species within the footprint of the Proposed Development. Where an infestation is confirmed / identified within the footprint of the Proposed Development, this will require the implementation of the measures detailed in the Non-Native Invasive Species Management Plan (See Appendix 1.5 of the NIS). ***Non-native Invasive Species Management Plan (ISMP)*** Where a pre-construction invasive species survey identifies newly established non-native invasive species within the footprint of the Proposed Development, the ISMP, as shown in Appendix 1.5, will be updated to provide a detailed description of the new infestations (e.g. approximate area of the respective colonies (m^2), where feasible; approximate total number of stems, pattern of growth and information on other vegetation present), and where necessary, include calculations of volumes of infested soils to be excavated.

NIS Section Reference	Description of Mitigation and Monitoring Measures from the NIS
	The ISMP for the Proposed Development will be implemented, including confirmation following the preconstruction survey the appropriate treatment methodology including the detailed control measures contained within it, as advised by a suitably qualified specialist, in accordance with the Transport Infrastructure Ireland's (TII 2020) The Management of Invasive Alien Plant Species on National Roads - Technical Guidance) (2020a) and The Management of Invasive Alien Plant Species on National Roads – Standard (TII 2020b), and other species-specific guidance documents including those listed in the non-native ISMP, in so far as they can be applied to the Proposed Development, and as necessary. The appointed contractor will ensure that all control measures that may be specified in the non-native ISMP shall be implemented by a suitably qualified and licenced specialist prior to the construction of the Proposed Development to control the spread of newly established non-native invasive species within the footprint of the Proposed Development. Furthermore, the appointed contractor will adhere to control measures specified within the Non-Native ISMP throughout the construction phase of the Proposed Development. The site will be monitored by the appointed contractor in consultation with the suitably qualified and licensed specialist after the control measures have been implemented. Any re-growth will be subsequently treated as detailed in the Proposed Development ISMP.
7.1.12.5	**Measures to prevent habitat degradation as a result of air quality impacts** Before commencing relevant works, an air quality management plan shall be prepared by the contractor and submitted for approval to the relevant planning authorities. The plan must include all appropriate dust and emissions mitigation measures, applicable to the circumstances of the relevant site, based on the local authority requirements and industry best practices. Dublin City Council (DCC) guidance document titled *Air Quality Monitoring and Noise Control Unit's Good Practice Guide for Construction and Demolition* (DCC 2018) has been taken into consideration with respect to mitigation dust measures. The plan will be developed by the contractor and for each worksite shall include: • An inventory and timetable of activities which may give rise to emissions or dust; • Alert levels; • Alert system to be used (including notification process); • Details of control measures; and • Details of dust monitoring arrangements, including the location of sensitive receptors, monitoring locations, and monitoring equipment to be used. In summary, the measures which will be implemented shall include: • Material handling systems and site stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods; • Liaison with local authorities and community groups; • Hoarding will be provided around the Construction Compounds; and • It is anticipated that methods of collecting rainwater and recycling for general site use, will be adopted where practical. Strict dust prevention will always be in place, to minimise any potential emissions and these procedures will be strictly monitored and assessed. In the event of dust nuisance occurring outside the site boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem before the resumption of construction operations. ***Construction Phase Traffic Mitigation Measures*** The modelling of road traffic for impacts on human and ecological receptors has found no significant impacts that require mitigation measures with respect to the modelling of emissions (reference the assessment). However, some mitigation measures can be put in place to minimise fugitive emissions:

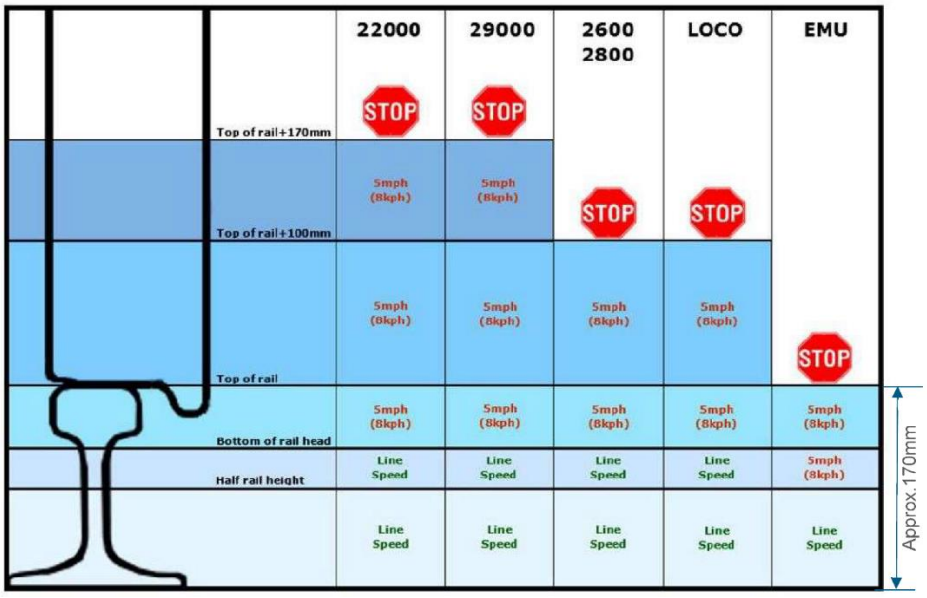
NIS Section Reference	Description of Mitigation and Monitoring Measures from the NIS
	• Implement a policy which prevents idling of vehicles both on and off-site including HGV holding sites; • Construction Phase traffic should be monitored to ensure construction vehicles are using the designated haul routes; • The contractor must adhere to defined traffic routes as noted in the Construction Traffic Management Plan; • Efficient scheduling of deliveries to minimise number of truck movements; • Construction vehicles will conform to the current EU emissions standards and where reasonably practicable, their emissions should meet upcoming standards prior to the legal requirement date for the new standard. This will ensure emissions on haul routes are minimised. Mitigation measures are required for the control of dust with respect to HGV movements onsite with the site and deliveries to/from the site: o HGV traffic leaving site will pass through a wheel wash. o Public roads outside the site will be regularly inspected for cleanliness and cleaned as necessary. If public roads are deemed to require additional cleaning where possible a suction device for road cleaning will be utilised to access spaces around cars and other street furniture more effectively. o During movement of loose material both on and off-site, trucks will be stringently covered with tarpaulin. Before entrance onto public roads, trucks will be adequately inspected to ensure no potential for dust emissions.
7.2	**River Boyne and River Blackwater SAC [001957]**
7.2.7	**Measures to Protect Surface Water Quality during Construction** The measures presented above in Section 7.1.12 will protect surface water quality during construction of the Proposed Development.
7.2.8	**Measures to Prevent introduction /spreading of non-native Invasive species during Construction** The measures presented above in Section 7.1.12 will prevent the spread of non-native invasive species to downstream European sites during construction of the Proposed Development.

NIS Section Reference	Description of Mitigation and Monitoring Measures from the NIS

7.2.9	**Measures to Protect Otter from Disturbance/Displacement impacts**
	Pre-Construction Survey
	• Prior to construction works commencing, the appointed contractor will engage the services of a suitably experienced ecologist to conduct a pre-construction otter survey of the Proposed Development. The survey will be undertaken within 10 months in advance of construction and supplemented by a further inspection of the Proposed Development immediately prior to site clearance to ensure that no new holts have been established in the intervening period. These surveys will be carried out in accordance with *Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes* (TII, 2006).
	• Where any new active holts/couches are recorded within 150m of the Proposed Development the appointed ecologist will ensure that adequate mitigation is provided in accordance with Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA, 2006), and a derogation licence is sought from the NPWS where necessary.
	Precautionary Mitigation measures for new active holts/couches recorded within 150m of the Proposed Development
	Until such time as otters have been successfully evacuated from active holts, the following provisions will apply to all construction works:
	• No works will be undertaken within 150m of any holts at which breeding females or cubs are present. Until consultation with NPWS, works closer to such breeding holts may take place - provided appropriate mitigation measures detailed below are in place.
	• No wheeled or tracked vehicles (of any kind) will be used within 20m of active, but non-breeding, otter holts. Light work, such as digging by hand or scrub clearance should also not take place within 15m of such holts, except under licence.
	• The prohibited working area associated with otter holts will where appropriate, be fenced with temporary fencing prior to any possibly invasive works. Fencing will be in accordance with Clause 303 of the TII's Specification for Roadworks (TII 2011). Appropriate awareness of the purpose of the enclosure will be conveyed through notification to site staff and sufficient signage should be placed on each exclusion fence. All contractors or operators on site will be made fully aware of the procedures pertaining to each affected holt.
	Ecological Clerk of Works/Retained Ecologist
	• Were a new holt to be encountered within 150 metres (up and downstream) of watercourse crossing, NPWS consultation will be sought, and the services of an Ecological Clerk of Works (EcOW) or retained Ecologist (both with experience with otter survey/mitigation) would be required.
	• The appointed contractor shall employ the services of an EcOW with experience in implementing otter mitigation, to oversee and advise works at watercourse crossings for the Proposed Development (they may also undertake the preconstruction survey). The EcOW will have the authority to:
	  ○ Review method statements;
	  ○ Oversee works;
	  ○ Provide instruction to the appointed contractor(s); and,
	  ○ Require the temporary cessation of works, where necessary.
	• The EcOW will deliver a toolbox talk on biodiversity including otter to the appointed contractor(s) working in the proximity of watercourses. This talk will include instructions on identifying otter and details on the protections afforded to otter under Irish and EU legislation. The EcOW will outline the actions which will be taken by the contractor(s) if otter are noted on or near the Proposed Development during construction works.

NIS Section Reference	Description of Mitigation and Monitoring Measures from the NIS
	Measures to Prevent/Reduce Disturbance and Displacement of otters • Night working within/directly adjacent to watercourses where otter are known to commute will be avoided, where possible, and will only be permitted with the prior approval of the planning authority. • Where night-working adjacent to watercourses known to support otter, is required, the advice of a suitably qualified ecologist/ECoW must be sought and a derogation licence, if necessary, will be sought from NPWS permitting such works. **Measures to Reduce Lighting Impacts to Otter** Security lighting in active works areas in close proximity to watercourses with known otter activity will be designed in conjunction with a suitably qualified ecologist to minimise light spill. Similarly, where any new or amended lighting design is required at a watercourse crossing, it should be cognisant of downward light-spill onto watercourses. Measures to reduce light spill may include the following: • The use of sensor / timer triggered lighting; • LED luminaires should be used where possible due to their sharp cut-off, lower intensity, good colour rendition and dimming capability; • Column heights should be considered to minimise light spill; and, • Accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only where needed.
7.2.10	**Measures to prevent habitat degradation as a result of air quality impacts during construction** The measures presented above in Section 7.1.12 will prevent habitat degradation as a result of air quality impacts during construction of the Proposed Development.
7.3	**Boyne Coast and Estuary SAC [001957]**
7.3.6.1	**Measures to Protect Surface Water Quality during Construction** The mitigation measures presented above in Section 7.1.12. will protect surface water quality during construction of the Proposed Development.
7.3.6.2	**Measures to Prevent the Spread of Invasive Species during Construction** The mitigation measures presented above in section 7.1.12 will prevent the spread of invasive species to downstream European sites during the construction of the Proposed Development.
7.4	**Rockabill to Dalkey Island SAC [003000], Lambay Island SAC [000204] & Codling Fault Zone SAC [003015]**
7.4.7.1	**Measures to Protect Surface Water Quality during Construction** The measures presented above in Section 7.1.12 will protect surface water quality during construction of the Proposed Development.
7.5	**Rogerstown Estuary SPA [004015], Malahide Estuary SPA [004025], Lambay Island SPA [004069], Skerries Islands SPA [004122], Baldoyle Bay SPA [004016], North Bull Island SPA [004006], South Dublin and River Tolka Estuary SPA [004024], River Nanny Estuary and Shore SPA [004158], Boyne Estuary SPA [004080], River Boyne and River Blackwater SPA [004232], Howth Head Coast SPA [004113], Dalkey Island SPA [004172], Dundalk Bay SPA [004026], Ireland's Eye SPA [004117], Rockabill SPA [004014], The Murrough SPA [004186], and Stabannan-Braganstown SPA [004091], and the North-West Irish Sea SPA [004236]**
7.5.22.1	**Measures to Protect Surface Water Quality during Construction**

NIS Section Reference	Description of Mitigation and Monitoring Measures from the NIS
	The measures presented above in Section 7.1.12 will protect surface water quality during construction of the Proposed Development.
7.5.22.2	**Measures to Prevent the Spread of Invasive Species during Construction** The mitigation measures presented above in section 7.1.12 will prevent the spread of invasive species to European sites during construction of the Proposed Development.
7.5.22.3	**Measures to prevent disturbance and displacement of SCI species** Where a site Construction Compound is required, its location relative to the Proposed Development is likely to be adjacent to the potential foraging areas. The appointed contractor will undertake the establishment of the following Construction Compounds outside of the wintering bird season (October to March): • CC-16100 Malahide (Caves Strand) • CC-15900W Malahide (Bissets Strand) • CC-52050, CC-51800, CC-51900 Drogheda Substation/Compounds • CC-44900 Laytown Construction Compound • CC-32200 Skerries Substation/Compound • CC 40200 Gormanston Construction Compound In addition, the Construction Compound in Malahide (CC-16100 Caves Strand), and the utilities compound in Laytown (CC- 44390E) will only be in use outside of the wintering bird season (October to March, inclusive) to ensure there are no disturbance related impacts to wintering birds foraging and roosting in the surrounding habitats. As a further precautionary measures, the design of the lighting will ensure that light-spill will not occur in the direction of any adjacent fields. Mitigation measures to reduce light spill will include the following: • The use of sensor/timer triggered lighting; • LED luminaires to be used where practicable; • Column heights to be considered to minimise light spill; and • Accessories such as baffles, hoods or louvres to be used to reduce light spill and direct it only where needed.
7.6	**Seas Off Wexford SPA [004237], Wicklow Head SPA [004127], and Saltee Islands SPA [004002]**
7.6.7.1	**Measures to Protect Surface Water Quality during Construction** The measures presented above in Section 7.1.12 will protect surface water quality during construction of the Proposed Development.
Operational Phase Mitigation	
7.1	**Malahide Estuary SAC [000205], Rogerstown Estuary SAC [000208], North Dublin Bay SAC [000206], South Dublin Bay SAC [000210] and Baldoyle Bay SAC [000199]**

NIS Section Reference	Description of Mitigation and Monitoring Measures from the NIS
7.1.12.2	**Measures to Protect Surface Water Quality during the Operational Phase** Maintenance of the railway and substations will be on-going to ensure the risks are minimised during the Operational Phase. Maintenance activities will be in accordance with Iarnród Éireann best practice procedures to ensure that no additional risks to waterbodies are encountered. Iarnród Éireann will also follow and implement its flood risk management operational procedures which assist in managing flood risk for rolling stock during inclement weather and flooding events, these include: • CCE-TMS-311 - Irish Rail Weather Management Procedures (2017); • CCE-TEB-2014-05 - Guidance On Alerts And Service Restrictions During Adverse Weather Events; and; • CME-TMS-001-008 - Operation Of IÉ RU Rolling Stock On Flooded Track (2016). These procedures specify how Iarnród Éireann: • Monitors and disseminates applicable weather warnings from Met Éireann; • Prepares and implements local weather management plans for predicted adverse weather events; • Sets out recommended flood level limits for their rolling stock passing over flooded tracks; and • Sets out actions to be undertaken by duty managers, drivers, signallers etc when high water alerts are issued. Operational limits have been specified for the different rolling stock (i.e., types of trains) within their fleet, as shown in Chapter 10 (Water) in Volume 2 of the EIAR and in **Figure 27-1** in the NIS. The limits have been set to avoid damage to critical onboard equipment and to mitigate against the risk of a train becoming disabled in a flooded area. The limits are also subject to change depending on the track and weather conditions. It is important to note that no trains may operate over flooded track until permitted to do so by Iarnród Éireann's Infrastructure Department. Electric Multiple Units (EMUs) are the type of rolling stock of primary concern for this study; however diesel units will continue to use the railway line. The maximum limit identified within the procedure for the EMU is the top of the railway track. A typical railway track is approximately 170mm deep from ground level.  **Figure 27-1 Iarnród Eireann RU Rolling Stock Operating Procedure on Flooded Track Condition**

NIS Section Reference	Description of Mitigation and Monitoring Measures from the NIS
7.1.12.4	**Measures to Prevent introduction /spreading of non-native Invasive species during Operation** Once the Proposed Development is in operation, and in the absence of any required management during the Construction Phase, which might extend into the Operational Phase depending on the method of eradication used, Iarnród Éireann will implement a maintenance and management regime subject to their current management procedures for trackway maintenance, where any introduction of non-native invasive plant species are managed, across their assets or the ongoing control and management of invasive species on their network. This includes the following documents, which can be found in Appendix 1.6: • Control and Management of Vegetation; • Identification and Control of Japanese Knotweed; and • Identification and Control of Giant Hogweed.
7.2	**River Boyne and River Blackwater SAC [001957]**
7.2.7	**Measures to Protect Surface Water Quality during Operation** The measures presented above in Section 7.1.12 will protect surface water quality during operation of the Proposed Development.
7.2.8	**Measures to Prevent introduction /spreading of non-native Invasive species during Operation** The measures presented above in Section 7.1.12 will prevent the spread of non-native invasive species to downstream European sites during operation of the Proposed Development.
7.3	**Boyne Coast and Estuary SAC [001957]**
7.3.6.1	**Measures to Protect Surface Water Quality during Operation** The mitigation measures presented above in Section 7.1.12 will protect surface water quality during operation of the Proposed Development.
7.3.6.2	**Measures to Prevent the Spread of Invasive Species during Operation** The mitigation measures presented above in section 7.1.12 will prevent the spread of invasive species to downstream European sites during the operation of the Proposed Development.
7.4	**Rockabill to Dalkey Island SAC [003000],Lambay Island SAC [000204] & Codling Fault Zone SAC [003015]**
7.4.7.1	**Measures to Protect Surface Water Quality during Operation** The measures presented above in Section 7.1.12 will protect surface water quality during operation of the Proposed Development.
7.5	**Rogerstown Estuary SPA [004015], Malahide Estuary SPA [004025], Lambay Island SPA [004069], Skerries Islands SPA [004122], Baldoyle Bay SPA [004016], North Bull Island SPA [004006], South Dublin and River Tolka Estuary SPA [004024], River Nanny Estuary and Shore SPA [004158], Boyne Estuary SPA [004080], River Boyne and River Blackwater SPA [004232], Howth Head Coast SPA [004113], Dalkey Island SPA [004172], Dundalk Bay SPA [004026], Ireland's Eye SPA [004117], Rockabill SPA [004014], The Murrough SPA [004186], and Stabannan-Braganstown SPA [004091], and the North-West Irish Sea cSPA [004236]**
7.5.22.1	**Measures to Protect Surface Water Quality during Operation** The measures presented above in Section 7.1.12 will protect surface water quality during operation of the Proposed Development.
7.5.22.2	**Measures to Prevent the Spread of Invasive Species during Operation**

NIS Section Reference	Description of Mitigation and Monitoring Measures from the NIS
	The mitigation measures presented above in section 7.1.12 will prevent the spread of invasive species to European sites during operation of the Proposed Development.
7.5.22.4	**Measures to prevent direct injury/mortality of SCI bird species during Operation** The following mitigation shall be implemented for the protection of SCI species. The feeder wire along both sides of the new Single-Track Cantilever OHLE masts will be fitted with a device to make lines more visible to commuting, foraging and migrating SCI species. Although the information surrounding the efficacy of bird diverters with a species-specific focus is limited, a wide range of wire marking devices can been used, generally falling into three basic designs; aerial marker spheres, spirals, and suspended devices (swinging, flapping, and fixed) (APLIC, 2012). The hanging device is proposed here (**Figure 27-2**) as it is universal, cost-effective, allows easy installation, remains in position in severe weather conditions and fits a range of conductors/wires. Like other diverters (because there are few comparative studies), there is extensive field studies (Prinsen et al., 2011) showing that when installed properly they can significantly decrease bird strike. Hanging devices (e.g. Raptor Clamp Diverter, Fire Fly) are suspended from the wire with fixed or swinging plates or flappers and are designed to increase the visibility of overhead lines and reduce the incidence of bird collisions with overhead cables.  **Figure 27-2 Examples of hanging tabs (APLIC, 2012)** Specification requirements include (derived from SNH Guidance, 2016): • Devices should vary in colour (e.g. black and white), be as reflective as possible with glowing surfaces and be capable of a swinging or flapping motion making them more visible and effective (ESKOM Transmission, 2009) (see Figure 27-2). Devices shall not be restricted in their movement; • Devices should be placed 5m apart and staggered on parallel lines. Based on various studies as reported by APLIC (2012) in the United States, data recommends spacing between 4.6 m and 30 m. As this is largely dependent on the extent of the overhead lines which requires mitigation through diversion devices, 10m is considered appropriate for the Viaducts (i.e. Malahide, Rogerstown, Balbriggan), and at areas where there is no tree/building cover leaving the proposed OHLE exposed (i.e. Gormanston Station – Monsey Accommodation centre), along the Proposed Development, as advised in APLIC (2012) report for these types of bird diverter, however they will be spaced so that the devices will be no more than 5m apart on separate lines; • Devices should be as large as possible for maximum visibility (i.e. diameter of at least 20 cm and length of at least 10 to 20cm).

NIS Section Reference	Description of Mitigation and Monitoring Measures from the NIS
	A study completed by Jenkins et al., (2010) concluded that by line marking with devices that increase visibility of the line, are likely to lower general collision rates of SCI bird species by 50% to 80%. Other studies have also shown a reduction of collision rates by 50% to 94% (Prinsen et al., 2011); • Line markers shall require annual maintenance and replacement, ensuring that markers remain in position and functional throughout the lifetime of the Proposed Development.
7.6	**Seas Off Wexford SPA [004237], Wicklow Head SPA [004127], and Saltee Islands SPA [004002]**
7.6.7.1	**Measures to Protect Surface Water Quality during Operation** The measures presented above in Section 7.1.12 will protect surface water quality during operation of the Proposed Development.

27.3 References

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