



Cork Line Level Crossings
Appendix 1L: Schedule of Mitigation
Iarnród Éireann

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Cork Line Level Crossings

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Appendix 1L: Schedule of Mitigation

1L.1 Introduction

The purpose of this document is to provide a comprehensive schedule of all mitigation measures associated with the proposed Project.

The schedule collates all mitigation set out within the Environmental Impact Assessment Report (EIAR).

The mitigation associated with each document has been set out in a series of tables which include the applicable reference document i.e. the EIAR chapter, the mitigation measure, the specific section and page where it has been cited. The tables also include a column indicating who has responsibility for addressing the mitigation.

In addition to the above, for ease of reference, the mitigation has been separated not only in terms of each document outlined above but also by topic area i.e. Table 2.1 below sets out EIAR mitigation applicable to Population and Human Health.

1L.2 Environmental Impact Assessment Report Mitigation Measures

Table 2.1: Mitigation Measures for Population and Human Health (Volume 3, Chapter 6)

Mitigation Measure	Reference within EIS	Responsibility
Mitigation for Amenity Impacts: construction and operational Phases		
Mitigation measures are set out under each site where required. These include noise abatement and traffic control measures during construction to prevent health effects; and changed access arrangements to avoid severance.	Volume 3, Chapter 6: Population and Human Health Section: 6.8 Mitigation Measures	As per mitigation measures identified in Volume 3 Chapter 11, Traffic and Transport, Chapter 10 Noise and Vibration, Chapter 15 Air Quality and Chapter 13 Landscape and Visual.

Table 2.2: Mitigation Measures for Biodiversity (Volume 3, Chapter 7)

Mitigation Measure	Reference within EIS	Responsibility
Construction Phase Mitigation		
<p>Pollution Control of surface water Measures have been designed with reference to the following guidelines:</p> <ul style="list-style-type: none"> Construction Industry Research and Information Association (CIRIA) C648 Control of Water Pollution from Linear Construction Projects: Technical Guide (Murnane et al., 2006a); CIRIA C649 Control of Water Pollution from Linear Construction Projects: Site Guide (Murnane et al., 2006b); CIRIA C532: Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors (Masters-Williams et al., 2001); and Guidelines on Protection of Fisheries during Construction Works in and Adjacent to Waters (Inland Fisheries Ireland, 2016). 	Volume 3, Chapter 7: Biodiversity Section: 7.7.1	Client/Appointed Contractor
<p>Control of Silt Laden Runoff Surface water runoff at the construction sites will be managed to prevent flow of silt laden surface water flowing into surface water receptors.</p>		

Mitigation Measure	Reference within EIS	Responsibility
<p>The contractor shall be obliged to ensure no deleterious discharges are released from then sites to the nearby waterbodies during construction. If a discharge to a watercourse is necessary, the water will pass through a swale or silt buster prior to discharge. Levels of suspended solids in any discharge will be not greater than 25mg/l as per IFI guidance (2016) and flows will be controlled to levels appropriate to the receiving water. It is possible that such a discharge may require a licence under the Water Pollution Acts 1977 & 1990, as amended and the Arterial Drainage Act 1945 & 1995, as amended. The Contractor will liaise with the regulatory authorities at an early stage to determine the necessity for licences and include the appropriate application time required in any construction programme.</p> <p>Silt fences will be erected along the boundary of water bodies to prevent any silt laden runoff from impermeable surfaces, temporary or permanent, as well as spoil heaps within the construction working width.</p> <p>Reinstatement of any banks affected as a result of silt laden run off during construction will be reinstated back to pre-development conditions.</p>		
<p>Stockpiling of Materials</p> <p>During site set up, sites would be either cleared in stages to prevent bare earth being exposed for prolonged periods, or the bare earth would be immediately covered in a gravel/plastic covering to reduce the likelihood of sediment laden run-off following rainfall events. Stripped soil will be stockpiled more than 10m away from the surface interceptor drain described above. Stockpiles will be in a dry zone that is not subject to flooding. The following measures will be put in place by the Contractor with regard to stockpiling of material:</p> <ul style="list-style-type: none"> ▪ temporary stockpiles will be located away from drains and watercourses. Stockpiles will not be located within 10m of a watercourse; ▪ for watercourse crossings, stockpiles will not be located anywhere within the crossing working area; ▪ management of stockpiles to prevent siltation of watercourse systems through runoff during rainstorms will be required with the final measures to be determined by the Contractor. These will include the following measures or equivalent measures: <ul style="list-style-type: none"> ▪ allowing the establishment of vegetation on the exposed soil; ▪ providing silt fences or straw barriers at the toe of the stockpile to mitigate runoff during rain events; ▪ surrounding stockpiles with cut-off ditches to contain runoff; ▪ directing any runoff to the site drainage system or filter drains along the Construction Working Width and to the settlement pond (or other) treatment systems; and 		

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Mitigation Measure	Reference within EIS	Responsibility
<p>providing bunds or another form of diversion to keep runoff from entering the stockpile area.</p>		
<p>Storage of Materials</p> <ul style="list-style-type: none"> ▪ all oil and diesel storage facilities will be at least 30m from any watercourse including surface water drains; ▪ spill kits and drip trays will be provided for all equipment and at locations where any liquids are stored and dispensed; ▪ storage areas for solid materials, including waste soils, will be designed and managed to prevent deterioration of the materials and their escape (via surface runoff or wind blow); ▪ storage areas will be kept secure to prevent acts of vandalism that could result in leaks or spills; and ▪ all containers of any size will be correctly labelled indicating their contents and any hazard warning signs. 		
<p>Fuel Tanks, Drums, Mobile Bowsers and Bunds</p> <p>The following measures will be implemented across the site for the prevention of spills:</p> <ul style="list-style-type: none"> ▪ Fuel tanks, drums and mobile bowsers (and any other equipment that contains oil and other fuels) will have a secondary containment, for example, double skinned tanks; ▪ all tanks, drums and mobile bowsers will be located in a sealed impervious bund with sufficient capacity to contain at least 25% of the total volume of the containers or 110% of the largest container, whichever is the greatest; ▪ storage areas will be covered, wherever possible, to prevent rainwater filling the bunded areas; ▪ fuel fill pipes will not extend beyond the bund wall and will have a lockable cap secured with a chain; ▪ where fuel is delivered through a pipe permanently attached to a tank or bowser: ▪ the pipe will be fitted with a manually operated pump or a valve at the delivery end which closes automatically when not in use; ▪ the pump or valve will be fitted with a lock; ▪ the pipe will be fitted with a lockable valve at the end where it leaves the tank or bowser; ▪ the pipework will pass over and not through bund walls; ▪ tanks and bunds will be protected from vehicle impact damage; ▪ tanks will be labelled with contents; capacity information and hazard warnings; and ▪ all valves, pumps and trigger guns will be turned off and locked when not in use. All caps on fill pipes will be locked when not in use. ▪ suitable precautions will be taken to prevent spillages from equipment containing small quantities of hazardous substances (for example, chainsaws and jerry cans) including: 		

Mitigation Measure	Reference within EIS	Responsibility
<ul style="list-style-type: none"> ▪ each container or piece of equipment will be stored in its own drip tray made of a material suitable for the substance being handled; and ▪ containers and equipment will be stored on a firm, level surface. <p>For deliveries and dispensing activities, the Contractor will ensure that:</p> <ul style="list-style-type: none"> ▪ site-specific procedures are in place for bulk deliveries; ▪ delivery points and vehicle routes are clearly marked; and ▪ emergency procedures are displayed, and a suitably sized spill kit is available at all delivery points, and staff are trained in these procedures and the use of spill kits. 		
<p>Vehicles and Plant</p> <p>The use of vehicles and plant poses similar risks to those posed by storage of liquids. Fuel and oil may leak from such equipment which may enter drains and/or watercourses, as well as contaminating the ground itself. The following measures will be implemented to reduce this risk:</p> <ul style="list-style-type: none"> ▪ vehicles and plant provided for use on the site will be in good working order to ensure optimum fuel efficiency, and will be regularly inspected to ensure they are free from leaks; ▪ sufficient spill kits will be carried on all vehicles; ▪ vehicles and plant will be regularly maintained to ensure that they are working at optimum efficiency and are promptly repaired when not in good working order; ▪ vehicles and plant will not park near or over drains; and ▪ refuelling of vehicles and plant will be carried out on hard standing, using drip trays to ensure no fuel can contaminate the ground outside of the bunded areas. 		
<p>Working in or Near Watercourses</p> <ul style="list-style-type: none"> ▪ works within and adjacent to watercourses will be conducted during forecast low flow periods where possible; ▪ in-stream works will not be carried out in watercourses frequented by salmon or trout during the Annual Close Season. The duration of the season varies regionally within the period from the beginning of October to the end of February inclusive (IFI, 2016). River and brook lamprey spawn during the period March-April; translocation and instream works should be undertaken outside of the spawning season. The timing of works will be considered on a site-specific basis and in agreement with the IFI; 		

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Mitigation Measure	Reference within EIS	Responsibility
<ul style="list-style-type: none"> ▪ operation of machinery in-stream will be kept to an absolute minimum. All construction machinery operating in-stream will be mechanically sound to avoid leaks of oils, hydraulic fluid, etc. Machinery will be cleaned and checked prior to commencement of in-stream works; ▪ the design of temporary settlement ponds, the outfalls from these temporary ponds and the construction method statements for their installation will be agreed with IFI prior to construction; ▪ the area of disturbance of the watercourse bed and bank will be the absolute minimum required for the installation of outfalls/ culverts; ▪ any dewatering flows will be directed to the construction drainage system and to the settlement pond (or other) treatment system; ▪ sediment mats/ silt traps or similar will be located immediately downstream of the works within and adjacent to the watercourses. These will be inspected daily, maintained and cleaned regularly during the course of site works. Diversion of water to and from a temporary diversion channel will only take place during the period March to September (IFI, 2016) or as agreed with the IFI; ▪ small check dams will be constructed in the cut-off watercourse to trap any sediment, and a sediment trap will be provided immediately downstream of the diversion to the existing watercourse; and ▪ where in-stream bed material is to be removed, coarse aggregates, if present, will be stockpiled at least 10m away from the watercourse for replacement following reinstatement of a watercourse channel. ▪ Reinstatement of any banks affected during construction works near a watercourse will be reinstated back to pre-development conditions. ▪ Reinstatement of any banks affected during construction works near a watercourse will be reinstated back to pre-development conditions. 		
<p>Use of Concrete</p> <p>Where the use of concrete near water cannot be avoided, the following control measures will be employed:</p> <ul style="list-style-type: none"> ▪ when working in or near the surface water and the application of in-situ materials cannot be avoided, the use of alternative materials such as biodegradable oils shall be used; ▪ placing of concrete in or near watercourses will be carried out only under the supervision of the Ecological Clerk of Works (ECoW); ▪ there will be no hosing of concrete, cement, grout or similar material spills into surface water drains. Such spills shall be contained immediately, and runoff prevented from entering the watercourse; ▪ concrete waste and wash-down water will be contained and managed on-site to prevent pollution of all surface watercourses; and ▪ washout from concrete lorries will not be permitted on-site and will only take place at the batching plant (or other appropriate facility designated by the manufacturer). 		

Mitigation Measure	Reference within EIS	Responsibility
<p>Small Mammals</p> <p>Removal and clearance of vegetation may affect small mammal species if present in these habitats. The following measures will be adhered to in order to avoid impacts to small mammal species:</p> <ul style="list-style-type: none"> ▪ any excavations will be covered at night to prevent small mammals from falling in or becoming trapped; ▪ working at night will be prohibited; ▪ any lights will be turned off after working hours; ▪ noise levels will not exceed permissible levels for construction works (70dB(A)) based on Guidelines for the Treatment of Noise and Vibration in National Road Schemes (NRA, 2004); and ▪ post construction, the site will be revegetated. 		
<p>Amphibians</p> <p>Removal and clearance of vegetation may affect amphibians if present in these habitats. The following measures will be adhered to in order to avoid impacts to amphibians:</p> <ul style="list-style-type: none"> ▪ a pre-construction survey will identify whether amphibians are present, including frog/newt spawn during the breeding season (February – May) within the study area and if translocation is required then a suitable receptor habitat will be identified; ▪ a toolbox talk will be carried out to ensure all site personnel are aware of these protected species and their mitigation requirements; ▪ if found to be present during pre-construction surveys or during works, amphibians and/or spawn will be cleared by a suitably qualified and experienced ecologist under licence to displace any animals present within the works area prior to construction. In particular areas where soil heaps are to be placed will be checked. Any amphibians removed will be placed into alternative suitable receptor habitat in the locality; ▪ where practical in the context of construction, water levels will be maintained in any watercourses potentially used by amphibians; and ▪ habitat reinstatement will re-create, as far as is practicable, the former channels so that amphibians may use these post-construction. 		
<p>Breeding Birds - BoCCI Amber and Green List Species</p> <p>Vegetation (e.g. hedgerows, trees and scrub) will not be removed between the 1 March and 31 August, to avoid impacts on nesting birds. Where this seasonal restriction cannot be adhered to, then these areas will be inspected by a suitably qualified ecologist for the presence of breeding birds prior to clearance. Where nests are present, an</p>		

Mitigation Measure	Reference within EIS	Responsibility
<p>ecologist will make a decision as to whether a licence is required for vegetation removal. Alternatively, the ecologist can demarcate a suitable buffer around an active nest and clearance within this area will be postponed until the chicks have fledged. A suitable exclusion zone will be established dependant on the species identified. Areas found not to contain nests must be cleared within three days of the inspection; otherwise repeat inspections will be required. If vegetation is to be cleared in the breeding season (under supervision of an ecologist) it will be chipped, removed or covered (ideally) on the same day to prevent birds from nesting.</p>		
<p>Site-Specific Construction Mitigation Measures</p>		
<p>XC201 Thomastown</p> <p>All impacts associated with construction activities at XC201 Thomastown will be avoided through the adoption of generic mitigation measures, as outlined above.</p>	<p>Volume 3, Chapter 7: Biodiversity Section: 7.7.1</p>	<p>Client/Appointed Contractor</p>
<p>XC209 Ballyhay</p> <p>It is not anticipated that a significant volume of water will be dewatered from the trenches, however as part of the additional Ground Investigation proposed for prior to construction, groundwater samples will be taken. The groundwater quality samples will identify if there is any issue with groundwater quality. Based on the results, it may be possible to dewater and discharge to the Awbeg (Buttevant East) River following settlement; alternatively, if other contamination such as metals or hydrocarbons are detected, additional measures will be needed which could include additional treatment or disposal off site.</p>		
<p>XC211 Newtown and XC212 Ballycoskery</p> <p>Designated Sites</p> <p>Mitigation measures to protect European sites have been set out in the NIS, included in Volume 5, Appendix 7H. These measures have been developed to protect the River Blackwater (Cork/Waterford) SAC and Kilcolman Bog SPA. Kilcolman Bog pNHA has also been identified as a KER; this site is concurrent with the boundaries of, and is designated for the same QI as, Kilcolman Bog SPA and will therefore be protected by the mitigation measures set out in the NIS.</p> <p>Fish</p>		

Mitigation Measure	Reference within EIS	Responsibility
<p>Mitigation measures regarding pollution control have been detailed in Volume 3, Chapter 7: Biodiversity Section 7.7.1.1. These measures have been developed to protect watercourses and the habitats and species that they support and will avoid a reduction in water quality during construction.</p> <p>Specific control measures are required for the installation of the proposed culvert to the west of the railway at Ballycoskery. The culvert will be pre-fabricated and clean, so as to avoid concrete washings contamination. If the ditch is flowing, it will be dammed and pumped over the installation area to avoid the transportation sediment downstream. Additional in-stream measures will also be deployed, such as straw bales and oil booms to ensure there is no downstream impact as a result of the installation process.</p> <p>Fish species present in the River Awbeg, downstream of the Newton River, will be protected by these mitigation measures.</p> <p>Invertebrates (white-clawed crayfish)</p> <p>Mitigation measures regarding pollution control have been detailed in Volume 3, Chapter 7: Biodiversity Section 7.7.1.1. These measures have been developed to protect watercourses and the habitats and species that they support and will avoid a reduction in water quality during construction.</p> <p>Specific control measures are required for the installation of the proposed culvert to the west of the railway at Ballycoskery. The culvert will be pre-fabricated and clean, so as to avoid concrete washings contamination. If the ditch is flowing, it will be dammed and pumped over the installation area to avoid the transportation sediment downstream. Additional in-stream measures will also be deployed, such as straw bales and oil booms to ensure there is no downstream impact as a result of the installation process.</p> <p>White-clawed crayfish present in the River Awbeg, downstream of the Newton River, will be protected by these mitigation measures.</p> <p>Wintering Birds</p> <p>No infilling or direct discharge of pollutants will occur to the pond at Newton, which is used by several species of wintering birds. Pollution control measures are detailed in Volume 3, Chapter 7: Biodiversity Section 7.7.1.1. These measures will ensure no disturbance or loss of habitat for wintering birds at Newtown.</p>		

Mitigation Measure	Reference within EIS	Responsibility
<p>XC215 Shinanagh</p> <p><i>Invasive Species</i></p> <p>The mitigation measures described below follow the recommendations set out in the <i>Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads</i> (National Roads Authority, 2010).</p> <ul style="list-style-type: none"> ▪ a pre-construction survey will be carried to inform a change in the baseline; ▪ all staff will be informed of the presence of Japanese knotweed and any other invasive species through toolbox talks; ▪ exclusion zones will be established where necessary to prevent spread of invasive species; ▪ no machinery will be allowed within exclusion zones other than where necessary to undertake treatment measures; ▪ any plant material and soil containing plant material must be disposed of in accordance with the NRA (2010) guidelines; and ▪ care will be taken near watercourses to ensure that material that contains flower heads, seeds or cuttings of any invasive species will be disposed of correctly and not enter watercourses. <p>Badger</p> <p>The mitigation measures described below follow the recommendations set out in the Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (National Roads Authority, 2006).</p> <p>The following lists mitigation measures which are to be undertaken during works:</p> <ul style="list-style-type: none"> ▪ a pre-construction survey will be carried out to inform a change in the baseline; ▪ if badgers are found to be present any works within 30m of a sett will be supervised on-site and fulltime by a suitably qualified ecologist (extended to 50m during the breeding season); ▪ night-time working will be restricted as far as possible within 100m of a sett; ▪ the use of noisy plant and machinery in the vicinity of badger setts will cease before sunset; ▪ any excavations will be covered at night to prevent badger from falling in or becoming trapped; ▪ any borrow pits or spoil heaps will be sited at a minimum distance of 30m from setts; and ▪ chemicals shall not be used within 20m of a badger sett. 		

Mitigation Measure	Reference within EIS	Responsibility
<p>XC219 Buttevant</p> <p>Designated Sites</p> <p>Mitigation measures to protect European sites have been set out in the NIS, included in Volume 5, Appendix 7G. These measures have been developed to protect the River Blackwater (Cork/Waterford) SAC and Kilcolman Bog SPA. Kilcolman Bog pNHA has also been identified as a KER; this site is concurrent with the boundaries of, and is designated for the same QI as, Kilcolman Bog SPA and will be protected by the mitigation measures set out in the NIS.</p> <p>Otter</p> <p>The mitigation measures described below follow the recommendations set out in the <i>Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes</i> (National Roads Authority, 2008).</p> <p>The following list of mitigation measures which are to be undertaken during works:</p> <ul style="list-style-type: none"> ▪ a pre-construction survey will be carried out to inform a change in the baseline; ▪ if otters are found to be present no works should be undertaken within 150m of any holts at breeding females or cubs are present; ▪ no wheeled or tracked vehicles should be used with 20m of active, but non-breeding, holts; ▪ light work, such as digging by hand or scrub clearance should not take place within 15m of such holts, except under licence; ▪ any excavations will be covered at night to prevent otter from falling in or becoming trapped; ▪ working at night will be prohibited; ▪ any lights will be turned off after working hours or angled away from watercourses; ▪ noise levels will not exceed permissible levels for construction works (70dB(A)) based on Guidelines for the Treatment of Noise and Vibration in National Road Schemes (NRA, 2004); ▪ post construction, the site will be revegetated; and ▪ pollution control measures are detailed in Section 7.7.1.1. Implementation of these measures will avoid a reduction in water quality that could impact otter through reduced prey availability. <p>Fish</p>		

Mitigation Measure	Reference within EIS	Responsibility
<p>Mitigation measures regarding pollution control have been detailed in Section 7.7.1.1. These measures have been developed to protect watercourses and the habitats and species that they support and will avoid a reduction in water quality during construction.</p> <p>Additional measures that will be undertaken at XC219 Buttevant to protect fish species:</p> <ul style="list-style-type: none"> ▪ where culverts are to be installed the area will be dewatered to provide a dry working area. The Pepperhill River and the ditch at XC219 Buttevant will have culverts installed at separate times so that flows can be maintained downstream during the installation; ▪ the culverts will be pre-fabricated and clean, so as to avoid concrete washings contamination; ▪ netting, sandbags and/or dumpy-bags filled with rock will be installed upstream to prevent fish travelling downstream into the working area; ▪ fish will be removed from the working area through electrofishing and moved upstream of the dammed area; ▪ water will then be over pumped continually to ensure a dry working area. This must be pumped through a silt buster or onto the field to avoid sediment from becoming suspended within the watercourse; ▪ additional in-stream measures will also be deployed, such as straw bales and oil booms to ensure there is no downstream impact as a result of the installation process; and ▪ once construction is completed the watercourse will be re-wetted under the direction of an Ecological Clerk of Works (EcoW). Water will be released slowly and silt mats, sediment traps and haybales will be used to avoid a sudden influx of sediment to the system. A silt buster will be used where required. <p><i>Invertebrates (white-clawed crayfish)</i></p> <p>Mitigation measures regarding pollution control have been detailed in Section 7.7.1.1. These measures have been developed to protect watercourses and the habitats and species that they support and will avoid a reduction in water quality during construction.</p> <p>Additional measures that will be undertaken at X219 Buttevant to protect white-clawed crayfish:</p> <ul style="list-style-type: none"> ▪ prior to dewatering of the Pepperhill River and ditch at XC219 Buttevant, hand searches will be conducted and any crayfish found will be removed and moved upstream of the dammed area. This will be carried out by the EcoW under licence; and ▪ mitigation measures listed above for fish species at XC219 Buttevant will also avoid impacts to white-clawed crayfish. 		

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Mitigation Measure	Reference within EIS	Responsibility
<p>Wintering birds</p> <p>Where timing of works cannot be completed outside the critical period (October – March) measures will be implemented to mitigate the disturbance impacts to whooper swan foraging in the vicinity of XC219 Buttevant level crossing. The following measures would be required:</p> <ul style="list-style-type: none"> ▪ the existing treeline along the R522 road at Buttevant will be retained in so far as is possible in order to act as natural visual screen along the works area (Volume 5, Appendix 7C Photograph 23); ▪ where the treeline cannot be retained, then artificial screening will be put in place. Non-transparent visual screening will be erected along the north of the works area to hide the construction works and the movement of machinery/ workforce to minimise disturbance to whooper swan; ▪ screening will be installed in early September to ensure the site/works are screened before the main migration period (October). Erection of fencing later than this could potentially cause further disturbance to the birds; ▪ the fencing will be of adequate height to screen the works area (2 – 3m) or as advised by an ecologist; ▪ this screening will remain in place for the duration of the works; and ▪ an EcoW will supervise the erection of the screening (if natural screening cannot be retained) and provide guidance to the appointed contractor(s) through a toolbox talk ensuring these measures are effective. The EcoW will make regular checks of the screening throughout the works to ensure it is maintained in good condition and working order. 		
Operation Phase Mitigation		
<p>Pollution Control</p> <p>No drainage works are proposed at XC187 Fantstown as limited works within the railway line boundary only are proposed; none is required either at XC209 Ballyhay as limited construction is proposed to take place there and the CCTV infrastructure does not require drainage or any alterations to existing drainage systems. For the remaining sites, in keeping with <i>NRA TB 13 – Revised Road Drainage Standards</i>, over the edge drainage is proposed in the design for all locations, supplemented with additional features to accommodate the presence of structures or site constraints where necessary (see Table 7.25). New swale ditches are proposed, located at the toe of the road embankment, that will then drain back to the low points to maximise attenuation and pollution control as part of a SuDS management chain.</p> <p>The swale features will be grassed, with shallow side slopes and a long-wetted perimeter to reduce flow rates and velocities. Typically, they will be underlain by a filter material and perforated pipe to provide a second stage of</p>	<p>Volume 3, Chapter 7: Biodiversity Section: 7.7.2</p>	<p>Client/Appointed Contractor</p>

Mitigation Measure	Reference within EIS	Responsibility
<p>treatment. The width of the swale varies between 3 and 7 metres depending on the site, and the depth (including 0.15 metres freeboard) is up to 0.75 metres and typically less than 0.5 metres. See TII Publication Number CC-SCD-00525 for typical details. Where agricultural or local access must be maintained, a short section of culvert will be constructed beneath the respective junction to ensure connectivity of the swale ditches either side of the access.</p> <p>The swale ditches will outfall directly or indirectly into water bodies within the River Mague (the Fantstown and Thomastown crossings are located within this sub-catchment) or River Awbeg (all other crossings are located within this sub-catchment) sub-catchments respectively. The maximum outflow of the swales will be capped at greenfield runoff rates.</p> <p>XC201 Thomastown</p> <p><i>Habitats</i></p> <p>Areas of existing vegetation will be retained and enhanced insofar as possible. Hedgerows will be retained or reinstated where possible. Where hedgerows will need to be removed to facilitate the footprint of the proposed Project, these will be replaced with areas of planting throughout the site. Mitigation measures for the loss of habitat at XC201 Thomastown, planting of native scrub and trees, will be incorporated into the landscape plan (see Volume 3, Chapter 13: Landscape and Visual). Plant species will be selected to complement the existing broadleaf hedgerow species mix around the site and will be of local provenance. Any residual space between the landscape measures will be planted with a wild grass seeding mix of local provenance.</p> <p><i>Bats</i></p> <p>Mitigation measures for the loss of habitat at Thomastown have been detailed above. These measures will also protect bat species from loss of foraging and commuting habitat.</p> <p><i>Breeding Birds</i></p> <p><u>BoCCI Amber and Green List Species</u></p> <p>To mitigate for loss of nesting habitat trees, hedgerows and scrub will be incorporated into the landscape plan at Thomastown. Whilst no significant impacts are anticipated during the operational phase, this will provide compensatory habitat for some bird species. Nest boxes will also be provided to compensate for passerine habitat</p>		

Mitigation Measure	Reference within EIS	Responsibility
<p>loss. One large mature tree will be lost at XC201 Thomastown. Four nest boxes to accommodate different species will be provided and these will be erected under supervision of a suitably qualified ecologist at appropriate locations.</p> <p>XC211 Newtown and XC212 Ballycoskery</p> <p>Habitats</p> <p>An indicative Mitigation Strategy has been developed (see Appendix 7H) which details the method for translocating the area of tall herb swamps (FS2), including the Annex I habitat (6430) Hydrophilous tall herb swap communities, which will be lost under the footprint of the proposed Project. The extent of the receptor site for this habitat will be based on a like for like area basis.</p> <p>Areas of existing vegetation will be retained and enhanced insofar as possible. Hedgerows will be retained or reinstated where possible. Where hedgerows will need to be removed to facilitate the footprint of the proposed Project, these will be replaced with areas of planting throughout the site. Mitigation measures for the loss of habitat at Newtown and Ballycoskery, planting of native scrub and trees will be incorporated into the landscape plan (see Volume 3, Chapter 13: Landscape and Visual). Plant species will be selected to complement the existing broadleaf hedgerow species mix around the site and will be of local provenance. Any residual space between the landscape measures will be planted with a wild grass seeding mix of local provenance.</p> <p>Bats</p> <p>Mitigation measures for the loss of habitat at XC211 Newtown and XC212 Ballycoskery have been detailed above. These measures will also protect bat species from loss of foraging and commuting habitat.</p> <p>Breeding Birds</p> <p><u>BoCCI Amber and Green List Species</u></p> <p>To mitigate for loss of nesting habitat trees, hedgerows and scrub will be incorporated into the landscape plan at XC211 Newtown and XC212 Ballycoskery. Whilst no significant impacts are anticipated during the operational phase, this will provide compensatory habitat for some bird species. Nest boxes will also be provided to compensate for passerine habitat loss. A small area of scrub will be lost at XC211 Newtown and around 15 large mature trees will be lost at XC212 Ballycoskery. Two nest boxes at XC211 Newtown and fifteen boxes at XC212 Ballycoskery to</p>		

Mitigation Measure	Reference within EIS	Responsibility
<p>accommodate different species will be provided and these will be erected under supervision of a suitably qualified ecologist at appropriate locations.</p> <p>Wintering Birds</p> <p>No infilling or direct discharge of pollutants will occur to the pond at XC211 Newton, which is used by several species of wintering birds. Pollution control measures are detailed in Section 7.7.1.1. These measures will ensure no disturbance or loss of habitat for wintering birds at XC211 Newtown.</p>		
<p>XC215 Shinanagh</p> <p>Habitats</p> <p>Areas of existing vegetation will be retained and enhanced insofar as possible. Hedgerows will be retained or reinstated where possible. Where hedgerows will need to be removed to facilitate the footprint of the proposed Project, these will be replaced with areas of additional planting throughout the site. Mitigation measures for the loss of habitat at XC215 Shinanagh, planting of native scrub and trees will be incorporated into the landscape plan (see Volume 3, Chapter 13: Landscape and Visual). Plant species will be selected to complement the existing broadleaf hedgerow species mix around the site and will be of local provenance. Any residual space between the landscape measures will be planted with a wild grass seeding mix of local provenance.</p> <p>Badger</p> <p>No large areas of badger habitat will be lost. Mitigation measures for the loss of habitat at XC215 Shinanagh have been detailed above. These measures will also protect badgers from loss of foraging and commuting habitat.</p> <p>Bats</p> <p>Mitigation measures for the loss of habitat at XC215 Shinanagh have been detailed above. These measures will also protect bat species from loss of foraging and commuting habitat.</p> <p>Breeding Birds</p> <p><u>BoCCI Amber and Green List Species</u></p>		

Mitigation Measure	Reference within EIS	Responsibility
<p>To mitigate for loss of nesting habitat trees, hedgerows and scrub will be incorporated into the landscape plan at XC215 Shinanagh. Whilst no significant impacts are anticipated during the operational phase, this will provide compensatory habitat for some bird species. Nest boxes will also be provided to compensate for passerine habitat loss. Three large mature trees will be lost at XC215 Shinanagh. Four nest boxes to accommodate different species will be provided and these will be erected under supervision of a suitably qualified ecologist at appropriate locations.</p> <p>XC219 Buttevant</p> <p>Habitats</p> <p>An indicative Mitigation Strategy has been developed (see Appendix 7G) which details the method for translocating the area of dry meadows and grassy verges (GS2), including the habitat corresponding to Annex I habitat (6510) Lowland hay meadows, which will be lost under the footprint of the proposed Project. The extent of the receptor site will be greater than a like for like area to include an area that will be enhanced for invertebrates, reptiles and birds.</p> <p>Areas of existing vegetation will be retained and enhanced insofar as possible. Hedgerows will be retained or reinstated where possible. Where hedgerows will need to be removed to facilitate the footprint of the proposed Project, these will be replaced with areas of planting throughout the site. Mitigation measures for the loss of habitat at Buttevant, planting of native scrub and trees will be incorporated into the landscape plan (see Volume 3, Chapter 13: Landscape and Visual). Plant species will be selected to complement the existing broadleaf hedgerow species mix around the site and will be of local provenance. Any residual space between the landscape measures will be planted with a wild grass seeding mix of local provenance.</p> <p>A section of a stone wall will be removed at this site. The stones from this wall will be retained and moved to the lowland hay meadow receptor site to create refugia for reptiles. An EcoW will be present during these works to check for reptiles and a license may be required if reptiles are found to be present.</p> <p>Bats</p> <p>Mitigation measures for the loss of habitat at XC219 Buttevant have been detailed above. These measures will also protect bat species from loss of foraging and commuting habitat.</p> <p>Breeding Birds</p>		

Appendix 1L: Schedule of Mitigation

Mitigation Measure	Reference within EIS	Responsibility
<p><u>BoCCI Amber and Green List Species</u></p> <p>To mitigate for loss of nesting habitat trees, hedgerows and scrub will be incorporated into the landscape plan at Buttevant. Whilst no significant impacts are anticipated during the operational phase, this will provide compensatory habitat for some bird species. Nest boxes will also be provided to compensate for passerine habitat loss. Three nest boxes to accommodate different species will be provided and these will be erected under supervision of a suitably qualified ecologist at appropriate locations at the proposed project.</p> <p><u>Wintering Birds</u></p> <p>As no significant impacts to wintering birds are predicted as a result of the operation of the proposed Project, no mitigation measures are required.</p>		

Table 2.3: Mitigation Measures for Soils, Geology and Hydrogeology (Volume 3, Chapter 8)

Mitigation Measure	Reference within EIS	Responsibility
Mitigation for Contaminated Land: Contaminated Land		
<p>Any contaminated groundwater intercepted during construction will be treated prior to being discharged or will be disposed of at an appropriate licensed facility.</p> <p>Prior to construction activities, appropriate health and safety and waste management procedures for working with contaminated soils will be established. Waste management procedures will take account of inter alia: The principles of risk assessment, including the concept of the source-pathway-receptor linkage, have been adopted by the Environmental Protection Agency (EPA) for the assessment of Environmental Liabilities 11 and Unregulated Waste Disposal Sites 12. However, there remains no formalised approach to the assessment of risks to human health from contaminated soils or groundwater. These procedures will be implemented as appropriate during construction. This will be developed in cognisance of the soil testing, soil leachability tests and groundwater testing results.</p>	<p>Volume 3, Chapter 8: Soils, Geology and Hydrogeology</p> <p>Section: 8.7.2 Contaminated Land</p>	<p>Client/Appointed Contractor</p>

Appendix 1L: Schedule of Mitigation

Mitigation Measure	Reference within EIS	Responsibility
<p>Risks to construction and maintenance staff working with/near contaminated land will be mitigated by the implementation of the above in combination with the adoption of appropriate systems of work, including personal protective equipment (PPE) as a last resort. In the event that unrecorded contamination is encountered, works should be stopped, and the working procedures reassessed to confirm the working methods remain appropriate.</p>		
<p>Appropriate training of personnel involved in earthworks activities to implement a watching brief to identify potential presence of previously unidentified contamination.</p>		
<p>To maximise the reuse of site-won materials on-site (and minimise the need for disposal of waste in line with the principles of the "Waste Hierarchy") whilst ensuring that no risks are posed to human health nor the water environment, a soil reuse assessment will be undertaken prior to construction. The soil reuse assessment will identify any potential risks posed to both human health and the water environment from potentially contaminated soils reused throughout the proposed Project.</p>		
<p>If excavated soils are deemed unsuitable for reuse, they will be assessed in line with the 'Guidance on Soil and Stone By-products' (in the context of article 27 of the European Communities (Waste Directive) Regulations 2011 (Environmental Protection Agency, June 2019) prior to disposal to determine whether they are hazardous or non-hazardous. This will establish the most appropriate and cost-effective waste stream for the waste materials.</p>		
<p>Where concrete materials are proposed to be used, appropriate guidance such as 'I.S. EN 206-1' should be followed to ensure that ground conditions are appropriate for the use of concrete at each given location.</p>		
Mitigation for Hydrogeology		
<p>PWS209/1, PWS215/2, PWS219/2 and PWS219/3 will be monitored for yield and quality before and during construction. Should any impact be recorded on any of these supplies, an alternative water supply will be provided to the property affected. A site visit will be undertaken to refine the location of PWS209/1. Following this survey, it will be determined whether the supply should be added to the list of private water supplies being monitored.</p>	<p>Volume 3, Chapter 8: Soils, Geology and Hydrogeology Section: 8.7.3 Hydrogeology</p>	<p>Client/Appointed Contractor</p>

Appendix 1L: Schedule of Mitigation

Mitigation Measure	Reference within EIS	Responsibility
Storage of excavated soils and made ground will be minimised on site (spatially and in duration) and all storage areas will be appropriately lined, with adequate drainage management in place. This is to ensure that no polluted water percolates into the ground and minimise run-off and suspended solids.		
Mitigation detailed within Volume 3, Chapter 9: Water and the production of Construction Environmental Management Plan (CEMP) will offer additional protection in relation to potential impacts associated with geology, soils, contaminated land and groundwater. For example, mitigation measures designed to protect the surface water environment will also protect groundwater receptors while air quality mitigation measures will avoid the creation of a statutory nuisance associated with dust and air pollution when working with contaminated land.		
Following completion of the ground investigation, a settlement analysis will be undertaken for the proposed Project at Ballyhay. Should the settlement analysis raise any concerns additional mitigation measures will be implemented for existing rail and road infrastructure and nearby small buildings.		
The backfilling of the trenches in XC209 Ballyhay which fall within the wet grassland area should be backfilled with the material that was dug out to prevent any preferential pathways being created.		

Table 2.4: Mitigation Measures for Water (Volume 3, Chapter 9)

Mitigation Measure	Reference within EIS	Responsibility
Generic Mitigation Measures for Construction Sequencing		
In order to protect water bodies from potential impacts such as increased flood risk, increased volumes of runoff, silty water and accidental spills, it is proposed to install the permanent drainage elements in at the outset, prior to full site clearance.	Volume 3, Chapter 9: Water Section: 9.6: Mitigation Measures	Client/Appointed Contractor
For roadways, the footprint for the proposed swales would be excavated, the perforated pipes laid, soil back-filled and the topsoil seeded. These are positioned either side of the new highways and would then receive any runoff following the rest of the site clearance. The swales at this point would not be connected into local drainage systems, they would be blocked and a small inspection/pumping chamber or pit left open to allow for visual inspection and either the controlled release of clean water to the local drainage system or, if still slightly silty, pumping out to a settlement tank or silt-buster before being discharged. This also allows the rate of flow to be controlled to prevent any increase in flood risk during the construction phase.		

Mitigation Measure	Reference within EIS	Responsibility
<p>Once the highways and bridge structures are almost completed, the swales will be accessed further from those highways to finish their construction and open up permanent connection to outfall points at each site. Then the roads will be finished. On this basis, and with this management plan in place, no operational effect is expected.</p>		
Generic Mitigation Measures		
<p>There are many potentially significant impacts on surface water receptors which will be common to most major construction works and are possible across the various elements of this proposed Project. A number of Generic Mitigation Measures have been identified which will be applied across the proposed Project. These are described in this Section.</p> <p>In addition to this, there are mitigation measures specific to the various proposed Project elements.</p> <p>Consistent with the assessment of impacts during the Construction Phase, generic control measures are described in order to potentially avoid or reduce the potential impacts outlined.</p> <p>These measures have been designed with reference to the following guidelines:</p> <ul style="list-style-type: none"> ▪ Construction Industry Research and Information Association (CIRIA) C648 Control of Water Pollution from Linear Construction Projects: Technical Guide (Murnane et al., 2006); ▪ CIRIA C649 Control of Water Pollution from Linear Construction Projects: Site Guide (Murnane et al., 2006); ▪ 'Control of Water Pollution from Construction Sites, Guidance for Consultants and Contractors' (CIRIA, 2001); and ▪ Inland Fisheries Board document 'Guidelines on Protection of Fisheries During Construction Works in and Adjacent to Waters'. 	<p>Volume 3, Chapter 9: Water Section: 9.6: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>
Generic Mitigation for Control of Silt Laden Runoff		
<p>Specific measures to control silt are planned to be implemented at each of the proposed Project infrastructure sites. Surface water runoff at the construction sites will be managed to prevent flow of silt laden surface water flowing into surface water receptors.</p> <p>If a discharge to a watercourse is necessary, the water will be treated and controlled in accordance with any conditions imposed by regulatory authorities such as the relevant Local Authority, the EPA and/or OPW. It is anticipated that the levels of suspended solids in any discharge will be not greater than 25mg/l and flows will be controlled to levels appropriate to the receiving water. It is possible that such a discharge may require a licence under the Water Pollution Acts 1977 & 1990, as amended and the Arterial Drainage Act 1945 & 1995, as amended. The Contractor will liaise with the regulatory authorities at an early stage to determine the necessity for licences and include the appropriate application time required in any construction programme.</p>	<p>Volume 3, Chapter 9: Water Section: 9.6: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>

Mitigation Measure	Reference within EIS	Responsibility
Silt fences will be erected along the boundary of water bodies to prevent any silt laden runoff from impermeable surfaces, temporary or permanent, as well as spoil heaps within the construction working width.		
Reinstatement of any banks affected as a result of silt laden run off during construction will be reinstated back to pre-development conditions.		
Generic Mitigation for Stockpiling of Materials		
<p>The following measures will be put in place by the Contractor with regard to stockpiling of material:</p> <ul style="list-style-type: none"> ▪ Temporary stockpiles will be located away from drains and watercourses. Stockpiles will not be located within 5m of a watercourse; ▪ For watercourse crossings, stockpiles will not be located anywhere within the crossing working area; ▪ Management of stockpiles to prevent siltation of watercourse systems through runoff during rainstorms will be required with the final measures to be determined by the Contractor. These will include the following measures or equivalent measures: <ul style="list-style-type: none"> ▪ Allowing the establishment of vegetation on the exposed soil; ▪ Providing silt fences or straw barriers at the toe of the stockpile to mitigate runoff during rain events; ▪ Surrounding stockpiles with cut-off ditches to contain runoff; ▪ Directing any runoff to the site drainage system or filter drains along the Construction Working Width and to the settlement pond (or other) treatment systems; and ▪ Providing bunds or another form of diversion to keep runoff from entering the stockpile area. 	<p>Volume 3, Chapter 9: Water Section: 9.6: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>
Generic Mitigation for Storage of Materials		
<p>The following measures will be implemented across the site for the storage of materials:</p> <ul style="list-style-type: none"> ▪ All oil and diesel storage facilities will be at least 30m from any watercourse including surface water drains; ▪ Spill kits and drip trays will be provided for all equipment and at locations where any liquids are stored and dispensed; ▪ Storage areas for solid materials, including waste soils, will be designed and managed to prevent deterioration of the materials and their escape (via surface runoff or wind blow); ▪ Storage areas will be kept secure to prevent acts of vandalism that could result in leaks or spills; and ▪ All containers of any size will be correctly labelled indicating their contents and any hazard warning signs. 	<p>Volume 3, Chapter 9: Water Section: 9.6: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>
Generic Mitigation for Fuel Tanks, Drums, Mobile Bowsers and Bunds		

Mitigation Measure	Reference within EIS	Responsibility
<p>Fuel tanks, drums and mobile bowzers (and any other equipment that contains oil and other fuels) will have a secondary containment, for example, double skinned tanks. All tanks, drums and mobile bowzers will be located in a sealed impervious bund with sufficient capacity to contain at least 25% of the total volume of the containers or 110% of the largest container, whichever is the greatest.</p> <p>The following measures will be implemented across the site for Fuel Tanks, Drums, Mobile Bowzers and Bunds:</p> <ul style="list-style-type: none"> ▪ Storage areas will be covered, wherever possible, to prevent rainwater filling the bunded areas; ▪ Fuel fill pipes will not extend beyond the bund wall and will have a lockable cap secured with a chain; ▪ Where fuel is delivered through a pipe permanently attached to a tank or bowser: <ul style="list-style-type: none"> ▪ The pipe will be fitted with a manually operated pump or a valve at the delivery end which closes automatically when not in use; ▪ The pump or valve will be fitted with a lock; ▪ The pipe will be fitted with a lockable valve at the end where it leaves the tank or bowser; ▪ The pipework will pass over and not through bund walls; ▪ Tanks and bunds will be protected from vehicle impact damage; ▪ Tanks will be labelled with contents; capacity information and hazard warnings; and ▪ All valves, pumps and trigger guns will be turned off and locked when not in use. All caps on fill pipes will be locked when not in use. ▪ Suitable precautions will be taken to prevent spillages from equipment containing small quantities of hazardous substances (for example, chainsaws and jerry cans) including: <ul style="list-style-type: none"> ▪ Each container or piece of equipment will be stored in its own drip tray made of a material suitable for the substance being handled; and ▪ Containers and equipment will be stored on a firm, level surface. <p>For deliveries and dispensing activities, the Contractor will ensure that:</p> <ul style="list-style-type: none"> ▪ Site-specific procedures are in place for bulk deliveries; ▪ Delivery points and vehicle routes are clearly marked; and ▪ Emergency procedures are displayed, and a suitably sized spill kit is available at all delivery points, and staff are trained in these procedures and the use of spill kits. 	<p>Volume 3, Chapter 9: Water Section 9.6: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>
Generic Mitigation for Vehicles and Plant		
<p>The following measures will be implemented to reduce the risks imposed by vehicles and plant:</p> <ul style="list-style-type: none"> ▪ Vehicles and plant provided for use on the site will be in good working order to ensure optimum fuel efficiency, and will be regularly inspected to ensure they are free from leaks; ▪ Sufficient spill kits will be carried on all vehicles; 	<p>Volume 3, Chapter 9: Water Section: 9.6: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>

Mitigation Measure	Reference within EIS	Responsibility
<ul style="list-style-type: none"> ▪ Vehicles and plant will be regularly maintained to ensure that they are working at optimum efficiency and are promptly repaired when not in good working order; ▪ Vehicles and plant will not park near or over drains; and ▪ Refuelling of vehicles and plant will be carried out on hard standing, using drip trays to ensure no fuel can contaminate the ground outside of the bunded areas. 		
Generic Mitigation for Working in or Near Watercourses		
<p>The following control measures will be implemented during the construction of the proposed Project in or adjacent to a watercourse:</p> <ul style="list-style-type: none"> ▪ Works within and adjacent to watercourses will be conducted during forecast low flow periods where possible; ▪ In-stream works will not be carried out in watercourses frequented by salmon or trout during the Annual Close Season. The duration of the season varies regionally within the period from the beginning of October to the end of February. The timing of works will be considered on a site-specific basis and in agreement with the IFI because some rivers have late spawning salmonids; ▪ Operation of machinery in-stream will be kept to an absolute minimum. All construction machinery operating in-stream will be mechanically sound to avoid leaks of oils, hydraulic fluid, etc. Machinery will be cleaned and checked prior to commencement of in-stream works; ▪ The design of the outfalls and settlement ponds and the construction method statements for their installation will be agreed with IFI prior to construction; ▪ The area of disturbance of the watercourse bed and bank will be the absolute minimum required for the installation of the outfall; ▪ Any dewatering flows will be directed to the construction drainage system and to the settlement pond (or other) treatment system; ▪ A sediment mat / silt trap or similar will be located immediately downstream of the works within and adjacent to the minor watercourse. These should be inspected daily, maintained and cleaned regularly during the course of site works. Diversion of water to and from a temporary diversion channel will only take place during the period March to September or as agreed with the IFI; ▪ Small check dams will be constructed in the cut-off watercourse to trap any sediment, and a sediment trap will be provided immediately downstream of the diversion to the existing watercourse; and ▪ Where in-stream bed material is to be removed, coarse aggregates, if present, will be stockpiled at least 10m away from the watercourse for replacement following reinstatement of a watercourse channel. 	<p>Volume 3, Chapter 9: Water Section: 9.6: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>
<p>Reinstatement of any banks affected during construction works near a watercourse will be reinstated back to pre-development conditions.</p>		

Mitigation Measure	Reference within EIS	Responsibility
Generic Mitigation for Use of Concrete		
<p>The use and management of concrete in or close to watercourses shall be carefully controlled to avoid spillage. Where the use of concrete near water cannot be avoided, the following control measures will be employed:</p> <ul style="list-style-type: none"> ▪ When working in or near the surface water and the application of in-situ materials cannot be avoided, the use of alternative materials such as biodegradable oils shall be used; ▪ Placing of concrete in or near watercourses will be carried out only under the supervision of the Ecological Clerk of Works (ECoW); ▪ There will be no hosing of concrete, cement, grout or similar material spills into surface water drains. Such spills shall be contained immediately, and runoff prevented from entering the watercourse; ▪ Concrete waste and wash-down water will be contained and managed on-site to prevent pollution of all surface watercourses; and ▪ Washout from concrete lorries will not be permitted on-site and will only take place at the batching plant (or other appropriate facility designated by the manufacturer). 	<p>Volume 3, Chapter 9: Water Section: 9.6: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>
Generic Construction Compounds typical Construction Compounds Site Establishment Measures		
<p>The topsoil, and upper level of subsoil, will be stripped and stockpiled over the Construction Working Width. Any existing land drains crossing the works area will be culverted.</p>	<p>Volume 3, Chapter 9: Water Section: 9.6: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>
<p>The Contractor will be required to provide a temporary geogrid mattress overlain in stone for trafficking within the Construction Compound.</p>		
<p>Other developments proposed to occur within the site include the laying of interceptor traps in a demarcated area for refuelling, and drainage works associated with plant cleaning and service areas.</p>		
Drainage		
<p>Generally, the site will be pervious as it is overlain in stone. Those areas with impervious pavement will be graded to a fuel / oil separator for collection of any surface water runoff contaminants.</p>	<p>Volume 3, Chapter 9: Water Section: 9.6: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>
<p>Both the bundled refuelling and plant servicing areas will incorporate a forecourt separator for any potential spillages which may occur during vehicle refuelling and road tanker delivery.</p>		

Appendix 1L: Schedule of Mitigation

Mitigation Measure	Reference within EIS	Responsibility
The retained contents of the separators will be collected for disposal by a licensed operator to a licensed waste disposal / recovery facility.		
Construction Compounds will be provided with a Sustainable Drainage System (SuDS) designed storage and soakaway system for storm water running directly off of site buildings, and pavement such as access and site roads. Storage compounds will have stoned areas for the clean storage of materials.		
Generic Construction Monitoring Measures		
Continuous monitoring of water quality will take place at the outlets from attenuation areas along the pipeline and the settlement lagoons and surface water attenuation ponds at the Key Infrastructure Sites. If hydrocarbons are observed or other water quality parameters are exceeded, discharges will be suspended until the quality of the water is of a standard acceptable for discharge.	Volume 3, Chapter 9: Water Section: 9.6: Mitigation Measures	Client/Appointed Contractor
<p>During the Construction Phase, the Contractor will monitor the levels of Total Suspended Solids (TSS), turbidity, pH, temperature, Dissolved Oxygen (DO) and hydrocarbons at the same locations up and down stream of watercourses in close proximity to the works, or at crossing points where relevant, once a week for the duration of the following works:</p> <ul style="list-style-type: none"> ▪ Site clearance works, earthworks movements and stockpiling; ▪ Excavations including those associated with the provision of drainage works; and ▪ Construction works within and adjacent to watercourses. <p>The Construction Phase monitoring results will be compared with those results established in pre-construction monitoring. In the event of an elevation above pre-construction levels an investigation will be undertaken by the Contractor and remediation measures will be put in place.</p>		
<p>In addition, daily visual inspections of the surface drainage and sediment control measures and the watercourses will be undertaken by the Contractor. Indicators that water pollution may have occurred include the following:</p> <ul style="list-style-type: none"> ▪ Change in water colour; ▪ Change in water transparency; ▪ Increases in the level of silt in the water; ▪ Oily sheen to water surface; and ▪ Floating detritus, or scums and foams. <p>These inspections will be recorded. In the event that such indicators are observed, works will cease, and sampling will immediately be undertaken as described for the weekly monitoring, and an investigation of the potential cause will be undertaken by the Contractor.</p>		
<p>Where the works are identified as the source causing the exceedance the following will apply:</p> <ul style="list-style-type: none"> ▪ Works capable of generating sediment and all discharges shall be stopped immediately; and ▪ The Contractor will be required to take immediate action to implement measures to ensure that such discharges do not re-occur. 		

Mitigation Measure	Reference within EIS	Responsibility
This monitoring will alert the Contractor to any detrimental impacts that construction activities could have on water quality such that appropriate remedial action can be taken as quickly as possible. This will also allow the Contractor to demonstrate the success of the mitigation measures employed in maintaining any sediment release within the 'trigger' value established.		
Site Specific Mitigation Measures		
XC201 – Thomastown		
During construction the adoption of good working practice, as outlined in the CEMP.	Volume 3, Chapter 9: Water Section: 9.6.2: XC201 – Thomastown	Client/Appointed Contractor
The hydraulic design of the culvert will be such that the risk of overtopping, backing up and increased flood levels is minimised. As well as this, the structure should be able to convey 1% AEP flood event with an allowance for climate change and where applicable include a suitable blockage freeboard.		
XC209 Ballyhay		
It is not anticipated that this would be a significant volume of water will be dewatered from the trenches, however as part of the additional Ground Investigation proposed for prior to construction, groundwater samples will be taken. The groundwater quality samples will tell whether there is any issue with groundwater quality. Based on the results, it may be possible to dewater and discharge to the Awbeg (Buttevant) (East)_020 following settlement; alternatively, if other contamination such as metals or hydrocarbons are detected, additional measures will be needed which could be additional treatment or disposal off site.	Volume 3, Chapter 9: Water Section: 9.6.2: XC201 – Thomastown	Client/Appointed Contractor
XC211 & XC212 – Newton & Ballycosckery		
During construction the adoption of good working practice, as outlined in the CEMP.	Volume 3, Chapter 9: Water Section: 9.6.3: XC211 & XC212 – Newton & Ballycosckery	Client/Appointed Contractor
In addition, specific control measures are required for the installation of the proposed culvert to the west of the railway. The culvert will be pre-fabricated and clean, so as to avoid concrete washings contamination. If the ditch is flowing, it will be dammed and pumped over the installation area to avoid the transportation sediment downstream. Additional in-stream measures will also be deployed, such as straw bales and oil booms to ensure there is no downstream impact as a result of the installation process.		
XC215 – Shinangah		

Appendix 1L: Schedule of Mitigation

Mitigation Measure	Reference within EIS	Responsibility
During construction the adoption of good working practice, as outlined in the CEMP.	Volume 3, Chapter 9: Water Section: 9.6.4: XC215 - Shinangah	Client/Appointed Contractor
XC219 – Buttevant		
During construction the adoption of good working practice, as outlined in the CEMP.	Volume 3, Chapter 9: Water Section: 9.6.5: XC219 - Buttevant	Client/Appointed Contractor
In addition, specific control measures are required for the installation of the proposed culverts to the west of the railway. The culverts will be pre-fabricated and clean, so as to avoid concrete washings contamination. The water bodies will be dammed and the water pumped over the installation area to avoid the transportation sediment downstream. Additional in-stream measures will also be deployed, such as straw bales and oil booms to ensure there is no downstream impact as a result of the installation process. The culverts will be embedded and the natural beds of the waterbodies allowed to re-establish naturally following installation and the removal of the upstream dam.		

Table 2.5: Mitigation Measures for Noise and Vibration (Volume 3, Chapter 10)

Mitigation Measure	Reference within EIS	Responsibility
Mitigation for Noise: during construction		
<p>All work will be undertaken to the guidance detailed in BS 5228-1 and BS 5228-2</p> <p>It is anticipated that the following mitigation measures would be employed on site to ensure that noise levels are adequately controlled (all of which are considered to be examples of Best Practicable Means (BPM)):</p> <ul style="list-style-type: none"> ▪ Appropriate selection of plant and equipment, construction methods and programming. Only plant conforming with or better than relevant national or international standards, directives or recommendations on noise or vibration emissions would be used. Construction plant would be maintained in good condition with regards to minimising noise and vibration emission; ▪ The appointed contractor should obtain Prior Consent from the Environmental Departments at both Limerick and Cork County Councils prior to undertaking particularly noisy or high vibratory works; ▪ The contractor should communicate to local residents, details of the construction programme together with notice of any particularly noisy works; ▪ Plant would be operated and maintained appropriately, with due regard for manufacturer recommendations. All vehicles, plant and equipment would be switched off when not in use; 	Volume 3, Chapter 10: Noise and Vibration Section: 10.6: Mitigation Measures	Client/Appointed Contractor

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Mitigation Measure	Reference within EIS	Responsibility
<ul style="list-style-type: none"> ▪ Use of appropriate noise abatement site hoardings and screens, where appropriate, particularly at XC212 Ballycoskery and XC219 Buttevant where noise levels during construction were predicted to be very high. Where practicable, gates (to compounds and construction areas) would not be located opposite noise sensitive receptors; ▪ Where practicable, gates (to compounds and construction areas) would not be located opposite noise sensitive receptors; ▪ Careful selection of routes and programming for the transport of construction materials, spoil and personnel so as to reduce the risk of increased noise and vibration impacts during construction; ▪ Vehicle and mechanical plant/ equipment used for the purpose of the works should be fitted with effective exhaust silencers, to be maintained in good working order and operated in such a manner so as to minimise noise emissions; ▪ The positioning of construction plant and activities to minimise noise at sensitive locations; ▪ Equipment that breaks concrete by pulverising or similar, rather than by percussion, would be used where practicable; ▪ Mufflers shall be used on pneumatic tools; ▪ The use, where necessary, of effective sound reducing enclosures; ▪ Establish agreement with the local authorities on appropriate controls for undertaking significantly noisy works or vibration-causing operations close to receptors; ▪ Programming works so that the requirement for working outside normal working hours is minimised; and ▪ It would be expected that the appointed contractor shall endeavour to undertake construction works between the following hours: <ul style="list-style-type: none"> ○ 08:00 to 18:00 Monday to Friday; and ○ 08:00 to 13:00 on Saturdays. 		
<p>Some limited night-time and / or weekend working may be required on occasion for activities such as tie in works or structural works at the bridge structures. The night-time and weekend periods are more sensitive than daytime, as baseline noise levels are lower during these periods. Significant effects are more likely during such periods; therefore, night time and weekend working should be minimised. Where works during such periods are required, the appointed contractor should consider obtaining Prior Consent from the Environmental Departments at Limerick and Cork County Councils prior to undertaking such works. In order to achieve this, the appointed contractor should demonstrate that BPM has been applied to the required works and potential significant effects have been mitigated as much as reasonably practicable.</p>		
<p>If feasible the noisiest construction activities at XC212 Ballycoskery should be undertaken during school holidays due to the presence of Ballyhea National School.</p>		
<p>The construction appointed contractor will be required to undertake an updated construction noise assessment, once working methods, the plant and equipment to be used and the construction programme have been sufficiently finalised, in order to determine the most appropriate form of mitigation measure(s) to implement in each location.</p>		

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Table 2.6: Mitigation Measures for Traffic and Transport (Volume 3, Chapter 11)

Mitigation Measure	Reference within EIS	Responsibility
Construction Mitigation for Traffic and Transport		
<p>A Construction Traffic Management Plan (CTMP) will be prepared to set out management and mitigation measures to prevent or minimise the transport impacts during the Construction Phase of the proposed Project. The CTMP shall include details of the following:</p> <ul style="list-style-type: none"> ▪ Regulated site working hours i.e. construction traffic will, where practicable, avoid heavy volumes of movement during peak periods, particularly in the morning and evening peak hours when general traffic levels will be higher than normal; ▪ Identify to all staff and contractors the appropriate and safe routes to and from the proposed Project and will through consultation with Cork County Council and Limerick City and County Council; ▪ Confirmation of routeing for HGV traffic; ▪ Timing of HGV movements to take place outside of peak flow hours, where practicable, in order to minimise disruption to general traffic flows on the road network; ▪ Appropriate warning signs to be erected to warn other road users of the presence of HGV's and general Construction Phase related traffic. ▪ Where appropriate, additional warning and speed control signs will be installed to warn other road users of the presence of HGV's and general Construction Phase related traffic, whether temporarily or otherwise, with the agreement of the Roads Authority; ▪ A wheel wash facility and road sweeper shall be provided to minimise any mud and debris on the surrounding public road network and prevent the introduction of non-native or invasive plant material onto the site; ▪ The temporary closure of public rights of way to facilitate construction activity will be discussed with local council Access Officer(s) at an early stage and suitable diversions agreed. All rights of way will be reinstated to their original state and some will be improved as a result of the proposed Project. Considering the potentially long-term nature of some closures, suitable consideration will be given to providing alternatives, which may necessitate due consideration of suitable crossing facilities, to existing standards, that minimise delay and optimise safety for all users; and ▪ At some locations the potential for conflict on the road could be easily mitigated by the stationing of a "Stop-Go" banksman with appropriate communications between the two and the construction vehicle drivers. <p>It is proposed that the CTMP shall provide for regular inspections to be carried out to ensure that agreed mitigation measures, as outlined above, are being undertaken.</p>	<p>Volume 3, Chapter 11: Traffic and Transport Section: 11. 7.1: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>

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Mitigation Measure	Reference within EIS	Responsibility
<p>To help reassure the local community, it is anticipated that a Traffic Management Plan will be developed detailing ways to reduce the construction traffic effect, including:</p> <ul style="list-style-type: none"> ▪ Avoiding transit at school arrival and departure times. ▪ A communications protocol to avoid delays with emergency vehicle traffic. ▪ A diary of proposed delivery movements to liaise with the communities to avoid key dates such as festivals etc. ▪ Notices will be published, and advice given to the public and employers in the area of the likely increased driver delay as a result of the works. Drivers will be encouraged to reduce their need to travel where possible, particularly during the peak periods when delays will be most pronounced. ▪ Working with local businesses to ensure the construction traffic does not interfere with deliveries or normal business traffic. 		
<p>A construction specific Travel Plan is also proposed to provide the mechanism to support and promote sustainable travel for staff, contractors and visitors travelling to the proposed Project sites. The Travel Plan would seek to eliminate the barriers preventing users of the site from accessing via sustainable travel modes, improving travel choices and managing single occupancy car use.</p>		
<p>In terms of severance beyond that associated with increased traffic flows, it is also necessary to consider the potential effects of temporarily closing existing pedestrian and cycle routes and any related impact on delay.</p>		
<p>Any alternative routes will likely have to make use of the surrounding network. It will be paramount that any diversion route minimises delay and optimises safety for users. This will require avoiding/eliminating features that may pose a hazard to visually impaired users e.g. bollards, barriers or restrict access by infirm, disabled or other users e.g. gradients. This will also entail the incorporation of tonal contrast into the design where appropriate, which is particularly important for visually impaired users, as well as providing a suitable temporary signing strategy that is clear and conspicuous.</p>		
<p>Nevertheless, to minimise delay, optimise safety and mitigate any pedestrian amenity impact for all people walking and cycling, including disabled users, the level of provision of crossing facilities will have to be assessed taking anticipated traffic volumes into account, and will have to recognise existing good practice e.g. dropped kerbs flush with road surface, double transition kerbs, tactile surfaces etc.</p>		

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Mitigation Measure	Reference within EIS	Responsibility
Operation Mitigation for Traffic and Transport		
The TP would continue through operation of the proposed Project developments and seek ways in which to promote active and sustainable travel to maintenance staff.	Volume 3, Chapter 11: Traffic and Transport Section: 11.7.2: Mitigation Measures	Client/Appointed Contractor

Table 2.7: Mitigation Measures for Cultural Heritage (Volume 3, Chapter 12)

Mitigation Measure	Reference within EIS	Responsibility
Pre-Construction Measures		
Standard test excavations over approximately 12% of testable greenfield areas shall also be undertaken in the remaining portions of the development where there is a potential for currently unrecorded subsurface archaeology to be present.	Volume 3, Chapter 12: Cultural Heritage Section: 12.6: Mitigation Measures	Client/Approved Contractor
An underwater archaeological assessment shall be undertaken at the stream crossings at XC219 Buttevant (AY043) prior to construction. The aim of this assessment shall be to ascertain the existence, location, extent and condition of any water-related archaeological features/deposits or objects within the stream crossings and to appropriately mitigate the impact on such remains in consultation with the NMS and NMI.		
Archaeological monitoring shall be carried out where there is still a potential for construction to impact archaeology and/or upstanding built heritage (e.g. in the vicinity of the burial ground at Ballyhay Church (AY025) where there is a potential for skeletal material to be encountered). Such monitoring shall be carried out in consultation with the NMS and NMI under an excavation licence. Vibration monitoring shall be undertaken during construction for any vulnerable built heritage assets (e.g. the goods shed at Buttevant, AH019). Periodic monitoring shall also be carried out post-construction to verify that the residual impacts have been accurately assessed and reported and that mitigation measures have been adequately employed.		
Potential accidental impacts during construction on known cultural heritage sites, in particular the moated site at Ballycoskery (AY020), Imphrick church and graveyard (AY029 & AY030) and the potential earthworks at Buttevant (AY041 & AY042) shall be avoided through the erection of construction barriers.		

Mitigation Measure	Reference within EIS	Responsibility
<p>Detailed building recording shall be carried out on all architectural heritage features that are to be removed or otherwise impacted by the development. This includes the former gatekeeper’s house at Ballycoskery (AH013/IH-7); all built heritage features impacted at Buttevant including the former train station (AH020), 'Bregoge New Bridge' (AH022) and kerbstones (AH021); Shinanagh railway bridge (AH015) and associated walling; and any curtilage features impacted at Ballyhay Church (AH010/AY025), Ballyhay parochial house (AH011) and farmhouse (AH012). This building recording shall include, but not be limited to, written descriptions, measured drawings and the compilation of photographic and documentary archives as necessary and oral history where possible. In the case of the gatekeeper’s house (AH013), building recording shall include the interior of the building. The aim of the building recording will be to compile a comprehensive written and illustrated record of architectural heritage features which are within the lands acquired for construction of the project and which are being directly impacted.</p>		
<p>Detailed recording shall also be carried out on the level crossings to be closed and removed (IH-2, IH-3, IH-4, IH-5, IH-6, IH-8 and IH-9) and adjoining sections of the Cork–Dublin rail line (IH-1). The aim of the recording will be to compile a comprehensive written, drawn and photographic record of these crossings before their closure, and it shall include the collection and recording of oral history specific to these crossings. The information gathered shall be compiled into an archive or suitable publication that shall be accessible to the community and others with an interest in the history of the railway</p>		
<p>Townland boundary surveys shall be carried out in relation to those sections of townland boundaries impacted by the development, namely the townland boundaries between Thomastown and Effin (TB-2), between Imphrick and Ballynageragh (TB-9) and between Creggane and Bregoge (TB-10). The aim of the townland boundary surveys will be to compile a comprehensive written and illustrated record of those historic boundaries which are within the lands acquired for construction of the project and which are being directly impacted.</p>		
<p>Operational impacts on the setting of identified cultural heritage assets shall be mitigated through screening and landscaping as appropriate.</p>		
Construction Mitigation		
<p>At XC201 Thomastown, a programme of archaeological testing shall be carried out by a licensed archaeologist to establish whether any subsurface archaeological features survive based on the results of the geophysical survey. Should significant archaeological features be recorded during testing, further mitigation will be required. This may include redesign to allow for preservation in situ, archaeological excavation and/or a combination of both strategies. The developer and archaeologist shall</p>		Client/Approved Contractor

Mitigation Measure	Reference within EIS	Responsibility
<p>be advised in these matters by the National Monuments Service (NMS) of the Department of Housing, Local Government and Heritage.</p>	<p>Volume 3, Chapter 12: Cultural Heritage Section: 12.6: Mitigation Measures</p>	
<p>Archaeological monitoring of groundworks by a suitably qualified, licensed archaeologist shall be carried out at XC211 Newtown. Should significant archaeological features be identified during monitoring, all works which might affect elements of the archaeological heritage shall stop on the advice of the monitoring archaeologist. The exposed archaeological material shall be recorded, and further mitigation will be undertaken as required. This may include redesign to allow for preservation in situ, archaeological excavation and/or a combination of both strategies. The developer and archaeologist shall be advised by the NMS in these matters.</p>		
<p>Archaeological test excavations shall be carried out by a licensed archaeologist at XC212 Ballycoskery to investigate the potential archaeological features identified through field walking and geophysical survey including the potential enclosure (AY026), possible leat adjacent to the moated site (AY020a) and former road and field boundaries (AY044). The test-trench layout shall be informed by the results of the geophysical surveys. Should significant archaeological features be recorded during testing, further mitigation will be required. This may include redesign to allow for preservation in situ, archaeological excavation and/or a combination of both strategies. The developer and archaeologist shall be advised in these matters by the NMS.</p>		
<p>The two areas of archaeology identified during field walking, geophysical survey and testing at XC215 Imphrick/Shinanagh to the north of Imphrick Church (AY036 and AY045) shall be subject to full open-area excavation. The excavation shall be carried out according to best archaeological practice by a suitably qualified, licensed archaeologist in consultation with the NMS. Adequate funds shall be made available for all required archaeological works including but not limited to finds retrieval, conservation, storage and analysis of all artefacts and ecofacts, post-excavation analyses, specialist reports, reporting and dissemination of findings. A programme of more intensive archaeological testing shall also be carried out along the rest of the route between the two areas designated for excavation.</p>		
<p>Additional archaeological test excavations shall also be carried out at XC215 Imphrick/Shinanagh to the east, southeast and south of Imphrick Church and graveyard to investigate the archaeology in this area (AY035). Where significant archaeological features are recorded during testing, further mitigation will be undertaken as required. This may include redesign to allow for preservation in situ, archaeological excavation and/or a combination of both strategies. The developer and archaeologist shall be advised by the NMS in these matters.</p>		

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Mitigation Measure	Reference within EIS	Responsibility
At XC219 Buttevant, archaeological test excavations shall be carried out by a licensed archaeologist to investigate the potential archaeological features identified through geophysical survey (AY047 and AY048) and monitoring of geotechnical investigations (AY046). Test excavations shall also be carried out at Buttevant station (AH020) to identify and record any remnants of former railway infrastructure surviving below the ground surface. Should significant archaeological features be recorded during testing, further mitigation will be required. This may include redesign to allow for preservation in situ, archaeological excavation and/or a combination of both strategies. The developer and archaeologist shall be advised by the NMS in these matters.		

Table 2. 8: Mitigation Measures for Landscape and Visual (Volume 3, Chapter 13)

Mitigation Measure	Reference within EIS	Responsibility
Generic Mitigation		
Areas of existing vegetation at all sites of the proposed Project will be retained and enhanced insofar as possible. Retention of existing hedgerow boundaries within and surrounding the proposed alignments prevents a sense of disregard, aids visual screening and maintains existing fields patterns. Where hedgerows or trees need to be removed to facilitate the footprint of the proposed Project, these will be offset with areas of additional planting.	Volume 3, Chapter 13: Landscape and Visual Section: 13.7: Mitigation Measures	Appointed Contractor/Landscape Contractor
It is also proposed to bolster areas of existing hedgerows with under-planting and inter-planting of whip transplants (i.e. Hedgerow Type 1 – see Inset Figure 13.27 of Volume 1, Chapter 13: Landscape and Visual) in order to ensure dense and consistent screening of the proposed structures and traffic in perpetuity. Advanced nursery stock in the form of 8-10cm girth trees will be used to fill any noticeable gaps and plant species will be selected to complement the existing broadleaf hedgerow species mix around the site and will be of local provenance.		
It is also proposed to plant new 'Hedgerow Type 2' (Volume 3, Chapter 13: Landscape and Visual Inset Figure 13.28 refers), with whips and a high proportion of advanced nursery stock (c.3m planted height), along all of the proposed timber post and rail fencing that encircles the proposed Projects (refer to Table and individual Project landscape mitigation plans for site specific landscape measures). Areas where hedgerows have been removed and are to be reinstated will also be planted as per		

Mitigation Measure	Reference within EIS	Responsibility
<p>'Hedgerow Type 2'. This landscape measure will be allowed to mature up to a maintained height of 3-4m to provide screening of the proposed alignments from nearby dwellings whilst still maintaining any distant views afforded of hills and ridges.</p> <p>A low shrub mix will carpet the lower portions of the proposed engineered embankments which will soften their appearance and aid in visually blending them with their immediate landscape context. Once mitigation planting is fully established, this landscape measure will also contribute to screening moving vehicles, their lights and lower anthropogenic elements such as road signage and safety barriers from the view of nearby receptors. The low shrub species mix will comprise of Low-canopy: Sub-dominants (<10%), Understorey and Fringe: High-Shrubs (40-50%) and Understorey and Edge: Lower-Shrubs (40-50%). Planting on embankments will be allowed to grow to reach maturity and will be concentrated on the lower portions of the embankments so as not to generate any further sense of enclosure at nearby dwellings and local roads. Any residual space between the landscape measures identified above will be planted with a wild grass seeding mix of local provenance.</p>		
Site Specific Mitigation for Landscape and Visual		
XC201 – Thomastown		
<ul style="list-style-type: none"> ▪ Any areas of existing retained hedgerow within the proposed Project site are to be supplemented as per 'Hedgerow Type 1' where necessary. ▪ Areas of hedgerow removed to facilitate sightlines at the northern end of the proposed project are to be reinstated as per 'Hedgerow Type 2' to the rear of the identified sightlines. ▪ Hedgerow Type 2 to be planted along the project side of the proposed timber post and rail fencing. ▪ A corridor of low shrub mix will straddle the proposed alignment and the lower portions of the proposed engineered embankments. 	<p>Volume 3, Chapter 13: Landscape and Visual</p> <p>Section: 13.7: Mitigation Measures</p>	<p>Appointed Contractor/Landscape Contractor</p>
XC211 – Newtown		
<ul style="list-style-type: none"> ▪ Any areas of existing retained hedgerow within the proposed Project site are to be supplemented as per 'Hedgerow Type 1' where necessary. ▪ Areas of hedgerow removed to facilitate sightlines at the northern and southern intersections with the existing local roads are to be reinstated as per 'Hedgerow Type 2' to the rear of the identified sightlines. ▪ Hedgerow Type 2 to be planted along the project side of the proposed timber post and rail fencing. 	<p>Volume 3, Chapter 13: Landscape and Visual</p> <p>Section: 13.7: Mitigation Measures</p>	<p>Appointed Contractor/Landscape Contractor</p>

Mitigation Measure	Reference within EIS	Responsibility
XC212 – Ballycoskery		
<ul style="list-style-type: none"> ▪ Any areas of existing retained hedgerow within the proposed Project site are to be supplemented as per ‘Hedgerow Type 1’ where necessary. The dense mature tree lined hedgerow situated on the southern verge of the L1533 local road south of the Beechwood residential estate to be retained in so far as possible. ▪ Areas of hedgerow removed/trimmed back to facilitate construction works to be reinstate as per Hedgerow Type 2 in so far as possible. ▪ Hedgerow Type 2 to be planted along the project side of the proposed timber post and rail fencing. ▪ A corridor of low shrub mix will straddle the proposed embankments on both sides of the Dublin-Cork Railway Line. Specific landscape measures to be implemented to north-facing embankments to the front of the national school to include areas of amenity planting (may include non-native species) creating year round visual interest. ▪ Street trees planted along proposed footpaths south of the National school and surrounding the proposed parking spaces. ▪ Native Ivy to be planted at the base of retaining concrete walls. ▪ Section of native hedgerow planted as per Hedgerow Type 2 and a row of street trees planted on the eastern boundary of the existing railway corridor 	<p>Volume 3, Chapter 13: Landscape and Visual Section: 13.7: Mitigation Measures</p>	<p>Appointed Contractor/Landscape Contractor</p>
XC215 – Shinanagh		
<ul style="list-style-type: none"> ▪ Any areas of existing retained hedgerow within the proposed Project site are to be supplemented as per ‘Hedgerow Type 1’ where necessary. ▪ Hedgerow Type 2 to be planted along the project side of the proposed timber post and rail fencing. ▪ An area of low shrub mix to be planted along the proposed east facing embankment at the northern end of the proposed alignment. The proposed low shrub mix to be planted along the lower portions of the embankment. 	<p>Volume 3, Chapter 13: Landscape and Visual Section: 13.7: Mitigation Measures</p>	<p>Appointed Contractor/Landscape Contractor</p>
XC219 – Buttevant		
<ul style="list-style-type: none"> ▪ Any areas of existing retained hedgerow within the proposed Project site are to be supplemented as per ‘Hedgerow Type 1’ where necessary. Hedgerow vegetation to be retained and supplemented in so far as possible along the southern and northern verge of the R522 regional road on the western side of the Dublin-Cork Railway Line. ▪ Areas of hedgerow removed/trimmed back to facilitate construction works to be reinstate as per Hedgerow Type 2 in so far as possible. ▪ Hedgerow Type 2 to be planted along the project side of the proposed timber post and rail fencing. 	<p>Volume 3, Chapter 13: Landscape and Visual Section: 13.7: Mitigation Measures</p>	<p>Appointed Contractor/Landscape Contractor</p>

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Mitigation Measure	Reference within EIS	Responsibility
<ul style="list-style-type: none"> A corridor of low shrub mix to straddle the lower slopes of proposed embankments on both sides of the Dublin-Cork Railway Line. Native Ivy to be planted at the base of retaining concrete walls. 		

Table 2.9: Mitigation Measures for Resource Use and Waste Management (Volume 3, Chapter 14)

Mitigation Measure	Reference within EIS	Responsibility
Sustainable Waste Management Principles		
The design of the proposed Project will seek to maximise resource efficiency, reducing the amount of waste generated, minimising water consumption and making the most efficient use of energy. This will be adhered to also in the development of the Site Waste Management Plans (SWMPs) that will be produced for each site by the contractor prior to commencement but post consent, in accordance with local planning policy objectives. The approach to resource use and waste management for the proposed Project will follow sustainable waste management principles which incorporates the European Union 'waste hierarchy'.	Volume 3, Chapter 14: Resource Use and Waste Management Section: 14.7.1: Sustainable Waste Management Principles	Client/Appointed Contractor
Prevent		
<ul style="list-style-type: none"> The consumption of raw materials and waste will be minimised, through sound design and good practice in procurement. In particular, the implementation of a 'just in time' materials procurement policy. The SWMPs will consider the application of solutions and guidelines for designing out waste for civil engineering projects to reduce materials use as well as waste arisings. Both will be monitored as part of the SWMPs' review process. 	Volume 3, Chapter 14: Resource Use and Waste Management Section: 14.7.1: Sustainable Waste Management Principles	Client/Appointed Contractor
Reuse		
<ul style="list-style-type: none"> Opportunities for reusing 'waste' before recycling, recovery or disposal will be considered. For example, one of the principle waste materials generated by the Proposed Development would be excavated soils and substrate. Where possible, and appropriate, such materials will be re-used on site. Site set up will involve stripping vegetation and topsoil for some of the construction areas. Surface vegetation, topsoil and subsoils will be stored separately for re-use and handled in accordance with good practice methods. 	Volume 3, Chapter 14: Resource Use and Waste Management Section: 14.7.1: Sustainable Waste Management Principles	Client/Appointed Contractor

Mitigation Measure	Reference within EIS	Responsibility
Recycle		
If materials cannot be appropriately reused on site, they shall be assessed for their potential for recycling. General construction waste may be produced, such as wood, plastics and cardboard packaging. These will be segregated and stored for short periods on site in secure designated areas prior to removal from site to a recycling facility.	Volume 3, Chapter 14: Resource Use and Waste Management Section: 14.7.1: Sustainable Waste Management Principles	Client/Appointed Contractor
Recover		
Stripped vegetation and removed trees (with landowner agreement except where this is identified for re-use or recycling) and general food waste will be taken to a composting, anaerobic digestion or biomass plant.	Volume 3, Chapter 14: Resource Use and Waste Management Section: 14.7.1: Sustainable Waste Management Principles	Client/Appointed Contractor
Disposal		
The disposal of waste from the Proposed Development to landfill will be regarded as a last resort. All other options, as described above, will be considered prior to considering disposing of waste to landfill. If required, disposal will be undertaken in a safe and responsible manner ensuring that all waste carriers and management facilities are appropriately licensed, in accordance with the procedures outlined in this document.	Volume 3, Chapter 14: Resource Use and Waste Management Section: 14.7.1: Sustainable Waste Management Principles	Client/Appointed Contractor
Standards		
A set of standard measures will be employed for the management of waste and are listed below: <ul style="list-style-type: none"> the treatment of recyclable waste materials from the proposed Project will be undertaken off-site at an appropriate facility. Waste materials will be recovered and sorted on site for transportation and taken from site to the recycling facility; material will be stored for short periods on site in secure designated places in the identified construction working areas until taken away for recycling; all waste materials shall be stored securely on site in order to prevent their escape and protect them against vandalism, vermin or outside interference; 	Volume 3, Chapter 14: Resource Use and Waste Management Section: 14.7.1: Sustainable Waste Management Principles	Client/Appointed Contractor

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Mitigation Measure	Reference within EIS	Responsibility
<ul style="list-style-type: none"> ▪ hazardous waste (e.g. paints, solvents, sealants) will be segregated on-site to avoid contaminating other material and waste streams; ▪ all waste management contractors carrying waste shall be authorised to do so and all sites that receive the waste shall be authorised to do so; ▪ a sample of waste management routes will be subject to an annual audit to confirm that waste is being managed correctly; ▪ quantities of waste generated will be recorded and monitored. Records will be kept for a minimum of three years; ▪ an authorised waste management contractor will deal with the disposal of any fly-tipped materials discovered. Any fly-tipping will be reported as an environmental incident and notified to the local authority and/or EPA to enable them to investigate the incident; ▪ all employees and contractors involved with the handling and managing of waste will have the relevant training and be assessed as competent and training records retained; ▪ all waste containers shall be labelled to indicate the types of waste that may be deposited in them; ▪ all staff and contractors working on the project shall understand which waste should be deposited where, and that they are not allowed to use the facilities for the disposal of domestic waste. This will be delivered by toolbox talks; and ▪ a SWMP shall be produced for all sites. 		
Storage		
<p>Waste may be stored at construction compounds for a limited amount of time to help to limit the number of vehicle movements to and from site as far as possible to minimise effects on the local roads.</p> <ul style="list-style-type: none"> ▪ waste will be stored in secure designated areas, in enclosures or containers to prevent material being dispersed by the wind; ▪ designated areas will be sited at least 10m away from drains and watercourses to limit risk of escape and contamination of water courses; ▪ waste storage containers will be labelled with their waste type and their LoW code; any labelling will be consistent with Industry Best Practice at the time construction commences and reviewed annually; ▪ waste containers will be covered to prevent dust emissions and potential nuisances; ▪ the burning of any waste is prohibited; ▪ liquid wastes will be stored in containers within bunded zones with secondary containment of at least 110% capacity of the largest container or at least 25% of the total tank capacity inside the bunded zone (whichever is the greatest); and <p>incompatible or hazardous wastes will be stored and handled in accordance with Hazardous Wastes Regulations.</p>	<p>Volume 3, Chapter 14: Resource Use and Waste Management</p> <p>Section: 14.7.1: Sustainable Waste Management Principles</p>	<p>Client/Appointed Contractor</p>

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Mitigation Measure	Reference within EIS	Responsibility
Site Waste Management Plans (SWMPs)		
<p>SWMPs will be produced for each site. The SWMPs shall record the following information:</p> <ul style="list-style-type: none"> ▪ proposals for managing the waste following the Waste Hierarchy to ensure that waste arisings are minimised, including 'designing out waste' and waste prevention measures; ▪ details of any decisions taken before the SWMP was drafted to minimise the quantity of waste produced on site; ▪ a description of each type of waste expected to be produced in the course of the project; ▪ an estimate of the quantity of each waste type that will be produced; ▪ identification of the waste management action proposed for each waste type, including reusing, recycling, recovery and disposal; ▪ a detailed action plan for the management of the waste, including roles and responsibilities, data collection and reporting procedures; ▪ details of any site waste storage facilities including the requirements of environmental permits and pollution control measures; and ▪ a declaration that material will be handled efficiently, and waste managed appropriately. 	<p>Volume 3, Chapter 14: Resource Use and Waste Management</p> <p>Section: 14.7.1: Sustainable Waste Management Principles</p>	<p>Client/Appointed Contractor</p>
Outline Construction Environmental Management Plan (CEMP)		
<p>Along with the other mitigation measures outlined within this Chapter the production of a Construction Environmental Management Plan (CEMP) will offer additional protection in relation to potential impacts associated with resource use and waste.</p>	<p>Volume 3, Chapter 14: Resource Use and Waste Management</p> <p>Section: 14.7.3: Outline Construction Environmental Management Plan (CEMP)</p>	<p>Client/Appointed Contractor</p>

Table 2.10: Mitigation Measures for Air Quality (Volume 3, Chapter 15)

Mitigation Measure	Reference within EIS	Responsibility
Construction Mitigation		

Mitigation Measure	Reference within EIS	Responsibility
Good practice mitigation would be required to control the effects of dust emissions and pollutant emissions from construction plant and machinery during construction at those level crossings where construction activities are required (i.e. XC201 Thomastown, XC211 Newtown, XC212 Ballycoskery, XC215 Shinanagh and XC219 Buttevant).	Volume 3, Chapter 15: Air Quality Section: 15.6.1: Construction Phase	Client/Appointed Contractor
Develop and implement a stakeholder communications plan that includes community engagement before work commences on the site.		
Display the name and contact details of person(s) accountable for air quality and dust issues on the site boundary. This may be the environment manager/engineer or the site manager.		
Display the head or regional office contact information.		
Develop and implement a Dust Management Plan (DMP), which may include measures to control other emissions, approved by the local authority. The level of detail will depend on the risk, and should include, as a minimum, the highly recommended measures in this assessment. The desirable measures should be included as appropriate for the site (desirable rather than highly recommended for low risk sites)		
Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken		
Make the complaints log available to the local authority when asked.		
Record any exceptional incidents that cause dust and/or air emissions, either on-site or off-site, and the action taken to resolve the situation in the log book.		
Carry out regular site inspections to monitor compliance with the DMP (or equivalent), record inspection results and make an inspection log available to the local authority when asked.		
Increase the frequency of site inspections by the person accountable for air quality and dust issues on site when activities with a high potential to produce dust are being carried out and during prolonged dry or windy conditions.		
Where considered necessary, agree dust deposition/dust flux monitoring locations with the local authority.		
Plan site layout so that machinery and dust causing activities are located away from receptors, as far as is possible		
Where practicable, erect solid screens or barriers around dusty activities or operations.		
Avoid site runoff of water or mud		

Appendix 1L: Schedule of Mitigation

Mitigation Measure	Reference within EIS	Responsibility
Keep site fencing, barriers and scaffolding clean using wet methods (desirable rather than highly recommended for low risk sites).		
Remove materials that have a potential to produce dust from the site as soon as possible, unless being re-used on site. If they are being re-used on-site, cover as described below (desirable rather than highly recommended for low risk sites).		
Cover, seed or fence stockpiles to prevent wind whipping (desirable rather than highly recommended for low risk sites).		
Ensure all vehicles switch off engines when stationary – no idling vehicles.		
Avoid the use of diesel or petrol-powered generators and use mains electricity or battery powered equipment where practicable.		
Where required or practicable, produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials (not required for low risk sites).		
Where applicable, only use cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. "suitable local exhaust ventilation systems".		
Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible and appropriate.		
Where applicable, use covered skips for storage of dusty wastes or materials.		
Minimise drop heights from loading shovels and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.		
Ensure equipment is readily available on site to clean any dry spillages and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods (desirable rather than highly recommended for low risk sites).		
Avoid dry sweeping of large areas (desirable rather than highly recommended for low risk sites).		
Inspect any on-site haul routes for integrity and instigate any necessary repairs to the surface as soon as reasonably practicable (not required for low risk sites).		
Where required, record all inspections of haul routes and any subsequent action in a site log book (desirable rather than highly recommended for low risk sites).		
Avoid bonfires and burning of waste materials.		
Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place (desirable rather than highly recommended for low risk sites).		

Appendix 1L: Schedule of Mitigation

Mitigation Measure	Reference within EIS	Responsibility
Use water-assisted dust sweeper(s) on the access and local roads to remove, as necessary, any material tracked out of the site(s) (desirable rather than highly recommended for low risk sites).		
Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport.		
If applicable, implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud) prior to leaving the site(s) where reasonably practicable (desirable rather than highly recommended for low risk sites).		
Ensure there is an adequate area of hard surfaced road between the wheel wash facility and the site exit, wherever site size and layout permits (not required for low risk sites).		
Where practicable, access gates to be located at least 10m from receptors where possible (not required for low risk sites).		

Table 2.11: Mitigation Measures for Cross Cutting Themes (Volume 3, Chapter 16)

Mitigation Measure	Reference within EIS	Responsibility
Mitigation for Risk of Major Accidents and Disasters		
<p>The proposed Project has been designed in accordance with TII's Standards March 2020 which include designs to improve pedestrian and road safety and reduce risks.</p> <p>The proposed Project has also been designed in accordance with the Health and Safety Authority Project Supervisor Design Process (PSDP) to identify and minimise risks during construction.</p>	<p>Volume 3, Chapter 16: Cross Cutting Themes</p> <p>Section: 16.2.11: Mitigation Measures</p>	Client/Appointed Contractor
<p>In addition, further measures identified in the EIAR Technical Chapters have been embedded into the design of the proposed Project to minimise risks associated with those topics that have been assessed as having a Medium or High risk for accidents or natural disasters. These include:</p> <ul style="list-style-type: none"> High voltage lines in proximity to the proposed Project have been identified. Any crossings of High Voltage lines have been identified and assigned a unique ID. Adequate provision has been made within the Planning Application Boundary to ensure there is sufficient space to accommodate works. Overhead services will be stated and included in any method / lifting plans so they can be avoided. In particular where noted on the preliminary drawings, such as for XC219, existing ESB O/H service to be decommissioned. The status of these will be checked and verified from the utility owner and a certificate issued to confirm. If the infrastructure / cables of these services remain on site, appropriate safety notices and warnings will be displayed throughout the construction works. Where necessary a demarcation zone may be implemented to prevent operatives or plant coming into contact. Sufficient time should 	<p>Volume 3, Chapter 16: Cross Cutting Themes</p> <p>Section: 16.2.11: Mitigation Measures</p>	Client/Appointed Contractor

Mitigation Measure	Reference within EIS	Responsibility
<p>be allowed in the programme in advance of site works to allow such statutory authority searches / utility decommissioning or required diversions.</p> <ul style="list-style-type: none"> ▪ Underground utilities and services have been mapped as part of the outline design process. The appointed Contractor will confirm the location of known services and will undertake ground scans in advance of excavations and construction work. ▪ The risk of accidental release to surface water will be reduced by the development and implementation of mitigation measures outlined in Volume 3, Chapter 9: Water and within the CEMP (Volume 5, Appendix 11L). The appointed Contractor will develop and implement a detailed Pollution Control Plan (PICP), Emergency Response Plan (ERP) and Method Statements for working near waterbodies, drafted in agreement with Inland Fisheries Ireland and other relevant authorities, and having regard to relevant pollution prevention guidelines. ▪ The appointed Contractor will develop and follow strict biosecurity measures to prevent the spread of infectious diseases. This will form part of the detailed CEMP. ▪ During the construction phase there is potential for the spread of invasive species. This will be mitigated by measures identified in Volume 5, Chapter 7: Biodiversity. ▪ The appointed Contractors will adhere to the Traffic Management Plan (TMP) developed as part of the detailed design phase of the proposed Project. Further mitigation measures are identified within Volume 3, Chapter 11: Traffic and Transport. ▪ The appointed contractors will adhere to the strict safety protocols set out in the Project Health & Safety Plan. ▪ See Volume 3, Chapter 3 Project Description and Volume 5, Appendix 9A Flood Risk Assessment. The proposed Project is designed to withstand flood events to the appropriate standard. 		
Further Mitigation Measures		
<p>Mitigation Measures Embedded into the Design of the proposed Project</p> <p>Regulation 15 of the Safety, Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013) places a duty on designers carrying out work related to the design of a project to take account of the General Principles of Prevention as listed in Schedule 3 of the Safety, Health and Welfare at Work Act 2005.</p> <p>In addition to the duties imposed by Regulation 15 of the Health and Welfare at Work (Construction) Regulations 2013 (S.I. No. 291 of 2013), designers must comply with Section 17(2) of the Safety, Health and Welfare at Work Act 2005 which requires persons who design a project for construction work to ensure, so far as is reasonably practicable, that a project is designed and is capable of being constructed to be safe and without risk to health, can be maintained safely and without risk to health during use, and complies in all respects, as appropriate, with other relevant legislation. This includes the Building</p>	<p>Volume 3, Chapter 16: Cross Cutting Themes Section: 16.2.11: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>

Mitigation Measure	Reference within EIS	Responsibility
<p>Regulations 2012 (S.I. No. 138 of 2012) and, if the works being designed are intended for use as a workplace, the relevant parts of the Safety, Health and Welfare at Work (General Application) Regulations 2007 (S.I. No. 299 of 2007).</p> <p>In accordance with these requirements, the proposed Project design team established a consistent and appropriate means of assessing the risks that may arise from design decisions and of applying the General Principles of Prevention, mitigation measures that are to be embedded into the design and operational activities through Design Risk Assessments.</p>		
<p>Construction Environmental Management Plan</p> <p>An outline CEMP has been prepared as part of this EIAR (Volume 5, Appendix 1I). Prior to the commencement of works, the appointed Contractor to construct the proposed Project will prepare a detailed CEMP. The CEMP will be a live document which will be updated post-consent as it will include method statements and work programmes that provide more detailed phasing of work based on the methodologies and the mitigation measures contained in this EIAR, in addition to any relevant conditions contained in the planning consent. The appointed Contractor will develop a series of detailed plans for the construction of the proposed Project. This will include (but will not be limited to) a Construction Traffic Management Plan (CTMP) and Travel Plan, Environmental Incident Response Plan (EIRP), Pollution Incident Control Plan (PICP) and Dust Management Plan (DMP), each of which is outlined below.</p>		
<p>Construction Traffic Management Plan and Travel Plan</p> <p>Prior to commencement of construction, the appointed contractor shall prepare a CTMP for the proposed Project. The purpose of the CTMP is to set out management and mitigation measures to prevent or minimise the transport impacts during the Construction Phase of the proposed Project. A Travel Plan will also be available to provide the mechanism to support and promote sustainable travel for staff, contractors and visitors travelling to the proposed Project sites to minimise potential pollution generation. Further information on the CTMP and Travel Plan are contained within the CEMP (Volume 5, Appendix 1I).</p>		
<p>Pollution Incident Control Plan</p> <p>Contractors will develop and implement a PICP which will detail their response in the event of any incident on site. Further information on the PICP is contained within the CEMP (Volume 5, Appendix 1I).</p>		
<p>Environmental Incident Response Plan</p>		

Mitigation Measure	Reference within EIS	Responsibility
<p>The EIRP will contain Incident Response Procedures which will outline the detailed procedures for dealing with any potential emergency and shall include the following:</p> <ul style="list-style-type: none"> ▪ Initial response procedures; ▪ List of emergency contact details; ▪ Records and sharing of records with prescribed bodies; ▪ Training; and ▪ Details (location, number and type) of emergency response equipment maintained on site <p>Dust Management Plan</p> <p>A Dust Management Plan (DMP) will be produced by the principle contractor post consent but pre construction for the proposed Project. The DMP is a plan for the management of dust which is likely to arise during the construction phase of the proposed Project, relevant to each site, where applicable. The DMP will provide measures to control other emissions, approved by the local authority. The level of detail will depend on the risk, and should include, as a minimum, the highly recommended measures in this assessment. The desirable measures should be included as appropriate for the site (desirable rather than highly recommended for low risk sites). This will help control potential pollution from the proposed Project. The DMP is highlighted as a mitigation measure in Volume 3, Chapter 15: Air Quality and Volume 5 Appendix 11 (CEMP).</p>		
Construction Phase Mitigation for Material Assets		
Material Assets of Human Origin		
<p>The following mitigation measures will be implemented during construction for Material Assets of Human Origin:</p> <ul style="list-style-type: none"> ▪ Existing Properties: Mitigation measures in Volume 3, Chapter 11: Traffic and Transport, Chapter 10: Noise and Vibration, Chapter 15: Air Quality and Chapter 13: Landscape and Visual will be adhered to during the construction phase. ▪ Road Network: Prior to commencement of construction, the appointed contractor will prepare a CTMP for the proposed Project. The purpose of the CTMP is to set out management and mitigation measures to prevent or minimise the transport impacts during the construction phase of the proposed Project. Other mitigation measures for the road network as per Volume 3, Chapter 11: Traffic and Transport include: <ul style="list-style-type: none"> ○ Traffic Management Plan to help reassure the local community which will detail ways to reduce the construction traffic effect; ○ A construction specific Travel Plan which will provide the mechanism to support and promote sustainable travel for staff, contractors and visitors travelling to the proposed Project sites; and 	<p>Volume 3, Chapter 16: Cross Cutting Themes Section 16.3.9: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>

Mitigation Measure	Reference within EIS	Responsibility
<ul style="list-style-type: none"> ○ Existing good practice such as dropped kerbs flush with road surface, double transition kerbs, tactile surfaces etc. ▪ Rail Network: A detailed construction plan and schedule will be developed for the proposed Project to ensure that the construction phasing allows for maximum efficiency while minimising potential for environmental impact. Detailed information in regard to the construction programme for the proposed Project is set out at Volume 2, Chapter 3: Project Description. ▪ Public Utilities: The following general measures will be implemented: <ul style="list-style-type: none"> ○ Communication and consultation will be conducted with public utility providers ahead of construction commencement; ○ Underground surveying techniques are a key method of understanding the below ground conditions and confirming the presence of utility services. The Principle Contractor will confirm the location of known services and will undertake ground scans in advance of excavations and construction work; ○ Method Statements shall be developed for the construction phase by the appointed Contractor to ensure that all underground services are located manually and carefully protected. The CEMP, prepared by the Principle Contractor and approved by CIE shall outline a methodology and procedure for carrying out such detection surveys; and ○ An avoidance policy shall be adopted where possible in relation to all services and appropriate protection shall be provided for all above and below ground services as necessary. ▪ Pedestrian Ways: Mitigation measures in Volume 3, Chapter 6: Population & Human Health; Chapter 10: Noise and Vibration; Chapter 11: Traffic and Transport; Chapter 13: Landscape and Visual; and Chapter 15: Air Quality and will be adhered to during the construction phase. 		
Material Assets of Natural Origin		
<p>The following mitigation measures will be implemented during construction for Material Assets of Natural Origin:</p> <ul style="list-style-type: none"> ▪ Land Resource: Mitigation measures relevant to recreational facilities are outlined in the chapters on which this topic depends including Volume 3, Chapter 6: Population & Human Health; Chapter 10: Noise and Vibration; Chapter 11: Traffic and Transport; Chapter 13: Landscape and Visual; and Chapter 15: Air Quality and will be adhered to during the construction phase. ▪ Natural Amenities: Mitigation measures outlined in Volume 3, Chapter 7: Biodiversity and Chapter 9: Water as well as Volume 5, Appendix 7G Natura Impact Statement will be adhered to throughout the construction phase. 	<p>Volume 3, Chapter 16: Cross Cutting Themes Section 16.3.9: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>

Mitigation Measure	Reference within EIS	Responsibility
<ul style="list-style-type: none"> ▪ Raw Materials: Consideration will be given to the sustainable sourcing of all materials. Materials arising from excavation will be reused where possible. This, and the methodologies chosen at design stage, will result in a decrease in the amount of imported material, which in turn will reduce the impact of traffic on the surrounding roads and will result in less demand on non-renewable sources such as quarries. ▪ Other mitigation measures which will be employed in relation to raw materials are as follows: <ul style="list-style-type: none"> ○ Design will be optimised to minimise the requirements for raw materials; ○ Materials will be reused where possible (such as excavated rock); ○ Raw materials will be sourced locally where possible; and ○ Raw materials will be managed in accordance with the CEMP for construction. ○ Volume 3, Chapter 14: Resource Use and Waste Management outlines further mitigation measures for the handling and minimisation of raw materials. 		
Operational Mitigation Measures for Material Assets		
Material Assets of Human Origin		
<p>The following mitigation measures will be implemented during operation for Material Assets of Human Origin:</p> <ul style="list-style-type: none"> ▪ Existing Properties: Mitigation measures in Volume 3, Chapter 11: Traffic and Transport, Chapter 10: Noise and Vibration, Chapter 15: Air Quality and Chapter 13: Landscape and Visual will be adhered to during the operation phase. ▪ Recreational Facilities: Mitigation measures in Volume 3, Chapter 11: Traffic and Transport, Chapter 10: Noise and Vibration, Chapter 15: Air Quality and Chapter 13: Landscape and Visual will be adhered to during the operation phase. ▪ Public Utilities: Method Statements shall be developed by contractors engaged to carry out maintenance or other works in the roads and bridges during operational to ensure that any underground services are located manually and carefully protected during any excavation works. ▪ Pedestrian Ways: No mitigation measures are required during the operational phase that have not already been designed into the proposed Project. 	<p>Volume 3, Chapter 16: Cross Cutting Themes Section 16.3.9: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>
Material Assets of Natural Origin		

Mitigation Measure	Reference within EIS	Responsibility
<p>The following mitigation measures will be implemented during construction for Material Assets Natural Origin:</p> <ul style="list-style-type: none"> Land Resource: Where access to individual parcels of agricultural land is restricted as a result of the proposed Project, new access arrangements will be provided. 	<p>Volume 3, Chapter 16: Cross Cutting Themes Section 16.3.9: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>
<p>Mitigation for Climatic Factors</p>		
<p>Vulnerability to Climate Impacts – Drainage Strategy</p>		
<p>No drainage works are proposed at XC187 Fantstown as no construction is proposed there; none is required either at XC209 Ballyhay as limited construction is proposed to take place there and the CCTV infrastructure does not require drainage or any alterations to existing drainage systems.</p> <p>For the remaining sites, in keeping with <i>NRA TB 13 – Revised Road Drainage Standards</i>, over the edge drainage is proposed in the design for all locations, supplemented with additional features to accommodate the presence of structures or site constraints where necessary. New swale ditches are proposed, located at the toe of the road embankment, that will then drain back to the low points to maximise attenuation and pollution control as part of a SuDS management chain.</p> <p>The swale features will be grassed, with shallow side slopes and a long-wetted perimeter to reduce flow rates and velocities. Typically, they will be underlain by a filter material and perforated pipe to provide a second stage of treatment. The width of the swale varies between 3 and 7 metres depending on the site, and the depth (including 0.15 metres freeboard) is up to 0.75 metres and typically less than 0.5 metres. See TII Publication Number CC-SCD-00525 for typical details. Where agricultural or local access must be maintained, a short section of culvert will be constructed beneath the respective junction to ensure connectivity of the swale ditches either side of the access.</p> <p>The swale ditches will outfall directly or indirectly into water bodies within the River Mague or River Awbeg sub-catchments respectively, with further detail provided under each site below. The maximum outflow of the swales will be capped at greenfield runoff rates.</p> <p>Swale ditches are not proposed at XC219 Buttevant within the existing floodplain as there is a potential for these to be overwhelmed in a fluvial flood event, resulting in a direct pathway between untreated runoff from the highway and the receiving watercourse (Pepperhill). Instead, a gully and pipe network is detailed which will capture surface runoff from the highway. This will discharge into the Pepperhill (indirectly via existing ditches) through an interceptor.</p>	<p>Volume 3, Chapter 16: Cross Cutting Themes Section 16.4.7: Mitigation Measures</p>	<p>Client/Appointed Contractor</p>