Chapter 22
Summary of Mitigation & Monitoring Measures

Contents

22. Summary of Mitigation & Monitoring Measures

22.1 Introduction

The purpose of this Chapter is to collate the mitigation and monitoring measures identified in the Environmental Impact Assessment Report (EIAR) that are considered necessary to protect the environment, prior to the commencement of, and throughout the duration of the Construction and / or Operational Phases of the Tallaght / Clondalkin to City Centre Core Bus Corridor Scheme (hereafter referred to as the Proposed Scheme).

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

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

22.2 Mitigation and Monitoring Schedules

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

Mitigation and monitoring measures specified within the EIAR technical assessments are also provided in Chapter 6 to Chapter 21 of this EIAR.

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

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

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

22.3 General Mitigation Requirements

Table 22.1: General Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
GEN1	Section 5.10	Throughout (as required)	The mitigation measures appropriate to the construction contract summarised in this chapter have been included in the Construction Environmental Management Plan (CEMP) and its associated management plans (provided in Appendix A5.1 in Volume 4 of this EIAR).	**Construction**

22.4 Traffic and Transport

Table 22.2: Traffic and Transport Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
TT1	6.5.1	Throughout (as required)	A Construction Environmental Management Plan (CEMP) has been prepared (included as Appendix A5.1 in Volume 4 of this EIAR) and will be implemented (and developed further as required) by the appointed contractor. A detailed Construction Traffic Management Plan will be prepared (and included in the CEMP) and implemented by the appointed contractor. The appointed contractor will also prepare (and include in the CEMP) and implement a Construction Stage Mobility Management Plan (CSMMP) to actively encourage personnel to travel to site by sustainable means.	**Construction**

22.5 Air Quality

Table 22.3: Air Quality Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
AQ1	7.5.1	Construction Compounds and throughout (as required)	A series of mitigation measures will be implemented by the appointed contractor to minimise dust nuisance impacts: • Public roads affected by the Proposed Scheme works will be regularly inspected for soiling associated with the construction activities and cleaned as necessary; • Material handling systems and stockpiling of materials will be designed and laid out to minimise exposure to wind. Water misting or sprays (or similar dust suppression methods) will be used as required if particularly dusty activities associated with the construction contract are necessary during dry or windy periods; • During movement of dust generating materials both on and off-site, trucks will be covered with tarpaulin, and before entrance onto public roads, trucks will be checked to ensure the tarpaulins are properly in place; and • The appointed contractor will provide a site hoarding of 2.4m height along noise sensitive boundaries, at a minimum, at the Construction Compounds, which will assist in minimising the potential for dust impacts off-site. The appointed contractor will keep the effectiveness of the mitigation measures under review and revise them as necessary. In the event of dust nuisance associated with the Proposed Scheme occurring outside the works boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem.	**Construction**

22.6 Climate

Table 22.4: Climate Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
CL1	8.7.1	Throughout (as required)	A series of mitigation measures have been incorporated into the Proposed Scheme with the goal of reducing the embodied carbon associated with the Construction Phase. These mitigation measures include: • The replacement, where practicable, of concrete containing Portland cement with concrete containing ground granulated blast furnace slag (GGBFS); • Where practicable, materials will be reused within the extent of the Proposed Scheme; and • Where practicable, materials will be sourced locally to reduce the embodied emissions associated with transport.	**Construction**

22.7 Noise and Vibration

Table 22.5: Noise and Vibration Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
NV1	9.5.1.1	Throughout (as required)	The appointed contractor will be required to take specific noise abatement measures to the extent required and comply with the recommendations of BS 5228–1 (BSI 2014a) and European Communities Noise Emissions by Equipment for Use Outdoors (Amendment) Regulations 2006 (S.I. No 241/2006). The mitigation measures outlined below for the Construction Phase have also been included in the Construction and Environmental Management Plan (Appendix A5.1 in Volume 4 of this EIAR). These measures will ensure that: • During the Construction Phase, the appointed contractor will be required to manage the works to comply with the limits detailed in Section 9.2.4.1 in Chapter 9 of this EIAR using methods outlined in BS 5228–1 (BSI 2014a). • The best means practicable, including proper maintenance of plant and equipment, will be employed to minimise the noise produced by on site operations.	**Construction**
NV2	9.5.1.1	Throughout (as required)	The appointed contractor will put in place the most appropriate noise control measures depending on the level of noise reduction required at individual working areas i.e., based on the construction threshold values for noise and vibration set out in Tables 9.11 and 9.14 in Chapter 9 of this EIAR. Reference to Table 9.50 in Chapter 9 of this EIAR indicates that intrusive works occurring within 75m of Noise Sensitive Locations (NSLs) with a direct line of sight to work will need specific noise control measures to reduce impacts depending on the time period over which they will occur, i.e. daytime or evening.	**Construction**
NV3	9.5.1.1.1	Throughout (as required)	The potential for any item of plant or equipment to result in exceedance of construction noise thresholds (Tables 9.11 and 9.14 in Chapter 9 of this EIAR) will be assessed prior to the item being brought onto the site. The least noisy item of plant or equipment will be selected wherever practicable (e.g., plant items with sound attenuation incorporated). Should a particular item of plant or equipment already on the site be found to exceed the construction noise thresholds, the first action will be to identify whether the item can be replaced with a quieter alternative.	**Construction**
NV4	9.5.1.1.2	Construction Compounds and throughout (as required)	The following measures will be implemented by the appointed contractor to control noise levels at source in order to remain below the threshold values for noise set out in Table 9.11 in Chapter 9 of this EIAR, which relate to specific site considerations: • For mobile plant items such as dump trucks, planers, excavators and loaders, the installation of an acoustic exhaust, utilising an acoustic canopy to replace the normal engine cover and/or maintaining enclosure panels closed during operation can reduce noise levels by up to 10 dB; • For percussive tools such as pneumatic concrete breakers and tools a number of noise control measures include fitting muffler or sound reducing equipment to the breaker 'tool' and ensuring any leaks in the air lines are sealed; • The Construction Compounds are in close proximity to NSLs (refer to Table 9.40 in Chapter 9 of this EIAR). Noisy items of plant or equipment (e.g., crushing plant) will be sited away from noise sensitive boundaries; • Where compressors, generators and pumps are located in proximity to NSLs and have potential to exceed the construction noise thresholds, these will be surrounded by acoustic lagging or enclosed within acoustic enclosures providing air ventilation; and • Resonance effects in panel work or cover plates can be reduced through stiffening or application of damping	**Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			compounds, while other noise nuisance can be controlled by fixing resilient materials in between the surfaces in contact.	
NV5	9.5.1.1.3	Throughout (as required)	Erection of localised demountable enclosures or screens will be used by the appointed contractor around breakers or drill bits, as required, when in operation in proximity to NSL boundaries with the potential to exceed the construction noise thresholds. Annex B of BS 5228–1 (BSI 2014a) (Figures B1, B2 and B3) provide typical details for temporary and mobile acoustic screens, sheds and enclosures that can be constructed on site from standard materials.	**Construction**
NV6	9.5.1.1.3	Construction Compounds	The appointed contractor will provide a site hoarding of 2.4m height along noise sensitive boundaries, at a minimum, at the Construction Compounds.	**Construction**
NV7	9.5.1.1.3	Construction Compounds	Careful planning of the Construction Compounds including the placement of site buildings and stores between the site and NSLs will also be considered by the appointed contractor.	**Construction**
NV8	9.5.1.1.4	Throughout (as required)	Construction activities will be scheduled in a manner that reflects the location of the site and the nature of neighbouring properties. Construction activities / plant or equipment items will be considered with respect to their potential to exceed construction noise thresholds at NSLs and will be scheduled according to their noise level, proximity to sensitive locations and possible options for noise control. In situations where an activity with potential for exceedance of construction noise thresholds is scheduled (e.g., road widening and utility diversions or activities with similar noise levels identified in Table 9.50 in Chapter 9 of this EIAR). Other construction activities associated with the Proposed Scheme will be scheduled to avoid significant cumulative noise levels.	**Construction**
NV9	9.5.1.1.5	Throughout (as required)	The NTA will establish clear forms of communication that will involve the appointed contractor and NSLs in proximity to the works so that residents or building occupants are aware of the likely duration of activities likely to generate noise or vibration that are potentially significant as set out in Tables 9.11 and 9.14 in Chapter 9 of this EIAR.	**Construction**
NV10	9.5.1.1.6	Throughout (as required)	During the Construction Phase the appointed contractor will carry out noise monitoring at representative NSLs to evaluate and inform the requirement and / or implementation of noise management measures. Noise monitoring will be conducted in accordance with ISO 1996–1 (ISO 2016) and ISO 1996–2 (ISO 2017). The selection of monitoring locations will be based on the nearest representative NSLs to the working area which will progress along the length of the Proposed Scheme.	**Construction**
NV11	9.5.1.2	Throughout (as required)	During the Construction Phase the appointed contractor will carry out vibration monitoring at buildings and structures where proposed works have the potential to be at or exceed the vibration limit values in Table 9.14 in Chapter 9 of this EIAR. Vibration from construction activities will be limited to the values set out in Table 9.14 in Chapter 9 of this EIAR to avoid any form of potential cosmetic damage to buildings and structures.	**Construction**
NV12	9.5.1.2	Throughout (as required)	The appointed contractor will implement the following mitigation measures during the Construction Phase: • A clear communication programme will be established by NTA to inform adjacent building occupants in advance of any potential intrusive works which may give rise to vibration levels likely to result in significant effects as per Table 9.15 in Chapter 9 of his EIAR; • Activities capable of generating significant vibration effects with respect to human response as per Table 9.15 in Chapter 9 of this EIAR will be restricted to daytime hours only, as far as practicable; and • Appropriate vibration isolation (such as resilient mounts to pumps and generators) will be applied to plant and equipment, where required and where feasible.	**Construction**

22.8 Population

Table 22.6: Population Mitigation Measures

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

22.9 Human Health

Table 22.7: Human Health Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
HH1	11.5.1	Throughout (as required)	Mitigation for adverse psychosocial responses to the Construction Phase will include providing the public with sufficient information to enable people to plan their days, journeys and activities around the construction works and take control of their options to some extent. The appointed contractor will put in place a Communications Plan in accordance with the NTA requirements. The Plan will provide a mechanism for members of the public to communicate with the NTA and the appointed contractor, and for the NTA and the appointed contractor to communicate important information on various aspects of the Proposed Scheme to the public. This will include timely communication to the local community on the planned works activities, timings and traffic management. These requirements are set out in the CEMP (Appendix A5.1 in Volume 4 of this EIAR).	**Construction**
HH2	11.5.1	Tallaght University Hospital, Coombe Women's Hospital, CHI Hospital Crumlin	In advance of construction works in the vicinity of the hospitals, the appointed contractor will liaise with the hospitals to inform them of the proposed construction traffic management arrangements	**Construction**

22.10 Biodiversity

Table 22.8: Biodiversity Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
BD1	12.5.1	Throughout (as required)	Where deemed necessary a suitably experienced and qualified ecologist will be employed by the appointed contractor. The ecologist will advise the appointed contractor on ecological matters during construction, communicate all findings in a timely manner to the NTA and statutory authorities, acquire any licenses / consents required to conduct the work, and supervise and direct the ecological measures associated with the Proposed Scheme.	**Construction**
BD2	12.5.1.2.1	Throughout (as required)	**Habitat Loss and Fragmentation** Where practicable, areas of vegetation, including habitats of Local Importance (Higher Value), (i.e., mixed broadleaved woodland, mixed broadleaved conifer woodland, scattered trees and parkland, treeline and hedgerow habitat types), which lie within the footprint, or along the boundary of the Proposed Scheme, will be retained. The areas of vegetation to be retained are shown on the Landscaping General Arrangement Drawings (BCIDA-ACM-ENV_LA-0809_XX_00-DR-LL-9001) in Volume 3 of this EIAR. These areas will be protected by the appointed contractor for the duration of construction works and fenced off at an appropriate distance.	**Construction**
BD3	12.5.1.2.1	Throughout (as required)	**Habitat Loss and Fragmentation** To mitigate loss of habitat, proposed planting incorporated into the Proposed Scheme will be implemented by the appointed contractor listed below and displayed on the Landscaping General Arrangement Drawings (BCIDA-ACM-ENV_LA-0809_XX_00-DR-LL-9001) in Volume 3 of this EIAR: • 1,055 no. trees planted; • 590m of proposed hedgerow; • 20,560m^2 of proposed species rich grassland; • 3,450m^2 of proposed ornamental planting; • 5,525m^2 of proposed native planting; and, • 43,140m^2 of proposed amenity grassland planting.	**Construction**
Refer to WT1 in Table 22.9	-	Construction compounds and throughout (as required)	**Habitat Degradation – Surface Water Quality** In terms of mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in the CEMP, Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme. It will be a condition of the Employer's Requirements that the successful contractor, immediately following appointment, must detail in the SWMP how it is intended to effectively implement all the applicable measures identified in this EIAR and any additional measures required pursuant to conditions imposed by An Bord Pleanála to any grant of approval. At a minimum, all the control and management measures set out in the SWMP will be implemented by the appointed contractor. This includes measures relating to: • Construction Compound management including the storage of fuels and materials; • Control of sediment;	**Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			• Use of concrete; • Management of vehicles and plant including refuelling and wheel wash facilities (if necessary); and • Monitoring.	
Refer to WT4 in Table 22.9	-	Works Close to ESB Oil-Filled Cables	**Habitat Degradation – Surface Water Quality** The appointed contractor in consultation with the NTA will engage with ESB Networks to locate their oil-filled cable in the context of the Proposed Scheme. A ground investigation, where construction works are to take place near to the ESB oil-filled cable, will be carried out prior to construction commencing and following this, an appropriate suite mitigation measures will be confirmed and deployed, which could for example result in the removal of all contaminated material from site as outlined in Chapter 14 (Land & Soils). Any hazardous material to be removed from site will be removed in accordance with measures outlined in Chapter 18 (Waste & Resources)	**Construction**
Refer to WT5 in Table 22.9	-	Widening of R134	**Habitat Degradation – Surface Water Quality** No significant or intrusive works will be carried out within 10m of adjacent waterbody (Camac _040). Silt fences will be installed along the length of the top of the bank where works are taking place. These will be monitored on a daily basis by the appointed contractor to ensure they remain intact. There will be no in-stream works and no works on the bank itself, only along the top of the bank. Vegetation removal will be kept to a minimum.	**Construction**
Refer to WT6 in Table 22.9	-	Modifications of River Camac headwall	**Habitat Degradation – Surface Water Quality** To ensure there are no water quality impacts as a result of this, no works will take place during the closed (fisheries) season and a form of bunding will be used to provide a dry area of work. This could be in the form of sandbags or a silt curtain. Any silty water will be directed to a settlement area or silt-buster tank prior to discharge back to the water body.	**Construction**
Refer to LSGH8 to LSGH11 in Table 22.10	-	Throughout (as required)	**Habitat Degradation – Groundwater** The mitigation measures which will be applied by the appointed contractor with regard to the control pollution of soil and groundwater during the Construction Phase are outlined in LGSH8 and LGSH11 in Table 22.10 of this Chapter of the EIAR.	**Construction**
Refer to AQ1 in Table 22.3	-	Construction Compounds and throughout (as required)	**Habitat Degradation – Air Quality** The mitigation measures to control dust emissions during the Construction Phase are outlined in Table 22.3 of this Chapter of the EIAR.	**Construction**
BD4	12.5.1.2.5	Throughout (as required)	**Habitat Degradation – Invasive Species** The NTA will ensure that a confirmatory pre-construction invasive species survey will be undertaken by a suitably qualified specialist to confirm the absence and/or extent of all Third Schedule invasive species within the footprint of the Proposed Scheme. Where an infestation is confirmed / identified within the footprint of the Proposed Scheme, this will require the implementation of a Non-Native Invasive Species Management Plan (refer to the Plan contained in the CEMP in Appendix A5.1 of Volume 4 of this EIAR). Following the confirmatory pre-construction survey, mitigation measures outlined in BD5 and BD6 will be implemented, as required.	**Pre-Construction** **Construction**
BD5	12.5.1.2.5	Throughout (as required)	**Habitat Degradation – Invasive Species** Where a pre-construction invasive species re-survey identifies newly established non-native invasive species within the footprint of the Proposed Scheme, the non-native Invasive Species Management Plan (ISMP) produced will provide a detailed description of the infestations (e.g. approximate area of the respective colonies (m^2), where feasible; approximate total number of stems, pattern of growth and information on other vegetation present), and where	**Pre-Construction / Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			necessary, include calculations of volumes of infested soils to be excavated. The ISMP will be finalised following the pre-construction survey as advised by a suitably qualified specialist, with regard to the guidance on The Management of Invasive Alien Plant Species on National Roads (Technical Guidance) (TII 2020a; 2020b) and other species-specific guidance documents including those listed in the non-native ISMP, as necessary.	
BD6	12.5.1.2.5	Throughout (as required)	**Habitat Degradation – Invasive Species** The NTA will ensure that all control measures specified in the Proposed Scheme non-native ISMP will be implemented by a suitably qualified and licenced specialist prior to the construction of the Proposed Scheme to control the spread of newly established non-native invasive species within the footprint of the Proposed Scheme. Furthermore, the appointed contractor will adhere to control measures specified within the Non-Native ISMP throughout the Construction Phase of the Proposed Scheme. The site will be monitored by the appointed contractor after control measures have been implemented. Any re-growth, will be subsequently treated as detailed in the Proposed Scheme non-native ISMP.	**Pre-Construction / Construction**
BD7	12.5.1.4.1	(CBC08009PRF009; CBC08009PRF010, CBC08009PRF011, CBC08009PRF001, CBC0001PRF005) Provided in Figure 12.7.2 in Volume 3 of this EIAR.	**Bats** Protection of Bats during Vegetation Clearance A total of four potential roost features (PRFs) were identified in trees within the footprint of the Proposed Scheme during the multidisciplinary surveys. The following mitigation measures will be implemented by the appointed contractor to protect the PRFs: • Retained trees with PRFs will be fenced off at the outset of works and for the duration of construction to avoid structural damage to the trunk, branches, or root system of the tree which could disturb roosting bats. Temporary fencing will be erected at a sufficient distance from the tree so as to enclose the Root Protection Area (RPA) of the tree. The RPA will be defined based upon the recommendation of a qualified arborist; • Where fencing is not feasible due to insufficient space, protection for the tree will be afforded by wrapping hessian sacking (or suitable equivalent) around the trunk of the tree and strapping stout buffer timbers around it; • The area within the RPA will not be used for vehicle parking or the storage of materials (including soils, oils and chemicals). The storage of hazardous materials (e.g., hydrocarbons) or concrete washout areas will not be undertaken within 10m of any retained trees, hedgerows and treelines; • A qualified arborist will assess the condition of, and advise on any repair works necessary to, any trees which are to be retained or that lie outside of the Proposed Scheme footprint but whose RPA is impacted by the works. Any remedial works required will be carried out by a qualified arborist; • Where works are required within the RPA, the mitigation measures as set out in the method statement within the Arboricultural Impact Assessment (refer to Appendix A17.1 in Volume 4 of this EIAR) will be implemented; and • There will be no additional lighting within 5m of the PRF during the Construction Phase of the Proposed Scheme to avoid disturbance to roosting bats.	**Construction**
BD8	12.5.1.4.1	Throughout (as required)	**Bats** Roost Loss The NTA will ensure that a confirmatory pre-construction survey of all trees identified as containing PRFs or not to be removed within the boundary of the Proposed Scheme will be rechecked for PRFs by a suitably qualified ecologist engaged by the NTA as part of the preconstruction surveys. The survey will:	**Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			• Confirm that previously identified trees with PRFs which are to be retained are still standing; and • Identify whether new PRF features (if any) may have developed owing to damage or management change to trees in the intervening period between the original surveys and grant of planning. In the unlikely event that trees with PRFs are detected during the preconstruction survey it is recommended that: • In advance of any clearance, all trees deemed to contain PRFs which are subject to felling / clearance will be checked for the presence of bats by a suitably qualified / licenced bat specialist (using an endoscope under a separate licence held by that individual); • In the unlikely event that bats are found on the proposed development site during construction works such as vegetation clearance, works will immediately cease in that area and the local NPWS Conservation Ranger will be contacted; • An application will then be made to the NPWS for a derogation licence to permit actions affecting bats or their roosts that would normally be prohibited by law; • After licence approval from the NPWS (which may include the necessity for additional mitigation measures to those recommended here) bats may be removed by a bat specialist licenced to handle bats and released in the area in the evening following capture; and • Only then will trees with PRFs be felled and this should be undertaken 'in sections' where the section can be handled to avoid sudden movements or jarring of the sections.	
BD9	12.5.1.4.1	Throughout (as required)	**Bats** Roost Loss – Installation of Bat Boxes In addition to mitigation proposals that may arise as result of the pre-construction survey (e.g. emergence surveys and confirmation of roost), it is proposed to install generalist/self-cleaning bat boxes for each PRF that is confirmed to be removed: • Standard Schwegler 1FFH (2 number) and 3FF boxes (1 number) for all PRF trees to be removed; • The boxes will be installed three months in advance of felling of any tree with PRFs and in public spaces managed by the Local Authority as close as possible to areas of the PRF tree to be felled and which overlap with areas of bat activity confirmed during activity surveys undertaken as part of the EIAR; • The boxes will be installed on the tree at a height of 3-5 and firmly fixed to tree trunk; • Where practicable, the bat boxes will be installed in an east, south and west orientation and protected from undue disturbance by selective placement away from light spill and at a height >3.5m; • There will be 1m clearance (e.g., no overhanging branches or ivy encroachment near installed box) around each bat box opening; and • Installed bat boxes will be labelled and data (reference number, GPS location and photographic record) will be supplied to Bat Conservation Ireland (BCI), Local Authority Biodiversity Officer and NPWS.	**Construction**
BD10	12.5.1.4.1	Throughout (as required)	**Bats** Habitat Loss and Fragmentation Where practicable, habitats of importance to bats such as scattered trees and parkland, treeline and hedgerow habitat types, which lie within the footprint, or along the boundary of the Proposed Scheme, that are not directly impacted by	**Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			the Proposed Scheme will be retained. These areas will be protected for the duration of construction works and fenced off at an appropriate distance. Vegetation to be retained is shown on Landscaping General Arrangement drawings (BCIDA-ACM-ENV_LA-0809_XX_00-DR-LL-9001) in Volume 3 of this EIAR.	
BD11	12.5.1.4.1	Throughout (as required)	**Bats** Disturbance of Flight Patterns / Foraging Routes as a result of Lighting Impacts The appointed contractor in liaison with the suitably qualified licensed ecologist(s) will ensure that lighting at the Construction Compounds, and active work areas in proximity to known bat activity (including those work areas in close proximity to watercourses with known bat activity), will be designed to minimise light spill and be cognisant of light-spill onto these areas. Mitigation measures to reduce light spill will include the following: • The use of sensor / timer triggered lighting; • LED luminaires to be used where practicable; • Column heights to be considered to minimise light spill; • Accessories such as baffles, hoods or louvres can be used to reduce light spill and direct it only where needed; and • Where night time works are required, the appointed contractor will liaise with the engaged suitably experienced and qualified ecologist(s) and implement measures to mitigate the impact of such works (especially works carried adjacent to watercourses with known bat activity).	**Construction**
BD12	12.5.1.4.2	Throughout (as required)	**Badgers** Disturbance / Displacement The NTA will ensure that a confirmatory pre-construction check of all suitable badger habitat will be completed within the 12 month period prior to any construction works commencing. The presence of any new setts or significant badger activity will be treated and/or protected in accordance with the Guidelines for the Treatment of Badgers during the Construction of National Road Schemes (NRA 2005b).	**Pre-Construction**
BD13	12.5.1.4.2	Throughout (as required)	**Badgers** Protection of Badgers from Accidental Harm During Construction (Excavations) To protect badgers from indirect harm during construction, where practicable, open excavations will be covered when not in use and backfilled as soon as practicable by the appointed contractor. Excavations will also be covered at night, where practicable, and any deep excavations which must be left open will have appropriate egress ramps in place to allow mammals to safely exit should they fall in.	**Construction**
BD14	12.5.1.4.2	Throughout (as required)	**Badgers** Lighting See BD11 which relates to lighting mitigation measures.	**Construction**
BD15	12.5.1.4.3	Throughout (as required)	**Otter** Loss of Breeding / Resting Sites The NTA will ensure that a confirmatory pre-construction check of all suitable otter habitat will be completed within the 12 month period prior to any constructions works commencing. The presence of any new holt / couch sites will be treated and/or protected in accordance with the Guidelines for the	**Pre-Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			Treatment of Otters prior to the Construction of National Road Schemes (NRA 2006b).	
BD16	12.5.1.4.3	Throughout (as required)	**Otter** Measures to Prevent Injury / Mortality Impacts • The appointed contractor will engage a suitably qualified and / or licensed ecologist(s) to oversee and advise works at watercourse crossings. • Where a new or reactivated holt is encountered, within 150 metres (up and downstream) of the watercourse crossing, the qualified ecologist(s) will consult with the NPWS in conjunction with the NTA and appointed contractor. • The qualified ecologist will review method statements; oversee works; provide instruction to the appointed contractor(s), deliver toolbox talks and temporarily halt works, if, and as, necessary, having conferred with the NTA. • To protect otters from indirect harm during construction, where practicable open excavations will be covered when not in use and backfilled as soon as practicable by the appointed contractor. • Excavations will also be covered at night, where practicable, and any deep excavations which must be left open will have appropriate egress ramps in place to allow mammals to safely exit should they fall in; • Fencing requirements as per the Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA 2006b) will be erected around the Construction Compound and other working areas which are in close proximity to significant watercourses and have suitable roaming territory for otter; and • Where mammal-proof fencing cannot for practical reasons be installed to delineates the works area from the riparian zone, the use of physical hoarding 2.4m tall (as specified in the Appendix A5.1 CEMP in Volume 3 of the EIAR) is acceptable.	**Construction**
Refer to WT1 in Table 22.9	-	Construction Compounds and throughout (as required)	**Otter** Habitat Degradation / Reduced Prey Availability – Water Quality In terms of mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in the CEMP, Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme. It will be a condition of the Employer's Requirements that the successful contractor, immediately following appointment, must detail in the SWMP how it is intended to effectively implement all the applicable measures identified in this EIAR and any additional measures required pursuant to conditions imposed by An Bord Pleanála to any grant of approval. At a minimum, all the control and management measures set out in the SWMP will be implemented by the appointed contractor. This includes measures relating to: • Construction Compound management including the storage of fuels and materials; • Control of sediment; • Use of concrete; • Management of vehicles and plant including refuelling and wheel wash facilities (if necessary); and • Monitoring.	**Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
BD17	12.5.1.4.3	Throughout (as required)	**Otter** Measures to Prevent Disturbance / Displacement Where night-time works are required, the appointed contractor will liaise with the engaged suitably qualified and licenced ecologist(s) and implement measures to mitigate the impact of such works (especially works carried adjacent to watercourses with known otter activity).	**Construction**
BD18	12.5.1.4.3	Throughout (as required)	**Otter** Measures to Prevent Disturbance / Displacement Site set up near watercourse crossings will be undertaken in a timely manner to reduce impacts to otter. The works area will be delineated from the watercourse with hoarding by the appointed contractor to obscure the site from otter and prevent access. The construction works will commence following confirmation from the suitably qualified ecologist that no otter holt is located within 150m of any proposed works near watercourse. Should an otter holt be found to be present, the suitably qualified ecologist will advise, in discussion with the NTA and the appointed contractor on the appropriate actions to be taken. Where night-time works are required, the appointed contractor will liaise with the engaged suitably experienced and qualified ecologist(s) and implement measures to mitigate the impact of such works (especially works carried adjacent to watercourses with known otter activity). Specific mitigation in respect of the proposed culvert extension and headwall installation at the River Camac along the R134 New Nangor Road / Oak Road intersection is required. Instream works are proposed alongside the existing culvert under the road. In order to keep otter away from the works area, an additional section of mammal resistant fencing, as specified in the NRA (2006b) guidance, is required. The mammal resistant fencing will be placed along either side of the works area (extending at least 25m, but preferably 50m, alongside and away from the works area) but reconnecting with the existing culvert to maintain potential commuting access under the culvert). This temporary dry commuting territory will be provided shortly in advance of works commencing and will be retained for the duration of the proposed works in this area (estimated at 6.5 weeks).	**Construction**
BD19	12.5.1.4.3	Throughout (as required)	**Otter** Lighting See BD11 which relates to lighting mitigation measures.	**Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
Refer to WT1 in Table 22.9	-	Throughout (as required)	**Marine Mammals / Other Mammal Species** Habitat & Food Resource Degradation – Water Quality In terms of mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in the CEMP, Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme. It will be a condition of the Employer's Requirements that the successful contractor, immediately following appointment, must detail in the SWMP how it is intended to effectively implement all the applicable measures identified in this EIAR and any additional measures required pursuant to conditions imposed by An Bord Pleanála to any grant of approval. At a minimum, all the control and management measures set out in the SWMP will be implemented by the appointed contractor. This includes measures relating to: • Construction Compound management including the storage of fuels and materials; • Control of sediment; • Use of concrete; • Management of vehicles and plant including refuelling and wheel wash facilities (if necessary); and • Monitoring.	**Construction**
BD20	12.5.1.5.1	Throughout (as required)	**Breeding Birds** Habitat Loss and Fragmentation Where practicable, habitats of importance to birds such as scattered trees and parkland, treeline and hedgerow and scrub - habitat types, which lie within the footprint, or along the boundary of the Proposed Scheme, that are not directly impacted by the Proposed Scheme will be retained. These areas will be protected for the duration of construction works and fenced off appropriately.	**Construction**
BD21	12.5.1.5.1	Throughout (as required)	**Breeding Birds** Habitat Loss and Fragmentation Planting of treeline, hedgerow and grassland habitats within the Proposed Scheme footprint will be carried out by the appointed contractor, as detailed in the landscape drawings which will provide suitable compensatory habitat for the breeding bird species recorded within the study area (Refer to the Landscaping General Arrangement Drawings (BCIDA-ACM-ENV_LA-0809_XX_00-DR-LL-9001in Volume 3 of this EIAR for locations.	**Construction**
BD22	12.5.1.5.1	Throughout (as required)	**Breeding Birds** Mortality Risk Where practicable, vegetation (e.g., hedgerows, trees, scrub, bankside vegetation and grassland) will not be removed, between 1 March and the 31 August, to avoid direct impacts on nesting birds. Where the construction programme does not allow this seasonal restriction to be observed, then these areas will be inspected by a suitably qualified ecologist as engaged by the appointed contractor, for the presence of breeding birds prior to clearance. Areas found not to contain nests will be cleared within three days of the nest survey, otherwise repeat surveys will be required. Vegetation clearance will not commence where nests are present, works will resume when birds have fledged and nests are no longer in use, or an agreement is reached with NPWS.	**Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
BD23 refer to Table 22.7	12.5.1.5.1	Throughout (as required)	**Breeding Birds** Disturbance / Displacement To mitigate disturbance and / or displacement to breeding birds from noise and vibration activities the relevant mitigation measures as described in Table 22.7 in this Chapter will be implemented by the appointed contractor.	**Construction**
Refer to WT1 in Table 22.9	-	Throughout (as required)	**Breeding Birds / Wintering Birds / Amphibians / Fish / Invertebrates** Habitat Degradation – Water Quality In terms of mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in the CEMP, Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme. It will be a condition of the Employer's Requirements that the successful contractor, immediately following appointment, must detail in the SWMP how it is intended to effectively implement all the applicable measures identified in this EIAR and any additional measures required pursuant to conditions imposed by An Bord Pleanála to any grant of approval. At a minimum, all the control and management measures set out in the SWMP will be implemented by the appointed contractor. This includes measures relating to: • Construction Compound management including the storage of fuels and materials; • Control of sediment; • Use of concrete; • Management of vehicles and plant including refuelling and wheel wash facilities (if necessary); and • Monitoring.	**Construction**
BD24	12.5.1.5.1	Construction Compounds	**Wintering Birds** Disturbance / Displacement • The appointed contractor will undertake the establishment of the Construction Compounds outside of the wintering bird season (October to March). However, where the construction programme does not allow these seasonal restrictions to be observed, then the Construction Compounds will be inspected by a suitably qualified ecologist as engaged by the appointed contractor, for the presence of wintering birds prior to establishment. Where wintering birds are observed the suitably qualified ecologist will, in discussion with the appointed the contractor, advise how works will be appropriately undertaken; • Hoarding of the Construction Compounds will be in place prior to the arrival of wintering birds and will be retained on all sides of the compound for the duration of the works; • The use of lighting at Construction Compounds, where required, will be such that it is not excessively tall thus providing an obstacle to low-flying birds potentially moving between feeding sites. Furthermore, and where security lighting is not required, lighting should not be continuously on when compound is closed. Sensor-operated lighting timers as necessary should be installed; and • The lighting column heights will be considered by the appointed contractor, so as not to act as an obstacle to birds.	**Construction**
BD25	12.5.1.7	Throughout (as required)	**Amphibians** Habitat Loss, Disturbance & Mortality Risk If vegetation clearance works by the appointed contractor are to begin during the season where frogspawn or tadpoles	**Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			may be present (i.e., February to mid-summer), or where breeding adult newts, their eggs or larvae may be present (i.e., mid-March to September), a pre-construction survey of suitable habitat will be undertaken by a suitably qualified ecologist engaged by the appointed contractor to determine whether breeding amphibians are present. Where amphibians are present, mitigation measures outlined in BD26, BD27, and BD28 will be completed before works recommence.	
BD26	12.5.1.7	Throughout (as required)	**Amphibians** Habitat Loss, Disturbance & Mortality Risk In the case of common frog, any frog spawn, tadpoles, juvenile or adult frogs present will be captured, under licence from NPWS, and removed from affected habitat by hand net and translocated to the nearest area of available suitable habitat, beyond the Zone of Influence (ZoI) of the Proposed Scheme.	**Construction**
BD27	12.5.1.7	Throughout (as required)	**Amphibians** Habitat Loss, Disturbance & Mortality Risk In the case of smooth newt, individuals will be captured, under licence from NPWS, and removed from affected habitat either by hand net or by trapping and translocated to the nearest area of available suitable habitat, beyond the ZoI of the Proposed Scheme. If used, the type and design of traps will be approved by the NPWS. This is a standard and proven method of catching and translocating smooth newt.	**Construction**
BD28	12.5.1.7	Throughout (as required)	**Amphibians** Habitat Loss, Disturbance & Mortality Risk If the size or depth of the habitat feature is such that it cannot be determined by visual survey whether all amphibians have been captured, the suitably qualified ecologist engaged by the appointed contractor will advise on the appropriate course of action to confirm that no amphibian species remain. If drainage of the habitat feature is deemed to be the appropriate course of action, any mechanical pumps used will have a screen fitted, and be sited, such that no amphibian species can be sucked into the pump mechanism. Any capture and translocation works will be undertaken immediately in advance of site clearance/construction works commencing.	**Construction**
BD29	12.5.1.8	River Camac	**Fish** Habitat Loss and Fragmentation The design of the headwall at the River Camac is set back from the existing watercourse. Standard environmental protection measures as provided for in the CEMP, Appendix A5.1 in Volume 4 of this EIAR, will be implemented by the appointed contractor to reduce the duration of instream works and disturbance. Works associated with the construction of the Headwall at the Camac River will be undertaken outside the closed season (October to June, unless approved with IFI by the appointed contractor in consultation with the NTA).	**Construction**
BD30	12.5.1.8	River Camac	**Fish** Disturbance / Displacement Where deemed necessary and in advance of bunding and dewatering, electrofishing and translocating capture fish to suitable donor sites will be undertaken by appropriately licenced ecologists. The sequence of electrofishing (permitted during period July to September) will be confirmed by the licenced ecologist on site with the appointed contractor in advance of works commencing and as it overlaps with the licence crayfish search, retrieval and translocation. Strict biosecurity measures, following the Inland Fisheries Ireland 'Biosecurity Protocol for field surveys work' guidance (IFI 2010) as a minimum and those included in the CEMP will be implemented. The following measures, and others as	**Pre-Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			advised by the licenced ecologist include: • Clean, check and dry all equipment; • Steam washing of any plant in advance of arrival onsite and full drying of any equipment; and • Virkon bath onsite for staff. Following full dewatering, retrieval, and translocation of fish, over-pumping of the upstream sections of the River Camac will be required to ensure that the proposed works area is 'dry'. Pumps used for over-pumping will have a suitable sized mesh, or similar, as advised by the ecologist to ensure that the intake hose cannot draw up fish.	
BD31	12.5.1.9		**Aquatic Invertebrates** Disturbance / Displacement Given the presence of the Annex II White clawed crayfish at the proposed culvert extension and headwall construction, the following mitigation measures will be implemented • A preconstruction survey (under crayfish licence) of the affected watercourse will be completed; • A suitably qualified ecologist (with appropriate licences specific to each operation) will be present throughout the works; • Upstream bunding of the watercourse is required in the works area (under NPWS licence, supervised by a suitably qualified ecologist). Bunding of the area and over-pumping to facilitate translocation from the works area with partial dewatering and then full dewatering will be implemented. Any remaining crayfish will be detected after full drawdown; • The translocation of trout from the proposed works area, as it is being dewatered, will be undertaken at the same time as the crayfish translocation; • Following full drawdown of water, trapping (overnight) for crayfish will be undertaken by the licenced ecologist. Hand searching of bed refugia will be carried out and all crayfish translocated in a timely manner upstream along the River Camac to survey site CBC0809AQ001; • Owing to the potential for Crayfish plague (no outbreaks currently known from River Camac), it is a requirement that the proposed upstream translocation site be confirmed as part of the NPWS licence or for an alternative site to be approved by the NPWS; and • Following full dewatering, retrieval and translocation of white-clawed crayfish, over-pumping of the upstream sections of the River Camac will be required to ensure that the proposed works area is 'dry'. Pumps used for over-pumping will have a suitable sized mesh or similar, as advised by the ecologist, to ensure that the intake hose cannot draw up crayfish. The above mitigation measures will be undertaken at the same time as the licenced electrofishing (BD30).	**Pre-Construction**
BD32	12.5.2.1	Throughout (as required)	**Designated Areas for Natura Conservation** Habitat Degradation – Surface Water Quality The proposed SuDS drainage system, as shown in Proposed Surface Water Drainage Works drawings (BCIDA-ACM-DNG_RD-0809_XX_00-DR-CD-9001 in Volume 3 of this EIAR), will be installed by the appointed contractor during the Construction Phase. In the Operational Phase, the maintenance regime for these SuDS will be carried out by the local authorities and will be subject to their management procedures. No additional mitigation is required.	**Operation**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
BD31	12.5.2.1	Throughout (as required)	**Habitats / Rare and Protected Plant Species** Habitat Degradation – Surface Water Quality Once the Proposed Scheme is in operation, the local authorities will implement a maintenance and inspection regime (and / or emergency repairs if necessary) for the surface water drainage network, subject to their management procedures. No additional mitigation is required.	**Operation**
BD32	12.5.2.1	Throughout (as required)	**Habitats / Rare and Protected Plant Species** Habitat Degradation – Non-Native Invasive Plant Species Once the Proposed Scheme is in operation, the local authorities will implement a maintenance and inspection regime subject to their management procedures, where any introduction of non-native invasive plant species will be managed. No additional mitigation is required.	**Operation**
BD33	12.5.2.1	Throughout (as required)	**Bats** Habitat Loss and Loss of Breeding / Resting Sites In line with the maintenance contract, the appointed contractor will carry out annual post construction monitoring, over a two-year period to ensure the successful re-establishment of vegetation within the Proposed Scheme.	**Operation**
BD34	12.5.2.1	Throughout (as required)	**Bats** Monitoring of Bat Boxes • Where bat boxes are installed as part of the Construction Phase of the Proposed Scheme, monitoring is required under best practice guidance (e.g., Marnell et al. 2022 (Bat mitigation guidelines for Ireland, NPWS, 2022)). The level of post-installation monitoring will be dependent on the roost type and the number of bats present. A precautionary approach will be assumed on the basis that bats using these PRFs reflect species that were typically noted during the activity surveys and are occasionally identified from urban transport corridors; • The NTA will ensure that annual inspections of installed bat boxes will be undertaken for 2 years or as advised by a suitably qualified ecologist, to confirm occupancy; and • Where no occupancy is noted in year 1, the boxes will be relocated to another mature tree and details communicated with Bat Conservation Ireland, Local Authority Biodiversity Officer and NPWS.	**Operation**

22.11 Water

Table 22.9: Water Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
WT1	13.5.2.1	Construction Compounds and throughout as required	In terms of mitigation, a Surface Water Management Plan (SWMP) has been prepared (provided in the CEMP, Appendix A5.1 in Volume 4 of this EIAR), which details control and management measures for avoiding, preventing, or reducing any significant adverse impacts on the surface water environment during the Construction Phase of the Proposed Scheme. It will be a condition of the Employer's Requirements that the successful contractor, immediately following appointment, must detail in the SWMP how it is intended to effectively implement all the applicable measures identified in this EIAR and any additional measures required pursuant to conditions imposed by An Bord Pleanála to any grant of approval. At a minimum, all the control and management measures set out in the SWMP will be implemented by the appointed contractor. This includes measures relating to: • Construction Compound management including the storage of fuels and materials; • Control of sediment; • Use of concrete; • Management of vehicles and plant including refuelling and wheel wash facilities (if necessary); and • Monitoring.	**Construction**
WT4	13.5.2.2.2	Works Close to ESB Oil-Filled Cables	The appointed contractor in consultation with the NTA will engage with ESB Networks to locate their oil-filled cable in the context of the Proposed Scheme. A ground investigation, where construction works are to take place near to the ESB oil-filled cable, will be carried out prior to construction commencing and following this, an appropriate suite mitigation measures will be confirmed and deployed, which could for example result in the removal of all contaminated material from site as outlined in Chapter 14 (Land & Soils). Any hazardous material to be removed from site will be removed in accordance with measures outlined in Chapter 18 (Waste & Resources).	**Construction**
WT5	13.5.2.2.3	Widening of R134	Silt fences will be installed along the length of the top of the bank where works are taking place. These will be monitored on a daily basis to ensure they remain intact. Vegetation removal will be kept to a minimum	**Construction**
WT6	13.5.2.2.4	Modifications of Camac headwall	To ensure there are no water quality impacts as a result of this, no works will take place during the closed (fisheries) season and a form of bunding will be used to provide a dry area of work. This could be in the form of sandbags or a silt curtain. Any silty water will be directed to a settlement area or silt-buster tank prior to discharge back to the water body.	**Construction**
WT7	13.5.3	Throughout (as required)	In the Operational Phase, the infrastructure (including the maintenance regime for SUDS) will be carried out by the local authority and will be subject to their management procedures.	**Operational**

22.12 Land, Soils, Geology and Hydrogeology

Table 22.10: Land, Soils, Geology and Hydrogeology Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
LSGH1	14.5.1	Throughout (as required)	Loss or Damage of Topsoil Excavated topsoil will be stockpiled by the appointed contractor using appropriate methods to minimise the effects of weathering. Care will be taken in reworking this material to minimise dust generation, groundwater infiltration and generation of runoff.	**Construction**
LSGH2	14.5.1	Throughout (as required)	Loss or Damage of Topsoil All topsoil or subsoil will be assessed for re-use within the Proposed Scheme by the appointed contractor ensuring the appropriate handling, processing and segregation of the material. Where practical the removal of topsoil from the Proposed Scheme will be avoided. All earthworks will be undertaken in accordance with TII Specification for Road Works (SPW) Series 600 Earthworks (TII 2013) and project specific earthworks specifications ensuring that all excavated material and imported material is classified using the same methodology so as to allow maximum opportunity for the reuse of materials on site.	**Construction**
LSGH3	14.5.1.2	Throughout (as required)	Loss or Damage of Topsoil The appointed contractor will ensure that excavations will be kept to a minimum, using shoring or trench boxes where appropriate. For more extensive excavations, a temporary works designer will be appointed by the appointed contractor to design excavation support measures in accordance with all relevant guidelines that minimises the excavation of contaminated ground.	**Construction**
LSGH4	14.5.1.2	Throughout (as required)	Loss or Damage of Topsoil The appointed contractor will be responsible for regular testing of excavated soils to monitor the suitability of the soil for reuse.	**Construction**
LSGH5	14.5.1.2	Throughout (as required)	Loss or Damage of Topsoil Samples of ground suspected of contamination will be tested for contamination by the appointed contractor during the ground investigation and ground excavated from these areas will be disposed of to a suitably licensed or permitted site in accordance with the current Irish waste management legislation.	**Construction**
LSGH6	14.5.1.2	Throughout (as required)	Loss or Damage of Topsoil Any dewatering in areas of contaminated ground will be designed by the appointed contractor to minimise the mobilisation of contaminants into the surrounding environment.	**Construction**
LSGH7	14.5.1.3	Greenhills Esker – M50 overbridge	Loss or damage of proportion of Geological Heritage Area The NTA will facilitate site visits by GSI personnel during the construction phase and / or provide relevant information gathered during the construction phase to supplement the GSI's existing County Geological Site Report	**Construction**
LSGH8	14.5.1.4	Throughout (as required)	Pollution of Soil and Groundwater Good construction management practices, as outlined in the CIRIA guidance, Control of Water Pollution from	**Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			Construction Sites – Guidance for consultants and contractors (Masters-Williams *et al*., 2001), will be employed by the appointed contractor to minimise the risk of transmission of hazardous materials as well as pollution of adjacent watercourses and groundwater.	
LSGH9	14.5.1.4	Throughout (as required)	Pollution of Soil and Groundwater The construction management of the site by the appointed contractor will take account of the recommendations of the CIRIA guidance Control of Water Pollution from Construction Sites – Guidance for consultants and contractors (Masters-Williams *et al*., 2001) to minimise as far as possible the risk of soil, groundwater and surface water contamination.	**Construction**
LSGH10	14.5.1.4	Construction Compounds and throughout (as required)	Pollution of Soil and Groundwater Measures to be implemented by the appointed contractor to minimise the risk of spills and contamination of soils and waters include: • Employing only competent and experienced workforce, and site-specific training of site managers, foremen and workforce, including all sub-contractors, in pollution risks and preventative measures; • Ensure that all areas where liquids (including fuel) are stored, or cleaning is carried out, are in designated impermeable areas that are isolated from the surrounding area and within a secondary containment system, e.g., by a roll-over bund, raised kerb, ramps or stepped access; • The location of any fuel storage facilities will be considered in the design of the Construction Compounds. These are to be designed in accordance with relevant guidelines and codes of best practice and will be fully bunded; • Good housekeeping at the site (daily site clean-ups, use of disposal bins, etc.) during the entire Construction Phase; • All concrete mixing and batching activities will be located in areas away from watercourses and drains; • Potential pollutants to be adequately secured against vandalism; • Provision of proper containment of potential pollutants according to codes of best practice; • Thorough control during the entire Construction Phase to ensure that any spillage is identified at early stage and subsequently effectively contained and managed; and • Spill kit to be provided and to be kept close to the storage area. Staff to be trained on how to use spill kits correctly.	**Construction**
LSGH11	14.5.1.4	Throughout (as required)	An Environmental Incident Response Plan, as described in the CEMP (Appendix A5.1 in Volume 4 of this EIAR), will be implemented by the appointed contractor, which will identify the actions to be taken in the event of a pollution incident. It will address containment measures, emergency discharge routes, a list of appropriate equipment and clean-up materials and notification procedures to inform the relevant environmental protection authority.	**Construction**
LSGH12	14.5.1.4	Throughout (as required)	Sediment control methods are outlined in the Surface Water Management Plan within the CEMP (Appendix A5.1 in Volume 4 of this EIAR) and these will be implemented by the appointed contractor.	**Construction**

22.13 Archaeological and Cultural Heritage

Table 22.11: Archaeological and Cultural Heritage Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
ACH1	15.5.1.1	Throughout (as required)	The NTA will procure the services of a suitably qualified archaeologist as part of its Employer's Representative team administering and monitoring the works.	**Pre-Construction**
ACH2	15.5.1.1	Throughout (as required)	The appointed contractor will make provision for archaeological monitoring to be carried out under licence to the Department of Housing, Local Government and Heritage (DHLGH) and the National Museum of Ireland (NMI), and will ensure the full recognition of, and the proper excavation and recording of, all archaeological soils, features, finds and deposits which may be disturbed below the ground surface. All archaeological issues will be resolved to the satisfaction of the DHLGH and the NMI.	**Construction**
ACH3	15.5.1.1	Throughout (as required)	The appointed contractor will ensure that the archaeologist as described in ACH5 will have the authority to inspect all excavation to formation level for the proposed works and to temporarily halt the excavation work, if, and as, necessary, having conferred with the NTA. They will be given the authority to ensure the temporary protection of any features of archaeological importance identified having conferred with the NTA. The archaeologist will be afforded sufficient time and resources to record and remove any such features identified in accordance with licensing requirements agreed.	**Construction**
ACH4	15.5.1.1	Throughout (as required)	The appointed contractor will make provision to allow for, the necessary archaeological monitoring, inspection and excavation works that may arise on the site during the Construction Phase.	**Construction**
ACH5	15.5.1.1.1	Throughout (as required)	An experienced and competent licence-eligible archaeologist will be employed by the appointed contractor to advise on archaeological and cultural heritage matters during construction to communicate all findings in a timely manner to the NTA and statutory authorities, to acquire any licenses / consents required to conduct the work, and to supervise and direct the archaeological measures associated with the Proposed Scheme.	**Construction**
ACH6	15.5.1.1.1	Throughout (as required)	Licence applications are made by the licence-eligible archaeologist to the National Monuments Service at the DHLGH. In addition to a detailed method statement, the applications must include a letter from the NTA that confirms the availability of adequate funding. There is a prescribed format for the letter that must be followed.	**Construction**
ACH7	15.5.1.1.1	Throughout	The archaeologist will be provided with information on where and when the various elements and ground disturbance will take place.	**Construction**
ACH8	15.5.1.1.1	Throughout (as required)	Once the presence of archaeologically significant material is established, full archaeological recording of such material is recommended in accordance with the licensing requirements. If it is not possible for the construction works to avoid the material, full excavation of the archaeologically significant material will be recommended. The extent and duration of excavation will be advised by the archaeologist and will be a matter for discussion between the NTA and the licensing authorities.	**Construction**
ACH9	15.5.1.1.1	Throughout (as required)	Secure storage for artefacts recovered during the course of the monitoring and related work will be provided by the appointed contractor.	**Construction**
ACH10	15.5.1.1.1	Throughout (as required)	During construction, all construction traffic and the management of materials will be restricted where practicable by the appointed contractor so as to avoid any newly revealed archaeological or cultural heritage sites and their environs, to	**Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			ensure no damage to a site of archaeological interest.	
ACH11	15.5.1.2	Throughout (as required)	Features of cultural heritage interest that are required to be removed on a temporary basis or for a short-term period, will be removed under archaeological supervision and in accordance with a method statement in consultation with the NTA and the relevant statutory authorities.	**Construction**
ACH12	15.5.1.3.1	Tallaght to Ballymount Road Section (RMP DU021-037/ DU022-018, DU021-037002, DU021-037007, DU022-005005, CBC 0809CH001)	The appointed contractor will ensure that archaeological monitoring under licence will take place: • Within the designated ZAP for the Historic village of Tallaght (RMP DU021-037 / DU022-018), which includes the recorded ecclesiastical enclosure (DU021-037002) and recorded mill site (DU021-037007) (Sheets 2 and 3 of 27, Figure 15.1 in Volume 3 of this EIAR); • Within the designated ZAP for the ecclesiastical enclosure (RMP DU022-005005, Sheet 5 of 27, Figure 15.1 in Volume 3 of this EIAR), to include the full extent of land take for the proposed road realignment. The monitoring of topsoil-stripping across this whole area will be carried out as an archaeological exercise. It is in these areas that there is a possibility to disturb intact archaeological layers and material. Licensed archaeological excavation, in full or in part, of any identified archaeological remains (preservation by record) or preservation in situ will be undertaken.	**Construction**
ACH13	15.5.1.3.2	Tallaght to Ballymount Road Section Katharine Tynan memorial statue (CBC0809CH001)	The proposed mitigation is the recording, protection and monitoring of the sensitive fabric prior to, and for the duration of the Construction Phase. Recording, overseeing of protective measures and monitoring is to be undertaken by an appropriate architectural heritage specialist engaged by the appointed contractor in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR.	**Construction**
ACH14	15.5.1.4.1	Ballymount to Crumlin (RMP DU022-002)	The appointed contractor will ensure that archaeological monitoring under licence will take place: • On Greenhills Road where it runs alongside the ZAP for a flat cemetery (RMP DU022-002, Sheet 8 of 27, Figure 15.1 in Volume 3 of this EIAR). It is in these areas that there is a possibility to disturb intact archaeological layers and material. Licensed archaeological excavation, in full or in part, of any identified archaeological remains (preservation by record) or preservation in situ will be undertaken.	**Construction**
ACH15	15.5.1.5.1	Crumlin to Grand Canal (RMP DU018-004, DU018-043002, DU018-038003, DCIHR 18-13-035, CBC0809AH002)	Archaeological monitoring (as defined in Section 15.5.1.1 in Chapter 15 of this EIAR) under licence will take place, where any preparatory ground-breaking or ground reduction works are required (as defined in Section 15.4.1), at the following locations: • At the sites of a water mill (unclassified, RMP DU018-044 and 19th century mill site DCIHR 18-13- 035) and watercourse (the City Water, RMP DU018-043002) on Clogher Road, at its junction with Rutland Avenue (Sheet 14 of 27, Figure 15.1 in Volume 3 of this EIAR); • Within the ZAP ecclesiastical enclosure (DU018-038003) at St Mary's Church on Bunting Road and St Mary's Road (Sheet 10 of 27, Figure 15.1 in Volume 3 of this EIAR); and • At the site of an 18th / 19th century house at the junction of Bunting Road and St Mary's Road (CBC0809AH002, Sheet 10 of 27, Figure 15.1 in Volume 3 of this EIAR). It is in these areas that there is a possibility to disturb intact archaeological layers and material. Licensed archaeological excavation, in full or in part, of any identified archaeological remains (preservation by record) or preservation in situ will be undertaken.	**Construction**
ACH16	15.5.1.5.2	Crumlin to Grand Canal –	The Crumlin market cross (CBC0809CH002, Sheet 11 of 27, Figure 15.1 in Volume 3 of this EIAR) will be protected from any adverse impacts during construction works and if necessary, for its protection, it will be removed under archaeological	**Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
		Crumlin market cross (CBC0809CH002)	supervision. This will be undertaken in accordance with a method statement agreed with the statutory authorities. It will be returned to its current setting and as close as possible to its current location following completion of the works.	
ACH17	15.5.1.6.1.1	Grand Canal to Christchurch St Patricks Cathedral and Chris Church Cathedral and environs (RMP DU018-020001)	With regard to ground-breaking works (as defined in Section 15.4.1 in Chapter 15 of this EIAR) in the environs of national monuments (listed below and shown on Sheets 16 and 17 of 27, Figure 15.1 in Volume 3 of this EIAR), archaeological consent is required from the Minister of DHLGH. Archaeological monitoring of the works will require Ministerial Directions from the Minister under the terms of the National Monuments (Amendment) Act 2004: • At the sites of City Defences (RMP DU018-020001, national monument) on Nicholas Street (St Nicholas' Gate) and on Patrick Street (St Patrick's Gate); • Adjacent to those sections of the City Defences (RMP DU018-020001, national monument) previously excavated c. 5m east of the Proposed Scheme at Patrick Street / Nicholas Street (Ditch and wall), Patrick Street / St. Nicholas Place (Ditch), and Nicholas Street / St. Nicholas Place (Ditch and wall); and • In the environs of St Patrick's Cathedral and Christ Church Cathedral (national monuments).	**Construction**
ACH18	15.5.1.6.1.2	Grand Canal to Christchurch (DU018-020, DU018-020575, DU018-020987, DU018-020331, -020205, -020041, -020197, -020059, - 020058, -020390, DU018-020196, DU018-020198, DU018-020735, -020399, DU018-020126, DU018-020873, DU018-020503, DU018-020679, DU018-020631, DU018-020085, DU018-020767, DU018-020873, DU018-020106)	Archaeological monitoring (as defined in Section 15.5.1.1 in Chapter 15 of this EIAR) under licence will take place, where any preparatory ground-breaking or ground reduction works are required (as defined in Section 15.4.1), at the following locations: • Within the designated ZAP for the Historic City of Dublin (DU018-020, Sheets 14 to 17 of 27, Figure 15.1 in Volume 3 of this EIAR); • At the following RMP / SMR sites which lie within the Proposed Scheme: the sites of watercourses (DU018-020575 and -020987), seven bridges (DU018-020331, -020205, -020041, -020197, -020059, - 020058, -020390), a ritual site - holy well (DU018-020196), a house - 18th/19th century (DU018-020198), two mill sites (DU018-020735, -020399), a cross (DU018-020126), a habitation site (DU018-020873), and a building (DU018-020145); and • At the following RMP sites, where associated features may survive below ground within the Proposed Scheme: Graveyard (DU018-020503), Hospital (DU018-020679), Riverine revetment (DU018-020631), Church (DU018-020085), Building (DU018-020767), a habitation site (DU018-020873) and a 16th/17th century house (DU018-020106). It is in these areas that there is a possibility to disturb intact archaeological layers and material. Licensed archaeological excavation, in full or in part, of any identified archaeological remains (preservation by record) or preservation in situ will be undertaken	**Construction**
ACH19	15.5.1.6.1.3	Grand Canal to Christchurch Dean Street (CBC0809AH003)	Archaeological monitoring (as defined in Section 15.5.1.1 in Chapter 15 of this EIAR) under licence will take place, where any preparatory ground-breaking or ground reduction works are required (as defined in Section 15.4.1), at the following locations: • On Dean Street, in the vicinity of CBC0809AH003, Hiberno-Norse / Medieval Habitation, where additional features may survive below ground within the Proposed Scheme. It is in this area that there is a possibility to disturb intact archaeological layers and material. Licensed archaeological excavation, in full or in part, of any identified archaeological remains (preservation by record) or preservation in situ will be undertaken.	**Construction**

22.14 Architectural Heritage

Table 22.12: Architectural Heritage Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
AH1	16.5.1.1	**Protected Structures** Throughout as required, and specifically at the north boundary of Motor Distributors Ltd (DCC RPS 5792)	The proposed mitigation is the recording, overseeing and protective measures and monitoring of sensitive fabric by an appropriate architectural heritage specialist engaged by the appointed contractor, prior to of the Construction Phase, in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR. A similar boundary treatment will be reinstated on the new alignment.	**Construction**
AH2	16.5.1.1	**Protected Structures** Saint Maelruain's Church, Saint Patricks Cathedral, Patrick Street, Christ Church Cathedral (RMP DU021-37003, DU021-037004, DU018-020270)	The proposed mitigation is the recording, overseeing and protective measures and monitoring of sensitive fabric by an appropriate architectural heritage specialist engaged by the appointed contractor, prior to of the Construction Phase, in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR.	**Construction**
AH3	16.5.1.1	**Protected Structures** 28 locations outlined in Table 16.7 and described in Appendix A16.2 Inventory of Architectural Heritage Sites in Volume 4 of this EIAR.	The proposed mitigation is the recording, overseeing and protective measures and monitoring of sensitive fabric by an appropriate architectural heritage specialist engaged by the appointed contractor, prior to of the Construction Phase, in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR.	**Construction**
AH4	16.5.1.2	**Architectural Conservation Areas** (Tallaght ACA, Saint Agnes Road ACA, Thomas Street ACA)	The proposed mitigation is the recording, protection and monitoring of the sensitive fabric prior to, and for the duration of the Construction Phase, in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR.	**Construction**
AH5	16.5.1.3	**Conservation Areas** Grand Canal Conservation Areas, Patrick Street Conservation Area, Christchurch Conservation Area, Drimnagh Castle Conservation Area	The proposed mitigation is the recording, protection and monitoring of the sensitive fabric prior to, and for the duration of the Construction Phase, in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR.	**Construction**
AH6	16.5.1.4	**NIAH Structures** Boundary walls of Ardscoil Éanna Crumlin Road (NIAH 50080190)	The proposed mitigation is the recording the of the boundary wall detail and the labelling of the various elements before they are carefully taken down, prior to removal to safe storage, and reinstatement on new lines. The architectural heritage specialist will oversee any labelling, taking down and reinstatement of the affected wall. A rendered wall, similar to the existing will be reinstated on the new alignment as per the detailed survey. Works to historic fabric will be carried out in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR. Recording is to be undertaken by an appropriate architectural heritage specialist engaged by the appointed contractor.	**Construction**
AH7	16.5.1.4	**NIAH Structures** Crumlin Health Centre (NIAH 50080483)	The proposed mitigation is the recording the of the boundary wall detail and the labelling of the various elements before they are carefully taken down, prior to removal to safe storage, and reinstatement on new lines. The architectural heritage specialist will oversee any labelling, taking down and reinstatement of the affected boundary treatment. It is proposed that a similar boundary treatment which is sympathetic to the associated clinic	**Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			be reinstated on the new alignment, reusing the existing materials, where practicable. Works to historic fabric will be carried out in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR. Recording is to be undertaken by an appropriate architectural heritage specialist engaged by the appointed contractor.	
AH8	16.5.1.4	**NIAH Structures** (NIAH 50080190, NIAH 50080483, 50080196, 50080190, 50080195, 50080483, 50080200, 50080201, 50080203, 50080467, 50080750, 50080745, 50080750, 50080639, 50080635, 50080637, 50080691, 50080192, 50080731, 50080732)	The proposed mitigation is the recording, protection and monitoring of the adjoining structures or boundaries prior to, and for the duration of the Construction Phase. Recording, overseeing of protective measures and monitoring is to be undertaken by an appropriate architectural heritage specialist engaged by the appointed contractor in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR.	**Construction**
AH9	16.5.1.5	**Designed Landscapes** **Temporary Land take** Tymon Park (NIAH 2290)	The proposed mitigation is the recording of the boundary treatment prior to its removal to safe storage, and reinstatement by the appointed contractor on a new alignment, which reinstates the existing details, and the relationships between the entrances and buildings. Recording, overseeing of protective measures and monitoring is to be undertaken by an appropriate architectural heritage specialist engaged by the appointed contractor in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR.	**Construction**
AH10	16.5.1.6	**Designed Landscapes** **Saint Patrick's Park** (DCC RPS 6444)	The proposed mitigation is the recording, overseeing and protective measures and monitoring of adjoining structures and boundaries, by an appropriate architectural heritage specialist engaged by the appointed contractor, prior to of the Construction Phase, in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR.	**Construction**
AH11	16.5.1.6	**Other Structures** **Land take** **Rubble Wall** (CBC0809BTH036, CBC0809BTH038, (CBC0809BTH064, CBC0809BTH002, CBC0809BTH033)	The proposed mitigation is the recording of the boundary treatment before it is taken down prior to its removal to safe storage, and reinstatement by the appointed contractor on a new alignment, which reinstates the existing details, and the relationships between the entrances and buildings. The architectural heritage specialist will oversee any opening up works, labelling, taking down and reinstatement of the affected walling. Rubble will be reused in the boundary walls to the new access road, where practicable. The rubble walling will be taken down and the rubble stored for reuse in new rubble boundary walls along the proposed boundary alignment on the west side of the proposed junction by the appointed contractor. Works to historic fabric will be carried out in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR. Recording, overseeing of protective measures and monitoring is to be undertaken by a suitably qualified architectural heritage specialist engaged by the appointed contractor.	**Construction**
AH12	16.5.1.6	**Other Structures** 133 to 147 Drimnagh Road (CBC0809BTH064)	The proposed mitigation is the recording of the boundary treatment before it is taken down prior to its removal to safe storage, and reinstatement on a new alignment, which reinstates the existing details, and the relationships between the entrances and buildings. The architectural heritage specialist will oversee any opening up works, labelling, taking down and reinstatement of the affected walling. If practicable, the materials are to be retained for reuse. The boundary will be rebuilt in a like for like manner in consultation with affected householders and the NTA. Works to historic fabric will be carried out in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting	**Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			Sensitive and Historic Fabric in Volume 4 of this EIAR. Recording, overseeing of protective measures and monitoring is to be undertaken by a suitably qualified architectural heritage specialist engaged by the appointed contractor.	
AH13	16.5.1.6	**Other Structures** Grand Canal (CBC0809BTH002)	The proposed mitigation is the recording, protection and monitoring of the sensitive fabric prior to, and for the duration of the Construction Phase by an appropriate architectural heritage specialist engaged by the appointed contractor, and in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR. The south bank and retaining walls of the Canal will be protected during the course of works by the appointed contractor to safeguard against damage to the bank and canal walls.	**Construction**
AH14	16.5.1.6	**Other Structures** Tallaght Racing Pigeon Club (CBC0809BTH033)	The proposed mitigation is the recording, protection and monitoring of the structure prior to, and for the duration of the Construction Phase. Recording, overseeing of protective measures and monitoring is to be undertaken by an appropriate architectural heritage specialist engaged by the appointed contractor in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR.	**Construction**
AH15	16.5.1.6	**Other Structures** 139 other architectural heritage structures outlined in Table 16.7 and described in Appendix A16.2 Inventory of Architectural Heritage Sites in Volume 4 of this EIAR.	The proposed mitigation is the recording, protection and monitoring of the structures or boundaries prior to, and for the duration of the Construction Phase. Recording, overseeing of protective measures and monitoring is to be undertaken by an appropriate architectural heritage specialist engaged by the appointed contractor in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR.	**Construction**
AH16	16.5.1.7.1	**Street Furniture** Post Boxes: • One Post box located at Kildare Road Crumlin (CBC08089PB002)	The proposed mitigation is the recording of the post box in position prior to the works, the labelling of the affected fabric prior to its careful removal to safe storage, and its reinstatement in a new position in close proximity (within 20m) of its existing position. A suitably qualified architectural heritage specialist engaged by the appointed contractor will oversee the labelling, taking down and reinstatement. The works to the historic fabric will be carried out in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR.	**Construction**
AH17	16.5.1.7.1	**Street Furniture** Post Boxes: • Five Cast iron post boxes (CBC0809PB001, CBC0809PB005, CBC0809PB006, CBC0809PB007, NIAH 50080638). • Two cast Iron post boxes (CBC0809PB004, CBC0809PB003	The proposed mitigation is the recording, protection and monitoring prior to and during the Construction Phase. Recording, overseeing of protective measures and monitoring is to be undertaken by an appropriate architectural heritage specialist engaged by the appointed contractor and in accordance with the methodology provided in Appendix A.16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of the EIAR.	**Construction**
AH18	16.5.1.7.2	**Street Furniture** Relocated Lamp Posts: (CBC0809LP030, CBC0809LP032, CBC0809LP036, CBC0809LP038, CBC0809LP057**.**	The proposed mitigation is the recording of the lamp posts in position prior to the works, the labelling of the affected fabric prior to its careful removal to safe storage, and their reinstatement in new positions in close proximity (within 2m) of their existing positions. Recording, overseeing of protective measures and monitoring is to be undertaken by a suitably qualified architectural heritage specialist engaged by the appointed contractor. The works to the historic fabric will be carried out in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting	**Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
			Sensitive and Historic Fabric in Volume 4 of this EIAR.	
AH19	16.5.1.7.2	**Street Furniture** Medium sensitivity Retained Lamp Posts: • CBC0809LP028; • CBC0809LP029; • CBC0809LP031; • CBC0809LP033; • CBC0809LP034; • CBC0809LP035; • CBC0809LP037; • CBC0809LP039; • CBC0809LP040; • CBC0809LP041; • CBC0809LP042; • CBC0809LP043; • CBC0809LP044; • CBC0809LP045; • CBC0809LP046; • CBC0809LP047; • CBC0809LP048; • CBC0809LP049; • CBC0809LP050; • CBC0809LP051; • CBC0809LP052; • CBC0809LP053; • CBC0809LP054; • CBC0809LP055; • CBC0809LP056; • CBC0809LP077; • CBC0007LP078; • CBC0007LP079.	The proposed mitigation is the recording, overseeing and protective measures and monitoring of adjoining structures and boundaries, prior to of the Construction Phase, in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR. Recording, overseeing of protective measures and monitoring is to be undertaken by a suitably qualified architectural heritage specialist engaged by the appointed contractor.	**Construction**
AH20	16.5.1.7.2	**Street Furniture** Low sensitivity Retained Lamp Posts: • 13 reproduction Lamp posts on Blessington Road (CBC0809LP001 to CBC0809LP013); • 14 reproduction lamp posts on Main Street Tallaght (CBC0809LP014 to CBC0809LP027)	The proposed mitigation is the recording, overseeing and protective measures and monitoring of adjoining structures and boundaries, prior to of the Construction Phase, in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR. Recording, overseeing of protective measures and monitoring is to be undertaken by a suitably qualified architectural heritage specialist engaged by the appointed contractor.	**Construction**

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
AH21	16.5.1.7.73	**Statuary and Street Furniture** Milestone (NIAH 50080455)	The proposed mitigation is the recording of the milestone in position prior to the works, labelling the affected fabric prior to its careful dismantling and removal to safe storage, and the reinstatement of the milestone. Recording, overseeing of protective measures and monitoring is to be undertaken by a suitably qualified architectural heritage specialist engaged by the appointed contractor.	**Construction**
AH22	16.5.1.7.3	**Statuary and Street Furniture** The remains of a bollard or base of a lamp post at 140 Kildare Road Crumlin (CBC0809BTH151)	The proposed mitigation is the recording of the Bollard in position prior to the works, labelling the affected fabric prior to its careful dismantling and removal to safe storage, and the reinstatement of the Bollard. Recording, overseeing of protective measures and monitoring is to be undertaken by a suitably qualified architectural heritage specialist engaged by the appointed contractor.	**Construction**
AH23	16.5.1.7.3	**Statuary and Street Furniture** Vent pipe (CBC0809BTH003)	The proposed mitigation is the recording of the Vent Pipe in position prior to the works, labelling the affected fabric prior to its careful dismantling and removal to safe storage, and the reinstatement of the Vent Pipe. Recording, overseeing of protective measures and monitoring is to be undertaken by a suitably qualified architectural heritage specialist engaged by the appointed contractor.	**Construction**
AH24	16.5.1.7.3	**Statuary and Street Furniture** • Victor's sculpture (CBC0809BTH015) • Dancer's sculpture (CBC0809BTH023) • Crumlin Cross (CBC0809BTH067) • Sentinel Sculpture (CBC0809BTH153) • The city wall markers at Nicholas Place, the Nicholas Street Flats and Ross Road (CBC0809BTH157, CBC0809BTH158, CBC0809BTH154, CBC0809BTH159) • Millennium Child Sculpture (CBC0809BTH155)	The proposed mitigation is the recording, overseeing and protective measures and monitoring by an appropriate architectural heritage specialist engaged by the appointed contractor, prior to of the Construction Phase, in accordance with the methodology provided in Appendix A16.3 Methodology for Works Affecting Sensitive and Historic Fabric in Volume 4 of this EIAR. Recording, overseeing of protective measures and monitoring is to be undertaken by a suitably qualified architectural heritage specialist engaged by the appointed contractor.	**Construction**
AH25	16.5.1.7.4	**Paving and Surface Treatments** Various locations (locations provided in Table 16.15 in Chapter 16 of the EIAR	The proposed mitigation is to record the kerbs or flagstones in position prior to the works, labelling the affected fabric prior to their removal to safe storage, and the reinstatement of the kerbs or flagstones on the new line. Recording, overseeing of protective measures and monitoring is to be undertaken by an appropriate architectural heritage specialist engaged by the appointed contractor and in accordance with the methodology provided in Appendix A.16.3 in Volume 4 of the EIAR.	**Construction**

22.15 Landscape (Townscape) and Visual

Table 22.13: Landscape (Townscape) and Visual Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
LV1	17.5.1	Throughout (as required)	Mitigation and management measures are proposed to avoid, reduce or remediate, wherever practicable significant negative landscape (townscape) and visual effects of the Construction Phase of the Proposed Scheme. These measures (LV1-LV6) will be carried out by the appointed contractor and are to be applied across the Proposed Scheme wherever necessary to avoid disturbance of landscape features or characteristics to be retained. Trees and vegetation to be retained within and adjoining the Proposed Scheme will be protected in accordance with the British Standard Institution (BSI) British Standard (BS) 5837:2012 'Trees in relation to design, demolition and construction – Recommendations' (BSI 2012). Works required within the root protection area (RPA) of trees to be retained will follow a project specific Arboricultural methodology for such works, prepared by a professional qualified arborist. For details of trees to be retained refer to Tree Protection Plans (BCIDA-ACM-ENV_ZZ-0001_XX_00-DR-LL-0001 - 0021 in the Arboricultural Impact Assessment (Appendix A17.1 in Volume 3 of this EIAR)).	**Construction**
LV2	17.5.1	Throughout (as required)	Wherever practicable trees and vegetation will be retained within the Proposed Scheme. Trees and vegetation identified for removal will be removed in accordance with BS 3998:2010 'Tree Work – Recommendations' (BSI 2010) and best Arboricultural practices as detailed and monitored by a professional qualified arborist engaged by the appointed contractor. For details of trees and vegetation to be removed refer to Tree Protection Plans (BCIDA-ACM-ENV_ZZ-0001_XX_00-DR-LL-0001 to 0021 in the Arboricultural Impact Assessment (Appendix A17.1 in Volume 4 of this EIAR)) and Landscape General Arrangements (BCIDA-ACM-UBR_ZZ-0001_XX_00-DR-LL-9001 in Volume 3 of this EIAR).	**Construction**
LV3	17.5.1	Throughout (as required)	The Arboricultural Impact Assessment prepared for the Proposed Scheme will be fully updated at the end of the Construction Phase by the appointed contractor and made available, with any recommendations for on-going monitoring of retained trees during the Operational Phase.	**Construction**
LV4	17.5.1	Throughout (as required)	Where properties are subject to permanent and / or temporary acquisition, an inventory of boundary details and accesses, planting, paving, and other features that may be disturbed or removed will be prepared by the appointed contractor prior to commencement of construction works.	**Construction**
LV5	17.5.1	Throughout (as required)	Where properties are subject to permanent and / or temporary acquisition, appropriate measures will be put in place by the appointed contractor to provide for protection of features, trees and vegetation to be retained, for continued access during construction and for adequate security and screening of construction works. All temporary acquisition areas will be fully decommissioned and reinstated at the end of the Construction Phase, or at the earliest time after the reinstatement works are completed to the satisfaction of the NTA.	**Construction**
LV6	17.5.1	Throughout (as required)	Appropriate access to amenities and public open spaces will be maintained by the appointed contractor.	**Construction**

22.16 Waste and Resources

Table 22.14: Waste and Resources Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
WR1	18.5.1	Throughout (as required)	A Construction and Demolition Resource and Waste Management Plan (CDRWMP) has been prepared and this will be implemented (and updated as necessary) by the appointed contractor - refer to Appendix A5.1 in Volume 4 of this EIAR.	**Construction**
WR2	18.5.1	Throughout (as required)	The following measures will be implemented during construction, where practicable, by the appointed contractor, to ensure the maximum quantity of material is reused on the Proposed Scheme and to contribute to achieving the objectives set out in the Waste Action Plan for a Circular Economy (Government of Ireland 2021a) as follows: • Stockpiling of existing sub-base, capping layer and topsoil material generated on-site for direct reuse in the Proposed Scheme where practicable (subject to material quality testing to ensure it is suitable for its proposed end use); and • Recycled aggregates and reclaimed bituminous mixtures will be specified in the Proposed Scheme, where practicable.	**Construction**
WR3	18.5.1	Throughout (as required)	The following management measures will be implemented by the appointed contractor in so far as is reasonably practicable: • Where waste generation cannot be avoided, waste disposal will be minimised; • Opportunities for reuse of materials, by-products and wastes will be sought throughout the Construction Phase of the Proposed Scheme; • Possibilities for reuse of clean non-hazardous excavation material as fill on the site or in landscaping works will be considered following appropriate testing to ensure material is suitable for its proposed end use; • Where excavated material cannot be reused within the Proposed Scheme works, material will be sent for recovery or recycling; • Source segregation: Metal, timber, glass and other recyclable material will be segregated (and waste stream colour coding will be used) during construction works and removed off site to a permitted / licensed facility for recycling; • Material management: 'Just-in-time' delivery, where practicable, will be used to minimise material wastage; • General construction waste and by-products will be reused within the Proposed Scheme, where practicable, or appropriately reused (in accordance with Article 27 of the Waste Directive Regulations), recovered, recycled or disposed of off-site, as arranged by the appointed contractor; • Any hazardous waste arising will be managed by the appointed contractor in accordance with the applicable legislation; and • Waste auditing: The quantity and types of waste and materials leaving site during the Construction Phase will be recorded by the appointed contractor. The name, address and authorisation details of all facilities and locations to which waste and materials are delivered will be recorded along with the quantity to each facility. Records will show material, which is recovered, which is recycled and which is disposed of; • Where Article 27 notifications are required in relation to the Proposed Scheme, the appointed contractor will complete and submit these Article 27 notifications to the EPA for by-product reuse; • Any off-site interim storage or waste management facilities for excavated material will have the appropriate EPA licence, Waste facility permit or Certificate of Registration, as appropriate, in place; and The relevant appropriate waste authorisation will be in place for all facilities that wastes are delivered to (i.e., EPA Licence, Waste Facility Permit or Certificate of Registration).	**Construction**

22.17 Material Assets

Table 22.15: Material Assets Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
MA1	19.5.1.1	Throughout (as required)	Where there are interfaces with existing utility infrastructure, the appointed contractor will ensure that protection in place or diversion as necessary will be carried out to prevent long-term interruption to the provision of the affected services.	**Construction**
MA2	19.5.1.1	Throughout (as required)	All possible precautions will be taken by the appointed contractor to avoid unplanned interruptions to any services during the Construction Phase of the Proposed Scheme. This will include appropriate investigation by the appointed contractor to identify the precise location of all utility infrastructure within the working areas prior to the commencement of excavation works. Where works are required in and around utility infrastructure, precautions will be implemented by the appointed contractor to protect the infrastructure from damage, in accordance with best practice methodologies and the requirements of the utility companies where practicable. Protection measures during construction will include warning signs and markings indicating the location of utility infrastructure, safe digging techniques in the vicinity of known utilities, and in certain circumstances where possible, isolation of the section of infrastructure during works in the immediate vicinity.	**Construction**
MA3	19.5.1.1	Throughout (as required)	All utility companies for which diversions are proposed will continue to be consulted with NTA oversight when designing any diversions to ensure that proposed diversions conform to the utility provider's requirements, where practicable and acceptable to the NTA, and to ensure that service interruptions are kept to a minimum.	**Construction**
MA4	19.5.1.1	Throughout (as required)	Where diversions or modifications are required to utility infrastructure, service interruptions and disturbance to the surrounding residential, commercial and/or community property may be unavoidable. Where this is the case, it will be planned in advance by the appointed contractor. Required service interruptions will generally only occur for a set period of time per day (a set number of hours not exceeding eight hours where reasonably practicable) and will generally not be continuous for full days at a time. Prior notification will be given to all impacted properties. This notification will include information on when interruptions and works are scheduled to occur and the duration of such interruption. Any required works will be carefully planned by the appointed contractor to ensure that the duration of interruptions is minimised in so far as is practicable.	**Construction**
MA5	19.5.1.2	Throughout (as required)	Consideration will be given by the appointed contractor to the sustainability of material being sourced for the construction of the Proposed Scheme. In so far as is reasonably practicable, materials required for the construction of the Proposed Scheme will be sourced locally in order to reduce the amount of travelling required to get the material to the site. Key issues to be considered when sourcing materials for the Construction Phase will include the source, the material specification, production and transport costs, and the availability of the material. For quarried material sourced within the State, only quarries which are included in local authority quarry registers will be used by the appointed contractor to source any quarried material.	**Construction**
MA6	19.5.1.2	Throughout (as required)	Construction materials will be managed on-site by the appointed contractor in such a way as to prevent over-ordering and waste. Materials will be stored in appropriate storage areas or receptacles to reduce the potential for damage requiring replacement. 'Just In Time' ordering principles will be implemented by the appointed contractor where practicable in order to reduce the potential for over-ordering.	**Construction**

22.18 Major Accidents and Disasters

Table 22.16: Population Mitigation Measures

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

22.19 Cumulative Impacts & Environmental Interactions

Table 22.17: Cumulative Impacts & Environmental Interactions Mitigation Measures

Mitigation Number	EIAR Section Reference	Location	Description of Mitigation or Monitoring Measure / Environmental Commitment	Implementation Stage
CI&EI1	21.4.2.1	Throughout (as required)	Other major infrastructure projects could directly interface with the construction of the Proposed Scheme. Interface liaison will take place on a case-by-case basis through the NTA, as will be set out in the Construction Contract, to ensure that there is coordination between projects, that construction access locations remain unobstructed by the Proposed Scheme works and that any additional construction traffic mitigation measures required to deal with cumulative impacts are managed appropriately.	**Pre-Construction / Construction**

22.20 References

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

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

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

CIRIA (2001). CIRIA C532: Control of Water Pollution from Construction Sites – Guidance for consultants and contractors.

EPA (2021). Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects [Online] Available from https://www.epa.ie/publications/circular-economy/resources/C_and_D_Guidelines-.pdf

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

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

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

TII (2013) Specification for Road Works Series 600 - Earthworks (including Erratum No. 1, dated June 2013) CC-SPW-00600.

TII (2020a). The Management of Invasive Alien Plant Species on National Roads – Technical Guidance.

TII (2020b). The Management of Invasive Alien Plant Species on National Roads – Standard.

Directives and Legislation

S.I. No. 126/2011 - European Communities (Waste Directive) Regulations 2011 as amended

Waste Management Act 1996, as amended

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

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

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

S.I. No. 549/2018 – European Communities (Environmental Noise) Regulations 2018