Chapter 27

Schedule of Environmental Commitments

Contents

Tables

27 SCHEDULE OF ENVIRONMENTAL COMMITMENTS

Table 27-1 to **Table 27-33** sets out a summary of the mitigation measures detailed within the Environmental Impact Assessment Report (EIAR) and **Table 27-35** sets out the summary of mitigation measures detailed within the Natura Impact Statement (NIS) for the N2 Slane Bypass and Public Realm Enhancement Scheme (hereafter referred to as the 'Proposed Scheme').

An Environmental Operating Plan (EOP) for the Proposed Scheme has also been prepared in accordance with the NRA (2007) Guidelines on the Creation, Implementation and Maintenance of an Environmental Operating Plan, and is available in **Appendix 5.6** of this EIAR. The EOP contains all of the mitigation measures as detailed in this EIAR and also the NIS. The contractor will be required to take ownership of the EOP and implement the measures outlined. The contractor will set out their approach to managing environmental issues associated with the construction of the Proposed Scheme and for delivering on the mitigation measures.

During the operational and maintenance phase, Meath County Council (MCC) will implement the mitigation measures outlined under 'Operational Phase Mitigation' as part of their operational controls and procedures. These include measures relating to, inter alia, maintenance of landscaping, noise barriers etc.

27.1 Chapter 7 – Traffic and Transport

Table 27-1: Summary Table of Mitigation Measures in the Traffic and Transport Chapter

EIAR Section Reference	Description of Mitigation Measures for Traffic and Transport
Construction Phase Mitigation	
7.5.1	In order to manage the likely construction-related traffic movements and the normal traffic movements in the Slane area, construction traffic management shall incorporate the measures set out in **Chapter 5**, **Section 5.5.1** (Traffic Management During Construction).
Operational Phase Mitigation	
7.6.2	The mitigation proposed for the operational phase of the Proposed Scheme is embedded into the operational assessment. The overall impact is considered to be positive and therefore no specific additional operational mitigation measures are required.

Table 27-2: Summary Table of Monitoring Measures in the Traffic and Transport Chapter

EIAR Section Reference	Description of Monitoring Measures for Traffic and Transport
Construction Phase Monitoring	
7.7.1	The construction traffic management measures shall be periodically reviewed by the appointed contractor to respond to dynamic conditions in the receiving environment.
Operational Phase Monitoring	
7.7.2	No specific operational monitoring is required.

27.2 Chapter 8 – Population

Table 27-3: Summary Table of Mitigation Measures in the Population Chapter

EIAR Section Reference	Description of Mitigation Measures for Population
Construction Phase Mitigation	
8.5.1.1	**General** • The Construction Strategy as set out in **Chapter 5** of this EIAR shall be fully implemented. • The mitigation measures in related chapters of the EIAR directly impacting communities which include **Chapter 7 – Traffic and Transport**, **Chapter 9 – Noise and Vibration**, **Chapter 10 – Air Quality**, **Chapter 11 – Human Health**, **Chapter 12 – Landscape and Visual**, **Chapter 20 – Material Assets: Agricultural Properties**, and **Chapter 21 – Material Assets: Non-agricultural Properties**, shall be fully implemented. • An Environmental Operating Plan (EOP) has been prepared and is included in **Appendix 5.6** to **Chapter 5** of the EIAR. The EOP contains all of the specific mitigation from the EIAR in relation to Population and shall be implemented by the appointed Contractor(s). • Construction Traffic Management Plans shall be prepared by the appointed Contractor(s) to deliver the traffic and transport related mitigation measures included in this EIAR. Construction Traffic Management Plans shall incorporate and elaborate on site specific delivery of the stated mitigation measures from the EIAR including temporary disruption to traffic signals, footpath access, management of pedestrian crossing points at the time of construction, provision of appropriate temporary signage to direct road users to alternative routes / car parking arrangements etc. Construction Traffic Management Plans will detail the implementation of the mitigation measures from the EIAR to ensure disruption to economic amenities and residential properties is minimised and access is maintained along haulage routes and in vicinity of the construction site(s) for vehicles, pedestrians, cyclists, and economic operators at all times. • The appointed Contractor(s) shall provide car and bike parking for construction staff in construction compounds. • A Community Liaison Officer (CLO) shall be appointed by the Contractor for the construction phase of the Proposed Scheme to facilitate communication between the Contractor and stakeholders and members of the public. Contact details (email, phone) for the CLO shall be included in the EOP for the Proposed Scheme and on the project website. The CLO shall be involved throughout construction on all aspects of community engagement. • A Community Liaison Plan shall be prepared by the CLO prior to construction and shall be updated regularly. The Community Liaison Plan will specify obligations in relation to community and stakeholder engagement that the Contractor must adhere to. Where communications are related to environmental issues, the Environmental Clerk of Works shall be involved, if appropriate. • The plan shall include: o Details of how the local community, road users and affected residents shall be notified in advance of the scheduling of major works, the temporary traffic diversions, bridge and road closures and the progress of the construction works. o Details of the available communication channels/points of contact for members of the public to contact the project team during construction shall be established in advance of the commencement of construction. o The contact details for the Community Liaison Officer (CLO) shall be posted on all construction site notice boards and on any other information or correspondence, which may be distributed from time to time. • A significant part of the plan will be 'good neighbour' policy. Key aspects of this policy that shall be implemented by the Contractor include: o Providing a point of contact for queries and complaints; o Minimising causes of nuisance; o Maintaining access to neighbouring premises; o Clear and concise information distributed widely and updated frequently; and

EIAR Section Reference	Description of Mitigation Measures for Population
	○ Undertaking timely liaison with stakeholders. • Details of general construction process/phasing shall be communicated to the relevant stakeholders in sufficient time prior to implementation to ensure local residents and businesses are fully informed of the nature and duration of construction.
8.5.1.2	**Residential and Recreational Amenity** The measures that shall be implemented by the contractor in liaison with MCC are as follows: • Where part of the curtilage of a property is to be permanently acquired, boundaries shall be replaced on a like for like basis subject to safety considerations and in discussion with the landowner. • Prior to construction and subject to agreement with the relevant property owners, property condition surveys shall be undertaken in relation to all buildings/ structures in use, located within 50 m of the extents of the landtake boundary and within 150 m of any proposed blasting/ piling works along the Proposed Scheme. This will provide a baseline against which any claims shall be measured. • Any services that are interfered with as a result of the Proposed Scheme shall be repaired/ replaced without unreasonable delay. • Prior notice shall be provided to walkers, cyclists, anglers etc. regarding temporary restrictions around the River Boyne and towpath during construction. • MCC will undertake to replace easements across the lands to be acquired both during construction and operation of the Scheme.
8.5.1.3	**Journey Characteristics** No additional mitigation measures are proposed.
8.5.1.4	**Journey Amenity** Construction impacts related to noise, air quality and landscape and visual shall be mitigated in line with the mitigations presented in **Chapters 9**, **10** and **12** of this EIAR. No additional mitigation measures are proposed.
8.5.1.5	**Accessibility and Severance** Where access to a property cannot be fully maintained and temporary interruption is required, advance notice shall be given to the landowner and alternative access arrangements shall be provided as necessary. Access shall be restored without unreasonable delay. Accommodation works required to maintain access to lands shall be completed as early as feasible in the construction programme. Specifically, the following shall be undertaken: • **Landowner 107/108**: Overbridge 1 and associated access tracks shall be constructed and ready for landowner's use prior to severing lands for mainline construction. Temporary access across the construction site shall be required until the overbridge is completed and ready for use by the landowner. • **Landowner 118/119**: Overbridge 3 and associated access tracks shall be constructed and ready for landowner's use prior to severing lands for mainline construction. Temporary access across the construction site shall be required until the overbridge is completed and ready for use by the landowner. Existing access lane from N51 shall be retained for landowner's use until the alternative access to N51 is provided. Construction of the alternative access road from the N51 shall be constructed early in the construction programme to minimise severance of the construction site. • **Landowner 147:** Prior to severing lands for mainline construction, Access Track 6 shall be constructed and ready for landowner's use to provide access from N2 to severed lands.
8.5.1.6	**Economic Impacts** Dedicated signage shall be provided for existing tourist attractions affected by construction traffic management within and on approach to the village. In addition, signage providing advance direction to local services shall be provided in advance of construction.

EIAR Section Reference	Description of Mitigation Measures for Population
Operational Phase Mitigation	
8.5.2.1	**Residential and Recreational Amenity** No additional mitigation measures are proposed. Relevant mitigation in relation to impacts from noise and vibration, air quality, human health, and landscape and visual aspects are found in **Chapters 9**, **10**, **11** and **12** respectively shall be fully implemented.
8.5.2.2	**Journey Characteristics** No additional mitigation measures are proposed.
8.5.2.3	**Journey Amenity** No additional mitigation measures are proposed.
8.5.2.4	**Accessibility and Severance** No additional mitigation measures are proposed.
8.5.2.5	**Economic Impacts** Dedicated signage will be provided in accordance with the Department of Transport Traffic Signs Manual (DoT, 2019). In accordance with the NRA Policy on the Provision of Tourist and Leisure Signage on National Roads (2011), this will be generic in nature except where tourist facilities are of high significance or achieve a threshold of visitor numbers.

Table 27-4: Summary Table of Monitoring Measures in the Population Chapter

EIAR Section Reference	Description of Monitoring Measures for Population
Construction Phase Monitoring	
8.7	No specific monitoring is proposed.
Operational Phase Monitoring	
8.7	No specific monitoring is proposed.

27.3 Chapter 9 – Noise and Vibration

Table 27-5: Summary Table of Mitigation Measures in the Noise and Vibration Chapter

EIAR Section Reference	Description of Mitigation Measures for Noise and Vibration
Construction Phase Mitigation	
9.5.1	The following mitigation measures will be implemented during the construction works: • Noise barriers (reflective) of at least 2.4 m height up to 3.6 m height shall be installed and maintained at all site compounds for the duration of the construction phase. The noise barriers will, at a minimum, block line of sight between the construction activities and noise sensitive locations. Noise barriers at the site compounds will be installed as early as practicable within the construction programme; • Noise barriers (reflective) of at least 2.4 m height up to 3.6 m height shall be installed and maintained for the duration of the construction phase at the southern end of the Boyne bridge; • Noise barriers (reflective) of at least 2.4 m height up 3.6 m height shall be installed and maintained for the duration of the construction phase along the northern boundary of the N51 east of the junction with the bypass. The noise barriers will, at a minimum, block line of sight between the construction activities and noise sensitive locations; • When undertaking tree felling and processing during site clearance works, the distance between tree felling and processing plant required for site clearance and the nearest noise sensitive locations shall be maximised;

EIAR Section Reference	Description of Mitigation Measures for Noise and Vibration
	• During the public realm works there is potential for elevated noise levels at some noise sensitive locations due to the close proximity of some of the works. Where works are occurring over an extended period, the use of temporary noise barriers/screens or enclosure shall be implemented; • Evening and night-time works will be required as part of the N51 improvement between the bypass and Slane village, and on-street public realm works in Slane village. Any works outside normal working hours shall require pre-approval from MCC. Notification to the general public and affected residents and businesses shall be provided; • Where a hydraulic breaker is required, the following measures shall be implemented: - Fit suitably designed muffler or sound reduction equipment to reduce noise without impairing machine efficiency. - Use dampened bit to eliminate ringing. - Where works are occurring over an extended period, the use of temporary noise barriers/screens or enclosure shall be implemented; • All traffic to and from the site shall only be by way of the proposed transport routes as outline in **Chapter 5** of this EIAR. Haul routes shall be well maintained to minimise impulsive noise and vibration from vehicles running over discontinuities in the running surfaces; • Construction shall be phased in accordance with the construction phase description (**Chapter 5 – Description of the Construction Phase**) to minimise the duration of activities in each area. Due to the complex nature of the works detailed schedules, noise control measures and monitoring proposals shall, as a minimum, include the measures set out in this assessment and be documented in the EOP; • Where works (outside of emergency works) need to be completed outside normal working hours or where proposed works indicate that the noise or vibration levels set out in **Section 9.2.4.2 (Construction Nosie Criteria)** or **Section 9.2.4.4 (Construction Vibration Criteria)** may be exceeded, permission for these works shall be sought from the County Council in advance of any works taking place. The application for such works shall require a detailed noise control plan and follow up report to be prepared by the Contractor. This plan shall include (i) a justification for the works being carried out in the manner proposed, (ii) an assessment indicating what alternatives have been considered, (iii) a statement of the noise control measures from B.S. 5228 to be adopted and how Best Practicable Means will be used to control noise, (iv) an activity specific noise monitoring programme including contact details for persons with the authority to cease working if required by the County Council. Each follow up report will include details of any complaints received and the action taken to address such complaints; • A noise and vibration monitoring programme shall be implemented for the duration of the construction phase. Monitoring will assess compliance of the construction works with the noise limits set out in **Table 9-4** and **Table 9-5**. The noise and vibration programme shall also include actions for exceedances in the noise limits should they arise; • Full details of the Contractor's provision for noise and vibration monitoring and procedures including provisions for publication of monitoring results shall be submitted to and approved by the County Council prior to commencement of work. The County Council shall have discretion to vary the monitoring requirements and publication of results during the course of construction; and • Works will be carried out using Best Practicable Means (BPM) to minimise noise and vibration, such measures shall include: – Limiting the hours of construction set out in **Section 5.9 Employment and Welfare** and **Section 5.14.1 Construction Phase Hours of Operation** in **Chapter 5**, except in certain circumstances as set out in **Section 9.2.4.2**. – Work practices, equipment noise control and screening shall be in compliance with BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise, and BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration (together referred to as B.S. 5228). Typical work practices which shall be implemented include: ○ Noisy works shall be scheduled to normal working hours; ○ Quiet working methods, using plant with lower noise emission levels shall be used;

EIAR Section Reference	Description of Mitigation Measures for Noise and Vibration
	○ Working methods that minimise vibration generation particularly with regard to demolition activities and piling shall be adopted; ○ Plant such as pumps and generators used on or near sensitive locations will be contained within an acoustic enclosure and comply with the noise levels in **Table 9-4** and **Table 9-5**; ○ Plant and machinery used on-site will comply with the EC (Construction Plant and Equipment) Permissible, Noise Levels Regulations, 1988 (S.I. No. 320 of 1988); ○ All noise producing equipment will comply with S.I. No 632 of 2001 European Communities (Noise Emission by Equipment for Use Outdoors) Regulations 2001 and S.I. No. 241/2006 - European Communities (Noise Emission by Equipment for Use Outdoors) (Amendment) Regulations 2006; ○ Measures outlined in "Environmental Good Practice Site Guide" 2005 compiled by CIRIA and the UK Environmental Agency and the "London Good Practice Guide: Noise & Vibration Control for Demolition and Construction" 2016 will be applied as appropriate; ○ All plant shall be properly maintained, (mechanisms properly lubricated, faulty silencers replaced, worn bearings replaced, cutting tools sharpened etc.); ○ Acoustic covers to engines shall be closed when in use or idling; ○ For electricity generation at the construction compounds, hydrogen generators or electrified plant shall be utilised over traditional diesel generators. This will also apply to lower powered mobile plant as appropriate; ○ Hydraulic equipment shall be used in preference to pneumatic equipment; ○ Wheeled plant shall be used in preference to tracked plant; ○ Plant shall be located as far away from noise and vibration sensitive receptors as practicable; ○ Site hoardings or perimeter noise barriers shall be installed; ○ Temporary acoustic enclosures or screens around specific noisy static plant shall be used; ○ Large fully enclosed acoustic buildings shall be used to surround activities and/or worksites; ○ The unnecessary revving of engines shall be avoided and equipment shall be switched off when not in use; ○ Starting-up plant and vehicles sequentially shall be used rather than at the same time; ○ Internal haul routes shall be well maintained to minimise impulsive noise and vibration from vehicles running over discontinuities in the running surfaces; ○ Rubber linings shall be fitted to chutes, hoppers and dumper vehicles to reduce impact noise from material transfer; ○ Drop heights of materials shall be minimised; ○ Regular inspections of mitigation measures (BPM audits) shall be carried out to ensure compliance with noise and vibration commitments; ○ Regular briefings shall be provided for all site-based personnel so that noise and vibration issues (including the requirement to employ BPM at all locations at all times) are understood and that generic and site-specific mitigation measures are explained and adhered to; ○ Unloading shall be carried out within the worksite rather than on adjacent roads or laybys; ○ Phasing of materials deliveries shall be controlled on a 'just in time' basis to minimise noise and congestion on roads around the site. ○ A formal stakeholder engagement process shall be put in place for the duration of the construction phase, including the provision of information to local residents about noise and vibration monitoring results, works likely to cause significant noise or vibration and/or works planned to take place outside of core working hours; ○ Channels of communication between the Contractor, Meath County Council Planning Section (County Council) and residents shall be established at project commencement; and ○ Records of any noise complaints relating to the construction operations will be investigated as soon as possible and reported to the County Council.

EIAR Section Reference	Description of Mitigation Measures for Noise and Vibration
Operational Phase Mitigation	
9.5.2	The NRA Guidelines (2004) states that: "*The Authority accepts that it may not always be sustainable to provide adequate mitigation in order to achieve the design goal. Therefore, a structured approach should be taken in order to ameliorate as far as practicable road traffic noise through the consideration of measures such as alignment changes, barrier type (e.g. earth mounds), low noise road surfaces etc.*" In **Section 9.4.2 Table 9 51**, sixteen receptor locations were identified as meeting the criteria for mitigation either in the opening year, the design year or both as defined in the NRA Guidelines (2004). In order to reduce road traffic noise for as many properties as possible, all newly constructed roads will be constructed using low noise road surfaces. A low noise road surface is defined as a road surface that can provide a minimum noise reduction of 2.5dB(A) when compared to a standard Hot Rolled Asphalt road surface. However, even with a low noise road surface installed, the requirement for further mitigation was identified at many of the receptor locations. **Table 9-53** presents the details of noise reducing measures that shall be required in addition to the use of a low noise road surface within the scheme boundary. The height and length of the noise barriers proposed are detailed in **Table 9-53**. The table refers to 'Noise Barriers'; this may take the form of walls, earthen berms and other landscaping features providing the required acoustic screening and meeting all other technical specifications. The locations of noise mitigation measures are shown on **Figure 9.6**.

Table 9-53: Details of Noise Mitigation Measures

Receptor ID	Location	Chainage	Description	Length	Height
R696	Mainline South	Ch. 1112 – 1178	Earthen berm/false cut with a 76 m long by 3 m high noise barrier on top	76 m	3 m
R762	Realigned Rossnaree Road	Ch. 0 – 15	Extended existing 1m stone wall by 15 m	15 m	1 m
R941b	Mainline North transitioning into Realigned N51 East	Mainline North Ch. 2240 – 2450	Combined barrier and bund/false cut with a total height of 2.5 m	295 m	2.5 m
R942a/ R942b		N51 West Ch. 0 – 80			
R1066a	Realigned N51 West	Ch. 720	Barrier Adjacent to property boundary	21.5 m	2 m

EIAR Section Reference	Description of Mitigation Measures for Noise and Vibration

Figure 9.6: Locations of Noise-Reducing Measures

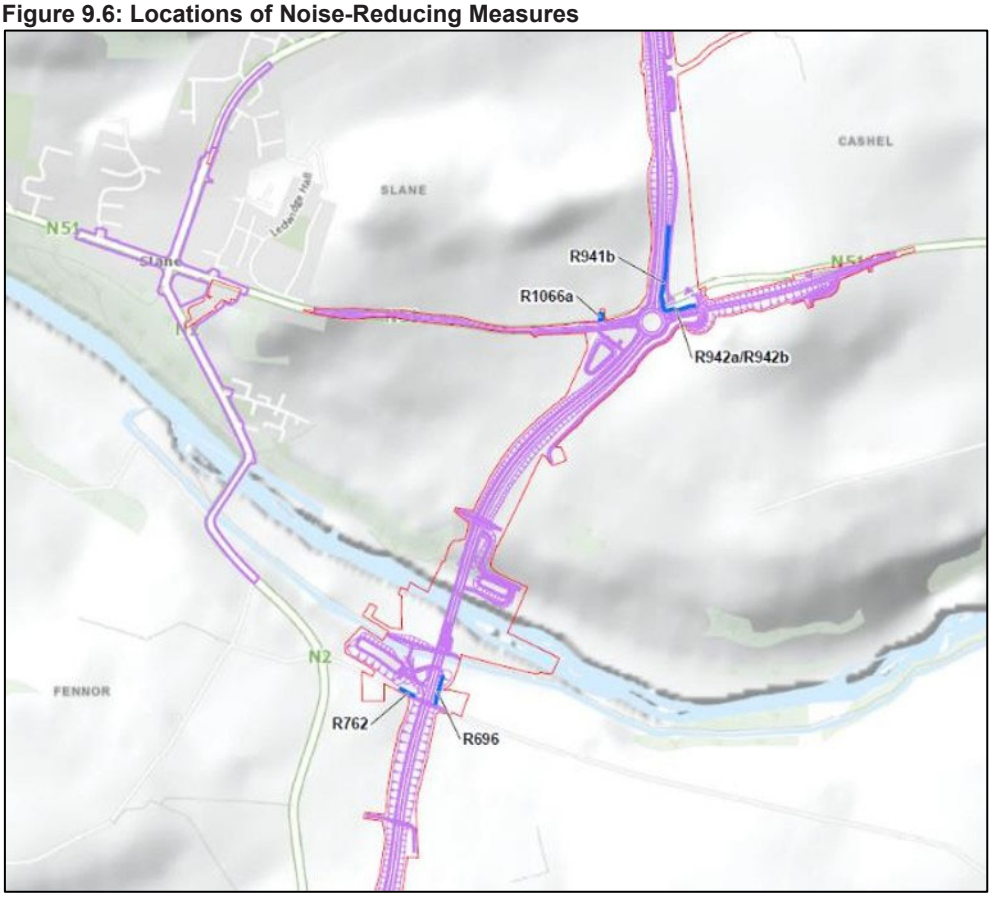


Table 27-6: Summary Table of Monitoring Measures in the Noise and Vibration Chapter

EIAR Section Reference	Description of Monitoring Measures for Noise and Vibration
Construction Phase Monitoring	
9.7.1	During the construction phase, a noise and vibration monitoring programme shall be implemented to assess compliance of the construction works with the noise limits set out in **Table 9-4**, **Table 9-5** and **Table 9-9** in **Chapter 9**. Full details of the Contractor's provision for noise and vibration monitoring and procedures including provisions for publication of monitoring results will be submitted to and approved by the County Council prior to commencement of work. The mitigation in **Chapter 8** of this EIAR and the Environmental Operating Plan for the Proposed Scheme will detail channels of communication between the Contractor, Meath County Council and residents including a system for recording and investigating noise complaints relating to the construction operations.
Operational Phase Monitoring	
9.7.2	No specific noise or vibration monitoring is proposed.

27.4 Chapter 10 – Air Quality

Table 27-7: Summary Table of Mitigation Measures in the Air Quality Chapter

EIAR Section Reference	Description of Mitigation Measures for Air Quality
Construction Phase Mitigation	
10.5.1.1	**Construction Dust** Dust mitigation measures are based upon the industry guidelines in the Building Research Establishment (BRE) document entitled 'Control of Dust from Construction and Demolition Activities'. Measures to be implemented on the Proposed Scheme to avoid, prevent or reduce and, if possible, offset likely significant adverse effects are as follows: • A Dust Minimisation Plan shall be prepared in advance of construction works commencing on-site. The Dust Minimisation Plan shall include details of a monitoring regime using standard Bergerhoff gauges (to VDI standard) at a series of locations that are identified based on potential risk of dust nuisance (see **Section 10.7.1** for further details of monitoring). • The contractor shall be required to maintain monthly dust levels below the guideline of 350 mg/m^2/day (for non-hazardous dusts) as an annual average at sensitive receptors. Where dust levels are measured to be above this guideline the mitigation measures in the area will be reviewed and improved to ensure that dust deposition is reduced to below 350 mg/m^2/day. • Site roads shall be regularly cleaned and maintained as appropriate. Hard surface roads shall be swept to remove mud and aggregate materials from their surface while any un-surfaced roads shall be restricted to essential site traffic only. • Any site roads with the potential to give rise to dust shall be regularly watered, as appropriate, during dry and/or windy conditions (also applies to vehicles delivering material with dust potential). • All vehicles exiting the site shall make use of a wheel wash facility prior to entering onto public roads, to ensure mud, dust and other materials are not tracked onto public roads. • Wheel washes shall be self-contained systems that do not require discharge of the wastewater to water bodies. • Public roads outside the site shall be regularly inspected for cleanliness and cleaned as necessary. • The focus of the control procedures relating to emissions to air during earth moving and construction shall be to reduce the generation of airborne material. • Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind. • All rock processing, crushing and screening undertaken at the Southern Stockpile will be in accordance with the procedures presented in the UK Process Guidance Note 3/16(12) Statutory guidance for mobile crushing and screening. • Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods. • All vehicles which present a risk of spillage of materials, while either delivering or removing materials, will be loaded in such a way as to prevent spillage on to the public road. • All vehicles will be suitably maintained to ensure that emissions of engine generated pollutants are kept to a minimum. With the implementation of the above measures and monitoring during construction, it is expected that the levels of dust generated will be minimal and are unlikely to cause an environmental nuisance.
10.5.1.2	**Construction Traffic** Mitigation of road traffic emissions are mainly achieved through application of EU legislation which promotes improvements in fuel and engine technology resulting in a gradually reducing emissions per vehicle profile. The collection of EU Directives, known as the Auto Oil Programme, have outlined improved emission criteria which manufacturers are required to achieve from vehicles produced in the past and in

EIAR Section Reference	Description of Mitigation Measures for Air Quality
	future years. This is a trend which has been in operation for many years and is destined to continue in future years for both cars and heavy-duty vehicles. The following mitigation is proposed in relation to construction traffic management for the proposed road development: • A Traffic Management Plan shall be prepared to deliver the mitigation measures outlined in **Chapters 5** and **7** of this EIAR on a location-specific basis by the appointed contractor(s) in advance of the works commencing on-site. • A designated delivery route shall be used for all materials to/from the site for all drivers, as overseen by the PSCS to be appointed by MCC. • Owners/ operators of all vehicles are responsible for ensuring those vehicles are suitably maintained to ensure that emissions of engine generated pollutants are kept to a minimum. • The use of low emissions vehicles within the construction fleet will be included within the Contract Documents. • The use of private vehicles by construction staff to access the site will be minimised through the encouragement of use of public transport, encouragement of car sharing, and maximising use of local labour to reduce transport emissions. To implement this, the contractor shall prepare a Mobility Management Plan for site staff.
10.5.1.3	**Construction Plant** To reduce emissions from compounds a mobile plant the following mitigation is recommended: • For electricity generation at the construction compounds, hydrogen generators or electrified plant shall be utilised over traditional diesel generators. This should also apply to lower powered mobile plant as appropriate. • A regular maintenance schedule for all construction plant machinery shall be undertaken to maintain optimum machinery efficiency. • Engines will be turned off when machinery is not in use.
Operational Phase Mitigation	
10.5.2	As noted earlier in this chapter, reduction of road traffic emissions is mainly driven by legislation and improved criteria focussed on improvements in fuel and engine technology which in tuns results in a gradually reducing emissions profile. This is a trend which has been in operation for many years and is projected to continue in future years for both cars and heavy goods vehicles. The introduction of the National Car Test (NCT) and Commercial Vehicle Roadworthiness Test. (CVRT) in Ireland has also helped to reduce transport emissions by ensuring that all vehicles on Irish roads over four years old undergo an emissions test. No scheme specific mitigation measures have been identified but emissions of pollutants from road traffic will be controlled by either controlling the number of road users or by controlling the flow of traffic. For the majority of vehicle-generated pollutants, emissions rise as speed drops, although the opposite is true at very high speeds (i.e. speeds greater than 120 km/hr). Emissions also tend to be higher under stop-start conditions when compared with steady speed driving. The free flow of traffic on the proposed bypass, as well as giving priority to the east-west traffic through Slane village as part of the public realm enhancement proposals, would allow for the generation of lower concentrations of traffic-related pollutants due to more steady speed driving. As outlined in the DMRB assessment, with the Proposed Scheme operational, compliance with all the relevant limit values will be achieved at the nearest sensitive receptors.

Table 27-8: Summary Table of Monitoring Measures in the Air Quality Chapter

EIAR Section Reference	Description of Monitoring Measures for Air Quality
Construction Phase Monitoring	
10.7.1	Monthly monitoring of dust deposition levels shall be undertaken by the contractor for the duration of construction for comparison with the guideline of 350 mg/m^2/day (for non-hazardous dusts). This monitoring shall be carried out at a minimum of three locations at each construction compound in each section and further monitoring locations at sensitive receptors around the proposed works. The

EIAR Section Reference	Description of Monitoring Measures for Air Quality
	additional locations will be at any residential receptor area within 100 m of the proposed works areas. Where dust levels are measured to be above the guideline of 350 mg/m^2/day, the mitigation measures in the area shall be reviewed and improved to ensure that dust deposition is reduced to below 350 mg/m^2/day. Should high dust levels continue to occur following these improvements, the contractor shall provide alternative mitigation measures and/or will modify the construction works taking place.
Operational Phase Monitoring	
10.7.2	No operational phase monitoring is proposed.

27.5 Chapter 11 – Human Health

Table 27-9: Summary Table of Mitigation Measures in the Human Health Chapter

EIAR Section Reference	Description of Mitigation Measures for Human Health
Construction Phase Mitigation	
11.5.1.1	**Health Lifestyles** No further mitigation is proposed.
11.5.1.2	**Socio-economic Conditions** No further mitigation is proposed.
11.5.1.3	**Environmental Conditions** **Air Quality** No further mitigation is proposed. **Noise and Vibration** No further mitigation is proposed; refer to **Chapter 9 – Noise and Vibration** for specific details of the noise mitigation.
Operational Phase Mitigation	
11.5.2.1	**Health Lifestyles** No further mitigation is proposed. The following enhancement would support maximising the public health opportunity: Implementation of the active travel routes within Slane, including to the school, could be accompanied by a health promotion launch initiative to encourage behavioural change to active travel modes. This could be coordinated, and detail developed, with local public health stakeholders and the school. The Proposed Scheme could support planning and providing information boards. Vulnerable groups could be targeted by the initiative, including school children.
11.5.2.2	**Safe and Cohesive Communities** **Transport** No further mitigation is proposed, though regular review of any unintended accident hotspots would be a routine monitoring activity of the local authority and would underpin any need for further action. **Community Identity and Society** No further mitigation is proposed.
11.2.5.3	**Environmental Conditions** **Air Quality** No further mitigation is proposed. **Noise and Vibration** No further mitigation is proposed; refer to **Chapter 9 – Noise and Vibration** for specific details of the noise mitigation.

Table 27-10: Summary Table of Monitoring Measures in the Human Health Chapter

EIAR Section Reference	Description of Monitoring Measures for Human Health
Construction Phase Monitoring	
11.7.1	No monitoring is proposed for the construction phase.
Operational Phase Monitoring	
11.7.2	No monitoring is proposed for the operational phase.

27.6 Chapter 12 – Landscape and Visual

Table 27-11: Summary Table of Mitigation Measures in the Landscape and Visual Chapter

EIAR Section Reference	Description of Mitigation Measures for Landscape and Visual
12.5.1	**General Aims and Objectives of Landscape Mitigation Strategy** Mitigation shall be in keeping with the existing landscape character. Therefore, mixed broadleaved woodland, mixed species hedgerows and mixed species hedgerows with scattered trees formed using plant species present in the local landscape shall be used. It is noted that some of the mitigation planting proposed on slopes associated with formation of new embankments and cuttings are proposed to be implemented on slopes of 1:2 gradient, and such planting shall be implemented carefully and monitored for successful establishment. In instances where existing hedgerows are disrupted adjacent boundaries shall be replanted with hedgerows of similar species composition. Plant mixes of native trees and shrubs and wild meadow grass mix will be implemented where appropriate. The implementation of the landscape mitigation measures will be in accordance with the NRA Guide to Landscape Treatments of National Road Schemes in Ireland. Native plants and seed from indigenous sources shall be used. The aims of the landscape and visual mitigation measures are: • To provide mitigation measures to help avoid, reduce, or remedy any significant landscape and visual impacts arising from any elements within the Proposed Scheme; • To ensure that the Proposed Scheme and its associated features (bridges) are physically and visually integrated into the surrounding landscape; • To provide replacement planting for woodland and hedgerows, whether they are visually significant or not, which are to be removed because of the Proposed Scheme and to ensure green corridor connectivity is maintained; • As far as possible, avoid, or reduce effects on, landscape features, retain and make best use of existing vegetation and re-use site-won materials wherever possible; • To provide appropriate levels of visual screening to avoid, reduce or remedy visual intrusion at residential properties to address any negative aspects regarding the visual impact of the Proposed Scheme; and • Mitigation planting on 1:2 slopes will require the appointed landscaping contractor to apply site-specific safety protocols.
Construction Phase Mitigation	
12.5.2	• The construction contractor will, during the construction phase of the Proposed Scheme, adhere to the NRA's Guidelines on the Implementation of Landscape Treatments on National Road Schemes in Ireland; • Topsoil, subsoil and other materials for re-use within the Proposed Scheme will be located in areas (refer to **Chapter 5**) to avoid impacting on existing residential properties; • Retained trees, retained woodland and retained hedgerows will be strengthened with new planting to strengthen these existing landscape features; • Construction compounds and storage areas used during the construction phase will be fully de-compacted and re-instated to former usage (e.g. re-instated to agricultural usage) prior to the end of the construction phase;

EIAR Section Reference	Description of Mitigation Measures for Landscape and Visual
	• The removal of important landscape features, such as hedgerows, will be limited as far as practically possible to reduce both direct and indirect impacts on landscape character. Any losses will be replaced with locally native and characteristic plant species and species mixes; • Existing trees will be retained wherever possible, with protective measures implemented in accordance with current guidance e.g. BS 5837(2012) – Trees in Relation to Design, Demolition and Construction. All existing tree losses will be mitigated by replacement planting; and • Topsoil, stripped as part of the construction operations, will be stored in low mounds and reused in accordance with best practice guidance.
Operational Phase Mitigation	
12.5.3.1	**Specific Landscape Measures (SLM)** The location and details of where SLMs will be implemented are set out in **Table 12-38**; indicative locations of the SLMs are illustrated in **Figure 12.7(a)-(e)**. Where cuttings and embankments are not present, the SLM will require the implementation of a new mixed species hedgerow to define the boundary together with locally appropriate, native species mixed woodland planting.

Table 12-38: Specific Landscape Measures (SLM)

Location	Description of SLM
Sitewide	During construction operations, the site compounds and road diversions will be located where the least environmental impacts will be experienced and will avoid the excessive removal of existing vegetation. Where vegetation is to be removed, it will be replaced with similar species following completion of the Proposed Scheme.
Sitewide	The land take will be minimised as far as practically possible to reduce both direct and indirect landscape impacts. Re-profiled slopes are to be maintained to allow for planting (cuttings and embankments).
Sitewide	Cuttings and embankments will be as natural as possible and graded and shaped to integrate with the adjacent landform. Slopes will be graded to minimise land take in so far as reasonably practical.
Sitewide	Areas requiring re-profiling will be stripped of their existing soils and will be stockpiled for re-use. Existing soils will be re-used on new embankments to retain the seedbank of localised vegetation communities.
Sitewide	Where access road closures occur or where the old N2 / N51 corridors becomes surplus to requirements, such areas of former road makeup will be fully excavated, removed and re-profiled to allow for planting or seeding with appropriate native species mixtures to continue the existing vegetation adjacent to the former roadside. This will help screen views of the Proposed Scheme and further integrate the new road corridor into the surrounding landscape.
Sitewide	The removal of mature trees, mature hedgerows with trees and mixed species woodland will be avoided as far as possible to reduce both direct and indirect impacts. New woodland planting will be provided to compensate for losses of woodland, hedgerows, and trees adjacent to the Proposed Scheme during construction operations and to accommodate the improvements. Different woodland types will be established to reflect the existing woodland composition and promote integration with the existing character.
Sitewide	A species-rich, low maintenance grassland mix will be used within all planting areas on embankments and slopes to enhance the overall biodiversity value associated with the Proposed Scheme.
Sitewide	Drainage elements, such as SuDs ponds, swales, ditches and the like, where they occur, will be naturalistic and sensitively integrated into the wider landscape setting.
Sitewide	Materials for the construction of the accommodation tracks will be selected to integrate with the existing material in the area. In addition, locally sourced materials will aid integration into the landscape and promote sustainability.

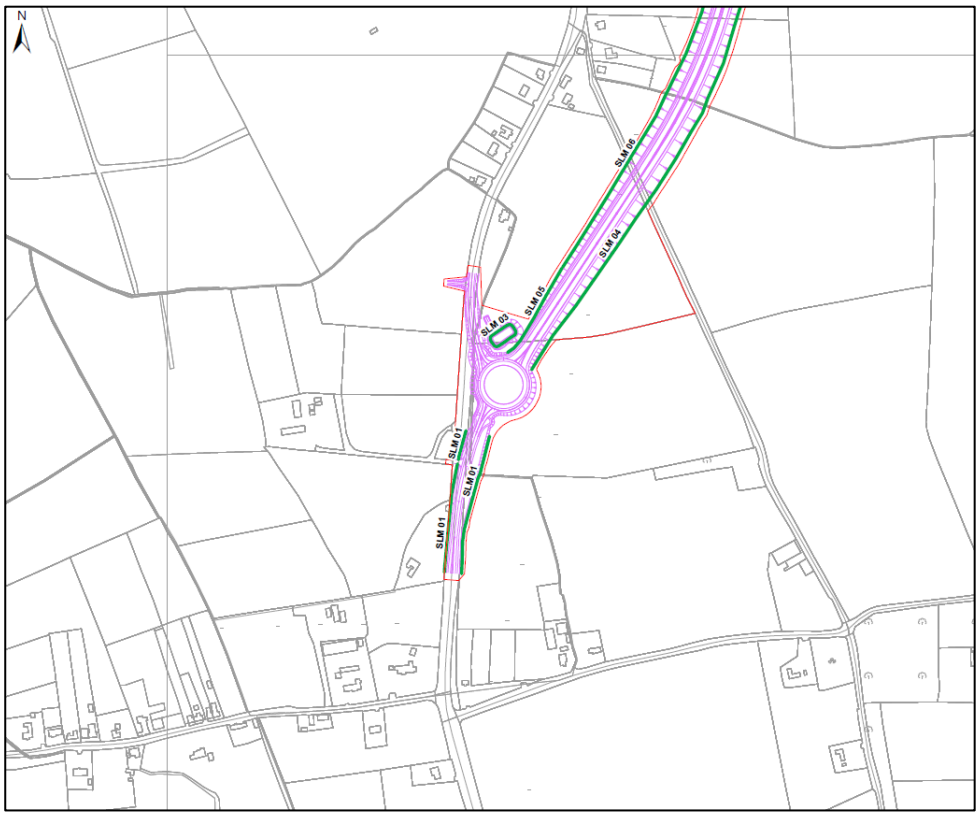
EIAR Section Reference	Description of Mitigation Measures for Landscape and Visual	
	Sitewide	The ongoing maintenance and management of the landscape planting and seeding will be an integral part of the Proposed Scheme. MCC will ensure that all mitigation and monitoring committed to in the EIAR and NIS and planning conditions, will be enforced on the appointed contractor through express terms of the contract, and will be overseen by an official engaged by the Council.
	SLM 01: Ch. 0 – 200 both sides, south of southern roundabout	New hedgerow with scattered hedgerow tree planting to replace existing hedgerows along roadside, to provide integration with existing woodland and vegetation cover outside of the lands made available (LMA).
	SLM 02: Ch. 0 – Ch. 130 western side (Access link from Southern roundabout to retained section N2)	New mixed species woodland, with a high percentage of evergreen species to areas between new property access, west of new roundabout and on top of existing N2 corridor to provide visual screen.
	SLM 02a: Southern roundabout	Provide new woodland planting on slopes, new hedgerow with scattered hedgerow trees to provide visual integration and reforming of field boundaries along the eastern LMA boundary.
	SLM 03: Pond 1	Mixed species broadleaved woodland to areas around Pond 1 to aid integration of pond and associated access / maintenance track. Mixed species woodland with high percentage of evergreen species along northern boundary to provide visual screening of new road from residential properties in close proximity.
	SLM 04: Ch. 0 – Ch. 700 eastern side	New mixed species hedgerow with scattered hedgerow tree planting to LMA boundary to reform field boundaries and provide integration. Provide new native species woodland planting on slopes, of varying widths. Width of planting to be 5 m minimum and up to 9 m maximum with minimum 1.5 m stand-off / clear zone provided adjacent to drainage ditch for maintenance access requirements. Proposed planting on slopes to provide visual relief to road users and integration of the scheme into the surrounding landscape context.
	SLM 05: Ch. 0 – Ch. 150 western side	New mixed species hedgerow with scattered hedgerow tree planting to edge of LMA boundary to reform field boundary and provide integration. Provide new native species woodland planting on slopes to provide visual relief to road users and integration of the scheme into the surrounding landscape context.
	SLM 06: Ch. 150 – Ch. 750 western side	New mixed species hedgerow with scattered hedgerow tree planting to be provided along LMA boundary. New woodland planting to be provided to top of slope and level area between top of slope and LMA boundary to provide visual screening to properties to the west. Proposed planting to contain evergreen species, to level areas at top of slope, to provide visual screening of Proposed Scheme.
	SLM 07: Overbridge 1	Provide new hedgerows with hedgerow tree planting to provide integration and screening. Provide mixed species woodland to provide screening to abutments of the overbridge.
	SLM 08: Ch. 800 – Ch. 1100 both sides	Provide new mixed species hedgerow with hedgerow tree planting to LMA boundary to reform field boundaries. Provide a minimum 4 m depth of mixed species woodland planting, with evergreen species, to top of cutting. Woodland planting to be extended down slopes to provide screening of deep cuttings from Hill of Slane and provide visual integration with the wider landscape. Proposed planting to extend down cutting slopes to provide visual relief to road users and to provide integration with wider landscape.
	SLM 09: Rossnaree Road Overbridge	Provide new mixed species hedgerows to replace removed sections of roadside hedgerow. Provide replacement hedgerow planting to northern edge of proposed satellite compound to replace removed planting. Fully re-instate satellite compound on Rossnaree Road with appropriate mixed species grassland.

EIAR Section Reference	Description of Mitigation Measures for Landscape and Visual	
	SLM 10: Pond 2 and associated access tracks	Provide new mixed species hedgerow with scattered trees along southern boundary of the pond land adjacent to Rossnaree Road. Provide new wet woodland planting on southern edge of pond land - infill between pond edge and new hedgerow planting on southern edge of pond and on northern embankments associated with re-aligned towpath. Provide mixed species woodland planting with woodland edge planting on slopes and land lying between re-aligned towpath and access track 8 and pedestrian and cycle lane access routes. Provide native aquatic species planting to areas of Pond 2. Proposals shall include for marginal, semi-submerged and submerged native species. Provide wet-meadow seed mix to pond edges.
	SLM 11: River Boyne Bridge	Provide mixed species native woodland planting on eastern embankment slopes lying between residential property and River Boyne Bridge (approx. Ch. 1100 – Ch. 1200) to provide visual integration and screening. Woodland planting to incorporate high percentage of evergreen species for visual screening together with larger specification (semi-mature and extra heavy standard trees). Provide wet meadow seeding to all riverbank lands disturbed as part of the Proposed Scheme. Where possible, and subject to confirmation by the Project Ecologist, existing soil and materials associated with the SAC woodland, which will be removed as part of the northern bridge abutment works, are to be retained and re-used. Riparian margins shall be planted with native species, with the species mix comprising Alder-Oak-Ash (DAFM, 2018): Small groups of alder (50%), grey willow (10%) and downy birch (10%). Groups interspersed alternately and set back 10m minimum from the bank to provide dappled shade and avoid tunnelling. Pedunculate oak (10%) on drier areas. Hawthorn (5%) scattered throughout. Minor species (15%) will be between the above groups: holly, hazel, guelder rose.
	SLM 12: Access Track 9 and 9A	Provide wet woodland shrub planting re-instate vegetation cover along towpath. Provide wet meadow seeding to all land disturbed as part of the Proposed Scheme.
	SLM 13: Pond 3 and associated access tracks	Provide mix species wet woodland planting adjacent to River Boyne (5 m depth), outwith flooding extents to aid integration and screening of bridge crossing and pond on upper elevation slopes. Provide mixed species native woodland on southern and western embankments of Pond 3 to aid visual integration. Provide mixed species woodland planting between wet woodland and lower access track to Pond 3.
	SLM 14: Ch. 1400 – Ch. 1550 western side	Provide mixed species woodland screen planting to replace removed vegetation, aid visual integration and provide connectivity with adjacent woodland to the west of the Proposed Scheme.
	SLM 15: Overbridge 3	Provide mixed species woodland planting to embankments to aid visual integration of overbridge in views.
	SLM 16: Ch. 1600 – Ch. 1800 both sides	Provide new mixed species hedgerow planting to LMA boundary. Provide new mixed species woodland planting of 4 m minimum width, on slopes and level areas between top of slope and LMA boundary, to aid integration and screening of Proposed Scheme in southern views from N51.
	SLM 17: Ch. 1800 – Ch 2200 eastern side	Provide new mixed species woodland planting between access road to residential property and new N2 corridor. Planting to include high percentage of evergreen species to provide screening. Provide new hedgerow planting to LMA boundary to aid integration of access road to residential property.

EIAR Section Reference	Description of Mitigation Measures for Landscape and Visual	
	SLM 17: Ch. 1800 – Ch. 2000 western side	Provide new mixed species hedgerow planting to LMA boundary. Provide new mixed species woodland planting, minimum 5 m depth, to aid integration and screening of Proposed Scheme in southern views from N51 and residential properties to the north.
	SLM 18: Pond 4 and access track	Provide mixed species woodland planting between pond edge and south-western portion of new roundabout. Provide new hedgerow planting to western boundaries to aid integration. Provide wet meadow seeding to pond slopes. Provide locally appropriate native species aquatic planting to permanent water areas.
	SLM 19: Ch. 2200 – Ch. 3000 eastern side	Provide new mixed species hedgerow planting to LMA boundary. Provide new mixed species woodland planting, minimum 3 m depth between access track and new corridor to aid integration and screening of cuttings and embankments in southern views available from Hill of Slane. Provide new woodland planting, mixed species hedgerow planting to reform boundaries at access points to lands to be used for stockpile storage. Provide agricultural seed mix for grazing to land used as storage area – return lands to agricultural use following completion of the Proposed Scheme.
	SLM 20: Ch. 2200 – Ch. 3000 western side	Provide new mixed species hedgerow planting to LMA boundary. Provide new mixed species woodland planting, minimum 4 m depth, to aid integration and screening of cuttings and embankments in southern views available from Hill of Slane.
	SLM 21: Pond 5A and Pond 5B	Provide new mixed species hedgerow planting to LMA boundary. Provide new mixed species woodland planting, around ponds to aid visual integration. Provide aquatic planting, native, locally appropriate species to permanent water areas.
	SLM 22: Ch. 3000 – Ch. 3450 – both sides	Provide new mixed species hedgerow planting to LMA boundary. Provide new mixed species woodland planting, minimum 5m depth on slopes, to aid integration and screening of cuttings and embankments in southern views available from Hill of Slane and to provide visual relief to road users. Planting to extend horizontally along full length of identified chainages.
	SLM 23: Northern roundabout	Provide new mixed species hedgerow planting to LMA boundary. Provide new mixed species hedgerow planting with scattered trees to replace removed sections of roadside hedgerow vegetation. Provide new mixed species woodland planting, to northern side of roundabout, between existing hedgerow, on top of removed portion of existing N2 corridor and on embankments to north of proposed roundabout to aid visual integration and screening in north-western views from Hill of Slane.
	SLM 24: Pond 6 and access track	Provide new mixed species hedgerow planting to LMA boundary and adjacent to access track. Provide new mixed species woodland planting, on embankments and areas to south of pond to aid integration in views from Hill of Slane car park.
	SLM 25: N51 Corridor Alignment	Retention of existing garden boundary treatments where possible. Provide new mixed species native hedgerow along sections of the corridor where existing hedgerows are to be removed as part of the Proposed Scheme. Provide Semi-mature tree planting to create avenue within soft verge areas between roadside and proposed pedestrian footway with tree density increasing towards Slane.

EIAR Section Reference	Description of Mitigation Measures for Landscape and Visual
	Provide Semi-mature tree planting to create avenue along northern side of the N51 corridor realignment with tree density increasing towards Slane. Provide low level shrub planting on all embankments associated with N51 corridor, not contained within residential curtilage. Provide appropriate screen planting (hedgerow with trees, amenity shrub planting) around proposed parking facility adjacent to N15 corridor). Refer also to the general arrangement drawing in **Volume 3**, **Technical Drawing MDT0806-RPS-01-N2-DR-C-GA2201** (General Arrangement - N51 West Realignment).
SLM Public Realm	There are number of embedded soft landscape design proposals for the Public Realm; refer to **Chapter 4**, **Section 4.4.13**. In addition, soft landscape proposals to the pedestrian/cyclist link between the proposed carpark and the existing N2 will contain a high percentage of amenity perennial and shrub species to provide a softening of proposed earthworks associated with the link route, whilst providing year-round interest.

Figure 12.7(a): Indicative Locations of Specific Landscape Mitigation Measures



EIAR Section Reference	Description of Mitigation Measures for Landscape and Visual

Figure 12.7(b): Indicative Locations of Specific Landscape Mitigation Measures

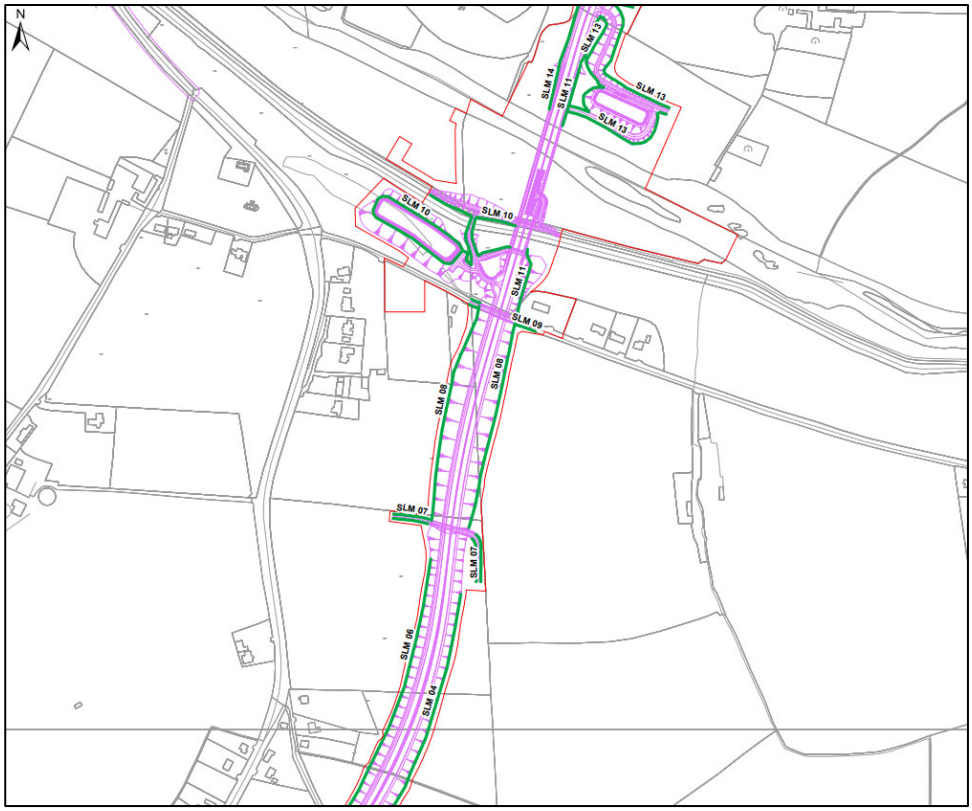
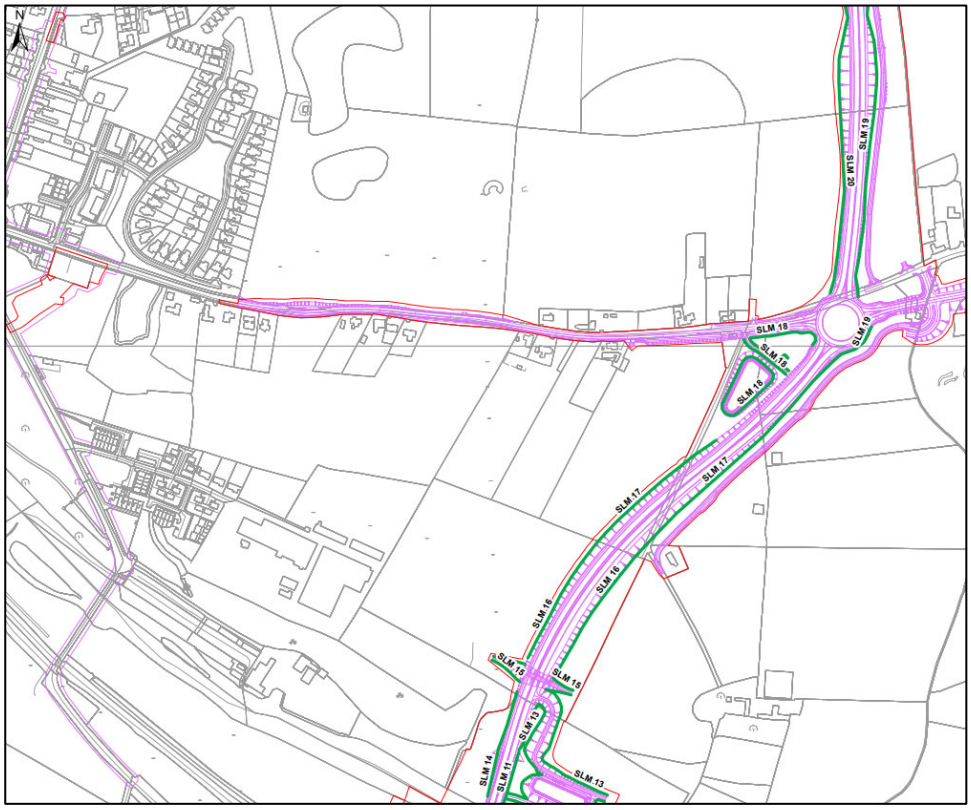


Figure 12.7(c): Indicative Locations of Specific Landscape Mitigation Measures



EIAR Section Reference	Description of Mitigation Measures for Landscape and Visual

Figure 12.7(d): Indicative Locations of Specific Landscape Mitigation Measures

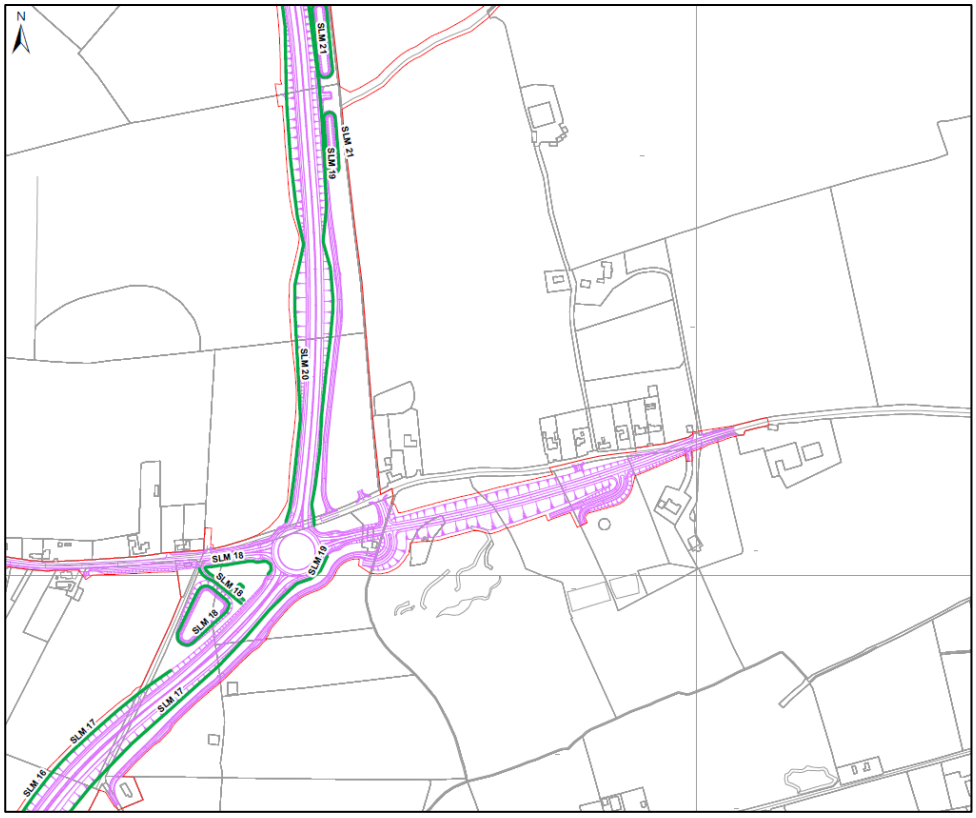


Figure 12.7(e): Indicative Locations of Specific Landscape Mitigation Measures

EIAR Section Reference	Description of Mitigation Measures for Landscape and Visual
12.5.3.2.1	**Mitigation Specifications** **Trees, Hedgerows and Shrub Planting** All trees, shrubs, transplants/whips, hedging material and ground cover planting shall conform fully to the specification, prepared by the appointed and suitably qualified landscape architect, in respect of species, size and quality, which shall be designed to deliver on the mitigation as set out in this EIAR. All plants shall be well grown, sturdy and bushy according to species type, use and shall be free from all diseases and defects. The plants shall be made available for inspection prior to planting works commencing. Any plant material that does not conform to the specification will be automatically rejected and will be removed from site. All trees, shrubs and other plant material shall comply with the standards set out in National Plant Specification (NPS) prepared by the Committee on Plant Supply and Establishment and published with the backing of the Joint Council of Landscape Industries (JCLI, 1989).
12.5.3.2.2	**Defective Plant Material** All trees, shrubs, transplants, hedging material and ground cover planting shall be maintained and guaranteed for a period of five years against death, deformation, die-back, or disease other than that caused by malicious damage, to ensure successful establishment of hedgerows, screen planting and development of habitats.
12.5.3.2.3	**Plant Mixes** Essentially road verge or bank planting will consist of 'bare root transplants', 'whips' and 'feathered trees' which, due to their smaller stock size at time of planting, will adapt more easily to the disturbed ground and exposed site conditions. All plants are to be positioned in the locations and in the required numbers and centres indicated on the agreed planting plan.
12.5.3.2.4	**Woodland Mix** Landscape mitigation planting of road verges and slopes and as compensation for loss of existing woodland, individual trees, scrub shrub and hedgerows along the Proposed Scheme will exclusively use Irish native species that reflect the existing vegetation of the area. Core species will include oak, hawthorn, hazel, holly, yew, blackthorn, goat willow, alder, rowan, beech, and birch. Woodland Mix areas will be planted as whips and feathered transplants at a standard size of 60-90 cm or 90-120 cm augmented by larger, Semi-mature, extra heavy standard and standard individual tree planting, appropriate to final locations. Species shall be planted randomly in groups to mirror local woodlands. Most species used will be quickly maturing species and will have formed dense woodland within ten years. The canopy will reach at least 7 to 10 m, in places where groups of trees are planted. In addition to whip and feathered transplants individual semi-mature trees shall be used to provide screening at SLM locations where limited roadside space is available or where early effect is required as set out in **Table 12-38**.
12.5.3.2.5	**Individual Tree Planting** Individual tree planting using semi-mature, extra heavy standard, and standard trees shall be included in the locations identified in **Table 12-38**.
12.5.3.2.6	**Native Shrub Planting** Shrub planting shall consist of native species from the core and additional species listed above to provide a woodland understorey and/or woodland edge. Shrub planting mixes shall complement areas of woodland and be used at locations consistent with the surrounding landscape. All existing hedgerows shall be reinstated at interrupted field boundaries or where new boundaries with fields and adjacent residential properties are created using native hawthorn, blackthorn and holly that shall be the predominant species used.
12.5.3.2.7	**Grass and Wildflower Mixes** The road verges will be seeded with a robust, low-maintenance grass seed mix. Areas away from designated sight lines where mowing regimes are not required to be of a regular nature will be seeded with a low maintenance semi-natural species rich seed mix appropriate to final location. Areas lying adjacent to the River Boyne and surrounding ponds will be seeded with a low maintenance, species rich, wet meadow seed mixture using seed from Irish native sources as appropriate to final location. Grass and wildflower mixes using seed from Irish native sources shall be employed to provide quality areas of low maintenance, rapid establishment, and visual appearance.

EIAR Section Reference	Description of Mitigation Measures for Landscape and Visual
12.5.3.2.7	**Grass and Wildflower Mixes** The road verges will be seeded with a robust, low-maintenance grass seed mix. Areas away from designated sight lines where mowing regimes are not required to be of a regular nature will be seeded with a low maintenance semi-natural species rich seed mix appropriate to final location. Areas lying adjacent to the River Boyne and surrounding ponds will be seeded with a low maintenance, species rich, wet meadow seed mixture using seed from Irish native sources as appropriate to final location. Grass and wildflower mixes using seed from Irish native sources shall be employed to provide quality areas of low maintenance, rapid establishment, and visual appearance.

Table 27-12: Summary Table of Monitoring Measures in the Landscape and Visual Chapter

EIAR Section Reference	Description of Monitoring Measures for Landscape and Visual
12.7	Monitoring of implemented specific landscape mitigation measures shall be carried out in accordance with DMRB Volume 10; Environmental Design and Management; Section 3; Landscape Management and the relevant sections of Volume 1; Specification for Highway Works; Series 3000 Landscape and Ecology to ensure that the proposed mitigation measures become well-established and aid the integration of new elements associated with the Proposed Scheme into the surrounding landscape and mitigate visual effects at residential properties (**Table 12-40**).
Construction Phase Monitoring	
12.7	**Table 12-40: Project Monitoring Commitments**

Environmental Effect	Monitoring Commitment
Significant landscape and visual effects	Establishment and maintenance of specific landscape mitigation in **Table 12-38** for a period of five years.

Operational Phase Monitoring	
12.7	**Table 12-40: Project Monitoring Commitments**

Environmental Effect	Monitoring Commitment
Slope/planting stability	Additional monitoring of mitigation planting on slopes of 1:2 during the maintenance period will also be required for a period of five years to ensure successful establishment of proposed planting areas and to monitor the underlying ground stability in such areas.

27.7 Chapter 13 – Archaeological and Cultural Heritage

Table 27-13: Summary Table of Mitigation Measures in the Archaeological and Cultural Heritage Chapter

EIAR Section Reference	Description of Mitigation Measures for Archaeological and Cultural Heritage
Construction Phase Mitigation	
13.5	Mitigation of the effect of development on the archaeological resource can take the form of 'preservation by record' (full hand excavation; i.e. sterilisation of archaeological area); and 'preservation in situ' (excluded from development, i.e. avoidance through design in a location where the future protection and interpretation of the site can be assured) or a combination of both. All archaeological works will take place under Ministerial Direction or Section 26 Consent Licence to the Department of Housing, Local Government and Heritage (DHLGH).
13.5.1	**World Heritage Property** The key aim of the HIA has been to avoid or minimise any adverse impacts on OUV, consistent with the delivery of the public benefits of the project and recognising the need to resolve potential conflicts of interest with other environmental disciplines. This aim, as reported in Section 6 of the HIA report in **Appendix 13.1**, was achieved in two main stages: • Option selection: comparison of the likely impact of the available route options on OUV, leading to a choice of preferred route for the bypass by Meath County Council that takes sufficient account of any implications for the World Heritage Property; and • Design and Environmental Evaluation: advice to the project design team based on an understanding of OUV, leading to a detailed design proposal that incorporates all opportunities to minimise adverse impacts on OUV from the preferred route of the bypass. The route option selection process led to the selection of a preferred route for the bypass to the east of Slane, between Slane and the World Heritage Property. This was not the preferred choice from the perspective of protection of OUV as all eastern route option corridors were predicted to cause adverse impacts of some magnitude and moderate significance in the absence of detailed design mitigation. Most western and on-line options were predicted to have no impact on OUV but other material environmental considerations led to the rejection of these route options. From the perspective of the World Heritage Property, the choice of preferred route represented a compromise, but one that already delivered considerable mitigation embedded in the design. It was the best of the eastern route options from the perspective of predicted impacts on the OUV of the World Heritage Property. This is because it offered more embedded design mitigation at the two most sensitive locations affected by the various eastern route options, minimising visibility of the proposed road in: • the view looking west from Knowth; and • the view of the World Heritage Property from the Hill of Slane. Accepting that the selected route option could have an adverse impact on OUV, the subsequent design and environmental evaluation stage of the project provided an opportunity to reduce these adverse impacts. The primary aim of mitigation measures at this stage was to reduce the visibility or visual prominence of the proposed bypass, and vehicles using it, in views from Knowth and the Hill of Slane. This was achieved through refinements to the design of the bypass as follows: • Selection of a design and materials for the Boyne Bridge that minimise its visual prominence in views from Knowth; • Addition of a planted bund that creates additional screening of vehicles immediately to the south of the bridge structure when viewed from Knowth; • Planting of hedgerows and trees beside the mainline cutting south of the Boyne Bridge to integrate the cutting into the existing landscape of enclosed fields and to screen the upper parts of high-sided vehicles in views from Knowth; and

EIAR Section Reference	Description of Mitigation Measures for Archaeological and Cultural Heritage
	• Planting of a woodland strip along the west side of the mainline between the N51 Roundabout and the north roundabout to screen the bypass and vehicles moving along it when viewed from the Hill of Slane. The net effect of these additional mitigation measures, after growth of screening vegetation, would significantly reduce the visibility of the proposed bypass in key views from Knowth and the Hill of Slane. This, in turn, would reduce the magnitude of impact on OUV of the World Heritage Property below that identified in the option selection assessment.
13.5.1.1	**Opportunities for enhancement of OUV** Good practice guidance emphasises the need not only to avoid or minimise adverse impacts but also to identify opportunities to enhance OUV as part of the impact assessment process (UNESCO, 2022, s.6.10.2). In the present assessment, mitigation measures have been dominated by the avoidance or reduction of adverse impacts and opportunities to incorporate enhancement measures have proved very limited. In so far as any potential for enhancement has been identified, attention has been focussed on potential for improvement of access to, and appreciation of the World Heritage Property from Slane. The proposed removal of traffic from the existing N2 as it crosses Slane Bridge and passes through the village has created the opportunity for Slane to become a much more attractive destination for visitors with a strong focus on heritage. This potential would be enhanced by the proposed public realm measures that form part of the Proposed Scheme. These enhancements in Slane village do not, of themselves, offer any direct enhancement for the World Heritage Property. However, they would provide the necessary starting point for future opportunities to enhance access to the World Heritage Property from the west, along the River Boyne. Proposals for a Boyne Greenway between Oldbridge to Navan (currently only in the early stages of design) envisage the creation of a continuous walking and cycling route along the Boyne from Navan to Drogheda (Drogheda to Oldbridge is already complete). At Slane, this route is likely to adopt the existing towpath of the Boyne Navigation and would create public access along the right bank of the river, connecting Slane Bridge with the Brú na Bóinne Visitor Centre. This route would also create new and informative views into the World Heritage Property, enhancing public appreciation of the key prehistoric monuments, such as Knowth and Newgrange, in their landscape setting. It should be noted that the design of the new Boyne Bridge for the Slane bypass avoids any disruption to the Boyne Navigation and its towpath. There will also be a direct pedestrian link from the footpath beside the bypass carriageway down on to the towpath. It must be emphasised that delivery of the enhancement to OUV offered by the Boyne Greenway proposals lies outside the scope of the Proposed Scheme, and there is currently no certainty that the Greenway project will be realised. However, the public realm enhancements that the Proposed Scheme would deliver in Slane will greatly improve visitor access to the River Boyne and Boyne Navigation at Slane Bridge with additional access to the Boyne Navigation from the new Boyne bridge. These measures would facilitate any future local access to the long-distance route envisaged in the Boyne Greenway project, enhancing access and appreciation of the World Heritage Property.
13.5.2.1	**Setting of Archaeological Monuments** **National Monuments** The landscape specialist has developed appropriate planting and screening strategies to ensure the sensitive incorporation of the Proposed Scheme into the existing landscape (detailed in **Chapter 12 – Landscape and Visual**). It is proposed to create a continuous strip of woodland along the west side of the mainline from the N51 Roundabout northwards, including the North Roundabout. The mixed species woodland planting will aid the integration and screening of cuttings and embankments in southern views available from Hill of Slane. It is predicted that after 10 years of growth this will be sufficient to screen the cutting and carriageway from view (Photomontages, **Figure A12.17.1a-e** [Hill of Slane Graveyard NE] and **Figure A12.17.2a-e** [Hill of Slane Graveyard S] in **Volume 4**,

EIAR Section Reference	Description of Mitigation Measures for Archaeological and Cultural Heritage
	Appendix 12.1); the woodland will also screen vehicles (and their lights) from view, although the upper parts of high-sided vehicles may remain visible for a longer time.
13.5.2.2	**Recorded Archaeological Monuments** The landscape specialist has developed appropriate planting and screening strategies to ensure the sensitive incorporation of the proposed road development into the existing landscape (referenced below and detailed in **Chapter 12**). Woodland planting along the Proposed Scheme (Mainline Bypass) in Slane townland will serve to screen the proposed road from the two recorded enclosures (AH27 & AH28, ME019-062 & -063). It is proposed to create a continuous strip of woodland along the west side of the mainline from the N51 Roundabout northwards, including the North Roundabout. The mixed species woodland planting will aid the integration and screening of cuttings and embankments in the vicinity of the recorded enclosures. While it is not possible to screen the proposed new bridge crossing in the view from Slane Bridge (AH09, ME019-024), appropriate planting on the riverbanks and the embankment slopes will be provided. This will include woodland planting on the embankment slopes and wet meadow seeding to all riverbank lands disturbed as part of the Proposed Scheme. This will serve to aid visual integration and screening in these areas. In addition, once completed, the public realm works and associated greening strategy will greatly enhance both the bridge and its immediate setting. Appropriate planting on the riverbanks and the embankment slopes (as discussed above) will provide visual integration and screening in these areas when viewed from Fennor Church and graveyard (AH20, 21; ME019-035, -035001). In addition, once completed, the public realm works and associated greening strategy will enhance its immediate setting.
13.5.3	**Archaeological Testing within the Proposed LMA** A detailed programme of archaeological test excavation will be undertaken within the LMA well in advance of construction. This will involve the excavation of a centreline test-trench, with off-sets placed at regular intervals. The quantity of testing will, where conditions allow, typically represent a 12% sample coverage of the area being tested. Archaeological testing will be carried out by a team (or teams) of suitably qualified archaeologists, under ministerial directions. The purpose of this blanket-testing strategy is to help determine the location, date, nature and extent of any previously unknown archaeological features, deposits, or finds. Given the investigations carried out to date, it is anticipated that any such features would be discrete and small in scale. The test-trenching will also target the potential archaeological sites or specific areas of archaeological potential identified in this assessment to examine their exact nature, extent, origin and significance. As part of the testing strategy, the following will also take place: • The entire area containing possible enclosure ACH24 (where previous limited testing proved unsuccessful) will first be stripped of topsoil under archaeological supervision (from Ch. 2300 to Ch. 2360) to aid in the identification of any archaeological features that may be present; • A percentage of the soil from the test-trenches will be sieved and metal-detected. This will facilitate the identification of any archaeological artefacts that may be present, that may otherwise go unrecognised; • Core samples will be taken in the floodplain of the River Boyne. Analysis of the environmental material will contribute to our understanding of this riverine landscape, facilitating a reconstruction of its environment in the past; • The two sections of townland boundary affected by the Proposed Scheme (Slane / Cashel and Fennor / Cullen boundaries) will be investigated during archaeological test-trenching and mitigated by preservation by record in the form of a survey. The aim of this survey shall be to make a representative written and photographic record of the townland boundary affected by the proposed development. • At ACH14 (Lime-kiln & post-medieval industrial activity, site of), areas that may have been less affected by past quarrying (i.e. the north and east sides of the hilltop) will be targeted in the testing strategy. This will include preservation by record in the form of a survey of the access track, the stone-faced boundary around the tree copse to the west, and any surviving lime-kiln foundations. The

EIAR Section Reference	Description of Mitigation Measures for Archaeological and Cultural Heritage
	aim of this survey shall be to make a representative written and photographic record of the features. Where sites of archaeological significance are identified, due regard will be given to the feasibility of preserving such remains in-situ. Where preservation in-situ is not deemed feasible, all features of agreed archaeological significance will, subject to ministerial directions, be preserved by record (by means of archaeological excavation, post-excavation analysis, reporting and dissemination). During the archaeological testing, existing field access points / routes will be used to avoid disturbance / removal of hedgerows, trees and scrub. Where this is not possible (and in the case of townland boundaries requiring investigation), the TII Project Archaeologist will liaise with the Project Ecologist for the Proposed Scheme, in advance of any disturbance, with regard to the mitigation strategy for terrestrial ecology. The testing strategy will have regard for the Guidelines for the testing and mitigation of the wetland archaeological heritage for national road schemes (NRA 2005).
13.5.3.1	**Archaeological works within the River Boyne floodplain and in proximity to watercourses** In line with the mitigation strategy for the River Boyne floodplain and other watercourses in **Chapter 16 – Biodiversity: Aquatic Ecology**, the following will take place: • Archaeological testing of areas of archaeological potential located within the floodplain of the River Boyne (ACH05 & ACH08) will minimise ground disturbance. To achieve this, testing within the floodplain will be carried out (ground conditions allowing) after the advanced testing programme, within the footprint of the coffer dams and attenuation ponds, if necessary during the site preparation works phase and before construction takes place; • Core sampling within the River Boyne floodplain will take place during the bridge foundation construction period and at the same locations as the bridge piers to avoid further ground disturbance; • No test-trenches will be placed within 10m of the River Boyne or any other waterways crossed by the Proposed Scheme; • Where trenches are in proximity to watercourses, the material taken out of test trenches shall be placed, as far as possible, on the landward side of the trench. The TII Project Archaeologist for the proposed scheme will liaise with the Project Ecologist appointed by Meath County Council to supervise the GI and archaeological works with regard to these measures.
13.5.4	**Archaeological Monitoring** Archaeological monitoring will take place where any preparatory ground-breaking or ground reduction works are required for the public realm works along the existing N2 road at Fennor, in the vicinity of Fennor Church and Fennor Castle (AH20, 24, 25; ME019-035, -036001, -036002), at Slane Bridge (AH09, ME019-024), and in Slane village, where further deposits or features associated with the 18th century estate village may survive (including any remains that survive of the fountain, ACH41). In order to mitigate any potential negative effects on the fabric of Slane Bridge (AH09, ME019-024) during the proposed works, archaeological monitoring of any ground disturbance works will be undertaken. The Contractor will engage suitably qualified conservation specialist to prepare a method statement. The works are to be carried out in accordance with the method statement in consultation with the TII Project Archaeologist.
13.5.5	**Archaeological Excavation (Preservation by Record)** Any archaeological features revealed by the test-trenching, or by any other means (e.g. through archaeological monitoring), which will be directly affected by the proposed works, will be preserved by record by means of archaeological excavation, recording and publication of results. This includes the three confirmed archaeological sites – the early medieval enclosure site in Slane (ME019-085, AH32), the probable enclosure in Cashel (ACH27), and the probable ring-ditch in Fennor (ACH26) – where they lie within the Proposed Scheme LMA. It also includes the subsurface remains of the 18th century trough and drain (ACH39) identified by archaeological monitoring in Slane village.

EIAR Section Reference	Description of Mitigation Measures for Archaeological and Cultural Heritage
	Where deemed appropriate by the National Monuments Service (DHLGH), archaeological features or sites revealed by the test trenching, which will be directly affected by the proposed works, may be preserved in-situ (by avoidance or design). It is anticipated that where possible all archaeological excavation will be completed pre-construction, or if not, then during the early stages of construction phase. This is in accordance with the Code of Practice for Archaeology agreed between the Minister for Arts, Heritage, Regional, Rural and Gaeltacht Affairs and Transport Infrastructure Ireland (TII), 2017.
13.5.6	**General** Archaeological and cultural heritage issues will be resolved at the pre-construction and construction stages of the development. This will include any necessary archaeological monitoring and inspection work required along the Proposed Scheme during the site preparation / advanced works phase of the project. This is in accordance with the TII Code of Practice for Archaeology, 2017. During the construction phase, a mechanism for recording, protecting and (where necessary) resolving existing archaeological monuments and newly revealed sites within the Lands Made Available (LMA) will have to be agreed with the TII Project Archaeologist and the National Monuments Service of the DHLGH. If features are to be left in-situ, detailed plans shall be prepared by the Project Archaeologist as to the layout and extent of these features/ sites as well as a geographical location. Before and after photographs will be required as well as a full report on the preservation of the site and how this was achieved. This will be submitted to the National Monuments Service. In accordance with TII policy on all road schemes, the results generated from archaeological investigations on the Proposed Scheme will be made freely and publicly available. The enhanced dissemination of information is a key part of TII's policy with regard to archaeology and can help in promoting a greater awareness of the past among local communities. As such, the results will be communicated at intervals throughout the project and at its conclusion, through a variety of means, including public open days, the presentation and publication of academic and community papers, and digital story maps. The technical reports will be uploaded to the TII Digital Heritage Collection. **Table 13-20** provides the summary of potential effects on archaeological sites and features and mitigation measures. **Table 13 20: Summary of Potential Effects and Mitigation Measures** **Assessment Topic** / **Potential Effect (Pre-Mitigation)** / **Mitigation Measure** **Designated Sites** Brú na Bóinne, World Heritage Property — Construction and operation of the Proposed Scheme within the wider setting of the World Heritage Property has the potential to effect on the ways in which that setting currently supports OUV. — Mitigation measures have been embedded in the design of the Proposed Scheme, with additional measures aimed to reduce the visibility or visual prominence of the proposed bypass, and vehicles using it, in views from Knowth and the Hill of Slane, i.e. selection of appropriate materials for the proposed bridge and additional screening using a planted bund, hedgerows, trees and a woodland strip at sensitive locations (as described in **Section 13.5.1**). Hill of Slane, National Monument — Indirect effect on setting — Screening in the form of a woodland strip. Growth by Year 10 would be sufficient to obstruct views of the carriageway and vehicles from the Hill of Slane national monument.

EIAR Section Reference	Description of Mitigation Measures for Archaeological and Cultural Heritage		
	AH09, ME019-024, Bridge	Moderate negative effect on setting during construction & operational phase, but overall significant positive effect as a result of the considerable reduction of traffic on the bridge	The operational bypass will greatly help to ameliorate the present significant adverse effects of heavy traffic on the bridge. Appropriate planting on the riverbanks and the embankment slopes will provide visual integration and screening in these areas when viewed from the site. Archaeological monitoring of any ground disturbance works will be undertaken. The works are to be carried out in accordance with a method statement to be prepared by a suitably qualified conservation specialist, in consultation with the TII Project Archaeologist.
	AH20, ME019-035, Church	Indirect effect on setting	Appropriate planting on the riverbanks and the embankment slopes will provide visual integration and screening in these areas when viewed from the site.
	AH21, ME019-035001, Graveyard	Indirect effect on setting	Appropriate planting on the riverbanks and the embankment slopes will provide visual integration and screening in these areas when viewed from the site.
	AH24, ME019-036001, House - 16th/17th century	Indirect effect on setting	Appropriate planting on the riverbanks and the embankment slopes will provide visual integration and screening in these areas when viewed from the site.
	AH25, ME019-036002, Castle - tower house	Indirect effect on setting	Appropriate planting on the riverbanks and the embankment slopes will provide visual integration and screening in these areas when viewed from the site.
	AH32, ME019-085, Enclosure	Large part of this early medieval complex lies within the LMA. Direct and permanent construction effect due to ground disturbance.	Site confirmed by testing. Full archaeological excavation of the site within the LMA.
	AH27, ME019-063, Enclosure	Indirect effect on setting	Woodland planting in Slane townland will serve to screen the proposed road from the enclosures
	AH28, ME019-062, Enclosure	Indirect effect on setting	Woodland planting in Slane townland will serve to screen the proposed road from the enclosures
	Undesignated Sites		
	ACH01 Possible curvilinear feature (geophysical anomaly)	Located within the LMA. Potentially direct and permanent construction effect due to ground disturbance, should the feature prove to be archaeological.	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).
	ACH02 Pre-1830s structure (site of)	Located within the LMA. Direct and permanent construction effect due to ground disturbance if any	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).

EIAR Section Reference	Description of Mitigation Measures for Archaeological and Cultural Heritage		
		subsurface remains survive.	
	ACH03 Pre-1830s road	Located within the LMA. Direct and permanent construction effect due to ground disturbance if any subsurface remains survive.	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).
	ACH04 Pre-1830s structures (site of)	Located within the LMA. Direct and permanent construction effect due to ground disturbance if any subsurface remains survive.	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).
	ACH05 Possible milling activity	Located within the LMA. Potentially direct and permanent construction effect should any archaeological features be present.	Targeted archaeological testing. As this area is within the River Boyne floodplain, it is necessary to minimise ground disturbance in line with the mitigation strategy for **Chapters 15** and **16** and the Natura Impact Statement (NIS). To achieve this, testing within the floodplain will be carried out (ground conditions allowing) after the advanced testing programme, within the footprint of the coffer dams and attenuation ponds, if necessary during the site preparation works phase and before construction takes place. Archaeological excavation in full or part of any identified remains (preservation by record).
	ACH07 Possible curvilinear feature (geophysical anomaly)	Partly within the LMA. Potentially direct and permanent construction effect due to ground disturbance, should the feature prove to be archaeological.	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).
	ACH08 Riverine environs (area of archaeological potential)	Located within the LMA. Potentially direct and permanent construction effect should any archaeological features be present.	Targeted archaeological testing. As this area is within the River Boyne floodplain, it is necessary to minimise ground disturbance in line with the mitigation strategy for **Chapters 15** and **16** and the Natura Impact Statement (NIS). To achieve this, testing within the floodplain will be carried out (ground conditions allowing) after the advanced testing programme, within the footprint of the coffer dams and attenuation ponds, if necessary during the site preparation works phase and before construction takes place. Archaeological excavation in full or part of any identified remains (preservation by record). Palaeo-environmental sampling.
	ACH09 Pre-1830s structure (site of)	Located within the LMA. Direct and permanent construction effect due to ground	

EIAR Section Reference	Description of Mitigation Measures for Archaeological and Cultural Heritage		
		disturbance if any subsurface remains survive.	
	ACH12 Pre-1830s structure (site of)	Located within the LMA. Direct and permanent construction effect due to ground disturbance if any subsurface remains survive.	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).
	ACH14 Lime-kiln & post-medieval industrial activity (site of)	Partly within the LMA. A direct and permanent construction effect due to ground disturbance.	Targeted archaeological testing as part of the blanket testing strategy in areas that may have been less effected by past quarrying (i.e. the N and E sides of the hilltop). This will include preservation by record in the form of a survey of the access track, the stone-faced boundary around the tree copse to the west, and any surviving lime-kiln foundations. The aim of this survey shall be to make a representative written and photographic record of the features.
	ACH16 Pre-1830s structure (site of)	Located within the LMA. Direct and permanent construction effect due to ground disturbance if any subsurface remains survive.	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).
	ACH18 Flint scatters	Located within the LMA. Potentially direct and permanent construction effect should any archaeological features be present.	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).
	ACH21 Pre-1830s structures (site of)	Located within the LMA. Direct and permanent construction effect due to ground disturbance if any subsurface remains survive.	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).
	ACH24 Possible enclosure	Located within the LMA. Potentially direct and permanent construction effect should any archaeological features be present.	Previous testing failed to identify any archaeological features. Underlying geology may have interfered with the survey, but it is also possible that there are still archaeological features here which limited testing failed to isolate. As part of the blanket testing strategy, the entire area containing ACH24 will first be stripped of topsoil under archaeological supervision (from Ch. 2300 to Ch. 2360) to aid in the identification of any archaeological features that may be present.
	ACH25 Pre-1830s structure (site of)	Located within the LMA. Direct and permanent construction effect due to ground disturbance if any	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).

EIAR Section Reference	Description of Mitigation Measures for Archaeological and Cultural Heritage		
		subsurface remains survive.	
	ACH26 Probable ring-ditch	Partly within the LMA. Direct and permanent construction effect due to ground disturbance.	Site confirmed by testing. Full archaeological excavation of the site within the LMA.
	ACH27 Probable enclosure	Partly within the LMA. Direct and permanent construction effect due to ground disturbance.	Site confirmed by testing. Full archaeological excavation of the site within the LMA.
	ACH28 Possible archaeological features (geophysical anomalies)	Located within the LMA. Potentially direct and permanent construction effect should any archaeological features be present.	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).
	ACH29 Possible archaeological features (geophysical anomalies)	Located within the LMA. Potentially direct and permanent construction effect should any archaeological features be present.	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).
	ACH30 Possible archaeological features (geophysical anomalies)	Located within the LMA. Potentially direct and permanent construction effect should any archaeological features be present.	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).
	ACH33 Possible rectilinear feature	Located within the LMA. Potentially direct and permanent construction effect should any archaeological features be present.	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).
	ACH35 Possible archaeological features (geophysical anomalies)	Located within the LMA. Potentially direct and permanent construction effect should any archaeological features be present.	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).
	ACH36 Possible archaeological features (geophysical anomalies)	Located within the LMA. Potentially direct and permanent construction effect should any archaeological features be present.	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).
	ACH37 Possible archaeological features (geophysical anomalies)	Located within the LMA. Potentially direct and permanent construction effect should any archaeological features be present.	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).

EIAR Section Reference	Description of Mitigation Measures for Archaeological and Cultural Heritage		
	ACH38 Possible burnt spread	Located within the LMA. Potentially direct and permanent construction effect should any archaeological features be present.	Targeted archaeological testing as part of the blanket testing strategy. Archaeological excavation in full or part of any identified remains (preservation by record).
	ACH39, 18th century trough & drain	Located within the LMA. A direct and permanent construction effect due to ground disturbance.	Site identified during archaeological monitoring. Full archaeological excavation of the site within the LMA.
	ACH41, 18th century fountain (site of)	Located within the LMA. A direct and permanent construction effect due to ground disturbance.	Archaeological monitoring of ground disturbance works in the village centre to determine if any remains survive.
	Townland boundaries	Fennor / Cullen and Slane / Cashel boundaries partly within the LMA. Direct and permanent construction effect due to ground disturbance.	Targeted archaeological testing as part of the blanket testing strategy. This will include preservation by record in the form of a survey. The aim of this survey shall be to make a representative written and photographic record of the affected sections of boundary. The TII Project Archaeologist will liaise with the Project Ecologist for the proposed scheme, in advance of any disturbance, with regard to the mitigation strategy for terrestrial ecology.

Table 27-14: Summary Table of Monitoring Measures in the Archaeological and Cultural Heritage Chapter

EIAR Section Reference	Description of Monitoring Measures for Archaeological and Cultural Heritage
Construction Phase Monitoring	
13.7	Any necessary archaeological monitoring and inspection work required along the Proposed Scheme during the site preparation / advanced works phase of the project shall be undertaken.
Operational Phase Monitoring	
13.7	There will be no requirement for monitoring post-construction.

27.8 Chapter 14 – Architectural Heritage

Table 27-15: Summary Table of Mitigation Measures in the Architectural Heritage Chapter

EIAR Section Reference	Description of Mitigation Measures for Architectural Heritage
Construction Phase Mitigation	
14.5.1	A description of the mitigation measures for the construction phase are detailed for the proposed mainline bypass and N51 improvement works in **Table 14-13**, and for the public realm enhancement proposals in **Table 14-14**.

Table 14-13: Mitigation of Construction Effects – Mainline Bypass and N51 Improvements

BH No.	Location	Mitigation
BH 1	Former labourer's cottage. Single storey	The effect on the setting will be reduced once construction is completed. No mitigation required.
BH 2	Boyne Canal	On completion of the construction of the bridge the effect on the setting of a localised area of the canal will be reduced. No mitigation required.
BH 3	Slane Mill Architectural Conservation Area	On completion of the construction of the route the effect on the setting of the eastern end of the ACA will be reduced. No mitigation required.
BH 4	Two-storey farmhouse	The farmhouse is to be recorded with photographs, measured drawings and written description and the record submitted to Meath County Libraries and the Irish Architectural Archive.
BH 5	Single-span masonry arch bridge; original arch visible on eastern side of N2; widened on the western side and faced with concrete	The bridge is to be recorded with photographs and written description and the record submitted to Meath County Libraries and the Irish Architectural Archive.
BH 6	Single-storey former labourer's cottage	No mitigation is required
BH 7	Ledwidge Museum, single-storey former labourers' cottages	The effect on the setting will be eliminated once construction is completed. Noise barriers are to be erected.
BH 8	Derelict gate lodge	The gate lodge is to be recorded with photographs, measured drawings and written description, including the associated walls, gates and other features and the record submitted to Meath County Libraries and the Irish Architectural Archive.
BH 9	Stone wall with gate piers, wrought-iron gates and stone stile	The wall and gateway are to be protected from damage during construction
BH 10	Pair of single-storey former labourers' cottages	The effect on the setting will be eliminated once construction is completed. No mitigation is required.
BH 11	Single-storey former labourer's cottage	The effect on the setting will be eliminated once construction is completed. No mitigation is required.
BH 12	Pair of single-storey labourers' cottages	The effect on the setting will be eliminated once construction is completed. No mitigation is required.
BH 13	Pair of single-storey labourers' cottages	The effect on the setting will be eliminated once construction is completed. No mitigation is required.

Table 14-14: Mitigation of Construction Effects – Public Realm Improvements

BH No.	Location	Mitigation
BH 3	Slane Mill Architectural Conservation Area	No mitigation is necessary

EIAR Section Reference	Description of Mitigation Measures for Architectural Heritage		
	BH 14	St Patrick's Church, Chapel Street	No mitigation is necessary
	BH 15	Gates and railings at St Patrick's Church, Chapel Street	No mitigation is necessary
	BH 16	Belfry of St Patrick's Church, Chapel Street	No mitigation is necessary
	BH 17	House, Chapel Street	No mitigation is necessary
	BH 18	Mount Charles Lodge, Chapel Street	No mitigation is necessary
	BH 19	House, Chapel Street	No mitigation is necessary
	BH 20	Derelict terraced house, Chapel Street	No mitigation is necessary
	BH 21	Derelict terraced house, Chapel Street	No mitigation is necessary
	BH 22	Derelict terraced house, Chapel Street	No mitigation is necessary
	BH 23	Derelict terraced house, Chapel Street	No mitigation is necessary
	BH 24	Semi-detached house, Chapel Street	No mitigation is necessary
	BH 25	Semi-detached house, Chapel Street	No mitigation is necessary
	BH 26	Semi-detached house, Chapel Street	No mitigation is necessary
	BH 27	Semi-detached house, Chapel Street	No mitigation is necessary
	BH 28	Residential shop, Chapel Street	No mitigation is necessary
	BH 29	Cast-iron hydrant, Chapel Street	The hydrant is to be reconnected to the water supply following its relocation
	BH 30	Single-storey outbuilding, Chapel Street	No mitigation is necessary
	BH 31	Single-storey outbuilding, Chapel Street	No mitigation is necessary
	BH 32	Presbytery, The Square	No mitigation is necessary
	BH 33	Four cast-iron bollards at kerbs on each corner of The Square	The bollards are to be protected during the works
	BH 34	Gas lamp standard, The Square	The lamp standard is to be protected during the works
	BH 35	Single-storey shop, Main Street	No mitigation is necessary
	BH 36	Two-storey shop and post office, Main Street	No mitigation is necessary
	BH 37	Three-storey over basement, three-bay detached house and gateway, The Square	A protective fence is to be erected to protect the ha-ha from damage during construction
	BH 38	Two-storey, three-bay outbuilding, The Square	No mitigation is necessary
	BH 39	Two-storey, three-bay former outbuilding, Mill Hill	No mitigation is necessary
	BH 40	Three-storey over basement, three-bay detached house and gateway, The Square	No mitigation is necessary
	BH 41	The Village Inn, Main Street Lower	No mitigation is necessary
	BH 42	Two-storey, three-bay house, Main Street Lower	No mitigation is necessary
	BH 43	Rock House, The Square	No mitigation is necessary

EIAR Section Reference	Description of Mitigation Measures for Architectural Heritage		
	BH 44	Single-storey, three-bay gate lodge, Mill Hill	No mitigation is necessary
	BH 45	Rubble-stone wall on eastern side of Mill Hill	The opening in the wall is to be carried out in accordance with a conservation method statement prepared by a suitably qualified conservation specialist
	BH 46	Rubble-stone wall of Slane Castle demesne on western side of Mill Hill	No mitigation is necessary
	BH 47	Cobbled drainage channel on western side of Mill Hill	No mitigation is necessary
	BH 48	Gateway to Slane Castle, Mill Hill	No mitigation is necessary
	BH 49	1 Boyne View Terrace	No mitigation is necessary
	BH 50	2 Boyne View Terrace	No mitigation is necessary
	BH 51	3 Boyne View Terrace	No mitigation is necessary
	BH 52	4 Boyne View Terrace	No mitigation is necessary
	BH 53	5 Boyne View Terrace	No mitigation is necessary
	BH 54	6 Boyne View Terrace	No mitigation is necessary
	BH 55	Single-storey, three-bay gate lodge to Slane Mill	No mitigation is necessary
	BH 56	Gateway to Slane Mill	No mitigation is necessary
	BH 57	Granite bollards on approach to Slane Mill	No mitigation is necessary
	BH 58	Slane Bridge; thirteen-arch stone bridge	The works are to be carried out in accordance with a method statement to be prepared by a suitably qualified conservation specialist
	BH 59	Weir running diagonally across the Boyne west of Slane Bridge	No mitigation is necessary
	BH 60	Boyne Navigation	No mitigation is necessary
	BH 61	Rubble-stone walls on both sides of Drogheda Road	The opening in the wall is to be carried out in accordance with a conservation method statement prepared by a suitably qualified conservation specialist
	BH 62	Old Post Office, Main Street Lower	No mitigation is necessary
	BH 63	Two-storey, two-bay terraced house, Main Street Lower	No mitigation is necessary
	BH 64	Two-storey, two-bay terraced house, Main Street Lower	No mitigation is necessary
	BH 65	Two-storey, three-bay terraced house with carriage arch, Main Street Lower	No mitigation is necessary
	BH 66	Two-storey, two-bay end of terrace house, Main Street Lower	No mitigation is necessary
	BH 67	Two-storey, five-bay house with oriel windows and shopfronts, Main Street Lower	No mitigation is necessary
	BH 68	Conyngham Arms, Main Street Lower; three-storey, five-bay hotel	No mitigation is necessary
	BH 69	Two-storey, four-bay terraced house, Main Street Lower	No mitigation is necessary
	BH 70	Three-bay, three-storey outbuilding at rear of Main Street Lower	No mitigation is necessary

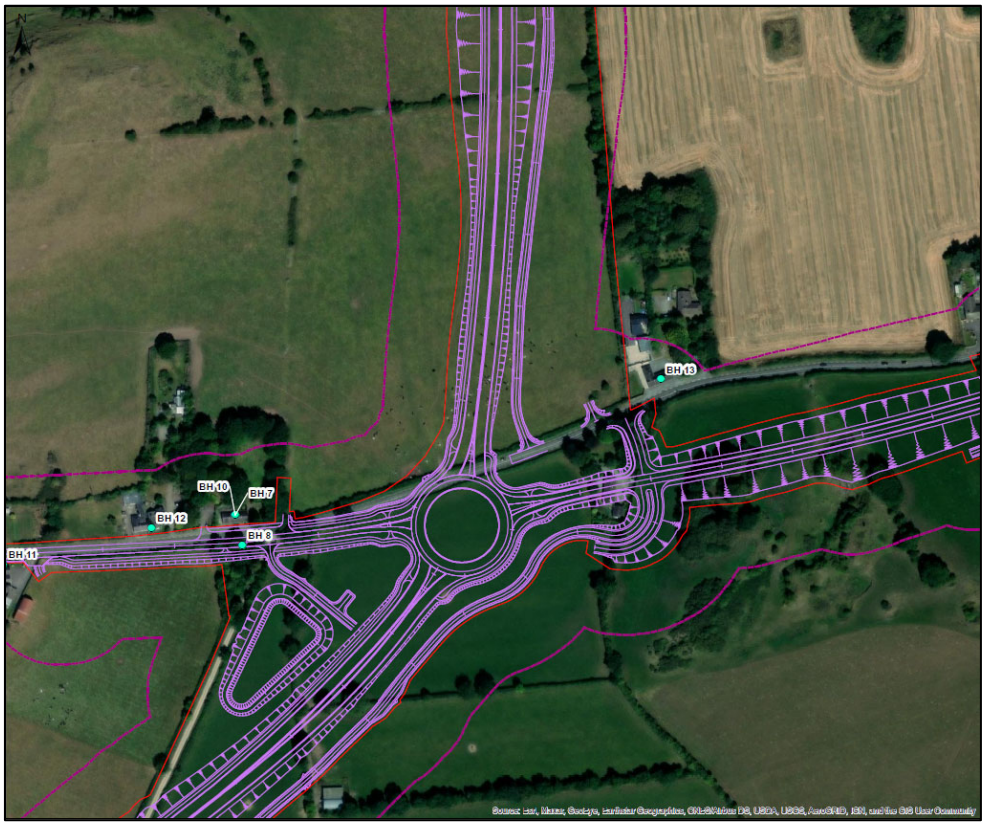
EIAR Section Reference	Description of Mitigation Measures for Architectural Heritage	
BH 71	Two-storey, three-bay end of terrace house, Main Street Lower	No mitigation is necessary
BH 72	St Patrick's Church, Main Street Lower	No mitigation is necessary
BH 73	Single-storey, three-bay, red-brick house, Main Street Lower	No mitigation is necessary
BH 74	Slane Garda Station, Main Street Lower; three-storey, six-bay detached building	No mitigation is necessary
BH 75	Slane Historic Core Architectural Conservation Area	The works are to be monitored by a suitably qualified conservation expert to collect and record information in relation to earlier features of the village.
BH 76	Slane Castle Demesne Architectural Conservation Area	No mitigation is necessary

Figure 14.6(a): Architectural Heritage

EIAR Section Reference	Description of Mitigation Measures for Architectural Heritage

Figure 14.6(b): Architectural Heritage

Figure 14.6(c): Architectural Heritage



EIAR Section Reference	Description of Mitigation Measures for Architectural Heritage

Figure 14.6(d): Architectural Heritage

Figure 14.6(e): Architectural Heritage

EIAR Section Reference	Description of Mitigation Measures for Architectural Heritage

Figure 14.6(f): Architectural Heritage

Operational Phase Mitigation	
14.5.2	No specific mitigation measures are required for architectural heritage during the operational phase; however, refer to **Chapter 12, Section 12.5.3** (Mitigation Measures) for the operational phase mitigation measures set out for landscape planting for the Proposed Scheme.

Table 27-16: Summary Table of Monitoring Measures in the Architectural Heritage Chapter

EIAR Section Reference	Description of Monitoring Measures for Architectural Heritage
Construction Phase Monitoring	
14.7.1	A suitably qualified conservation professional shall be employed at construction stage to monitor the works to ensure that adequate precautions are taken and that adequate protections are put in place and maintained during construction to safeguard architectural heritage.
Operational Phase Monitoring	
14.7.2	No monitoring is required during the operational phase.

27.9 Chapter 15 – Biodiversity: Terrestrial Ecology

Table 27-17: Summary Table of Mitigation Measures in the Biodiversity: Terrestrial Ecology Chapter

EIAR Section Reference	Description of Mitigation Measures for Biodiversity: Terrestrial Ecology
15.5.1	**Mitigation Incorporated into the Design** The following measures have been incorporated and integrated into the Proposed Scheme design as described in **Chapter 4** and **Chapter 5**. The key measures are: • A clear-span weathering steel plate girder bridge will be used in order to eliminate the requirement for any instream works and to eliminate direct ecological impact on the freshwater environment of the River Boyne and River Blackwater SAC. • Working platforms will consist of reno-mattresses containing washed clean rockfill in order to prevent the introduction of any additional run-off in the form of sediment, particularly working platforms 3 and 4 located within the floodplain of the River Boyne and River Blackwater SAC (for details, refer to **Chapter 5 – Description of the Construction Strategy**, and **Appendix 5.1 – Working Platform Design**). • To facilitate the construction of bridge piers within the floodplain of the River Boyne and River Blackwater SAC, cofferdams will be constructed which will comprise of interlocking sheet piles. Cofferdams will provide an almost watertight environment, preventing any uncontrolled run-off during construction from reaching the River Boyne. Rainwater will enter the cofferdam at times and some groundwater may also ingress from the base of the cofferdam, both of which will be pumped out using a bowser and taken off-site to a suitably licensed facility for treatment/ disposal. • Seeding and planting, and geotextiles and mats will be employed during the construction phase on all exposed earthworks slopes to limit the amount of sediment being initially suspended in rainfall or groundwater run-off. • Settlement ponds, check-dams, silt barriers and specific stockpile locations will be implemented during the construction phase to reduce sediment that has become suspended despite the erosion controls. • To minimise sediment run-off from stockpiles their locations have been carefully considered. Stockpiles will be: – Located away from drains, water bodies and flood zones; – Seeded or provided with other surface protection appropriate to the length of time the stockpile is in place; – Provided with earth bunds or ditches on adjacent higher ground or slopes to prevent surface run-off reaching the stockpile; – Provided with silt fences around the toe of a stockpile to trap any sediment in run-off from the stockpile; and – Topsoil stockpiles will be tamped down and grass-seeded and protected by a surrounding silt fence. • Where groundwater is encountered, slope drains and external de-watering will be utilised. • The drainage design for the Proposed Scheme includes for both measures to mitigate any interference with the existing hydrology and to convey run-off from the proposed road scheme to proposed treatment and attenuation facilities prior to outfall to existing watercourse. • To assist with the proposed treatment of surface water run-off and to provide measures to reduce peak water flows to outfalls, six attenuation ponds together with vortex grit separators and petrol interceptors will be provided. • Control measures will be implemented to reduce the generation of airborne material (i.e. dust), including: – Use of water spraying of exposed earthworks and site haul roads during dry weather. – Sediment tracked on plant will be controlled at exit from the site (i.e. wheel washes). – Spraying of earthworks during dry weather conditions will include for the provision of silt traps; – Self-contained wheel washes will be provided at site compounds as well as at site exit points; – Erosion control measures will be implemented as early as possible to protect exposed side slopes (i.e. erosion control mats and hydroseeding); – Site vehicle speeds will be limited to minimise the dust re-suspension; – Hard surface roads will be regularly swept; and

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	– Dust generation will be monitored as part of the management of construction activities. Dust monitoring locations will be established on site. A baseline dust measurement will be made in advance of works and an ongoing system of monitoring and remedial action will be implemented during the construction. • •Measures will be implemented to maintain a clean and uncluttered site, including: – Daily inspections of the site will be carried out and a program of site tidying will be prepared; – Debris netting will be attached to scaffolding to prevent debris materials and equipment from falling from a height as both a debris matter and for health and safety reasons; – Food waste will be strictly controlled to prevent litter and/or attraction of vermin; – Wheel wash facilities will be provided for vehicles exiting the construction site. Wheel wash run off will be stored in an onsite storage tank and will be disposed of by permitted waste haulage company at a permitted or licensed facility; – There will be regular inspection and sweeping of public roads; and – Covering will be applied to loaded lorries and skips, if necessary. • A Resource and Waste Management Plan (RWMP) will be prepared by the contractor in advance of construction to ensure that the materials and waste arising during the construction and demolition phase of the Proposed Scheme will be managed and disposed of in a way that ensures compliance with the provisions of the Waste Management Act, 1996, as amended and associated Regulations as amended. The preparation of the RWMP will follow the EPA guidance (Best Practice Guidelines for the preparation of resource & waste management plans for construction & demolition projects, EPA 2021. • Earthworks will be phased into Phase 1 (Drainage) and Phase 2 (Earthworks): – Phase 1 will include the construction and seeding of all permanent pre-earthworks ditches (PEDs) and attenuation ponds and the construction of all culverts as this will allow sufficient time for vegetation establishment on the base and sides of the ponds prior to the commencement of the main earthworks will allow the permanent attenuation ponds to be utilised as temporary settlement ponds for the treatment of construction run-off; and – Phase 2 will include earthworks of the proposed mainline and side roads which have been divided into zones based on existing and proposed topography, and existing and proposed road layouts. The construction of the zones will be carried out in the sequence set out below to reduce the risk of sediment-laden run-off entering the River Boyne and River Blackwater SAC/SPA directly or indirectly. • Machines will be checked regularly for evidence of hydrocarbon leaks. While machines are parked-up on the working platform, a contaminant containment tray will be placed beneath them. These trays will be removed from the working platform at the end of each day and any contaminants they have collected disposed of accordingly. • An early warning system will be implemented to monitor rainfall and upstream river levels in real-time. Once set thresholds are exceeded all materials, plant and equipment will be removed from the platform.
Pre-construction Mitigation	
15.5.2	**Pre-construction Works**
15.5.2.1	**Appointment of Environmental Team** Prior to commencement of any works related to the Proposed Scheme, the following key environmental personnel shall be appointed (see **Chapter 5 – Description of the Construction Phase**): • **Contractor's Environmental Clerk of Works (ECoW):** to ensure that the mitigation measures outlined in this document and the outline Environmental Operating Plan (EOP) (including any updates to these documents following consent) are implemented in full and to supervise works with respect to sensitive habitats and/or species (including the control/eradication of invasive species). • **Contractor's Project Ecologist(s):** to supervise all pre-construction ecological surveying, implementation and overseeing of ecological mitigation measures and ensuring that activities on site are conducted in accordance with the planning permission as they pertain to ecological matters and specifically any works that could have an effect on the River Boyne and River Blackwater SAC and/or SPA, their qualifying interests (QI) and special conservation interests (SCI) respectively.

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	• **Client Environmental Representative (CER):** MCC shall appoint the CER before the commencement of works. The CER shall act as the 'MCC representative' and liaise directly with the contactor's environmental staff, review reporting deliverables, and supervise site activities as required. • **Client Project Ecologist:** MCC shall appoint the Client Project Ecologist before the commencement of works. to supervise all pre-construction ecological surveying, implementation and overseeing of ecological mitigation measures and ensuring that activities on site are conducted in accordance with the planning permission as they pertain to ecological matters and specifically any works that could have an effect on the River Boyne and River Blackwater SAC and/or SPA, their qualifying interests (QI) and special conservation interests (SCI) respectively. **Note:** When mitigation measures extend beyond the construction phase (undertaken by Contractor), and thereafter require 'monitoring' during the operational phase, Meath County Council will be responsible for the commission of a suitably qualified person(s) to monitor their effectiveness.
15.5.2.2	**Environmental Operating Plan** An EOP for the Proposed Scheme has been prepared and is available in **EIAR Volume 4, Appendix 5.6**. The EOP contains all the mitigation measures as detailed in the EIAR and this NIS. Following grant of planning consent, the appointed Contractor will be responsible and take ownership of the EOP. Prior to the commencement of construction phase, the Contractor will update the EOP to take account of any conditions attached to planning consent and to include the level of mitigation detail required by that consent prior to commencement of construction for the identified mitigation measures. The updated EOP will be subject to the Client's approval prior to the commencement of construction. During the construction phase, the Contractor and Client will undertake a monthly review of the implementation of the mitigation measures identified within the approved EOP, taking inputs and feedback from the appointed Environmental Team. Following the completion of the monthly reviews, the Contractor will be responsible for any further updates of the EOP necessary to address any issues identified during the review process. Such updates will be approved by the Client. The Contractor will be responsible for the implementation in full of the approved EOP throughout the construction phase in accordance with NRA/TII guidelines (refer to **Chapter 5**). The EOP will set out the Contractor's approach to managing environmental issues associated with construction of the Proposed Scheme and provide a documented account to the implementation of the environmental commitments set out in the EIAR and NIS and measures stipulated in the planning conditions.
15.5.2.3	**Pre-construction Surveys** Prior to the commencement of construction works, the scope, programme and phasing of pre-construction habitat and species surveys will be defined by the ECoW in consultation with MCC and the appointed Contractor. Given the duration of the construction works, the pre-construction habitat and species surveys will be appropriately phased to take account of the planned work and seasonal constraints. This is to ensure that an up-to-date baseline is maintained to inform construction stage activities. Some of these surveys will be completed as part of Enabling Works set out in **Chapter 4**. Others will be completed as the phases of construction are progressed along the route. Based on the existing evidence base, pre-construction surveys will be required with respect to the following IEFs: • **Bats**: The status with respect to bat roosting of any buildings to be demolished and trees to be felled to enable construction will be confirmed through the completion of update surveys at the appropriate time of year (typically, May to August) by the ECoW (and appropriately qualified personnel, if required). The surveys will be completed with reference to the following guidance (or relevant guidance at time of survey): – NPWS (2022) Bat Mitigation Guidelines for Ireland (v.2); and – Bat Conservation Trust (BCT) (2016) Bat Surveys for Professional Ecologists: Good Practice Guidelines (3rd Ed). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline no such derogation licensing is necessary. • **Badgers:** Update badger surveys will be completed for all setts (active or inactive) within the CPO boundary and within 200 m of the CPO boundary. The level of survey will be sufficient to

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	confirm and classify whether setts are active (or not) and to confirm if they are main, annexe, subsidiary or minor setts, depending on their use and importance to the badger group at that time. The survey will be completed with reference to Guidelines for the Treatment of Badgers prior to the construction of National Road Schemes (NRA, 2006a). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline a derogation licence will be required; • **Otters:** Evidence of otter was recorded along the River Boyne, the Boyne Canal and the Mattock (Mooretown) stream. No breeding or resting sites were recorded within the ZoI of the Proposed Scheme. However, prior to any works being carried out, a pre-construction otter survey will be carried out to ensure that otter has not taken up residence or established any new territories within or in close vicinity to the footprint of the Proposed Scheme. The survey will be completed within the footprint of the proposed scheme and 200 m up and downstream of this footprint. The survey will confirm the presence/absence of otter holts, resting sites (couches) and any other signs of otter activity within the survey area. The survey will be completed with reference to Guidelines for the Treatment of Otter Prior to the Construction of National Road Schemes (NRA, 2006b) or whatever guidelines are pertinent at that stage in the event that those guidelines are updated and superseded. The survey will be completed during optimal seasonal/weather conditions and will be completed by competent, experienced otter surveyor(s). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline no such derogation licensing is necessary; • **Invasive Species:** The presence of Japanese Knotweed *Reynoutria japonica* and Himalayan Balsam *Impatiens glandulifera* have been identified in the vicinity of the Proposed Scheme. The survey will be undertaken within the lands made available and all stands of Schedule 3 species will be taped off to prevent accidental spread. An Invasive Alien Species Avoidance and Management Plan will also be prepared by an ecologist/invasive species specialist and shall build on the baseline data presented in this statement; including the findings of the pre-construction survey. The Plan will include any measures to manage, control or eradicate any identified Schedule 3 species prior to and during the construction phase of the Proposed Scheme. The plan will also identify any licensing or approvals necessary from NPWS, EPA or other to enable the implementation of the plan. • **Kingfisher Survey:** Evidence of kingfisher was recorded along the River Boyne. One nesting site was recorded upstream of the Proposed Scheme, however no adverse effects were predicted. Although no suitable nesting habitat was noted within the footprint of the Proposed Scheme, the precautionary principle has been applied and prior to any works being carried out, a pre-construction kingfisher survey will be carried out to ensure that kingfisher has not established any new territories within or in close vicinity to the footprint of the Proposed Scheme. The survey will be completed within the footprint of the proposed scheme and 200 m up and downstream of this footprint. The survey will confirm the presence/ absence of kingfisher nesting sites and any other signs of kingfisher activity within the survey area. The survey will be completed during optimal seasonal/weather conditions and will be completed by competent, experienced ornithologist(s). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline no such derogation licensing is necessary. Based on the findings of the pre-construction surveys, mitigation for each of these species set out in the EIAR will be reviewed and, if necessary, augmented accordingly by the ECoW; particularly with respect to whether any derogation licensing or other approvals are triggered by the findings of the pre-construction surveys. Any adjustment to the mitigation measures will be agreed with the Client in advance of them being implemented. The pre-construction surveys will be supplemented by further inspection of any identified otter holt/resting site, kingfisher nest or IAPs stand by the ECoW (as deemed necessary by them) immediately prior to site clearance.
15.5.2.4	**Pre-Construction Ground Investigation and Archaeological Testing** The following mitigation measures will be implemented prior to and during the completion of the pre-construction ground investigations and archaeological testing.

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15.5.2.4.1	**Within the Proposed LMA** The following mitigation will be implemented prior to the construction phase during ground investigation works. Ground investigation works will consist of a mix of percussion drilling and rotary coring. • An ECoW and a suitably qualified and experienced Project Ecologist will be appointed by MCC to supervise the proposed GI works and to ensure compliance with relevant legislation, planning conditions and to ensure the implementation (in whole or part) of the mitigation measures in the planning approval as may be granted as relevant to the pre-construction GI works; • No ground investigation testing will be permitted outside the lands made available for the Proposed Scheme; • Works at sensitive locations will be carried out under the strict supervision of and to the approval of an ECoW appointed to supervise the works; • Ground investigation will not be undertaken within 10m of the River Boyne; • Soil/subsoil removed for GI works will be piled near to the trench and a minimum 10 m setback from watercourses. Each excavation will be backfilled as soon as possible to avoid prolonged exposure and to ensure sediment does not erode or wash away; • Each location for excavation will be assessed for potential pathways for run-off to the River Boyne and measures to prevent uncontrolled run-off will be implemented (see below): – Silt barrier fencing will be used around excavations to prevent uncontrolled run-off. – Each excavation will be backfilled as soon as possible to avoid prolonged exposure and to ensure sediment does not erode or wash away. – Works will be carried out under the strict supervision of and to the approval of an ECoW appointed to supervise the works. – When working within the flood plain of the River Boyne, weather conditions will be closely monitored and works will not be undertaken when periods of heavy rainfall are predicted, which could result in flooding of the area. – Plant will not be left within the flood plain overnight and will be mobilised daily as required from locations outside the flood plain. – Considering the nature of the existing soft ground within the flood plain area, access into the site will be a carefully controlled process. Access will be from the existing Boyne Canal towpath and bog mats will be placed over the existing ground in advance of machinery, such as borehole rigs and excavators entering into the area. At each location of an excavation, a silt barrier fence will be erected around the site to prevent any run-off reaching the river as the excavation takes place and excavated materials temporarily stored within the area protected by the silt fence. Each excavation will be backfilled as soon as practicable and vegetated topsoil reinstated on completion. – All hydrocarbons will be stored and all refuelling will take place outside the floodplain of the SAC. • Existing field access points/routes will be used to avoid disturbance/removal of hedgerows, trees and scrub. In the event that such field access points/routes are not available, the removal of hedgerows, trees and scrub will be minimised to only the extent required for access. Any vegetation removal will be completed outside the breeding bird season (March to August, inclusive) unless the Project Ecologist has confirmed that no breeding birds, their active nest or dependent young are present immediately prior to the works commencing. Any trees needing to be removed will be assessed for bat roosting by the Project Ecologist prior to them being removed and any derogation requirements identified and implemented according to any derogation licence obtained. With respect to the pre-construction archaeology investigations, the TII Project Archaeologist will liaise with the Project Ecologist for the Proposed Scheme, in advance of any disturbance, with regard to the mitigation strategy for terrestrial ecology. The archaeology testing strategy will have regard for the Guidelines for the testing and mitigation of the wetland archaeological heritage for national road schemes (NRA, 2005).
15.5.2.4.2	**Within the River Boyne Floodplain** In addition to the measures detailed above (Section 15.5.2.4.1), the following measures will also be implemented when undertaking ground investigation works within the River Boyne floodplain: • Works within the River Boyne floodplain will be carried out under the strict supervision of and to the approval of an ECoW appointed to supervise the works;

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	• Access to the River Boyne floodplain will be from the existing Boyne Canal towpath and ground protective bog mats will be put in place prior to the commencement of any works within the River Boyne floodplain; • When working within the flood plain of the River Boyne, weather conditions will be closely monitored and works will not be undertaken when periods of heavy rainfall are predicted, which could result in flooding of the area; • Plant will not be left within the flood plain overnight and will be mobilised daily as required from locations outside the flood plain; • Core samples in the River Boyne floodplain shall only be taken during the bridge foundation construction period and at the same locations as the bridge piers to avoid further ground disturbance; and • Disturbed areas of soil will be returned to its former use. With respect to the archaeological testing, in addition the following mitigation measures will be implemented: • Archaeological testing of areas of archaeological potential located within the floodplain of the River Boyne (ACH05 & ACH08) will minimise ground disturbance. To achieve this, testing within the floodplain will be carried out (ground conditions allowing) after the advanced testing programme, within the footprint of the coffer dams and attenuation ponds, if necessary during the site preparation works phase and before construction takes place; • Core sampling within the River Boyne floodplain will take place during the bridge foundation construction period and at the same locations as the bridge piers to avoid further ground disturbance; • No test-trenches will be placed within 10m of the River Boyne or any other waterways crossed by the Proposed Scheme; • Where trenches are in proximity to watercourses, the material taken out of test trenches shall be placed, as far as possible, on the landward side of the trench. The TII Project Archaeologist for the proposed scheme will liaise with the Project Ecologist appointed by MCC to supervise the GI and archaeological works with regard to these measures.
Construction Phase Mitigation	
15.5.3.1	**Mitigation by Avoidance** The Proposed Scheme has been designed to avoid ecologically sensitive areas and had been constraint led from the initial feasibility stage and route selection process. The Proposed Scheme design has followed the principles outlined below to eliminate the potential for ecological impacts where possible, and to minimise such effects where total elimination is not possible. The Proposed Scheme has been designed to: • Avoid any direct, indirect or residual adverse effects on the integrity of European sites or other designated sites for nature conservation; • To avoid/minimise effects on habitats that correspond to those that are listed on Annex I of the EU Habitats Directive outside of European and nationally designated sites; and • Minimise direct or indirect effects on any habitats or species that were classified as being of National, County or Local Importance (Higher Value) in the design of the Proposed Scheme. Through careful planning and design, direct or indirect effects on receptors of international, national and county importance have been avoided at the designs stage. In addition, the Proposed Scheme layout minimises the potential for effects on receptors. A detailed construction methodology has been developed in consultation with the relevant experts to avoid, minimise and mitigate impacts and effects, particularly with respect to the River Boyne and surface water quality impacts; refer to **Chapter 5**. The construction of the Proposed Scheme will be undertaken in accordance with this construction methodology.
15.5.3.2	**Overarching Measures** Prior to the commencement of construction or enabling works, the Environment Team (as set out above) will be appointed and the post-consent updated EOP (as set out above) will be prepared by the Contractor and approved by the Client. The approved EOP will then be updated and reviewed as detailed above. In advance of works commencing on site, the Contractor will be responsible for providing all personnel involved with construction on site (either at the outset or brought onboard during the construction phase) with an on-site induction by the Contractor's ECoW and Contractor's Project Ecologist. The scope and content of the on-site induction will be agreed with the Environment Team prior to the commencement of construction. The content will include a briefing on

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	ecological constraints/sensitivities and all the applicable ecological mitigation measures relevant to the construction phase. For the avoidance of doubt, it will be the responsibility of the Contractor to ensure that any new personnel who are employed during the construction work also receive the on-site induction prior to commencing work. Prior to the commencement of construction works, the scope, programme and phasing of pre-construction surveys will be defined by the Contractor's ECoW and Project Ecologist and agreed by the Environment Team. Given the duration of the construction works, the habitat and species surveys to be completed prior to construction works will be appropriately phased mindful of the planned work and seasonal constraints. This is to ensure that an up-to-date baseline is maintained to inform decision making including with respect to the need for derogation licensing in the event of baseline changes between this assessment and commencement of construction. Some of these surveys will be completed as part of enabling works set out in **Chapter 5**; others will be completed as the phases of construction are progressed along the route. The scope of updated surveys will take full account of the mitigation (precautionary or otherwise) set out in this chapter. Given the mobile nature of the species concerned (e.g. kingfishers, bats, otters and badgers), the need for derogation licensing for any particular phase of works will be informed by the findings of the update surveys. The level of surveying will be sufficient to inform any derogation licensing which may be required. The need for derogation licensing will be determined by the Contractor's ECoW in consultation with the Contractor's Project Ecologist and agreed with the Environment Team. The acquisition of derogation licences will be the responsibility of the Contractor (unless otherwise agreed with the Environment Team) and may be completed, in part, during the enabling works set out in **Chapter 5**. The need for derogation licences will be kept under review by the Contractor's ECoW as the works progress based on the findings of the update surveys completed. The Contractor's ECoW will oversee the implementation of mitigation for management/ control of IAPS, however, the 'sign off' of the works required to remove/eradicate IAS will be completed by a specialist contractor specialising in such eradication.
15.5.3.3	**Measures to Protect European Sites (River Boyne and River Blackwater SAC/SPA)** The mitigation measures that are specifically required to ensure that the Proposed Scheme will not result in a likely significant effect on the European Sites within its ZoI (River Boyne and River Blackwater SAC, River Boyne and River Blackwater SPA, Boyne Estuary SPA, North-west Irish Sea SPA) are presented in **Section 7 of the NIS**. Following consideration and assessment of the Proposed Scheme on the identified relevant European sites, mitigation measures were developed and will be implemented to address the following potential impacts that were identified: • **Habitat Loss:** Mitigation measures to avoid loss of QI habitats within the River Boyne and River Blackwater SAC (see **Section 15.5.3.3.1**) during the construction of the Proposed Scheme; • **Habitat degradation – hydrogeology:** Mitigation measures to avoid habitat degradation in the River Boyne and River Blackwater SAC as a result of potential hydrogeological impacts during the construction of the Proposed Scheme; • **Habitat degradation – hydrology:** Mitigation measures to protect water quality in receiving watercourses during construction; • **Habitat degradation – air quality:** Mitigation measures to control dust emissions during construction to prevent impacts on vegetation in River Boyne and River Blackwater SAC ; • **Habitat degradation – non-native invasive plant species:** Mitigation measures to avoid the introduction or spread of non-native plant invasive species to European sites during construction or operation; • **Disturbance/Displacement:** Mitigation measures to avoid/reduce the disturbance/displacement effects of construction works on SCI Kingfisher and wintering birds of the Boyne Estuary SPA using ex-situ sites within the ZoI of the Proposed Scheme; • **Barrier effect:** Mitigation measures to avoid the Proposed Scheme restricting otter movement within the River Boyne and Mattock (Mooretown) Stream; and • **Mortality risk:** Mitigation measures to avoid mortality of the QI species of the River Boyne and River Blackwater SAC. These include measures to ensure that construction materials are not introduced into the River Boyne and to remove the risk of otter being killed/injured due to collisions with road traffic.
15.5.3.3.1	**Habitat Loss** Habitat loss (topsoil stripping, excavation and filling) within the floodplain of the River Boyne and River Blackwater SAC will occur in order to accommodate Working Platforms 1, 2, 3 and 4 (reno mattresses), which will further accommodate the construction of cofferdams.

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	In order to minimise impacts of temporary habitat loss within the River Boyne and River Blackwater SAC (i.e. GS4 Wet grassland and FS1 Reed and large sedge swamp), the following measures shall be completed: • Vegetation clearance will be programmed to avoid the bird nesting season (1 March to the 31 August, inclusive); • Vegetation/surface stripping will be removed concurrent with the working platform construction in order to minimise erosion, run-off or dust from exposed unvegetated surfaces; and • Surface vegetation will be carefully removed in turves (i.e. intact block of vegetation and soil) for later re-instatement or re-location elsewhere within the SAC. In order to remediate temporary habitat loss within the River Boyne and River Blackwater SAC, the following measures shall be completed: • Monitoring of weather forecasting reports will be undertaken in the lead up to removal of the temporary reno-mattress work platforms such that the works including the subsequent reinstatement will be carried out during an extended settled weather period in which time platforms can be installed when there is low risk of over-bank river flows on the Boyne. This will occur in the spring/summer months when grasses can re-establish within that growing season for protection over the ensuing winter; • Any ground damage and habitat loss within the SAC will be remediated to ensure that any bare soil is stabilised and habitats returned to their former function. This habitat will be reinstated through reseeding with appropriate wet/damp native meadow grasses following the completion of the construction work; • Remediation will start as soon as construction works have ceased; • Remediation will involve the development of a Habitat Restoration and Monitoring plan prepared by a qualified person(s) appointed by MCC in consultation with the NPWS. The plan shall be implemented. The plan shall detail the following: – the re-instatement of stripped surface turves, where possible – the use of stabilising materials to allow for natural regeneration through reseeding. Ground remediations will not include the use of artificial fertilisers – a monitoring schedule to assess site stabilisation and revegetation progress such as seed germination, recruitment of native species and determining/correcting any problems (i.e. erosion) – habitat monitoring will be completed on a monthly basis and once vegetation is established and site stabilisation is achieved, monitoring will continue on a quarterly basis for three years thereafter – progress reports shall be completed on a monthly basis and once vegetation is established and site stabilisation is achieved, progress reports shall be completed on a quarterly basis for three years; – after the three year period (of vegetation establishment) a final report shall be prepared which will summarise the following: ○ the name, title, and company of all persons involved in restoration monitoring and report preparation; ○ maps or aerials showing restoration areas and photo documentation ○ an explanation of the methods and restoration techniques used to perform the work ○ a description of the vegetation communities, the size of the restoration area restored, and any maintenance activities completed. – the wet meadow habitat will be retained under the control of MCC and it will be managed for the sole benefit of biodiversity in order to complement the existing biodiversity features of the SAC (and SPA).
15.5.3.4	**Pollution Control Measures** The construction methodology (**Chapter 5**) set out a significant suite of measures to control pollution from sediments, hydrocarbons, cement and other chemicals used during the construction phase. **<u>Erosion Control Measures</u>** Erosion controls will be carried out on all exposed earthworks slopes to limit the amount of sediment being initially suspended in rainfall or groundwater run-off. The following erosion controls will be used on the Proposed Scheme: • Geotextiles and mats: all earthworks side slopes will be provided with a geotextile fabric, mesh or mat to protect against immediate erosion.

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- Seeding and planting: after geotextiles/mats are laid, hydraulic seeding (where a binder is mixed with the seed) will be widely used on slopes to ensure establishment of a vegetative cover.

Additional measures to control sediment are discussed in greater detail in **Chapter 5**, **Section 5.3**.

Sediment Control Measures

Sediment controls will be implemented to reduce whatever sediment has become suspended despite the erosion controls. The following sediment controls will be used on the Proposed Scheme:

- **Sediment ponds:** A combination of temporary settlement areas and use of the permanent attenuation pond for the control and treatment of run-off during construction is proposed to be implemented for the construction of the Proposed Scheme (see **Chapter 5**, **Section 5.13**);
- **Check-dams:** Check-dams will only be used where water volumes and sediment load are low, for example, in pre-earthworks ditches that only cater for overland flow or groundwater (see **Chapter 5**, **Section 5.13**);
- **Silt barriers:** Silt barriers will be typically used around temporary stockpile areas, site perimeters and across ditches with low flows. The silt barriers used during construction of the Proposed Scheme will comprise a geotextile filter fabric installed in the path of sheet flow run-off to filter out heavy sediments. Posts support the filter fabric and the fabric itself will be buried in the ground to ensure sediment is trapped behind it and doesn't breach the fence; and
- **Stockpile locations:** Stockpiles will be located remote from existing watercourses, drains and flood zones and provided with measures to control sediment run-off. Topsoil stockpiles will be tamped down and grass-seeded and protected by a surrounding silt fence. Stockpiles consisting of rock (to be processed and reused during the construction) will be protected from uncontrolled run-off by a perimeter protection consisting of either bunding and/or silt fences. Additional measures to control sediment are discussed in greater detail in **Chapter 5**, **Section 5.3**.

Groundwater Protection Measures

The mitigation measures to protect groundwater quality during construction of the Proposed Scheme are detailed in **Chapter 18 – Land, Soils, Geology and Hydrogeology**, **Section 18.5**.

Dust Control Measures

The potential for dust to be emitted depends on the type of construction activity being carried out in conjunction with environmental factors including levels of rainfall, wind speeds and wind direction. The potential for impact from dust depends on the distance to potentially sensitive receptors and whether the wind can carry the dust to these locations. The implementation of a Dust Minimisation Plan during construction of the Proposed Scheme shall include the following standard measures:

- Site roads shall be regularly cleaned and maintained as appropriate. Hard surface roads shall be swept to remove mud and aggregate materials from their surface while any un-surfaced roads shall be restricted to essential site traffic only;
- Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions (also applies to vehicles delivering material with dust potential);
- All vehicles exiting the site shall make use of a wheel wash facility prior to entering onto public roads, to ensure mud and other wastes are not tracked onto public roads;
- Wheel washes, will be self-contained systems that do not require discharge of the wastewater to water bodies;
- Public roads outside the site shall be regularly inspected for cleanliness and cleaned as necessary;
- The focus of the control procedures relating to emissions to air during earth moving and construction will be to reduce the generation of airborne material;
- Material handling systems and site stockpiling of materials shall be designed and laid out to minimise exposure to wind; and
- Water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods.

Additional measures to mitigate dust emissions are discussed in greater detail in **Chapter 10**, **Section 10.5**.

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15.5.3.5	**Environmental Emergency Response/Contingency Plan** Prior to commencing works, the contractor shall prepare an Environmental Emergency Response Plan/ Contingency Plan, as per the mitigation outlined in **Chapter 17** (**Section 17.5.1**), **Chapter 18** (**Section 18.5.1**) and **Chapter 5** (**Section 5.11**). The plan will detail the procedures to be undertaken in the event of the release of any sediment into a watercourse, a serious spillage of chemical, fuel or hazardous wastes (e.g. concrete), or other such risks that could lead to a pollution incident, including flood risks. The plan will be updated regularly and shall include a Spill Response with the following as a minimum: • Instruction to stop work; • Instruction to contain the spill; • Details of spill clean-up material location; • Name and contact details of responsible staff; and • Measures particular to the location and the activity. This Response Plan shall be displayed at several locations along the proposed road and at all sensitive locations.
15.5.3.6	**Derogation Licensing** Based on the current baseline, no derogation licensing is required for any species, however a license will be required for badgers due to sett closures. Given the mobile nature of the species concerned (e.g. bats and otters), the need for derogation licencing for any particular phase of works will need to be informed by the findings of the up-to-date pre-construction surveys. The level of surveying will need to be sufficient to inform any derogation licensing which may be required. The need for derogation licensing will be determined by the ECoW in conjunction with the Project Ecologist. The acquisition of derogation licences may be completed, in part, during the enabling works set out in **Chapter 5**. The need for derogation licences will be kept under review by the ECoW as the works progress based on the findings of the pre-construction surveys completed.
15.5.3.7	**Measures to Protect Otter** Pre-construction surveys for otter are dealt with above. Otters are evidenced as using watercourses throughout the study area, particularly along the River Boyne and its proximal complex of wetland habitats which support suitable feeding and commuting habitat. Otters do not limit their movements to watercourse and can enter hinterlands to search for prey species, such as frogs and newts where available. An exclusion zone and set-back of 10 m from the riverbank is included in the design proposals to accommodate free movement of otter along these riparian habitats. No work will be permitted within this exclusion zone. Temporary otter fencing will be used to enclose all construction working areas 200 m to the south of the Canal, between the Canal and the River Boyne, 200 m to the north of the River Boyne and 200 m upstream and downstream of the Mattock (Mooretown) Stream. The fencing will be maintained throughout the construction period to provide a robust barrier to avoid movement of otters into and through the construction working areas. The following are precautionary measures in the event that an otter holt is identified during pre-construction surveys: No construction personnel or machinery will be used within 150 m of otter holts unless subject to the provisions of a derogation licence. The location of otter holts will be confirmed during the pre-construction survey. During the pre-construction survey, otter holts located within the CPO boundary or within 150 m of this boundary will be clearly identified to all personnel working in the vicinity of the holt. Temporary boundary tape fencing (or similar) will be used at the discretion of the ECoW to identify such holts subject to such measures themselves not impacting on the use of the holt. Neither blasting nor pile-driving will be undertaken within 150 m of active holts during the breeding season, unless subject to provisions of a derogation licence. In the event that holts are to be closed (wholly or partially), this will be completed in accordance with the necessary derogation licence which will be obtained from the NPWS and with reference to the Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA, 2006b). The need for licence to be determined by the ECoW. The need for additional mitigation for derogation licensing purposes will be reviewed and determined by the ECoW and relayed, as necessary to the appointed Environmental Team. It is assumed that all active holts at the time of construction and within the CPO boundary will need to be closed in accordance with a derogation licence. Currently, no active holts are located within the CPO boundary and no derogation licence is required. Where required, evacuation and destruction of holts setts will be carried out under the supervision of an appropriately qualified ecologist under licence from the NPWS. In the event that derogation

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licence(s) are required, these could require the loss of holt(s) to be compensated through the construction of artificial holt(s). The locations of such holts will be determined by the ECoW in liaison with the Contractor and the requirement of any derogation licence. The above provisions regarding otter fencing will apply to such artificial setts. Currently, no active holts are located within the CPO boundary and no derogation licence is required.

Otters may potentially be affected during the construction phase of the development during foraging activities (based on existing survey evidence). The potential for fatalities from road traffic accidents on site or becoming trapped within open works could pose a direct impact. Mitigation measures to protect from the accidental killing/injury of otter during the construction phase are detailed as follows and will be implemented:

- Maintain the 10 m set back zone from both banks of the River Boyne to ensure the free movement and safe passage of otter along the watercourse during construction phase (i.e. habitat will not be bisected);
- Pre-construction surveys will be undertaken to ensure that otter has not taken up residence or established any new territories (i.e. since baseline surveys were undertaken, see **Section 15.3**) within or in close vicinity to the footprint of the Proposed Scheme;
- Mammal-resistant fencing will be incorporated at the earliest possible stage during road construction, preferably during erection of the permanent fence line with gaps left at locations specified for culverts. These gaps shall be subsequently closed after culverts have been constructed;
- With reference to the NRA Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA, 2006b), mammal-resistant fencing will be incorporated along the boundary of construction compounds, working areas and reno-mattresses to ensure no otters can access or become trapped within open works. Mammal-resistant fencing will adhere to the relevant specifications as set out by the NRA (2006b); see **Figure 15.11**:
  - Fences will be constructed and erected in accordance with Irish Standard (I.S.) 435:2005 (updated version available: I.S. 435-1:2017);
  - Where appropriate, fences will stretch at least 25 m and preferably to 50 m or more either side of watercourse crossings;
  - Any length of fencing (including branches and spurs) will start with a post and end with a post. An additional post will be provided at fence junctions and at fence corners;
  - Posts (2100 x 150 x 75) will be erected 2100 mm above ground level, 700 mm below ground and 2100mm apart;
  - Rails (4200 x 100 x 44) will be spaced out between 200 and 250 mm from ground level (i.e. the two rails closest to ground level will be spaced 200mm apart, with the remaining two furthest from ground level spaced 250 mm apart);
  - Chain-link mesh will be 1800 mm wide, consisting of 60 mm mesh made up of a diameter of 2.25/3.15 mm. Mesh will be plastic coated galvanised mild steel wire and erected with a 200 mm section below ground level and recovered with excavated material; and
  - Post holes falling in rock shall be excavated to a depth of 700 mm or with an Engineer's approval to a depth of 500 mm. Where a reduced depth of hole is accepted by the Engineer, the top of the post will be suitably cut and treated with preservative.
- Once installed, the mammal-resistant fencing will be inspected by the Contractor's Project Ecologist to ensure that fencing is fit for purpose (i.e. adequate for the exclusion of otter).

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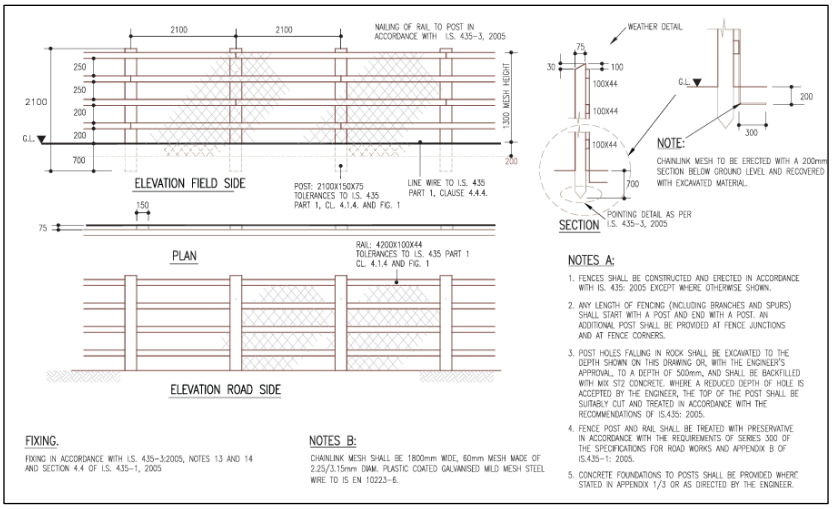
Figure 15.11: Specification for Mammal-Resistant Fencing (NRA, 2006b)



15.5.3.8 **Measures to Protect Badger**

The following measures will be implemented during the construction phase to protect badger:

- Pre-construction surveys for badgers are dealt with above (Section 15.5.3.8). Pre-construction surveys will be undertaken to identify any newly established badger setts (mindful of the mobile nature of the species concerned) and on the following badger setts identified within the baseline environment to determine whether setts are active or not prior to the commencement of construction activities:
  - The Mill House Badger Group (BS07, BS08, BS09, BS28, BS49, BS50)
  - The Cullen/Fennor Badger Group (BS14 and BS48)
  - The Cashel Badger Group (BS04, BS13, BS18, BS21 and BS22)
  - Not considered to be part of any badger group (BS16)
- Where setts are identified to be active and are to be closed (wholly or partially), a derogation license will be obtained from the NPWS by the Contractor's Project Ecologist and setts located within the footprint of the Proposed Scheme (i.e. loss of breeding/resting site) will be evacuated in line with Guidelines for the Treatment of Badgers prior to the construction of National Road Schemes (NRA, 2006a). The need for a licence shall be determined by the Project Ecologist.
- Setts within the footprint of the Proposed Scheme will be clearly marked with temporary fencing and signage with construction activities prohibited until such a time that setts have been evacuated.
- Evacuation and destruction of setts will be undertaken under the supervision of a qualified and licensed ecologist and will be undertaken during the period 1 July to 30 November. The derogation licence(s) will be complied with in the carrying out of the works in question.
- An artificial sett will be constructed west of attenuation pond 3 and the proposed bridge crossing [Ch. 1350-1550] and alongside the boundary of woodland habitat located just outside the LMA, in order to provide a suitable alternative sett to replace the setts that require evacuation as part of the Mill House Badger Group. The artificial sett will be constructed in line with NRA guidance (NRA, 2006a);
- The need for additional mitigation for derogation licensing purposes to be reviewed and determined by the ECoW and relayed, as necessary to the appointed Environmental Team.

Where badger setts will not be lost but could be subject to disturbance (BS01, BS02, BS03, BS06, BS10, BS11, BS12, BS15, BS17, BS24, BS25, BS27, BS29, BS30, BS42-BS47), the following measures will be implemented:

- No construction personnel or machinery will be used within 30 m of badger setts (extended to 50 m for active setts during the breeding season, December – June inclusive) unless those works are subject to a derogation licence.
- During the pre-construction survey, setts located within 50 m of the Proposed Scheme will be clearly marked with temporary fencing and the extent of bounds prohibited for vehicles clearly

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	marked by fencing and signage. Such marker fencing will be sufficiently durable and robust to cover the period of construction. • Neither blasting nor pile-driving will be undertaken within 150 m of active setts during the breeding season. • Temporary badger fencing (doubling up with otter fencing as necessary) in line with the NRA (2006a) will be used to enclose all construction working areas. The fencing must be maintained throughout the construction period to provide a robust barrier to avoid movement of badger into and through the construction working areas. Badger fencing will be checked by the ECoW to ensure compliance with specifications.
15.5.3.9	**Measures to Protect Bats** Pre-construction surveys for bats are dealt with above. No demolition of buildings or the removal of any trees with bat roost potential (potential to be determined by the ECoW based on findings of pre-construction surveys) will be undertaken unless the ECoW has confirmed that the buildings or trees do not support roosting bats (confirmed via survey) or unless the demolition/removal is completed under the provisions of a derogation licence. Following the pre-construction survey, bat roosts located within the CPO boundary will be clearly identified to all personnel working in the vicinity of the roost. Temporary boundary tape fencing (or similar) will be used at the discretion of the ECoW to identify such roosts subject to such measures themselves not impacting on the use of the roost. In the event that roosts are removed or significantly disturbed (wholly or partially), this will be completed in accordance with the necessary derogation licence to be obtained from NPWS and with reference to the Best Practice Guidelines for the Conservation of Bats in the Planning of National Road Schemes and the Guidelines for the Treatment of Bats during the Construction of National Road Schemes (NRA, 2006c) and Bat Mitigation Guidelines for Ireland (NPWS, 2022). The need for licence will be determined by the Contractor's Project Ecologist. The need for additional mitigation for derogation licensing purposes to be reviewed and determined by the ECoW and relayed, as necessary to the appointed Environmental Team. It is assumed that all roosts at the time of construction and within the CPO boundary will need to be closed in accordance with a derogation licence. Currently, no roosts are located within the CPO boundary and no derogation licence necessary. By way of biodiversity enhancement, ten no. bat boxes per 1 km of new carriageway will be erected in pairs at suitable locations along the route of the Proposed Scheme. Suitable locations will be determined by the ECoW based on suitable locations available to erect them, proximity to artificial lighting and connectivity to foraging and commuting habitats. In the absence of suitable structures (e.g. retained trees, bridge structures, buildings) to erect the boxes, they will be pole-mounted in suitable locations or mounted in suitable locations on built structures. The bat boxes will be Schwegler-type (woodcrete) type boxes (or similar) and a range of different type boxes (e.g. 2f, 1FF, 3FF, 1FW, 1FE and 1FTH) will be used. These will be provided in addition to any mitigation required with respect to any derogation requirements which may be identified as a result of pre-commencement surveys. See also **Section 15.5.1.15** and **Chapter 12** for planting mitigation.
15.5.3.10	**Measures to Protect Birds** All vegetation removal, demolition of buildings or works on other pre-existing structures e.g. bridges will be completed outside the breeding bird season (March to August, inclusive) unless no breeding birds are confirmed present by the ECoW immediately prior to the vegetation being removed or unless required for the implementation of derogated measures with respect to otters or badgers. Breeding birds will be present in most habitats at the appropriate time of year including habitats which are of negligible ecological value in their own right (e.g. modern agricultural buildings). By way of enhancement, six no. bird boxes per 1 km of new carriageway will be erected at suitable locations along the route of the Proposed Scheme. Suitable locations will be determined by the ECoW based on locations available to erect, proximity to operational sources of disturbance and connectivity to foraging and commuting habitats. In the absence of suitable structures (e.g. retained trees, bridge structures, buildings) to erect the boxes, they will be pole-mounted in suitable locations. The bird boxes will be Schwegler-type (woodcrete) type boxes (or similar) and a range of different type boxes (e.g. 1B, 2H, 17C) will be used.
15.5.3.11	**Measures to Protect Amphibians** The removal of any aquatic vegetation suitable to support breeding smooth newt or common frog will avoid the breeding period (typically, 1 March to 31 July) unless otherwise agreed by the Environment Team as advised by the Contractor's ECoW and Project Ecologist. By way of enhancement, artificial hibernacula/ refugia will be constructed (ideally using materials such as

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	logs generated during the vegetation clearance) in the vicinity of the attenuation basins to be created as part of the Proposed Scheme. At least one hibernacula/refugia per attenuation basin will be provided. The design of the hibernacula/refugia will follow standard guidance such as the Amphibian Habitat Management Handbook (Baker, J. et al., 2011).
15.5.3.12	**Artificial Lighting** Where artificial lighting is required during hours of darkness (i.e. critical bridge lifts) the following measures are proposed to control the effects of artificial lighting: • During daytime working, all lights shall be turned off prior to darkness periods. This will eliminate any risk to sensitive receptors as a result of lighting used during daytime hours; • During periods of night working, directional lighting (i.e. lighting which only shines on roads and not adjacent habitats) shall be used to prevent overspill. This will be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvers and shields to direct the light to the intended area only; and • Where lighting may spill (although highly unlikely with application of the above measures) onto nearby habitats, light spill shall not exceed 1 lux. To put this in perspective, 0.2 lux level is equivalent to moonlight (BCI, 2010).
15.5.3.13	**Landscape Planting** Linear features such as hedgerows and treelines serve as commuting corridors for bats (and other wildlife). Severed linear features such as hedgerows and treelines shall be reconnected to the specific landscape measures and ecological landscape measures using semi-mature trees underplanted with hedgerow species to compensate for the loss of treelines and hedgerows. Furthermore, the woodland copse (WD1) located at Ch. 1450 which is considered 'recent woodland' (i.e. it is neither ancient nor possible ancient woodland based on a review of historic mapping), will be replanted to the west of the Proposed Scheme, between Ch. 1400 and Ch. 1500. Soil excavated as part of the removal of the woodland copse will be stored for later replanting and re-seeding of certified native (broadleaf tree species) seed mix as part of detailed landscape design. This shall be overseen by the Project Ecologist and the appointed landscape designer. The indicative locations of such planting are outlined in the Landscape and Visual chapter (refer to **Chapter 12**, **Section 12.5**). Native species shall be used as they support more insect life than non-native varieties. Planting of trees and shrubs will preferably be completed prior to completion of the Proposed Scheme. This would ensure that bats commuting in the area would have prior knowledge of newly planted landscape features as well as ensuring the newly planted hedgerows/treelines are well established prior to completion of the Proposed Scheme. Habitat replacement and landscaping will mitigate for scheme effects and also provide an opportunity to support biodiversity in the area. Woodland mixes, individual tree planting and grass and wildflower mixes will also be planted. Attenuation pond planting is proposed to include mixed species broadleaved woodland, mix species hedgerows, aquatic planting, and wet meadow seeding along pond edges, all of which will aid in the integration of these features into the wider natural landscape bring ecological benefit to the area. The Contractor's Project Ecologist shall liaise with the landscaping specialist regarding the landscaping mitigation measures. Refer also to the Specific Landscape Mitigation measures as set out in **Chapter 12**, **Section 12.5**.
15.5.3.14	**Non-IEF Mitigation – Non-native Invasive Species** **Relevant Guidance** Three non-native species, Japanese knotweed, Himalayan Balsam and Giant Hogweed were recorded in close proximity to the Proposed Scheme (i.e. outside the footprint but within the immediate surrounds). Where the above species are encountered and for the prevention of spread of these species, the following guidelines will be followed: • The Management of Invasive Alien Plant Species on National Roads – Standard, (TII 2020); • The Management of Invasive Alien Plant Species on National Roads – Technical, Guidance, (TII 2020); • Guidelines for the Management of Waste from National Road Construction Project (NRA, 2014), • The Knotweed Code of Practice. Managing Japanese Knotweed on Development sites. UK Environment Agency Environment Agency (2013).

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	• Inland Fisheries Ireland (IFI) guidance regarding aquatic invasive species control (http://www.fisheriesireland.ie/Research/invasive-species), and • Guidelines on the Management of Noxious Weeds and Non-Native Invasive Plant Species on National Roads (NRA, 2010), • Invasive Species Ireland guidance (http://invasivespeciesireland.com). **Invasive Species Management Plan** Prior to commencing construction, a further invasive species survey will be undertaken within the lands made available and an Invasive Species Management Plan, outlining measures to control invasive species. This will be prepared by a licensed professional and will be implemented during all phases of the Proposed Scheme. This plan will be prepared in accordance with TII's Management of Invasive Alien Plant Species on National Roads (TII, 2020) and shall include the following as a minimum: • General measures to avoid spreading invasive species during construction or soil movement; • Treatment plan to include in-situ chemical treatment and/or excavation and disposal at a suitably licensed facility; • Biosecurity measures to ensure invasive species are not spread between sites or along the Route Corridor, including measures to limit any potential introduction or spread of Crayfish plague (which has been noted in the Boyne previously); and • Good machinery hygiene including steam cleaning machinery and disinfection of water pumps etc.
Operational Phase Mitigation	
15.5.4.1	**Surface Water Drainage** **Surface Water Drainage Design** During the operational phase and as part of the Proposed Scheme, it is proposed to control and attenuate water draining the Proposed Scheme. The drainage design will facilitate attenuation/retention and pollution control of drainage water before it is released to receiving aquatic receptors such as streams and watercourses, coastal/ intertidal areas and groundwater within the ZoI. Measures to attenuate and treat carriageway run-off have been incorporated into the drainage design of the Proposed Scheme in accordance with TII standards. The Proposed Scheme involves the construction of a new surface water drainage system including new attenuation outfalls to existing watercourses or existing surface water drainage networks. The proposed alignment crosses a number of existing watercourses, agricultural drains and the River Boyne. Where the Proposed Scheme crosses these, they are proposed to be accommodated in culverts. The culverts, surface water drainage network, and run-off interceptors have been designed so as to minimise the potential impact on the receiving watercourses. Attenuation measures in the form of attenuation/retention ponds and grassed surfaced water channels which are considered to be a Sustainable Drainage System (SuDS) will be used to reduce the rate of run-off discharged to the receiving watercourses. While the purpose of the attenuation/retention ponds and grassed surfaced water channels is to reduce the risk of flooding in the receiving watercourse/ networks, they will also improve water quality by facilitating settlement and deposition of sediment and contaminants carried through the pipe network from the carriageway. The proposed surface water drainage system also includes measures to reduce the concentrations of pollutants that are routinely found in road run-off, and which pose a risk of short-term acute impacts (from dissolved/ soluble pollutants) and/or long-term chronic impacts (from sediment bound pollutants on receiving waters). As part of the proposed surface water drainage design, a Class I by-pass petrol interceptor will be installed upstream of where the drainage collection system discharges into the retention/attenuation ponds. The hydrocarbon interceptors incorporated within the design of the proposed surface water drainage network are primarily aimed at removing hydrocarbons from run-off. However, to ensure that the concentrations of other types of pollutants, (e.g. heavy metals and sediment) are controlled, filter drains, and vortex grit removal chambers will also contribute to the treatment of surface water run-off from the Proposed Scheme.

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	Surface water drainage measures for the scheme and their maintenance are described in the relevant chapters of this EIAR namely, **Chapter 4 – Description of the Proposed Scheme**, **Chapter 5 – Description of the Construction Phase** and **Chapter 17 – Water**. **Culvert Design** In addition to the culvert drainage design proposed as part of the Proposed Scheme, the following enhancement measures will be implemented to improve the three culverts located along the Mattock (Mooretown) Stream for the free passage of otter, which may be used by commuting otter: • Culvert construction will take cognisance of the 'Guidelines for the Treatment of Otters during the Construction of National Road Schemes. National Roads Authority' (NRA, 2008c); • As otters will be disinclined to use water-filled culverts without dry pathways, culverts will provide ledges; • There will be adequate access to any ledges provided from the riverbank next to the ledge; • The ledges and mammal access paths should be linked (i.e. fencing) and landscaped appropriately so that otters will use them. Ramps will be provided to ensure accessibility to ledges; • Ledges shall be at least 500 mm wide, constructed at least 150 mm above the 1 in 5 year flood event, and allow at least 600 mm headroom; • Care will be taken to ensure planting/landscaping does not obscure entrances to wildlife ledges; and • During operation, quarterly monitoring will be carried out over a period of at least one year to determine the success of the measures employed in an effort to ensure protection of otter. **Surface Water Drainage Inspection and Maintenance** During the operational phase of the Proposed Scheme, regular inspection will be required in addition to the establishment of a maintenance regime to ensure that the surface drainage network is functioning effectively. These include: • All maintenance site personnel will be made aware of the importance of the surrounding environment of the Proposed Scheme (i.e. European sites and connectivity with the freshwater environment) and the requirement to avoid pollution of all types; • Grassed surface water channels will be inspected monthly for the duration of the establishment period (i.e. will vary but generally 3 months) and will be inspected after heavy rainfall events; • Filter drains will be inspected monthly; • Attenuation/ retention ponds will require an inspection every six months; • Vortex grit removal chambers and petrol/oil interceptors will require monthly inspections for the duration of the first 3 months and then every 3-6 months thereafter; • Maintenance tasks in relation to the aforementioned surface water drainage to be completed during inspections include (where relevant), but are not limited to: – Weed control; – Sediment removal/monitoring (i.e. depth) and the unclogging or replacement of filter materials; – Removal of litter and other debris; – Repair of any damage associated with drainage infrastructures; – Vegetation inspection and care (i.e. retention ponds and grassed surface water channels); – Cleaning and integrity check.
15.5.4.2	**Pollution Control Measures** Due to the incorporation of the inherent design measures that have been proposed for this scheme (see **Chapter 4 – Description of the Proposed Scheme**), it is unlikely that the operation of the Proposed Scheme will have any significant adverse impacts on the surrounding hydrological environment. There will be no direct discharges to surface waters during this phase (refer to **Appendix 5.6 – Environmental Operating Plan**). In addition, the surface water design measures, the following control measures are also proposed and have due regard to pollution prevention control during the operational phase. These include:

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	Sediment and Contaminant Control • The level of suspended solids in any discharges to watercourses as a consequence of the operational phase shall not exceed 25 mg/l nor result in the deposition of silts on gravels or any element of aquatic flora and fauna (as per IFI (2016) guidelines); • Existing and proposed surface water drainage and discharge points shall be mapped on a site plan including the location of existing and proposed measures such as of petrol/oil interceptors, vortex grit separators, sediment traps, attenuation ponds with treatment forebays, grassed channels and filter drains where appropriate; • Attenuation ponds will be lined and the surface water drainage system sealed to prevent any infiltration of contaminated groundwater into surface water network; and • To minimise sediment build up, a regular inspection and maintenance regime will be put in place to remove any litter, debris and sediment from drainage features which will be removed to a suitable licensed facility. **Environmental Incidents and Accidents** In the case of environmental incidents or accidents occurring during the operational phase of the Proposed Scheme, the following measures will help to prevent/ contain the contamination of the potential source-vector pathways for negative impacts to proximal European sites: • All surface water run-off from rainwater that has passed over impermeable surfaces will be collected within the surface water drainage network, which will pass through petrol/hydrocarbon interceptors prior to the discharge into attenuation/retention ponds before it is released into the River Boyne; • In the case of a catastrophic accidental spill or similar incident, each attenuation/retention pond will be fitted with an emergency shut-down facility so that the spillage will be contained and prevent contaminants entering the downstream watercourse; • As detailed in **Section 15.7.2**, the drainage system will be maintained by Meath County Council. **Oil and Chemical Spillages** Should an oil or chemical spill occur during the operational phase of the Proposed Scheme, the following measures will help to prevent/ contain the potential source of the spill to prevent pathways for negative impacts to the relevant IEFs: • The type, size and location of the spill will be identified; • If possible, stop the source of the spill and control the area of the spill; • If the oil spill is small in nature, it will be treated with an appropriate spill kit to reduce the effect of the spillage (i.e. a suitable absorbent material will be used to absorb/remove the spill); • In the event of a significant oil spill occurring, an appropriate licenced contractor will be employed to determine the extent of the area affected and to implement an appropriate clean-up operation in line with suitable standards; • Material will be removed and disposed of in accordance with the Resource and Waste Management Plan; • In the event of a chemical spill, stop the source of the spill and control the area; • If the spill is hazardous or toxic in nature, warn all in the vicinity, and use an appropriate clean up kit, or if a large spill occurs employ a licenced contractor to carry out remediation works; and • A programme of mitigation will be put into place to address the spill and any relevant bodies will be notified. **Aquatic Ecology** A suite of measures for the protection of watercourses including the design of culverts for the Mattock (Mooretown) Stream, channel realignment measures and measures for the operation of attenuation ponds and wetlands, are provided in **Chapter 16**.
15.5.4.3	**Measures to Protect Mammals** Mammal=resistant or mammal proof fencing will be required to guide badgers and otter under the proposed bridge crossing and to prevent animals crossing the new roadway. The specification for mammal=resistant fencing (badger and otter respectively) is given in the NRA guidelines (NRA 2006a and 2006b).

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	Otter fencing will be recessed and tied into the following chainage (Ch.) points of the Proposed Scheme: • To guide otter under the proposed bridge crossing, otter fencing will be installed at appropriate locations south of the River Boyne between Ch. 1250 and Ch. 1300, in addition to 150 m either side of this chainage point in parallel with the Boyne towpath, north of the Boyne Navigation Canal; • To guide otter under the proposed bridge crossing, otter fencing will be installed at appropriate locations north of the River Boyne between Ch. 1450 and 1600; • Where steel single field gates are proposed north and south of the River Boyne (i.e. maintenance track south of the River Boyne, access track 4 north of the River Boyne and the farm accommodation overbridge 3), gates will be fitted with chain link mesh (see NRA 2006b) to prevent otter using these points to gain access to the mainline. The location of gates on farm access roads requiring this modification will be determined at the detailed design stage; • Attenuation Ponds 2 and 3 will remain unfenced to allow the free movement of otter within this habitat; • To guide otters to culverts along the Mattock (Mooretown) Stream, otter fencing will be installed at Ch. 3440, Ch. 3450 and Ch. 3460 and for a distance of 150 m either side of each culvert; • Where there is an overlap of stock-proof fencing and mammal-resistant fencing at culvert locations, stock-proof fencing will be adjusted to allow for unimpeded access to the culvert. The fence will be adjusted so that the bottom rail and wire mesh are removed and chain-link is not fixed to the ground at the location of the underpass. This allows for the animals to see a break in the fence line and thus clear access to the underpass nearby. Detail of this will be seen in the NRA (2006a) Guidelines; and • These crossings will be more readily used if the approach is softened through the use of appropriate planting. Badger fencing will be recessed and tied into the following chainage points of the Proposed Scheme: • To prevent badger from entering the proposed carriageway, badger fencing will be installed as a precautionary measure between Ch. 0 and Ch. 700; • To guide badger under the proposed bridge crossing, badger fencing will be installed at appropriate locations north of the River Boyne between Ch. 1450 and Ch. 1600; • These crossings will be more readily used if the approach is softened through the use of appropriate planting; • Where steel single field gates are proposed north River Boyne (i.e. Access Track 4 north of the River Boyne and the farm Overbridge 3), gates will be fitted with chain link mesh (see NRA 2006b) to prevent badger using these points to gain access to the mainline. The location of gates on farm access roads requiring this modification will be determined at the detailed design stage; • In general, gates entering into farm access roads will require concrete sills and mammal-resistant mesh attached to the gate to exclude badgers from accessing the proposed N2 mainline. Mammal-resistant fencing will be incorporated at the earliest possible stage during operation.
15.5.4.4	**Artificial Lighting** Lighting proposed for the Proposed Scheme has been identified in accordance with TII Publication DN-LHT-03038 Design of Road Lighting the National Road Network and is described in detail in **Chapter 4 – Description of the Proposed Scheme**. During the operational phase, the risk of impacts (i.e. disturbance) associated with artificial lighting will be minimised through the adoption of the following requirements: • Floodlight style lighting is prohibited; • A suitably qualified ecologist will be present to oversee artificial lighting requirements and ensure the spread of lighting is minimised to at, or near horizontal to ensure that only the task area is lit. This will avoid the use of high-level lighting columns such as over-hanging lanterns etc.; • The proposed River Boyne bridge crossing will remain unlit during the operational phase; and • The use of any ground lighting will be avoided (i.e. upward lighting) so as to avoid any up-lighting trees, buildings and vegetation.

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15.5.4.5	**Measures to Protect European Sites (River Boyne and River Blackwater SAC/SPA)** The mitigation measures that are specifically required to ensure that the Proposed Scheme will not result in a likely significant effect on the European Sites within its ZoI (River Boyne and River Blackwater SAC, River Boyne and River Blackwater SPA, Boyne Estuary SPA and the North-west Irish Sea SPA) are presented in **Section 7 of the NIS**. Following consideration and assessment of the Proposed Scheme on the identified relevant European sites, mitigation measures were developed to address the following potential impacts that were identified: • **Habitat Loss:** Mitigation measures to remediate the temporary loss of QI habitats within the River Boyne and River Blackwater SAC during operation of the Proposed Scheme (see **Section 15.5.3.3.1**); • **Habitat degradation – hydrogeology:** Mitigation measures to avoid habitat degradation in the River Boyne and River Blackwater SAC as a result of potential hydrogeological impacts during the operation of the Proposed Scheme; • **Habitat degradation – hydrology:** Mitigation measures to protect water quality in receiving watercourses during operation; and • **Habitat degradation – non-native invasive plant species:** Mitigation measures to avoid the introduction or spread of non-native plant invasive species to European sites during operation.
15.5.4.6	**Non-IEF Mitigation – Invasive Alien Species Management** Mitigation to follow measures already outlined for construction phase; see **Section 15.5.3**. In addition, measures to mitigate deer-vehicle collision risk are as follows: • Deer signage will be erected between Ch. 1200 and Ch. 3450 as these sections of the Proposed Scheme are most likely to coincide with deer encounters (i.e. east/west movement along the Boyne Valley, and Littlewoods Forest north of the scheme); • Sign W 153 for Deer or Wild Animals will be used in line with the Traffic Signs Manual (DTTS, 2019); • Deer signs will be erected at distances in line with the Traffic Signs Manual (DTTS, 2019).

Table 27-18: Summary Table of Monitoring Measures in the Biodiversity: Terrestrial Ecology Chapter

EIAR Section Reference	Description of Monitoring Measures for Biodiversity: Terrestrial Ecology
Construction Phase Monitoring	
15.7.1	The construction works will be monitored at several levels to ensure that the environmental best practice prescribed in this document is fully adhered to and is effective. The following system will be put in place to ensure compliance: • The contractor will assign an Environmental Clerk of Works with the responsibility for ensuring the mitigations prescribed in this document are adhered to. The Main Contractor's Environmental Clerk of Works will liaise directly with the Environmental Clerk of Works / Project Ecologist appointed by the Local Authority to oversee the ecological aspects of the work (see also **Appendix 5.6 Environmental Operating Plan** for details on roles and responsibilities). A checklist will be filled in on a weekly basis to show how the measures above have been complied with. Any environmental incidents or non-compliance issues will immediately be reported to the project team; • The project manager will be continuously monitoring the works and will be fully briefed and aware of the environmental constraints and protection measures to be employed; • The works will be periodically monitored during the construction phase by a suitably qualified ecologist. Following completion of the works, the ecologist will complete a final audit report to show how the works complied with the environmental provisions described in this chapter; • Surface water monitoring procedures will be undertaken to endure environmental protection and management requirements are being implemented. These measures are described in **Chapter 16**. **Monitoring of mammal-resistant fencing** In order to ensure the effectiveness of the exclusion of otter from open works during the construction phase, mammal-resistant fencing requires monitoring and maintenance at regular intervals. Naturally, a sturdy fence requires less maintenance, however digging by animals and

EIAR Section Reference	Description of Monitoring Measures for Biodiversity: Terrestrial Ecology
	damage from machinery may contribute to reduced fence robustness. If damage occurs, the main purpose of the fence is jeopardized. The following monitoring measures will include: • Monthly inspection will be undertaken by the Contractor's Project Ecologist in order to identify and fix potential fencing problems (e.g. 'weak spots'); • If potential problems are identified by personnel between monthly inspections, the Contractor's Project Ecologist will be notified; • Any problems identified, such as damage or weak spots, will be rectified immediately.
Operational Phase Monitoring	
15.7.2	Meath County Council will be responsible, during operation, for the commission of a suitably experienced ecologist to monitor the effectiveness of: • Surface water drainage and water quality mitigation; • Mammal-resistant fencing; and • Habitat remediation. **Surface water drainage and water quality** As part of this EIAR, as transposed to the Environmental Operating Plan (EOP) for the Proposed Scheme, surface water quality monitoring procedures are proposed during the construction works. These measures are described in **Chapter 16 – Biodiversity: Aquatic Ecology**. In relation to surface water drainage features, during the operational phase of the Proposed Scheme, regular inspection will be required in addition to the establishment of a maintenance/monitoring regime to ensure that the surface drainage network is functioning effectively. These include: • All maintenance site personnel will be made aware of the importance of the surrounding environment of the Proposed Scheme (i.e. European sites and connectivity with the freshwater environment) and the requirement to avoid pollution of all types: • Grassed surface water channels will be inspected monthly for the duration of the establishment period (i.e. will vary but generally three months) and will be inspected after heavy rainfall events; • Filter drains will be inspected monthly; • Attenuation/ retention ponds will require an inspection every six months; • Vortex grit removal chambers and petrol/oil interceptors will require monthly inspections for the duration of the first three months and then every three to six months thereafter; and • Maintenance tasks in relation to the aforementioned surface water drainage to be completed during inspections include (where relevant), but are not limited to: – Weed control; – Sediment removal/monitoring (i.e. depth) and the unclogging or replacement of filter materials; – Removal of litter and other debris; – Repair of any damage associated with drainage infrastructures; – Vegetation inspection and care (i.e. retention ponds and grassed surface water channels); – Cleaning and integrity check. **Mammal-resistant fencing** Meath County Council will be responsible, during operation, for the commission of a suitably experienced ecologist to monitor the effectiveness of surface water drainage mitigation. The success of mitigation measures for mammals will be monitored for a period of 3 years after construction, and measures taken to enhance the use of underpasses where required. Quarterly monitoring will be carried out to determine the success of the measures employed. Thereafter, mammal fencing will be monitored once every three years for maintenance purposes. Should a pattern of roadkill be identified at any location, a suitably qualified ecologist will reassess territories, fencelines and crossing points and advise on replacement / further works to reduce the risk as far as practicable. **Habitat remediation** The success of habitat remediation within the River Boyne and River Blackwater SAC will also be monitored, such as a monitoring schedule to assess site stabilisation and revegetation progress

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	(refer also to the NIS, available under separate cover). Habitat monitoring will be completed on a monthly basis and once vegetation is established and site stabilisation is achieved, monitoring will continue on a quarterly basis for 3 years thereafter. Regrowth of IAPS will be monitored annually for 7 years post opening of the scheme. Should regrowth occur, further control measures will be implemented suitable to the species and size of the stand.

27.10 Chapter 16 – Biodiversity: Aquatic Ecology

Table 27-19: Summary Table of Mitigation Measures in the Biodiversity: Aquatic Ecology Chapter

EIAR Section Reference	Description of Mitigation Measures for Biodiversity: Aquatic Ecology
Construction Phase Mitigation	
16.5.1	**Table 16-11** sets out specific mitigations only for impact categories where likely and potentially *Significant* impacts were identified in **Section 16.4.1**.

Table 16-11: Construction Phase Mitigation Measures

Potentially Significant Impact Category Identified	Mitigation
General waterborne pollutant loss - River Boyne during N2 Slane bypass bridge and floodplain crossing construction	• Monitoring of weather forecasting reports will be undertaken in the lead up to construction of the temporary work platform such that installation of reno-mattresses will be carried out during an extended settled weather period in which time platforms can be installed when there is low risk of over-bank river flows on the Boyne. • General sediment loss controls: all sources and pathways of sediment loss shall be controlled according to details set out in Phases 1-5 of the construction methodology. Whilst specific mitigation measures are not required in the area of sediment and erosion control, it is necessary that a clear system of checks/ monitoring of mitigation efficacy throughout the construction phase be employed. This will require a documented schedule of daily (during key construction periods near the Boyne for instance), weekly and monthly implementation and efficacy checks of all water quality protection measures in the areas of sediment control and treatment (e.g. silt fences, check-dams, attenuation ponds). A proposed monitoring schedule, including trigger points for certain parameters (suspended solids, pH) are set out in **Section 16.7**. • During and immediately after heavy periods of rain, earthmoving activities shall be reviewed with temporary restrictions where necessary while sediment control measures are bolstered and/or ground dries out to the point that sediment wash-out is not occurring. • General concrete loss controls: all sources and pathways of concrete loss shall be controlled according to details set out in Phases 1-5 of the construction methodology. This will require a documented schedule of daily, weekly and monthly implementation and efficacy checks of all water quality protection measures in the areas of concrete and concrete wash-water control and treatment (e.g. pH monitoring of pump-out waters and attenuation ponds). A proposed monitoring schedule is set out in **Section 16.7**. • General hydrocarbon loss controls: all sources and pathways of hydrocarbon loss shall be controlled according to details set out in **Chapter 5** for Phases 1-5 of the construction methodology. This will require a documented schedule of daily, weekly and monthly implementation and efficacy checks of all water quality protection

EIAR Section Reference	Description of Mitigation Measures for Biodiversity: Aquatic Ecology	
		measures in the areas of hydro-carbon storage and control (e.g. storage and refuelling areas). A proposed monitoring schedule is set out in **Section 16.7**. • All general pollutant loss control measures (as above) also apply for the Pre-Main Construction – Enabling Works (refer to **Chapter 5**, **Section 5.2.2**). In relation to the River Boyne, there shall be no ground disturbance within 10 m from the River Boyne main channel and mattock (Mooretown) Stream i.e. associated with Ground Investigation Works or Archaeological Surveys and testing. • Archaeological core sampling within the River Boyne floodplain will take place during the bridge foundation construction period and only within the cofferdam areas around bridge piers; • A Surface Water Monitoring Programme shall be prepared by the contractor and employed to monitor functionality and effectiveness of the prescribed mitigation measures throughout the proposed Boyne bridge construction period (see **Section 16.7**). The programme shall include identified trigger points and actions relating to principal pollutants (sediment or concrete wash out).
	Cofferdam ingress water – River Boyne during N2 Slane bypass bridge and floodplain crossing construction	• On-site pumps will be present to dewater as required at cofferdam containment areas. • On-site containment storage facilities of sufficient volume will be present to hold this pump out water prior to removal for appropriate treatment. • Ingress water will not be directly discharged to either the River Boyne or any adjoined drainage channels. In the absence of appropriate treatment, pump-out water will not be directly discharged to the attenuation ponds or general environment at any other location. • Pump-out water will be regularly monitored for pH, hydrocarbons and TSS. The monitoring schedule is set out in **Section 16.7**. • Stored contaminated cofferdam pump-out water will be pH monitored (see **Section 16.7**) and removed for treatment at an appropriate licenced off-site facility. If treated for pH, the pump-out water will be discharged to the site attenuation ponds for attenuation of TSS and hydrocarbon.
	Floodplain reinstatement – River Boyne	• Monitoring of weather forecasting reports will be undertaken in the lead up to removal of the temporary reno mattress work platforms such that the works including the subsequent reinstatement will be carried out during an extended settled weather period in which time platforms can be installed when there is low risk of over-bank river flows on the Boyne. This will occur in the spring/summer months when grasses can re-establish within that growing season for protection over the ensuing winter. • Reinstatement of the Boyne floodplain following removal of the temporary work platform will include reseeding with appropriate native damp meadow grasses on the south bank, and coir-matting with hydroseeding if possible, or otherwise resodding with appropriate native species mix, on the northern bank.
	Aquatic habitat and species protection – Mattock (Mooretown) Stream	• No in-stream works on the Mattock (Mooretown) Stream shall be carried out without the agreement of Inland Fisheries Ireland (IFI) in advance and IFI will be given sufficient notice before consented in-stream works commence. • The Mattock (Mooretown) Stream will be treated as fish-bearing (trout, eel, brook lamprey). As per fisheries restrictions stipulated by IFI, any in-stream works shall therefore only be carried out during the period 1 May to 30 September of any year. • Culvert designs (slope, dimensions) have been agreed with IFI as per consultation on 15 May 2023. The finalised stream crossing methodology as set out in **Chapter 5** will be agreed with IFI at

EIAR Section Reference	Description of Mitigation Measures for Biodiversity: Aquatic Ecology	
		detailed design stage and agreed with IFI prior to works commencing. • As a precaution, the Mattock (Mooretown) Stream will be de-stocked of fish as part of in-stream works covering the reach of the three locations for culvert installation. Fish removal shall be carried out only by authorised personnel under electro-fishing licence and in agreement with, or under supervision of IFI as agreed with IFI in consultation of 15 May 2023.
	Pollutant Loss during installation of Mattock (Mooretown) Stream Culverts	• The method statement for culvert installation and channel realignment will be agreed with IFI prior to works commencing. • A temporary diversion will occur to complete culvert installation and channel realignment in 'dry' working conditions with no severance of channel continuity during the construction period. • The temporary diversion channel will be of a calculated width and depth that will pass high frequency flood events (at least Q_{med}). It will be constructed in advance, off-line, with a soil/vegetation bund between it and the stream. • The channel will be lined with appropriate waterproof geotextile material and the bottom of the channel lined with appropriate, locally sourced, low-fine content gravels of a size class agreed in advance with IFI. • There will be no crossing of the temporary channel by machines and no direct discharge of pollutants or pump-out water to the diversion channel from the construction works area. Water may ingress to the works area, and all such construction related pump-out water will be directed to Attenuation Pond 6A (which will be constructed in advance of main works) for settlement of suspended solids.
	Prevention of spread of pathogens and invasive species	• Adherence to IFI biosecurity protocol (Caffrey, 2010) for avoidance of spread of pathogens will be followed by contractors and surveyors. • Extremely careful disinfection and biosecurity measures is essential to prevent transfer of damaging pathogens e.g. crayfish plague disease, between sites and river catchments within and outside of the watercourses. This will apply to all personnel (contractors, surveyors etc.) and machinery that come in contact with surface water and/or drainage to surface waters. • Transfer of invasive plant species between sites within catchments and to other catchments will be prevented. An invasive species management plan must identify specific locations of invasive plants (e.g. Japanese knotweed) at watercourse crossings and along any cable trenching routes. The final Construction Method Statement must set out methods for management and prevention of invasive species transfer.
	Overseeing of environmental controls	• The developer will be required to employ a suitably qualified technical professional (Environmental Clerk of Works [ECoW]) for the duration of the construction phase in order to protect water quality and avoid potential impacts on aquatic receptors. See **Section 16.7** for details of the ECoW role and responsibilities.
Operational Phase Mitigation		
16.5.2	**Table 16-12** sets out specific mitigations only for impact categories where potentially *Significant* impacts were identified in **Section 16.4.2**.	

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Table 16-12: Operational Phase Mitigation Measures

Potentially Significant Impact Category Identified	Mitigation
Potential Habitat Loss and Fragmentation – Mattock (Mooretown) Stream	Proposed culverts have been designed to meet IFI 2016 guidelines in terms of fish passage requirements (trout, brook lamprey, eel in this stream). Box culverts will be subject to minimum embeddedness of 500 mm below exiting bed level at upstream and downstream end. The culverts do not exceed 3.0% effective slope.
Potential Habitat Fragmentation – Mattock (Mooretown) Stream	The existing fish barrier at upstream end of existing N2 culvert shall be removed to comply with fish passage requirements in accordance with NRA (2008) guidelines. The streambed flowing towards the new Culvert 6A shall be graded at the upstream end using appropriate local gravels and rocky bank material to mimic natural channel morphology.
Potential Hydromorphological Changes – Mattock (Mooretown) Stream	Reinstatement of in-stream habitats in realigned sections of the Mattock (Mooretown) Stream shall be carried out to mimic existing morphology and habitats, incorporating in-stream structures and features e.g. gravel substrates, that will give rise to flow type variation as found in fish bearing waters. IFI have agreed in principle to in-stream habitat reinstatement of the stream as part of consultation (15 May 2023), but materials (i.e. locally sourced gravels) and method statement for channel reinstatement will be agreed with IFI prior to commencement of works.

16.5.2 In addition to **Table 16-12**, the following paragraphs describe the wider approach that shall be applied to operational phase mitigation measures. The primary aims are to ensure: (1) fish passage at the Mattock (Mooretown) Stream culverts, (2) reinstatement of suitable habitats for fish and macroinvertebrates in the Mattock (Mooretown) Stream, (3) ongoing efficacy of road surface drainage treatment measures (hybrid constructed wetlands).

General Measures

The following guidance shall be adhered to in relation to design of culverts and sections of channel realignment in watercourses:

- NRA (2008) Guidelines for the crossing of Watercourses During Construction of National Road Schemes; and
- IFI (2016) Guidelines on protection of fisheries during construction works in and adjacent to waters.

Channel Realignment Measures (to ensure near natural recovery)

- Newly formed channel sections shall mimic (or improve) the existing habitats, e.g., incorporating in-stream structures, features and meanders that will give rise to flow type variation as found in fish-bearing waters;
- Any additional coarse material shall match the existing gravel size and be of local rock type origin.
- Newly formed channel base widths shall be designed to match the width of the original channel. There will be low flow channels incorporated into the new channel design as part of the construction phase to concentrate flow and maintain depth for fish passage; and
- Riparian margins shall be planted with native species, set back from the bank and spaced to provide dappled (not tunnelled) shade.

Attenuation Ponds and Wetlands

Attenuation ponds shall be provided at all major surface water outfalls along the length of the road scheme and are designed in accordance with DN-DNG-03063 Vegetated Drainage Systems for Road Runoff Attenuation and DN-DNG-03065 Road Drainage and the Water Environment. Ponds shall be designed as hybrid wetlands, so they provide both attenuation

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	and consequent water treatment function. They will be planted with vegetation suitable for the specific zone of the pond the planting is located, i.e., permanently wet, marginal zones, dry earthworks slopes. Irish studies have shown surface flow constructed wetlands to be highly effective at removing road run-off pollutants (Healy et al, 2008; Bruen et al, 2006; NRA, 2014), which are removed through physical (settlement and sedimentation), chemical (cation exchange and adsorption, oxidation and hydrolysis, precipitation) and biological processes including uptake of metals by wetland plants (Healy et al. 2008). Constructed wetlands shall be maintained according to TII Vegetated Drainage Systems for Road Runoff DN-DNG-03063-02. Constructed wetland planting will include (amongst other species) Reed canary-grass (*Phalaris arundinacea)* and Bulrush (*Typha latifolia*), both of which occur naturally in the Boyne Valley. These species are metal-tolerant and are useful for phytoextraction of Cd, Cu, and Zn (Kacprzak et al., 2014), hence suitable to support constructed wetland treatment function (Healy et al., 2008). Maintenance of CW requires sediment removal a minimum of every 25 years, regular monitoring (for blockages) of inlet and outlet, and repair of planting and landscaping where necessary (NRA, 2014). Constructed wetlands and infiltration basins will be lined either naturally with a low permeability clay, or with an artificial membrane liner to protect groundwater, and adjoining surface waters, in accordance with groundwater regulations[1] and surface water regulations.[2] This will ensure separation of surface and groundwater and prevent potential leakage of contaminants to groundwater, which can be a subsurface pathway to surface waters.

Table 27-20: Summary Table of Monitoring Measures in the Biodiversity: Aquatic Ecology Chapter

EIAR Section Reference	Description of Monitoring Measures for Biodiversity: Aquatic Ecology
Construction Phase Monitoring	
16.7.1.1	**Responsibilities** As part of this EIAR, as transposed to the Environmental Operating Plan (EOP) for the Proposed Scheme, surface water quality monitoring procedures have been proposed during the construction works. In addition to the Project Ecologist, the developer will be required to employ a suitably qualified technical professional(s) (Environmental Clerk of Works (ECoW)) for the duration of the construction phase. The ECoW shall be based on site and shall oversee the implementation of pollution mitigation measures, compliance with environmental planning conditions, monitoring and reporting on environmental aspects of the development, and liaison with third parties and the Planning Authority. The ECoW appointment and role must cover all phases of the construction including advance works and accommodation works: • The proposed works and associated in situ control measures will be supervised full-time by the ECoW. • The ECoW is responsible for all monitoring duties and shall not delegate duties to other staff. The only exception is for unforeseen absence and annual leave cover, in which case the Site Manager shall appoint a suitably qualified back-up ECoW to temporarily fulfil the role. Training for each member of staff on their specific area of responsibility to implement environmental controls shall be carried out before the commencement of that operation. A record of all training carried out shall be maintained in the EOP. • Toolbox talks on the EOP will be presented by the ECoW to all site staff immediately before works commence. The subject shall be the measures that have been put in place to protect the environment and the procedures, monitoring and recording that is to be undertaken in accordance with the Construction Methodology, environmental commitments and the EOP. Site personnel will also be made aware of the ecological sensitivity of the site and its surrounds.

[1] European Communities Environmental Objectives (Groundwater) Regulations, 2010 (S.I. No. 9 of 2010), as amended.

[2] European Union Environmental Objectives (Surface Waters) (Amendment) Regulations (S.I. 77 of 2019) and European Communities Environmental Objectives (Surface Waters) Regulations 2009 (S.I. No 272 of 2009), as amended.

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16.7.1.2.1	**Site Daily Monitoring Procedure** **Weather Forecasts** Future seven-day forecasts will be checked daily by the ECoW, with construction works programmed accordingly in the event that heavy rainfall is forecast. Prior to any forecast heavy rainfall, the ECoW will ensure that all sediment loss prevention measures and environmental controls are functioning correctly. During and immediately after heavy periods of rain, earthmoving activities must be reviewed with temporary restrictions where necessary.
16.7.1.2.2	**General Procedures** The following environmental monitoring procedure will be carried out to ensure that environmental protection and management requirements are being implemented and are meeting their objectives: • All mitigation/ control measures shall be inspected daily by the ECoW during specific construction area working days with any maintenance and repairs carried out immediately. • All environmental monitoring and checklists shall be recorded and added to the EOP on a daily basis. • The ECoW will report any instances of failure of mitigations, spillage, maintenance and repair by way of specific Incident Reporting sheets that include how the issue was remedied. • The ECoW will attend all relevant stakeholder meetings (IFI, NPWS etc.).
16.7.1.3.1	**Surface Water Monitoring Procedure** **River Boyne Monitoring Locations** Samples must be taken from each bank (north and south) with a long reach sampling pole, collecting from as far out into the channel as is practicable. There will be 6 No. monitoring points on the River Boyne in relation to the bridge crossing reach, 2 No. attenuation pond outfalls and 2 No. locations on the canal as illustrated in **Figure 16.2** and explained as follows: • 2 No. upstream A sites: one from each bank at locations immediately upstream of the crossing works reach that are outside the influence of the project; • 2 No. downstream B sites: one sample from each branch of the Boyne, north and south of the mid-channel island, 100 m downstream of the Boyne bridge pier work platforms; • 2 No. downstream C sites: one sample taken from each bank of the river a further 200 m downstream of the above sites i.e. a total of 300 m downstream of the Boyne bridge pier work platforms; • Canal: one sample upstream of Attenuation Pond 2 outfall and one sample approx. 250 m downstream; and • Outfall channels of Attenuation Ponds 2 and 3. See **Section 16.7.1.3.4** (Sample Frequency) for the schedule of sampling.

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Figure 16.2: River Boyne Construction Phase Monitoring Locations

16.7.1.3.2 **Mattock (Mooretown) Stream Construction Phase Monitoring Locations**

There will be 2 No. monitoring points on the Mattock (Mooretown) Stream relating to culverting works and 3 No. attenuation pond outfalls as illustrated in **Figure 16.3** and explained as follows:

- 2 No. downstream C sites; one sample taken from each bank of the river a further 200 m downstream of the above sites, i.e. a total of 300 m downstream of the Boyne bridge pier work platforms.
- Attenuation ponds 5A, 5B and 6A outfall channels.
- See **Section 16.7.1.3.4** (Sample Frequency) below for the schedule of sampling.

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Figure 16.3: Mattock (Mooretown) Stream construction phase monitoring locations

16.7.1.3.3 **Sample Parameters**

The meaningful parameters for this construction phase surface monitoring programme are suspended solids/ turbidity (related to potential sediment loss from the site) and pH (related to potential concrete run-off).

Turbidity and pH measurements must be taken at all sampling sites during construction using a portable probe. In situ measurements have the advantage of providing site management with immediate (and actionable) data. In contrast, TSS for example may take a week or more to be analysed and reported. Notable pH changes upstream and downstream of the construction area may indicate concrete contamination and would trigger a stop-work response to identify and remove the source of contamination.

Where routine turbidity measurements show that there may be impact on the receiving waters, additional measurements must be taken with the probe (working back towards the possible source areas) to determine the source of elevated suspended sediment, e.g. by checking attenuation pond outflows etc. This will trigger works to stop until the offending sediment source is remedied.

16.7.1.3.4 **Sample Frequency**

River Boyne – Sampling Plan

The 8 No. river/canal sampling sites shown in **Figure 16.2**, plus the outflows from Attenuation Ponds 2 and 3 will be sampled by the ECoW on during the period of construction on the Boyne floodplain with the following frequency:

Daily sampling during the active construction period at each site:

- Turbidity measurement in situ, using a hand-held (portable) turbidity meter (NTU);
- pH measurement in situ, using hand-held (portable) calibrated meter (pH units);

Twice weekly sampling (fixed days – Monday and Thursday) at each site:

- Discrete grab sample and laboratory analysis for suspended solids (mg/l) and turbidity.

Additional sampling during 2 elevated flow (rainfall) events per month at each site:

EIAR Section Reference	Description of Monitoring Measures for Biodiversity: Aquatic Ecology
	• Turbidity measurement in situ, using a hand-held (portable) turbidity meter (NTU); • pH measurement in situ, using handheld (portable) calibrated meter (pH units); and • Discrete grab sample and laboratory analysis for suspended solids (mg/l) and turbidity. There are likely to be days when there is no outflow from the Attenuation Ponds, and hence no grab sample or in situ readings from those locations. This will be logged as "*No sample – No flow*" in the daily monitoring sheet. Upstream (US) and downstream (DS) samples on the Boyne River and Boyne Canal will still be taken on such days. The ECoW will ensure that samples are taken during or immediately after heavy rainfall whenever a rain event is occurring because these are the periods during which water in on-site drains and ground surfaces become hydrologically active and export diffuse contaminants including suspended solids. **Mattock (Mooretown) Stream – Sampling Plan** Water monitoring for the Proposed Scheme revealed persistently high suspended sediment concentrations in the Mattock (Mooretown) Stream. For this reason, a scaled-back monitoring schedule will be undertaken for this tributary. The two stream sites shown in **Figure 16.3**, will be sampled by the ECoW on during the period of construction in the vicinity of the proposed N2 tie-in with the following frequency: **Twice weekly sampling (fixed days – Tuesday and Friday) at each site:** • Turbidity measurement in situ, using a handheld (portable) turbidity meter (NTU); • pH measurement in situ, using handheld (portable) calibrated meter (pH units). **Sampling during 2 no. elevated flow (rainfall) events per month at each site:** • Turbidity measurement in situ, using a hand-held (portable) turbidity meter (NTU); • pH measurement in situ, using hand-held (portable) calibrated meter (pH units); • Discrete grab sample and laboratory analysis for turbidity and suspended solids (mg/l) and turbidity. The outflows from Attenuation Ponds 5A and 5B will be checked following every heavy rainfall event and when they are actively flowing will be sampled as follows: • Turbidity measurement in situ, using a handheld (portable) turbidity meter (NTU); • pH measurement in situ, using handheld (portable) calibrated meter (pH units); • Discrete grab sample and laboratory analysis for turbidity and suspended solids (mg/l) and turbidity.
16.7.1.3.5	**Visual Checks** Underpinning the monitoring approach will be daily visual checks conducted by the ECoW to ensure all mitigation measures are implemented as set out in the EOP. These visual checks will include checks on integrity of all on-site mitigation infrastructure, e.g. attenuation ponds, silt fencing, on-site drainage flow paths etc. Any required maintenance will be carried out immediately. The ECoW will have powers to stop works if there are obvious sediment plumes in watercourses or any obvious pathways from the construction areas that are conveying sediment laden water to nearby drains or watercourses. In the instance that works must stop, the source(s) and/or reasons for observed sediment loss will be identified and controls will be bolstered through additional silt fencing, check-dams or pump-out and containment of runoff for off-site treatment.
16.7.1.3.6	**Monitoring Records** A daily Water Monitoring Sheet (see example in Appendix 16.4) will be filled in by the ECoW at each sample location recording sampling date and times for each individual sample, plus general flow condition (High, > Average, Average, < Average, Low). Any visible turbidity or discoloration of the water will be recorded. The register of daily monitoring sheets will be kept on-site and entered into an Excel spreadsheet and will be updated regularly for inspection by the construction Site Manager.
16.7.1.3.7	**TSS versus Turbidity Correlation** Turbidity data is not possible to interpret in any meaningful way in the absence of data on suspended solids, and/or without being continuously monitored using upstream/downstream in-stream sondes. Experience during the EIAR water monitoring phase proved that continuous turbidity measurement on the Boyne is unreliable owing to the swift flows and possible issues with turbulence and biofouling. Furthermore, there is no standard conversion factor between turbidity and suspended solids; each river is different owing to variable geology, soil type etc. Handheld turbidity meter data must be correlated with concurrent suspended solids data in order to interpret the information. It is considered that suspended solids sampling (whether correlated with turbidity or not) is cost

EIAR Section Reference	Description of Monitoring Measures for Biodiversity: Aquatic Ecology
	effective, reliable and produces more easily interpretable data which can be compared to existing Irish water quality standards (e.g. 25 mg/l threshold for salmonid waters). In order to utilise in situ turbidity information for actionable indications of construction impact, a correlation will be made between the in-situ turbidity data and laboratory analysed suspended solids concentrations. A once-off professional TSS/ turbidity correlation shall be undertaken using an approved laboratory and laboratory-based methods to form a reliable relationship between the parameters. The relationship is sediment-specific and unique for each river system, the method therefore requires samples of local sediments and river waters to be taken to the lab for gravimetric analysis of TSS and concurrent turbidity. The samples are mixed in increasing dilutions to provide the specific TSS/ turbidity relationship. The exact turbidity meter type that will be deployed in the field will be calibrated by this relationship. Once a rational correlation is made, in situ daily turbidity readings will be used in lieu of ongoing additional monthly high flow grab sampling for suspended solids. Turbidity probes will be regularly re-calibrated. Twice weekly (Monday and Thursday) suspended solids sampling will continue throughout the construction period on the Boyne.
16.7.1.3.8	**Trigger Levels** **Watercourses – Suspended Solids / Turbidity** Once the relationship between suspended solids and turbidity is established, a suspended solids/ turbidity trigger level will be set for works to stop in order to implement additional on-site measures for sediment control. The trigger level to stop work and implement additional sediment control measures is if there is an upstream/ downstream difference of 25 mg/l suspended solids, or the correlated (as above in **Section 16.7.1.3.7**) turbidity equivalent (NTU). Alternatively, the trigger level will be set at any change in turbidity between upstream and downstream sites on the Boyne River, although it will be necessary to continue collecting twice weekly and three times monthly suspended solids samples for analysis as a log of efficacy and to assist interpretation of turbidity data. **Watercourses – pH** According to the Surface Water Regulations 2009, as amended, the acceptable pH range for these surface waters is: 6 < pH < 9.0. The Boyne and Mattock (Mooretown) Stream both had ambient values of pH 7.3-8.3, with means (across August 2021 – March 2022) of pH approx. 7.8. The trigger level to stop (concrete related) works will be if there is any in situ upstream/ downstream difference in pH that indicates more alkaline conditions downstream with pH approaching 8.5-9.0 at the downstream site, along with a clear difference compared to upstream in situ pH value. **Attenuation Pond Outfalls** Suspended solids concentrations in the attenuation pond outfall channels to surface waters will not exceed 25 mg/l TSS or the turbidity (NTU) equivalent and pH will not exceed 9.0. These are the trigger levels, either separately or together, that trigger works to stop and additional appropriate control measures to be implemented following investigation/ evaluation of the source by the ECoW. Works will not recommence without agreement from the ECoW.
16.7.1.3.9	**Cofferdam Pump-out Water Monitoring** Constant water ingress is expected to the cofferdams surrounding bridge pier foundations during their construction. These containment areas will require regular if not constant pumping out to retain dry conditions. The pump-out water is likely to be contaminated with sediment and concrete, and to a lesser extent hydrocarbons. These waters shall not be pumped directly to the Boyne or to any other watercourse. The contractor will be required to tanker and remove to a suitably licensed treatment facility; refer to **Chapter 5**. Before any concrete pouring has commenced, i.e., in the earth excavation stage, the ECoW will take daily pH readings of a sample of the pump-out water. This water will be transported by tanker and discharged into Attenuation Pond 2 or 3 for settlement of suspended solids. Once bulk liquid concrete pouring has commenced and concrete is curing, the ECoW will continue daily in situ measurement of pump-out water. If pH remains between 6.0 and 9.0, then this water can still be discharged into the Attenuation Ponds for settlement of suspended solids. If pump-out water pH exceeds 9.0, the water will be treated to reduce pH or transported off-site for disposal at a licenced facility.
Operational Phase Monitoring	

EIAR Section Reference	Description of Monitoring Measures for Biodiversity: Aquatic Ecology
16.7.2	Refer to **Chapter 17 – Water**, **Section 17.7.2** for details of operational phase monitoring requirements. In addition to maintenance over the life cycle of the constructed wetlands i.e. sediment removal every 25 years, regular monitoring (for blockages) of inlet and outlet, and repair of planting and landscaping where necessary (NRA, 2014) shall be undertaken by the road operator to ensure: (1) regular base flow through the system to maintain plants and micro-organisms; (2) sufficient residence time to allow for sediment particles to settle and the removal of pollutants through adhesion to vegetation.

27.11 Chapter 17 – Water

Table 27-21: Summary Table of Mitigation Measures in the Water Chapter

EIAR Section Reference	Description of Mitigation Measures for Water
Construction Phase Mitigation	
17.5.1	As outlined in **Chapter 5**, a wide range of sediment and erosion controls will be but in place such as the use of attenuation ponds, check dams and silt barriers. Stockpile locations have been chosen to minimise potential impacts of run-off on the water environment. The sequencing of the works, described in **Section 5.12**, has been developed with the sensitivity of the receiving environment in mind. Works within the River Boyne floodplain are necessary to construct the bridge crossing. Access tracks from the upper bank will be constructed down to temporary working platforms (TWPs) in the floodplain. The following measures will be implemented to minimise potential impacts on the river and canal: • Construction of attenuation ponds prior to construction of bridge crossing; • Construction of interceptor ditches to capture run-off; • Works confined to TWPs to avoid working directly on the floodplain surface; • Silt and hydrocarbon barrier fences installed at the edges of the TWPs; • Platforms constructed on reno mattress to facilitate the passage of water in the event of flooding; • Cofferdams to be constructed around foundation excavations to prevent water and sediment from entering or escaping; • Staged removal of TWPs in sections to reduce erosion potential. The sequencing and methodology of the earthworks elements, described in **Section 5.13**, has also been developed to minimise potential impacts on watercourses. This includes: • Construction and vegetation of pre-earthworks ditches in the first phase of works to allow for effective interception of surface water run-off; • Construction of the permanent attenuation ponds in the first phase of works so that they will be used during the remaining construction period to control and improve the quality of run-off entering watercourses; • Extent of exposed earthworks at any one time will be minimised by covering and seeding completed sections; • Earthworks plugs will be maintained at low point of cut areas until slopes have been vegetated, initial road construction layers have been placed and all road drainage pipes and chambers, and groundwater filter drains and chambers have been installed; • Vehicle wheel washing will occur in controlled zones prior to leaving the site; • Early vegetation establishment on stockpiles to prevent erosion of topsoil; • Protection of stockpile locations with ditches and silt fences to prevent run-off towards the stockpile and the run-off of sediment from the stockpile; and • Weather monitoring to avoid exposing earthworks slopes and the temporary protection of earthworks slopes prior to forecasted large rainfall events. Further information on construction phase mitigation measures in relation to the aquatic environment will be found in **Chapter 5**, **Section 5.2 Pre-Main Construction Works (Enabling Works)**, **Section 5.4 Construction Works**, **Section 5.11 Environmental Emergency**

EIAR Section Reference	Description of Mitigation Measures for Water
	Procedures/Contingency, and **Section 5.12 Detailed Construction Methodology and Sequencing** and **Chapter 16**, **Section 16.5.1 Construction Phase**.
Operational Phase Mitigation	
17.5.2	In the event that an accidental release of potential pollutants occurs, an emergency response plan will be followed to minimise potential contamination of watercourses/groundwater. If, during maintenance activity, scouring is observed around the bridge piers in the River Boyne floodplain, a scour assessment will be undertaken and scour protection measures put in place, if considered necessary by the operator. The energy dissipators installed at the Mattock (Mooretown) Stream culverts will be maintained to reduce the likelihood of morphological changes. If, during maintenance activity, erosion is observed in the vicinity of these culverts, a morphological assessment will be undertaken by the operator. Further information on operational phase mitigation measures in relation to the aquatic environment will be found in **Section 16.5.2**.

Table 27-22: Summary Table of Monitoring Measures in the Water Chapter

EIAR Section Reference	Description of Monitoring Measures for Water
Construction Phase Monitoring	
17.7.1	Refer to **Chapter 16**, **Section 16.7.1** for details of monitoring during the construction phase.
Operational Phase Monitoring	
17.7.2	It is expected that the OPW will continue to monitor flows in the River Boyne at the Slane Castle gauging station upstream of the ZoI. Any unforeseen changes in extreme flow volumes or increased frequency can be risk assessed in the context of the scheme design. It is expected that the EPA will continue to sample at the existing Slane Bridge. EPA monitoring downstream at the WWTP discharges is also expected to continue. This will continue to provide a robust water quality baseline for the River Boyne upstream of the proposed bridge crossing. Water quality monitoring will be undertaken monthly by the appointed operator in the River Boyne and Mattock until at least 24 months post-completion. Additional sampling points if required can be determined by the appointed operator The results of the water quality monitoring programme will be reviewed by MCC on an ongoing basis. In the event of any non-compliance with regulatory limits for any of the water quality parameters monitored, an investigation will be undertaken to identify the source of this non-compliance and corrective action will be taken were the this is deemed to be associated with the Proposed Scheme. The realigned reach of the Mattock (Mooretown) Stream shall be monitored annually by the operator to ensure the energy dissipators are still in place. If they have been washed away, they shall be replaced. The culverts must be maintained free of blockages. The drainage systems serving the Proposed Scheme will be monitored to ensure that same continue to function as designed to ensure adequate treatment of run-off before discharge to watercourses. Maintenance of each component is set out in TII standards and manufacturer recommendations. Maintenance requirements related to these systems are discussed in detail in **Chapter 4**, **Section 4.5**.

27.12 Chapter 18 – Land, Soils, Geology and Hydrogeology

Table 27-23: Summary Table of Mitigation Measures in the Land, Soils, Geology and Hydrogeology Chapter

EIAR Section Reference	Description of Mitigation Measures for Land, Soils, Geology and Hydrogeology
Construction Phase Mitigation	
18.5.1.1	**Accidental Emissions and Release of Potentially Hazardous Substances** The following mitigation measures will be implemented during the construction phase to manage accidental emissions and release of potential hazardous substances: • The storage and handling of oils, fuel, chemicals and hydraulic fluids will be in secure areas within the site compounds and will not occur within a minimum of 50 m of watercourses. • All hydrocarbons used during the construction phase shall be appropriately handled, stored and disposed of in accordance with the TII/NRA document "Guidelines for the crossing of watercourses during the construction of National Road Schemes" (NRA,2008). • All chemical and fuel filling locations shall be protected from potential spillages through the provision of appropriate protection measures including but not limited to bunded areas and double skinned bowser units with spill kits. • Storage tanks shall have secondary containment provided by means of an above ground bund to capture any oil leakage. Storage tanks and associated provision, including bunds, shall conform to the current best practice for oil storage and will be undertaken in accordance with Best Practice Guide BPGCS005 – Oil Storage Guidelines (Enterprise Ireland, 2017). • The pouring of concrete, sealing of joints, application of water-proofing paint or protective systems and curing agents will be completed in the dry weather conditions and allowed to cure for 48 hours in order to avoid pollution of watercourses. • The use and management of concrete in or close to watercourses will be carefully controlled on hardstanding areas using dedicated concrete washout areas/boxes to avoid spillage. • An Emergency Response Plan (ERP) detailing the procedures to be undertaken in the event of a spillage of chemical, fuel or other hazardous wastes (e.g. concrete) shall be in place prior to commencement of the Proposed Scheme. These procedures to be undertaken shall at a minimum include the following: – Carry out an investigation to identify the nature, source and cause of the incident and any emission arising therefrom; – Isolate the source of any such emission; – Evaluate the environmental pollution, if any, caused by the incident; – Identify and execute the measures to minimise the emissions/malfunction and the effects thereof; – Identify the date, time and place of the incident; – Notify the Environmental Protection Agency and other relevant authorities; and, – MCC and the appointed contractor during the construction phase shall provide a proposal to the Environmental Protection Agency for its agreement within one month of the incident occurring or as otherwise agreed by the Agency to identify and put in place measures to avoid reoccurrence of the incident and identify and put in place any other appropriate remedial action. • Relevant staff, including cover staff shall be trained in the implementation of the ERP and the use of any spill kit / control equipment. • Plant and equipment shall be maintained in place and in working order for the duration of the works. • The main and satellite compounds have been located to ensure they are more than 50 m from any water course and away from zones at risk of flooding. In addition, measures will be implemented to ensure that silt laden or contaminated surface water run-off from the compound does not discharge directly to the surface waters. • As outlined in **Chapter 5 – Description of the Construction Phase**, the construction methodology has been developed in order to ensure there will not be any uncontrolled run-off or spillage to the River Boyne or its tributaries, including the European designated sites associated with the river; refer to **Chapter 5**, **Section 5.4**. All soiled construction run-off water will be passed through settlement ponds/silt traps and/or bunds prior to outfall to the receiving surface water where appropriate.

EIAR Section Reference	Description of Mitigation Measures for Land, Soils, Geology and Hydrogeology
	• Management of material deposition areas will prevent siltation of watercourse systems through run-off during rainstorms. Collector ditches shall be put in place surrounding material stockpiles to contain run-off and direct it to the settlement ponds / silt traps before discharge to an adjacent watercourse. • As noted in **Chapter 5 – Description of the Construction Phase**, wheel wash run off will be stored in an onsite storage tank and will be disposed of by permitted waste haulage company at a permitted or licensed facility.
18.5.1.2	**Infiltration of Surface Run-off** Excavated materials will be carefully managed in accordance with the TII Specification for Road Work, to prevent any potential negative impact on the receiving environment and the excess material will be taken directly to an appropriately licenced facility avoiding contact with any open surface water drains. Excavated material will not be left uncovered to avoid run-off of silty water and trial pits will be backfilled at the earliest convenience to avoid leaving stockpiles exposed. Dust mitigation measures will be as per those specified in **Chapter 10 – Air Quality, Section 10.5.1**.
18.5.1.3	**Loss of Soil Reserves** Excavated soil is to be managed for onward reuse at licenced facilities. Mitigation measures relating to the use of soils as a resource are specified in **Chapter 23 – Material Assets: Resource Waste Management**. Following the removal of overburden, the mitigation measures stated in **Sections 18.6.1.1** and **18.6.1.2** shall apply in order to protect bedrock aquifers.
Operational Phase Mitigation	
18.5.2	The Proposed Scheme will include designed in measures including oil interceptors and will undergo routine maintenance as outlined in **Chapter 4**. In order to prevent fuels, oils or other potentially hazardous substances, arising from accidental spillages on the Proposed Scheme, impacting soils and/or groundwater in the vicinity, **Chapter 4** specifies, as part of the design, installation of 7 no. Class 1 oil/petrol bypass interceptors upstream of where the drainage collection system discharges into the retention/attenuation ponds. All mainline run-offs will be treated in attenuation facilities as identified in **Chapter 4**. Further, **Chapter 17- Water, Section 17.5.2,** specifies that in the event that an accidental release of potential pollutants occurs during the operational phase, an emergency response plan will be followed to minimise potential contamination of watercourses/groundwater; refer to **Section 4.4.11.12 Environmental Emergency Procedures**. No further operational phase mitigation measures are proposed.

Table 27-24: Summary Table of Monitoring Measures in the Land, Soils, Geology and Hydrogeology Chapter

EIAR Section Reference	Description of Monitoring Measures for Land, Soils, Geology and Hydrogeology
Construction Phase Monitoring	
18.7	Based on the conclusions of the impact assessment and residual effects, specific monitoring of land, soils, geology or hydrogeology is not considered necessary. It is noted however that construction phase monitoring by a full-time ECoW is specified in **Chapters 15** and **16** to ensure implementation of mitigation measures for surface waters and habitats. This monitoring will also serve to ensure compliance with mitigation measures related to land, soils, geology and hydrogeology.
Operational Phase Monitoring	
18.7	No operational phase monitoring is proposed.

27.13 Chapter 19 – Climate

Table 27-25: Summary Table of Mitigation Measures in the Climate Chapter

EIAR Section Reference	Description of Mitigation Measures for Climate
Construction Phase Mitigation	
19.5.1	The projected emissions from the construction phase are presented using traditional methods and materials and result in a moderate adverse impact. The need to mitigate these impacts is clearly signalled in national policy such as CAP23 (Action EN/23/12: Specify low carbon construction methods and low carbon cement material as far as practicable for directly procured or supported construction projects from 2023). There has been ongoing interaction between the climate team and the design team to assess the potential pathways for mitigation during construction of the Proposed Scheme. Embodied carbon in the materials employed in the construction phase dominate the impact. As such, to mitigate these impacts mandatory use of the following will be required: • As a replacement for traditional precast concrete materials made with Portland cement mixes, the Proposed Scheme will use 50% ground granulated blast-furnace slag (GGBS) cement for all structural and non-structural precast structures, kerbs, drains, etc with the only exception being the prestressed concrete bridge beams to be employed on the overbridges which cannot meet this commitment at present; • Similarly, all concrete poured in-situ for the Proposed Scheme will consist of 50% GGBS cement; • All reinforcing steel employed on site will be 85% minimum recycled steel; and • As a combined noise and climate mitigation, Stone Mastic Asphalt (SMA) will be used as an alternative to Hot Rolled Asphalt (HRA). Stone Mastic Asphalt is a low carbon alternative to HRA. • Research has shown that the carbon intensity of SMA can be further reduced if Recycled Asphalt Pavement (RAP) is employed in the mix. The Proposed Scheme will use SMA with a minimum RAP content of 20%. • MCC will revisit this mix during detailed design to achieve greater embodied reductions if possible, based on industry practices available at the time. The impacts of the use of these low carbon materials are presented in **Table 19-34** which shows the baseline levels of embodied carbon relative to the mitigated levels of embodied carbon. The total embodied carbon saved by these measures equates to 5,038 tonnes of CO_2e. This saving is equivalent to 23% of the total embodied carbon estimated for the Proposed Scheme (21,483 tonnes CO_2e as per **Table 19 24**).

Table 19-34: Mitigation of Embodied GHG in Construction Materials

Material	Total Baseline GHG (tonnes CO_2e)	Mitigation Material	Total GHG after Mitigation (tonnes CO_2e)
Non-structural precast concrete structures, kerbs, drains, etc. using Portland cement.	4,133	50% GGBS cement mix	2,438
Poured concrete using Portland cement.	3,334	50% GGBS cement mix	2,134
Reinforcing steel using virgin steel	4,112	Recycled steel	2,467
Hot Rolled Asphalt	2,907	Road Pavements - Bituminous Materials using Stone Mastic Asphalt	2,326
Total	**14,486**		9,365
	Total Embodied Carbon Mitigated		**5,038**

EIAR Section Reference	Description of Mitigation Measures for Climate
	In addition to the above mitigation regarding material choices, there are a series of additional construction mitigation measures that will also be adopted as follows: • The use of non-concrete assets shall be optimised in the design e.g. gravel footpaths, grassed drains etc. to minimise the need for concrete. • All aggregates required for pavement materials shall be secondary aggregates. Virgin aggregates shall only be employed where it is demonstrated that secondary aggregates are unsuitable for structural reasons and/or they are unavailable. • Wherever available, the contractor shall secure construction materials from local/regional sources or sources within the State to minimise material transport emissions and reduce life cycle carbon emissions associated with the construction materials. • For electricity generation at the construction compounds, hydrogen generators or electrified plant shall be utilised over traditional diesel generators. This shall also apply to lower powered mobile plant, as appropriate. • A regular maintenance schedule for all construction plant machinery shall be undertaken to maintain optimum machinery efficiency. • Sustainable timber post fencing will be specified over steel in boundary treatments where possible. • Engines will be turned off when machinery is not in use. • The use of private vehicles by construction staff to access the site will be minimised through the encouragement of use of public transport, encouragement of car sharing, and maximising use of local labour to reduce transport emissions. To implement this, the contractor shall prepare a Mobility Management Plan for site staff.
Operational Phase Mitigation	
19.5.2	Future mitigation of transport emissions will be driven by EU and national policy on fuel and engine technology, improved walking/cycling facilities, a modal shift to public transport and a transition to low emission vehicles. For mitigation of other sources of emissions the following will apply: • The level of public lighting on the Proposed Scheme will be limited to the minimum required for safety. Public lighting installations will use photocells to ensure they are only operational when required. • Lighting fixtures will be enhanced where possible with the addition of a Central Management System (CMS) to actively manage the required level of lighting for the circumstance, e.g. dimming, reduced night-time scouting. This will be particularly useful in the public realm element of the scheme. • The road surfacing and horizontal gradients shall be optimised during detailed design for greater vehicle efficiency throughout the design life of the Proposed Scheme. This will allow for a smoother journey throughout the length of the Proposed Scheme and require less sudden acceleration or braking to negotiate hills or tight bends. • Sheltered and accessible bus stops at suitable locations such as village nodes shall be provided. • Tree planting, in line with the mitigation proposals in **Chapter 12 – Landscape and Visual**, shall be integrated into the Proposed Scheme to provide carbon sequestration potential.

Table 27-26: Summary Table of Monitoring Measures in the Climate Chapter

EIAR Section Reference	Description of Monitoring Measures for Climate
Construction Phase Monitoring	
19.7	No specific monitoring is proposed for the construction phase.
Operational Phase Monitoring	
19.7	No specific monitoring is proposed for the operational phase.

27.14 Chapter 20 – Material Assets: Agricultural Properties

Table 27-27: Summary Table of Mitigation Measures in the Material Assets: Agricultural Properties Chapter

EIAR Section Reference	Description of Mitigation Measures for Material Assets: Agricultural Properties
Construction Phase Mitigation	
20.5.1	Mitigation measures have been considered on a farm-by-farm basis and details of specific measures that are required for individual properties are shown in **Table 20-12**. However, there are a number of measures that will be implemented by MCC and the contractor across all properties, and these are outlined as follows: • A Landowner Liaison Officer (LLO) will be appointed by the Local Authority following the making of the Compulsory Purchase Order and granting of Planning Permission. The LLO will act as the interface between the landowners and the Contractor/Local Authority and will be in regular communications with all parties (landowners, Local Authority and Contractor). • Mitigation measures regarding traffic and transport, noise and vibration, and air quality as outlined in **Chapters 7, 9** and **10**, respectively will be implemented. • MCC will undertake to replace (either along the same or alternative routes) all existing rights of drainage, rights of access to the public road network and easements across the lands to be acquired. • All drainage likely to be affected or disturbed during the pre-construction (ground surveys and investigations) and construction works will be confirmed during discussions with landowners. Land drains will, to the extent possible, be maintained during the course of the works. Any damage to drains due to the works will be repaired on completion of the works. MCC as the developing authority will seek to minimise the damage involved and, to the extent required by law, will pay compensation to the owner or occupier. Any such claim for compensation will be dealt with expeditiously. • Existing accesses to property, including homes, farms and divided lands will, where practicable, be maintained by the contractor during construction of the Proposed Scheme; otherwise reasonable temporary access will be provided to and from divided land plots and to and from the public road network. • Where necessary, suitable stockproof temporary fencing will be erected by the contractor for the duration of the works. Where any fences, walls or hedges are damaged during the construction of this Proposed Scheme they will be made stock proof immediately, unless otherwise agreed with the landowner. Any necessary permanent restoration of fences, walls, or hedges will be completed within two months of the work concluding. • Any disruption to animal water supplies will be reinstated immediately by the contractor or an alternative source supplied until the source is reinstated, unless otherwise agreed with the landowner. • All machinery coming from outside of the State will be cleaned and disinfected on entry to the country. An inspection of these machines will be undertaken by the contractor at the point of entry to the country to ensure this measure has been implemented and the contractor will verify to the LLO that this has been done. • All machines will be sprayed with appropriate disinfectant prior to arrival on site. The contractor will verify to the LLO that this has been done. • The LLO will liaise with the local district veterinary office (DVO) to establish the location of any restricted herds along the route of the Proposed Scheme. The liaison will continue on a regular basis throughout the construction and reinstatement periods. Where any landholder becomes aware that his/her herd has become infected, it is his/her responsibility to inform the LLO as a matter of urgency. • Where the LLO has been informed of a restricted herd along the route, it will require the contractor to disinfect machinery and personnel before leaving the land concerned. The number of accesses across the working strip will be reduced to one in the case of lands having restricted herd status. The contractor will arrange for disinfectant mats/baths to be replenished with disinfectants, as required. • In the event of an outbreak of a notifiable disease, the Proposed Scheme will be subject to such operational restrictions as are imposed by DAFM. • Permanent and temporary landtake will be dealt with by way of compensation.

EIAR Section Reference	Description of Mitigation Measures for Material Assets: Agricultural Properties

- Loss of facilities will all form part of the overall compensation package agreed with the landowner.

Table 20-12: Assessment of the Impact of Landtake on Agricultural Properties

CPO No.	Primary Enterprise	Mitigation
100b, 100c & 100d	Dairy+	Reinstatement of property entrance.
102	Dairy	Reinstatement of property entrance.
103a	Dairy+	Reinstatement of existing field entrance.
105a	Horses	None required
106a	Tillage	None required
107a, 107c & 108a	Dairy+	It is proposed to construct an overbridge which will provide access to the divided lands.
109a	Tillage	None required
110a	Drystock	None, existing access will be maintained.
111a	Drystock	None required
112a	Tillage	None required
112c, 112d, 112e & 112f	Drystock	None required
114a	Drystock	None required
115a & 115c	Drystock	None required
118a, 118b, 118c, 118d & 118e	Dairy+	It is proposed to provide an overbridge and a new access road (access from the N51 to facilities and access to the overbridge).
120 a & 120b	Drystock	Reinstatement of existing field entrance.
121a & 121b	Dairy+	None required
122a, 122b & 122d	Dairy+	Agricultural access to this plot is from the N51 and while this access can be maintained off the N51, access will also need to be provided off the Proposed Scheme to the lands on the southern side of the Proposed Scheme.
123a, 123b, 123c & 123g	Dairy+	None required
138 a & 138b	Drystock	Reinstatement of existing field gates.
146a, 146b, 146c, 146d & 146g	Drystock	Reinstatement of existing field gates in new location and new access provided for divided lands to the east.
147a	Tillage	An access road will be constructed to allow access to divided lands to the east.
148a & 148c	Beef+	Reinstatement of existing field gates to new location. Loss of sheds and facilities will be dealt with by way of compensation under the statutory code.
151a, 151b & 151c	Dairy	Reinstatement of existing field gates.
152a	Tillage	None required
201a, 201b & 201c	Horses	Reinstatement of existing field gates.

Note 1:

- Landholding 100 denotes plots of land owned by MCC but is not specific to the Slane area; the total plot area of landholding 100 is therefore nominally defined for the purposes of this assessment as an estimate of plot areas around the Slane environs known to be in the ownership of MCC. The actual 'total plot area' would encompass both known and unknown areas of land in the ownership of MCC located throughout other parts of the county.

EIAR Section Reference	Description of Mitigation Measures for Material Assets: Agricultural Properties
	Note 2: • This table should be read in conjunction with **Figure 20.1(a)-(c)** (Landholdings), as well as the maps in **Volume 3**, drawing series **MDT0806-RPS-01-N2-DR-C-DM1000-DM1003** (Engineering Drawings). • A CPO reference of '1xx' represents landtake related to the proposed N2 bypass and N51 realignment works. A reference of '2xx' represents landtake related to the proposed public realm enhancement proposals in Slane village.
Operational Phase Mitigation	
20.5.2	Similar to the construction mitigation measures, operational mitigation measures have been considered on a farm-by-farm basis and details of these measures are shown in the individual assessments in **Table 20-12**: Measures that will be implemented across all farms, where required, during the operational phase and these are listed below: • Permanent access will be provided to all divided lands. Where required this access will be to and from the public road network and where appropriate the access will be by way of farm tracks and overbridges); • All drains, cables, conduits, pipes, rights of way and wayleaves etc. where such services are severed by the CPO during construction or operation of the Proposed Scheme will be maintained or replaced, unless otherwise agreed with the landowner. • MCC will undertake to replace (either along the same or alternative routes) all existing rights of drainage, rights of access to the public road network and easements across the lands to be acquired. • Ducting will be provided, where required and where practicable, to allow for the provision of services (electrical/water) across the newly developed road to divided areas. • Where required, suitable permanent stock-proof fencing will be erected along the Proposed Scheme. Maintenance of fencing alongside the Proposed Scheme will be the responsibility of the local authority.

Table 27-28: Summary Table of Monitoring Measures in the Material Assets: Agricultural Properties Chapter

EIAR Section Reference	Description of Monitoring Measures for Material Assets: Agricultural Properties
Construction Phase Monitoring	
20.7	No specific monitoring is required for the construction phase.
Operational Phase Monitoring	
20.7	No specific monitoring is required for the operational phase.

27.15 Chapter 21 – Material Assets: Non-agricultural Properties

Table 27-29: Summary Table of Mitigation Measures in the Material Assets: Non-agricultural Properties Chapter

EIAR Section Reference	Description of Mitigation Measures for Material Assets: Non-agricultural Properties
Construction Phase Mitigation	
21.5.1	Mitigation measures have been considered on an individual property basis and details of specific measures that are required for individual properties are shown in **Table 21-6**. However, there are a number of measures that will be implemented by MCC and the contractor across all properties, and these are outlined as follows: • Mitigation measures regarding traffic and transport, noise and vibration, air quality, and landscape and visual, as outlined in **Chapters 7**, **8**, **9**, **10** and **12** respectively will be implemented. • Existing accesses to property, including homes and businesses, to and from the public road network and way-leaves and routing for all existing services, including water, sewerage, electricity etc. will be maintained during construction of the Proposed Scheme; otherwise reasonable temporary access and routing for such services will be provided. • All drains, cables, conduits, pipes, rights of way and wayleaves etc. where such services are severed by the CPO during construction of the Proposed Scheme will be maintained or replaced, unless otherwise agreed with the landowner. • MCC shall undertake to replace (either along the same or alternative routes) all existing rights of drainage, rights of access to the public road network and easements across the lands to be acquired. • Where necessary, suitable boundary fencing will be erected for the duration of the works. Any necessary permanent restoration of fences, walls, or hedges will be completed without unreasonable delay after works have concluded in the area. • Prior to construction and subject to written agreement with the relevant property owners, property condition surveys will be undertaken in relation to all buildings/structures in use, located within 50 m of the extents of the landtake. • Permanent and temporary landtake will be dealt with by way of compensation. Matters of compensation are dealt with through the CPO process. Boundary treatment for all lands permanently acquired will be provided unless otherwise agreed with the landowner.

Table 21-6: Assessment of the Impact of Landtake on Non-agricultural Properties (Note 1)

CPO No.	Property Type	Mitigation *(Other than compensation see **Note 1**)*
100a, 100b, 100e, 100f, 100g & 104b	Roadbed	None required
100c & 104a	Residential	The boundary treatment will be reinstated to pre-construction condition unless otherwise agreed with the landowner.
101a	Private Access Track	Access will be reinstated to pre-construction condition unless otherwise agreed with the landowner.
105b	Roadbed	None required
107b	Private Laneway	New lane to be provided in the adjacent plot; refer to CPO 108 in **Chapter 20 – Material Assets: Agricultural Properties**.
110b	Roadbed	None required
111b	Roadbed	None required
112b	Roadbed	None required
112g	Other – River Boyne	None required
113a & 113b	Residential	See **Note 2**.

EIAR Section Reference	Description of Mitigation Measures for Material Assets: Non-agricultural Properties		
			The boundary treatment will be reinstated to pre-construction condition and access to the property will be retained. Also see mitigation in **Chapter 9 – Noise and Vibration** and **Chapter 12 – Landscape and Visual**.
	113c	Roadbed	None required
	114b	Roadbed	None required
	115b	Roadbed	None required
	116a	Other – Canal	None required
	116b	Other – Towpath	None required
	117a	Undeveloped Land	None required.
	118e	Residential	None required; see **Note 2**
	118f & 118g	Roadbed	None required
	118h	Other – River Boyne	None required
	119a & 119e	Residential	See **Note 2**
	119a, 119b & 119c	Part of Access Track	Lane will be provided; see **Chapter 20 – Material Assets: Agricultural Properties**.
	119d	Roadbed	None required
	120b & 120d	Residential	The boundary treatment will be reinstated to pre-construction condition and access to the property will be retained.
	120c & 120e	Roadbed	None required
	121d	Residential	See **Note 2**
	121c & 121e	Roadbed	None required
	122c	Roadbed	None required
	123b, 123d & 123f	Roadbed	None required
	123a & 123e	Property Access	Provision of lane and reinstate existing field gate.
	124a	Private Access Track	Reinstate existing field gate and access.
	124b	Roadbed	None required
	125a & 125c	Private Access Track	The existing access and boundary treatment will be reinstated to pre-construction condition unless otherwise agreed with the landowner.
	125b & 125d	Roadbed	None required
	126a	Roadbed	None required
	127a	Roadbed	None required
	128a	Roadbed	None required
	129a	Roadbed	None required
	130a	Roadbed	None required
	131a	Roadbed	None required
	132a	Roadbed	None required
	133a	Roadbed	None required
	134a	Roadbed	None required
	135a	Roadbed	None required

EIAR Section Reference	Description of Mitigation Measures for Material Assets: Non-agricultural Properties		
	136a	Residence	Existing access will be retained. The boundary treatment will be reinstated to pre-construction condition unless otherwise agreed with the landowner.
	136b	Roadbed	None required
	137a	Residence	Existing access will be retained. The boundary treatment will be reinstated to pre-construction condition unless otherwise agreed with the landowner.
	137b	Roadbed	None required
	138a & 138b	Roadbed	None required
	139a	Roadbed	None required
	140a	Roadbed	None required
	141a	Roadbed	None required
	142a	Roadbed	None required
	143a	Roadbed	None required
	144a	Roadbed	None required
	145a	Roadbed	None required
	146b, 146d, 146e & 146f	Roadbed	None required
	147b	Roadbed	None required
	148e	Residential	None required; see **Note 2**
	148b, 148d & 148f	Roadbed	None required
	149a	Roadbed	None required
	150a & 150b	Roadbed	None required
	151a, 151b & 151c	Road Verge & Roadbed	None required
	201d, 201e & 201f	Roadbed	None required
	202a	Access Ramp/ Paved Area	The access ramp and boundary wall will be reinstated to pre-construction condition unless otherwise agreed with the landowner.
	202b	Roadbed	None required
	203a	Residence	The driveway entrance and boundary wall will be reinstated to pre-construction condition unless otherwise agreed with the landowner.
	203b	Roadbed	None required

Note 1:

- This table should be read in conjunction with **Figure 21.1(a)-(c) (Landholdings)**, as well as the maps in **Volume 3**, drawing series **MDT0806-RPS-01-N2-DR-C-DM1000 – DM1003** (Engineering Drawings).
- A CPO reference of '1xx' represents landtake related to the proposed N2 bypass and N51 realignment works. A reference of '2xx' represents landtake related to the proposed public realm enhancement proposals in Slane village.
- References to a, b, c etc. relate to individual plots, or where plots are adjacent to each other, but the use is different e.g. residential, roadbed etc. As this chapter deals only with non-agricultural property landtake, where the referencing sequence is not contiguous, this indicates the CPO belongs to an agricultural property e.g. 100c (residential), 100d (*agricultural*), 100e (roadbed) etc. Refer to **Chapter 20 – Material Assets: Agricultural Properties** for details of impacts on agricultural properties and farming enterprises.
- The blue shading in the table is used to denote very low impact from the landtake of roadbed/ road verge, which is a very low sensitivity property type.

Note 2:

EIAR Section Reference	Description of Mitigation Measures for Material Assets: Non-agricultural Properties
	Permanent and temporary landtake will be dealt with by way of compensation. Compensation is part of the CPO process and is not dealt with in the EIAR.
	Note 3: Landholding 100 denotes plots of land owned by MCC but is not specific to the Slane area; the total plot area of landholding 100 is therefore nominally defined for the purposes of this assessment as an estimate of plot areas around the Slane environs known to be in the ownership of MCC. The actual 'total plot area' would encompass both known and unknown areas of land in the ownership of MCC located throughout other parts of the county.
Operational Phase Mitigation	
21.5.2	Similar to the construction mitigation measures mentioned previously, operational mitigation measures have been considered on an individual property basis and details of these measures are shown in the individual assessments in **Table 21-6**. However, there are a number of measures that will be implemented across all non-agricultural properties, where required, and these are outlined as follows: • All drains, cables, conduits, pipes, rights of way and wayleaves etc. where such services are severed by the CPO during operation of the Proposed Scheme will be maintained or replaced, unless otherwise agreed with the landowner. • MCC shall undertake to replace (either along the same or alternative routes) all existing rights of drainage, rights of access to the public road network and easements across the lands to be acquired. • Where required, access to and from the public road network and way-leaves and routing for all existing services, including water, sewerage, electricity etc. will be provided to all severed properties. • Where required, suitable fencing/ boundary treatment shall be provided along the boundary of the Proposed Scheme. • The maintenance of this boundary fencing alongside the Proposed Scheme will be the responsibility of the local authority. • Notice of any maintenance access requirements (via wayleave) will be given to landowners by MCC in advance of maintenance works commencing.

Table 27-30: Summary Table of Monitoring Measures in the Material Assets: Non-agricultural Properties Chapter

EIAR Section Reference	Description of Monitoring Measures for Material Assets: Non-agricultural Properties
Construction Phase Monitoring	
21.7	No specific monitoring is proposed for the construction phase.
Operational Phase Monitoring	
21.7	No specific monitoring is proposed for the operational phase.

27.16 Chapter 22 – Material Assets: Utilities

Table 27-31: Summary Table of Mitigation Measures in the Material Assets: Utilities Chapter

EIAR Section Reference	Description of Mitigation Measures for Material Assets: Utilities
Construction Phase Mitigation	
22.5.1	In the majority of cases, conflicts with utilities have been mitigated through the design evolution. Additional mitigation in the construction stage, in the main relates to ongoing liaison and coordination with service providers, advance notice to local residents and business of any temporary interruptions to service and timely reconnection where disruption is required. The general good practice measures required to be implemented by the contractor in liaison with MCC in relation to Material Assets: Utilities are as follows: • All existing services will be confirmed prior to construction using service records, further GPR surveys and slit trenches to ensure that their position is accurately identified before excavation works commence. • Enabling works on utilities shall be programmed to maintain connections, or at least minimise downtimes, to public and private customers. • Early consultation shall be undertaken with service providers to enable providers to reroute their service during non-peak periods to maintain connections to customers. • Where diversions, or modifications are required to utility infrastructure: – It will be planned in advance by the appointed contractor and adequate notice (not less than 14 days) will be given to all impacted properties; and – Notification shall 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. • Where works are required in and around known utility infrastructure, precautions will be implemented by the appointed contractor to protect the infrastructure from damage and avoid unplanned interruptions. • Any damage to services as a result of the Proposed Scheme shall be repaired / replaced without delay. • Safety procedures will be put in place to minimise the risk to utility provider personnel and the general public during works on services. Protection measures during construction will include warning signs and markings indicating the location of utility infrastructure, safe digging techniques in the vicinity of known utilities, and in certain circumstances where possible, isolation of the section of infrastructure during works in the immediate vicinity. • Alternative connections shall be provided before any connections are severed. Supply to existing services will be maintained as far as possible during construction. • All proposed relocation / diversion works shall be delivered through the appropriate service provider processes e.g. Irish Water Developer Services – Diversion process. • For unknown utilities encountered during construction works, further liaison with utility providers will be required to establish the preferred solution. • Works effecting underground services shall be carried out strictly in accordance with the HSA (2016) Code of Practice for Avoiding Danger from Underground Services. • Works affecting electricity services must also be carried out strictly in accordance with the ESB (2019) Code of Practice for Avoiding Danger from Overhead Electricity Lines. Where construction equipment passes under lines, goalpost barriers will be established within a lateral distance of 6 m either side of the line, ensuring that tall vehicles will not come into contact with overhead lines during construction. A no-tip zone will also be established within 10 m of power lines. All proposed poles will be placed at a sufficient distance from proposed earthworks. • For 220 kV lines, an exclusion zone shall be established within a 6 m radius of the overhead lines and a hazard zone will be established within a lateral distance of 10 m either side the lines. • The ESB shall be contacted in a timely manner prior to finalising any designs of infrastructure within 30 m of the 220 kV centreline to ensure that all relevant Building Safety Clearances from the 220 kV OHL are in place.

EIAR Section Reference	Description of Mitigation Measures for Material Assets: Utilities
	• For the low voltage network of 10 kV, 20 kV, and 38 kV lines, an exclusion zone shall be established within a 3 m radius of the overhead lines and a hazard zone will be established within a lateral distance of 6 m either side the lines. • All proposed poles will be placed at a sufficient distance from proposed earthworks. • As part of the Public Realm Enhancement proposals, existing overhead services will be relocated underground, and poles removed throughout Slane village Architectural Conservation Area (ACA) where reasonably practicable. • Ducting shall be provided, where required and where practicable, to allow for the provision of services across the newly developed road and any lands compulsorily acquired to severed/retained properties and areas. • The relocation of the two poles on the southern bank of the River Boyne to facilitate diversion of the ESB line shall be outside the 10 m setback from the riverbank which is required to protect the riparian zone (see **Chapters 5**, **15** and **16** for further details). • The temporary access route along the field to reach the relocation point for the poles shall be achieved without the need to remove or cut back any hedgerow or tree line.
Operational Phase Mitigation	
22.5.2	As noted above, ducting shall be provided, where required and where practicable, to allow for the provision of services across the newly developed road and any lands compulsorily acquired to severed/retained properties and areas. Same will be retained during the operational phase and wayleaves will be maintained or granted to provide for continuation of all services to any homes/ properties where services have been intersected across the lands compulsorily acquired. No other significant effects have been identified for the operation phase and as such no mitigation measures are required.

Table 27-32: Summary Table of Monitoring Measures in the Material Assets: Utilities Chapter

EIAR Section Reference	Description of Monitoring Measures for Utilities
Construction Phase Monitoring	
22.7	No specific monitoring is proposed for the construction phase.
Operational Phase Monitoring	
22.7	No specific monitoring is proposed for the operational phase.

27.17 Chapter 23 – Material Assets: Resource and Waste Management

Table 27-33: Summary Table of Mitigation Measures listed in the Material Assets: Resource and Waste Management Chapter

EIAR Section Reference	Description of Mitigation Measures for Material Assets: Resource and Waste Management
Construction Phase Mitigation	
23.5.1	The Proposed Scheme will be delivered in compliance with the Standard and Technical documents related to the environment as presented in Chapter 5, **Section 5.10** (Environmental Management During Construction), including details of the Environmental Operating Plan. A Resource and Waste Management Plan (RWMP) will be prepared by the appointed Contractor to deliver the mitigation presented in this chapter of the EIAR. The RWMP will be prepared in accordance with the Best Practice Guidelines for the Preparation of Resources & Waste Management Plans for Construction and Demolition Projects (EPA, 2021).

EIAR Section Reference	Description of Mitigation Measures for Material Assets: Resource and Waste Management

The RWMP will, as a minimum address the following aspects of the Proposed Scheme:

- Analysis of the waste arising/material surpluses;
- Methods proposed for the prevention, reuse, and recycling of wastes;
- Material handling procedures;
- Proposals for disposal of waste at appropriately licensed facilities only; and
- Proposals for education and a workforce and plan dissemination programme.

A Waste Manager will be nominated who will have overall responsibility for the implementation of all waste processes. In conjunction with this, a clear responsibility structure will be introduced for the construction staff/contractor to ensure issues encountered are raised at an appropriate level and acted upon. This is essential in ensuring that all waste is properly dealt with.

The contractor will be obliged to implement and maintain the measures and actions contained within in the EIAR during the construction phase. Measures to be implemented on site will include:

- **Source Segregation:** Source separating wastes into dry mixed recyclables, biodegradable, and residual wastes. Clear labelling of waste bins, containers, skip containers and storage areas, including waste stream colour coding and photographs as appropriate.
- **Waste Auditing:** Good record keeping being conducted by the contractor including quantities (tonnes) and type of waste and materials leaving the site. The name, address and authorisation details of all facilities and locations to which waste and materials are delivered will be recorded along with the quantity of waste in tonnes delivered to each facility. Records will show material, which is recovered, and which is disposed.
- **Appropriate Storage:** Waste fuels/oils will be generated from equipment used on-site during construction and will be classified as hazardous waste. Paints, sealants, and hazardous chemicals etc. will be stored in secure, bunded locations. All hazardous waste will be separately stored and labelled, in appropriate lockable containers, prior to removal from site by an appropriately permitted waste collection service provider; and
- **Efficient Removal:** Waste generated on site will be removed as soon as practicable following generation for delivery to an authorised waste facility.

Any waste arising from the construction phase of the Proposed Scheme will be deposited at an appropriate facility (as listed in **Table 23-4**) in accordance with the current national waste policy. This is necessary so that all waste is disposed of to the best possible facility type to adhere to the circular economy and resource opportunity strategies.

If unforeseen waste or hazardous material is encountered during the Proposed Scheme, the appropriate authorities will be notified, and the material will be deposited at an appropriate waste facility. There is a possibility that unforeseen or hazardous material is encountered during excavation works.

Staff will be trained in how to identify contamination and how to manage it if encountered. Identification will include visual checks for unusual discolouration, oil sheens, anthropogenic materials, and checks for olfactory clues such as hydrocarbon or other odours. Suspect contaminated material will be sampled and appropriately analysed at laboratory.

Records will be kept on the quantity nature/type and quality of all waste leaving the site.

Noting the efforts already made through the design evolution for the Proposed Scheme in terms of reuse of cut material in noise and visual bunds, integral to the scheme (see **Chapter 9 – Noise and Vibration** and **Chapter 12 – Landscape and Visual**), further opportunities will be sought through detailed design stage to reuse soil and stone material arising from excavation works on site to further reduce the quantity of material needing to be removed off-site.

Concrete waste will be recycled into a new aggregate product by a specialist contractor (operating under Article 28 of the EC Waste Directive Regulations 2011 (referred to as end of waste material)).

By-product notifications (under Article 27 of the EC Waste Directive Regulations 2011) provide an opportunity for reuse of surplus clean soil and stone material arising from construction activity. At the time of construction, options for Article 27 by-product status or similar will be reviewed by MCC and the appointed contractor, subject to waste management and planning requirements being fully met. Such opportunities offer potential to further reduce indirect effects of waste management resulting from the transport of materials from site, notably traffic, noise, and air emissions from transport-related haulage.

Exported materials, particularly soils, will be carefully managed to restrict the spread of invasive alien plant species (IAPS); refer to **Chapter 15 – Biodiversity: Terrestrial Ecology** for further information on the management of IAPS.

Sustainable practices will be implemented when choosing materials to be used in the construction of the Proposed Scheme, including the use of cement containing high levels of GGBS or recycled steel; refer to **Chapter 19 – Climate** for further information relating to sustainable materials.

EIAR Section Reference	Description of Mitigation Measures for Material Assets: Resource and Waste Management
Operational Phase Mitigation	
23.5.2	The waste hierarchy principles will be fully implemented throughout the operational and maintenance phase to ensure that the circular economy approach is supported. Prevention, preparing for reuse, recycling and recovery will be enforced with appropriate waste management facilities chosen to accept disposed waste. The drainage design for the Proposed Scheme includes for both petrol/oil interceptors and vortex grit separators to ensure control of hydrocarbons and sediment entering the attenuation ponds. Notwithstanding these controls, given the sensitive nature of the receiving environment any sediments or vegetated material for disposal during maintenance will be considered contaminated unless testing of material is available to prove otherwise and it will be disposed of accordingly in an appropriately licensed facility. Sediment and plant waste is likely to require pre-treatment prior to disposal at a landfill site. This will take place either as the material is extracted or at the landfill site itself. Under no circumstances will sediment or vegetation arising from pond maintenance be disposed of on-site. Any waste arising from the operational and maintenance phases of the Proposed Scheme will be deposited at an appropriate facility (as listed in **Table 23-4**) in accordance with the current national waste policy at the time. This is necessary so that all waste is disposed of to the best possible facility type in order to adhere to the circular economy and resource opportunity strategies. All waste to be removed from the site will be required to be collected by valid waste collection permit holders. All facilities to which waste will be taken will have appropriate waste licenses or permits, under the Waste Management Act 1996 to 2016, as amended, and the regulations thereunder. Records will be kept on the quantity nature/type and quality of all waste leaving the site.

Table 27-34: Summary Table of Monitoring Measures in the Material Assets: Resource and Waste Management Chapter

EIAR Section Reference	Description of Monitoring Measures for Resource and Waste Management
Construction Phase Monitoring	
23.7.1	Monitoring will be undertaken and recorded by the contractor as follows: • Records will be kept of all truck movements relating to the removal of site clearance vegetation, topsoil, and construction soil. The records will include quantity, nature/ type and quality of the material, and the excavation and disposal locations. • Records will be kept on the quantity, nature/ type and quality of all waste leaving the construction site including individual waste and typical construction site waste. • Segregation of construction site waste will be carefully monitored with waste audits taking place at regular intervals.
Operational Phase Monitoring	
23.7.2	Monitoring will be undertaken and recorded by the appointed contractor as follows: • Contractors will be contractually obliged to ensure that good housekeeping practices are employed for all maintenance activities; and • Records will be kept detailing the de-silting of the attenuation ponds, including quantity, nature/ type and quality of the sediment and the permitted waste facility where it is disposed.

27.18 Natura Impact Statement

Table 27-35: Summary Table of Mitigation and Monitoring Measures in the Natura Impact Statement

NIS Section Reference	Description of Mitigation and Monitoring Measures in the Natura Impact Assessment
7.1	**Measures incorporated into the Design** The following measures have been incorporated and integrated into the Proposed Scheme design as described in Chapter 4 and Chapter 5. The key measures are: • A clear-span weathering steel plate girder bridge will be used in order to eliminate the requirement for any instream works, to eliminate direct ecological impact on the freshwater environment of the River Boyne and River Blackwater SAC and to minimise any barrier effect to certain species during the operation of the Proposed Scheme. • Working platforms will consist of reno-mattresses containing washed clean rockfill in order to prevent the introduction of any additional run-off in the form of sediment, particularly working platforms 3 and 4 located within the floodplain of the River Boyne and River Blackwater SAC (for details, refer to Chapter 5 – Description of the Construction Strategy, and Appendix 5.1 – Working Platform Design). • To facilitate the construction of bridge piers within the floodplain of the River Boyne and River Blackwater SAC, cofferdams will be constructed which will comprise of interlocking sheet piles. Cofferdams will provide an almost watertight environment, preventing any uncontrolled run-off during construction from reaching the River Boyne. Rainwater will enter the cofferdam at times and some groundwater may also ingress from the base of the cofferdam, both of which will be pumped out using a bowser and taken off-site to a suitably licensed facility for treatment/ disposal. • Nurse seeding and planting, and geotextiles and mats will be employed during the construction phase on all exposed earthworks slopes to limit the amount of sediment in rainfall or groundwater run-off. • Settlement ponds, check-dams and silt barriers will be installed during the construction phase to reduce sediment that has become suspended despite the erosion controls. • To minimise sediment run-off from stockpiles their locations have been carefully considered. Stockpiles will be: – Located away from drains, water bodies and flood zones; – Nurse seeded or provided with other surface protection appropriate to the length of time the stockpile is in place; – Provided with earth bunds or ditches on adjacent higher ground or slopes to prevent surface run-off reaching the stockpile; – Provided with silt fences around the toe of a stockpile to trap any sediment in run-off from the stockpile; and – Topsoil stockpiles will be tamped down and grass-seeded and protected by a surrounding silt fence. • Where groundwater is encountered, slope drains and external de-watering will be utilised. • The drainage design for the Proposed Scheme includes for measures to both mitigate any interference with the existing hydrology and to convey run-off from the proposed road scheme to proposed treatment and attenuation facilities prior to outfall to existing watercourse. • To assist with the proposed treatment of surface water run-off and to provide measures to reduce peak water flows to outfalls, six attenuation ponds together with vortex grit separators and petrol interceptors will be provided. • Control measures will be implemented to reduce the generation of airborne material (i.e. dust), including: – Use of water spraying of exposed earthworks and site haul roads during dry weather. Sediment tracked on plant will be controlled at exit from the site (i.e. wheel washes). – Spraying of earthworks during dry weather conditions will include for the provision of silt traps; – Self-contained wheel washes will be provided at site compounds as well as at site exit points; – Erosion control measures will be implemented as early as possible to protect exposed side slopes (i.e. erosion control mats and hydroseeding); – Site vehicle speeds will be limited to minimise the dust re-suspension; – Hard surface roads will be regularly swept; and

NIS Section Reference	Description of Mitigation and Monitoring Measures in the Natura Impact Assessment
	– Dust generation will be monitored as part of the management of construction activities. Dust monitoring locations will be established on site. A baseline dust measurement will be made in advance of works and an ongoing system of monitoring and remedial action will be implemented during the construction. • Measures will be implemented to maintain a clean and uncluttered site, including: – Daily inspections of the site will be carried out and a program of site tidying will be prepared; – Debris netting will be attached to scaffolding to prevent debris materials and equipment from falling from a height as both a debris matter and for health and safety reasons; – Food waste will be strictly controlled to prevent litter and/or attraction of vermin; – Wheel wash facilities will be provided for vehicles exiting the construction site. Wheel wash run off will be stored in an onsite storage tank and will be disposed of by permitted waste haulage company at a permitted or licensed facility; – There will be regular inspection and sweeping of public roads; and – Covering will be applied to loaded lorries and skips, if necessary. • A Resource and Waste Management Plan (RWMP) will be prepared by the contractor in advance of construction to ensure that the materials and waste arising during the construction and demolition phase of the Proposed Scheme will be managed and disposed of in a way that ensures compliance with the provisions of the Waste Management Act, 1996, as amended and associated Regulations as amended. The preparation of the RWMP will follow the EPA guidance (Best Practice Guidelines for the preparation of resource & waste management plans for construction & demolition projects, EPA 2021. • Earthworks will be phased into Phase 1 (Drainage) and Phase 2 (Earthworks): – Phase 1 will include the construction and nurse seeding of all permanent pre-earthworks ditches (PEDs) and attenuation ponds and the construction of all culverts as this will allow sufficient time for vegetation establishment on the base and sides of the ponds prior to the commencement of the main earthworks and will allow the permanent attenuation ponds to be utilised as temporary settlement ponds for the treatment of construction run-off; and – Phase 2 will include earthworks of the proposed mainline and side roads which have been divided into zones based on existing and proposed topography, and existing and proposed road layouts. The construction of the zones will be carried out in the sequence set out below to reduce the risk of sediment-laden run-off entering the River Boyne and River Blackwater SAC and SPA directly or indirectly. • Machines will be checked regularly for evidence of hydrocarbon leaks. While machines are parked-up on the working platform, a contaminant containment tray will be placed beneath them. These trays will be removed from the working platform at the end of each day and any contaminants they have collected disposed of accordingly. An early warning system will be implemented to monitor rainfall and upstream river levels in real-time. Once set thresholds are exceeded all materials, plant and equipment will be removed from the platform.
Pre-construction Mitigation & Monitoring	
7.2.1	**Pre-construction Works** **Appointment of Environmental Team** Prior to commencement of any works related to the Proposed Scheme, the following key environmental personnel shall be appointed (see **Chapter 5 – Description of the Construction Phase**): • **Contractor's Environmental Clerk of Works (ECoW):** to ensure that the mitigation measures outlined in this document and the outline Environmental Operating Plan (EOP) (including any updates to these documents following consent) are implemented in full and to supervise works with respect to sensitive habitats and/or species (including the control/eradication of invasive species). • **Contractor's Project Ecologist(s):** to supervise all pre-construction ecological surveying, implementation and overseeing of ecological mitigation measures and ensuring that activities on site are conducted in accordance with the planning permission as they pertain to ecological matters and specifically any works that could have an effect on the River Boyne and River Blackwater SAC and/or SPA, their qualifying interests (QI) and special conservation interests (SCI) respectively.

NIS Section Reference	Description of Mitigation and Monitoring Measures in the Natura Impact Assessment
	• **Client Environmental Representative (CER):** MCC shall appoint the CER before the commencement of works. The CER shall act as the '*MCC representative*' and liaise directly with the contactor's environmental staff, review reporting deliverables, and supervise site activities as required. • **Client Project Ecologist:** MCC shall appoint the Client Project Ecologist before the commencement of works. to supervise all pre-construction ecological surveying, implementation and overseeing of ecological mitigation measures and ensuring that activities on site are conducted in accordance with the planning permission as they pertain to ecological matters and specifically any works that could have an effect on the River Boyne and River Blackwater SAC and/or SPA, their qualifying interests (QI) and special conservation interests (SCI) respectively. **Note:** When mitigation measures extend beyond the construction phase (undertaken by Contractor), and thereafter require 'monitoring' during the operational phase, Meath County Council will be responsible for the commission of a suitably qualified person(s) to monitor their effectiveness.
7.2.2	**Pre-construction Ecological Surveys** Prior to commencement of any works, the following pre-construction surveys will be completed by a qualified person(s): • **Otter surveys:** evidence of otter was recorded along the River Boyne, the Boyne Canal and the Mattock (Mooretown) stream. No breeding or resting sites were recorded within the ZoI of the Proposed Scheme. However, prior to any works being carried out, a pre-construction otter survey will be carried out to ensure that otter has not taken up residence or established any new territories within or in close vicinity to the footprint of the Proposed Scheme. The survey will be completed within the footprint of the proposed scheme and 200m up and downstream of this footprint. The survey will confirm the presence/absence of otter holts, resting sites (couches) and any other signs of otter activity within the survey area. The survey will be completed with reference to Guidelines for the Treatment of Otter Prior to the Construction of National Road Schemes (NRA, 2006b) or whatever guidelines are pertinent at that stage in the event that those guidelines are updated and superseded. The survey will be completed during optimal seasonal/weather conditions and will be completed by competent, experienced otter surveyor(s). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline no such derogation licensing is necessary; • **Kingfisher surveys:** evidence of kingfisher was recorded along the River Boyne. One nesting site was recorded upstream of the Proposed Scheme, however no adverse effects were predicted. Although no suitable nesting habitat was noted within the footprint of the Proposed Scheme, the precautionary principle has been applied and prior to any works being carried out, a pre-construction kingfisher survey will be carried out to ensure that kingfisher has not established any new territories within or in close vicinity to the footprint of the Proposed Scheme. The survey will be completed within the footprint of the proposed scheme and 200m up and downstream of this footprint. The survey will confirm the presence/absence of kingfisher nesting sites and any other signs of kingfisher activity within the survey area. The survey will be completed during optimal seasonal/weather conditions and will be completed by competent, experienced ornithologist(s). The findings of the pre-construction survey will be reviewed with respect to the Proposed Scheme in relation to whether the updated findings trigger a requirement for a species derogation licence from NPWS; based on current baseline no such derogation licensing is necessary; and • **Invasive Alien Plant Species survey:** the presence of Japanese Knotweed Reynoutria japonica and Himalayan Balsam Impatiens glandulifera have been identified in the vicinity of the Proposed Scheme. The survey will be undertaken within the lands made available and all stands of Schedule 3 species will be taped off to prevent accidental spread. An Invasive Alien Species Avoidance and Management Plan will also be prepared by an ecologist/invasive species specialist and shall build on the baseline data presented in this statement; including the findings of the pre-construction survey. The Plan will include any measures to manage, control or eradicate any identified Schedule 3 species prior to and during the construction phase of the Proposed Scheme. The plan will also identify any licensing or approvals necessary from NPWS, EPA or other to enable the implementation of the plan. Based on the findings of the pre-construction surveys, mitigation for each of these species set out in the EIAR will be reviewed and, if necessary, augmented accordingly by the ECoW; particularly with respect to whether any derogation licensing or other approvals are triggered by the findings

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	of the pre-construction surveys. Any adjustment to the mitigation measures will be agreed with the Client in advance of them being implemented. The pre-construction surveys will be supplemented by further inspection of any identified otter holt/resting site, kingfisher nest or IAPs stand by the ECoW (as deemed necessary by them) immediately prior to site clearance.
7.2.3.1	The following mitigation measures will be implemented prior to and during the completion of the pre-construction ground investigations and archaeological testing. **Within the Proposed LMA** The following mitigation will be implemented prior to the construction phase during ground investigation works. Ground investigation works will consist of a mix of percussion drilling and rotary coring. • An ECoW and a suitably-qualified and experienced Project Ecologist will be appointed by MCC to supervise the proposed GI works and to ensure compliance with relevant legislation, planning conditions and to ensure the implementation (in whole or part) of the mitigation measures in the planning approval as may be granted as relevant to the pre-construction GI works; • No ground investigation testing will be permitted outside the lands made available for the Proposed Scheme; • Works at sensitive locations will be carried out under the strict supervision of and to the approval of an ECoW appointed to supervise the works; • Ground investigation will not be undertaken within 10m of the River Boyne; • Soil/subsoil removed for GI works will be piled near to the trench and a minimum 10 m setback from watercourses. Each excavation will be backfilled as soon as possible to avoid prolonged exposure and to ensure sediment does not erode or wash away; • Each location for excavation will be assessed for potential pathways for run-off to the River Boyne and measures to prevent uncontrolled run-off will be implemented (see **Section 7.3.2.4** and below): – Silt barrier fencing will be used around excavations to prevent uncontrolled run-off. – Each excavation will be backfilled as soon as possible to avoid prolonged exposure and to ensure sediment does not erode or wash away. – Works will be carried out under the strict supervision of and to the approval of an ECoW appointed to supervise the works. – When working within the flood plain of the river Boyne, weather conditions will be closely monitored and works will not be undertaken when periods of heavy rainfall are predicted, which could result in flooding of the area. – Plant will not be left within the flood plain overnight and will be mobilised daily as required from locations outside the flood plain. – Considering the nature of the existing soft ground within the flood plain area, access into the site will be a carefully controlled process. Access will be from the existing Boyne Canal towpath and bog mats will be placed over the existing ground in advance of machinery, such as borehole rigs and excavators entering into the area. At each location of an excavation, a silt barrier fence will be erected around the site to prevent any run-off reaching the river as the excavation takes place and excavated materials temporarily stored within the area protected by the silt fence. Each excavation will be backfilled as soon as practicable and vegetated topsoil reinstated on completion. – All hydrocarbons will be stored and all refuelling will take place outside the floodplain of the SAC. • Existing field access points/routes will be used to avoid disturbance/removal of hedgerows, trees and scrub. In the event that such field access points/routes are not available, the removal of hedgerows, trees and scrub will be minimised to only the extent required for access. Any vegetation removal will be completed outside the breeding bird season (March to August, inclusive) unless the Project Ecologist has confirmed that no breeding birds, their active nest or dependent young are present immediately prior to the works commencing. Any trees needing to be removed will be assessed for bat roosting by the Project Ecologist prior to them being removed and any derogation requirements identified and implemented according to any derogation licence obtained. • With respect to the pre-construction archaeology investigations, the TII Project Archaeologist will liaise with the Project Ecologist for the Proposed Scheme, in advance of any disturbance, with regard to the mitigation strategy for terrestrial ecology. The archaeology testing strategy

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	will have regard for the Guidelines for the testing and mitigation of the wetland archaeological heritage for national road schemes (NRA, 2005).
7.2.3.2	**Within the River Boyne Floodplain** In addition to the measures detailed above (Section 7.2.3.1), the following measures will also be implemented when undertaking ground investigation works within the River Boyne floodplain: • Works within the River Boyne floodplain will be carried out under the strict supervision of and to the approval of an ECoW appointed to supervise the works; • Access to the River Boyne floodplain will be from the existing Boyne Canal towpath and ground protective bog mats will be put in place prior to the commencement of any works within the River Boyne floodplain; • When working within the flood plain of the river Boyne, weather conditions will be closely monitored and works will not be undertaken when periods of heavy rainfall are predicted, which could result in flooding of the area; • Plant will not be left within the flood plain overnight and will be mobilised daily as required from locations outside the flood plain; • Core samples in the River Boyne floodplain shall only be taken during the bridge foundation construction period and at the same locations as the bridge piers to avoid further ground disturbance; and • Disturbed areas of soil will be returned to its former use. With respect to the archaeological testing, in addition the following mitigation measures will be implemented: • Archaeological testing of areas of archaeological potential located within the floodplain of the River Boyne (ACH05 & ACH08) will minimise ground disturbance. To achieve this, testing within the floodplain will be carried out (ground conditions allowing) after the advanced testing programme, within the footprint of the coffer dams and attenuation ponds, if necessary during the site preparation works phase and before construction takes place; • Core sampling within the River Boyne floodplain will take place during the bridge foundation construction period and at the same locations as the bridge piers to avoid further ground disturbance; • No test-trenches will be placed within 10m of the River Boyne or any other waterways crossed by the Proposed Scheme; • Where trenches are in proximity to watercourses, the material taken out of test trenches shall be placed, as far as possible, on the landward side of the trench. • The TII Project Archaeologist for the proposed scheme will liaise with the Project Ecologist appointed by MCC to supervise the GI and archaeological works with regard to these measures.
Construction Phase Mitigation & Monitoring	
7.3.1	**Environmental Operating Plan** An EOP for the Proposed Scheme has been prepared and is available in **EIAR Volume 4**, **Appendix 5.6**. The EOP contains all the mitigation measures as detailed in the EIAR and this NIS. Following grant of planning consent, the appointed Contractor will be responsible and take ownership of the EOP. Prior to the commencement of construction phase, the Contractor will update the EOP to take account of any conditions attached to planning consent and to include the level of mitigation detail required by that consent prior to commencement of construction for the identified mitigation measures. The updated EOP will be subject to the Client's approval prior to the commencement of construction. During the construction phase, the Contractor and Client will undertake a monthly review of the implementation of the mitigation measures identified within the approved EOP, taking inputs and feedback from the appointed Environmental Team. Following the completion of the monthly reviews, the Contractor will be responsible for any further updates of the EOP necessary to address any issues identified during the review process. Such updates will be approved by the Client. The Contractor will be responsible for the implementation in full of the approved EOP throughout the construction phase in accordance with NRA/TII guidelines (refer to **Chapter 5**). The EOP will set out the Contractor's approach to managing environmental issues associated with construction of the Proposed Scheme and provide a documented account to the implementation of the

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	environmental commitments set out in the EIAR and NIS and measures stipulated in the planning conditions.
7.3.2	**For the Protection of QI River Lamprey, QI Atlantic Salmon and QI Otter (River Boyne and River Blackwater SAC)**
7.3.2.1	**Artificial Lighting** Light spill onto the river channel during hours of darkness (i.e. critical bridge lifts) has the potential to form a temporary barrier to the movement of foraging and commuting nocturnal QI species (Otter, River Lamprey and Atlantic Salmon). Measures to control the effects of artificial lighting, shall include: • During daytime working, all lights shall be turned off prior to darkness periods. This will eliminate any risk to sensitive receptors as a result of lighting used during daytime hours; • Where artificial lighting is required during periods of night working, directional lighting (i.e. lighting which only shines on roads and not adjacent habitats) shall be used to prevent overspill. This will be achieved by the design of the luminaire and by using accessories such as hoods, cowls, louvers and shields to direct the light to the intended area only; and • Where lighting may spill (although highly unlikely with application of the above measures) onto nearby habitats, light spill shall not exceed 1 lux. To put this in perspective, 0.2 lux level is equivalent to moonlight (BCI, 2010).
7.3.2.2	**Noise Emissions** Noise emissions, have the potential to cause displacement and a barrier to the movement of migrating, and foraging and commuting QI species (otter). A range of best practice control measures shall be adopted for the construction phase, they include: • Construction noise shall be kept to a minimum in accordance with BS 5228 (2009). To monitor compliance with the specified construction noise level limits, environmental noise monitors will be installed at the selected locations prior to the construction works commencing on site; • Construction generated vibration at sensitive receptors shall be subject to specified upper limits. Prior to the construction works commencing on site, environmental vibration monitors will be installed at the selected locations; • Rock breaking methods which minimise noise and vibration shall be used; • Sheet piles required for the construction of cofferdams and the Boyne crossing foundation shall utilise methods that will minimise the risk of vibration being generated (i.e. piling will be via drilling auger and bucket) and will only be undertaken in daytime; • Temporary 2.4 m high acoustic barriers shall be installed at the site compounds; • The contractor shall be required to install additional temporary screening at southern end of the bridge that will be capable of providing a reduction of 10 dB(A) at the nearby noise sensitive locations; • Construction shall be phased to minimise the duration of activities in each area; • Where works need to be completed outside normal working hours or the contractor's method statement for any proposed works permission for these works shall be sought from the County Council in advance of any works taking place. The application for such works shall require a detailed noise control plan and follow up report to be prepared; • A noise and vibration monitoring programme shall be implemented for the duration of the construction phase; • Full details of the contractor's provision for noise and vibration monitoring and procedures including provisions for publication of monitoring results shall be submitted to and approved by the County Council prior to commencement of work. The County Council shall have discretion to vary the monitoring requirements and publication of results during the course of construction; and • Blasting is not expected to be necessary for the duration of the construction phase and shall not be permitted during the course of the works. Additional measures also include: • Exclusion zones for otter: otters are evidenced as using watercourses throughout the study area, particularly along the River Boyne and its proximal complex of wetland habitats which support suitable feeding and commuting habitat. Otters do not limit their movements to watercourses and can enter hinterlands to search for prey species, such as frogs and newts where available. An exclusion zone and set-back of 10 m from the riverbank is included in the design proposals to accommodate free movement of otter along these riparian habitats. No work shall be permitted within this exclusion zone.

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7.3.2.3	**Habitat Loss** Habitat loss (topsoil stripping, excavation and filling) within the floodplain of the River Boyne and River Blackwater SAC will occur in order to accommodate Working Platforms 1, 2, 3 and 4 (reno mattresses), which will further accommodate the construction of cofferdams. In order to minimise impacts of temporary habitat loss within the River Boyne and River Blackwater SAC (i.e. terrestrial habitat used by QI otter), the following measures will be completed: • Vegetation clearance will be programmed to avoid the bird nesting season (1 March to the 31 August, inclusive); • Vegetation/surface stripping will not be removed too far ahead of working platform construction in order to minimise erosion, run-off or dust from exposed unvegetated surfaces; and • Surface vegetation will be carefully removed in turves (i.e. intact block of vegetation and soil) for later re-instatement or re-location elsewhere within the SAC. In order to remediate temporary habitat loss within the River Boyne and River Blackwater SAC (i.e. terrestrial habitat used by QI otter), the following measures will be completed: • Monitoring of weather forecasting reports will be undertaken in the lead up to removal of the temporary reno-mattress work platforms such that the works including the subsequent reinstatement will be carried out during an extended settled weather period in which time platforms can be installed when there is low risk of over-bank river flows on the Boyne. This will occur in the spring/summer months when grasses can re-establish within that growing season for protection over the ensuing winter; • Any ground damage and habitat loss within the SAC will be remediated to ensure that any bare soil is stabilised and habitats returned to their former function. This habitat will be reinstated through reseeding with appropriate wet/damp native meadow grasses following the completion of the construction work; • Remediation will start as soon as construction works have ceased; • Remediation will involve the development of a Habitat Restoration and Monitoring plan prepared by a qualified person(s) appointed by MCC in consultation with the NPWS. The plan will be implemented. The plan will detail the following: – the re-instatement of stripped surface turves, where possible – the use of stabilising materials to allow for natural regeneration through reseeding. Ground remediations will not include the use of artificial fertilisers – a monitoring schedule to assess site stabilisation and revegetation progress such as seed germination, recruitment of native species and determining/correcting any problems (i.e. erosion) – habitat monitoring will be completed on a monthly basis and once vegetation is established and site stabilisation is achieved, monitoring will continue on a quarterly basis for three years thereafter – progress reports will be completed on a monthly basis and once vegetation is established and site stabilisation is achieved, progress reports shall be completed on a quarterly basis for three years; – after the three year period (of vegetation establishment) a final report will be prepared which will summarise the following: ○ the name, title, and company of all persons involved in restoration monitoring and report preparation; ○ maps or aerials showing restoration areas and photo documentation ○ an explanation of the methods and restoration techniques used to perform the work ○ a description of the vegetation communities, the size of the restoration area restored, and any maintenance activities completed. – the wet meadow habitat will be retained under the control of MCC and it will be managed for the sole benefit of biodiversity in order to complement the existing biodiversity features of the SAC (and SPA).
7.3.2.4	**Control of Water Pollution**
7.3.2.4.1	**<u>General Pollution Control</u>** **Suspended Solids** The following measures for erosion and sediment control will be adhered to by the contractor. These measures are proposed to restrict the release of suspended solids from entering

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watercourses including those directly within or associated via downstream connectivity to the identified European sites.

- There will be no direct discharge of surface water from any element of the works;
- Silt fences and silt traps will be provided for all watercourses during construction and will adhere to IFI (2016) Guidelines;
- Silt fences will comply with the requirements of ASTM D6462 – 19 Standard Practice for Silt Fence Installation and Maintenance (June 2019) (ASTM, 2019);
- Silt control measures will be installed correctly and monitored regularly (i.e. daily by the contractor and weekly by the ECoW). Any remedial measures shall be identified by the ECoW;
- The contractor will monitor weather forecasts for heavy rain and where required, certain works and in particular excavations will cease to minimise exposed soil entering surface water run-off. Excavations for foundation shall be carried out so as to minimise sediment runoff (e.g. soil excavation will not be completed during periods of prolonged or heavy rain (i.e. Met Éireann Amber rain warning);
- Any stockpiles will be located greater than 100 m from any watercourse (not within the boundary of SAC/SPAs) and will be covered with an impermeable material (e.g. tarpaulin);
- Clearly defined working areas, delineated by temporary protective fencing will be required, and are essential to ensure there is a sufficiently large buffer zone between working areas and nearby watercourses and to avoid accidental incursion by personnel, materials or equipment;
- The creation of fords on streams and rivers through the introduction of stone will be prohibited; and
- An Environmental Incident and Emergency Response Plan will be prepared by the contractor detailing the steps to be undertaken in the event of a spillage of chemical, fuel or other hazardous wastes (e.g. concrete) will be put in place by the contactor prior to commencement of construction and will prescribe the process from investigation of the spillage to generating a plan to avoid a future incident occurring.

Pollution with Other Substances

The following guidelines based on Chilibeck et al (1992) and NRA (2005) will be followed for the protection of all watercourses from pollution with other substances:

- The storage of oils, fuel, chemicals, hydraulic fluids, etc. will not occur within 100 m of all watercourses and will be undertaken in accordance with current best practice for oil storage (Enterprise Ireland, BPGCS005) on an impervious base within a bund and appropriately secured;
- All machinery operating in these locations will be steam-cleaned in advance of works and routinely checked to ensure no leakage of oils or lubricants occurs;
- All fuelling of machinery will be undertaken at least 100 m set-back from all watercourses;
- Raw or uncured waste concrete will be disposed of by removal from the site;
- Wash down water from exposed aggregate surfaces, cast-in-place concrete and from concrete trucks will be trapped on-site to allow sediment to settle out. Discharge of the wastewater to water bodies will not be permitted. Clarified water is released to a drain system or removed to a suitable licensed facility;
- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the site and properly disposed of;
- Oil booms and oil soakage pads will be kept on site to deal with any accidental spillage; and
- Prior to any instream works, the contractor will ensure that all construction equipment is mechanically sound to avoid leaks of oil, fuel, hydraulic fluids and grease.

Use of Concrete

The use and management of concrete, which has a deleterious effect on water chemistry and aquatic habitats and species, in or close to watercourses and waterbodies shall be carefully controlled to avoid spillage. Alternate construction methods have been proposed to ensure avoidance of contamination with concrete, (e.g. use of pre-cast units, stream diversions to undertake works in the dry, and permanent formwork). All avoidance measures will reduce the risks associated with concreting works. Where the use of concrete near water cannot be avoided, (e.g. for in situ stitching), the following control measures will be employed:

- When working in or near the surface water and the application of in-situ materials cannot be avoided, the use of alternative materials such as biodegradable shutter oils shall be used;

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- Any plant operating close to the water will require special consideration of the transport of concrete from the point of discharge from the mixer to final discharge into the delivery pipe (tremie). Care will be exercised when slewing concrete skips or mobile concrete pumps over or near surface waters;
- Placing of concrete in or near watercourses will be carried out only under the supervision of the ECoW;
- There will be no hosing of concrete, cement, grout or similar material spills into surface water drains. Such spills shall be contained immediately and runoff prevented from entering the watercourse;
- Concrete waste and wash-down water will be contained and managed on site to prevent pollution of all surface watercourses;
- On-site concrete batching and mixing activities will not be allowed and will be specifically prohibited in the contract documents;
- Washout from concrete lorries, with the exception of the chute, will not be permitted on site and will only take place at the batching plant (or other appropriate facility designated by the manufacturer);
- Chute washout will be carried out at designated locations only. These locations will be signposted. The concrete plant and all delivery drivers will be informed of their location with the order information and on arrival on site;
- Chute washout locations will be provided with appropriate designated, contained impermeable area and treatment facilities including adequately sized settlement tanks; and
- The clear water from the settlement tanks shall be pH corrected prior to discharge (which shall be by means of one of the construction phase settlement facilities) or alternatively disposed of as waste to a licensed facility.

Environmental Incidents and Accidents

- An emergency-operating plan will be established to deal with incidents or accidents during construction that may give rise to pollution within any watercourse. This will include means of containment in the event of accidental spillage of hydrocarbons or other pollutants (including oil booms, soakage pads, etc.);
- Throughout all stages of the construction phase of the proposed road project the contractor will ensure that good housekeeping is maintained at all times and that all site personnel are made aware of the importance of the freshwater environments and the requirement to avoid pollution of all types;
- All hazardous materials on site will be stored within secondary containment designed to retain at least 110% of the storage contents;
- Temporary bunds for oil/diesel storage tanks will be used on the site during the construction phase of the project as appropriate;
- Safe handling of all potentially hazardous materials will be emphasised to all construction personnel employed during this phase of the project and an emergency response plan shall be in place, in case of accidental spillage;
- Raw or uncured waste concrete will be disposed of by removal from the site;
- Any spillage of fuels, lubricants or hydraulic oils will be immediately contained and the contaminated soil removed from the site and properly disposed of; and
- There will be no discharge of un-attenuated water to the adjacent marine environment.

Oil and Chemical Spillages

- The type, size and location of the spill will be identified;
- If possible, stop the source of the spill and control the area of the spill;
- If the oil spill is small in nature, it will be treated with an appropriate spill kit to reduce the effect of the spillage i.e. a suitable absorbent material will be used to absorb/remove the spill;
- In the event of a significant oil spill occurring, an appropriate licenced contractor will be employed to determine the extent of the area affected and to implement an appropriate clean-up operation in line with suitable standards;
- Material will be removed and disposed of in accordance with the Waste Management Plan prepared by the contractor;
- In the event of a chemical spill, stop the source of the spill and control the area;

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	• If the spill is hazardous or toxic in nature warn all in the vicinity use an appropriate clean up kit or if a large spill occurs employ a licenced contractor to carry out remediation works; • The Project Ecologist will be informed in the event of a spillage occurring. A programme of mitigation will be put into place to address the spill; • The Project Ecologist will inform MCC so the relevant bodies will be notified; • All fuels, oils and chemicals will be stored in a designated bunded storage area and stored in a manner that will ensure no environmental impacts occur; and • Bunds or bunded containers will have a bunded capacity of 110% of the largest tank or 25% of the total volume of material stored. **Plant Management** • All plant will be checked and active monitoring carried out to prevent leaking of hydrocarbons/chemicals; • Stationary plant machinery will have drip trays located beneath if located within an environmentally sensitive area; • When refuelling, care will be taken to prevent spills by using appropriate equipment; • Where feasible, refuelling will take place at least 50-100 m away from watercourses; • Unauthorised Waste Disposal • All waste generated on site will be transported by a permitted waste carrier and suitably disposed of at a licensed waste facility; • No waste will be buried, burnt, dumped on-site or in land adjacent to the site as this will be considered as unauthorised waste management; and • In the event of unauthorised waste management, the cause and impact will be assessed. **Dust Suppression and Water Abstraction** • Abstraction from local water courses for use as dust suppression will not take place. • Wheel washes will be self-contained systems that do not require discharge of the wastewater to water bodies and water misting or sprays shall be used as required if particularly dusty activities are necessary during dry or windy periods. • Site roads shall be regularly cleaned and maintained as appropriate. • Hard surface roads shall be swept to remove mud and aggregate materials from their surface while any un-surfaced roads shall be restricted to essential site traffic only. • Any site roads with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions (also applies to vehicles delivering material with dust potential). • Stockpiling of materials will be designed and laid out to minimise exposure to wind.
7.3.2.4.1.1	**River Boyne** An ECoW will be employed by the contractor to be present during key parts of the construction phase in order to protect water quality and avoid potential impacts on aquatic receptors. General control measures in order to prevent waterborne pollutants from entering the River Boyne during the construction of the Boyne bridge crossing, include: • Monitoring of weather forecasting reports will be undertaken in the lead up to construction of the temporary work platform such that installation of reno-mattresses will be carried out during an extended settled weather period in which time platforms can be installed when there is low risk of over-bank river flows on the Boyne; • All sources and pathways of sediment loss will be controlled according to details set out in Phases 1-5 of the construction methodology (see **Section 2.2** and **Section 7.2.1**) • This will require a documented schedule of daily, weekly and monthly implementation and efficacy checks of all water quality protection measures in the areas of sediment control and treatment (e.g. silt fences, check-dams, attenuation ponds). A proposed monitoring schedule is set out in **Section 7.3.2.4.2**; • During and immediately after heavy periods of rain, earthmoving activities shall be reviewed with temporary restrictions where necessary while sediment control measures are bolstered and / or ground dries out to the point that sediment wash-out is not occurring; • All sources and pathways of concrete loss will be controlled according to details set out in Phases 1-5 of the construction methodology (see **Section 2.2** and **Section 7.2.1**)

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	• This will require a documented schedule of daily, weekly and monthly implementation and efficacy checks of all water quality protection measures in the areas of concrete and concrete wash-water control and treatment (e.g. pH monitoring of pump-out waters and attenuation ponds). A proposed monitoring schedule is set out in **Section 7.3.2.4.2**; • All sources and pathways of hydrocarbon loss are controlled according to details set out in Phases 1-5 of the construction methodology (see **Section 2.2** and **Section 7.2.1**) • This will require a documented schedule of daily, weekly and monthly implementation and efficacy checks of all water quality protection measures in the areas of hydro-carbon storage and control (e.g. storage and refuelling areas). A proposed monitoring schedule is set out in **Section 7.3.2.4.2**; • A Surface Water Monitoring Programme will be prepared by the contractor and employed to monitor functionality and effectiveness of the prescribed mitigation measures throughout the proposed Boyne bridge construction period. The programme will include identified trigger points and actions relating to principal pollutants (sediment or concrete wash out); and • Silt fences will comply with the requirements of ASTM D6462 – 19 Standard Practice for Silt Fence Installation and Maintenance (June 2019) (ASTM, 2019) and will also include a double geotextile layer where works are to be completed within the vicinity of the River Boyne.
7.3.2.4.1.2	**Cofferdam Water Ingress** Control measures in order to prevent waterborne pollutants from entering the River Boyne during the construction of the Boyne bridge (i.e. bridge foundations and piers within the floodplain), include: • On-site pumps will be present to dewater as required at cofferdam containment areas; • On-site containment storage facilities of sufficient volume will be present to hold this pump out water prior to removal for appropriate treatment; • Ingress water will not be directly discharged to either the River Boyne or any adjoined drainage channels. In the absence of appropriate treatment, pump-out water will not be directly discharged to the attenuation ponds or general environment at any other location; • Pump-out water will be regularly monitored for pH, hydrocarbons and TSS. A proposed monitoring schedule is set out in **Section 7.3.2.4.2**; and • Stored contaminated cofferdam pump-out water will be pH monitored (see **Section 7.3.2.4.2**) and removed for treatment at an appropriate licenced off-site facility. If treated for pH the pump-out water will be discharged to the site attenuation ponds for attenuation of TSS and hydrocarbon.
7.3.2.4.1.3	**Mattock (Mooretown) Stream** Control measures in order to protect aquatic habitats and species within the Mattock (Mooretown) Stream include: • No in stream works on the Mattock (Mooretown) Stream will be carried out without the agreement of Inland Fisheries Ireland (IFI); • The Mattock (Mooretown) Stream will be treated as fish bearing (trout, eel, brook lamprey). As per fisheries restrictions stipulated by IFI, any instream works shall, therefore, be carried out during the period 1 July to 30 September of any year; • The finalised culvert designs and stream crossing method statement will be agreed with IFI; • Box culverts will be laid to meet the gradient of the existing channel and will be subject to a minimum embed of 500 mm. Similarly, a pipe culvert on the Slane stream drain (tributary of the Mattock) must be a minimum of 900 mm diameter and be subject to embed of 300 mm, laid at the same gradient as the existing bed level; and • As a precaution, the Mattock (Mooretown) Stream will be de-stocked of fish as part of instream works covering the reach of the 3 No. locations for culvert installation. Fish removal shall be carried out only by authorised personnel under electro-fishing licence and in agreement with, or under supervision of IFI. • Control measures in order to prevent waterborne pollutants from entering the Mattock (Mooretown) Stream during culvert installation, include: • A suitable method for culvert installation and channel realignment will be agreed with IFI prior to works commencing; • A temporary diversion is proposed in order for culvert installation and channel realignment to be carried out in dry conditions with no severance of channel continuity during the construction period;

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	• The temporary diversion channel will be of a calculated width and depth that will pass high frequency flood events (at least Q_{med}). The channel will be constructed in advance, off-line, with a soil/vegetation bund between it and the stream; • The channel will be lined with appropriate waterproof geo-textile material and the bottom of the channel lined with appropriate, locally sourced, low-fine content gravels of a size class agreed in advance with IFI; • There can be no crossing of the temporary channel by machines and no direct discharge of pollutants or pump-out water to the diversion channel from the construction works area. Water may ingress to the works area, and all such construction related pump-out water will be directed to Attenuation Pond 6A (which will be constructed in advance of main works) for settlement of suspended solids; and • Silt fences will comply with the requirements of ASTM D6462 – 19 Standard Practice for Silt Fence Installation and Maintenance (June 2019) (ASTM, 2019) and will also include a double geotextile layer where works are to be completed within the vicinity of the Mattock (Mooretown) stream.
7.3.2.4.2.1	**Surface Water Monitoring Procedure** **River Boyne Monitoring Locations** Samples must be taken from each bank (north and south) with a long reach sampling pole, collecting from as far out into the channel as is practicable. There will be 6 No. monitoring points on the River Boyne in relation to the bridge crossing reach, 2 No. attenuation pond outfalls and 2 No. locations on the canal as illustrated in Figure 7.1 and explained as follows: • 2 No. upstream A sites: one from each bank at locations immediately upstream of the crossing works reach that are outside the influence of the project; • 2 No. downstream B sites: one sample from each branch of the Boyne, north and south of the mid-channel island, 100 m downstream of the Boyne bridge pier work platforms; • 2 No. downstream C sites: one sample taken from each bank of the river a further 200 m downstream of the above sites i.e. a total of 300 m downstream of the Boyne bridge pier work platforms; • Canal: one sample upstream of Attenuation Pond 2 outfall and one sample approx. 250 m downstream; and • Outfall channels of Attenuation Ponds 2 and 3. See Sample Frequency below for the schedule of sampling. **Figure 7.1: River Boyne Construction Phase Monitoring Locations** 

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7.3.2.5.2.2	**Mattock (Mooretown) Stream Monitoring Locations** There will be 2 No. monitoring points on the Mattock (Mooretown) stream relating to culverting works and 3 No. attenuation pond outfalls as illustrated in **Figure 7.2** and explained as follows: • 2 No. downstream C sites; one sample taken from each bank of the river a further 200 m downstream of the above sites i.e. a total of 300 m downstream of the Boyne bridge pier work platforms; and • Attenuation Ponds 5A, 5B and 6A outfall channels. See Sample Frequency below for the schedule of sampling. **Figure 7.2: Mattock (Mooretown) Stream Construction Phase Monitoring Locations** 
7.3.2.4.2.3	**Sample Parameters** The meaningful parameters for this construction phase surface monitoring programme are suspended solids/ turbidity (related to potential sediment loss from the site) and pH (related to potential concrete run-off). Turbidity and pH measurements must be taken at all sampling sites during construction using a portable probe. In-situ measurements have the advantage of providing site management with immediate (and actionable) data. In contrast total suspended solids (TSS), for example, may take a week or more to be analysed and reported. Notable pH changes upstream and downstream of the construction area may indicate concrete contamination and would trigger a stop-work response to identify and remove the source of contamination. Where routine turbidity measurements show that there may be impact on the receiving waters, additional measurements must be taken with the probe (working back towards the possible source areas) to determine the source of elevated suspended sediment, e.g. by checking attenuation pond outflows etc. This will trigger works to stop until the offending sediment source is remedied.
7.3.2.4.2.4	**Sample Frequency** **River Boyne – Sampling Plan** The 8 No. river/canal sites shown in Figure 7.1, plus the outflows from Attenuation Ponds 2 and 3, will be sampled by the ECoW during the period of construction on the Boyne floodplain with the following frequency:

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	Daily sampling at each site: • Turbidity measurement in-situ, using a hand-held (portable) turbidity meter (NTU); and • pH measurement in-situ, using hand-held (portable) calibrated meter (pH units). **Twice weekly sampling (fixed days - Monday & Thursday) at each site:** • Discrete grab sample and laboratory analysis for suspended solids (mg/l) and turbidity. **Additional sampling during 2 elevated flow (rainfall) events per month at each site:** • Turbidity measurement in-situ, using a hand-held (portable) turbidity meter (NTU); • pH measurement in-situ, using hand-held (portable) calibrated meter (pH units); • Discrete grab sample and laboratory analysis for suspended solids (mg/l) and turbidity. There are likely to be days when there is no outflow from the Attenuation Ponds, and hence no grab sample or in-situ readings from those locations. This will be logged as "No sample – No flow" in the daily monitoring sheet. Upstream (US) and downstream (DS) samples on the Boyne River and Boyne Canal will still be taken on such days. The ECoW will ensure that samples are taken during or immediately after heavy rainfall whenever a rain event is occurring because these are the periods during which water in on-site drains and ground surfaces become hydrologically active and export diffuse contaminants including suspended solids. **Mattock (Mooretown) Stream – Sampling Plan** Water monitoring for the Proposed Scheme revealed persistently high suspended sediment concentrations in the Mattock (Mooretown) stream. For this reason, a scaled back monitoring schedule will be undertaken for this tributary. The 2 No. stream sites shown in **Figure 7.2**, will be sampled by the ECoW during the period of construction in the vicinity of the proposed N2 tie-in with the following frequency: **Twice weekly sampling (fixed days – Tuesday and Friday) at each site:** • Turbidity measurement in-situ, using a hand-held (portable) turbidity meter (NTU); • pH measurement in-situ, using hand-held (portable) calibrated meter (pH units). **Sampling during 2 elevated flow (rainfall) events per month at each site:** • Turbidity measurement in-situ, using a hand-held (portable) turbidity meter (NTU); • pH measurement in-situ, using hand-held (portable) calibrated meter (pH units); • Discrete grab sample and laboratory analysis for turbidity and suspended solids (mg/l) and turbidity. The outflows from Attenuation Ponds 5A and 5B will be checked following every heavy rainfall event and when they are actively flowing will be sampled as follows: • Turbidity measurement in-situ, using a hand-held (portable) turbidity meter (NTU); • pH measurement in-situ, using hand-held (portable) calibrated meter (pH units); • Discrete grab sample and laboratory analysis for turbidity and suspended solids (mg/l) and turbidity.
7.3.2.4.2.5	**Visual Checks** Underpinning the monitoring approach will be daily visual checks conducted by the ECoW to ensure all mitigation measures are implemented as set out in this NIS. These visual checks will include checks on integrity of all on-site mitigation infrastructure, e.g. attenuation ponds, silt fencing, on-site drainage flow paths etc. Any required maintenance will be carried out immediately. The ECoW will have powers to stop works if there are obvious sediment plumes in watercourses or any obvious pathways from the construction areas that are conveying sediment laden water to nearby drains or watercourses. In the instance that works must stop, the source(s) and/or reasons for observed sediment loss will be identified and controls will be bolstered through additional silt fencing, check-dams or pump-out and containment of runoff for off-site treatment.
7.3.2.4.2.6	**Monitoring Records** An example daily Water Monitoring Sheet (see **Appendix 1.6 – Example Daily Water Monitoring Sheet**) will be filled in by the ECoW at each sample location recording sampling date and times for each individual sample, plus general flow condition (High, >Average, Average, <Average, Low). Any visible turbidity or discoloration of the water will be recorded. The register of daily monitoring sheets will be kept on-site and entered into an Excel spreadsheet and will be updated regularly for inspection by the construction Site Manager.
7.3.2.4.2.7	**TSS versus Turbidity Correlation**

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	Turbidity data is not possible to interpret in any meaningful way in the absence of data on suspended solids, and/or) without being continuously monitored using upstream/downstream instream sondes. Experience during the EIAR water monitoring phase proved that continuous turbidity measurement on the Boyne is unreliable owing to the swift flows and possible issues with turbulence and biofouling. Furthermore, there is no standard conversion factor between turbidity and suspended solids; each river is different owing to variable geology, soil type etc. Handheld turbidity meter data must be correlated with concurrent suspended solids data in order to interpret the information. It is considered that suspended solids sampling (whether correlated with turbidity or not) is cost effective, reliable and produces more easily interpretable data which can be compared to existing Irish water quality standards (e.g. 25 mg/l threshold for salmonid waters). In order to utilise in-situ turbidity information for actionable indications of construction impact, a broad correlation will be made between the in-situ turbidity data and laboratory analysed suspended solids concentrations. Data must comprise at least 15 elevated / high flow periods and about 30 instances of a range of elevated flows in order to form a practical correlation using the daily/monthly data collected by the ECoW. It is recommended that monitoring of high flow events begins in the pre-construction phase, i.e., as soon as possible following scheme approval. A once-off professional TSS / turbidity correlation will be undertaken using an approved laboratory and laboratory-based methods to form a reliable relationship between the parameters. The relationship is sediment-specific and unique for each river system; therefore the method requires samples of local sediments and river waters to be taken to the lab for gravimetric analysis of TSS and concurrent turbidity. The samples are mixed in increasing dilutions to provide the specific TSS/ turbidity relationship. The exact turbidity meter type that will be deployed in the field will be calibrated by this relationship. Once a rational correlation is made, in-situ daily turbidity readings will be used in lieu of ongoing additional monthly high flow grab sampling for suspended solids. Turbidity probes will be regularly re-calibrated. Twice weekly (Monday and Thursday) suspended solids sampling will continue throughout the construction period on the Boyne.
7.3.2.4.2.8	**Trigger Levels** **Watercourses – Suspended Solids / Turbidity** Once the relationship between suspended solids and turbidity is established (by either method outlined above), a suspended solids / turbidity trigger level will be set for works to stop in order to implement additional on-site measures for sediment control. The trigger level to stop work and implement additional sediment control measures is if there is an upstream/downstream difference of 25 mg/l suspended solids, or the correlated (as above) turbidity equivalent (NTU). Alternatively, the trigger level will be set at any-change in turbidity between upstream and downstream sites on the Boyne River, although it will still be necessary to continue collecting twice weekly and three times monthly suspended solids samples for analysis as a log of efficacy and to assist interpretation of turbidity data. **Watercourses – pH** According to Surface Water Regulations[3], the acceptable pH range for these surface waters is: 6 < pH < 9.0. The Boyne and Mattock (Mooretown) stream both had ambient values of pH 7.3 - 8.3, with means (August 2021 – March 2022) of pH ~7.8. The trigger level to stop (concrete related) works will be if there is any in-situ upstream / downstream difference in pH that indicates more alkaline conditions downstream with pH approaching 8.5-9.0 at the downstream site, along with a clear difference compared to upstream in-situ pH value. **Attenuation Pond Outfalls** Suspended solids concentrations in attenuation pond outfall channels should not exceed 25 mg/l TSS or the turbidity (NTU) equivalent and pH will not exceed 9.0. These are the trigger levels, either separately or together that trigger works to stop and additional appropriate control measures to be implemented following investigation/ evaluation of the source by the ECoW. Works will not recommence without agreement from the ECoW.
7.3.2.4.2.9	**Cofferdam Pump-out Water Monitoring** Constant water ingress is expected to the cofferdams surrounding bridge pier foundations during their construction. These containment areas will require regular, if not constant pumping out to retain dry conditions.

[3] European Communities Environmental Objectives (Surface Waters) Regulations (S.I. 272 of 2009).

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	The pump-out water is likely to be contaminated with sediment and concrete, and to a lesser extent hydrocarbons. These waters shall not be pumped directly to the Boyne or to any other watercourse. The contractor will be required to tanker and remove to a suitably licensed treatment facility. Before any concrete pouring has commenced, i.e., in the earth excavation stage, the ECoW will take daily pH readings of a sample of the pump-out water. This water will be transported by tanker and discharged into Attenuation Pond No. 2 or 3 for settlement of suspended solids. Once bulk liquid concrete pouring has commenced and concrete is curing, the ECoW will continue daily in-situ measurement of pump-out water. If pH remains between 6.0 and 9.0, then this water can still be discharged into the Attenuation Ponds for settlement of suspended solids. If pump-out water pH exceeds 9.0, the water will be treated to reduce pH, or transported off-site for disposal at a licenced facility.
7.3.2.5.1	**Accidental Killing/Injury** The following mitigation will be implemented in order to protect QI Otter. **<u>Mammal-resistant Fencing</u>** Otters may potentially be affected during the construction phase of the development during foraging activities (based on existing survey evidence). The potential for fatalities from road traffic accidents on site or becoming trapped within open works could pose a direct impact. Mitigation measures to protect the accidental killing/injury of otter during the construction phase are detailed as follows: • Maintain the 10 m set back zone from both banks of the River Boyne to ensure the free movement and safe passage of otter along the watercourse during construction phase (i.e. habitat will not bisected); • Pre-construction surveys will be undertaken to ensure that otter has not taken up residence or established any new territories (i.e. since baseline surveys were undertaken, see Section 4) within or in close vicinity to the footprint of the Proposed Scheme (see Section 7.2.2); • Temporary otter fencing will be used to enclose all construction working areas 200 m to the south of the canal, between the canal and the River Boyne, 200 m to the north of the River Boyne and 200 m upstream and downstream of the Mattock (Mooretown) Stream; • Taking consideration of the NRA Guidelines for the Treatment of Otters Prior to the Construction of National Road Schemes (NRA, 2008c), mammal-resistant fencing will be incorporated along the boundary of construction compounds, working areas and reno-mattresses to ensure no otters can access or become trapped within open works. Mammal-resistant fencing will adhere to the relevant specifications as set out by the NRA (2008c) (see **Figure 7.3**); – Fences will be constructed and erected in accordance with Irish Standard (I.S.) 435: 2005 (updated version available - I.S. 435-1:2017); – Where appropriate, fences will stretch at least 25 m and preferably to 50m or more either side of watercourse crossings; – Any length of fencing (including branches and spurs) will start with a post and end with a post. An additional post will be provided at fence junctions and at fence corners; – Posts (2100 x 150 x 75) will be erected 2100 mm above ground level, 700 mm below ground and 2100 mm apart; – Rails (4200 x 100 x 44) will be spaced out between 200 and 250 mm from ground level (i.e. the two rails closest to ground level will be spaced 200 mm apart, with the remaining two furthest from ground level spaced 250 mm apart); – Chain-link mesh will be 1800 mm wide, consisting of 60 mm mesh made up of a diameter of 2.25/3.15 mm. Mesh will be plastic coated galvanised mild steel wire and erected with a 200 mm section below ground level and recovered with excavated material; and – Post holes falling in rock shall be excavated to a depth of 700 mm or with an Engineer's approval to a depth of 500 mm. Where a reduced depth of hole is accepted by the Engineer, the top of the post will be suitably cut and treated with preservative. • Once installed, the mammal-resistant fencing will be inspected by the Contractor's Project Ecologist to ensure that fencing is fit for purpose (i.e. adequate for the exclusion of otter and any damaged sections mended within 24hrs of being identified).

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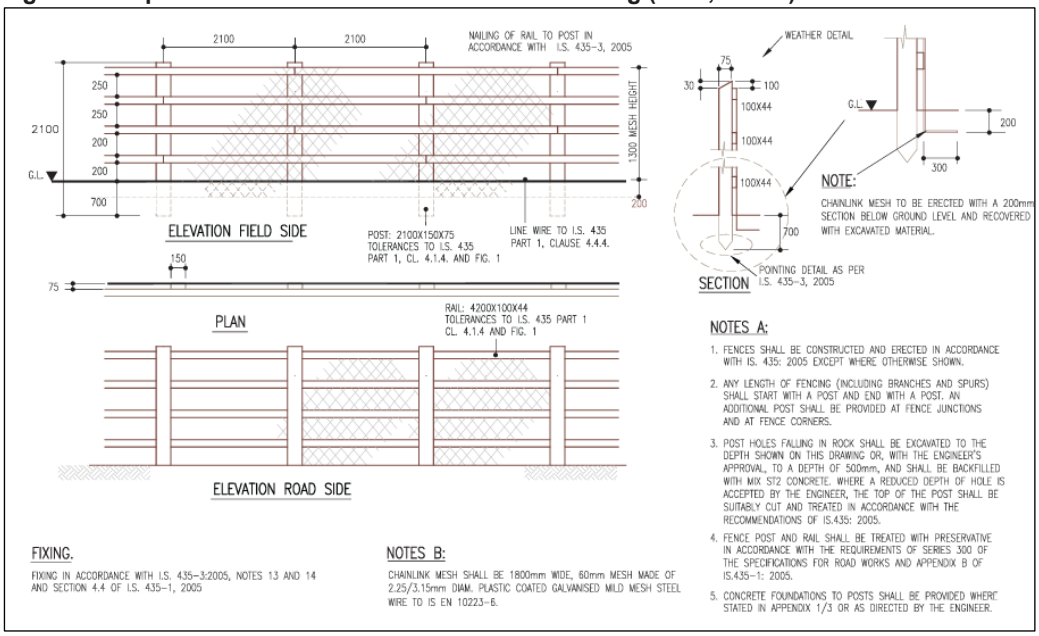
Figure 7.3: Specification For Mammal-Resistant Fencing (NRA, 2008c)



7.3.2.5.2	**Monitoring of Mammal-resistant Fencing** In order to ensure the effectiveness of the exclusion of otter from open works during the construction phase, mammal-resistant fencing requires monitoring and maintenance at regular intervals. Naturally, a sturdy fence requires less maintenance, however digging by animals and damage from machinery may contribute to reduced fence robustness. If damage occurs, the main purpose of the fence is jeopardized. Monitoring measures will include: • Weekly inspection will be undertaken by the Contractor's Project Ecologist in order to identify and fix potential fencing problems (e.g. 'weak spots'); • If potential problems are identified by personnel between weekly inspections, the Contractor's Project Ecologist will be notified and restorative actions agreed and implemented by the Contractor; • Any problems identified, such as damage or weak spots, will be rectified within 24 hrs of being identified.
7.3.3	**For the Protection of QI Alluvial Forest (River Boyne and River Blackwater SAC)**
7.3.3.1	**Control of Water Pollution** The mitigation at **Section 7.3.2.4** shall be implemented for QI Alluvial Forest.
7.3.3.2	**Spread of Invasive Alien Plant Species** The presence of invasive alien plant species has the potential to lead to an offence under the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) as amended. Two non-native invasive species, Japanese Knotweed and Himalayan Balsam, were recorded within the vicinity of the Proposed Scheme. These species are highly invasive and out-compete native flora to form single species stands. The following guidelines will be followed in relation to non-native invasive plant species: • Transport Infrastructure Ireland guidance (TII, 2020), entitled: 'The Management of Invasive Alien Plant Species on National Roads – Technical Guidance' https://www.tiipublications.ie/library/GE-ENV-01105-01.pdf; • Appropriate mitigation measures including management and control measures are required at all sites within the Proposed Scheme area where these species are encountered. Person(s) must therefore take all reasonable steps and exercise due diligence to avoid committing an offence under the 2011 Regulations. The following mitigations will be followed in relation to non-native invasive plant species: • An Invasive Species Management Plan (ISMP) shall be prepared by the contractor and will include management protocols for dealing with occurrences of scheduled invasive species in

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	compliance with the relevant legislation. The measures within the ISMP will need to contain, as a minimum, the mitigation measures set out within this NIS; • An invasive species survey will be completed at pre-construction phase by a qualified person(s) to check for new growths and identify any new-established plant species within the footprint of the Proposed Scheme; • All machinery entering the site during construction activities shall be free from contamination with scheduled invasive plants. The early installation and mandatory use of the wheel wash will be required to control this risk; • Any materials which are introduced to the site during the construction shall be free from scheduled invasive species, with certification of such from the supplier stating that they have not knowingly been sourced from an area known to be infected; and • Where a scheduled invasive species is accidentally introduced or becomes established within the area of the Proposed Scheme during pre-construction surveys and/or the construction phase, works shall be immediately halted and an effective exclusion zone will be erected (minimum 7 m) until such time that a suitably qualified ecologist/ invasive species specialist will assess the site(s), and implement/update the required management protocol.
7.3.4	**For the Protection of QI Estuaries, QI Mudflats and sandflats, QI Salt Meadows and QI Salicornia (Boyne Coast and Estuary SAC)**
7.3.4.1	**Control of Water Pollution** The mitigation at **Section 7.3.2.4** shall be implemented for QI Estuaries, QI Mudflats and Sandflats, QI Salt Meadows and QI Salicornia.
7.3.5	**For the Protection of SCI Kingfisher (River Boyne and River Blackwater SPA)**
7.3.5.1	**Control of Water Pollution** The mitigation at **Section 7.3.2.4** shall be implemented for SCI Kingfisher.
7.3.5.2	**Artificial Lighting** The mitigation at **Section 7.3.2.1** shall be implemented for SCI Kingfisher.
7.3.5.3	**Noise Emissions** The mitigation at **Section 7.3.2.2** shall be implemented for SCI Kingfisher.
7.3.6	**For the Protection of SCIs Northern Lapwing and Golden Plover (Boyne Estuary SPA)**
7.3.6.1	**Artificial Lighting** The mitigation at **Section 7.3.2.1** shall be implemented for SCI Northern lawing and SCI Golden plover.
7.3.7	**For the Protection of SCIs Shelduck, Oystercatcher, Knot, Sanderling, Black-tailed Godwit, Redshank, Turnstone and Little Tern (Boyne Estuary SPA)**
7.3.7.1	**Control of Water Pollution** The mitigation at **Section 7.3.2.4** shall be implemented for SCI Shelduck, SCI Oystercatcher, SCI Knot, SCI Sanderling, SCI Black-tailed Godwit, SCI Redshank, SCI Turnstone and SCI Little Tern.
7.3.8	**For the Protection of QI Wetlands (Boyne Estuary SPA)**
7.3.8.1	**Control of Water Pollution** The mitigation at **Section 7.3.2.4** shall be implemented for QI wetland habitat.
7.3.9	**For the Protection of SCIs Cormorant, Lesser Black-Backed Gull, Black-Headed Gull and Herring Gull**
7.3.9.1	**Artificial Lighting** The mitigation at **Section 7.3.2.1** shall be implemented for SCIs Cormorant, Lesser Black-Backed Gull, Black-Headed Gull and Herring Gull.
7.3.9.2	**Control of Water Pollution** The mitigation at **Section 7.3.2.4** shall be implemented for SCIs Cormorant, Lesser Black-Backed Gull, Black-Headed Gull and Herring Gull.
7.3.10	**For the Protection of SCIs Cormorant, Lesser Black-Backed Gull, Black-Headed Gull, Herring Gull, Red-Throated Diver, Common Scoter, Common Gull, Great Black-Backed Gull, Common Tern, Arctic Tern, Little Tern, Shag and Little Gull**
7.3.10.1	**Control of Water Pollution**

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	The mitigation at Section 7.3.2.4 shall be implemented for SCIs Cormorant, Lesser Black-Backed Gull, Black-Headed Gull, Herring Gull, Red-Throated Diver, Common Scoter, Common Gull, Great Black-Backed Gull, Common Tern, Arctic Tern, Little Tern, Shag and Little Gull.
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7.4.1	**For the Protection of QI River Lamprey, QI Atlantic Salmon and QI Otter (River Boyne and River Blackwater SAC)**
7.4.1.1	**Drainage Design** As part of the Proposed Scheme, it is proposed to control and attenuate water draining the N2 Slane Bypass. The drainage design will facilitate attenuation/retention and pollution control of drainage water before it is released to receiving aquatic receptors such as streams and watercourses, coastal / intertidal areas and groundwater within the ZoI. Measures to attenuate and treat carriageway run-off have been incorporated into the drainage design of the proposed N2 Slane Bypass in accordance with TII standards. The Proposed Scheme involves the construction of a new surface water drainage system including new attenuation outfalls to existing watercourses or existing surface water drainage networks. Furthermore, the proposed alignment crosses a number of existing watercourses, agricultural drains and the River Boyne. Where the Proposed Scheme crosses these, they will be accommodated in culverts. The culverts, surface water drainage network, and run-off interceptors have been designed so as to minimise the potential impact on the receiving watercourses. Attenuation measures in the form of attenuation/retention ponds and grassed surfaced water channels which are considered to be a Sustainable Drainage System (SuDS) are proposed to reduce the rate of run-off discharged to the receiving watercourses. While the purpose of the attenuation/retention ponds and grassed surfaced water channels is to reduce the risk of flooding in the receiving watercourse/ networks, they will also improve water quality by facilitating settlement and deposition of sediment and pollutants carried through the pipe network from the carriageway. The proposed surface water drainage system also includes measures to reduce the concentrations of pollutants that are routinely found in road surface run-off and which pose a risk of short-term acute impacts (from dissolved/ soluble pollutants) and/ or long-term chronic impacts (from sediment bound pollutants on receiving waters). As part of the proposed surface water drainage design, a Class I by-pass petrol interceptor will be installed upstream of where the drainage collection system discharges into the retention/attenuation ponds. The hydrocarbon interceptors incorporated within the design of the proposed surface water drainage network are primarily aimed at removing hydrocarbons from run-off. However, in order to ensure that the concentrations of other types of pollutants (e.g. heavy metals and sediment) are controlled, filter drains and vortex grit removal chambers will also contribute to the treatment of surface water run-off from the Proposed Scheme. Surface water drainage design measures for the scheme are described in **Section 2** of this statement and in **Chapter 4** and **Chapter 5** of the accompanying EIAR.
7.4.1.1.1	**Culvert Design – Enhancement** In addition to the culvert drainage design proposed as part of the Proposed Scheme, and the mitigation measures proposed in **Sections 7.4.1.5** to **7.4.1.8**, the following betterment measures are proposed to improve the three culverts located along the Mattock (Mooretown) Stream for the free passage of otter, which may be used by commuting otter outside the boundary of the River Boyne and River Blackwater SAC: • Culvert construction will take cognisance of the 'Guidelines for the Treatment of Otters during the Construction of National Road Schemes. National Roads Authority' (NRA, 2008c); • As otters will be disinclined to use water-filled culverts without dry pathways, culverts will allow for the provision of ledges; • There will be adequate access to any ledges provided from the riverbank next to the ledge; • The ledges and mammal access paths will be linked (i.e. fencing) and landscaped appropriately so that otters will use them. Ramps will be provided to ensure accessibility to ledges; • Ledges shall be at least 500 mm wide, constructed at least 150 mm above the 1 in 5 year flood event, and allow at least 600 mm headroom; • Care will be taken to ensure planting/landscaping does not obscure entrances to wildlife ledges; and • During operation, quarterly monitoring will be carried out over a period of at least one year to determine the success of the measures employed in an effort to ensure protection of otter.

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7.4.1.2	**Maintenance of Surface Water Drainage** During the operational phase of the Proposed Scheme, regular inspection will be required in addition to the establishment of a maintenance regime to ensure that the surface drainage network is functioning effectively. These include: • All maintenance site personnel will be made aware of the importance of the surrounding environment of the Proposed Scheme (i.e. European sites and connectivity with the freshwater environment) and the requirement to avoid pollution of all types: • Grassed surface water channels will be inspected monthly for the duration of the establishment period (i.e. will vary but generally three months) and will be inspected after heavy rainfall events; • Filter drains will be inspected monthly; • Attenuation/ retention ponds will require an inspection every six months; • Vortex grit removal chambers and petrol/oil interceptors will require monthly inspections for the duration of the first three months and then every three to six months thereafter; and • Maintenance tasks in relation to the aforementioned surface water drainage to be completed during inspections include (where relevant), but are not limited to: – Weed control; – Sediment removal/monitoring (i.e. depth) and the unclogging or replacement of filter materials; – Removal of litter and other debris; – Repair of any damage associated with drainage infrastructures; – Vegetation inspection and care (i.e. retention ponds and grassed surface water channels); – Cleaning and integrity check.
7.4.1.3	**Sediment and Pollutant Control** • Existing and proposed surface water drainage and discharge points shall be mapped on a site plan including the location of existing and proposed measures such as of petrol/oil interceptors, vortex grit separators, sediment traps, attenuation ponds with treatment forebays, grassed channels and filter drains where appropriate; • Attenuation ponds will be lined and the surface water drainage system sealed to prevent any infiltration of contaminated groundwater into surface water network; and • To minimise sediment build up, a regular inspection and maintenance regime will be put in place to remove any litter, debris and sediment from drainage features which will be removed to a suitable licensed facility.
7.4.1.4	**Environmental Incidents and Accidents** In the case of environmental incidents or accidents occurring during the operational phase of the Proposed Scheme, the following measures will be implemented to help prevent/ contain the contamination of the potential source-vector pathways for negative impacts to proximal European sites: • All surface water run-off from rainwater that has passed over impermeable surfaces will be collected within the surface water drainage network, which will pass through petrol/hydrocarbon interceptors prior to the discharge into attenuation/retention ponds before it is released into the River Boyne and River Blackwater SAC and SPA; • In the case of a catastrophic accidental spill or similar incident, each attenuation/retention pond will be fitted with an emergency shut-down facility so that the spillage will be contained and prevent contaminants entering the downstream watercourse; • As detailed in Section 7.4.1.2, the drainage system will be maintained by maintained by Meath County Council.
7.4.1.5	**Attenuation Ponds and Wetlands** • Attenuation ponds will be provided at all major surface water outfalls along the length of the road scheme and are designed in accordance with DN-DNG-03063 Vegetated Drainage Systems for Road Runoff Attenuation and DN-DNG-03065 Road Drainage and the Water Environment. Ponds will be designed as hybrid wetlands, so they provide both attenuation and consequent water treatment function. They will be planted with vegetation suitable for the specific zone of the pond the planting is located, i.e., permanently wet, marginal zones, dry earthworks slopes. • Constructed wetlands (CWs) shall be maintained according to TII Vegetated Drainage Systems for Road Runoff DN-DNG-03063-02. Constructed wetland planting will include (amongst other species) Reed canary-grass (Phalaris arundinacea) and Bulrush (Typha

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	latifolia), both of which occur naturally in the Boyne valley. These species are metal tolerant and are useful for phytoextraction of Cd, Cu, and Zn (Kacprzak et al., 2014), hence suitable to support constructed wetland treatment function (Healy et al., 2008). Maintenance of CWs requires sediment removal a minimum every 25 years, regular monitoring (for blockages) of inlet and outlet, and repair of planting and landscaping where necessary (NRA, 2014). • Constructed wetlands and infiltration basins will be lined either naturally with a low permeability clay, or with an artificial membrane liner to protect groundwater, and adjoining surface waters, in accordance with groundwater regulations and surface water regulations. This will ensure separation of surface and groundwater and prevent potential leakage of contaminants to groundwater, which can be a subsurface pathway to surface waters.
7.4.1.6	**Invasive Alien Species Management** Two non-native species, Japanese knotweed Reynoutria japonica, Himalayan Balsam Impatiens glandulifera were recorded in the vicinity of the Proposed Scheme. Although it is very unlikely for the spread of these species during the operational phase, a precautionary approach has been applied due to their location in proximity to watercourses, primarily the River Boyne. Where these species are encountered and for the prevention of spread of these species, the following guidelines will be followed in relation to non-native invasive plant species: • The Management of Invasive Alien Plant Species on National Roads – Standard. GE-ENV-01104. (TII, 2020a), • The Management of Invasive Alien Plant Species on National Roads – Technical Guidance. GE-ENV-01105. (TII, 2020b), • Guidelines for the Management of Waste from National Road Construction Project (NRA, 2014), • The Knotweed Code of Practice. Managing Japanese Knotweed on Development sites. UK Environment Agency Environment Agency (2013). Inland Fisheries Ireland guidance regarding aquatic invasive species control (http://www.fisheriesireland.ie/Research/invasive-species), and • Invasive Species Ireland guidance (http://invasivespeciesireland.com). • An Invasive Species Management Plan, outlining measures to eradicate Invasive species will be prepared by the contractor and will be implemented during all phases of the Proposed Scheme.
7.4.1.7	**Mammal-resistant fencing** Mammal-resistant or mammal proof fencing will be required to guide otter under the proposed bridge crossing and to prevent otter (and therefore direct mortality as a result of accidental killing or injury) crossing the new roadway. As a clear span bridge will be adopted, there will no obstruction of otter movement in an east-west direction along the Boyne corridor, however mitigation as detailed below will be required to prevent otter entering the proposed bridge crossing where vehicle movements may be frequent. The specification for mammal-resistant fencing is given in the NRA guidelines (NRA 2006a and 2006b) and is detailed in **Section 7.3.2.5**. Otter fencing will be recessed at tied into the following chainage points of the Proposed Scheme: • To guide otter under the proposed bridge crossing, otter fencing will be installed at appropriate locations south of the River Boyne between Ch. 1250 and Ch. 1300, in addition to 150 m either side of this chainage point in parallel with the Boyne towpath, north of the Boyne navigational canal; • To guide otter under the proposed bridge crossing, otter fencing will be installed at appropriate locations north of the River Boyne between Ch. 1450 and Ch. 1600; • Where steel single field gates are proposed north and south of the River Boyne (i.e. maintenance track south of the River Boyne, Access Track 4 north of the River Boyne and the farm Overbridge 3), gates will be fitted with chain link mesh (see NRA 2006b) to prevent otter using these points to gain access to the mainline. The location of gates on farm access roads requiring this modification will be determined at the detailed design stage; • Attenuation Ponds 2 and 3 will remain unfenced to allow the free movement of otter within this habitat; • To guide otters to culverts along the Mattock (Mooretown) Stream, otter fencing will be installed at Ch. 3440, Ch. 3450 and Ch. 3460, and for a distance of 150 m either side of each culvert; • Where there is an overlap of stock-proof fencing and mammal-resistant fencing at culvert locations, stock-proof fencing will be adjusted to allow for unimpeded access to the culvert. The fence will be adjusted so that the bottom rail and wire mesh are removed and chain-link is not fixed to the ground at the location of the underpass. This allows for the animals to see a

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	break in the fence line and thus clear access to the underpass nearby. Detail of this will be seen in the NRA (2006a) Guidelines; • These crossings will be more readily used if the approach is softened through the use of appropriate planting; • Mammal-resistant fencing will be incorporated at the earliest possible stage during the operational stage; and • Quarterly monitoring to ensure the effectiveness of the exclusion of otter from the mainline and the proposed bridge crossing will be carried out to determine the success of the measures employed. Monitoring will be undertaken by the Client Project Ecologist and continued for at least one year after construction works cease and monitored once every three years for maintenance purposes. Any deficiencies in the measures will be reported to Meath County Council and corrected immediately.
7.4.2	**For the Protection of QI Alluvial Forest (River Boyne and River Blackwater SAC)**
7.4.2	A range of control measures are outlined in **Section 7.4.1**. These measures also have due regard for QI Alluvial forest habitat.
7.4.3	**For the Protection of SCI Kingfisher (River Boyne and River Blackwater SPA)**
7.4.3	The mitigation at **Section 7.4.1** shall be implemented for QI Mudflats and sandflats, SCI Kingfisher.
7.4.4	**For the Protection of SCIs Northern Lapwing and Golden Plover (Boyne Estuary SPA)**
7.4.4	The mitigation at **Section 7.4.1** shall be implemented for SCIs Northern Lapwing and Golden Plover.
7.4.5	**For the Protection of SCIs Shelduck, Oystercatcher, Knot, Sanderling, Black-tailed Godwit, Redshank, Turnstone and Little Tern (Boyne Estuary SPA)**
7.4.5	The mitigation at **Section 7.4.1** shall be implemented for SCIs Redshank, Shelduck, Oystercatcher, Grey Plover, Knot, Sanderling, Black-tailed Godwit, Turnstone and Little Tern.
7.4.6	**For the Protection of SCIs Cormorant, Lesser Black-Backed Gull, Black-Headed Gull and Herring Gull**
7.4.6	The mitigation at **Section 7.4.1** shall be implemented for SCIs Cormorant, Lesser Black-Backed Gull, Black-Headed Gull and Herring Gull.
7.4.7	**For the Protection of SCIs Cormorant, Lesser Black-Backed Gull, Black-Headed Gull, Herring Gull, Red-Throated Diver, Common Scoter, Common Gull, Great Black-Backed Gull, Common Tern, Arctic Tern, Little Tern, Shag and Little Gull**
7.4.7	The mitigation at **Section 7.4.1** shall be implemented for SCIs Cormorant, Lesser Black-Backed Gull, Black-Headed Gull, Herring Gull, Red-Throated Diver, Common Scoter, Common Gull, Great Black-Backed Gull, Common Tern, Arctic Tern, Little Tern, Shag and Little Gull.