



OIFIG na nOIBREACHA POIBLÍ
OFFICE OF PUBLIC WORKS

River Deel (Crossmolina) Drainage Scheme



OUTLINE CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN

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RIVER DEEL (CROSSMOLINA) FLOOD RELIEF SCHEME

OUTLINE CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN

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1 INTRODUCTION

This Outline Construction and Environmental Management Plan (OCEMP) has been developed by MKO in association with Ryan Hanley who have been appointed as environmental consultants by the Office of Public Works (OPW) for a proposed flood relief scheme on the River Deel, Crossmolina, Co. Mayo.

The OCEMP has been prepared in conjunction with the Environmental Impact Assessment Report (EIAR) which has been prepared to provide information to allow the competent authority to conduct the Environmental Impact Assessment (EIA) of the proposed project. The EIA will be undertaken by the Department of Public Expenditure and Reform (DPER), as the competent authority.

The OCEMP will be revised as required by the selected contractor in order to identify, assess and satisfy the contract performance criteria as set out by the various stakeholders. The OCEMP should be read in conjunction with the EIAR and design drawings. The OCEMP due to its structure and nature will also require constant updating and revision throughout the construction period as set out below. Therefore, this is a working document and will be developed further prior to and during the construction phase of the Proposed Development.

Triggers for amendments to the OCEMP will include:

- When there is a perceived need to improve performance in an area of environmental impact;
- As a result of changes in environmental legislation applicable and relevant to the project;
- Where the outcomes from auditing establish a need for change;
- Where Work Method Statements identify changes to a construction methodology to address high environmental risk; and
- As a result of an incident or complaint occurring that necessitates an amendment.

This report provides the environmental management framework to be adhered to during the pre-commencement, construction and operational phases of the Proposed Development and it incorporates the mitigating principles to ensure that the work is carried out in a way that minimises the potential for any environmental impacts to occur.

This report is intended as a single, amalgamated document that can be used during the future phases of the project, as a single consolidated point of reference relating to all construction, environmental and drainage requirements for the competent authority, OPW and contractors alike.

1.1 SCOPE OF THE OUTLINE CONSTRUCTION AND ENVIRONMENTAL MANAGEMENT PLAN

This report is presented as a guidance document for the construction of the proposed flood relief scheme on the River Deel. Where the term 'site' is used in the OCEMP it refers to all works associated with the Proposed Development enabling works. The OCEMP clearly outlines the mitigation measures and monitoring proposals that are required to be adhered to in order to complete the works in an appropriate manner.

The report is divided into nine sections, as outlined below:

Section 1 provides a brief introduction as to the scope of the report.

Section 2 outlines the Site and Project details, detailing the targets and objectives of this plan along with providing an overview of construction methodologies that will be adopted throughout the project.

Section 3 sets out details of the environmental controls to be implemented on site. Site drainage measures, concrete, dust, noise control and monitoring measures and a waste management plan are also included in this section.

Section 4 sets out a fully detailed implementation plan for the environmental management of the project outlining the roles and responsibilities of the project team.

Section 5 outlines the Emergency Response Procedure to be adopted in the event of an emergency in terms of site health and safety and environmental protection.

Section 6 consists of a summary table of all mitigation proposals to be adhered to during the project, categorised into three separate headings, 1) pre-commencement measures; 2) construction-phase measures and 3) operational-phase measures.

Section 7 consists of a summary table of all monitoring requirements and proposals to be adhered to during the project, categorised into three separate headings, 1) pre-commencement measures; 2) construction-phase measures and 3) operational-phase measures.

Section 8 sets out a programme for the timing of the works.

Section 9 outlines the proposals for reviewing compliance with the provisions of this report.

1.2 STATEMENT OF AUTHORITY

This report has been prepared by Owen Cahill (B.Sc. M.Sc. (Env.), MIEEMA, CEnv) of MKO. Owen is an Environmental Engineer with MKO, with over 11 years of experience in the Environmental Management and Construction Industries. Owen's wide ranging multi sector experience has provided him with specialist knowledge and understanding of the challenges in the planning and delivery of developments with the minimum environmental impact and with practicality and constructability in mind.

Owen has been involved as a Project Manager on a range of energy infrastructure, commercial, residential, waste facility and quarry projects as well as managing the licensing requirements of a number of EPA licensed facilities.

2 DESCRIPTION OF THE PROPOSED DEVELOPMENT AND BASELINE ENVIRONMENT

2.1 SITE LOCATION

The proposed works are located approximately 750 metres to the south of the Jack Garrett Bridge in Crossmolina Town. The proposed channel runs from the bank of the River Deel (Grid Ref: E113141 N316508), it crosses a local road (leading south from Chapel Street) and proceeds in an easterly direction through farmland before crossing the R315 and veering south and crossing the local road to Gortnor Abbey and a local access to private properties. The proposed channel terminates to the east of the R315 in the townland of Mullenmore (Grid Ref: E114220 N316630). Additional areas surrounding the channel are required for the site compound. These are located on the lands surrounding the channel.

The text above describes the location of the physical works that are associated with the proposed flood relief scheme. Whilst there are no physical works associated with the lands over which the waters will discharge (washlands), they are included within the study area and the impacts thereon are assessed. The washlands extend from the end of the channel and proceed over two large springs at Mullenmore before following the route of the Mullenmore stream and entering Lough Conn to the after approximately 550metres. The location of the proposed works is provided in Figure 2.1 with an outline of the proposed scheme provided in Figure 2.2.

2.2 CHARACTERISTICS OF THE PROPOSED DEVELOPMENT

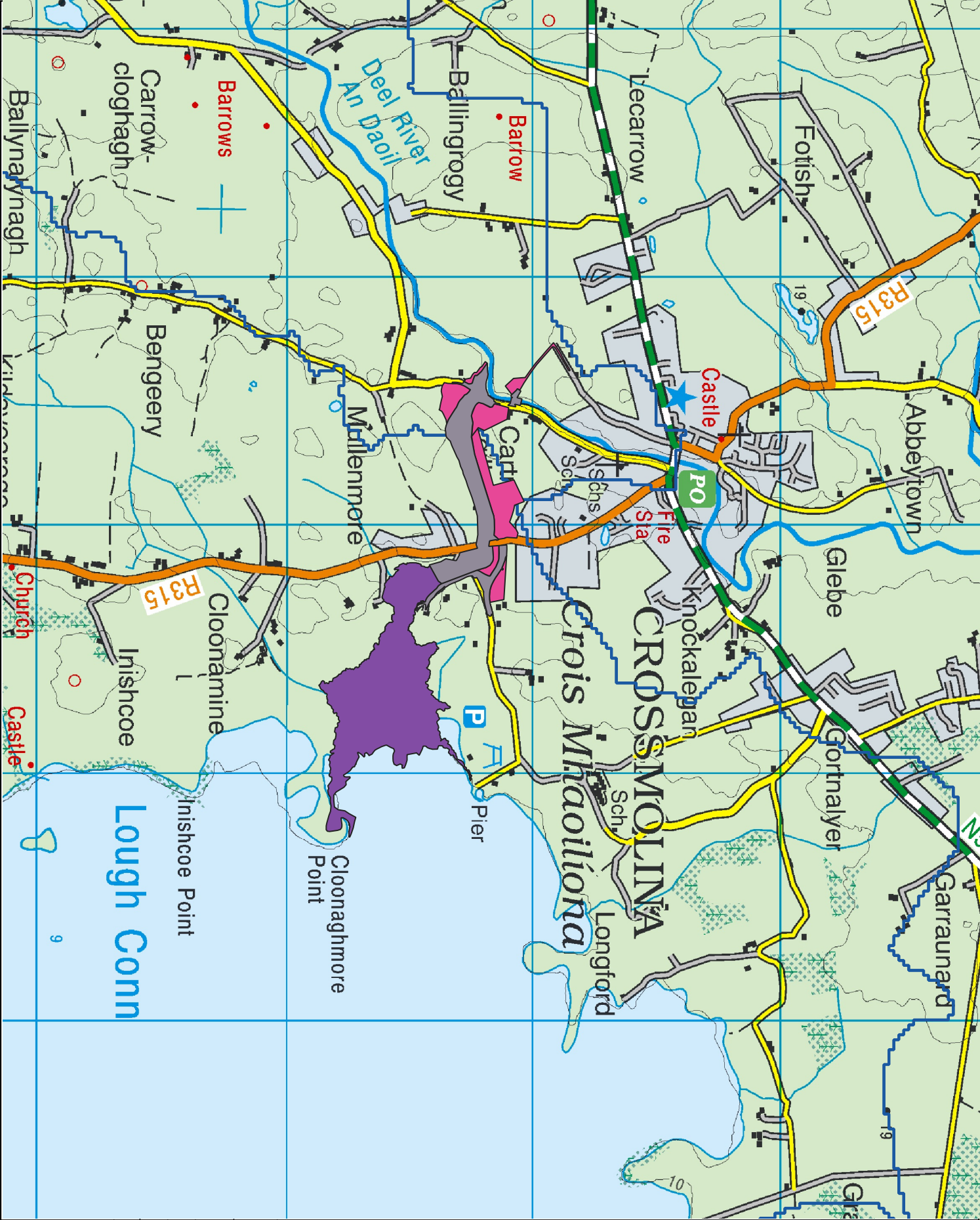
The River Deel and Crossmolina Town have a long history of flooding. The four most recent flood events in 1989, 2006, and 2015 (twice) resulted in flooding of three main streets in Crossmolina Town. Approximately 120 properties were inundated by flood water during the most extreme of these floods in December 2015. The preferred flood scheme for the River Deel is a diversion channel upstream of the town, which will redirect flood waters away from the town, directly to the flood plains of Lough Conn. The scheme will be designed to cater for the 1% Annual Exceedance Probability (AEP) flood event (also known as the 100 year flood event). In order to prevent flooding in Crossmolina Town, a diversion channel and intake structure is required with a capacity of 110 cumec.

The proposed infrastructure has been designed in order to prevent flooding in Crossmolina Town during high flow events up to the 1% Annual Exceedance Probability (AEP) flood event, while minimising resulting changes in the hydrology of the river by avoiding any significant impact on river flows downstream of the intake structure for flows up to bank full flow.

The proposed works are summarised below. To undertake the proposed works on site, some access will be required to adjacent lands and the river banks. The locations of each of the proposed works features are marked on the relevant drawing with a code, with the adjacent table providing a description for each code.

In summary, the proposed works for the River Deel Drainage Scheme comprise the following:

- Site investigation;
- Site preparation and clearance;



- Map Legend**
- Permanent Works Area
 - Temporary Construction Works Area
 - Washlands Extent

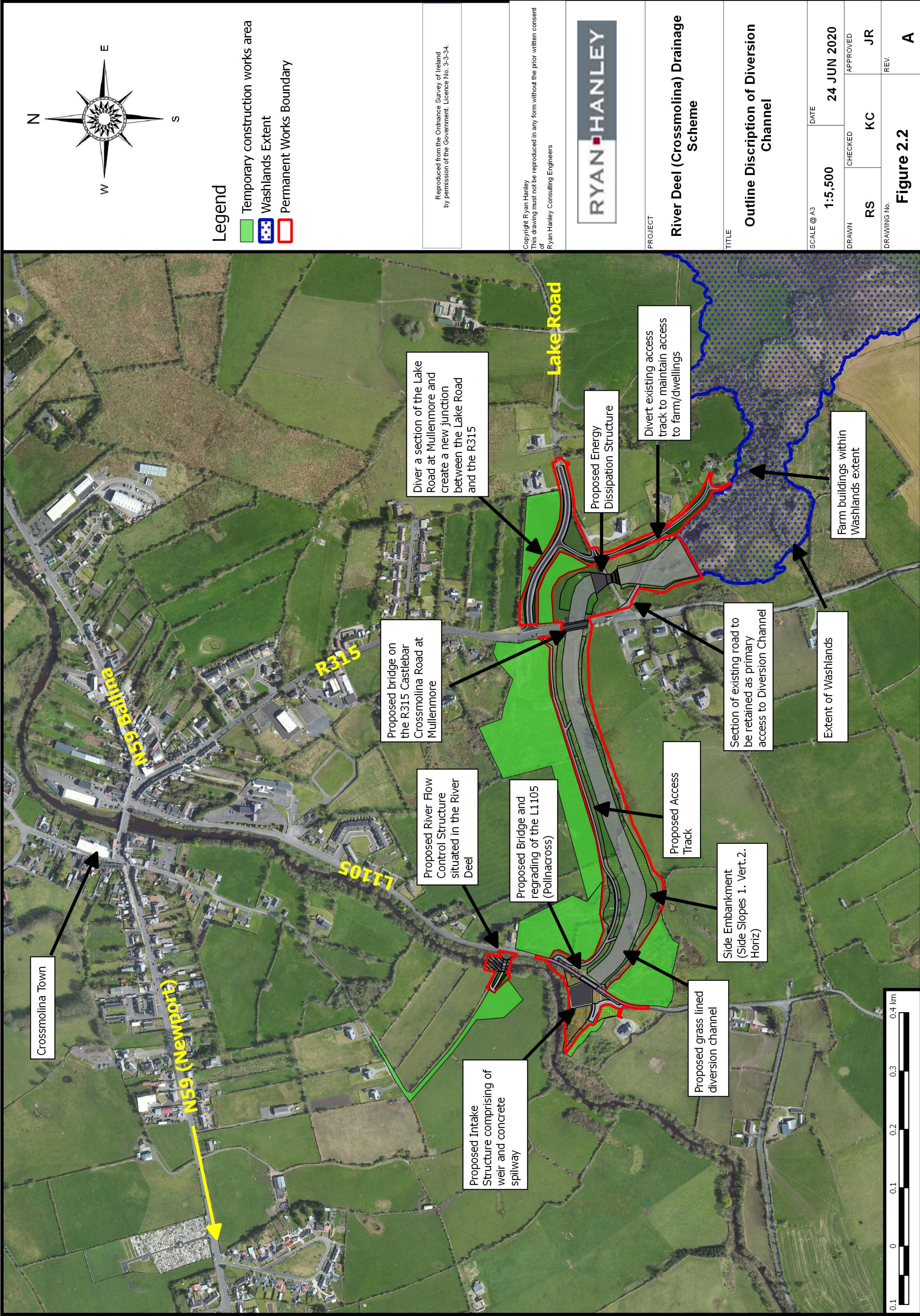


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Site Location

Project Title		Crossmolina Flood Relief Scheme	
Drawn By	LK	Checked By	PR
Project No.	120211-a	Drawing No.	Figure 2.1
Scale	1:20000	Date	24.09.20

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- Construction of a new grass lined diversion channel commencing at the River Deel/ L1105 and terminating in the townland of Mullenmore to the East of the R315 Crossmolina to Castlebar Regional Road;
- Construction of a new reinforced concrete intake structure and spillway on the banks of the River Deel at the upstream end of the abovementioned grass lined channel complete with an adjustable steel plate at the top of the 70m reinforced concrete intake structure;
- Construction of a new river flow control structure incorporating adjustable steel plates. The structure will consist of a series of precast box culverts and will be located approximately 155 metres downstream of the intake structure;
- Construction of an earthen embankment and reinforced concrete retaining walls/ steel sheet piling at the river flow control structure;
- Construction of a new reinforced concrete energy dissipation structure within the proposed diversion channel to the south east of the R315;
- Construction of two new bridges, one each on the R315 (Mullenmore Bridge) and L1105 (Pollnacross Bridge);
- Raising the L1105 at the approach to the new bridge;
- Realignment of the Lake Road and creation of a new junction with the R315. This will necessitate the closure of a section of the existing road;
- Realignment and raising of existing avenues connecting the Lake Road to properties to the South;
- Creation of washlands between the termination point of the new channel and Lough Conn;
- Removal of existing access points/ access routes and creation of new access points;
- Construction of an access track along the top of the channel between the L1105 and the R315. An access track will also be constructed alongside the intake structure linking the L1105 to the river bank. This will be used for maintenance purposes;
- Localised regrading of ground levels, erection of fencing and access gates, to facilitate pedestrian/ vehicular access to and around flood defences, or to redirect overland surface water flow paths;
- Utility diversions where required;
- Maintenance activities and other non-structural measures.

2.3 TARGETS AND OBJECTIVES

In so far as they have been completed to date, or are to be further completed in future, the construction phase works are designed to approved standards, which include specified materials, standards, specifications and codes of practice. The design of the project has considered all environmental issues, and this is enhanced by the works proposals.

The key site targets are as follows;

- Ensure construction works and activities are completed in accordance with mitigation and best practice approach presented in the Environmental Impact Assessment Report (EIAR) and associated documentation;
- Ensure construction works and activities are completed in accordance with all documents prepared as part of the assessment of the proposed development;

- Ensure construction works and activities have minimal impact/disturbance to local landowners and the local community;
- Ensure construction works and activities have minimal impact on the natural environment;
- Adopt a sustainable approach to construction; and,
- Provide adequate environmental training and awareness for all project personnel.

The key site objectives are as follows;

- Using recycled materials if possible, e.g. excavated stone and overburden material;
- Ensure sustainable sources for materials supply where possible;
- Avoidance of any pollution incident or near miss as a result of working around or close to existing watercourses and having emergency measures in place;
- Avoidance of vandalism;
- Keeping all watercourses free from obstruction and debris;
- Correct implementation of the sustainable drainage system (SuDS) drainage design principles;
- Keep impact of construction to a minimum on the local environment, watercourses, and wildlife;
- Correct fuel storage and refuelling procedures to be followed;
- Good waste management and house-keeping to be implemented;
- Air and noise pollution prevention to be implemented;
- Monitoring of the works and any adverse effects that it may have on the environment. Construction Methods and designs will be altered where it is found there is an adverse effect on the environment;
- Comply with all relevant water quality legislation listed throughout this document; and,
- Ensure a properly designed, constructed and maintained drainage system appropriate to the requirements of the site is kept in place at all times.

2.4 CONSTRUCTION METHODOLOGY OVERVIEW

2.4.1 Introduction

The works will be undertaken by OPW directly with the support of sub-contractors and will comply with this OCEMP and any revisions made to this document throughout the construction phase. An overview of the anticipated Construction Methodologies is provided below.

The proposed construction methodology is summarised under the following main headings:

- Temporary Construction Works Facilities;
- Grass Lined Channel;
- Intake Structure;
- River Flow Control Structure;
- Bridges;
- Energy Dissipation Structure
- Road Realignment (Lake Road)

2.4.2 Temporary Construction Works Facilities

Provision has been made within the working area for location of temporary site compounds, the locations of which are shown on the construction sequence drawings (Appendix 3B of the EIAR).

The site compounds will be surfaced with a hard standing to prevent generation of mud. A silt fence will be erected on all sides of the compounds to prevent any run off from the perimeter of the compounds. The compounds will be adequately buffered to prevent any surface water run off or will incorporate a surface water collection and treatment system if required.

The compounds will comprise the following elements:

- temporary site offices, port-a-loo toilets, facilities for staff and car-parking areas.
- storage areas for construction materials.
- bunded containment areas for plant refuelling, maintenance, washing and for the storage of fuels and site generators.
- a dedicated waste storage area for any construction waste generated. Skips or bays will be provided for recyclable material.
- wheel wash area for construction and delivery vehicles and a designated wash out tank for wash out of concrete trucks following concrete pours.

The preliminary site compound layout is provided in Appendix 3B of the EIAR.

2.4.3 Grass Lined Diversion Channel

The construction of the diversion channel will be carried out as follows:

- Isolation of works area, including erection of fencing and site clearance. The fenced area will include the full area required to facilitate the works including the temporary site compounds and temporary works areas.
- Temporary works will be put in place, including the provision of silt management as outlined in Section 3 below and presented in the construction stage drawings (Appendix 3B of the EIAR).
- Construction of the diversion channel will commence at the downstream end and works will proceed in successive sections. Each section will be reinstated in advance of commencing the subsequent section. The sequencing of construction works for the diversion channel is presented in Section 8 below.
- Prior to excavation, the site investigation report and service drawings will be examined to determine the location of existing services in proximity to the works. Additional site investigation will be carried out prior to excavation in order to determine the exact location of services. Any service diversions required will be managed as per the proposals set out in Section 6 below.
- Construction of the channel will involve removal of overburden and excavation to foundation level. Excavated material will be stored on site on a temporary basis within the working areas shown on the drawings. Excavated topsoil will be stored separately for reuse in reinstatement

works on site and the storage area will be fenced off with silt fencing to prevent any run off. Large volumes of excavated material will not be allowed to accumulate within the temporary working areas. Excavated material will be reused where possible, classified as a construction by-product in the context of Article 27 of the European Communities (Waste Directive) Regulations. Surplus excavated material will be transported off site to an authorised waste or recovery facility. The anticipated volume of excavated material is 166,000 m³. The estimated number of round trips associated with the removal of surplus excavated material from site is approximately 24,000, which will be spread over the anticipated construction period as detailed in Section 3.4.

- The works area will be managed so as to ensure that ingress of waters to the works area will be minimised and that any clean waters are prevented from entering where possible. Following detailed site investigation, it is anticipated that dewatering will be required on a temporary basis during the channel excavation between the R315 bridge and the energy dissipation structure. Waters will be pumped to lands that are over 30 metres from any watercourse and discharged via a silt bag to a discharge point. The discharge point will consist of a circle of triple silt fences surrounding a circle of straw bales wrapped in Terram. Waters pumped from the excavation will filter through the silt bag, straw bales and silt fences before diffusely discharging to the ground. The discharge points will be constructed prior to commencement of construction works and will be monitored on a daily basis when in use to ensure that the release of any polluting material is mitigated. The silt management area is shown on the Construction Sequence Stage 1 drawing (Appendix 3B of the EIAR). A continuous turbidity monitor (sonde) will be placed in the Mullenmore springs and stream and turbidity will be continually monitored to ensure that there is no effect of the proposed works on this watercourse.
- Reinstatement of the diversion channel will involve replacing topsoil from within the same section of works on the channel bed and sloping banks, levelling, raking and seeding with grass and wild-flower seed on the channel base and banks, respectively. A low flow channel will be constructed along the centre of the channel bed. Geotextile grass reinforcement layer will be placed in advance of grass seeding in areas identified by the hydraulic model to be at risk of erosion due to high water velocities during flood events. The construction works have been sequenced, as detailed in Section 8, so as to ensure that flow will not be allowed into the channel from the river until the grass lining has been established.
- Construction of a permanent 4m wide access track north of the diversion channel spanning from the L1105 to the R315 as shown on the scheme drawings (Appendix 3A).

2.4.4 Intake Structure

The construction of the intake structure will be carried out as follows:

- Isolation of works area, including erection of fencing and traffic management where required. The entire boundary of the works area with the River Deel will be fenced off with a triple silt fence as shown on Construction Sequence Drawing: Stage 5 (Appendix 3B of the EIAR) and Figure 2.3. A solid wall of sealed double bagged sand or soil bags will be constructed inside the silt fences to create a solid barrier between the works area and the river. All bankside

works will be undertaken at times of good weather and low flow in the River where there is no potential for the works area to become inundated with water. A 2.4m high hoarding will be erected to mitigate noise impacts during the construction phase.

- Topsoil will be stripped as necessary to prepare the foundation of the intake structure and spillway. Topsoil will be stockpiled for reuse within the works area or stored for reuse in the dedicated site compound which is protected with silt fences. Where soil is to be stored for an extended period of time, it will be sown with grass seed to prevent any windblow or water erosion and subsequent run-off. Excavated material will be reused where possible, classified as a construction by-product in the context of Article 27 of the European Communities (Waste Directive) Regulations. Where it is not required for re-use, it will be removed by a licenced waste contractor.
- Excavation for foundations, blinding of formation, fixing of reinforcement, placing of formwork, placing of concrete, and stripping of formwork: Following detailed site investigation, it is not anticipated that rock breaking will be required during excavation. All formwork and fixing of reinforcement will be located within the defined works area. Formwork will be sealed to prevent any leakage of concrete during pours and will be constructed with sufficient capacity to prevent overspills. Concrete will not be poured at times when heavy rain is predicted in order to prevent potential run off and overspill from the formwork. Concrete works will be programmed to avoid water levels that may cause inundation of the works area in order to avoid potential water contamination. Should any ingress of water (ground or rain) occur prior to a concrete pour, waters will be pumped to ground to a discharge point (as described in section 2.4.2).
- Alarmed Sondes will be employed to measure turbidity in the River Deel upstream and downstream of the works area from Scheme confirmation and throughout construction of the intake structure. If an increase in turbidity of 20% or greater is identified downstream of the works, all works will cease immediately until the source of the increased turbidity is identified and rectified (if caused by the construction works). If the increase in turbidity is clearly not attributed to the construction works, the works will proceed.
- Construction vehicles will work from hardstanding areas to avoid unnecessary ground disturbance within the works area. Temporary hardstanding will be constructed of clean shone behind the proposed retaining wall and all machinery will work from this area.
- Wash out of concrete truck chutes will be carried out at a designated wash out tank located in the site compound, if required.
- Reinstatement of area: Soil will be placed on top of stone gabions at the upstream and downstream ends of the intake structure and taller native vegetation such as Hazel and Hawthorn will be planted in these areas.
- If in the unlikely event during construction works, it is considered that there is a possibility of flood water passing underneath the intake structure foundations, either sheet piles or grouting techniques will be required to provide a cut-off. The sheet piles may be metal or plastic and would be driven to the required depth using a piling hammer or similar. Monitoring of noise

and vibration during critical periods at sensitive locations and along the river bed will be carried out as set out in Chapter 8, Section 8.5. Vibration levels will be limited to the levels set out in NRA, 2004.

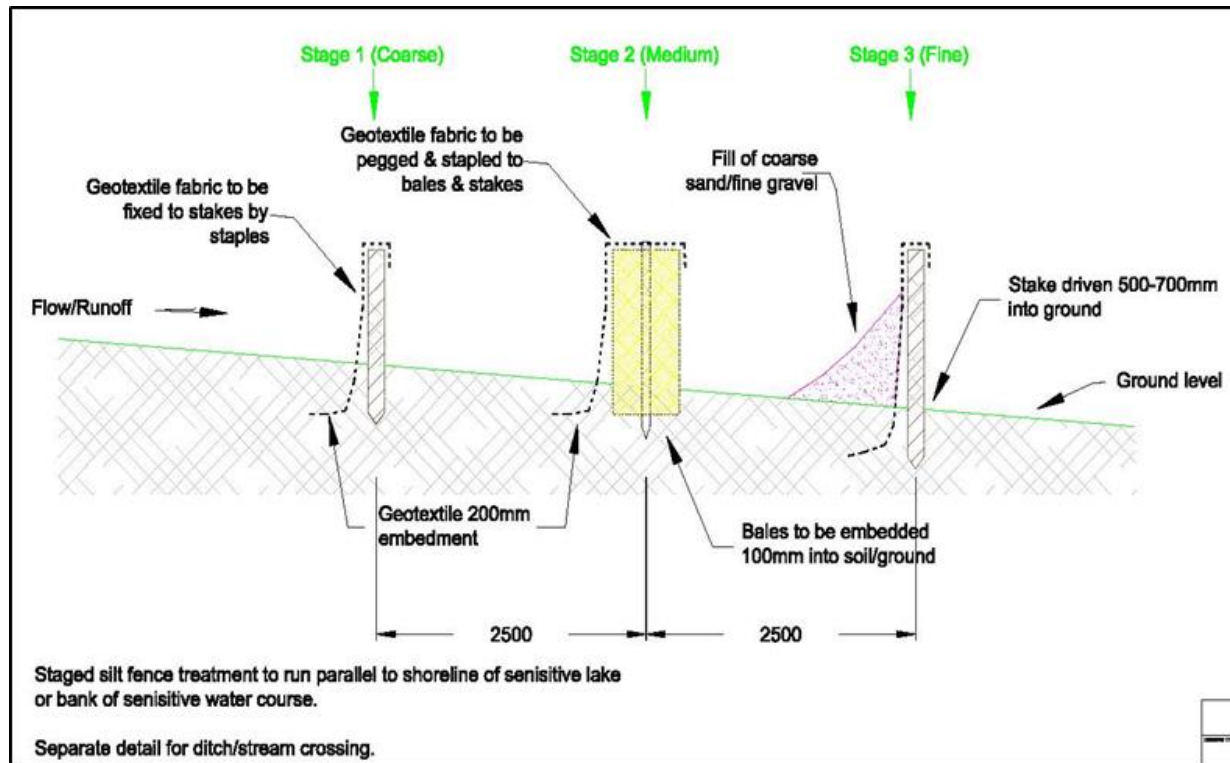


Figure 2.3 Silt Fence Detail

2.4.5 River Flow Control Structure

The construction of the river flow control structure is to be carried out as follows:

- Isolation of the works area, including erection of fencing and site clearance. The fenced area will include the full area required to facilitate the works including an access road from the Boreen to the river bank at the location of the river flow control structure, the temporary site compound and temporary works areas as shown in Drawing AR_03 (Appendix 3A). A 2.4m high hoarding will be erected to mitigate noise impacts during the construction phase.
- Site preparation on the banks will require isolation of the works area outside channel, including erection of fencing. A triple silt fence will be constructed at all interfaces of the works area with the River Deel and the SAC in advance of construction works in the terrestrial works area. These works will be carried out at times of good weather and low flow in the river where there is no potential for significant volumes of surface water runoff from the works area or inundation with flood waters.
- Instream works are to be carried out when the river runs dry or at low flow if this is not possible. Prior to commencement of instream works, a number of surveys will be carried out, the details of which are detailed in Section 7 below. The instream works area will be constructed by placing 1 tonne sealed double bagged bags of sand into the river to create a

horseshoe cofferdam that will enclose no more than half the river at any one time to allow for the passage of fish if the river is not dry. If the works are undertaken at low flow, the area within the cofferdam will be electro fished under licence from the IFI which will be obtained in advance of dewatering the area. If dewatering is required, waters will be pumped to a designated discharge point (as described in section 2.4.2) that is located over 30m away from the River Deel.

- Cobbles, stones and boulders will be removed from the instream works area as required and stored within the terrestrial works area.
- The base for the river flow control structure will be excavated to foundation level and constructed using the best practice requirements for the use of concrete. All formwork and fixing of reinforcement will be located within the defined works area. Formwork will be sealed to prevent any leakage of concrete during pours and will be constructed with sufficient capacity to prevent overflows. Concrete will not be poured at times when rain is predicted in order to prevent potential run off and overflow from the formwork. Concrete works will be programmed to avoid high water levels in the River Deel that may cause inundation of the works area in order to avoid potential water contamination.
- Alarmed Sondes will be employed to measure turbidity in the River Deel upstream and downstream of the works area from confirmation of the Scheme and throughout construction of the river flow control structure. If an increase in turbidity of 20% or greater is identified downstream of the works, all works will cease immediately until the source of the increased turbidity is identified and rectified (if caused by the construction works). If the increase in turbidity is clearly not attributed to the construction works, the works will proceed.
- Construction vehicles will work from hardstanding areas to avoid unnecessary ground disturbance within the works area. Wash out of concrete truck chutes will be carried out at a designated wash out tank located in the site compound if required.
- Scour protection will be placed on the channel bed in the form of rip-rap.
- The timing for construction of the river flow control structure is dependent on periods when the river runs dry or there is low flow in the river and outside of the sensitive period for spawning fish in the River Deel. As such, it may be beneficial to construct the base for the river flow control structure at the earliest suitable opportunity and install the culverts when construction of the diversion channel has been completed. In this case, the base for the river flow control structure will be constructed as outline above and the gravels and cobbles will be replaced in the river until further works are carried out to complete the construction of the structure.
- A crane will be set up within the terrestrial works area to the east of the river flow control structure and the culverts will be lifted into place from the L1105. A temporary closure of the L1105 will be required to facilitate these works and traffic management and a diversion will be put in place. The precast reinforced concrete culverts will be installed at a level below the existing bed of the river and the gravels and cobbles will be replaced. The culverts installed in the initial phase of the works will be set at a lower invert than the subsequent phase to allow any flows that may be in the river at the time of the works to be directed through the

recently constructed culvert, whilst the second half of the river is cofferdammed and the culverts installed in that section. Installation of adjustable steel plates, flood defence parapet, edge beam, access deck and safety rails will be carried out following installation of all culverts.

- Excavation for retaining wall foundations, blinding of formation, fixing of reinforcement, placing of formwork, placing of concrete, and stripping of formwork will be carried out for the construction of wing walls on both banks of the river. The walls will be constructed in accordance with the best practice requirements for the use of concrete as described above.
- The terrestrial area will be reinstated by re-seeding with native grass and planting of native tree species on the banks.

2.4.6 Bridges

The construction of bridges will be carried out by traditional methods comprising the activities listed below. Both bridges are to be constructed in accordance with the design standards; the Transport Infrastructure Ireland Publications (Technical) and the Structural Eurocodes, including EC0 Basis of Structural Design, EC1 Actions on Structures, EC2 Design of Concrete Structures and EC7 Geotechnical Design.

These works are not proposed in close proximity to the River Deel, Mullenmore Springs, Lough Conn or any other sensitive ecological receptor.

Pollnacross Bridge (L1105)

- The works area will be isolated and traffic management set up as required. Temporary road closures will be required as it will not be possible to maintain one lane of traffic on the existing road open at all times. Traffic will be diverted via the R316 and R315 as detailed in Chapter 11 Material Assets.
- The works area will be fenced off from the wider area and will be subject to the silt management and pollution control measures outlined in Section 3.
- Service diversions will be required in advance of bridge construction. Prior to excavation, the site investigation report and service drawings will be assessed to determine the location of existing services in proximity to the works. Additional site investigation will be carried out prior to excavation in order to determine the exact location of services. Any service diversions required will be agreed with the service provider as specified in 11A of the EIAR.
- Excavation of existing road surface, filling and compacting raised approach roads to bridge along L1105, and construction of temporary road surface.
- Excavation for foundations.
- Blinding of formation, fixing of reinforcement, placing of formwork, placing of concrete, and stripping of formwork for bridge abutments and channel bed.
- Delivery and installation of reinforced concrete bridge beams.

- Construction of concrete bridge deck and footpath including laying service ducts, fixing of reinforcement, placing of formwork, placing of concrete, and stripping of formwork.
- Installation of bridge parapets and safety barrier along approaches to bridge.
- Construction of permanent road surface followed by line marking.
- Reinstatement of area including the placement of topsoil, raking and reseeding with grass (channel base) and wild flower seed (channel banks).

Mullenmore Bridge (R315)

- The works area will be isolated and traffic management set up as required. Temporary road closures will be required if it does not prove possible to maintain one lane of traffic on the existing road open at all times. Traffic will be diverted temporarily along the realigned Lake Road as detailed in Chapter 11 Material Assets and summarised in Section 3.5 below.
- Temporary works will be put in place, including construction of silt fences, and the works will be subject to the silt and pollution control measures specified in Section 3. Service diversions will also be required in advance of bridge construction. This will notably include diversion of a gas transmission main.
- The works area will be managed so as to ensure that ingress of waters to the works area will be minimised and that any clean waters are prevented from entering where possible. Following detailed site investigation, it is anticipated that dewatering will be required during the excavation for the R315 bridge foundations. Waters will be pumped to lands that are over 30 metres from any watercourse and discharged via a silt bag to a discharge point located in the diversion channel downstream of the R315 bridge. The discharge point will consist of a circle of triple silt fences surrounding a circle of straw bales wrapped in Terram geotextile. Waters pumped from the excavation will filter through the silt bag, straw bales and silt fences before diffusely discharging to the ground. The discharge points will be constructed prior to commencement of construction works and will be monitored on a daily basis which in use to ensure that the release of any polluting material is mitigated.
- Piling and excavation for foundations. Monitoring of noise and vibration will be carried out as set out in Chapter 8, Section 8.5. Vibration levels will be limited to the levels set out in NRA, 2004.
- Phased installation of concrete panels, anchors and placement and compaction of earthen infill to form a piled bridge abutment adjoining concrete panelled reinforced earth wing walls.
- Blinding of formation, fixing of reinforcement, placing of formwork, placing of concrete, and stripping of formwork for pile cap and channel bed.
- Delivery and installation of reinforced concrete bridge beams supported on the new pile caps.
- Construction of concrete bridge deck and footpaths including laying service ducts, fixing of reinforcement, placing of formwork, placing of concrete, and stripping of formwork.
- Installation of bridge parapets and safety barrier along approaches to the new bridge.

- Construction of permanent road surface followed by line marking.
- Reinstatement of area including the placement of topsoil, raking and reseeding with grass (channel base) and wild flower seed (channel banks).

2.4.7 Energy Dissipation Structure

The construction of the energy dissipation structure will be carried out as detailed below. These works are not proposed in close proximity to the River Deel, Mullenmore Springs, Lough Conn or any other sensitive ecological receptor.

- Isolation of works area, including erection of fencing and site clearance.
- Temporary works will be put in place and works will be subject to the silt and pollution control measures specified in Section 3. Service diversions will be carried out as required and in accordance with the mitigation measures specified in Section 6 below.
- Should dewatering be required during the excavation for the Energy Dissipation Structure, waters will be pumped to lands that are over 30 metres from any watercourse and discharged via a silt bag to a discharge point located in the diversion channel downstream of the energy dissipation structure. The discharge point will consist of a circle of triple silt fences surrounding a circle of straw bales wrapped in Terram. All waters pumped from the excavation will filter through the silt bag, straw bales and silt fences before diffusely discharging to the ground. The discharge points will be constructed prior to commencement of construction works and will be monitored on a daily basis which in use to ensure that the release of any polluting material is mitigated.
- Piling and excavation to foundation level. Excavated material will be stored on site on a temporary basis within the working areas shown on the scheme drawings (Appendix 3A). Monitoring of noise and vibration during critical periods will be carried out as set out in Chapter 8, Section 8.5.
- Blinding of formation, fixing of reinforcement.
- Delivery and installation of precast concrete units.
- Placing of formwork, placing of concrete, and stripping of formwork.
- Installation of safety fencing.
- Reinstatement of area including the placement of topsoil, raking and reseeding with grass.

2.4.8 Road Realignment

The construction of the roads proposed as part of the Scheme is likely to be carried out by traditional methods comprising the following activities:

- Isolation of works area, including erection of fencing and site clearance.
- Temporary works will be put in place, and works will be subject to the silt and pollution control measures specified in Section 3.

- Excavation to foundation level. Excavated material will be stored on site on a temporary basis within the working areas shown on the drawings. Excavated topsoil will be stored separately for reuse. Surplus excavated material will be transported off site to an authorised waste or recovery facility.
- Installation of pipework for road drainage and other ducting required to facilitate installation of underground utilities. This will include placement of pipe bedding, surround, placing and compaction of backfill material.
- Construction of concrete footpaths, including fixing of reinforcement, placing of formwork, placing of concrete, and stripping of formwork.
- Construction of road including sub base, road base, base course and wearing course. This will be followed by line marking.
- Reinstatement of the area, including the placement of topsoil, raking and grass seeding of the road verges.

2.5 OPERATIONAL PHASE MAINTENANCE

Operational measures required will include regular scheduled maintenance of the diversion channel, river flow control structure and the intake structure, maintenance of the river gauges and groundwater monitoring points, and maintenance of vegetation on the river bank. Gravel tagging will be carried out to inform the frequency of maintenance.

Maintenance activities within the diversion channel will include grass cutting, and maintenance of vegetation at manageable levels, repairs to reinforced grass where required, inspection and repairs of other scheme elements, such as fencing, bridges, gates and access tracks.

Maintenance activities at the river flow control structure will include inspections of the structure and adjustable steel plates. This will be done from the access platform. Monitoring of any morphological adjustment and bed sediment characteristics will be carried out in the vicinity of the river flow control structure to ensure that any changes are recorded and any potential effects are identified. Monitoring will be carried out annually at a minimum and more frequently if required depending on hydrodynamic conditions.

Maintenance activities at the intake structure will include inspections, and maintenance of the reinforced concrete. This will be done from within the spillway, from the elevated platform and the riverbank access track. The operation of the new channel may result in some deposition of gravels in the reach between the intake structure and the river flow control structure.

If required, removal of any accumulated gravels in this reach will be carried out when the river is dry using a tracked machine which will access the river bank from the vicinity of the intake structure. There will be no instream works. The top of the accumulated gravels will be removed leaving the low water channel unaffected. All gravels removed will be made available to IFI for use in fisheries enhancement elsewhere in the catchment and will be stored on site for this purpose. The storage area will be located above the flood line within the permanent works area. It is not anticipated that this maintenance will be required on a regular basis.

Bankside vegetation at the river flow control structure and intake structure will require maintenance on an ongoing basis to prevent it from reducing the capacity of the intake. This will not require in-stream works and will be undertaken with the use of strimmers operated by hand, on an annual basis.

As part of the proposed Drainage Scheme, the section of the River Deel from just upstream of the intake structure to the Jack Garrett Bridge in Crossmolina Town will formally be included within the OPW Drainage Maintenance Programme for the Moy Catchment Drainage Scheme, which already extends upstream on the River Deel as far as Jack Garrett Bridge. Maintenance will involve the regular assessment of trees and branches in the area, periodic trimming of woody vegetation at the edges of the channel upstream of the Jack Garrett Bridge and the removal of any that are likely to fall and become trapped in the opening of the Jack Garrett Bridge.

3 ENVIRONMENTAL MANAGEMENT

3.1 INTRODUCTION

This OCEMP has been prepared and presented as a standalone document and includes all best practice measures required to construct the proposed development. The drainage proposals will be developed further to adapt to site conditions prior to commencement and during construction however, any such improvements will be in line with the principles set out here and will also be in full compliance with the mitigation measures as presented in the EIAR, NIS, and all other relevant documents. The following sections give an overview of the control measures proposed in regards drainage, fuel management, dust, noise, invasive species and waste management.

3.2 PROTECTING WATER QUALITY

3.2.1 Site Drainage and Management

The proposed site drainage features required for the site are outlined in Environmental Method Statements included in Section 5.5.6 of the EIAR. As this OCEMP is a working document and is presented as an Appendix to the EIAR, the detailed drainage measures are not included in this document. When the OCEMP report is presented as a standalone document for the construction phase, all drainage measures will be included in that document. The drainage proposals will be implemented prior to the commencement of construction. The following sections give an outline of drainage management arrangements in terms of pre-construction, construction and operational phases of the Proposed Development.

3.2.2 Pre-Construction Drainage

Prior to commencement of works in sub-catchments across the site, main drain inspections will be competed to ensure ditches and streams are free from debris and blockages that may impede drainage. It is proposed to complete these inspections on a catchment by catchment basis as the construction works develop across the site, as works in all areas will not commence simultaneously.

Drainage and associated pollution control measures will be implemented onsite before the main construction works commence. Where possible drainage controls will be installed during seasonally dry ground conditions. This will reduce the possibility of impact on surface waters by suspended sediment released during construction and entrained in surface run-off.

3.2.3 Construction Phase Drainage

The Project Hydrologist/Project Engineer will complete a site drainage and maintenance plan before construction commences and will attend the site to set out and assist with micro-siting of proposed drainage controls as outlined within Section 5.5.6 of the EIAR. The drainage system will be excavated and constructed in conjunction with the access and hard standing construction. Drains will be excavated and stilling ponds constructed to eliminate any suspended solids within surface water running off the site. Drainage infrastructure will include:

- Silt fences will be installed as an additional water protection measure around existing watercourses in certain locations, particularly where works are required where there is any

potential for run off from the works. Silt fences will be installed as single, double or a series of triple silt fences, depending on the space available and the anticipated sediment loading and are typically built using straw bales and lined with an impermeable membrane or a combination of both.

- Check dams will be installed and maintained at regular intervals within drainage channels in the adjacent fields (many of which are dry and none that regularly carry a significant flow).

Best practice and practical experience on other similar projects suggests that in addition to the drainage proposals that are included in the EIAR, there are additional site based decisions and plans that can only be made in the field through interaction between the Site Construction Manager, the Project Hydrologist and the Project Engineer. The mechanisms for interaction between these are outlined within Section 4 of this OCEMP.

In relation to decisions that are made on site it is important to stress that these will be implemented in line with the associated drainage controls and mitigation measures outlined in Section 6 below, and to ensure protection of all watercourses.

3.2.4 Operational Phase Drainage

The project hydrologist will inspect and review the drainage system after construction has been completed to provide guidance on the requirements of any operational phase drainage requirements. This operational phase drainage system will have been installed during the construction phase in conjunction with the access and hardstanding construction work as described above.

The drainage system will be monitored in the operational phase until such a time that all areas that have been reinstated become re-vegetated and a natural drainage regime has been restored

3.2.5 Preparative Site Drainage Management

All materials and equipment necessary to implement the drainage measures outlined above will be brought on-site in advance of any works commencing.

An adequate quantity of straw bales, clean stone, terram, stakes, etc. will be kept on site at all times to implement the drainage design measures as necessary. The drainage measures outlined in the above will be installed prior to, or at the same time as the works they are intended to drain.

3.2.6 Pre-emptive Site Drainage Management

The works programme for the groundworks part of the construction phase of the project will also take account of weather forecasts and predicted rainfall. The site Construction Manager/Site Supervisor is responsible for making the decision to postpone or abandon works. Large excavations and movements of overburden or large-scale overburden or soil stripping will be suspended or scaled back if heavy rain is forecast. The extent to which works will be scaled back or suspended will relate directly to the amount of rainfall forecast.

3.2.7 Reactive Site Drainage Management

The final drainage design prepared for the site has provided for reactive management of drainage measures. The effectiveness of drainage measures designed to minimise runoff entering works areas and capture and treat silt-laden water from the works areas, will be monitored continuously by the Environmental Clerk of Works (ECoW) on-site. The Construction Manager/Site Supervisor in collaboration with the ECoW or Project Hydrologist will respond to changing weather, ground or drainage conditions on the ground as the project proceeds, to ensure the effectiveness of the drainage design is maintained in so far as is possible. This may require the installation of additional check dams, interceptor drains or swales as deemed necessary on-site. The drainage design may have to be modified on the ground as necessary, and the modifications will draw on the various features outlined above in whatever combinations are deemed to be most appropriate to situation on the ground at a particular time.

In the event that works are giving rise to siltation of watercourses, the ECoW or Project Hydrologist will stop all works in the immediate area around where the siltation is evident. The source of the siltation will be identified and additional drainage measures such as those outlined above will be installed in advance of works recommencing.

3.3 REFUELLING, FUEL AND HAZARDOUS MATERIALS STORAGE

The following mitigation measures are proposed to avoid release of hydrocarbons at the site:

- Road-going will be refuelled off site wherever possible;
- On-site refuelling will take carried out at designated refuelling areas at various locations throughout the site. Machinery will be refuelled directly by a fuel truck that came to site as required
- All other refuelling was carried out using a mobile double skinned fuel bowser which will be parked on a level area in the construction compound when not in use;
- Only designated trained and competent operatives will be authorised to refuel plant on site. Mobile measures such as drip trays and fuel absorbent mats will be used during all refuelling operations.
- Fuels volumes stored on site should be minimised. Any fuel storage areas will be bunded appropriately for the fuel storage volume for the time period of the construction and fitted with a storm drainage system and an appropriate oil interceptor;
- The plant used will be regularly inspected for leaks and fitness for purpose; and,
- An emergency plan for the construction phase to deal with accidental spillages will be developed (refer to Section 5) Spill kits will be available to deal with and accidental spillage in and outside the refuelling area.

- A programme for the regular inspection of plant and equipment for leaks and fitness for purpose will be developed at the outset of the construction phase.

3.4 CEMENT BASED PRODUCTS CONTROL MEASURES

The following mitigation measures are proposed to avoid release of cement leachate from the site:

- No batching of wet-cement products will occur on site;
- Ready-mixed supply of wet concrete products and where possible, emplacement of pre-cast elements, will take place. Where possible pre-cast elements for culverts and concrete works will be used;
- No washing out of any plant used in concrete transport or concreting operations will be allowed on-site;
- Where concrete is delivered on site, only chute cleaning will be permitted, using the smallest volume of water possible. No discharge of cement contaminated waters to the construction phase drainage system or directly to any artificial drain or watercourse will be allowed.
- Use weather forecasting to plan dry days for pouring concrete;
- Ensure pour site is free of standing water and plastic covers will be ready in case of sudden rainfall event;
- The small volume of water that will be generated from washing of the concrete lorry's chute will be directed into a concrete washout area, typically built using straw bales and lined with an impermeable membrane. below. The areas are generally covered when not in use to prevent rainwater collecting. In periods of dry weather, the areas can be uncovered to allow much of the water to be lost to evaporation. At the end of the concrete pours, any of the remaining liquid contents is tankered off-site. Any solid contents that will have been cleaned down from the chute will have solidified and can be broken up and disposed of along with other construction waste.

The 50 m wide river buffer zone and 20 m existing artificial drainage buffer will be emplaced for the duration of the construction phase. No construction activity will occur within the buffer zone with the exception of bridge and culvert construction. The buffer zone will:

- Prevent any cement-based products accidentally entrained in the construction phase drainage system entering directly into watercourses, achieved in part by ending drain discharge outside the 50 m buffer zone and allowing percolation across the vegetation of the buffer zone;
- Provide a buffer against accidental direct pollution of surface waters by any pollutants, or by pollutants entrained in surface water run-off.



Plate 3 1 Typical concrete wash out areas

3.5 TRAFFIC MANAGEMENT

A Road Transport and Traffic Management Report will be prepared to include a map indicating the proposed public roads or haulage routes for removal of surplus material off site, as listed in Table 3.1 below. The localised traffic disruptions as a result of other proposed works throughout the scheme will be mitigated through the use of industry standard traffic management measures.

Road Name	Annual Average Daily Traffic	Construction Traffic	
		Peak Daily Construction Traffic	As a Percentage of Existing Traffic
N59 – Ballina Street	5000	107	2.14%
N59 – Main/Bridge Street	1200	107	8.92%
N59 – Erris Street	3200	107	3.34%
R315 – Church Street	2100	107	5.10%
R315 – Mullenmore Street	2800	107	3.82%
L1105 - Chapel Street	900	107	11.89%
The Boreen	82 ^a	14 ^b	17.07%

Table 3.1– Peak Daily Construction Traffic as a Percentage of Existing Traffic on Anticipated Construction Traffic Routes

The contractor will be obliged to design the traffic management measures in accordance with the ‘Guidance for the Control and Management of Traffic at Roadworks – Second Edition’.

The contractor will also be obliged to provide the following mitigation measures:

- Road signage on the public road network will comply with the Department of the Transport’s Traffic Signs Manual “Chapter 8 Temporary Traffic Measures and Signs for Roadworks”.
- Site entrance locations off the public road may require a durable bound surface and a secure joint must be formed between the access road and the public road. A durable bound surface is required on access roads for a minimum distance of 10 m from the public road
- Adequate drainage will be maintained at all times to ensure that no surface water from the site or site access discharges to the public roads
- Cleaning regime for plant will be implemented in order to minimise mud/dust on public roads

3.6 DUST CONTROL

Construction dust can be generated from many on-site activities such as excavation and backfilling. The extent of dust generation will depend on the type of activity undertaken, the location, the nature of the dust, i.e. soil, sand, etc. and the weather. In addition, dust dispersion is influenced by external factors such as wind speed and direction and/or, periods of dry weather. Construction traffic movements also have the potential to generate dust as they travel along the haul route.

Proposed measures to control dust include:

- Any access routes or hardstanding areas with the potential to give rise to dust will be regularly watered, as appropriate, during dry and/or windy conditions;
- The designated public roads outside the site and along the main transport routes to the site will be regularly inspected by the ECoW for cleanliness, and cleaned as necessary;
- Material handling systems and material storage areas will be designed and laid out to minimise exposure to wind;
- Water misting or sprays will be used as required if particularly dusty activities are necessary during dry or windy periods;
- Water misting or bowzers will operate on-site as required to mitigate dust in dry weather conditions;
- The transport of soils or other material, which has significant potential to generate dust, will be undertaken in tarpaulin-covered vehicles where necessary;
- All construction related traffic will have speed restrictions on un-surfaced roads to 20 kph;
- Daily inspection of construction sites to examine dust measures and their effectiveness.
- When necessary, sections of the haul route will be swept using a truck mounted vacuum sweeper; and,
- All vehicles leaving the construction areas of the site will pass through a wheel washing area prior to entering the local road network.

3.7 NOISE CONTROL

The operation of plant and machinery, including construction vehicles, is a source of potential impact that will require mitigation at all locations within the site. Proposed measures to control noise include:

- Diesel generators will be enclosed in sound proofed containers to minimise the potential for noise impacts;

- Plant and machinery with low inherent potential for generation of noise and/or vibration will be selected. All construction plant and equipment to be used on-site will be modern equipment and will comply with the European Communities (Construction Plant and Equipment) (Permissible Noise Levels) Regulations;
- Regular maintenance of plant will be carried out in order to minimise noise emissions. Particular attention will be paid to the lubrication of bearings and the integrity of silencers;
- All vehicles and mechanical plant will be fitted with effective exhaust silencers and maintained in good working order for the duration of the works;
- Compressors will be of the “sound reduced” models fitted with properly lined and sealed acoustic covers which will be kept closed whenever the machines are in use and all ancillary pneumatic tools shall be fitted with suitable silencers;
- Machines, which are used intermittently, will be shut down during those periods when they are not in use;
- Training will be provided by the ECoW to drivers to ensure smooth machinery operation/driving, and to minimise unnecessary noise generation; and,
- Local areas of the haul route will be condition monitored and maintained, if necessary.

3.8 INVASIVE SPECIES MANAGEMENT

A baseline invasive species survey will be carried out at the site to identify the presence and location of any invasive species (listed under the Third Schedule of the European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011) by a suitably qualified ecologist. If the presence of such species is found at or adjacent to the site, particularly in areas where its excavation may be required, an invasive species management plan will be prepared for the site to prevent the introduction or spread of any invasive species within the footprint of the works. An invasive species management plan, if required, will set out best practice control methods as summarised in the following sections.

3.8.1 Site Management

Careful preparation of the site and planning of the works is crucial to successful treatment of invasive species. The following list of guidelines, which is not exhaustive, shall be followed by all on-site personnel. Only those who have been inducted into biosecurity measures on-site may enter the contaminated zones within the works areas. Should any risk of contaminated material escaping be observed by the site supervisor, the management plan for the site must be amended by an appropriately qualified person to mitigate against the risk.

3.8.2 Establishing Good Site Hygiene

The following measures are proposed to establish good site hygiene to ensure the control of any potential spread of invasive species during construction works:

- A risk assessment and method statement must be provided by the Contractor prior to commencing works.
- Fences will be erected around areas of infestation, as confirmed by test pits, and warning signs shall be erected.
- A designated wash-down area will be created, where power-washed material from machinery can be contained, collected and disposed of with other contaminated material. This area will contain a washable membrane or hard surface.
- Stockpile areas will be chosen to minimise movement of contaminated soil.
- Stockpiles will be marked and isolated.
- Contaminated areas which will not be excavated will be protected by a root barrier membrane if they are likely to be disturbed by machinery. Root barrier membranes will be protected by a layer of sand above and below and topped with a layer of hardcore.
- The use of vehicles with caterpillar tracks within contaminated areas will be avoided to minimise the risk of spreading contaminated material.
- An ECoW/suitably qualified ecologist will be on site to monitor and oversee the implementation of invasive species management plans.

Plant and equipment which is operated within an area for the management of materials in contaminated areas should be decontaminated prior to relocating to a different works area. The decontamination procedures should take account of the following:

- Personnel may only clean down if they are familiar with the plant and rhizome material and can readily identify it.
- Decontamination will only occur within designated wash-down areas.
- Vehicles will be cleaned using stiff-haired brush and pressure washers, paying special attention to any areas that might retain rhizomes e.g. wheel treads and arches.
- All run-off will be isolated and treated as contaminated material. This will be disposed of in already contaminated areas.

3.9 CONSTRUCTION METHODOLOGY OVERVIEW

This section of the OCEMP provides a waste management plan (WMP) which outlines the best practice procedures during the excavation and construction phases of the project. The WMP will outline the methods of waste prevention and minimisation by recycling, recovery and reuse at each stage of construction of the proposed development. Disposal of waste will be seen as a last resort.

3.9.1 Legislation

The Waste Management Act 1996 and its subsequent amendments provide for measures to improve performance in relation to waste management, recycling and recovery. The Act also provides a regulatory framework for meeting higher environmental standards set out by other national and EU legislation.

The Act requires that any waste related activity has to have all necessary licenses and authorisations. It will be the duty of the Waste Manager on the site of the development to ensure that all contractors hired to remove waste from the site have valid Waste Collection Permits. It will then be necessary to ensure that the waste is delivered to a licensed or permitted waste facility. The hired waste contractors and subsequent receiving facilities must adhere to the conditions set out in their respective permits and authorisations.

The Department of the Environment provides a document entitled, 'Best Practice Guidelines on the Preparation of Waste Management Plans for Construction and Demolition Projects' (2006). It is important to emphasise that no demolition will take place at this site, however, this document was referred to throughout the process of completing this WMP.

3.9.2 Waste Management Hierarchy

The waste management hierarchy sets out the most efficient way of managing in the following order:

Prevention and Minimisation:

The primary aim of the WMP will be to prevent and thereby reduce the amount of waste generated at each stage of the project.

Reuse of Waste:

Reusing as much of the waste generated on site as possible will reduce the quantities of waste that will have to be transported off site to recovery facilities or landfill.

Recycling of Waste:

There are a number of established markets available for the beneficial use of Construction and Demolition waste such as using waste concrete as fill for new roads.

At all times during the implementation of the WMP, disposal of waste to landfill will be considered only as a last resort.

3.9.3 Construction Phase Waste Management

Description of the Works

The proposed development will comprise the construction of a new grass lined diversion channel, a reinforced concrete intake structure, river flow control structure, an earthen embankment, energy dissipation structure, road raising and realignment, creation of wash lands and all associated works required as part of the flood relief scheme. ...

The expected waste types arising from the construction phase of the development are outlined in Table 3.2 below.

Materials type	Example	EW Code
Cables	Electrical wiring	17 04 11
Cardboard	Boxes, cartons	15 01 01
Composite packaging	Containers	15 01 05
Metals	Steel	17 04 07
Inert materials	Sand, stones, plaster, rock, concrete	17 01 07
Mixed municipal waste	Daily canteen waste from construction workers, miscellaneous	20 03 01
Plastic	PVC ducting and fittings	17 02 03
Wooden packaging	Boxes, pallets	15 01 03

Table 3.2 Expected waste types arising during the Construction Phase

The access routes and hardstand areas will be constructed with rock won from local quarries and the quantities required will be brought to site on an as needed basis therefore the potential for significant volumes of unused or waste stone material is low.

For the concrete structure, it is anticipated that the majority of the concrete elements will be pre-cast and installed on site although there will be a requirement for wet concrete to be cast in-situ on site. Again the quantities required will be known and therefore the potential for waste concrete will be managed.

Where possible excavated material will be classified as a construction by-product in the context of Article 27 of the European Communities (Waste Directive) Regulations. Given the scale of the site and opportunity for re-use of excavated soil and overburden material it is also anticipated the volume for export of such material off site will not be significant. Where material cannot be

re-used or is unsuitable for site works, it will be transported off site by a licensed haulier to an authorised disposal or recovery facility.

Hazardous wastes that may occur on site during the construction phase of the development may include oil, diesel fuel, chemicals, paints, preservatives etc. All hazardous wastes will be stored in bunded containers/areas before being collected by an authorised waste contractor and brought to an EPA licensed waste facility. As mentioned above, hazardous wastes will be kept separate from non-hazardous wastes so that contamination does not occur.

Waste Arisings and Proposals for Minimisation, Reuse and Recycling of Construction Waste

Construction waste will arise on the project mainly from excavation and unavoidable construction waste including material surpluses and damaged materials and packaging waste.

Appropriate measures should be taken to ensure excess waste is not generated during construction, including;

- Ordering of materials should be on an 'as needed' basis to prevent over supply to site. Co-ordination is required with suppliers enabling them to take/buy back surplus stock.
- Purchase of materials pre-cut to length to avoid excess scrap waste generated on site.
- Request that suppliers use least amount of packaging possible on materials delivered to the site.
- Ensuring correct storage and handling of goods to avoid unnecessary damage that would result in their disposal
- Ensuring correct sequencing of operations.
- Use reclaimed materials in the construction works.
- Hazardous waste will be kept separate from all other construction waste to prevent contamination and removed appropriately.

Waste Arising from Construction Activities

All waste generated on site will be contained in waste skips at a waste storage area on site. This waste storage area will be kept tidy with skips clearly labelled to indicate the allowable material to be disposed of therein.

The expected waste volumes generated on site are unlikely to be large enough to warrant source segregation at the site. Therefore, all wastes streams generated on site will be deposited into a single waste skip. This waste material will be transferred to a Materials Recovery Facility (MRF) by a fully licensed waste contractor where the waste will be sorted into individual waste streams for recycling, recovery or disposal.

It is not envisaged that there will be any waste material arising from the materials used to construct the access routes and hardstanding areas as only the quantity of stone necessary will be sourced from local quarries and brought on site on an 'as needed' basis.

Site personnel will be instructed at induction that under no circumstances can waste be brought to site for disposal in the on-site waste skip. It will also be made clear that the burning of waste material on site is forbidden.

Reuse

Many construction materials can be reused a number of times before they have to be disposed of:

- Concrete can be reused as aggregate for backfilling material during the works.
- Plastic packaging etc. can be used to cover materials on site or reused for the delivery of other materials.
- Excavated material can be reused for reinstatement of the works areas.

Recycling

If a certain type of construction material cannot be reused onsite, then recycling is the most suitable option.

All waste that is produced during the construction phase including dry recyclables will be deposited in the on-site skip initially and sent for subsequent segregation at a remote facility. The anticipated volume of all waste material to be generated at the development is low which provides the justification for adopting this method of waste management.

Implementation

Roles and Responsibilities

Prior to the commencement of the development a Construction Waste Manager will be appointed by the Contractor. The Construction Waste Manager will be in charge of the implementation of the objectives of the plan, ensuring that all hired waste contractors have the necessary authorisations and that the waste management hierarchy is adhered to. The person nominated must have sufficient authority so that they can ensure everyone working on the development adheres to the management plan.

Training

It is important for the Construction Waste Manager to communicate effectively with colleagues in relation to the aims and objectives of the waste management plan. All employees working on site during the construction phase of the project will be trained in materials management and thereby, should be able to:

- Distinguish reusable materials from those suitable for recycling;
- Ensure maximum segregation at source;
- Co-operate with site manager on the best locations for stockpiling reusable materials;
- Separate materials for recovery; and
- Identify and liaise with waste contractors and waste facility operators.

Record Keeping

The WMP will provide systems that will enable all arisings, movements and treatments of construction waste to be recorded. This system will enable the contractor to measure and record the quantity of waste being generated. It will highlight the areas from which most waste occurs and allows the measurement of arisings against performance targets. The WMP can then be adapted with changes that are seen through record keeping.

The fully licensed waste contractor employed to remove waste from the site will be required to provide documented records for all waste dispatches leaving the site. Each record will contain the following:

- Consignment Reference Number
- Material Type(s) and EWC Code(s)
- Company Name and Address of Site of Origin
- Trade Name and Collection Permit Ref. of Waste Carrier
- Trade Name and Licence Ref. of Destination Facility
- Date and Time of Waste Dispatch
- Registration no. of Waste Carrier vehicle
- Weight of Material
- Signature of Confirmation of Dispatch detail
- Date and Time of Waste Arrival at Destination
- Site Address of Destination Facility

Waste Management Plan Conclusion

The WMP will be properly adhered to by all staff involved in the project which will be outlined within the induction process for all site personnel. The waste hierarchy should always be employed when designing the plan to ensure that the least possible amount of waste is produced during the construction phase. Reuse of certain types of construction wastes will cut down on the cost and requirement of raw materials therefore further minimising waste levels.

This preliminary WMP has been prepared to outline the main objectives that are to be adhered to for the preparation of a more detailed WMP to be completed after the planning phase of the Proposed Development.

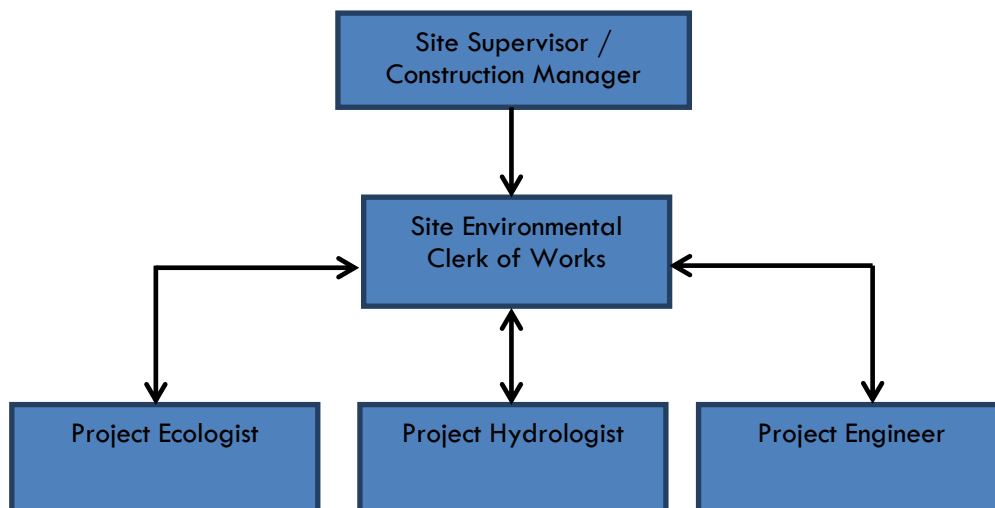
4 ENVIRONMENTAL MANAGEMENT IMPLEMENTATION

4.1 ROLES AND RESPONSIBILITIES

The Site Supervisor/Construction Manager and/or Environmental Clerk of Works (ECoW) are the project focal point relating to construction-related environmental issues.

In general, the ECoW will maintain responsibility for monitoring the works and Contractors/Sub-contractors from an environmental perspective. The ECoW will act as the regulatory interface on environmental matters by reporting to and liaising with Mayo County Council and other statutory bodies as required.

The ECoW will report directly to the Site Supervisor/Construction Manager. An ECoW or Project Ecologist, Project Hydrologist, Project Archaeologist and Project Engineer will visit the site regularly and report to the Site Environmental Office. This structure provides a “triple lock” review/interaction by external specialists. An organogram structure for the construction stage is as follows:



The works will be supervised by an engineer with professional indemnity insurance, who upon completion of the works, including site stability, shall certify the said works. Such an engineer will be appointed to oversee and supervise the construction phase of the project by the client, Office of Public Works (OPW).

4.1.1 Construction Manager / Site Supervisor

The Construction Manager / Site Supervisor will have overall responsibility for the organisation and execution of all related environmental activities as appropriate, in accordance with regulatory and project environmental requirements. The duties and responsibilities of the Site Supervisor/Construction Manager will include:

- Ensure that all works are completed safely and with minimal environmental risk;

- Approve and implement the Project OCEMP and supporting environmental documentation, and ensure that all environmental standards are achieved during the construction phase of the project;
- Take advice from the ECoW on legislation, codes of practice, guidance notes and good environmental working practice relevant to their work;
- Ensure compliance through audits and management site visits;
- Ensure timely notification of environmental incidents; and,
- Ensure that all construction activities are planned and performed such that minimal risk to the environment is introduced.

4.1.2 Site Environmental Clerk of Works

The main contractor will be required to engage a qualified Environmental Engineer, Environmental Scientist, or equivalent, to fulfil the role of Environmental Clerk of Works (ECoW), and to monitor all site works and to ensure that methodologies and mitigation are followed throughout construction to avoid negatively impacting on the receiving environment.

The ECoW will report to the Site Supervisor/Construction Manager. The responsibilities and duties of the ECoW will include the following:

- Preparation and update of the OCEMP as required, and supporting environmental documentation and review/approval of contractor method statements;
- Undertake inspections and reviews to ensure the works are carried out in compliance with the OCEMP;
- Monitor the implementation of the OCEMP, particularly all proposed/required Environmental Monitoring;
- Generate environmental reports as required to show environmental data trends and incidents and ensure environmental records are maintained throughout the construction period;
- Advise site management/contractor/sub-contractors on:
 - Prevention of environmental pollution and improvement to existing working methods;
 - Changes in legislation and legal requirements affecting the environment;
 - Suitability and use of plant, equipment and materials to prevent pollution;
 - Environmentally sound methods of working and systems to identify environmental hazards;

- Ensure the specified mitigation measures are initiated and adhered to during the construction phase;
- Liaise with Project Ecologist, Project Hydrologist and Project Engineer to ensure regular site visits and audits/inspections are completed;
- Ensure adequate arrangements are in place for site personnel to identify potential environmental incidents;
- Ensure that details of environmental incidents are communicated in a timely manner to the relevant regulatory authorities, initially by phone and followed up as soon as is practicable by e-mail;
- Support the investigation of incidents of significant, potential or actual environmental damage, and ensure corrective actions are carried out, recommend means to prevent recurrence and communicate incident findings to relevant parties; and,
- Identify environmental training requirements and arrange relevant training for all levels of site based staff/workers.

The level, detail and frequency of reporting expected from the ECoW for the Construction Manager, developer's project manager, and any Authorities or other Agencies, will be agreed by all parties prior to commencement of construction, and may be further adjusted as required during the course of the project.

4.1.3 Project Ecologist

The Project Ecologist will report to the ECoW and is responsible for the protection of sensitive habitats and species encountered during the construction phase. The Project Ecologist will not be full time on site but will visit the site at least once a month during construction.

The responsibilities and duties of the Project Ecologist will include the following:

- Review and input to the OCEMP in respect of ecological matters;
- In liaison with ECoW, oversee and provide advice on all relevant ecology mitigation measures set out in the EIAR and all associated documents;
- Regular inspection and monitoring of the development, through all phases of construction/operation and provide ecological advice as required;
- Carry out ecological monitoring and survey work as may be required by the local authority.

4.1.4 Project Hydrologist

The Project Hydrologist will report to the ECoW and is responsible for inspection and review of drainage and water quality aspects associated with construction of the proposed development. The Project Hydrologist will not be full time on site but will visit the site at least once a month during construction and on a weekly basis during site preparation/groundworks.

The responsibilities and duties of the Project Hydrologist will include the following:

- Assist in compiling a detailed drainage design before construction commences and attend the site to set out and assist with micro siting of drainage controls. This will be completed over several site visits at the start of the construction phase;
- Review and input to the final construction phase CEMP in respect of drainage and water quality management;
- Following the initial stage of drainage construction regular site visits will be required, at least once a month, to complete hydrological and water quality audits and reviews and report any issues noted to the Site Supervisor/Construction Manager; and,
- Complete ongoing inspection and monitoring of the development, particularly in areas of drainage control, through all phases of construction (including pre, during and post construction) and ensure construction is carried out as specified in the EIAR.

4.1.5 Project Engineer

The Project Engineer will be appointed by OPW to undertake the detailed design of the proposed development prior to construction. The Project Engineer will not be full time on site but will visit site at least once a month during the construction phase and on a weekly basis during site preparation/groundworks or as frequently as is required to the OPW.

The responsibilities and duties of the Project Engineer will include the following:

- Visit site regularly, or at least once a month during the construction phase, to complete geotechnical audits and reviews and report any issues to the Site Supervisor/Construction Manager;
- Ensuring that identified hazards are listed in the Construction Risk Register and that these are subject to ongoing monitoring; and,
- Ongoing inspection and monitoring of the development, particularly in the temporary stockpile areas, through all phases of construction (including pre, during and post construction) and ensure construction is carried out as specified in the EIAR and supporting documents.

4.2 ENVIRONMENTAL AWARENESS AND TRAINING

4.2.1 Environmental Induction

The Environmental Induction will be integrated into the general site induction on a case by case basis for each member of staff employed on-site depending on their assigned roles and responsibilities on site. Where necessary, the Environmental Induction will as a minimum include:

- A copy of the Environmental Management Site Plans and discussion of the key environmental risks and constraints;
- An outline of the OCEMP structure;
- A discussion of the applicable Works Method Statement;
- The roles and responsibilities of staff, including contractors, in relation to environmental management; and,
- An outline of the Environmental Incident Management Procedure.

4.2.2 Toolbox Talks

Toolbox talks will be held by the ECoW or Site Supervisor/Construction Manager at the commencement of each day, or at the commencement of new activities. The aims of the toolbox talks are to identify the specific work activities that are scheduled for that day or phase of work. In addition, the necessary work method statements and sub plans would be identified and discussed prior to the commencement of the day's activities. The toolbox talks will include training and awareness on topics including:

- On-site Ecological Sensitivities
- Buffers to be upheld – watercourses, archaeology, ecology
- Sediment and Erosion Control
- Good site practice
- On-site Traffic Routes and Rules
- Keeping to tracks – vehicle rules
- Strictly adhering to the development footprint
- Fuel Storage
- Materials and waste procedures

Site meetings would be held on a regular basis involving all site personnel. The objectives of site meetings is to discuss the coming weeks activities and identify the relevant work method statements and sub plans that will be relevant to that week's activities. Additionally, any non-compliance identified during the previous week would also be discussed with the aim to reduce the potential of the same non-compliance reoccurring.

During construction of the proposed development, all staff will be made aware of and adhere to the Health & Safety Authority's '*Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2013*'. This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan.

5 EMERGENCY RESPONSE PLAN

5.1 EMERGENCY RESPONSE PROCEDURE

The Emergency Response Plan (ERP) is presented in this section of the OCEMP. It provides details of procedures to be adopted in the event of an emergency in terms of site health and safety and environmental protection. The site ERP includes details on the response required and the responsibilities of all personnel in the event of an emergency. The ERP will require updating and submissions from the contractor/PSCS and suppliers as the project progresses. Where sub-contractors that are contracted on site are governed by their own emergency response procedure a bridging arrangement will be adopted to allow for inclusion of the sub-contractor's ERP within this within this document.

This is a working document that requires updating throughout the various stages of the project.

5.1.1 Roles and Responsibilities

The chain of command during an emergency response sets out who is responsible for coordinating the response. The Site Supervisor/Construction Manager will lead the emergency response which makes him responsible for activating and coordinating the emergency response procedure. The other site personnel who can be identified at this time who will be delegated responsibilities during the emergency response are presented in Figure 5.1. In a situation where the Site Supervisor/ Construction Manager is unavailable or incapable of coordinating the emergency response, the responsibility will be transferred to the next person in the chain of command outlined in Figure 5.1. This will be updated throughout the various stages of the project.

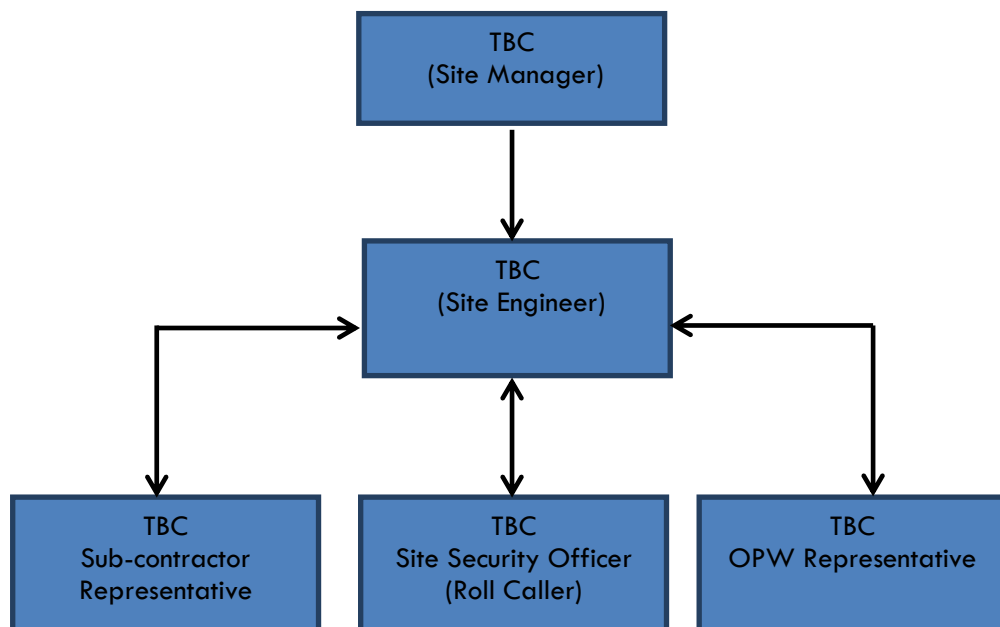


Figure 5.1 Emergency Response Procedure Chain of Command

5.1.2 Initial Steps

In order to establish the type and scale of potential emergencies that may occur, the following hazards have been identified as being potential situations that may require an emergency response in the event of an occurrence.

Hazard	Emergency Situation
Construction Vehicles: Dump trucks, tractors, excavators, cranes etc.	Collision or overturn which has resulted in operator or third-party injury.
Abrasive wheels/Portable Tools	Entanglement, amputation or electrical shock associated with portable tools
Contact with services	Electrical shock or gas leak associated with an accidental breach of underground services
Fire	Injury to operative through exposure to fire
Falls from heights including falls from scaffold towers, scissor lifts and ladders=	Injury to operative after a fall from a height
Sickness	Illness unrelated to site activities of an operative e.g. heart attack, loss of consciousness, seizure

Table 5.1 Hazards associated with potential emergency situations

In the event of an emergency situation associated with, but not restricted to, the hazards outlined in Table 5.1 the Site Supervisor/Construction Manager will carry out the following:

- Establish the scale of the emergency situation and identify the number of personnel, if any, have been injured or are at risk of injury.
- Where necessary, sound the emergency siren/fog-horn that activates an emergency evacuation on the site. The Site Supervisor/Construction Manager must proceed to the assembly point if the emergency poses any significant threat to their welfare **and if there are no injured personnel at the scene that require assistance**. The Site Supervisor/Construction Manager will be required to use their own discretion at that point. In the case of fire, the emergency evacuation of the site should proceed, without exception. The site evacuation procedure is outlined in Section 5.1.3.
- Make safe the area if possible and ensure that there is no identifiable risk exists with regard to dealing with the situation e.g. if a machine has turned over, ensure that it is in a safe position so as not to endanger others before assisting the injured.

- Contact the required emergency services or delegate the task to someone. If delegating the task, ensure that the procedures for contacting the emergency services as set out in Section 5.3 is followed.
- Take any further steps that are deemed necessary to make safe or contain the emergency incident e.g. cordon off an area where an incident associated with electrical issues has occurred.
- Contact any regulatory body or service provider as required e.g. ESB Networks the numbers for which as provided in Section 5.4.
- Contact the next of kin of any injured personnel where appropriate.

5.1.3 Site Evacuation/Fire Drill

A site evacuation/fire drill procedure will provide basis for carrying out the immediate evacuation of all site personnel in the event of an emergency. The following steps will be taken:

- Notification of the emergency situation. Provision of a siren or fog-horn to notify all personnel of an emergency situation.
- An assembly point will be designated in the construction compound area and will be marked with a sign. All site personnel will assemble at this point.
- A roll call will be carried out by the Site Security Officer to account for all personnel on site.
- The Site Security Officer will inform the Site Supervisor/Construction Manager when all personnel have been accounted for. The Site Supervisor/Construction Manager will decide the next course of action, which be determined by the situation that exists at that time and will advise all personnel accordingly.

All personnel will be made aware of the evacuation procedure during site induction. The Fire Services Acts of 1981 and 2003 require the holding of fire safety evacuation drills at specified intervals and the keeping of records of such drills.

5.1.4 Spill Control Measures

Every effort will be made to prevent an environmental incident during the construction and operational phase of the project. Oil/fuel spillages are one of the main environmental risks that will exist on the site which will require an emergency response procedure. The importance of a swift and effective response in the event of such an incident occurring cannot be over emphasised. The following steps provide the procedure to be followed in the event of such an incident:

- Stop the source of the spill and raise the alarm to alert people working in the vicinity of any potential dangers.

- If applicable, eliminate any sources of ignition in the immediate vicinity of the incident.
- Contain the spill using the spill control materials, track mats or other material as required. Do not spread or flush away the spill.
- If possible, cover or bund off any vulnerable areas where appropriate such as drains, watercourses or sensitive habitats.
- If possible, clean up as much as possible using the spill control materials.
- Contain any used spill control material and dispose of used materials appropriately using a fully licensed waste contractor with the appropriate permits so that further contamination is limited.
- Notify the ECoW immediately giving information on the location, type and extent of the spill so that they can take appropriate action.
- The ECoW will inspect the site and ensure the necessary measures are in place to contain and clean up the spill and prevent further spillage from occurring.
- The ECoW will notify the appropriate regulatory body such as Mayo County Council, and the Environmental Protection Agency (EPA), if deemed necessary.

The importance of a swift and effective response in the event of such an incident occurring cannot be over emphasised. Environmental incidents are not limited to just fuel spillages. Therefore, any environmental incident must be investigated in accordance with the following steps.

- The ECoW must be immediately notified.
- If necessary, the ECoW will inform the appropriate regulatory authority. The appropriate regulatory authority will depend on the nature of the incident.
- The details of the incident will be recorded on an Environmental Incident Form which will provide information such as the cause, extent, actions and remedial measures used following the incident. The form will also include any recommendations made to avoid reoccurrence of the incident.
- If the incident has impacted on an ecologically sensitive receptor, such as a sensitive habitat, protected species or designated conservation site (pSPA or cSAC), the ECoW will liaise with the Project Ecologist.
- If the incident has impacted on a sensitive receptor such as an archaeological feature the ECoW will liaise with the Project Archaeologist.

- A record of all environmental incidents will be kept on file by the ECoW and the Main Contractor. These records will be made available to the relevant authorities such as Mayo County Council, EPA if required.

The ECoW will be responsible for any corrective actions required as a result of the incident e.g. an investigative report, formulation of alternative construction methods or environmental sampling, and will advise the Main Contractor as appropriate.

5.2 CONTACTING THE EMERGENCY SERVICES

In the event of requiring the assistance of the emergency services the following steps should be taken:

Stay calm. It is important to take a deep breath and not get excited. Any situation that requires 999/112 is, by definition, an emergency. The dispatcher or call-taker knows that and will try to move things along quickly, but under control.

Know the location of the emergency and the number you are calling from. This may be asked and answered a couple of times but do not get frustrated. Even though many emergency call centres have enhanced capabilities meaning they are able to see your location on the computer screen they are still required to confirm the information. If for some reason you are disconnected, at least emergency crews will know where to go and how to call you back.

Wait for the call-taker to ask questions, then answer clearly and calmly. If you are in danger of assault, the dispatcher or call-taker will still need you to answer quietly, mostly "yes" and "no" questions.

If you reach a recording, listen to what it says. If the recording says your call cannot be completed, hang up and try again. If the recording says all call takers are busy, WAIT. When the next call-taker or dispatcher is available to take the call, it will transfer you.

Let the call-taker guide the conversation. He or she is typing the information into a computer and may seem to be taking forever. There is a good chance, however, that emergency services are already being sent while you are still on the line.

Follow all directions. In some cases, the call-taker will give you directions. Listen carefully, follow each step exactly, and ask for clarification if you do not understand.

Keep your eyes open. You may be asked to describe victims, suspects, vehicles, or other parts of the scene.

Do not hang up the call until directed to do so by the call taker.

Due to the remoteness of the site it may be necessary to liaise with the emergency services on the ground in terms of locating the site. This may involve providing an escort from a designated meeting point that may be located more easily by the emergency services. This should form part of the site induction to make new personnel and sub-contractors aware of any such arrangement or requirement if applicable.

5.3 CONTACT DETAILS

A list of emergency contacts is presented in Table 5.2. A copy of these contacts will be included in the Site Safety Manual and in the site offices and the various site welfare facilities.

Contact	Telephone no.
Emergency Services – Ambulance, Fire, Gardaí	999/112
Doctor – Deel Medical Centre	096 31313
Hospital – Mayo General Hospital	094 902 1733
ESB Emergency Services	1850 372 999
Gas Networks Ireland Emergency	1850 20 50 50
Gardaí – Local Garda Station. Crossmolina	096 31371
Health and Safety Co-ordinator - Health & Safety Services	TBC
Health and Safety Authority	1890 289 389
Inland Fisheries Ireland (IFI)	1890 347 424
Project Supervisor Construction Stage (PSCS): TBC	TBC
Project Supervisor Design Stage (PSDS): TBC	TBC
Client: Office of Public Works	093 36372

Table 5.2 Emergency Contact Details

5.3.1 Procedure for Personnel Tracking

All operatives on site without any exception will have to undergo a site induction where they will be required to provide personal contact details which will include contact information for the next of kin.

In the event of a site operative becoming in an emergency situation where serious injury has occurred and hospitalisation has taken place, it will be the responsibility of the Site Manager or next in command if unavailable to contact the next of kin to inform them of the situation that exists.

5.4 INDUCTION CHECKLIST

Table 5.3 provides a list of items highlighted in this ERP which must be included or obtained during the mandatory site induction of all personnel that will work on the site. This will be updated throughout the various stages of the project.

ERP Items to be included in Site Induction	Status
All personnel will be made aware of the evacuation procedure during site induction	
Due to the remoteness of the site it may be necessary to liaise with and assist the emergency services on the ground in terms of locating the site. This may involve providing an escort from a designated meeting point that may be located more easily by the emergency services. This should form part of the site induction to make new personnel and sub-contractors aware of any such arrangement or requirement if applicable.	
All operatives on site without any exception will have undergone a site induction where they will be required to provide personal contact details which will include contact information for the next of kin.	

Table 5.3 Emergency Response Plan Items Applicable to the Site Induction Process

6 MITIGATION PROPOSALS

All mitigation measures relating to the pre-commencement, construction and operational phases of the Proposed Development were set out in the various sections of the Environmental Impact Assessment Report (EIAR) prepared as part of the assessment.

This section of the OCEMP groups together all of the mitigation measures presented in the EIAR. The Mitigation Measures are presented in the following pages.

By presenting the mitigation proposals in the below format, it is intended to provide an easy to audit list that can be reviewed and reported on during the future phases of the project. The tabular format in which the below information is presented (Table 6.1), can be further expanded upon during the course of future project phases to provide a reporting template for site compliance audits.

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
Pre-Commencement Phase				
MM1	ELAR Ch4	During construction of the proposed development, all staff will be made aware of and adhere to the Health & Safety Authority's 'Guidelines on the Procurement, Design and Management Requirements of the Safety, Health and Welfare at Work (Construction) Regulations 2006'. This will encompass the use of all necessary Personal Protective Equipment and adherence to the site Health and Safety Plan		
MM2	ELAR Ch4	Prior to excavation, the Contractor will assess record drawings and the results of the Site Investigation Contract in order to determine the exact depth and location of the existing wastewater collection network within the works area		
MM3	ELAR Ch10	Pre-construction archaeological test trenching will be undertaken within the accessible green field areas to be impacted by ground reduction works to create the diversion channel and local road diversions. This will include investigations on the line of the townland boundary between Mullenmore North and Carrongilbert (CHS 3). In the event that any unrecorded features of archaeological significance are encountered the archaeologist will consult with Mayo County Council (MCC) and NMS in order to determine appropriate mitigation measures.		
MM4	ELAR Ch10	<p>The following mitigation measures traffic and roads will be implemented:</p> <ul style="list-style-type: none"> The contractor shall provide general condition and structural surveys of all transport infrastructure (roads (including haulage roads), bridges, access tracks) on all routes, including haulage routes, that may be impacted as a result of the proposed Drainage Scheme before works commence on site and after completion and provided to the Ballina Municipal District (BMD)-West Engineer. The contractor shall provide construction details of any lay-buys or hardstand if required to facilitate construction traffic during the construction phase of the Scheme; The contractor shall be obliged to identify locations of any bridges that have 		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
		<p>weight/ height restrictions along proposed haul routes and comply with these restrictions;</p> <ul style="list-style-type: none"> • Site entrance locations off the public road may require a durable bound surface and a secure joint must be formed between the access road and the public road. A durable bound surface is required on access roads for a minimum distance of 10m from the public road; • Adequate drainage will be maintained at all times to ensure that no surface water from the site or site access discharges to the public roads; • Cleaning regime for plant will be implemented in order to minimise mud/dust on public roads. 		
MM5	EIAR Ch11	The Employer's Representative (Consultant Engineer) will assess the water distribution drawing and detailed site investigation in order to determine the locations of watermains relative to the proposed works as part of the Design Phase. Any anticipated clashes between the water distribution network and the proposed works will be identified during the design phase and any diversions necessary to avoid accidental clashes during the construction phase will be designed, planned and agreed with Irish Water in advance of the construction phase of the Scheme.		
MM6	EIAR Ch11	The locations of the gas pipelines relative to the proposed works will be confirmed as part of the Design Phase. The Employer's Representative (Consulting Engineer) will assess the gas network drawings and result of the detailed site investigation in order to determine the exact depth and location of the existing gas pipelines within the works area. Should it be anticipated that the excavation for the diversion channel and bridge foundations will impact on this pipework, this will be taken into consideration at detailed design stage and any diversions necessary to avoid accidental clashes during construction phase will be designed, planned and agreed with Bord Gáis in advance of the construction phase.		
MM7	EIAR Ch11	The locations of the electricity network relative to the proposed works will be confirmed as part of the Design Phase. The Employer's Representative (Consulting Engineer) will assess the service drawings and results of the detailed site investigation in order to		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
		determine the exact depth and location of the existing electricity cables within the works area. Should it be anticipated that the excavation for the proposed works will impact on the electricity network, any diversions necessary to avoid accidental clashes during construction phase will be designed, planned and agreed with the ESB in advance of the construction phase		
MM8	ELAR Ch11	The Employer's Representative (Consultant Engineer) will assess the telecommunications network drawings and the detailed site investigation reports in order to determine the exact depth and location of the existing network within the works area. The locations of the telecommunications cable locations relative to the proposed works have been confirmed as part of the Design Phase. Should it be anticipated that the excavation for the proposed works will impact on this cabling, any diversions necessary to avoid accidental clashes during construction phase will be designed, planned and agreed with the service provider in advance of the construction phase.		
Construction Phase				
Construction Management				
MM9	ELAR Ch3	Construction of the diversion channel will commence at the downstream end and works will proceed in successive sections. Each section will be reinstated in advance of commencing the subsequent section		
MM10	ELAR Ch3	The timing for construction of the river flow control structure is dependent on periods when the river runs dry or there is low flow in the river and outside of the sensitive period for spawning fish in the River Deel.		
MM11	ELAR Ch3 OCEMP Section 8	The construction works have been sequenced, as detailed in Section 3.4, so as to ensure that flow will not be allowed into the channel from the river until the grass lining has been established		
MM12	ELAR Ch3	Construction vehicles will work from hardstanding areas to avoid the generation of mud within the works area. Temporary hardstanding will be constructed of clean shone behind the proposed retaining wall and all machinery will work from this area		
MM13	ELAR Ch3	A temporary construction compound will comprise the following: <ul style="list-style-type: none"> temporary site offices, port-a-loo toilets, facilities for staff and car-parking areas. 		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
		<ul style="list-style-type: none"> • storage areas for construction materials. • bunded containment areas for plant refuelling, maintenance, washing and for the storage of fuels and site generators. • a dedicated waste storage area for any construction waste generated. Skips or bays will be provided for recyclable material. • wheel wash area for construction and delivery vehicles and a designated wash out tank for wash out of concrete trucks following concrete pours. 		
MM1 4	EIAR Ch4	A traffic management plan (such as rolling traffic management) will be prepared and implemented for the duration of the works in order to ensure that any impacts on traffic mobility are minimised.		
MM1 5	EIAR Ch1 1	Good communication between the Communications Officer and the landowners during the construction phase will prevent undue disturbance due to noise, dust and to minimise difficulties caused by the restriction of access to severed land parcels. In cases where impeded drainage during construction will cause obvious difficulty to a particular landowner, temporary measures will be taken to allow waters to drain to less critical areas and so minimise the impact. Any existing service connections severed as a result of construction of the diversion channel will be reinstated.		
Drainage Design and Management				
	EIAR Ch3	Waters will be pumped to lands that are over 30 metres from any watercourse and discharged via a silt bag to a discharge point. The discharge point will consist of a circle of triple silt fences surrounding a circle of straw bales wrapped in Terram.		
	EIAR Ch3	Wash out of concrete truck chutes will be carried out at a designated wash out tank located in the site compound, if required		
	EIAR Ch3	Instream works required for the construction of the river flow control structure will be carried out when the river runs dry or at low flow if this is not possible.		
	EIAR Ch3	As part of the construction of the river flow control structure, scour protection will be placed on the channel bed in the form of rip-rap.		
	EIAR Ch3	Instream works (including preparatory work) will only be undertaken when the river is dry		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
		and outside of the sensitive period for spawning lamprey and salmonid fish in the River Deel from July to September (inclusive) and in consultation with Inland Fisheries Ireland to avoid accidental damage or siltation of spawning beds.		
MM16	ELAR Ch5 NIS Section 4	<p>Construction of the proposed scheme has been specifically designed to avoid the potential for water pollution. Details of the construction work practices and detailed method statements for each construction activity. Measures include:</p> <ul style="list-style-type: none"> • Minimisation of instream working area as outlined in construction drawings provided in Appendix 3A. • Appropriate timing of works to avoid sensitive periods, flooding or high flows. • Detailed construction drainage design to avoid potential run off • Detailed monitoring regime that ensures all measures are effectively employed during construction. • Employment of an Environmental Clerk of Works. • Use of Sondes upstream and downstream of the works area to continually monitor water quality during the construction period. • Use of alarms that trigger when there is a 20% difference in turbidity between the upstream and downstream sondes. • Emergency procedures in place to minimise the potential for or impact of any pollution event. 		
MM17	ELAR Ch5	<p>The main measures proposed for the control of the spread of invasive species are:</p> <ul style="list-style-type: none"> • The thorough cleaning and disinfecting of machinery and materials prior to introduction on to the site. 		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
MM18	ElAR Ch5, 8 OCEMP Section 3 NIS Section 2	<ul style="list-style-type: none"> The inspection of any topsoil, stone or other imported material (should this be required) to ensure that it is not contaminated with invasive species before allowing it to be brought onto the site. <p>The following measures will be put in place to avoid the occurrence of any adverse impacts resulting from the use of hydrocarbons on the site.</p> <ul style="list-style-type: none"> Fuels, chemicals, liquids and solid wastes will be stored on impermeable surfaces. Fuels stored on site will be minimised. Plant refuelling shall be undertaken using a jeep mounted bowser to minimise storage of fuel on site. Small quantities of chemicals and petrol required for tools shall be stored with drip trays in a vented fuel store in the temporary works compound Plant refuelling shall be undertaken on impermeable surfaces within a suitably constructed bund in accordance with best practice guidelines. No refuelling will be permitted in or near soil or rock cuttings. Only designated trained operatives will be authorised to refuel plant on-site Plant shall be inspected regularly for any leaks Storage of fuel and oil will be regularly inspected for leaks or signs of damage A lock system will be fitted on all taps, nozzles or valves associated with refuelling equipment All hydrocarbons and other potential contaminants will be stored within suitably constructed bunds in accordance with best practice guidelines. The bunds will be sized to hold 110% of the volume of the stored contaminants in order to contain a spill should it occur. The base and walls of the bund shall be impermeable to water and oil 		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
		<ul style="list-style-type: none"> • Spill kits will be provided at refuelling areas and at high risk/sensitive sites • Large volumes of excavated material will not be allowed to accumulate within the temporary working areas. Any stockpiling of soils will be greater than 10 metres away from any surface waters, and runoff will be prevented by the use of a silt fence • There will be no storage of materials, machinery or soil in areas that are susceptible to flooding • Where contaminated soil is encountered, the ECoW will assess the extent of contamination and will supervise any operations involving contaminated soil. Any contaminated soil will be transported to an approved waste facility for treatment and safe disposal. • An emergency response plan to deal with accidental spillages is contained within the Outline Construction Environmental Management Plan. This will include providing toolbox talks regarding the appropriate use of spill kits and best practice for the management of accidental spills. 		
MM19	ELAR Ch7 NIS Section 2	<p>Measures to minimise the suspension and transfer of sediment and pollutants to ground and surface waters will be implemented. These measures are as follows:</p> <ul style="list-style-type: none"> • Where dewatering is required, waters will be pumped to lands that are over 30 metres from any watercourse and discharged via a silt bag to a discharge point. The discharge point will consist of a circle of triple silt fences surrounding a circle of straw bales wrapped in Terram. All waters pumped from the excavation will filter through the silt bag, straw bales and silt fences before diffusely discharging to the ground. The discharge points will be constructed prior to commencement of construction works and will be monitored on a daily basis when in use to ensure that the release of any polluting material is mitigated. 		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
		<ul style="list-style-type: none"> Any stockpiling will be further than 10 metres from the river bank, and runoff will be prevented by the use of a silt fence. Prior to construction of the river flow control structure, the instream works areas will be constructed by creating a horseshoe cofferdam. Construction works will be carried out when the river runs dry if possible or at low flow conditions (outside of the sensitive period for spawning fish in the River Deel). A triple silt fence will be constructed at all interfaces of the works area with the River Deel in advance of construction works on the banks of the river at the river flow control structure. Works undertaken on the river banks will be carried out at times of good weather and low flow in the river where there is no potential for significant volumes of surface water runoff from the works area or inundation with flood waters. The entire boundary of the works area within the River Deel will be fenced off with a triple silt fence as shown on Construction Sequence Drawing: Stage 5 (Appendix 3B) for the construction of the intake structure. A solid wall of sand or soil bags will be constructed inside the silt fences to create a solid barrier between the works area and the river. All bankside works will be undertaken at times of good weather and low flow in the River where there is no potential for the works area to become inundated with water. All works undertaken on the banks will be fully consolidated to prevent scour and run off of silt. Consolidation may include use of protective and biodegradable matting (coirmesh) on the banks and also the sowing of grass seed on bare soil. Measures specified in the Outline Construction Environmental Management Plan will be adhered to in order to ensure all works are carried out in a manner designed to avoid and minimise any adverse impacts on the receiving 		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
		<p>environment.</p> <ul style="list-style-type: none"> All concrete works will be carried out in dry conditions, with no in-stream pouring of concrete, and in accordance with the best practice measures provided Chapter 3 A silt fence will be erected on all sides of the temporary site compounds to prevent any run off from the perimeter of the compounds. There will be no refuelling of machinery within the river channel. Refuelling will take place at designated locations in the site compound at distances of greater than 30 metres from the watercourse. No vehicles will be left unattended when refuelling and a spill kit including an oil containment boom and absorbent pads will be on site at all times. Wash out of concrete truck chutes will be carried out at a designated wash out tank located in the site compound, if required. Any fuel that is stored on the site will be in a double skinned, banded container that will be located within a designated site compound at a location that is removed from the river. The locations of the site compounds are shown on the construction sequence drawings (Appendix 3B). All construction materials and plant will be stored in the site compounds. The compounds will also house the site offices and port-a-loo toilets. The compounds will be located on ground that is not prone to flooding or will be surrounded by a protective earth bund to prevent inundation. The site compounds will be surfaced with a hard standing to prevent generation of mud. A silt fence will be erected on all sides of the compounds to prevent any run off from the perimeter of the compounds. The locations of the site compounds will be adequately buffered to prevent any 		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
		<p>surface water runoff.</p> <ul style="list-style-type: none"> All vehicles will be regularly maintained and checked for fuel and oil leaks. See also Chapter 5 of this EIAR for mitigation measures for aquatic ecology. With regard to the diversion channel, 166,000 m³ of excavated material is anticipated. This material will be reused where possible on site or contained and transported off site as it is generated to reduce any risk of mobilisation to receiving watercourses. Excavated topsoil will be stored separately for reuse in reinstatement works on site and the storage area will be fenced off with silt fencing to prevent any run off. Works in the vicinity of the Mullenmore Stream will take place during a dry period to prevent any erosion of bare soil to Mullenmore South stream and subsequently Lough Conn. <p>There will be no storage of materials, machinery or soil in areas that are susceptible to flooding.</p> <p>As well as minimising soil erosion, a surface water management system will also minimise the volume of suspended solids transported by surface water run-off and discharged into local watercourses. The following measures will form part of the surface water management system and the contractor will be obliged to implement them during the construction phase:</p> <ul style="list-style-type: none"> Vegetation and soil will be left in place for as long as possible prior to excavation and stockpiling of soil to be minimised during wet weather periods. Soil stockpiles will be shaped so as to shed water. Surface water run-off from exposed soil surface will be intercepted and redirected to the silt management areas as shown on the Construction Sequence Drawings (Appendix 3B). Granular materials will be placed over bare soil, particularly in the vicinity of 		
MM20	EIAR Ch6			

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
		watercourses, to prevent erosion of fines and/or rutting by construction machinery.		
MM21	ELAR Ch7	Should aggradation occur upstream of the river flow control structure, removal gravels in this reach will be carried out when the river is dry using a tracked machine which will access the river bank from the vicinity of the intake structure.		
MM22	ELAR Ch7	The energy dissipation structure will reduce velocities of water entering the washlands and therefore the potential for erosion. The scour protection will also reduce the potential for erosion where velocities are predicted to be highest in the Works Area.		
Flora and Fauna				
MM23	ELAR Ch3	As part of site reinstatement, Soil will be placed on top of stone gabions at the upstream and downstream ends of the intake structure and taller native vegetation such as Hazel and Hawthorn will be planted in these areas.		
MM24	ELAR Ch3	The terrestrial area at the River Flow Control Structure will be reinstated by re-seeding with native grass and planting of native tree species on the banks.		
MM25	ELAR Ch3	Reinstatement of area around the grass lined diversion, bridges, energy dissipation structure and road realignment will be completed with the placement of topsoil, raking and reseedling with grass (channel base) and wild flower seed (channel banks).		
MM26	ELAR Ch5, 9 NIS Section 2	The loss of 1,471m of hedgerow and tree line and 0.46ha. of woodland habitat will be mitigated through the planting of 2,445m of native hedgerows and treelines along with replanting of native trees around the intake structure and the flow control structure.		
MM27	ELAR Ch5 NIS Section 4	Habitat loss will also be minimised by the fencing off the construction area at the outset of the works and preventing all vehicular access to these areas during construction		
MM28	ELAR Ch5	The original bed of the river removed to facilitate construction will be replaced during the operational phase of the development to ensure that there is no loss of fisheries habitat associated with the proposed scheme		
MM29	ELAR Ch5	Instream work will only be undertaken, when the river is dry or outside the sensitive period for spawning lamprey and salmonid fish in the River Deel (July 1st to October September 30th)		
MM30	ELAR Ch5	When dewatering the river (if necessary), no more than 50% of the river will be blocked		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
		at any one time, thus allowing continued passage for the aquatic KERs through the catchment		
MM31	EIAR Ch5	Where cofferdams are required to facilitate a dry working area, the area inside the cofferdam will be electro-fished under licence from the IFI prior to drawdown.		
MM32	EIAR Ch5	All plant, machinery and equipment will be thoroughly cleaned and disinfected using Virkon 1% biocide prior to arrival and departure from the site to prevent the spread of invasive species such as Asian Clam, Zebra Mussel, Crayfish plague.		
MM33	EIAR Ch5	Where otter holts are identified as being in active use as a breeding holt at the time of the proposed works – these works will be suspended until breeding activity has concluded. All works will be undertaken in accordance with the 'Guidelines for Treatment of Otters prior to the Construction of National Road Schemes' (NRA 2008) following the procedure set out in EP 20 of the OPW 'Drainage Maintenance and Construction Environmental Guidance' (OPW 2019) In addition to the above, all works will be undertaken between the hours of 8am and 6 pm thus avoiding the main periods of activity for this crepuscular species.		
MM34	EIAR Ch5	Should any badger active setts be encountered, during the dedicated pre-construction badger survey (if badgers have migrated into the area since the recent dedicated surveys that have been undertaken), they will be similarly avoided where possible.		
MM35	EIAR Ch5	Should badger setts be identified within the development footprint during the pre-construction surveys (i.e. if the abandoned sett is re-occupied or if additional new setts are identified), a licence will be sought to exclude the Badgers in advance of the undertaking of any construction or clearance works.		
MM36	EIAR Ch5	All works will be carried out in accordance with the 'Guidelines for the Treatment of Badgers Prior to the Construction of National Road Schemes' (NRA 2008) and OPW EP 23 – Badger Procedure (OPW 2019)		
MM37	EIAR Ch6	All Japanese Knotweed within and surrounding the site of the proposed works will be subject to the Invasive Species Management Plan (Chapter 5). The following measures will be implemented in order to mitigate against the risk of moving soil contaminated with Japanese Knotweed; <ul style="list-style-type: none"> • A pre-construction invasive species survey will be undertaken at the site of the proposed Scheme • In advance of any works being carried out on the site of the proposed flood 		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
		<p>relief scheme, any invasive species that occur within the identified works area will be subject to treatment with a non-persistent glyphosate herbicide. This will be undertaken at the end of the growing season (late August – September) and the method of application and chemical formulation will be agreed with all relevant stakeholders prior to application and treatment. Some of the stands are currently being treated in advance of any works. It is intended that these advance works will weaken the plant in advance of the construction works</p> <ul style="list-style-type: none"> • Treatment will be undertaken from hand held sprayers and will avoid the potential for spray drift into other areas. • In all areas where Japanese Knotweed has been identified within the footprint of the proposed works (including areas within 7 metres of recorded stems) will be fenced off and included within the Knotweed Management Plan. • Knotweed and contaminated soil will be excavated from its current location and removed to a containment bund within the works area for ongoing treatment. The location of this bund is shown in Chapter 5, Figure 5.1. • The loading of each truck will be undertaken on a surface that can be easily cleaned (such as a radon barrier) and will be inspected by a suitably qualified ecologist and if necessary, brushed down before departure to ensure that there is no knotweed present on the outside of it. • The excavation will be overseen by a suitably qualified ecologist and will involve the excavation of the Knotweed and associated rhizomes. The ecologist will inspect the excavated area following removal and will determine whether all rhizomes have been removed. Once satisfied, the sites will be declared free from Knotweed. • All excavation machinery will be thoroughly cleaned and disinfected prior to 		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
		<p>leaving the section of the proposed works that is subject to the Knotweed Management Plan.</p> <ul style="list-style-type: none"> Following completion of the construction and reinstatement, the site will be sown with grass seed mix and allowed to quickly re-vegetate. Follow up surveys will be undertaken for at least three years following the construction to ensure that these small stands are completely eradicated. 		
MM38	EIAR Ch7	The diversion channel will be grass lined and is designed in accordance with fully researched and data substantiated methodology (CIRIA, 2003) for grass lined waterways to maximise the erosion resistance of the wash land. Areas of predicted high velocities will be reinforced with a geotextile layer and scour protection. In addition, the energy dissipation structure has been designed so as to reduce the velocities of flood waters entering the washlands from the diversion channel.		
MM39	EIAR Ch7	Cattle will not be permitted on the diversion channel to minimise disturbance. Sheep grazing has been shown to be effective for maintaining the grassed area with little/ no disturbance.		
Soils, Subsoils and Bedrock				
MM40	EIAR Ch3	Where soil is to be stored for an extended period of time, it will be sown with grass seed to prevent any windblow or water erosion and subsequent run-off.		
MM41	EIAR Ch3 OCEMP Section 3	Where soil is not required for re-use, it will be removed by a licensed waste contractor.		
MM42	EIAR Ch6	Where it is necessary to remove bedrock to facilitate construction of the proposed scheme, suitable material will be reused elsewhere where possible. Material removed from site will be transported to the closest suitably licensed facility to be processed and used on other construction projects in the vicinity, where possible.		
MM43	EIAR Ch6 OCEMP Section 2, 3	Excavated subsoils will be reused as fill where possible. Any remaining volumes of surplus materials will be transported to the closest suitably licensed facility to be processed and reused in other construction projects in the vicinity, where possible. Where reuse is not possible, material will be transported to an approved waste facility for safe disposal.		
MM44	EIAR Ch6	Any excavated topsoil will be stored on site and used to reinstate the channel. All storage		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
	OCEMP Section 2, 3	will be undertaken within the identified temporary works area. The amount stored at any time will be minimised by completing the channel on a sectional basis with each section being completed before proceeding to the next Topsoil storage areas will be defined and fenced off with silt fencing to prevent run off.		
Air Quality/Dust				
MM45	ELAR Ch4, 8 OCEMP Section 3	In periods of extended dry weather, dust suppression (localised wetting of surfaces) may be necessary within and around the site to ensure dust does not cause a nuisance.		
MM46	ELAR Ch4	Mitigation measures will be implemented in relation to exhaust emissions and climate during the construction phase switching machinery off when not in use, maintaining all construction vehicles and plant in good operational order and sourcing material which will be required in large volumes such as aggregates locally where possible to reduce potential emissions		
Noise				
MM47	ELAR Ch4 OCEMP Section 3	Noise control measures that will be employed include: <ul style="list-style-type: none"> • selection of plant with low inherent potential for generation of noise and/ or vibration; • erection of enclosures as necessary around noisy processes and items such as generators, heavy mechanical plant or high duty compressors; • placing of noisy / vibratory plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary. 		
MM48	ELAR Ch8	It is proposed that various practices be adopted during construction for the control of noise, including: <ul style="list-style-type: none"> • where noise levels at NSLs are anticipated to exceed the daytime noise criteria, hoarding extending to a height of 2.4 m will be erected between the works area and the NSL. If such measures are installed, the construction operations are expected to meet or be less than the 70 dB L_{Aeq}(1hr) criterion • an alternative piling process which is viable to reduce noise and vibration impacts such as the Giken Seisakusho 'Silent Piler', or Variable Frequency Hammer or Variable Static Moment piling will be employed, if it is necessary to include sheet 		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
		<p>piling in the works. The Giken piling rig employs a 'press-in' method of piling in lieu of the more typical vibratory or impact type of piling. This method allows pre-formed piles to be installed with minimal noise and vibration generation. Noise level data for the Giken 'Silent Piler' indicates a measured sound pressure level of 75dB(A) at a distance of 1m (White et al, 2002). Assuming the piling rig operates continuously for one hour, this would result in a noise level of 65dB LAeq, 1hr at a distance of 10m, which would be a closer distance than the piling works would be to any noise sensitive location. This level would be within the established criteria at each location and, hence, would allow piling activities to occur at any of the proposed works locations without a significant risk of noise emission exceeding the criteria.</p> <ul style="list-style-type: none"> • limiting the hours during which site activities likely to create high levels of noise or vibration are permitted; • establishing channels of communication between the contractor/developer, Local Authority and residents; inform affected residents of time of blasting or piling 24 hours in advance; • appointing a site representative responsible for matters relating to noise; • monitoring typical levels of noise during critical periods and at sensitive locations and along the river bed. <p>Furthermore, a variety of practicable noise control measures will be employed. These will include:</p> <ul style="list-style-type: none"> • selection of plant with low inherent potential for generation of noise; • erection of enclosures as necessary around noisy processes and items such as generators, heavy mechanical plant or high duty compressors; • placing of noisy plant as far away from sensitive properties as permitted by site constraints 		
MM49	EIAR Ch4	Open lines of communication with local residents with regards to work schedules,		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
MM50	ELAR Ch8	<p>programme and a reassurance of the temporary nature of the works generating noise and nuisance as well as adhering to agreed hours of construction</p> <p>For control of vibration, the following practices will be adopted during construction:</p> <ul style="list-style-type: none"> • establishing channels of communication between the contractor/developer, Local Authority and residents; inform affected residents of time of blasting or piling 24 hours in advance; • appointing a site representative responsible for matters relating to vibration; • monitoring typical levels of vibration during critical periods and at sensitive locations and along the river bed. • If traditional piling methods are employed, a test pile will be erected at the piling location closest to the nearest sensitive locations. Vibration monitoring will then be conducted to confirm that ground borne vibration will be within the guidance criteria limits listed in Table 8.5 of Chapter 8 and that no structural damage will therefore occur to adjacent buildings. Vibration may also impact on aquatic species such as the fresh water pearl mussel. Vibration monitoring will also be conducted at locations along the river bed which are in proximity to piling activities in order to ensure that vibration will not adversely affect the aquatic environment. The vibration transmission associated with piling can be significantly reduced if piling operations are conducted using methods that are viable to reducing vibration impacts such as the 'press-in' method. Although the exact levels will depend on ground composition, research indicates that vibration levels at a distance of 10m from the piling rig would be of the order of 1mm/s (White et al. 2002). This level is well below the BS 5228 guidance criteria limits. <p>Furthermore, a variety of practicable vibration control measures will be employed. These will include:</p> <ul style="list-style-type: none"> • selection of plant with low inherent potential for generation of vibration; 		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
		<ul style="list-style-type: none"> placing of vibratory plant as far away from sensitive properties as permitted by site constraints and the use of vibration isolated support structures where necessary. <p>Vibration from construction activities will be limited to the values set out in Table 8.5 of Chapter 8.</p>		
Cultural Heritage				
MM51	EIAR Ch10	A detailed building survey of the mill ruins will be undertaken by a suitably-qualified and experienced archaeologist in order to compile a full record of the extant structures in written, drawn and photographic formats.		
Traffic				
MM52	EIAR Ch11	The construction of the reinforced concrete bridges will be carried out by a suitably qualified and experienced contractor who will be supervised to ensure that the works are carried out correctly. This will ensure that the bridges will be constructed safely and ensure the structural integrity of the structure		
MM53	EIAR Ch11	<p>Road Transport and Traffic Management Report will be prepared to include a map indicating the proposed public roads or haulage routes for removal of surplus material off site, as listed in Table 11.5 of Chapter 11.</p> <p>In addition, the following mitigation measure will be implemented within the Plan:</p> <ul style="list-style-type: none"> The locations at which traffic management measures will be put in place will be agreed with the BMD-West Engineer prior to commencement of the construction phase. The contractor will confirm the proposed laden weight of trucks identified, maximum length of same, Journey time and number of trips per route per day to and from works sites. The contractor will confirm the proposed start and finish times as outlined in this document and days for truck haulage and estimate the minimum and maximum 		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
		<ul style="list-style-type: none"> number of days for full operation. Pull-in lay-bys or hardstands for overtaking of slow moving traffic will be identified along the proposed haulage routes. Any traffic control measures will be carried out with the agreement and under the supervision of the local Area Engineer. Road signage on the public road network will comply with the Department of the Transport's Traffic Signs Manual "Chapter 8 Temporary Traffic Measures and Signs for Roadworks". Traffic management measures will be designed in accordance with the "Guidance for the Control and Management of Traffic at Roadworks – Second Edition". 		
MM54	ELAR Ch11	<p>The contractor will also be obliged to provide the following mitigation measures:</p> <ul style="list-style-type: none"> Road signage on the public road network will comply with the Department of the Transport's Traffic Signs Manual "Chapter 8 Temporary Traffic Measures and Signs for Roadworks". Site entrance locations off the public road may require a durable bound surface and a secure joint must be formed between the access road and the public road. A durable bound surface is required on access roads for a minimum distance of 10 m from the public road Adequate drainage will be maintained at all times to ensure that no surface water from the site or site access discharges to the public roads Cleaning regime for plant will be implemented in order to minimise mud/dust on public roads 		
MM55	ELAR Ch11	Construction works will be sequenced so as to avoid unnecessary interruption to road users insofar as is practicable. The realigned Lake Road will be constructed in advance of		

Reference No.	Reference	Mitigation Measure	Audit Result	Action Required
		constructing the two new bridges thereby providing an alternative route to the R315 locally at the Mullenmore Bridge. This will minimise the potential requirement for a closure of the R315. Any road and lane closures will be timed to minimise the impact to the flow of traffic, and if possible, work will be carried out at off peak times to reduce the impact, particularly on heavy goods vehicles. All residents and interested parties shall be consulted when planning these road closures to optimise the timing of same. A complete schedule of road closures will be published in advance of the works commencing to facilitate residents in making alternative arrangements where necessary		
MM56	EIAR Ch11	New bridges are proposed for the L1105 and R315. Access to property along the Lake Road will be maintained by realigning the road and creating a new junction with the R315 Regional Road.		
MM57	EIAR Ch11	The Lake Road diversion will be constructed in advance of the other elements of the scheme so that access is maintained in the vicinity of the Lake Road. Maintenance of access will also be taken into account in the overall sequencing of the works.		

Table 6.1 Mitigation Measures

7 MONITORING PROPOSALS

All monitoring proposals relating to the pre-commencement, construction and operational phases of the Proposed Development were set out in various sections of the EIAR prepared as part of the proposed development.

This section of the Construction and Environment Management Plan groups together all of the monitoring proposals presented in the EIAR. The monitoring proposals are presented in the following pages.

By presenting the monitoring proposals in the below format, it is intended to provide an easy to audit list that can be reviewed and reported on during the future phases of the project. The tabular format in which the below) information is presented (Table 7.1), can be further expanded upon during the course of future project phases to provide a reporting template for site compliance audits.

Ref. No.	Reference	Survey/Monitoring Measure	Frequency	Reporting Measures	Responsibility
Pre-Commencement Phase					
MX1	ELAR Ch5	The construction works will be monitored at several levels of seniority as described below to ensure that the environmental best practice prescribed in this document is fully adhered to and is effective	On-going	n/a	Construction Manager/Site Supervisor
MX2	ELAR Ch5	The construction management team will be regularly monitoring the works and will be fully briefed and aware of the environmental constraints and protection measures to be employed.	On-going	n/a	ECoW
MX3	ELAR Ch5, 6 OCEMP Section 3	A pre-construction invasive species survey will be undertaken at the site of the proposed Scheme	Once, pre-commencement	On completion	Project Ecologist
MX4	ELAR Ch5	Prior to any instream works a crayfish survey will be undertaken by a suitably qualified ecologist and any crayfish encountered will be translocated under licence to areas upstream of the proposed works.	Once, pre-commencement	On completion	Project Ecologist
MX5	ELAR Ch5	Similarly, prior to any instream works being undertaken, a survey for freshwater pearl mussel will be undertaken by a suitably qualified ecologist. In the unlikely event that freshwater pearl mussel are present, a derogation licence will be sought from the NPWS to facilitate their translocation to a suitable location within the river (where it does not dry out for extended periods on an annual basis.	Once, pre-commencement	On completion	Project Ecologist
MX6	ELAR Ch5	Prior to construction, a dedicated otter survey will be undertaken by a suitably qualified ecologist to determine whether the identified holt has since become occupied and active. The status of the holt will be assessed (breeding holt/occasional use etc.) and a derogation licence for potential disturbance will be sought if works are proposed within 30m of an active holt.	Once, pre-commencement	On completion	Project Ecologist
MX7	ELAR Ch5	Prior to construction, a dedicated Badger survey will be undertaken of the entire works area by a suitably qualified ecologist to determine the current status of badger activity throughout the site.	Once, pre-commencement	On completion	Project Ecologist
MX8	ELAR Ch5	<p>The following measures will be put in place to promote biodiversity through the construction and operation of the proposed scheme:</p> <ul style="list-style-type: none"> The sections of the grasslands that are not in the base of the channel and subject to high levels of erosive stress will be sown with native 	On-going	n/a	ECoW/ Project Ecologist

Ref. No.	Reference	Survey/Monitoring Measure	Frequency	Reporting Measures	Responsibility
		<p>wildflower seed mixes that are designed to encourage pollinators. The grasslands will be managed as a hay meadow with an annual cut undertaken in late summer or early autumn and all cut material removed.</p> <ul style="list-style-type: none"> 20 Bird and bat boxes will be erected throughout the works area for the scheme to provide nesting and roosting opportunities. The planting of native hedgerows will include species such as hazel and hawthorn that provide a source of food for wildlife. The grasslands in the diversion channel will not be fertilised or treated with any herbicide or pesticide. A nesting bank for kingfisher will be constructed adjacent to the River Deel in the vicinity of the flow control structure 			
Construction Phase					
MX9	ElAR Ch3 OCEMP Section 8	<p>Alarmed Sondes will be employed to measure turbidity in the River Deel upstream and downstream of the works area from Scheme confirmation and throughout construction of the intake structure. If an increase in turbidity of 20% or greater is identified downstream of the works, all works will cease immediately until the source of the increased turbidity is identified and rectified (if caused by the construction works).</p> <p>A sonde will be placed in the Mullenmore springs and stream and turbidity will be continually monitored to ensure that there is no effect of the proposed works on this watercourse</p>	Continuous Monitoring	As required	ECoW
MX10	ElAR Ch3 OCEMP Section 2	A sonde will be placed in the Mullenmore springs and stream and turbidity will be continually monitored to ensure that there is no effect of the proposed works on this watercourse	Continuous Monitoring	As required	ECoW
MX11	ElAR Ch7 OCEMP Section 4	Runoff from works, stockpile and compound areas will be monitored and observed daily to ensure that it is not impacting on any local watercourses. Both hydrocarbons and silt cause discolouration so are easy to visually monitor for their presence.	Daily	As required	ECoW
MX12	ElAR Ch7	If necessary, water sampling and monitoring of the local water courses will also be completed to test for Total Suspended Solids (TSS) and hydrocarbon concentrations. The necessity will be determined by the Ecological Clerk of Work.	During period determined by site management	As required	ECoW
MX13	ElAR Ch3 Appendix 7c	Monitoring of any morphological adjustment and bed sediment characteristics will be carried out in the vicinity of the river flow control structure to ensure that any changes are recorded and any potential effects are identified. Monitoring	To be determined by the Project	As required	Project Ecologist

Ref. No.	Reference	Survey/Monitoring Measure	Frequency	Reporting Measures	Responsibility
		will be carried out annually at a minimum and more frequently if required depending on hydrodynamic conditions	Ecologist		
MX14	ELAR Ch8	Monitoring of noise and vibration during critical periods at sensitive locations and along the river bed will be carried out as set out in Chapter 8, Section 8.5. Vibration levels will be limited to the levels set out in NRA, 2004	During period determined by site management	As required	ECoW
MX15	ELAR Ch4	If needed, environmental monitoring will occur at agreed locations for dust to confirm the effectiveness of the dust suppression measures adopted.	During period determined by site management	As required	ECoW
MX16	ELAR Ch7	As part of the Scheme (hydrogeological assessment), observation boreholes have been installed adjacent to the channel route and also near the springs with sensors to continuously monitor groundwater conductivity and stage in order to determine the local hydrogeology of the subsols and bedrock. Data collection will continue during and subsequent to channel construction, with installation of new standpipes as required to replace standpipes disturbed of removed in the course of constructing the scheme.	During period determined by site management	As required	ECoW
MX17	ELAR Ch8	<p>The following survey methodology will be employed for attended noise monitoring:</p> <ul style="list-style-type: none"> • measure LAeq, LA_{Max}, LA_{Min}, LA₁₀ and LA₉₀ over a sample period of 15 minutes; • detailed notes will be taken in relation to primary noise sources, weather and prevailing winds; • measurements will be conducted at various locations on a cyclical basis over the course of a typical day. 	During period determined by site management	As required	ECoW
		Noise monitoring will be conducted in accordance with <i>ISO 1996: 2007: Acoustics – Description, measurement and assessment of environmental noise</i> .			
MX18	ELAR Ch8	<p>The following survey methodology will be employed for attended vibration monitoring or test pile measurements:</p> <ul style="list-style-type: none"> • measure the maximum ppv at each location over a sample period of 15 minutes; 	During period determined by site management	As required	ECoW

Ref. No.	Reference	Survey/Monitoring Measure	Frequency	Reporting Measures	Responsibility
MX19	EIAR Ch10	<ul style="list-style-type: none"> detailed notes will be taken in relation to primary vibration sources; measurements will be conducted at the locations on a cyclical basis over the course of a typical day (attended vibration monitoring only). <p>Vibration monitoring will be conducted in accordance with either BS 7385-1 (1990) <i>Evaluation and measurement for vibration in buildings — Part 1: Guide for measurement of vibrations and evaluation of their effects on buildings</i> or as appropriate.</p> <p>It is proposed to carry out works within the channel of the River Deel at the location of the River flow control system (RFCS). Works in this area will be subject to archaeological monitoring.</p>	During period determined by site management	As required	Project Archaeologist
Operational Phase					
MX20	EIAR Ch6	A monitoring programme will include for an annual hydro geomorphological review and comparative assessment made	To be determined by the Project Ecologist	As required	Project Ecologist
MX21	EIAR Ch3	Monitoring of morphological adjustment and bed sediment characteristics Gravel tagging will be carried out to inform the frequency of routine maintenance but is not proposed as a means of determining the effectiveness of the mitigation implemented	To be determined by the Project Ecologist	As required	Project Ecologist
MX22	EIAR Ch7	Data from hydrometric gauges installed in connection with the Scheme will be monitored and the hydraulic model will be periodically recalibrated following high flow events to inform if any adjustments are required to the adjustable steel plates on the river flow control structure and along the intake weir.	During period determined by site management	As required	ECoW

Table 6.1 Monitoring Proposals

8 PROGRAMME OF WORKS

8.1 CONSTRUCTION SCHEDULE

The construction works will last approximately 48 months and will be carried out in the stages detailed below and shown in the Construction Sequence drawings (Appendix 3B). Site clearance and fencing of works areas will be carried out on a phased basis, and in consideration of seasonal restrictions, as work proceeds in each works area.

1. The preliminary construction sequence for Stage 1 is shown in Construction Sequence Drawing: Stage 1 (Appendix 3B). Stage 1 is anticipated to take approximately 6 months. Works include:
 - Temporary site compound set up.
 - Realignment of the lake road and access roads will be constructed in conjunction with excavation of an area of the diversion channel upstream of R315. Excavated material from this section of the diversion channel works will be used as fill in the road works where required.
2. The preliminary construction sequence for Stage 2 is shown in Construction Sequence Drawing: Stage 2 (Appendix 3B). Stage 2 is anticipated to take approximately 9 months. Works include:
 - Construction of the R315 bridge.
 - Diversion channel works downstream of the proposed energy dissipation structure.
3. The preliminary construction sequence for Stage 3 is shown in Construction Sequence Drawing: Stage 3 (Appendix 3B). Stage 3 is anticipated to take approximately 6 months. Works include:
 - Construction of the energy dissipation structure
 - Diversion channel works from energy dissipation structure to the R315 bridge.
4. The preliminary construction sequence for Stage 4 is shown in Construction Sequence Drawing: Stage 4 (Appendix 3B). Stage 4 is anticipated to take approximately 9 months. Works include:
 - Temporary site compound set up.
 - Construction of the L1105 bridge and raising and regrading of the existing road approaching the bridge.
 - Channel works from the R315 bridge to the high point downstream of the L1105 bridge (Point D on drawing).
5. The preliminary construction sequence for Stage 5 is shown in Construction Sequence Drawing: Stage 5 (Appendix 3B). Stage 5 is anticipated to take approximately 12 - 14 months. Works include:
 - Construction of the intake structure and spillway

- Construction of the final section of the diversion channel between the high point downstream of the L1105 bridge and the intake structure.
6. The timing for construction of the river flow control structure is dependent on periods when the river runs dry or there is low flow in the river and outside of the sensitive period for spawning lamprey and fish in the River Deel. As such, it may be beneficial to construct the structure in two phases (i) construct the base for the river flow control structure at the earliest suitable opportunity when there no flow in the river Deel and (ii) install the culverts and complete the structure after the diversion channel construction has been completed. This two phased approach has been shown in Construction Sequence Drawings: Stage 1 and Stage 6. The construction of the River Flow Control Structure is anticipated to take approximately 6 months.

The construction works have been sequenced so as to adhere to the following programme constraints:

- Works will be sequenced, and temporary works areas selected to avoid potential for inundation of the works area by flood water in so far as is practicable during construction stage.
- Works will be sequenced so as to avoid unnecessary interruption to local landowners and road users insofar as is practicable.
- The realigned Lake Road will be constructed in advance of constructing the bridges or the diversion channel. Construction of the diversion channel will commence from the downstream (Lough Conn) end.
- Construction of the river flow control structure and intake structure will be timed to coincide with no / low flows in the River Deel insofar as is possible.
- Instream works (including preparatory work) will only be undertaken when the river is dry and outside of the sensitive period for spawning lamprey and salmonid fish in the River Deel from July to September (inclusive) and in consultation with Inland Fisheries Ireland to avoid accidental damage or siltation of spawning beds.
- To avoid impacting on bird nesting sites, the vegetation removal within the defined working area will not be carried out during the peak bird nesting season of March to August (inclusive) prior to the onset of works.

9 COMPLAINTS AND REVIEW

9.1 SITE INSPECTIONS AND ENVIRONMENTAL AUDITS

Routine inspections of construction activities will be carried out on a daily and weekly basis by the ECoW and the Site Supervisor/Construction Manager to ensure all controls to prevent environmental impacts, relevant to the construction activities taking place at the time, are in place.

Environmental inspections will ensure that the works are undertaken in compliance with this OCEMP and all relevant documents. Only suitably trained staff will undertake environmental site inspections.

9.2 AUDITING

An Environmental audit will first be carried out prior to the construction phase of the development to ensure the implementation of pre-construction mitigation measures, completion of baseline studies and implementation of pre-construction felling mitigation measures. Further environmental audits will be carried on a monthly basis during the construction phase of the project and again once operational.

In contrast to monitoring and inspection activities, audits are designed to shed light on the underlying causes of non-compliance, and not merely detect the non-compliance itself. In addition, audits are the main means by which system and performance improvement opportunities may be identified. Environmental audits will be carried out by the ECoW on behalf of the appointed contractor. It is important that an impartial and objective approach is adopted. Environmental audits will be conducted at planned intervals to determine whether the OCEMP is being properly implemented and maintained. The results of environmental audits will be provided to project management personnel.

An audit of compliance with the pre-commencement mitigation measures will be completed by the ECoW prior to the commencement of the construction phase of the development. An audit of compliance with the construction phase mitigation measures will be completed monthly during the construction phase. The findings of each audit will be documented by the ECoW in an audit report within the EMP for the site. The audit report will be made available to Mayo County Council and other statutory bodies on request.

Once the scheme is operational and has been commissioned, a report of compliance with operational phase mitigation measures will be prepared.

9.3 ENVIRONMENTAL COMPLIANCE

The following definitions shall apply in relation to the classification of Environmental Occurrences during construction:

Environmental Near Miss: An occurrence which if not controlled or due to its nature could lead to an Environmental Incident.

Environmental Incident: Any occurrence which has potential, due to its scale and nature, to migrate from source and have an environmental impact beyond the site boundary.

Environmental Exceedance Event: An environmental exceedance event occurs when monitoring results indicate that limits for a particular environmental parameter (as indicated in the Environmental Monitoring Programme) has been exceeded.

An exceedance will immediately trigger an investigation into the reason for the exceedance occurring and the application of suitable mitigation where necessary.

Exceedance events can be closed out on achieving a monitoring result below the assigned limit for a particular environmental parameter.

Environmental Non-Compliance: Non-fulfilment of a requirement and includes any deviations from established procedures, programs and other arrangements related to the EMP.

9.4 CORRECTIVE ACTION PROCEDURE

A corrective action is implemented to rectify an environmental problem on-site. Corrective actions will be implemented by the Site Supervisor/Construction Manager, as advised by the Site Environmental Clerk of Works. Corrective actions may be required as a result of the following;

- Environmental Audits;
- Environmental Inspections and Reviews;
- Environmental Monitoring;
- Environmental Incidents; and,
- Environmental Complaints.

A Corrective Action Notice will be used to communicate the details of the action required to the main contractor. A Corrective Action Notice is a form that describes the cause and effect of an environmental problem on site and the recommended corrective action that is required. The Corrective Action Notice, when completed, will include details of close out and follow up actions.

If an environmental problem occurs on site that requires immediate attention direct communications between the Site supervisor/Construction Manager and the ECoW will be conducted. This in turn will be passed down to the site staff involved. A Corrective Action Notice will be completed at a later date.

9.5 ENVIRONMENTAL COMPLIANCE

This OCEMP will be updated to adapt to site conditions during the construction phase of the project as required and also every six months thereafter.